



Guide for the Selection of Chemical Detection Equipment for Emergency First Responders

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Guide 100–06

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We also sincerely thank all vendors who provided us with information about their products.

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FOREWORD:

The U.S. Department of Homeland Security, Office of the Secretary, Preparedness Directorate Office of Grants and Training (G&T) Systems Support Division (SSD) develops and implements preparedness and prevention programs to enhance the capability of Federal, State and local governments, and the private sector to prevent, deter and respond to terrorist incidents involving chemical, biological, radiological, nuclear, and explosive (CBRNE) devices. The Preparedness Directorate Office of G&T administers comprehensive programs of direct and grant support for training, exercises, equipment acquisition, technology transfer, and technical assistance to enhance the nation's preparedness for CBRNE acts of terrorism. The Preparedness Directorate Office of G&T SSD works closely with other ODP divisions and Homeland Security professionals gaining an intimate understanding of the emergency responder technology needs and shortfalls. In addition, SSD conducts commercial technology assessments and demonstrations, and transfers equipment directly to the emergency responders. As part of the Congressional FY-03 funding, SSD was tasked with developing CBRNE technology guides and standards for the emergency responder community. This is one of several guides that will aid emergency responders in the selection of CBRNE technology.

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Commonly Used Symbols and Abbreviations

A	ampere	hf	high frequency	N	newton
ac	alternating current	Hz	hertz	o.d.	outside diameter
AM	amplitude modulation	i.d.	inside diameter	Ω	ohm
cd	candela	in	inch	p.	page
cm	centimeter	IR	infrared	Pa	pascal
CP	chemically pure	J	joule	pe	probable error
c/s	cycle per second	L	lambert	pp.	pages
d	day	L	liter	ppb	parts per billion
dB	decibel	lb	pound	ppm	parts per million
dc	direct current	lbf	pound-force	qt	quart
°C	degree Celsius	lbf·in	pound-force inch	rad	radian
°F	degree Fahrenheit	lm	lumen	rf	radio frequency
dia	diameter	ln	logarithm (base e)	rh	relative humidity
emf	electromotive force	log	logarithm (base 10)	s	second
eq	equation	M	molar	SD	standard deviation
F	farad	m	meter	sec.	Section
fc	footcandle	μ	micron	SWR	standing wave ratio
fig.	Figure	min	minute	uhf	ultrahigh frequency
FM	frequency modulation	mm	millimeter	UV	ultraviolet
ft	foot	mph	miles per hour	V	volt
ft/s	foot per second	m/s	meter per second	vhf	very high frequency
g	acceleration	mo	month	W	watt
g	gram	N·m	newton meter	λ	wavelength
gal	gallon	nm	nanometer	wk	week
gr	grain	No.	number	wt	weight
H	henry	oz	ounce	yr	year
h	hour				

area=unit² (e.g., ft², in², etc.); volume=unit³ (e.g., ft³, m³, etc.)

PREFIXES (See ASTM E380)

d	deci (10 ⁻¹)	da	deka (10)
c	centi (10 ⁻²)	h	hecto (10 ²)
m	milli (10 ⁻³)	k	kilo (10 ³)
μ	micro (10 ⁻⁶)	M	mega (10 ⁶)
n	nano (10 ⁻⁹)	G	giga (10 ⁹)
p	pico (10 ⁻¹²)	T	tera (10 ¹²)

Temperature: T_{°C} = (T_{°F} - 32) × 5/9

COMMON CONVERSIONS

0.30480 m = 1ft	4.448222 N = lbf
2.54 cm = 1 in	1.355818 J = 1 ft·lbf
0.4535924 kg = 1 lb	0.1129848 N m = lbf·in
0.06479891g = 1gr	14.59390 N/m = 1 lbf/ft
0.9463529 L = 1 qt	6894.757 Pa = 1 lbf/in ²
3600000 J = 1 kW·hr	1.609344 km/h = mph

Temperature: T_{°F} = (T_{°C} × 9/5) + 32

ACRONYMS SPECIFIC TO THIS DOCUMENT

BZ	3-quinuclidinyl benzilate (QNB)	LOD	level of detection
CA	chemical agent	LSD	Lysergic acid diethylamide
CE	Capillary Electrophoresis	MS	Mass Spectrometry
CZE	Capillary Zone Electrophoresis	NBC	Nuclear, Biological, Chemical
DMCS	Data Management and Control Software	NFPA	National Fire Protection Association
DMMP	dimethylmethylphosphonate	PID	Photoionization Detection
DIMP	diisopropylmethylphosphonate	rt	retention time
FID	Flame Ionization Detector	SAW	Surface Acoustic Wave
FPD	Flame Photometric Detector	SF	selection factor
FTIR	Fourier Transform Infrared	SCBA	Self Contained Breathing Apparatus
GC	Gas Chromatography	SME	Subject Matter Expert
HPLC	High-Performance Liquid Chromatography	TICs	toxic industrial chemicals
IC	Ion Chromatography	TIMs	toxic industrial materials
IDLH	Immediately Dangerous to Life and Health	TWA	time weighted average
IMS	Ion Mobility Spectrometry	UV-VIS	Ultraviolet-Visibility
LCt ₅₀	(Lethal Concentration x Time) ₅₀		

ABOUT THIS GUIDE

The Preparedness Directorate's Office of Grants and Training (G&T) Systems Support Division (SSD) of the U.S. Department of Homeland Security (DHS) is the focal point for providing support to State and local law enforcement agencies in the development of counterterrorism technology and standards, including technology needs for CBRNE defense. In recognizing the needs of State and local emergency first responders, the Office of Law Enforcement Standards (OLES) at the National Institute of Standards and Technology (NIST), supported by the U.S. Department of Homeland Security (DHS), the Technical Support Working Group (TSWG), the U.S. Army Edgewood Chemical and Biological Center (ECBC), the National Fire Protection Association (NFPA), the National Institute of Occupational Safety and Health (NIOSH), and the Interagency Board for Equipment Standardization and Interoperability (IAB), has developed CBRNE defense equipment guides. The guides focus on CBRNE equipment in areas of detection, personal protection, decontamination, and communication. This document is an update of the *Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders* (DHS Guide 100-04) published in March 2005 and developed to assist the emergency first responder community in the evaluation and purchase of chemical detection equipment.

The long-range plans continue to include two goals: (1) subject existing chemical detection equipment to laboratory testing and evaluation against a specified protocol, and (2) conduct research leading to the development of a series of documents, including national standards, user guides, and technical reports. It is anticipated that the testing, evaluation, and research processes will take several years to complete; therefore, DHS will continue to maintain this guide for the emergency first responder community in order to facilitate their evaluation and purchase of chemical detection equipment.

In conjunction with this program, the additional published guides and other documents, including biological agent detection equipment, explosives detection and blast mitigation equipment, portable radiological detection equipment, decontamination equipment, personal protective equipment, and communications equipment used in conjunction with protective clothing and respiratory equipment, will be periodically updated.

The information contained in this guide has been obtained through literature searches and market surveys. The vendors were contacted multiple times during the preparation of this guide to ensure data accuracy. In addition, the information is supplemented with test data obtained from other sources (e.g., Department of Defense) if available. It should also be noted that the purpose of this guide is not to provide recommendations but rather to serve as a means to provide information to the reader to compare and contrast commercially available detection equipment.

Technical comments, suggestions, and product updates are encouraged from interested parties. They may be addressed to the Office of Law Enforcement Standards, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8102, Gaithersburg, MD 20899-8102. It is anticipated that this guide will continue to be updated periodically.

Questions relating to the specific devices included in this document should be addressed directly to the proponent agencies or the equipment manufacturers. Contact information for each equipment item can be found in the equipment data sheets.

GUIDE FOR THE SELECTION OF CHEMICAL DETECTION EQUIPMENT FOR EMERGENCY FIRST RESPONDERS

This third edition guide includes information intended to be useful to the emergency first responder community in the selection of chemical agent (CA) and toxic industrial chemical/toxic industrial material (TIC/TIM) detection techniques and equipment for different applications. It includes an updated market survey of chemical detection technologies and commercially available detectors known to the authors as of December 2006. Brief technical discussions are presented that consider the principles of operation of the various technologies. These may be ignored by readers who find them too technical, while those wanting additional technical information can obtain it from the extensive list of references that is included in appendix A and the equipment data sheets provided in the corresponding data sheets in the appendices.

1. INTRODUCTION

The primary purpose of the *Guide for the Selection of Chemical Detection Equipment for Emergency First Responders* is to provide emergency first responders with information to aid them in the selection and utilization of CA and TIC/TIM detection equipment. The guide is intended to be more practical than technical and provides information on a variety of factors that should be considered when purchasing and using detection equipment, including sensitivity, detection states, and portability to name a few. For the remainder of this guide, CA and TIC/TIM detection equipment will be referred to as chemical detection equipment.

This guide is divided into six sections. Section 1 is the introduction. Section 2 provides an introduction to CAs and TIMs/TIMs. Specifically, it discusses nerve and blister agents by providing overviews, physical and chemical properties, routes of entry, and symptoms. It also discusses the 98 TICs that are considered in this guide. Section 3 presents an overview of the chemical detection technologies. For each technology, a short description is provided along with photographs of specific equipment that falls within the technology discussed. Section 4 discusses the market survey that was conducted to identify the commercially available chemical detection equipment items. Section 5 discusses various characteristics and performance parameters used to evaluate the chemical detection equipment in this guide. These characteristics and performance parameters are referred to as selection factors. Sixteen selection factors have been identified. These factors were compiled by a panel of experienced scientists and engineers with multiple years of experience in chemical detection and analysis, domestic preparedness, and identification of emergency first responder needs. The factors have also been shared with the emergency first responder community in order to obtain their thoughts and comments. Section 6 presents several tables that allow the reader to compare and contrast the different detection equipment utilizing the 16 selection factors.

Five appendices are included within this guide. Appendix A lists the documents that were used in developing this guide. Appendix B provides the 40 data fields that were identified for providing information relating to the equipment. The chemical detector data sheets, along with an index identifying each of the chemical detectors, are included in appendix C. Appendix D provides the Immediately Dangerous to Life and Health (IDLH) values for the CAs and most of

the TICs that are listed. Appendix E lists the vendor changes and updates to the chemical detectors that are included in appendix C.

2. INTRODUCTION TO CHEMICAL AGENTS AND TOXIC INDUSTRIAL CHEMICALS/TOXIC INDUSTRIAL MATERIALS

The purpose of this section is to provide a description of CAs and TICs/TIMs. Section 2.1 provides the discussion of CAs and sec. 2.2 provides the discussion of TICs/TIMs.

2.1 Chemical Agents

Chemical agents are chemical substances that are intended for use in warfare or terrorist activities to kill, seriously injure, or seriously incapacitate people through their physiological effects. A CA attacks the organs of the human body in such a way that it prevents those organs from functioning normally. The results are usually disabling or even fatal. Chemical agents are specifically identified in the Chemical Weapons Convention (CWC) list to separate them from TICs/TIMs.

Chemical agents, when referred to in this guide, indicate nerve and blister agents only. The most common CAs are the nerve agents, GA (tabun), GB (sarin), GD (soman), GF (cyclosarin), and VX; and the blister agents, H and HD (sulfur mustard), HN (nitrogen mustard), and the arsenical vesicant L (lewisite). Other toxic chemicals such as hydrogen cyanide (characterized as a chemical blood agent by the military) or phosgene (characterized as a choking agent) are included as TIMs under section 2.2 of this guide.

2.1.1 Nerve Agents

This section provides an overview of nerve agents. A discussion of their physical and chemical properties, their routes of entry, and descriptions of symptoms is also provided.

2.1.1.1 Overview

Among lethal CAs, blister agents dominated World War I and the nerve agents have had an entirely dominant role since World War II. Nerve agents acquired their name because they affect the transmission of impulses in the nervous system. All nerve agents belong to the chemical group of organo-phosphorus compounds; many common herbicides and pesticides also belong to this chemical group. Nerve agents are stable, easily dispersed, highly toxic, and have rapid effects when absorbed both through the skin and the respiratory system. Nerve agents can be manufactured by means of fairly simple chemical techniques. The raw materials are inexpensive but some are subject to the controls of the Chemical Weapons Convention and the Australia Group Agreement. The nerve agents considered in this guide include the following:

- GB: A volatile nonpersistent CA that is mainly taken up through inhalation as a gas or aerosol.
- GA: A low volatility persistent CA that is taken up through skin contact and inhalation as a gas or an aerosol.
- GD: A moderately volatile CA that can be taken up by skin contact or through inhalation as a gas or aerosol.

- GF: A low volatility persistent CA that is taken up through skin contact and inhalation of the substance as a gas or aerosol.
- VX: A low volatility persistent CA that can remain on material, equipment, and terrain for long periods. Uptake is mainly through the skin but also through inhalation of the substance as a gas or aerosol.

The term volatility refers to a substance's ability to become a vapor at relatively low temperatures.

2.1.1.2 Physical and Chemical Properties

Nerve agents in the pure state are colorless liquids; however, VX may have a slight yellow color. The volatilities of nerve agents vary widely. A highly volatile (nonpersistent) substance poses a greater respiratory hazard than a less volatile (persistent) substance. The consistency of VX may be likened to motor oil and is therefore classified as belonging to the group of persistent CAs. Its effect is mainly through direct contact with the skin. Sarin is at the opposite extreme; being a highly volatile liquid (comparable with, for example, water), it is mainly taken up through the respiratory organs. The volatilities of GD, GA, and GF are between those of GB and VX. Table 2–1 lists the common nerve agents and some of their properties. Water is included in the table as a reference point for the nerve agents.

Table 2–1. Physical properties of common nerve agents

Property	GB	GA	GD	GF	VX	Water
Molecular weight	140.1	162.3	182.2	180.2	267.4	18
Density, g/cm ³ *	1.089	1.073	1.022	1.120	1.008	1
Boiling point, °F	316	464	388	462	568	212
Melting point, °F	-69	18	-44	-22	< -60	32
Vapor pressure, mm Hg *	2.9	0.07	0.4	0.06	0.0007	23.756
Volatility, mg/m ³ *	22 000	610	3 900	600	10.5	23 010
Solubility in water, % *	Miscible with water	10	2	~2	Slightly	NA

* at 77 °F

NA: not applicable

2.1.1.3 Route of Entry

Nerve agents, either as a gas, aerosol, or liquid, enter the body through inhalation or through the skin. Poisoning may also occur through consumption of liquids or foods contaminated with nerve agents.

The route of entry also influences the symptoms developed and, to some extent, the sequence of symptom onset. Generally, the poisoning works fastest when the agent is absorbed through the respiratory system rather than other routes. Because the lungs contain numerous blood vessels, the inhaled nerve agent can quickly diffuse into the blood circulation to reach the target organs. If a person is exposed to a high concentration of nerve agent (e.g., 200 mg sarin/m³), death may occur within a couple of minutes.

The poisoning works slower when the agent is absorbed through the skin. Because nerve agents are somewhat fat-soluble, they can easily penetrate the outer layers of the skin, but it takes longer for the poison to reach the deeper blood vessels. Consequently, the first symptoms do not occur until 20 min to 30 min after the initial exposure but subsequently, the poisoning process may be rapid if the total dose of nerve agent is high.

2.1.1.4 Symptoms

When exposed to a low dose of nerve agent sufficient to cause minor poisoning, the victim experiences characteristic symptoms such as increased production of saliva, a runny nose, and a feeling of pressure on the chest. The pupil of the eye becomes contracted (miosis), which impairs night vision. In addition, the capacity of the eye to change focal length is reduced and short-range vision deteriorates, causing the victim to feel pain when trying to focus on nearby objects. This is accompanied by headache. Less specific symptoms are fatigue, slurred speech, hallucinations, and nausea.

Exposure to a moderate dose leads to more dramatic developments and more pronounced symptoms. Bronchoconstriction and secretion of mucus in the respiratory system leads to difficulty in breathing and to coughing. Discomfort in the gastrointestinal tract may develop into cramping and vomiting, and there may be involuntary defecation and discharge of urine. There may be excessive salivating, tearing, and sweating. If the poisoning is moderate, typical symptoms affecting the skeletal muscles may be muscular weakness, local tremors, or convulsions.

When exposed to a high dose of nerve agent, the muscular symptoms are more pronounced, and the victim may suffer convulsions and lose consciousness. The poisoning process may be so rapid that symptoms mentioned earlier may never have time to develop.

Nerve agents affect the respiratory muscles and cause muscular paralysis. Nerve agents also affect the respiratory center of the central nervous system. The combination of these two effects is the direct cause of death. Consequently, death caused by nerve agents is similar to death by suffocation.

2.1.2 Blister Agents (Vesicants)

Blister agents, also known as vesicants, are chemicals that cause severe skin, eye, and mucosal pain and irritation. They are so named because of their ability to cause vesicular skin lesions. This section provides an overview of blister agents, including a discussion of their physical and chemical properties, their routes of entry, and descriptions of their symptoms. Given the similarity of their physiological effects, the traditional blister agents and the arsenical vesicants are discussed together in this section.

2.1.2.1 Overview

There are two major families of blister agents: mustard agents [nitrogen mustards (HN-1, HN-2, and HN-3), sulfur mustards (H, HD, and HT), and mustard-lewisite (HL)], and the arsenical vesicant lewisite (L). All blister agents are persistent and may be employed in the form of

colorless gases and liquids. They burn and blister the skin or any other part of the body they contact. Blister agents are likely to be used to produce casualties rather than fatalities, although exposure to such agents can be fatal. Supportive care for blister agent casualties is often manpower and logistically intensive.

2.1.2.2 Physical and Chemical Properties

Mustard agents are oily liquids ranging from colorless (in pure state) to pale yellow to dark brown, depending on the type and purity. They have a faint odor of mustard, onion, garlic, or horseradish, but because of olfactory fatigue, odor cannot be relied on for detection.⁴ In addition, mustard agent can cause injury to the respiratory system in such low concentrations that the human sense of smell cannot distinguish them.

At room temperature, mustard agent is a liquid with low volatility and is very stable during storage. Mustard agent can be easily dissolved in most organic solvents but has negligible solubility in water. In aqueous solutions, mustard agent decomposes into nonpoisonous products by means of hydrolysis but, since only dissolved mustard agent reacts, the decomposition proceeds very slowly. Oxidants such as chloramine, however, react rapidly with mustard agent, forming nonpoisonous oxidation products. Consequently, these substances are used for the decontamination of mustard agent.

Organic arsenical vesicants are not as common or as stable as the sulfur or nitrogen mustards. All arsenical vesicants are colorless to brown liquids. They are more volatile than mustard and have fruity to geranium-like odors. These types of vesicants are much more dangerous as liquids than as vapors. Absorption of either vapor or liquid through the skin in adequate dosage may lead to systemic intoxication or death. The physical properties of the most common blister agents are listed in table 2–2. Water is included in the table as a reference point for the blister agents.

Table 2–2. Physical properties of common blister agents

Property	HD	HN-1	HN-2	HN-3	L	Water
Molecular weight	159.1	170.1	156.1	204.5	207.4	18
Density, g/cm ³	1.27 at 68 °F	1.09 at 77 °F	1.15 at 68 °F	1.24 at 77 °F	1.89 at 68 °F	1 at 77 °F
Boiling point, °F	421	381	167 at 15 mm Hg	493	374	212
Freezing point, °F	58	-61.2	-85	-26.7	64.4 to 32.18	32
Vapor pressure, mm Hg	0.072 at 68 °F	0.24 at 77 °F	0.29 at 68 °F	0.0109 at 77 °F	0.394 at 68 °F	23.756 at 77 °F
Volatility, mg/m ³	610 at 68 °F	1520 at 68 °F	3580 at 77 °F	121 at 77 °F	4480 at 68 °F	23,010 at 77 °F
Solubility in water, %	<1 %	Sparingly	Sparingly	Insoluble	Insoluble	NA

NA: not applicable

⁴ <http://www.emedicine.com/emerg/topic901.htm>

2.1.2.3 Route of Entry

Most blister agents are relatively persistent and are readily absorbed by all parts of the body. Poisoning may also occur through consumption of liquids or foods contaminated with blister agents. These agents cause inflammation, blisters, and general destruction of tissues. In the form of gas or liquid, mustard agent attacks the skin, eyes, lungs, and gastrointestinal tract. Internal organs, mainly blood-generating organs, may also be injured as a result of mustard agent being taken up through the skin or lungs and transported into the body. Since mustard agent gives no immediate symptoms upon contact, a delay of between 2 h and 24 h may occur before pain is felt and the victim becomes aware of what has happened. By then, cell damage has already occurred. The delayed effect is a characteristic of mustard agent.

2.1.2.4 Symptoms

In general, both liquid and vaporous vesicants can penetrate the skin. The latent period for the effects from mustard is usually several hours (the onset of symptoms from vapors is 4 h to 6 h and the onset of symptoms from skin exposure is 2 h to 48 h). There is no latent period for exposure to lewisite.

Mild symptoms of mustard agent poisoning may include aching eyes with excessive tearing, inflammation of the skin, irritation of the mucous membranes, hoarseness, coughing, and sneezing. Normally, these injuries do not require medical treatment.

Severe injuries that are incapacitating and require medical care may involve eye injuries with loss of sight, the formation of blisters on the skin, nausea, vomiting, and diarrhea together with severe difficulty in breathing. Severe damage to the eye may lead to the total loss of vision.

The most pronounced effects on inner organs are injury to the bone marrow, spleen, and lymphatic tissue. This may cause a drastic reduction in the number of white blood cells 5 d to 10 d after exposure, a condition very similar to that after exposure to radiation. This reduction of the immune defense will complicate the already large risk of infection in people with severe skin and lung injuries.

The most common cause of death as a result of mustard agent poisoning is complications after lung injury caused by inhalation of mustard agent. Most of the chronic and late effects from mustard agent poisoning are also caused by lung injuries.

2.2 Toxic Industrial Chemicals/Toxic Industrial Materials

This section provides a general overview of TICs/TIMs as well as a list of the specific TICs considered in this guide. Since the chemistry of TICs/TIMs is so varied, it is not feasible to discuss specific routes of entry and descriptions of symptoms. Several documents, including *2004 Emergency Response Guidebook (A Guidebook for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident)*, provide more detailed information about TICs/TIMs (see app. A).

TICs/TIMs are chemicals and materials other than CAs that have harmful effects on humans. TICs/TIMs are found in a variety of settings such as manufacturing facilities, maintenance areas, and general storage areas. While acute exposure to some of these chemicals may not be immediately dangerous, these compounds may have extremely serious effects on an individual's health after multiple low-level exposures.

2.2.1 General

A TIC is a *specific type* of industrial chemical, that is, one that has a LC₅₀ value (lethal concentration for 50 % of the population multiplied by exposure time) less than 100 000 mg-min/m³ in any mammalian species and is produced in quantities exceeding 30 tons per year at one production facility. Although they are not as lethal as the highly toxic nerve agents, their ability to make a significant impact on the populace is assumed to be more related to the amount of chemical a terrorist can employ on the target(s) and less related to their lethality. None of these compounds are as highly toxic as the nerve agents, but they are produced in very large quantities (multi-ton) and are readily available; therefore, they pose a far greater threat than CAs. For instance, sulfuric acid is not as lethal as the nerve agents, but it is easier to disseminate large quantities of sulfuric acid because of the large amounts that are manufactured and transported every day. It is assumed that a balance is struck between the lethality of a material and the amount of materials produced worldwide. TIMs include materials such as chemical, biological, and radioactive waste from industrial processes that can pose hazards to individuals.

Since TICs/TIMs are less lethal than the CAs, it is difficult to determine how to rank their potential for use by a terrorist. Physical and chemical properties for TICs such as ammonia, chlorine, cyanogen chloride, and hydrogen cyanide are presented in table 2–3. Water is included in the table as a reference point for the TICs. The physical and chemical properties for the remaining TICs identified in this guide can be found in *International Task Force 25: Hazard From Industrial Chemicals Final Report*, April 1998 (see app. B).

Table 2–3. Physical properties of toxic industrial materials

Property	Ammonia	Chlorine	Cyanogen Chloride	Hydrogen Cyanide	Water
Molecular weight	17.03	70.9	61.48	27.02	18
Density, g/cm ³	0.682 at 68 °F	3.214 at 77 °F	1.18 at 68 °F	0.990 at 68 °F	1 at 77 °F
Boiling point, °F	-28	-30	55	78	212
Freezing point, °F	-108	-150	20	8	32
Vapor pressure, mm Hg at 77 °F	7408	5643	1000	742	23.756
Volatility, mg/m ³	6 782 064 at 77 °F	21 508 124 at 77 °F	2 600 000 at 68 °F	1 080 000 at 77 °F	2010 at 77 °F
Solubility in water, %	89.9	1.5	Slightly	Highly soluble	NA

NA: not applicable

2.2.2 TIC Rankings

TICs are ranked into one of three categories that indicate their relative importance and assist in hazard assessment. Table 2–4 lists the TICs with respect to their Hazard Index Ranking (High, Medium, or Low Hazard).⁵ In addition, blood and choking agents are noted by single or double asterisks, respectively.

2.2.2.1 High Hazard

High Hazard indicates a widely produced, stored, or transported TIC that has high toxicity and is easily vaporized.

2.2.2.2 Medium Hazard

Medium Hazard indicates a TIC that may rank high in some categories but lower in others such as number of producers, physical state, or toxicity.

2.2.2.3 Low Hazard

Low Hazard indicates that this TIC is not likely to be a hazard unless specific operational factors indicate otherwise.

2.2.2.4 Blood Agents

A blood agent is a TIC, which typically includes the cyanide group, affecting bodily functions by preventing the normal utilization of oxygen by body tissues. The term “blood agent” is a misnomer, however, because these agents do not actually affect the blood in any way. Rather, they exert their toxic effect at the cellular level by interrupting the electron transport chain in the inner membranes of mitochondria.

2.2.2.5 Choking Agents

A choking agent (or pulmonary agent) is a TIC designed to impede a victim’s ability to breathe, resulting in suffocation. Choking agents were preferred in WWI but have lost much of their tactical destructive utility since the invention of nerve agents. Choking agents are lethal and are very easily obtained.

⁵ International Task Force 25: Hazard From Industrial Chemicals Final Report, April 1998.

Table 2–4. TICs listed by hazard index

High	Medium	Low
Ammonia**	Acetone cyanohydrin	Allyl isothiocyanate
Arsine*	Acrolein	Arsenic trichloride
Boron trichloride	Acrylonitrile	Bromine**
Boron trifluoride	Allyl alcohol	Bromine chloride
Carbon disulfide	Allylamine	Bromine pentafluoride
Chlorine**	Allyl chlorocarbonate	Bromine trifluoride
Diborane	Boron tribromide	Carbonyl fluoride
Ethylene oxide	Carbon monoxide*	Chlorine pentafluoride
Fluorine	Carbonyl sulfide	Chlorine trifluoride
Formaldehyde	Chloroacetone	Chloroacetaldehyde
Hydrogen bromide	Chloroacetonitrile	Chloroacetyl chloride
Hydrogen chloride**	Chlorosulfonic acid	Crotonaldehyde
Hydrogen cyanide*	Diketene	Cyanogen chloride*
Hydrogen fluoride	1,2-Dimethylhydrazine	Dimethyl sulfate
Hydrogen sulfide	Ethylene dibromide	Diphenylmethane-4,4'-diisocyanate
Nitric acid, fuming	Hydrogen selenide	Ethyl chloroformate
Phosgene**	Methanesulfonyl chloride	Ethyl chlorothioformate
Phosphorus trichloride	Methyl bromide**	Ethyl phosphonothioic dichloride
Sulfur dioxide	Methyl chloroformate	Ethyl phosphonic dichloride
Sulfuric acid	Methyl chlorosilane	Ethyleneimine
Tungsten hexafluoride	Methyl hydrazine	Hexachlorocyclopentadiene
	Methyl isocyanate**	Hydrogen iodide
	Methyl mercaptan	Iron pentacarbonyl
	Nitrogen dioxide	Isobutyl chloroformate
	Phosphine**	Isopropyl chloroformate
	Phosphorus oxychloride	Isopropyl isocyanate
	Phosphorus pentafluoride	n-Butyl chloroformate
	Selenium hexafluoride	n-Butyl isocyanate
	Silicon tetrafluoride	Nitric oxide
	Stibine	n-Propyl chloroformate
	Sulfur trioxide	Parathion
	Sulfuryl chloride	Perchloromethyl mercaptan
	Sulfuryl fluoride**	sec-Butyl chloroformate
	Tellurium hexafluoride	tert-Butyl isocyanate
	n-Octyl mercaptan	Tetraethyl lead
	Titanium tetrachloride	Tetraethyl pyrophosphate
	Trichloroacetyl chloride	Tetramethyl lead
	Trifluoroacetyl chloride	Toluene 2,4-diisocyanate
		Toluene 2,6-diisocyanate

* Blood agent

** Choking agent

3. OVERVIEW OF CHEMICAL DETECTION TECHNOLOGIES

The applicability of chemical detection equipment to potential user groups will be dependent upon the characteristics of the detection equipment, as well as the type of CA and TIC/TIM detected and the objective of the first responder unit. Numerous technologies are available for the detection of CA and TIC/TIM vapors; some technologies are available for detection and identification of liquid droplets of CAs on surfaces; and many laboratory-based technologies exist for detection of TICs/TIMs in water. The quality of analytical results from the various analyzers is dependent upon the ability to effectively sample the environment and get the sample to the analyzer.

Equipment designed for vapor detection will not be readily applicable for detection of low volatility liquid contamination on surfaces or contamination in water. In addition, vapor detection equipment could have difficulty in identifying a small amount of CA or TIC/TIM in a high background of nonhazardous environmental chemicals. For example, a chemical vapor detector may readily detect trace levels of CAs or TICs/TIMs in a rural setting such as a forest or an open field, but the same detector may not be capable of detecting the same level of CA or TIC/TIM in an urban setting such as a crowded subway station or busy city street. More urban environments typically contain many chemicals produced by everyday human activities (driving an automobile, deodorant/perfumes use, insecticide/herbicide application, etc.) that look like a CA or TIC/TIM to the detection equipment and may affect the reliability (number of false readings) of the instrument as well as its sensitivity. However, by testing the equipment prior to an emergency use, the operator can become familiar with the idiosyncrasies of the detection equipment when exposed to various environmental chemicals expected in operational areas. As technological advances continue to be made, more effective and accurate methods of detection that are less affected by environmental chemicals in operational areas will become commercially available at lower costs.

Chemical agents can be detected by several means that incorporate various technologies. The technologies discussed in this guide are grouped into three major categories: point detection, standoff detection, and analytical instruments. The technology needed for CA and TIC/TIM detection will be dependent on the CA or TIC/TIM used and the objective of the first responder unit.

3.1 Point Detection Technologies

Point detection technology is applicable in determining the presence of CA or TIC/TIM and can be used to map out contaminated areas if enough time is available. Point detectors can be used as warning devices to alert personnel to the presence of a toxic vapor cloud. In this scenario, the detector is placed up-wind of the first responder location. When the toxic chemical is carried towards this location, it first encounters the detector, thus sounding an alarm and allowing the first responders to don the necessary protective clothing. It should be noted that if the concentration of CA or TIC/TIM is high enough to be immediately life threatening, point detectors may not provide sufficient time to take protective measures.

Another use of a point detector would be to monitor the vapor contamination originating from a decontamination site. Point detectors can also be used during post-release triage to determine the contamination level of each person (i.e., highly contaminated personnel, lightly contaminated personnel, and uncontaminated personnel) with the idea that all contaminated people need rapid decontamination while noncontaminated people do not need to be decontaminated. This allows for conservation of decontamination resources and prevents wasted effort on noncontaminated personnel. The following point detection techniques were identified

- Ionization/Ion Mobility Spectrometry.
- Flame Photometry.
- Infrared Spectroscopy.
- Electrochemistry.
- Colorimetric.
- Surface Acoustic Wave.
- Photoionization Detection.
- Thermal and Electrical Conductivity.
- Flame Ionization.
- Polymer Composite Detection Materials.

3.1.1 Ionization/Ion Mobility Spectrometry

A detector using ionization/ion mobility spectrometry (IMS) technology is typically a stand-alone detector that samples the environment using an air pump. Contaminants in the sampled air are ionized by a radioactive source, and the resultant ions traverse the drift tube through an electric field toward an ion detector. The flight time, or the time it takes the ions to traverse the distance, is proportional to the size and shape of the ionized chemical species and is used for identification of the species. Analysis time ranges from several seconds to a few minutes.

Ionization of gaseous species can be achieved at atmospheric pressure. Using proton transfer reactions, charge transfer, dissociative charge transfer, or negative ion reactions such as ion transfer, nearly all chemical classes can be ionized. However, most IMS portable detectors use radioactive electron (beta ray) emitters to ionize the sample.

Because IMS requires a vapor or gas sample for analysis, liquid samples must first be volatilized. The gaseous sample is drawn into a reaction chamber by a pump where a radioactive source, generally ^{63}Ni (Nickel-63) or ^{241}Am (Americium-241), ionizes the molecules present in the sample. The ionized air sample, including any ionized CA, is then injected into a closed drift tube through a shutter that isolates the contents of the drift tube from the atmospheric air. The drift tube has an electrical charge gradient that draws the sample towards a receiving electrode at the end of the drift tube. Upon ion impact, an electrical charge is generated and recorded with respect to a travel time. The travel time is measured from the opening of the shutter to the signal appearance at the receiving electrode. The ions impact the electrode at different intervals providing a series of peaks and valleys in electrical charge that is usually graphed on Cartesian Coordinates. The Y-axis corresponds to the intensity of the charge received by impact of the various species that have respective travel times in the drift tube. This travel time in the drift tube and the strength of the charge gives a relative concentration of species in the sample. An

example of a handheld detector using IMS technology is the Advanced Portable Detector (APD) 2000, manufactured by Smiths Detection. This detector is shown in fig. 3–1.



Figure 3–1. Advanced Portable Detector (APD) 2000, Smiths Detection

The M8A1 Automatic Chemical Agent Alarm System is another example of an IMS technology CA detection and warning system. It incorporates the M43A1 detector to detect the presence of nerve agent vapors or inhalable aerosols. The M43A1 detector is an ionization product diffusion/ion mobility type detector. Air is continuously drawn through the internal sensor by a pump at a rate of approximately 1.2 L/min. Air and agent molecules are first drawn past a radioactive source (^{241}Am) and a small percentage are ionized by the radiation. The air and agent ions are then drawn through the baffle sections of the cell. The lighter air ions diffuse to the walls and are neutralized more quickly than the heavier agent ions that have more momentum and are able to pass through the baffled section. As a result, the collector senses a greater ion current when nerve agents are present compared to the current when only clean air is sampled. An electronic module monitors the current produced by the sensor and triggers the alarm when a critical threshold of current is reached.

Differential ion mobility spectrometry (DMS) is one more example of an IMS technology for detection and identification of analytes in a volatilized sample. DMS separates ions by measuring the difference between ion mobilities as they pass through applied electrical fields.

3.1.2 Flame Photometry

Flame photometry is based on burning ambient air with hydrogen gas. The flame decomposes any CAs or TIMs present in the air, and the characteristic radiation emitted by the particular excited molecular species during its transition to the ground state can be measured. Sulfur- and phosphorous-containing compounds introduced in a hydrogen-rich flame decompose, giving rise to excited S_2^* and HPO^* molecular species respectively, where * represents the excited atomic or molecular state. At the elevated flame temperature, the phosphorus and sulfur emit light of specific wavelengths. These chemiluminescent emissions are isolated by appropriate narrow band optical filters and converted into measurable electrical signals by a photomultiplier tube, which produces an analog signal related to the concentration of the phosphorus- and sulfur-containing compounds in the air. Since the classical nerve agents all contain phosphorus and sulfur and mustard contains sulfur, these agents are readily detected by flame photometry. Flame photometry is sensitive and allows ambient air to be sampled directly. However, it is also prone to false alarms from interferences that contain phosphorus and sulfur. The number of false positives due to interference can be minimized using algorithms. Using a flame photometric

detector (FPD) in cooperation with a gas chromatograph will further reduce the likelihood of false alarms. There are a number of gas chromatographs that use FPDs for detection purposes. Gas chromatographs are discussed in sec. 3.3.

An example of a handheld detector using this technology is the APACC Chemical Control Alarm Portable Apparatus, manufactured by Proengin SA. This detector is shown in fig. 3-2.



Figure 3-2. APACC Chemical Control Alarm Portable Apparatus, Proengin SA

3.1.3 Infrared Spectroscopy

Infrared (IR) spectroscopy is the measurement of the wavelength and intensity of the absorption of mid-infrared light by a sample. Mid-infrared light, bandwidth (2.5 μm to 50 μm) and frequency (4000 cm^{-1} to 200 cm^{-1}), is energetic enough to excite molecular vibrations to higher energy levels. The wavelengths of IR absorption bands are characteristic of specific types of chemical bonds and every molecule has a unique IR spectrum (fingerprint). Infrared spectroscopy finds its greatest utility for identification of organic and organometallic molecules. There are two IR spectroscopy technologies employed in point detectors: photoacoustic infrared spectroscopy (PIRS) and filter-based IR spectroscopy. These two technologies and specific detector examples are discussed in the remainder of this section.

3.1.3.1 Photoacoustic Infrared Spectroscopy

Photoacoustic infrared spectroscopy (PIRS) detectors use the photoacoustic effect to identify and detect CA vapors. Infrared radiation is pulsed into a sample that selectively absorbs specific IR wavelengths characteristic of target gases. When the gas absorbs IR radiation, its temperature rises, which causes the gas to expand and produces an acoustical wave that can be detected by microphones mounted inside the sample cell. Various filters are then used to selectively transmit specific IR wavelengths absorbed by the CA being monitored. Selectivity can be increased by sequentially exposing the sample to several wavelengths of light. Using multiple wavelengths to identify the unknown decreases the chance of contaminants that cause false positives and fewer interferences will be observed. Chemical agents are distinguished from interferences by the relative signal produced when several different wavelengths are sequentially transmitted to the sample.

When CA is present in the sample, an audible signal (at the frequency of modulation) is produced by the absorption of the modulated IR light. Quantitation is possible because the acoustical wave is directly proportional to the concentration of the gas inside the cell. Although photoacoustic detectors are sensitive to external vibration and humidity, as long as the detector is calibrated in each operating environment immediately prior to sampling, selectivity will be very high. One

mobile laboratory unit that utilizes photoacoustic IR spectroscopy technology is the Innova Type 1412 Multigas Monitor, from California Analytical Instruments, shown in fig. 3–3.



Figure 3–3. Innova Type 1412 Multigas Monitor, California Analytical Instruments

3.1.3.2 Filter-Based Infrared Spectrometry

Filter-based infrared spectrometry is based on a series of lenses and mirrors that directs a narrow bandpass IR beam in a preselected path through the sample. The amount of energy absorbed by the sample is measured and stored in memory. The same sample is examined at as many as four additional wavelengths. This multiwavelength, multicomponent data is analyzed by the microprocessor utilizing linear matrix algebra. Concentrations of each component, in each sample, at each station, are used for compiling time weighted average (TWA) reports and trend displays. The data management and control software (DMCS) retains data for further analysis and longer term storage and retrieval. Thermo Fisher Scientific produces a portable ambient air analyzer, the Miran SaphIRe Portable Ambient Air Analyzer that is shown in fig. 3–4.



Figure 3–4. Miran SaphIRe Portable Ambient Air Analyzer, Thermo Fisher Scientific

3.1.4 Electrochemistry

Electrochemical detectors monitor the resistance of a thin film that changes as the film absorbs chemicals from the air or monitors a change in the electric potential of an electrode when chemicals in solution or in air are absorbed. Although electrochemical detectors are selective, they are not as sensitive as technologies such as IMS and flame photometry. Hot and cold temperatures change the rates of reactions and shift the equilibrium point of the various reactions, which affects sensitivity and selectivity. Several of the fielded electrochemical detectors encounter problems when exposed to environmental extremes.

The inhibition of cholinesterase by nerve agents is an example of one type of reaction that can be detected by this technique. A solution containing a known amount of cholinesterase is exposed to an air sample that may contain nerve agent. If nerve agent is present, a percentage of the cholinesterase will be inhibited from reaction in the next step, that is, the addition of a solution containing a compound that will react with uninhibited cholinesterase to produce an electrochemically active product. The resulting cell potential is related to the concentration of uninhibited cholinesterase, which is related to the concentration of nerve agent present in the sampled air. Another type of electrochemical detector monitors the resistance of a thin film that increases as the film absorbs CA from the air. An example of a handheld detector using this technology is the ToxiRAE Plus Personal Gas Monitor manufactured by RAE Systems, Inc. (fig. 3-5).



Figure 3-5. ToxiRAE Plus Personal Gas Monitor, RAE Systems, Inc.

3.1.5 Colorimetric

Colorimetric chemistry is a wet chemistry technique formulated to indicate the presence of a CA by a chemical reaction that causes a color change when agents come in contact with certain solutions or substrates. The color change can be detected either visibly or with spectrophotometric devices. Detection tubes, papers, or tickets are common and can be used to detect nerve, blister, and blood agents. Detection paper is the least expensive and sophisticated technique for detection and can be used to quickly detect liquids and aerosols when defining a contaminated area, but it lacks specificity and can result in false-positive determinations with common chemicals such as antifreeze, brake fluid, or insect repellent. Normally, two dyes and one pH indicator are used, which are mixed with cellulose fibers in a paper without special coloring (unbleached). When a drop of chemical warfare agent is absorbed by the paper, it dissolves one of the pigments. Mustard agent dissolves a red dye and nerve agent a yellow. In addition, VX causes the indicator to turn blue that, together with the yellow, will become green/green-black.

Detector papers are generally used for testing suspect droplets or liquids on a surface. For gaseous or vaporous CAs, colorimetric tubes are available. The colorimetric tubes consist of a glass tube that has the reacting compound sealed inside. Upon use, the tips of the tubes are broken off and a pump is used to draw the sample across the reacting compound (through the tube). If a CA is present, a reaction resulting in a color change takes place in the tube. Colorimetric tubes are typically used for qualitative determinations, to verify the presence of a CA after an alarm is received from another monitor. They can also be used to test drinking water for contamination. Draeger Safety, Inc., manufactures a number of colorimetric tubes. A picture of the Draeger CDS Kit is shown in figure 3-6.



Figure 3–6. Draeger CDS Kit, Draeger Safety, Inc.

3.1.6 Surface Acoustic Wave

Surface acoustic wave (SAW) detectors consist of piezoelectric crystals coated with a film designed to absorb CAs from the air. The SAW sensors detect changes in the properties of acoustic waves as they travel at ultrasonic frequencies in the piezoelectric materials. Target gases are absorbed onto chemically selective surfaces, which cause a change in the resonant frequency of the piezoelectric crystal. The SAW detectors use two to six piezoelectric crystals that are coated with different polymeric films. Each polymeric film preferentially absorbs a particular class of volatile compound. For example, one polymeric film will be designed to preferentially absorb water, while other polymer films are designed to preferentially absorb different types of chemicals such as trichloroethylene, toluene, ethyl-benzene, or formaldehyde. The piezoelectric crystals detect the mass of the chemical vapors absorbed into the different, chemically selective polymeric coatings. The change in mass of the polymeric coatings causes the resonant frequency of the piezoelectric crystal to change. By monitoring the resonant frequency of the different piezoelectric crystals, a response pattern of the system for a particular vapor is generated. This response pattern is then stored in a microprocessor. When the system is operating, it constantly compares each new response pattern to the stored response pattern for the target vapor. When the response pattern for the target vapor matches the stored pattern, the system alarm is activated.

Arrays of these sensors are used to simultaneously identify and measure many different CAs. A preconcentration tube can be used to further increase detection sensitivity. These relatively inexpensive devices can be handheld and have several advantages, including rapid response (about 2 s), 100 % reversible recovery in 5 s to 100 s, parts per trillion (ppt) sensitivity in quantitative determinations, and a long lifetime (>1 yr) for the polymer coatings. The selectivity and sensitivity of these detectors depends on the ability of the film to absorb only the suspect CAs from the sample air. Operation is simple and involves very little training or expertise. Many SAW devices use preconcentration tubes to reduce environmental interferences and increase the detection sensitivity. A detector manufactured by Microsensor Systems, Inc., that is based upon the SAW technology is the SAW MiniCAD mkII (fig. 3–7).



Figure 3–7. SAW MiniCAD mkII, Microsensor Systems, Inc.

3.1.7 Photoionization Detection

Photoionization detection (PID) works by exposing a gas stream to an ultraviolet light of a wavelength with enough energy to ionize an agent molecule. If agents are present in the gas stream, they are ionized, and an ion detector then registers a voltage proportional to the number of ions produced in the gas sample, which is the concentration of the agent. Specificity of these detectors is a function of how narrow the spectral range of the exciting radiation is and on how unique that energy is to ionizing only the molecule of interest. RAE Systems, Inc., produces the MiniRAE 2000, a handheld detector that utilizes the PID technology, shown in fig. 3–8.



Figure 3–8. MiniRAE 2000, RAE Systems, Inc.

3.1.8 Thermal and Electrical Conductivity

Thermal and electrical conductivity detectors use metal oxide thermal semiconductors that measure the change in heat conductivity that occurs as a result of gas adsorption on the metal oxide surface. In addition, the change in resistance and electrical conductivity across a metal foil in the system is measured when a gas adsorbs onto the surface of the metal film. Contaminants in the atmosphere being measured will result in measurable electrical differences from the “clean” or background atmosphere. However, since different contaminants will have different thermal conductivities and, therefore, different electrical responses from the detector, this technology is relatively nonselective. An example of a handheld detector using this technology is the Portable Odor Monitor, manufactured by Sensidyne, Inc., (fig. 3–9).



Figure 3–9. Portable Odor Monitor, Sensidyne, Inc.

3.1.9 Flame Ionization

A flame ionization detector (FID) is a general-purpose detector used to determine the presence of volatile carbon-based compounds that are incinerated in a hydrogen-oxygen or hydrogen-air flame. When the carbonaceous compounds burn, ions are generated that cause an increase in the flame's baseline ion current at a collection electrode in proximity to the flame. The FIDs are not specific and require separation technology for specificity, such as a gas chromatograph. Identification of compounds is generally determined by comparison of the chromatographic retention time of a compound to that of a known standard, or to chromatographic retention indices for a series of known compounds using a standard set of chromatographic conditions. Thermo Fisher Scientific manufactures a unit, the TVA-1000B (FID or FID/PID) Toxic Vapor Analyzer for the specific determination of GA at 0.61 ppm (v) (above IDLH) and HD at 0.29 ppm (v) (no IDLH). The TVA-1000B is shown in fig. 3–10.



Figure 3–10. TVA-1000B (FID or FID/PID) Toxic Vapor Analyzer, Thermo Fisher Scientific

3.1.10 Polymer Composite Detection Materials

Polymer composite detection materials consist of individual thin-film carbon-black/polymer composite chemi-resistors configured into an array. The detection materials are deposited as thin films on an alumina substrate across two electrical leads, creating conducting chemi-resistors.

The output from the device is an array of resistance values measured between each of the two electrical leads for each of the detectors in the array. Nerve agent simulants, such as dimethylmethylphosphonate (DMMP) and diisopropylmethylphosphonate (DIMP), could be resolved from test analytes, including water, methanol, benzene, toluene, diesel fuel, lighter fluid, vinegar, and tetrahydrofuran, by using standard data analysis techniques to assess the collective output of the array. The Cyranose[®] 320, from Smiths Detection, pictured in fig. 3–11, is a polymer composite detection materials device.



Figure 3–11. Cyranose[®] 320, Smiths Detection

3.2 Standoff Detectors

Standoff detectors are used to give advance warning of a CA cloud. Standoff detectors typically use optical spectroscopy and can detect CAs at distances as great as 5 km. Agent-free spectra are used as a baseline to compare with freshly measured spectra that may contain CA. Standoff detectors are generally difficult to operate and usually require the operator to have some knowledge of spectroscopy in order to interpret results. Passive standoff detectors collect IR radiation emitted and/or measure IR radiation absorbed from the background to detect CA and TIM vapor clouds. The following standoff techniques were identified.

- Fourier Transform Infrared and Forward Looking Infrared.
- Ultraviolet Standoff.

3.2.1 Fourier Transform Infrared and Forward Looking Infrared

Fourier transform infrared (FTIR) and forward looking infrared (FLIR) spectrometers remotely monitor an area by either collecting IR radiation emitted or measuring IR radiation absorbed from the background to detect CA and TIM vapor clouds. In order to detect the various wavelengths emitted from the vapor clouds, FTIR spectroscopy uses an interferometer to process the IR radiation and FLIR spectroscopy uses a series of optical filters. Through the use of computer-based Fourier signal processing, rapid scan rates of wide ranges of wavelength and a spectrum with characteristic “fingerprint” peaks that can be used to identify the detected chemical can be generated. An example of a handheld detector using this technology is the HAWK Long Range

Chemical Detector, manufactured by Bruker Daltonics, Inc. (fig. 3–12). Another portable detector using this technology is the HazMatID from Smiths Detection, shown in fig. 3–13.



Figure 3–12. HAWK Long Range Chemical Detector, Bruker Daltonics, Inc.



Figure 3–13. HazMatID, Smiths Detection

3.2.2 Ultraviolet Standoff

Certain compounds have the ability to absorb ultraviolet (UV) light. Characteristic UV absorptions can be useful in identifying species or assisting in determining structure. Ultraviolet spectroscopy equipment, such as the Safeye 400 Gas Detection System, manufactured by Spectrex, Inc. (fig. 3–14), have several advantages, including direct fast response to changes in gas concentrations, capability of large area surveillance, good cost effectiveness, and ability to remain unaffected by environmental conditions such as heat, humidity, snow, or rain. Disadvantages of standoff detectors include the inability to indicate the precise concentration at a given point and dependence on an unobstructed line of sight between beam emitter and detector.

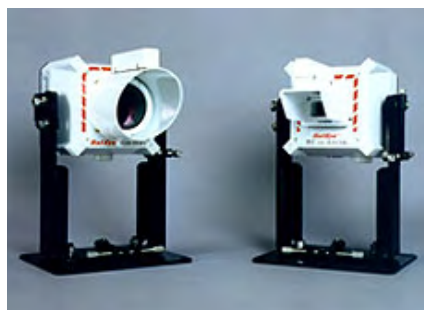


Figure 3–14. Safeye Model 400 Gas Detection System (UV), Spectrex, Inc.

3.3 Analytical Instruments

The analytical instruments described in this section can be used to analyze samples as small as a few microliters or milligrams. They are designed to differentiate between and accurately measure the unique chemical properties of different molecules. Accuracy and reliability requires that only very pure reagents be used, very rigid protocol and operating procedures be followed, and careful handling be employed to prevent contamination and malfunction. Since the instruments do not display the measured data in a straightforward manner, interpretation of the measured data generally requires a technical background and extensive formal training. This typically precludes their use outside of a laboratory environment, which is staffed by technically trained people.

However, some analytical instruments have been developed for field applications. The following analytical techniques were identified.

- Gas Chromatography.
- Mass Spectrometry.
- High-Performance Liquid Chromatography.
- Ion Chromatography.
- Capillary Zone Electrophoresis.
- Ultraviolet Spectrometry.

3.3.1 Gas Chromatography

In Gas Chromatography (GC) applications, an inert gas (mobile phase) is used to transport a volatile multicomponent sample through a long chromatographic column (packed or coated with stationary phase) in order to separate analytes in a mixture from interferences for subsequent detection. As the sample flows through the column, the various components of the sample partition between the mobile and stationary phases at different rates depending on their chemical identity or affinity for the stationary phase. The time spent (retention time) for each component of a mixture to flow through the column length will differ depending on the component's respective affinities, resulting in separation of the sample into discrete components. After exiting the column, the chemicals pass through a detector, such as a flame photometer or mass spectrometer, generating a signal proportional to the concentration. Since the retention time (rt) is characteristic of a specific compound, the rt can be used to identify components of the mixture by comparing with known rts, eliminating false alarms from similar compounds that have different rts. A preconcentrator specific to the analyte can also reduce false alarms caused by interferences. The preconcentrator passes air through an adsorbent filter that traps agent molecules. The filter is then isolated from the air, connected to the GC, and heated to release any CA that may have been trapped. Two instruments that use gas chromatography are the Voyager Portable Gas Chromatograph from Photovac, Inc., (fig. 3-15) and the CMS200, INFICON from (fig. 3-16).



Figure 3-15. Voyager Portable Gas Chromatograph, Photovac, Inc.



Figure 3-16. CMS200, INFICON

3.3.2 Mass Spectrometry

Mass spectrometry (MS) is a technique that can positively identify a CA at very low concentrations. In this technique, a volatilized sample is introduced into a vacuum chamber and ionized by an electron beam. This electron impact ionization generates a molecular ion of the compound and also causes the molecule to split into a number of fragment ions characteristic of the sample. The ionized molecules and fragments are mass analyzed by rapidly scanning a quadrupole mass filter across a wide mass range, resulting in a spectrum of intensity versus ion mass-to-charge ratio (equivalent to mass for the singly charged ions usually observed). The identity of the substances can then be determined by comparing the mass spectrum with library spectra and computer searching or by detailed interpretation of the ion masses and ratios. Since each molecule forms a unique set of fragments, mass spectroscopy provides positive and unambiguous identification of pure compounds. However, mixed samples may be problematic and complicate spectral interpretation. To simplify interpretation of the mass spectrum, it is often necessary to separate the components in the sample, such as in GC/MS, in which the gas chromatograph column exit is connected directly to the inlet of the mass spectrometer to permit MS analysis of mixtures separated by the GC. Two instruments that use mass spectrometry are the Hapsite[®] manufactured by INFICON and the Agilent 6890N-5975B GC/MSD from Agilent Technologies (fig. 3–17 and fig. 3–18, respectively).



Figure 3–17. Hapsite[®], INFICON



Figure 3–18. Agilent 6890N-5975B GC/MSD, Agilent Technologies

3.3.3 High-Performance Liquid Chromatography

High-performance liquid chromatography (HPLC) is most useful in the detection and identification of larger molecular weight CAs, or chemicals such as 3-quinuclidinyl benzilate [(QNB) BZ] or as lysergic acid diethylamide (LSD), and in the detection and identification of biological agents. With HPLC, compounds that do not easily volatilize can be analyzed without undergoing chemical derivatization. A solution of the sample is passed through a narrow bore column at high pressure, and species are separated based on their differential affinity for the stationary phase packing in the column. The time spent (retention time) for each component of a mixture to flow through the column length will differ depending on the component's respective affinities, resulting in separation of the sample into discrete components. As with GCs, HPLC instruments can be equipped with a variety of detectors such as ultraviolet-visible (UV-VIS) spectrometers, mass spectrometers, fluorescence spectrometers, and

electrochemical detectors. Limitations to the fielding of HPLCs and their detectors include the need for a 120 V ac source, the need for high purity solvents, and the size of the instruments. Currently there is no portable HPLC unit available. The HPLC instrumentation is available from a variety of vendors such as the Agilent 1200 Series LC from Agilent Technologies and the Shimadzu LC-20A HPLC System from Shimadzu Scientific Instruments. The instruments are shown in fig. 3–19 and fig. 3–20, respectively.



Figure 3–19. Agilent 1200 Series LC, Agilent Technologies



Figure 3–20. Shimadzu LC-20A HPLC System, Shimadzu Scientific Instruments

3.3.4 Ion Chromatography

A chromatographic technique closely related to HPLC is ion chromatography (IC). In this technique, ionic species can be separated, detected, and identified. Limitations to the fielding of ICs and their detectors are similar to the limitations associated with fielding HPLC instrumentation, that is, IC instruments require power requirements (120 V ac source), high purity water, and high purity chemical reagents for the preparation of buffering solutions. Like HPLC, IC instruments can use UV-VIS spectrometers, mass spectrometers, and electrochemical detectors. Ion chromatography has been successfully used in the U.S. Army Materiel Command’s Treaty Verification Laboratory in the analysis of several chemical nerve agents and their degradation products. The Metrohm Model 761 Compact IC System from Metrohm-Peak, Inc., is shown in fig. 3–21.



Figure 3–21. Metrohm Model 861 Compact IC System, Metrohm-Peak, Inc.

3.3.5 Capillary Zone Electrophoresis

Capillary zone electrophoresis (CZE or CE) is a chromatographic technique that can be thought of as a hybridization of gas chromatography, liquid chromatography, and ion chromatography. Rather than using a temperature gradient or a solvent gradient (as in GC or HPLC, respectively), a mobile phase containing an ionic buffer is used (as in ion chromatography). A high voltage electric field (either fixed potential or a gradient) is applied across a fused silica column similar to capillary columns used in GC.

The CZE instruments are typically configured with either a UV-VIS spectrometer or an electrochemical detector, but they can be interfaced to a mass spectrometer. The CZE instrumentation shares the same electrical requirements as HPLC and IC instruments. High purity water and chemical reagents are required but in much smaller quantities.

3.3.6 Ultraviolet Spectroscopy

Ultraviolet (UV) spectroscopy involves passing a monochromatic light through a dilute solution of the sample in a nonabsorbing solvent. The UV (UV = 200 nm to 400 nm) spectrum is generally taken by placing a dilute solution of the analyte in a silica cell and preparing a matching cell of pure solvent. The cells are placed in the spectrometer, and each cell is scanned with UV radiation. Ultraviolet spectra usually show only one broad peak indicating absorption. The intensity of the absorption is measured by the percent of the incident light that passes through the sample. The spectrum is determined by comparing the intensities of the transmitted light of the sample and the pure solvent.

4. MARKET SURVEY

An extensive market survey was conducted to identify commercially available chemical detection equipment. The market survey consisted of a solicitation of manufacturers, the review of previously conducted market surveys, literature searches, and consultation with subject matter experts (SMEs). Section 4.1 provides a summary of the assessment of previous market surveys. Section 4.2 provides the identification of new and updated equipment, and section 4.3 provides a summary of information obtained through interfacing with the vendors. In order to provide detailed information on each chemical detector, 40 data fields, to correspond to the vendor questionnaire, were identified. These data fields were developed by SMEs and approved for distribution by the government. Definitions for the chemical detector data fields are provided in appendix B.

4.1 Past Market Surveys

Several previously conducted market surveys were reviewed during the development of this guide. However, four specific sources proved to be the most valuable in the market survey conducted for this guide. These documents are as follows:

- *Worldwide Chemical Detection Equipment Handbook*
- *Final Report on Chemical Detection Equipment Market Survey for Emergency Responders*
- *Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders (NIJ Guide 100–00)*
- *Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders (DHS Guide 100–04), 2nd Edition*

A complete list of these surveys is provided in appendix A.

The *Worldwide Chemical Detection Equipment Handbook* was published in October 1995 and serves as a compendium of information pertaining to chemical warfare agent detection systems. It includes U.S. and foreign military chemical warfare agent detectors, as well as commercially available detectors. It is being used worldwide.

The *Final Report on Chemical Detection Equipment Market Survey for Emergency Responders* was published in September 1998 and serves as a compendium of commercially available chemical detectors.

The *Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders* was published in June 2000 and provides details on 148 chemical detection equipment items.

The *Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders, 2nd Edition* was published in March 2005 and provides details on 186 chemical detection equipment items.

The review of these four documents resulted in the inclusion of 147 detection equipment items within this guide.

4.2 Identification of New Equipment

Since the past market surveys focused on chemical detection equipment commercially available as of June 2000, a follow-on market survey was initiated to obtain updated information on previously identified equipment and detailed information on equipment developed after June 2000.

A variety of techniques were utilized to identify detection equipment. These techniques included the distribution of Federal Business Opportunities (FedBizOpps) and the Nuclear, Chemical, Biological (NBC) Industry Group Announcements, literature searches, database searches, Internet searches, and technical contacts. These techniques resulted in the identification of 69 new detection equipment items.

4.3 Vendor Contact

Vendors were contacted numerous times between January 2003 and December 2006 in order to obtain additional equipment information, as well as to update and to finalize their specific equipment data for inclusion in the guide.

The vendor-supplied data, along with an index identifying each of the chemical detectors, can be found in appendix C.

5. SELECTION FACTORS

Section 5 provides a discussion of 16 selection factors that are recommended for consideration by the emergency first responder community when selecting and purchasing chemical detection equipment. An initial set of selection factors for chemical detectors emerged from the review of the *Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders, Volume I* (NIJ Guide 100–00). These factors were shared with experienced scientists and engineers who have multiple years of experience in CA and TIC/TIM detection and analysis, domestic preparedness, and identification of emergency first responder needs. The factors were also shared with the emergency first responder community in order to get their thoughts and comments. The selection factors were modified to eliminate some of the initial criteria, include new criteria, and expand several definitions.

These factors were developed to allow for a quick comparison of commercially available chemical detection equipment. ***It is important to note that the evaluation conducted using the selection factors was based solely upon vendor-supplied data and no independent evaluation of equipment was conducted in the development of this guide.*** The results of the evaluation of the detection equipment are provided in section 6. The remainder of this section defines each of the selection factors. Details on the manner in which the selection factor was used to assess the detection equipment are included within the section factor definition.

5.1 Unit Cost

Unit Cost is the cost of the piece of equipment, including the cost of all support equipment and consumables.

Unit Cost	
●	Less than \$500 per unit
◐	Between \$500 and \$2K per unit
◑	Between \$2K and \$5K per unit
○	More than \$5K per unit
⊗	Not specified

5.2 Chemical Agents Detected

This factor describes the ability of the equipment to detect CAs. Chemical agents, when referred to in this guide, are nerve and blister agents. Nerve agents primarily consist of GB and VX. Other nerve agents include GA, GD, and GF. Blister agents primarily consist of HD, HN, and L.

Chemical Agents Detected	
●	Detects all nerve and blister agents
◐	Detects multiple nerve and blister agents
◑	Detects either the nerve or blister agent class
○	Detects none of the nerve or blister agents
⊗	Not specified

5.3 Toxic Industrial Chemicals/Toxic Industrial Materials Detected

This factor describes the ability of the equipment to detect TIMs. The TIMs considered in the development of this guide are discussed in sec. 2.2 and identified in one of three hazard indices (table 2–4).

TICs/TIMs Detected	
●	Detects all of the TICs/TIMs listed
◐	Detects multiple TICs/TIMs
◑	Detects one TICs/TIMs
○	Detects none of the TICs/TIMs listed
⊗	Not specified

5.4 Sensitivity

Sensitivity is the lowest concentration a CA or TIC/TIM can be detected at by a detector or instrument. This is also referred to as the detection limit or level of detection (LOD). Detection limits may be dependent upon the CA or TIC/TIM, the environmental conditions, or operational conditions.

Immediately dangerous to life and health (IDLH) is defined as the concentration at which self-contained breathing apparatus (SCBA) or respirators must be worn or immediate-life threatening effects will occur. The purpose of establishing an IDLH exposure level is to ensure that the worker can escape from a given contaminated environment in the event of a failure of the respiratory protection equipment. The IDLH values for the CAs and most of the 98 TICs that are listed in table 2–4 are provided in appendix D.

This guide bases its assessment of the sensitivity evaluation factors on the IDLH of CAs and TICs/TIMs versus the detection range of a detector. This factor does not apply to M8 and M9 paper since they require liquid contact to determine the presence of CAs or TICs/TIMs.

Sensitivity	
●	Detects at one-tenth IDLH for all detectable chemicals
◐	Detects at one-tenth IDLH for one or more detectable chemicals
◑	Detects at IDLH for all detectable chemicals
◒	Detects at IDLH for one or more detectable chemicals
○	Does not detect IDLH levels
⊗	Not specified

5.5 Resistance to Interferents

An interferent is a compound that causes a detector to either false alarm (false positive) or fail to alarm (false negative). Resistance to Interferents describes the ability of a detector or instrument to resist the effects of interferents.

Resistance to Interferents	
●	Responds only to CAs and TICs/TIMs
◐	Has a few noncritical interferents
◑	May respond to common battlefield interferents
◒	Has many interferents
○	Does not discriminate between CAs/ TICs/TIMs and interferents
⊗	Not specified

5.6 Response Time

Response Time is defined as the time it takes for an instrument to collect a sample, analyze the sample, determine if an agent is present, and provide feedback.

Response Time	
●	Less than 10 s
◐	Between 10 s and 60 s
◑	Between 60 s and 2 min
○	Greater than 2 min
⊗	Not specified

5.7 Start-Up Time

The Start-Up Time is the time required for setting up and initiating sampling with an instrument.

Start-Up Time	
●	Less than 30 s
◐	Between 30 s and 59 s
◑	Between 1 min and 5 min
◒	Between 5 min and 30 min
○	More than 30 min
⊗	Not specified

5.8 Detection States

Detection States factor indicates the sample states that an instrument can detect. The sample states include vapor, aerosol, and liquid.

Detection States	
●	Detects chemicals in all three states
◐	Detects chemicals in two states
◑	Detects chemicals in one state
○	No capability
⊗	Not specified

5.9 Alarm Capability

Alarm Capability indicates if an instrument has an audible, visible, or audible/visible alarm.

Alarm Capability	
●	Audible and visible alarm
◐	Audible alarm only
◑	Visible alarm only
◒	Alternate alarm type
○	No capability
⊗	Not specified

5.10 Portability

Portability is the ability of the equipment to be transported, including any support equipment required to operate the device. Two important things to consider under portability are the equipment dimensions and its weight. They determine if a single person can transport the equipment or if the equipment requires vehicular transport.

Portability	
●	Less than 2 lb and handheld
◐	Between 2 lb and 5 lb and handheld
◑	Between 5 lb and 10 lb
◒	Between 10 lb and 50 lb
○	Greater than 50 lb
⊗	Not specified

5.11 Battery Needs

Battery Needs describes if the equipment is powered by batteries with an operating life capable of sustaining activities throughout an incident. The number of batteries required for operation is also an important consideration.

Battery Needs	
●	Operates on standard, inexpensive, and readily available batteries for 8 h of continuous use
◐	Operates on standard, inexpensive, and readily available batteries for 2 h of continuous use
○	Operates on special order and expensive batteries
⊗	Not specified

5.12 Power Capabilities

Power Capabilities indicate whether specific equipment components can operate on a battery and/or ac electrical power.

Power Capabilities	
●	Battery or ac powered
◐	Battery powered
◑	Vehicle or ac powered
○	Powered by ac
⊗	Not specified

5.13 Operational Environment

Operational Environment describes the type of environment required by the equipment to operate optimally. For example, some equipment is designed to operate in the field under common outdoor weather conditions and climates (i.e., extreme temperatures, humidity, rain, snow, fog, etc.). However, other equipment may require more climate-controlled conditions such as a laboratory environment.

Operational Environment	
●	Operates in all expected environments
◐	Operates in most environments
○	Operation is restricted to certain environments
⊗	Not specified

5.14 Durability

Durability describes how rugged the equipment is, that is, how well can the equipment withstand rough handling and still operate.

Durability	
●	Able to operate with rough handling
◐	Able to operate after being moved but not after rough handling
○	Must remain stationary
⊗	Not specified

5.15 Operator Skill Level

Operator Skill level refers to the skill level and training required for the operation of an instrument.

Operator Skill Level	
●	No special skills or training required
◐	No special skills but training required
○	Technician required to operate equipment
⊗	Not specified

5.16 Training Requirements

Training Requirements is the amount of time required to instruct the operator to become proficient in the operation of the instrument. For example, higher-end equipment such as ion mobility spectrometers or SAW device requires more in-depth training such as specialized classes for operation, maintenance, and calibration of the equipment.

Training Requirements	
●	No special training required
◐	Less than 4 h training required
◑	Less than 8 h training required
○	More than 8 h training required
⊗	Not specified

6. EQUIPMENT EVALUATION

Based on vendor information following the final vendor contact in December 2006, a number of changes were made to the *Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responder, 2nd Edition*, dated March 2005. These changes were made to the data sheets in appendix C and include removing several discontinued chemical detectors, adding new chemical detectors, and updating all entries with current vendor information. The changes are presented in tabular form in appendix E of this guide.

The market survey conducted for chemical detection equipment identified 207 different pieces of detection equipment. The details of the market survey to include data on each piece of equipment are provided in appendix C. Section 6 documents the results of evaluating each equipment item versus the 16 selection factors. Section 6.1 defines the equipment usage categories and section 6.2 discusses the evaluation results.

6.1 Equipment Usage Categories

In order to display the evaluation results in a meaningful format, the detection equipment was grouped into seven categories based on the prospective manner of usage by the emergency first responder community. These usage categories included the following:

- Handheld-portable detection equipment.
- Handheld-stationary detection equipment.
- Vehicle-mounted detection equipment.
- Fixed-site detection systems.
- Fixed-site analytical laboratory systems.
- Standoff detection systems.
- Detection systems with limited data.

Definitions for the six usage categories were extracted from the *Final Report on Chemical Detection Equipment Market Survey for Emergency Responders* (see detailed reference in appendix A). The definitions for each of the usage categories are in the following sections.

6.1.1 Handheld-Portable Detection Equipment

Handheld-Portable Detection Equipment is defined as being human portable for mobile operations in the field. The instrument is light enough to be carried by an emergency first responder and operated while moving through a building.

6.1.2 Handheld-Stationary Detection Equipment

Handheld-Stationary Detection Equipment is defined as being human portable for stationary operations. The instrument is light enough to be carried by an emergency first responder but can only be operated while stationary.

6.1.3 Vehicle-Mounted Detection Equipment

Vehicle-Mounted Detection Equipment is defined as being used in or from a mobile vehicle and generally uses a vehicle battery for power requirements. The equipment is designed for monitoring inside or within the general vicinity of a vehicle.

6.1.4 Fixed-Site Detection Equipment

Fixed-Site Detection Equipment is defined as stand-alone detection systems specifically designed to operate inside a building. The duration of operation for these instruments is indefinite, and the power requirements are met through the building infrastructure. Consumables required for continuous operation of the detection instruments (i.e., compressed gas cylinders) would need to be provided by the building management.

6.1.5 Fixed-Site Analytical Laboratory Equipment

Fixed-Site Analytical Laboratory Equipment is defined as stand-alone detection systems requiring a means of delivering a sample to the equipment for analysis. This equipment generally requires a trained technical operator as well as extensive labor to assemble and disassemble inside a building for short duration monitoring of an area. This equipment typically performs low-level monitoring of an area but has not been specifically designed for use outside a laboratory.

6.1.6 Standoff Detection Equipment

Standoff Detection Equipment is specifically designed to monitor the presence of CAs and TICs/TIMs that may be present in the atmosphere up to three miles away. These systems typically require one or two individuals for monitoring operations. Depending on the technique employed and the environmental conditions, these detectors can have high or low selectivity. Standoff detectors usually require vehicle transport and special setup.

6.1.7 Detection Equipment with Limited Data

The equipment usage category for each detection item included in this section may be handheld-portable detection equipment, handheld-stationary detection equipment, vehicle-mounted detection equipment, fixed-site detection systems, fixed-site analytical laboratory systems, or standoff detection systems. These equipment items either did not have enough data to be thoroughly evaluated or were identified too late to have the data verified by the vendors.

The results of categorizing the chemical detection equipment are detailed in table 6–1. Equipment was also categorized by its detection capability (CAs, TICs/TIMs, or both).

Table 6–1. Detection equipment usage categories

Detection Type	Detection Capability				Total
	CAs	TICs/ TIMs	Both	Not Specified	
Handheld-Portable Detection Equipment	6	67	28	2*	103
Handheld-Stationary Detection Equipment	12	15	13	2*	42
Vehicle-Mounted Detection Equipment	3	0	4	0	7
Fixed-Site Detection Equipment	5	7	13	1	26
Fixed-Site Analytical Laboratory Equipment	15	1	2	1	19
Standoff Detection Equipment	1	0	3	0	4
Detection Equipment with Limited Data	0	0	0	6	6
Total	42	90	63	12	207

*Training/Certification Kits

6.2 Evaluation Results

The evaluation results for the CA and TIM detection equipment are presented in tabular format for the 207 pieces of detection equipment identified at the time of the writing of this guide. A table is presented for each of the six usage categories with the handheld-portable and handheld-stationary detectors subdivided by detection capability. A separate table was prepared for detector items that were identified but had insufficient data to evaluate. Each table includes the specific equipment and the symbol that corresponds to how the equipment item was characterized based upon each of the selection factor definitions. If a selection factor is not appropriate for a specific equipment item, not applicable (NA) is used to characterize that selection factor. Table 6–2 provides the table number and associated table pages for each of the usage categories.

Table 6–2. Evaluation results reference table

Table Name	Table Number	Page(s)
Handheld-portable detection equipment (CAs)	6–3	6–4
Handheld-portable detection equipment (TICs/TIMs)	6–4	6–5 to 6–8
Handheld-portable detection equipment (CAs and TICs/TIMs)	6–5	6–9 and 6–10
Handheld-stationary detection equipment (CAs)	6–6	6–11
Handheld-stationary detection equipment (TICs/TIMs)	6–7	6–12
Handheld-stationary detection equipment (CAs and TICs/TIMs)	6–8	6–13
Vehicle-mounted detection equipment	6–9	6–14
Fixed-site detection equipment	6–10	6–15 and 6–16
Fixed-site analytical laboratory equipment	6–11	6–17 and 6–18
Standoff detection Equipment	6–12	6–19
Detection systems with limited data	6–13	6–19

6.2.1 Handheld-Portable Detection Equipment

There were 103 handheld-portable detection equipment items identified in the development of this guide. These 103 detection equipment items are divided into three subcategories identifying their detection capability. Six handheld-portable detection equipment items are capable of detecting CAs only. Sixty-seven handheld-portable detection equipment items are capable of detecting one or more of the 98 TICs. Twenty-eight handheld-portable detection equipment items are capable of detecting

both CAs and TICs/TIMs. Two of the handheld-portable detection equipment items are training/certification kits for chemical identification.

Table 6–3 details the evaluation results for the six handheld-portable chemical detectors that capable of detecting CAs, but not TICs/TIMs.

**Table 6–3. Handheld-portable detection equipment (CAs)
January 2007**

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
90	AP2C Vapor and Liquid Agent Detector (M266 E10 000)	Flame Spectro photometer	○	●	○	◐	●	●	●	●	●	◐	●	◐	●	●	●	◐
91	AP2Ce Vapor and Liquid Agent Detector (M232 E10 000)	Flame Spectro photometer	○	●	○	◐	●	●	●	●	●	◐	●	◐	●	●	●	◐
93	APACC Chemical Control Alarm Portable Apparatus	Flame Spectro photometer	○	●	○	◐	●	●	●	●	●	◐	●	●	●	●	●	◐
130	Advanced Portable Detector (APD) 2000	IMS	⊗	●	○	◐	◐	◐	◐	◐	●	◐	●	●	●	●	◐	◐
138	M90-D1-C Chemical Warfare Agent Detector	IMS	○	●	○	◐	◐	◐	◐	◐	●	◐	●	●	●	●	◐	◐
162	SAW MiniCAD mkII	SAW	○	●	○	◐	◐	◐	◐	◐	●	●	●	◐	◐	⊗	◐	◐

Table 6–4 details the evaluation results for the sixty-seven handheld-portable detection equipment items that that capable of detecting TICs/TIMs, but not CAs.

Table 6–4. Handheld-portable detection equipment (TICs/TIMs)
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
10	ChomAir Badges	Color Change Chemistry	●	○	●	●	●	●	●	●	●	●	NA	NA	●	●	●	●
11	SafeAir Monitoring System	Color Change Chemistry	●	○	●	●	●	●	●	●	●	●	NA	NA	●	●	●	●
12	Kitagawa Gas Detector Tubes	Color Change Chemistry	●	○	●	●	●	●	●	●	●	●	NA	NA	●	●	●	●
15	NextStep Plus Portable Toxic Monitor	Color Change Chemistry	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
16	SureSpot Active Sampler	Color Change Chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	⊗	●	●
17	Sensidyne Gas Detection Tubes	Color Change Chemistry	●	○	●	●	●	⊗	●	●	●	⊗	NA	NA	●	●	●	●
25	C16 PortaSens II Gas Detector	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
26	AMC Series 1100 Portable Gas Detector	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
27	PhD5 Personal Gas Detector	Electro chemistry	●	○	●	●	●	⊗	⊗	●	●	●	●	●	⊗	●	●	●
31	GasAlert	Electro chemistry	●	○	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
32	GasAlertMax	Electro chemistry	●	○	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
33	GasAlert Micro	Electro chemistry	●	○	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
34	Pac 7000 Personal Gas Alarm	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
35	Miniwarn Gas Detector	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
36	X-am 7000 Gas Detector	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
37	Pac III Single Gas Detector	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
39	Omni-4000 Gas Detector	Electro chemistry	⊗	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
40	MX-2100 Portable Gas Detector with 5-Gas Capability	Electro chemistry	⊗	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
41	Spectrum SP	Electro chemistry	⊗	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
42	Target Gas Detector	Electro chemistry	⊗	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Table 6–4. Handheld-portable detection equipment (TICs/TIMs)–Continued
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
43	TX-2000 Toxic Gas Detector	Electro chemistry	⊗	○	●	●	●	⊗	●	●	●	●	●	●	●	●	●	●
46	Haz-Alert Gas Detector	Electro chemistry	●	○	●	●	●	⊗	●	●	●	●	●	●	⊗	●	●	●
47	ATX 612 Multi-Gas Aspirated Monitor	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
48	Gas Badge Plus	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
49	iTX Multi-Gas Monitor	Electro chemistry	⊗	○	●	●	⊗	●	●	●	●	●	●	●	●	⊗	●	●
50	Gas Badge Pro	Electro chemistry	●	○	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
51	T40 Rattler Single-Gas Monitor	Electro chemistry	●	○	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
52	T82 Single Gas Monitor	Electro chemistry	⊗	○	●	●	●	⊗	⊗	●	●	●	●	●	●	●	●	●
53	TMX412 Multi-Gas Monitor	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
54	M40 Multi-Gas	Electro chemistry	⊗	○	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
55	IQ-250 Single Gas Detector	Electro chemistry	●	○	●	●	●	●	⊗	●	●	●	●	●	●	●	●	●
56	4000 Series Compact Portable Gas Detector	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
58	MicroMax Multigas Monitor	Electro chemistry	⊗	○	●	●	●	⊗	⊗	●	●	●	●	●	●	●	●	●
59	Toxibee Personal Gas Alarm	Electro chemistry	⊗	○	●	●	●	●	⊗	●	●	●	⊗	⊗	●	⊗	●	●
60	Unimax II Personal Single Gas Detector	Electro chemistry	⊗	○	●	●	●	⊗	⊗	●	●	●	●	●	●	●	●	●
61	TOX-BOX Portable Gas Detector	Electro chemistry & Catalytic	⊗	○	●	⊗	●	●	●	●	●	●	●	●	●	●	●	●
62	Solaris® Multigas Detector	Electro chemistry	⊗	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
70	MultiCheck 2000 Multi-Gas Monitor	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
71	MultiLog 2000 Multi-Gas Monitor	Electro chemistry	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
74	QRAE Plus Hand Held 4 Gas Monitor (Model 2000 Monitor)	Electro chemistry	●	○	●	●	●	○	●	●	●	●	●	●	●	●	●	●

Table 6–4. Handheld-portable detection equipment (TICs/TIMs)–Continued
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
76	VRAE Hand Held 5 Gas Surveyor (Model 7800 Monitor)	Electro chemistry	●	○	●	●	●	○	●	●	●	●	●	●	●	●	●	●
77	Mini SA Single Gas Personal Monitor	HPLC	●	○	●	●	⊗	⊗	⊗	●	●	●	●	●	●	⊗	⊗	⊗
78	Scout Multi-Gas Personal Monitor	Electro chemistry	●	○	●	●	⊗	●	⊗	●	●	●	●	●	●	⊗	●	●
82	Genesis Portable Gas Monitor	Electro chemistry	●	○	●	●	●	●	⊗	●	●	●	●	●	●	●	●	●
83	GT Series Portable Gas Monitor	Electro chemistry	●	○	●	●	●	○	⊗	●	●	●	●	●	●	●	●	●
147	VX500 Photo Ionization Detector	Photo ionization	⊗	○	●	●	⊗	⊗	⊗	⊗	●	●	●	●	●	●	●	●
148	TLV Panther Gas Detector	Photo ionization	●	○	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
150	2020 Photoionization Monitor	Photo ionization	●	○	●	○	○	●	●	●	●	●	●	●	●	●	●	●
164	SXC-20 VOC Monitor	Thermal & Electrical Conductivity	●	○	●	○	●	●	●	●	●	●	NA	●	⊗	⊗	○	●
171	BadgeRAE	Electro chemistry	●	○	●	●	⊗	○	●	●	●	●	●	●	●	●	●	●
177	Sensit®Gold CGI	Electro chemistry	⊗	○	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
179	Aim Commander	Electro chemistry	⊗	○	●	●	⊗	⊗	⊗	●	●	●	●	●	●	●	●	⊗
180	Cyranose® 320	Electro chemistry	⊗	⊗	●	⊗	⊗	⊗	●	●	⊗	●	●	●	●	⊗	●	○
187	Draeger Hazmat Simultest Kit	Colorimetric	●	○	●	●	●	○	NA	●	○	○	NA	NA	●	●	●	●
188	CMS Analyzer	Colorimetric	●	○	●	●	●	○	●	●	○	●	●	●	●	●	●	●
189	Draeger CMS Emergency Response Kit	Colorimetric	●	○	●	●	●	○	●	●	○	○	●	●	●	●	●	●
193	Toxi Pro Gas Detector	Electro chemistry	⊗	○	●	⊗	●	⊗	⊗	●	●	●	●	●	●	⊗	●	●
194	Formaldemeter htV	Electro chemistry	⊗	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
201	Sensit®Gold	Electro chemistry	⊗	○	●	●	⊗	●	●	●	⊗	●	●	●	●	●	●	●
202	Sensit®TKY	Electro chemistry	⊗	○	●	●	⊗	●	●	●	⊗	●	●	●	⊗	⊗	●	●

Table 6–4. Handheld-portable detection equipment (TICs/TIMs)–Continued
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
203	Sensit® HXG-3	Electro chemistry	⊗	○	◐	◑	⊗	●	●	◐	⊗	●	●	◐	◐	●	●	●
205	Sensit® HXG-2	Electro chemistry	⊗	○	◐	◑	⊗	●	●	◐	⊗	●	●	◐	◐	●	●	●
206	Gas Trac®	Electro chemistry	⊗	○	◐	◑	⊗	●	◐	◐	⊗	●	●	◐	◐	⊗	●	●
207	Sensit® CO	Electro chemistry	⊗	○	◐	◑	⊗	●	◐	◐	⊗	●	●	◐	◐	●	●	●
212	GasAlert Micro5 PID	Electro chemistry & Photo Ionization	◑	○	◐	◑	NA	◐	●	◐	●	●	●	◐	●	●	●	●
213	Narco AirClear Kits	Colorimetric Detector tubes	⊗	○	◐	◑	◐	○	●	◐	○	◐	●	◐	◐	●	●	●
214	Deluxe NarcoWipe Kit	Colorimetric Direct read, surface wipe	⊗	○	◐	◑	◐	●	●	◐	○	◐	NA	NA	◐	●	●	●

Table 6–5 details the evaluation results for the 28 handheld-portable detection equipment items that are capable of detecting both CAs and TICs/TIMs, as well as the results for two handheld-portable simulation kits.

**Table 6-5. Handheld-portable detection equipment (CAs and TICs/TIMs)
January 2007**

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
63	SIRIUS Multigas PID Detector	Electro chemical	⊗	●	●	●	⊗	○	●	○	●	●	●	●	○	●	●	●
64	HAZMATCAD Chemical Agent Detector	Electro chemical & SAW	⊗	●	●	●	⊗	○	●	○	●	●	●	●	○	●	●	●
65	HAZMATCAD Plus Chemical Agent Detector	Electro chemical and SAW	⊗	●	●	●	⊗	○	●	○	●	●	●	●	○	●	●	●
73	MultiRae Plus Gas Detector (PGM-50 Detector)	Electro chemical and/or PID	●	●	●	●	●	○	●	○	●	●	●	●	○	●	●	●
75	ToxiRae Plus Personal Gas Monitor	Electro chemical and/or PID	●	●	●	●	●	○	●	○	●	●	●	●	○	●	●	●
88	UC AP4C CW & Toxic Industrial Materials Detector (M910 E00 003)	Flame spectro photometer	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
95	UC TIMs Detector (M629 E00 001)	Flame spectro photometer	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
100	ChemDisk™ Diffusive Sampler	GC or UV-VIS Spectroscopy	○	●	●	●	●	○	●	○	○	●	●	●	○	●	⊗	⊗
126	IMS 2000E Chemical Warfare Agent Detector	IMS	○	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●
127	Rapid Alarm and Identification Device-Mobile (RAID-M)	IMS	○	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●
132	Chemical Agent Monitor (CAM-2)	IMS	⊗	●	●	●	○	●	●	○	●	●	●	●	○	●	●	○
136	ACADA (was 196 Lightweight Chemical Detector (LCD))	IMS	⊗	●	●	○	●	●	●	○	●	●	●	●	○	●	●	○
152	MiniRAE 2000	IMS	●	●	●	●	○	●	●	○	●	●	●	●	○	●	●	○
153	ppbRae	Photo ionization	○	●	●	●	○	●	●	○	●	●	●	●	○	●	●	○
165	HAZMATCAD Plus	SAW	○	●	●	●	●	○	●	○	●	●	●	●	○	●	●	●
166	ECAM (Enhanced Chemical Agent Monitor)	IMS	⊗	●	●	●	●	●	○	○	●	●	●	●	○	●	●	○

Table 6-5. Handheld-portable detection equipment (CAs and TICs/TIMs)—Continued
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
167	SABRE 2000	IMS	⊗	●	●	⊗	⊗	●	●	●	●	●	NA	○	⊗	●	●	●
170	ChemPro100	IMS	⊗	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
172	Civil Defense Kits	Colorimetric	⊗	●	●	●	●	○	●	●	○	●	●	●	●	●	●	●
174	The HazMat Smart M-8 Simple Nerve Agent Detection	Colorimetric	⊗	●	⊗	⊗	⊗	●	●	⊗	●	●	●	●	●	●	●	●
178	HazMat Kits	Colorimetric	⊗	●	●	●	●	○	●	●	○	●	NA	NA	●	●	●	●
182	Airsense Model—GDA-II GDA-II-NA	IMS	○	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○
190	Draeger Multi-IMS	IMS	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
208	Chameleon Chemical Detection System (Armband Model: 085100)	Colorimetric	●	●	●	●	●	●	●	●	●	●	NA	NA	●	●	●	●
209	Gastec Gas Sampling Pumps and Detector Tubes	Colorimetric	⊗	●	●	●	●	○	●	●	○	●	NA	NA	●	●	●	●
210	Ahura First Defender Chemical ID System	Raman Spectro meter	○	●	●	NA	NA	●	●	●	●	●	●	●	●	●	●	●
215	Training/Certification Kit—Civil Defense Detector Tubes*	Colorimetric —CA simulants	⊗	NA	NA	NA	NA	NA	●	●	○	●	NA	NA	●	●	●	●
216	Training/Certification Kit—Civil Defense Detection Papers*	Colorimetric —CA simulants	⊗	NA	NA	NA	NA	NA	●	●	○	●	NA	NA	●	●	●	●
217	CP100T	IMS	⊗	●	●	●	⊗	●	●	●	●	●	●	●	●	●	●	●
225	JUNO™	DMS	⊗	●	●	⊗	●	●	●	●	●	●	NA	○	●	●	●	⊗

*Simulation Kits

6.2.2 Handheld-Stationary Detection Equipment

Forty-two handheld-stationary detection equipment items are identified in the development of this guide. These 42 detection equipment items are divided into three subcategories identifying their detection capability. Twelve handheld-stationary detection equipment items are capable of detecting CAs only. Fifteen detection equipment items are capable of detecting one or more of the 98 TIMs. Thirteen detection equipment items are capable of detecting both CAs and TICs/TIMs, and two of the

handheld-stationary detection equipment items are training/certification kits for chemical identification.

Table 6–6 details the evaluation results for the 12 handheld-stationary detectors that are capable of detecting CAs, but not TICs/TIMs.

Table 6–6. Handheld-stationary detection equipment (CAs)
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
2	Chemical Agent Liquid Detector, C8; Chemical Agent Liquid Detector, 3-Way; Chemical Agent Liquid Detector, CM9	Colorimetric	●	●	○	◐	◐	●	●	◐	◐	●	NA	NA	●	●	●	◐
8	HazCat® MicroCat/WMD Kit (Model KT1040)	Colorimetric	○	●	○	●	NA	○	◐	◐	○	◐	●	◐	◐	●	◐	○
9	HazCat® WMD Kit (Model KT1235)	Colorimetric	◐	●	○	●	◐	○	◐	◐	○	◐	NA	NA	◐	●	◐	○
14	No. 1 Mark 1 Detector Kit	Colorimetric	●	●	○	●	◐	⊗	◐	◐	◐	●	NA	NA	⊗	⊗	●	◐
18	ABC–M8 VGH Chemical Agent Detector Paper	Colorimetric	●	●	○	◐	◐	◐	●	◐	◐	●	NA	NA	◐	●	●	●
21	M9 Chemical Agent Detector Paper	Colorimetric	●	●	○	◐	◐	◐	●	◐	◐	●	NA	NA	◐	●	●	●
122	HazMatID	PIR	○	●	○	◐	◐	◐	◐	●	◐	◐	●	●	◐	●	◐	◐
154	TVA-1000B (FID or FID/PID) Toxic Vapor Analyzer (name changed)	PIR	⊗	◐	○	◐	●	●	⊗	◐	⊗	◐	●	◐	⊗	⊗	●	◐
156	Innova Type 1412 Multigas Monitor	PIR	○	◐	○	◐	●	◐	◐	◐	◐	◐	◐	●	◐	○	◐	◐
157	Innova Type 1314 Multigas Monitor	PIR	○	●	○	◐	●	◐	●	◐	◐	◐	◐	●	◐	●	◐	◐
197	KT1050 HazCat Tier 4 System	Immuno-chemical	○	◐	○	○	○	○	◐	●	◐	○	●	●	◐	●	◐	○
223	Nerve Agent Vapour Detector (NAVD)	Color Change Chemistry	●	◐	○	⊗	⊗	○	◐	◐	◐	⊗	NA	NA	●	●	◐	◐

Table 6–7 details the evaluation results for 15 handheld-stationary detectors that are capable of detecting TICs/TIMs, but not CAs.

Table 6–7. Handheld-stationary detection equipment (TICs/TIMs)
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
7	HazCat® Industrial Chemical and Mehamphetamine Identification Kit (Model KT1220)	Colorimetric	○	○	●	◐	○	◐	◐	○	◐	NA	NA	◐	●	◐	●	○
22	Chemkey TLD Toxic Gas Monitor	Colorimetric	⊗	○	◐	⊗	●	◐	◐	●	◐	●	●	◐	⊗	⊗	●	◐
23	CM4 Gas Monitor	Colorimetric	⊗	○	◐	⊗	◐	◐	◐	●	○	○	○	◐	⊗	⊗	●	◐
24	SPM Toxic Gas Monitor	Colorimetric	⊗	○	◐	⊗	●	◐	◐	●	◐	●	●	◐	⊗	⊗	●	◐
84	MiniMAX XT Disposable Gas Detector	GC	⊗	○	◐	⊗	◐	◐	◐	●	●	●	◐	◐	⊗	⊗	●	⊗
85	MiniMAX XP Portable Gas Detector	GC	⊗	○	◐	⊗	◐	◐	◐	●	●	●	◐	◐	⊗	⊗	●	⊗
86	MiniMAX X4 Portable Gas Detector	GC	⊗	○	◐	⊗	◐	◐	◐	●	●	●	◐	◐	⊗	⊗	●	◐
87	MicroMAX Plus Portable Gas Detector	GC	⊗	○	◐	⊗	◐	◐	◐	●	●	●	◐	◐	⊗	⊗	●	◐
109	Voyager Portable GC	GC	○	○	◐	◐	○	◐	◐	●	◐	●	◐	◐	●	○	○	○
163	Portable Odor Monitor	Thermal & Electrical Conductivity	⊗	○	◐	○	◐	●	◐	○	●	●	●	◐	●	⊗	●	◐
168	Safeye Model 400 Gas Detection System	UV Spectroscopy	○	○	◐	◐	●	◐	◐	◐	◐	NA	◐	◐	●	○	●	◐
186	Draeger Hazmat Kit	Colorimetric	○	○	◐	●	○	◐	◐	◐	◐	NA	NA	◐	●	◐	●	◐
199	MiniMAX Pro Portable Gas Detector	Electro chemistry	⊗	○	◐	⊗	⊗	◐	◐	◐	●	●	●	◐	●	⊗	◐	○
200	MiniMAX PID Portable Gas Detector	Electro chemistry	⊗	○	◐	⊗	⊗	◐	◐	◐	●	●	●	◐	●	⊗	◐	○
204	Trak-It®III CGI	Electro chemistry	⊗	○	◐	⊗	●	●	◐	⊗	◐	●	◐	◐	●	⊗	●	●

Table 6–8 details the evaluation results for 13 handheld-stationary detectors that are capable of detecting CAs and TICs/TIMs, as well as the evaluation results for one handheld-stationary command kit and one handheld-stationary simulation kit.

**Table 6-8. Handheld-stationary detection equipment (CAs and TICs/TIMs)
January 2007**

ID #	Detector Name		Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
3	Chemical Agent Detector C2 Kit	Colorimetric	●	●	●	●	⊗	○	●	●	●	●	NA	NA	●	●	●	●
4	CM256A1 Detector Kit	Colorimetric	●	●	●	●	●	○	●	●	●	●	NA	NA	●	●	●	●
6	Draeger CDS Kit	Colorimetric	●	●	●	●	●	●	●	●	●	●	NA	NA	●	●	●	●
19	M18A3 Chemical Agent Detector Kit	Colorimetric	●	●	●	●	●	○	●	●	●	●	NA	NA	●	●	●	●
20	M272 Water Kit	Colorimetric	●	●	●	●	●	○	●	●	●	●	NA	NA	●	●	●	●
107	Hapsite®	GC with SAW	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	○
110	CMS200	GC	○	●	●	●	●	○	○	●	●	●	●	●	●	●	○	○
111	CMS100	GC with MS	○	●	●	●	●	○	○	●	●	●	●	●	●	●	○	○
124	Miran SapphIRe Portable Ambient Air Analyzer	Infrared Spectroscopy	○	●	●	●	⊗	●	●	●	●	●	●	●	⊗	●	●	●
159	4200 Vapor Detector	GC with SAW	○	●	●	●	●	●	○	●	●	●	NA	○	●	⊗	●	●
160	7100 Vapor Detector	GC with SAW	○	●	●	●	●	●	○	●	●	●	NA	○	●	⊗	●	●
221	GasID	FTIR	○	●	●	●	●	●	○	●	●	●	○	●	●	●	●	●
222	Responder	Raman Spectroscopy	○	●	●	●	●	●	○	●	●	●	○	●	●	●	●	●
198	HazCat® CommandCat Kit (Model KT1044)*	Screening/Wireless transmission	○	NA	NA	NA	NA	●	⊗	NA	●	●	NA	○	●	●	●	○
224	M28 M29 and M256A1 Chemical Agent Detector Simulator Training Kits**	Colorimetric	●	NA	NA	⊗	⊗	○	●	●	●	⊗	NA	NA	●	●	●	●

* Accessory

** Simulator and training kits

6.2.3 Vehicle-Mounted Detection Equipment

Seven vehicle-mounted detection equipment items have been identified in the development of this guide. Three of the detection equipment items are capable of detecting CAs, and four are capable of

detecting one or more of the 98 TICs. Table 6–9 details the results of the seven vehicle-mounted detection equipment evaluation.

**Table 6–9. Vehicle-mounted detection equipment
January 2007**

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
CAPABLE OF DETECTING CAs ONLY																		
92	AP2C-V Mobile Detector (M268 E00 000)	Flame Spectro photometer and Agent Dose Meter	○	●	○	◐	●	●	●	●	●	◐	NA	◐	●	●	●	◐
146	Chemical Biological Mass Spectrometer (CBMS)	MS—Ion Trap MS/MS	○	●	○	◐	●	◐	◐	◐	●	◐	NA	◐	●	●	●	◐
181	IlluminatIR ML Package	Infrared Spectro meter	○	●	⊗	◐	◐	◐	◐	◐	◐	◐	○	◐	◐	◐	◐	○
CAPABLE OF DETECTING CAs AND TICs/TIMs																		
105	CT-1128 Portable GC-MS	GC with MS	○	●	◐	◐	●	○	○	◐	○	○	●	●	◐	●	○	○
176	Portable Isotopic Neutron-Spectroscopy Chemical Assay System	Ge Detector Plus Portable Spectro meter	⊗	●	◐	⊗	⊗	○	⊗	⊗	⊗	○	●	●	⊗	●	●	⊗
183	MINICAMS Series 2001/3001 Continuous Air Monitoring Systems	GC and sample collection	⊗	●	◐	◐	⊗	○	⊗	◐	◐	◐	NA	○	◐	●	⊗	⊗
191	DAXEL 2C	GC, Pyrolysis, and MS	⊗	◐	◐	◐	⊗	○	◐	●	◐	○	NA	○	◐	●	●	⊗

6.2.4 Fixed-Site Detection Systems

Twenty-six fixed-site detection systems have been identified in the development of this guide. Five fixed-site detection systems are capable of detecting CAs; seven detection systems are capable of detecting one or more of the 98 TICs, 13 detection systems are capable of detecting both CAs and TICs/TIMs, and one of the detection systems does not specify its detection capability. Table 6–10 details the evaluation results of the 26 fixed-site detection systems.

**Table 6–10. Fixed-site detection equipment
January 2007**

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
CAPABLE OF DETECTING CAs ONLY																		
80	Improved Automatic Continuous Environmental Monitor (IACEM)	GC	○	●	⊗	◐	◑	○	⊗	◐	○	◐	NA	○	◐	○	◐	◐
81	Automatic Continuous Environmental Monitor (ACEM)	GC	○	●	⊗	◐	◑	○	⊗	◐	○	◐	NA	○	◐	○	◐	◐
89	ADLIF Fixed Continuous Chemical Detector	Flame Spectro photometer & Agent Dose Meter	○	●	○	◐	●	●	●	●	●	○	NA	○	●	●	●	◐
106	Automatic Continuous Environmental Monitor (ACEM) 900	GC	○	●	○	◐	◑	○	⊗	◐	○	◐	NA	○	◐	○	○	○
139	Questor Continuous Multiple Chemical Agent Monitoring System	MS	○	●	⊗	◐	⊗	⊗	⊗	●	●	⊗	NA	○	○	●	◐	◐
CAPABLE OF DETECTING TICs/TIMs ONLY																		
44	Model TS400 Toxic Gas Detector	Electro chemistry	⊗	○	◐	◑	◐	◑	○	◐	○	●	NA	○	◐	●	●	◐
79	SensAlarm	Electro chemistry & Catalytic Bead	◐	○	◐	◐	◐	◐	◐	◐	●	◐	NA	○	◐	◐	◐	◐
114	Agilent 1200 Series LC	HPLC	⊗	○	◐	⊗	◐	⊗	⊗	◐	⊗	○	NA	○	◐	●	○	○
129	AirSentry-IMS® Ambient Air Analyzer	IMS	○	○	◐	◐	◐	◐	◐	◐	◐	◐	NA	○	◐	●	⊗	◐
184	Toxalert TOXCONTROL Gas Detection Systems Tox-Control (Tox-C)	Electro chemical, metal-oxide semi conductor, & IR	⊗	⊗	◐	◐	⊗	◐	⊗	◐	●	⊗	NA	○	◐	○	◐	●
195	Model TS4000 Toxic Gas Detector	Electro chemistry	⊗	○	◐	◐	◐	◐	○	◐	○	●	NA	○	●	●	●	◐
211	MSA Chemgard® Photoacoustic Infrared Gas Monitor Series	Photo acoustic Infrared	⊗	○	◐	◐	◐	◐	○	◐	●	◐	NA	○	○	○	◐	◐

Table 6–10. Fixed-site detection equipment—Continued
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
CAPABLE OF DETECTING CAs AND TICs/TIMs																		
97	Agilent 6850, Agilent 6850 Series II Network, Agilent 6852	GC with Flame Photometry	○	●	◐	●	◐	○	○	◐	●	○	NA	○	◐	●	◐	◐
98	Agilent 6890N	GC with Flame Photometry	○	●	◐	●	◐	○	○	◐	●	○	NA	○	◐	●	◐	◐
99	Agilent 6890N-5975B GC/MSD	GC with MS	○	●	◐	◐	◐	○	○	◐	○	○	NA	○	◐	●	○	○
128	Stationary Rapid Alarm & Identification Device (RAID-S)	IMS	○	●	◐	◐	◐	◐	◐	◐	●	◐	NA	○	◐	○	◐	◐
131	Centurion	IMS	⊗	●	◐	◐	◐	◐	◐	◐	●	◐	NA	○	○	○	●	◐
133	GID-2A™—Chemical Warfare Agent Detection System	IMS	⊗	●	◐	◐	◐	●	◐	◐	●	◐	NA	○	◐	●	●	◐
134	GID-3™, Chemical Agent Detection System	IMS	⊗	●	◐	◐	◐	●	◐	◐	●	◐	●	●	●	●	●	◐
135	GID-3 (24/7)—Chemical Warfare Agent Detection System	IMS	⊗	●	◐	◐	◐	●	◐	◐	●	○	NA	○	●	●	●	◐
161	CW Sentry 3G (was CW Sentry Plus)	SAW	○	●	◐	◐	◐	◐	◐	◐	●	◐	NA	○	◐	○	●	◐
169	LCD-3—Lightweight Chemical Agent Detector	IMS	⊗	●	◐	◐	◐	●	◐	◐	●	◐	●	●	●	●	●	◐
175	Dräger IMS 5100	IMS	○	●	◐	◐	◐	◐	◐	◐	◐	◐	NA	○	○	◐	◐	◐
192	Dräger GC-IMS 5700	IMS/ Integrated CG Column	○	●	◐	◐	◐	◐	◐	◐	◐	◐	NA	○	○	◐	●	◐
196	Griffin 400 (renamed Minotaur 400)	IMS/ Integrated CG Column	○	●	◐	●	●	◐	◐	◐	◐	◐	NA	○	⊗	●	◐	○
NOT SPECIFIED																		
45	Model TS420 Oxygen Deficiency Detector	Electro chemistry	⊗	⊗	⊗	◐	NA	◐	⊗	◐	⊗	●	NA	○	◐	●	●	⊗

6.2.5 Fixed-Site Analytical Systems

Nineteen fixed-site analytical laboratory systems have been identified in the development of this guide. Fifteen of these systems are capable of detecting CAs only, one is capable of detecting TICs/TIMs only, two are capable of detecting both CAs and TICs/TIMs, and one does not specify its detection capability. Table 6–11 details the evaluation results of the 19 fixed-site analytical laboratory systems evaluation

**Table 6–11. Fixed-site analytical laboratory equipment
January 2007**

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
CAPABLE OF DETECTING CAs ONLY																		
66	API 5000™ LC/MS/MS System	MS	⊗	●	⊗	◐	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
67	4000 QTRAP® LC/MS/MS System	MS	⊗	●	⊗	◐	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
68	4700 Proteomics Analyzer with TOF/TOF™ Optics	MS	⊗	●	⊗	◐	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
69	4800 MALDI TOF/TOF™ Analyzer	MS	⊗	●	⊗	◐	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
96	Automatic Continuous Air Monitoring System (ACAMS)	GC with Flame Photometry	○	●	○	●	◐	○	○	◐	●	○	NA	○	⊗	●	○	○
101	Infrared Detector for Gas Chromatograph	GC with IR Spectrometry	○	●	⊗	◐	●	○	◐	●	◐	○	NA	○	⊗	⊗	○	○
102	Trace Ultra High Sensitivity	GC with FTIR	○	●	⊗	●	◐	○	◐	●	⊗	⊗	NA	○	⊗	⊗	○	○
103	Bruker Viking 573	GC with MS	○	●	⊗	◐	●	◐	◐	◐	○	○	NA	○	◐	●	○	○
113	Saturn 2000 GC/MS	GC with MS	○	●	⊗	◐	◐	○	○	●	⊗	○	NA	○	⊗	⊗	○	○
140	API 3200™ LC/MS/MS System	MS	⊗	●	⊗	○	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
141	API 2000™ LC/MS/MS System	MS	⊗	●	⊗	○	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
142	API3000™ LC/MS/MS System	MS	⊗	●	⊗	○	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
143	API4000™ LC/MS/MS System	MS	⊗	●	⊗	○	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
144	QSTAR® XL Hybrid LC/MS/MS System	MS	⊗	●	⊗	○	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○
145	3200 QTRAP® LC/MS/MS System	MS	⊗	●	⊗	○	◐	◐	◐	◐	NA	○	NA	○	○	◐	○	○

Table 6–11. Fixed-site analytical detection equipment–Continued
January 2007

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
CAPABLE OF DETECTING TICs/TIMs ONLY																		
125	Metrohm Model 861 Advanced Compact IC System	IC	○	○	◐	○	⊗	⊗	⊗	◐	◐	◑	NA	○	◐	◐	○	○
CAPABLE OF DETECTING CAs AND TICs/TIMs																		
72	AreaRAE Wireless Gas Detection System	Electro chemical and/or PID	◐	●	◐	◑	◐	○	◐	◐	●	◐	●	◐	◐	●	●	◐
185	Griffin 300 (renamed Minotaur 300)	MS	○	●	◐	●	●	◐	◐	◐		◐	NA	○	⊗	●	◐	○
NOT SPECIFIED																		
112	Dual-Flame Photometric Detector	GC with Flame Photometry	⊗	○	⊗	◐	◐	○	◐	●		○	NA	○	⊗	⊗	○	○

6.2.6 Standoff Detection Systems

Four standoff detectors have been identified in the development of this guide. One standoff detection system is capable of detecting CAs only, and three are capable of detecting both CAs and TICs/TIMs. Table 6–12 details the results of the four standoff detection systems evaluation.

**Table 6–12. Standoff detection equipment
January 2007**

ID #	Detector Name	Technology	Unit Cost	CAs Detected	TICs/TIMs Detected	Sensitivity	Resistance to Interferents	Response Time	Start-Up Time	Detection States	Alarm Capability	Portability	Battery Needs	Power Capabilities	Operational Environment	Durability	Operator Skill Level	Training Requirements
CAPABLE OF DETECTING CAs ONLY																		
121	M21 Automatic Chemical Agent Alarm	FTIR	⊗	●	○	◐	◑	⊗	◐	◑	●	○	NA	◐	◑	●	◐	◑
CAPABLE OF DETECTING CAs AND TICs/TIMs																		
38	RAM 2000™	Active FTIR	○	●	◐	◑	●	◐	◑	●	○	NA	○	◐	◑	◐	◑	◐
118	HAWK Long Range Chemical Detector	Passive FTIR	○	●	◐	◑	●	●	◐	◑	●	○	●	●	◐	●	◐	◑
120	Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)	FTIR	⊗	●	◐	◑	●	◐	◑	◐	●	○	NA	◐	◑	●	◐	⊗

6.2.7 Detection Systems with Limited Data

Six detection systems with limited vendor supplied information have been identified in the market survey. None of these systems have been evaluated due to limited information. Table 6–13 presents a listing of the six detectors with limited data.

**Table 6–13. Detection systems with limited data
January 2007**

ID #	Detector Name	Technology	Portability
115	Perkin-Elmer Turbo LC Plus HPLC System	HPLC	Fixed-Site Analytical Laboratory
116	Shimadzu LC-20A HPLC System	HPLC	Mobile Laboratory Detection Equipment; Vehicle Mounted
117	Varian ProStar Analytical HPLC System	HPLC	Fixed-site Analytical Laboratory
218	Shimadzu QP-2010 Plus GCMS System	GC/MS	Mobile Laboratory Detection Equipment; Vehicle Mounted
219	Shimadzu LCMS-2010A LCMS System	LC/MS	Mobile Laboratory Detection Equipment; Vehicle Mounted
220	Shimadzu Axima TOF(2) Maldi MS System	TOF/MS	Fixed-site Analytical Laboratory

APPENDIX A—REFERENCES

APPENDIX A—REFERENCES

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APPENDIX B—CHEMICAL DETECTOR DATA FIELDS

APPENDIX B—CHEMICAL DETECTOR DATA FIELDS

Forty data fields were used to provide information relating to chemical detection equipment. The 40 data fields are comprised of data fields from the market survey vendor questionnaire requesting specifics about their products. Because of the database limitations, several data fields on the vendor questionnaire were combined, but all the vendor-supplied information was entered into the database. All data fields were developed using input from the emergency responder community.

The data fields are grouped according to the following six parameters and the number of data fields in each parameter:

- General (7 data fields).
- Operational (11 data fields).
- Physical (3 data fields).
- Logistical (9 data fields).
- Special Requirements (10 data fields).

1.0 General

1.1 Detector ID #

The Detector ID # is for identification purposes only.

1.2 Detector Type

The Detector Type identifies whether the equipment is military, commercial, or both.

1.3 Technology

Technology is the scientific method or application of the equipment. Examples of technologies employed are ion mobility spectrometry, mass spectrometry, gas chromatography, infrared spectroscopy, photoionization, electrochemistry, and color change chemistry.

1.4 Manufacturer

The Manufacturer data field is populated with the company that developed the piece of equipment. to include the name, address, telephone number, and point of contact (POC).

1.5 Source

Source indicates where the equipment information was obtained. Potential sources can include other market surveys, websites, industry journals, and other scientific publications.

1.6 Availability

Availability refers to how readily available a piece of equipment is (e.g., how long it takes to receive equipment upon purchasing).

1.7 Current User

The Current User data field is used to identify organizations that are currently using the piece of equipment.

2.0 Operational

2.1 Chemical Agents Detected

The Chemical Agents Detected data field indicates the type of CA detected by the equipment. The most common types of classic CAs are the nerve and blister agents. Nerve agents include GA (tabun), GB (sarin), GD (soman), GF, and VX. Blister agents include H and HD (sulfur mustards), HN (nitrogen mustard), and L (lewisite).

2.2 Biological Agents Detected

Biological Agents Detected identifies all BAs that can be detected by the equipment, using available reagents. Special note should be made where special or restricted reagents are required for the assay to detect an agent.

2.3 Toxic Industrial Material Detected (High Hazard Index)

Toxic Industrial Material Detected (High Hazard Index) identifies the type of non-CA (TIM) detected by the equipment. Toxic Industrial Material Detected (High Hazard Index) indicates a widely produced, stored, or transported TIM that has high toxicity and is easily vaporized.

2.4 Toxic Industrial Material Detected (Medium Hazard Index)

Toxic Industrial Material Detected (Medium Hazard Index) identifies the type of non-CW agent (TIM) detected by the equipment. Medium Hazard indicates a TIM that may rank high in some categories but lower in others such as number of producers, physical state, or toxicity.

2.5 Toxic Industrial Material Detected (Low Hazard Index)

Toxic Industrial Material Detected (Low Hazard Index) identifies the type of non-CW agent (TIM) detected by the equipment. Low Hazard indicates that this TIM is not likely to be a hazard unless specific operational factors indicate otherwise.

2.6 Detection State

The Detection State is the physical state of an agent (vapor, liquid, aerosol) that can be detected by the equipment.

2.7 Sensitivity

Sensitivity indicates the lowest concentration of the CW agent or TIM that can be detected by the equipment. The sensitivity may be dependent upon the agent, environmental conditions, operation, and other factors.

2.8 Resistance to Interferents

Resistance to Interferents is a measure of the ability of the equipment to distinguish between various compounds in the sample. An interferent is a compound that causes a detector to false alarm (false positive) or fail to alarm (false negative). The two types of false alarms are false positives and false negatives.

2.9 Start-Up Time

Start-up Time indicates the time required to set up the instrument and begin sampling.

2.10 Response Time

Response Time indicates the time required to collect a sample, analyze the sample, determine if agent is present, and provide feedback.

2.11 Alarm Capability

Alarm Capability is the ability of the detector to auto alarm either through visible or audible means.

3.0 Physical

3.1 Size

Size is the external dimensions of the equipment.

3.2 Weight

Weight indicates the total weight of the equipment in operational status.

3.3 Power Requirements

Power Requirements includes the type of power (ac, dc, etc.) required to operate the equipment.

4.0 Logistical

4.1 Transportability

Transportability refers to the ability of the equipment to be transported, including any support equipment required to operate it (e.g., handheld-portable, handheld-stationary, vehicle-mounted, fixed-site detection, fixed-site analytical laboratory, or standoff unit).

4.2 Durability

Durability describes the ruggedness of the equipment. That is, how well can the equipment withstand rough handling and still operate (with or without calibration).

4.3 Environmental Conditions

Environmental Conditions indicates the type of environment required for the equipment to operate optimally. For example, some equipment is designed to operate under common environmental conditions (e.g., rain, snow, fog, extreme temperatures, etc.). Other equipment may require climate-controlled conditions.

Consumables Required includes supplies that the equipment uses during operation and storage. Examples of consumables are batteries, filters, sensors, compressed gases, etc.

This field should include whether consumables are readily available and stocked for immediate shipping, or if there is a significant lead time required for ordering consumables. This field should also include the relative cost of the consumables.

4.5 Calibration Required

The Calibration Required data field indicates if any adjustments are necessary to bring operating characteristics into substantial agreement with standardized scales or markings. This will include any built-in testing and diagnostic capabilities. This field should include specific information about frequency (how often calibration is required), support (end user or manufacturer) for calibration, and any built-in testing or diagnostic capabilities.

In the event that extensive calibration or recalibration is required by the manufacturer service department, information should include whether a second instrument is available as a backup from the manufacturer.

4.6 Repairs Required

Repairs Required includes the services and parts that are necessary to keep the equipment at its peak operational readiness. This includes any parts needed during preventative maintenance.

4.7 Shelf Life

Shelf Life refers to the length of time a piece of equipment can be stored before it needs to be replaced.

4.8 Unit Cost

Unit Cost is the cost of the equipment including the cost of all consumables and support equipment.

4.9 Maintenance Cost

Maintenance Cost is the cost to maintain and operate the equipment and is normally based on equipment usage rates.

5.0 Special

5.1 Operator Skills Required

Operator Skills Required refers to the level of education and training required to operate the equipment.

5.2 Training Required

Training Required refers to the amount of instruction time the operator needs to become proficient in operating the equipment.

5.3 Training Available

Training Available refers to training availability from the manufacturer.

5.4 Manuals Available

The Manuals Available data field includes the types of manuals available from the manufacturer (e.g., user manuals, training documentation, etc.).

5.5 Support Equipment

Support Equipment includes any additional equipment required to operate the primary unit (e.g., laptop computer, sampling pump, etc.).

5.6 Communications Interface Capability

Communications Interface Capability refers to the ability of the detection equipment to interface with a communications system (network capability, hardwire capability, RF communication, etc.).

5.7 Tamper Resistance

Tamper Resistance indicates if the equipment can be protected from tampering (e.g., password protected).

5.8 Warranty

Warranty is the length of time a piece of equipment would be guaranteed by the manufacturer.

5.9 Testing Information

Testing Information includes data obtained from the manufacturer and other sources regarding the equipment (e.g., validation testing).

5.10 Applicable Regulations

Applicable Regulations includes any government and/or safety regulations that may apply to the possession, use, or storage of a piece of equipment (i.e., some detectors may require the use of a radioactive source material, which requires licensure by the Nuclear Regulatory Commission)

APPENDIX C—CHEMICAL DETECTOR INDICES AND DATA SHEETS

APPENDIX C—CHEMICAL DETECTOR INDICES AND DATA SHEETS

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Index by Chemical Detector ID#

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61	TOX-BOX Portable Gas Detector	Mil-Ram Technology, Inc.	C-92
62	Solaris® Multigas Detector	MSA Instrument Division	C-94
63	SIRIUS Multigas PID Detector	MSA Instrument Division	C-96
64	HAZMATCAD Chemical Agent Detector	MSA Instrument Division	C-97
65	HAZMATCAD Plus Chemical Agent Detector	MSA Instrument Division	C-98
66	API 5000™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-99
67	4000 QTRAP® LC/MS/MS System	Applied Biosystems/MDS Sciex	C-101

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69	4800 MALDI TOF/TOF™ Analyzer	Applied Biosystems/MDS Sciex	C-105
70	MultiCheck 2000 Multi-Gas Monitor	Quest Technologies, Inc.	C-107
71	MultiLog 2000 Multi-Gas Monitor	Quest Technologies, Inc.	C-109
72	AreaRAE Wireless Gas Detection System	RAE Systems Inc.	C-111
73	MultiRAE Plus Gas Detector (PGM-50 Detector)	RAE Systems Inc.	C-113
74	QRAE Plus Hand Held 4 Gas Monitor (Model 2000 Monitor)	RAE Systems Inc.	C-115
75	ToxiRAE Plus Personal Gas Monitor	RAE Systems Inc.	C-117
76	VRAE Hand Held 5 Gas Surveyor (Model 7800 Monitor)	RAE Systems Inc.	C-119
77	Mini SA Single Gas Personal Monitor	Scott Health & Safety	C-121
78	Scout Multi-Gas Personal Monitor	Scott Health & Safety	C-122
79	SensAlarm	Sensidyne, Inc.	C-123
80	Improved Automatic Continuous Environmental Monitor (IACEM) 980	CDS Analytical, Inc.	C-124
81	Automatic Continuous Environmental Monitor (ACEM) 9305	CDS Analytical, Inc.	C-126
82	Genesis Portable Gas Monitor	Thermo Fisher Scientific	C-128
83	GT Series Portable Gas Monitor	Thermo Fisher Scientific	C-130
84	MiniMAX XT Disposable Gas Detector	Honeywell Analytics Inc.	C-131
85	MiniMAX XP Portable Gas Detector	Honeywell Analytics Inc.	C-132
86	MiniMAX X4 Portable Gas Detector	Honeywell Analytics Inc.	C-133
87	MicroMAX Plus Portable Gas Detector	Honeywell Analytics Inc.	C-134
88	UC AP4C CW & Toxic Industrial Materials Detector (M910 E00 003)	Proengin SA	C-135
89	ADLIF Fixed Continuous Chemical Detector (M276 E00 000)	Proengin SA	C-137
90	AP2C Vapor and Liquid Agent Detector (M266 E10 000)	Proengin SA	C-139
91	AP2Ce Vapor and Liquid Agent Detector (M232 E10 000)	Proengin SA	C-141
92	AP2C-V Mobile Detector (M268 E00 000)	Proengin SA	C-143
93	APACC Chemical Control Alarm Portable Apparatus (M266 E10 000 and M452 E10 000)	Proengin SA	C-145
95	UC TIMs Detector (M629 E00 001)	Proengin SA	C-147

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97	Agilent 6850; Agilent 6850 Series II Network GC; Agilent 6852—GSA	Agilent Technologies	C-151
98	Agilent 6890N	Agilent Technologies	C-153
99	Agilent 6890N-5975B GC/MSD	Agilent Technologies	C-154
100	ChemDisk™ Diffusive Sampler	Assay Technology, Inc.	C-156
101	Infrared Detector for Gas Chromatograph	Analytical Solutions and Providers (ASAP)	C-158
102	Trace Ultra High Sensitivity	Biorad, Digilab Division (Varian)	C-159
103	Bruker Viking 573	Bruker Daltonics, Inc.	C-160
105	CT-1128 Portable GC-MS	Constellation Technology Corporation	C-162
106	Automatic Continuous Environmental Monitor (ACEM) 900	CDS Analytical, Inc.	C-164
107	Hapsite®	INFICON	C-166
109	Voyager Portable Gas Chromatograph	Photovac, Inc.	C-168
110	CMS200	INFICON	C-170
111	CMS100	INFICON	C-171
112	Dual-Flame Photometric Detector	SRI Instruments, Inc.	C-172
113	Saturn 2000 GC/MS	Varian Instruments	C-173
114	Agilent 1200 Series LC	Agilent Technologies	C-175
115	Perkin-Elmer Turbo LC Plus HPLC System	Perkin-Elmer LAS Inc.	C-176
116	Shimadzu LC-20A HPLC System	Shimadzu Scientific Instruments	C-177
117	Varian ProStar Analytical HPLC System	Varian Instruments	C-178
118	HAWK Long Range Chemical Detector	Bruker Daltonics, Inc.	C-179
120	Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)	General Dynamics	C-181
121	M21 Automatic Chemical Agent Alarm	General Dynamics (ECBC)	C-183
122	HazMatID	Smiths Detection	C-185
124	Miran SapphIRe Portable Ambient Air Analyzer	Thermo Fisher Scientific	C-187
125	Metrohm Model 861 Advanced Compact IC System	Metrohm-Peak, Inc.	C-188
126	IMS 2000E Chemical Warfare Agent Detector	Bruker Daltonics, Inc.	C-190
127	Rapid Alarm and Identification Device-Mobile (RAID-M)	Bruker Daltonics, Inc.	C-192
128	Stationary Rapid Alarm & Identification Device (RAID-S)	Bruker Daltonics, Inc.	C-194
129	AirSentry-IMS® Ambient Air Analyzer	Particle Measuring Systems	C-196

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130	Advanced Portable Detector (APD) 2000	Smiths Detection	C-198
131	Centurion	Smiths Detection	C-200
132	Chemical Agent Monitor (CAM-2)	Smiths Detection	C-202
133	GID-2A™ Chemical Warfare Agent Detection System	Smiths Detection	C-204
134	GID-3™ Chemical Agent Detection System	Smiths Detection	C-206
135	GID-3 (24/7) Chemical Warfare Agent Detection System	Smiths Detection	C-208
136	ACADA	Smiths Detection	C-209
138	M90-D1-C Chemical Warfare Agent Detector	Enviro-nics USA Inc.	C-211
139	Questor Continuous Multiple Chemical Agent Monitoring System	Abb Analytical	C-213
140	API 3200™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-214
141	API 2000™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-216
142	API3000™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-218
143	API4000™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-220
144	QSTAR® XL Hybrid LC/MS/MS System	Applied Biosystems/MDS Sciex	C-222
145	3200 QTRAP® LC/MS/MS System	Applied Biosystems/MDS Sciex	C-224
146	Chemical Biological Mass Spectrometer (CBMS)	Bruker Daltonics, Inc.	C-226
147	VX500 Photo Ionization Detector	Industrial Scientific Corporation	C-228
148	TLV Panther Gas Detector	International Sensor Technology	C-229
150	2020 Photoionization Monitor	Photovac, Inc.	C-230
152	MiniRAE 2000	RAE Systems Inc.	C-231
153	ppbRae	RAE Systems Inc.	C-233
154	TVA-1000B (FID or FID/PID) Toxic Vapor Analyzer	Thermo Fisher Scientific	C-235
156	Innova Type 1412 Multigas Monitor	California Analytical Instruments, Inc.	C-236
157	Innova Type 1314 Multigas Monitor	California Analytical Instruments, Inc.	C-237
159	4200 Vapor Detector	Electronic Sensor Technology	C-238
160	7100 Vapor Detector	Electronic Sensor Technology	C-240
161	CW Sentry 3G	Microsensor Systems, Inc.	C-242
162	SAW MiniCAD mkII	Microsensor Systems, Inc.	C-244
163	Portable Odor Monitor	Sensidyne, Inc.	C-246
164	SXC-20 VOC Monitor	Spectrex Corporation	C-247
165	HAZMATCAD Plus	Microsensor Systems, Inc.	C-248

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166	ECAM (Enhanced Chemical Agent Monitor)	Smiths Detection	C-250
167	SABRE 2000	Smiths Detection	C-252
168	Safeye Model 400 Gas Detection System	Spectrex, Inc.	C-253
169	LCD-3 Lightweight Chemical Agent Detector	Smiths Detection	C-254
170	ChemPro100	EnviroNics USA Inc.	C-255
171	BadgeRAE	RAE Systems Inc.	C-257
172	Civil Defense Kits	Nextteq, LLC	C-259
174	The HazMat Smart M-8 Simple Nerve Agent Detection	Safety Solutions Inc.	C-261
175	Dräger IMS 5100	Dräger Safety AG & Co. KGaA	C-263
176	Portable Isotopic Neutron-Spectroscopy Chemical Assay System	ORTEC	C-265
177	Sensit®Gold CGI	J and N Enterprises, Inc.	C-267
178	HazMat Kits	Nextteq, LLC	C-269
179	Aim Commander	Aim	C-271
180	Cyranose® 320	Smiths Detection	C-273
181	IlluminatIR ML Package	Smiths Detection	C-275
182	Airsense Model (GDA-II GDA-II-NA)	Airsense Analytics	C-277
183	MINICAMS Series 2001/3001 Continuous Air Monitoring Systems	CMS Field Products, Division of OI Analytical	C-280
184	Toxalert TOXCONTROL Gas Detection Systems, Tox-Control (Tox-C)	ToxAlert, Inc.	C-282
185	Griffin 300	ICx Griffin Analytical Technologies	C-283
186	Draeger Hazmat Kit	Draeger Safety, Inc.	C-285
187	Draeger Hazmat Simultest Kit	Draeger Safety, Inc.	C-287
188	CMS Analyzer	Draeger Safety, Inc.	C-289
189	Draeger CMS Emergency Response Kit	Draeger Safety, Inc.	C-291
190	Draeger Multi-IMS	Draeger Safety, Inc.	C-293
191	DAXEL 2C	MGP Instruments	C-294
192	Dräger GC-IMS 5700	Dräger Safety AG & Co. KGaA	C-296
193	Toxi Pro Gas Detector	Biosystems	C-298
194	Formaldemeter htV	Enmet Corporation	C-299
195	Model TS4000 Toxic Gas Detector	General Monitors	C-300
196	Griffin 400	ICx Griffin Analytical Technologies	C-302
197	KT1050 HazCat Tier 4 System	Haztech Systems, Inc.	C-304
198	HazCat® CommandCat Kit (Model KT1044)	Haztech Systems, Inc.	C-306

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199	MiniMAX Pro Portable Gas Detector	Honeywell Analytics Inc.	C-308
200	MiniMAX PID Portable Gas Detector	Honeywell Analytics Inc.	C-309
201	Sensit®Gold	J and N Enterprises, Inc.	C-310
202	Sensit®TKY	J and N Enterprises, Inc.	C-312
203	Sensit® HXG-3	J and N Enterprises, Inc.	C-313
204	Trak-It®III CGI	J and N Enterprises, Inc.	C-315
205	Sensit® HXG-2	J and N Enterprises, Inc.	C-317
206	Gas Trac®	J and N Enterprises, Inc.	C-318
207	Sensit® CO	J and N Enterprises, Inc.	C-319
208	Chameleon Chemical Detection System (Armband Model: 085100)	Morphix Technologies	C-321
209	Gastec Gas Sampling Pumps and Detector Tubes	Nextteq, LLC	C-323
210	Ahura First Defender Chemical ID System	Ahura Corporation	C-325
211	MSA Chemgard® Photoacoustic Infrared Gas Monitor Series	MSA Instrument Division	C-326
212	GasAlert Micro5 PID	BW Technologies by Honeywell	C-328
213	Narco AirClear Kits	Nextteq, LLC	C-330
214	Deluxe NarcoWipe Kit	Nextteq, LLC	C-332
215	Training/Certification Kit (Civil Defense Detector Tubes)	Nextteq, LLC	C-334
216	Training/Certification Kit (Civil Defense Detection Papers)	Nextteq, LLC	C-336
217	CP100T	EnviroNics USA Inc.	C-338
218	Shimadzu QP-2010 Plus GCMS System	Shimadzu Scientific Instruments	C-340
219	Shimadzu LCMS-2010A LCMS System	Shimadzu Scientific Instruments	C-341
220	Axima TOF(2) Maldi MS System	Shimadzu Scientific Instruments	C-342
221	GasID	Smiths Detection	C-343
222	Responder	Smiths Detection	C-345
223	Nerve Agent Vapour Detector (NAVD) (051010)	Anachemia Canada, Inc.	C-347
224	M28 (067230COM), M29 (062230COM), and M256A1 (063230COM) Chemical Agent Detector Simulator Training Kits	Anachemia Canada, Inc.	C-349
225	JUNO™	General Dynamics	C-351

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67	4000 QTRAP® LC/MS/MS System	Applied Biosystems/MDS Sciex	C-101
56	4000 Series Compact Portable Gas Detector	Interscan Corporation	C-85
159	4200 Vapor Detector	Electronic Sensor Technology	C-238
68	4700 Proteomics Analyzer with TOF/TOF™ Optics	Applied Biosystems/MDS Sciex	C-103
69	4800 MALDI TOF/TOF™ Analyzer	Applied Biosystems/MDS Sciex	C-105
160	7100 Vapor Detector	Electronic Sensor Technology	C-240
18	ABC-M8 VGH Chemical Agent Detector Paper	Truetech, Inc.	C-23
136	ACADA	Smiths Detection	C-209
89	ADLIF Fixed Continuous Chemical Detector (M276 E00 000)	Proengin SA	C-137
130	Advanced Portable Detector (APD) 2000	Smiths Detection	C-198
97	Agilent 6850; Agilent 6850 Series II Network GC; Agilent 6852—GSA	Agilent Technologies	C-151
98	Agilent 6890N	Agilent Technologies	C-153
114	Agilent 1200 Series LC	Agilent Technologies	C-175
99	Agilent 6890N-5975B GC/MSD	Agilent Technologies	C-154
210	Ahura First Defender Chemical ID System	Ahura Corporation	C-325
179	Aim Commander	Aim	C-271
182	Airsense Model (GDA-II GDA-II-NA)	Airsense Analytics	C-277
129	AirSentry-IMS® Ambient Air Analyzer	Particle Measuring Systems	C-196
26	AMC Series 1100 Portable Gas Detector	Armstrong Monitoring Corporation	C-35
90	AP2C Vapor and Liquid Agent Detector (M266 E10 000)	Proengin SA	C-139
91	AP2Ce Vapor and Liquid Agent Detector (M232 E10 000)	Proengin SA	C-141
92	AP2C-V Mobile Detector (M268 E00 000)	Proengin SA	C-143
93	APACC Chemical Control Alarm Portable Apparatus (M266 E10 000 and M452 E10 000)	Proengin SA	C-145
141	API 2000™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-216
140	API 3200™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-214
66	API 5000™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-99
142	API3000™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-218
143	API4000™ LC/MS/MS System	Applied Biosystems/MDS Sciex	C-220
72	AreaRAE Wireless Gas Detection System	RAE Systems Inc.	C-111

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96	Automatic Continuous Air Monitoring System (ACAMS)	Abb Process Analytics	C-149
106	Automatic Continuous Environmental Monitor (ACEM) 900	CDS Analytical, Inc.	C-164
81	Automatic Continuous Environmental Monitor (ACEM) 9305	CDS Analytical, Inc.	C-126
220	Axima TOF(2) Maldi MS System	Shimadzu Scientific Instruments	C-342
171	BadgeRAE	RAE Systems Inc.	C-257
103	Bruker Viking 573	Bruker Daltonics, Inc.	C-160
25	C16 PortaSens II Gas Detector	Analytical Technology, Inc.	C-33
131	Centurion	Smiths Detection	C-200
208	Chameleon Chemical Detection System (Armband Model: 085100)	Morphix Technologies	C-321
100	ChemDisk™ Diffusive Sampler	Assay Technology, Inc.	C-156
3	Chemical Agent Detector C2 Kit (021330)	Anachemia Canada, Inc.	C-3
2	Chemical Agent Liquid Detector, C8 (081030); Chemical Agent Liquid Detector, 3-Way (031010COM); Chemical Agent Liquid Detector, CM9 (091402COM)	Anachemia Canada, Inc.	C-1
132	Chemical Agent Monitor (CAM-2)	Smiths Detection	C-202
146	Chemical Biological Mass Spectrometer (CBMS)	Bruker Daltonics, Inc.	C-226
22	Chemkey TLD Toxic Gas Monitor	Honeywell Analytics Inc.	C-27
170	ChemPro100	EnviroNics USA Inc.	C-255
10	ChomAir Badges	Morphix Technologies	C-13
172	Civil Defense Kits	Nextteq, LLC	C-259
4	CM256A1 Detector Kit (021330)	Anachemia Canada, Inc.	C-5
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110	CMS200	INFICON	C-170
217	CP100T	EnviroNics USA Inc.	C-338
105	CT-1128 Portable GC-MS	Constellation Technology Corporation	C-162
161	CW Sentry 3G	Microsensor Systems, Inc.	C-242
180	Cyranose® 320	Smiths Detection	C-273
191	DAXEL 2C	MGP Instruments	C-294
214	Deluxe NarcoWipe Kit	Nextteq, LLC	C-332
6	Draeger CDS Kit	Draeger Safety, Inc.	C-7

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186	Draeger Hazmat Kit	Draeger Safety, Inc.	C-285
187	Draeger Hazmat Simultest Kit	Draeger Safety, Inc.	C-287
190	Draeger Multi-IMS	Draeger Safety, Inc.	C-293
192	Dräger GC-IMS 5700	Dräger Safety AG & Co. KGaA	C-296
175	Dräger IMS 5100	Dräger Safety AG & Co. KGaA	C-263
112	Dual-Flame Photometric Detector	SRI Instruments, Inc.	C-172
166	ECAM (Enhanced Chemical Agent Monitor)	Smiths Detection	C-250
194	Formaldemeter htV	Enmet Corporation	C-299
48	Gas Badge Plus	Industrial Scientific Corporation	C-71
50	Gas Badge Pro	Industrial Scientific Corporation	C-75
206	Gas Trac®	J and N Enterprises, Inc.	C-318
31	GasAlert	BW Technologies by Honeywell	C-39
33	GasAlert Micro	BW Technologies by Honeywell	C-43
212	GasAlert Micro5 PID	BW Technologies by Honeywell	C-328
32	GasAlertMax	BW Technologies by Honeywell	C-41
221	GasID	Smiths Detection	C-343
209	Gastec Gas Sampling Pumps and Detector Tubes	Nextteq, LLC	C-323
82	Genesis Portable Gas Monitor	Thermo Fisher Scientific	C-128
133	GID-2A™ Chemical Warfare Agent Detection System	Smiths Detection	C-204
135	GID-3 (24/7) Chemical Warfare Agent Detection System	Smiths Detection	C-208
134	GID-3™ Chemical Agent Detection System	Smiths Detection	C-206
185	Griffin 300	ICx Griffin Analytical Technologies	C-283
196	Griffin 400	ICx Griffin Analytical Technologies	C-302
83	GT Series Portable Gas Monitor	Thermo Fisher Scientific	C-130
107	Hapsite®	INFICON	C-166
118	HAWK Long Range Chemical Detector	Bruker Daltonics, Inc.	C-179
46	Haz-Alert Gas Detector	Grace Industries	C-68
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7	HazCat® Industrial Chemical and Mehamphetamine Identification Kit (Model KT1220)	Haztech Systems, Inc.	C-9

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178	HazMat Kits	Nextteq, LLC	C-269
64	HAZMATCAD Chemical Agent Detector	MSA Instrument Division	C-97
165	HAZMATCAD Plus	Microsensor Systems, Inc.	C-248
65	HAZMATCAD Plus Chemical Agent Detector	MSA Instrument Division	C-98
122	HazMatID	Smiths Detection	C-185
181	IlluminatIR ML Package	Smiths Detection	C-275
80	Improved Automatic Continuous Environmental Monitor (IACEM) 980	CDS Analytical, Inc.	C-124
126	IMS 2000E Chemical Warfare Agent Detector	Bruker Daltonics, Inc.	C-190
101	Infrared Detector for Gas Chromatograph	Analytical Solutions and Providers (ASAP)	C-158
157	Innova Type 1314 Multigas Monitor	California Analytical Instruments, Inc.	C-237
156	Innova Type 1412 Multigas Monitor	California Analytical Instruments, Inc.	C-236
55	IQ-250 Single Gas Detector	International Sensor Technology	C-84
49	iTX Multi-Gas Monitor	Industrial Scientific Corporation	C-73
120	Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)	General Dynamics	C-181
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12	Kitagawa Gas Detector Tubes	Matheson Safety Products	C-16
197	KT1050 HazCat Tier 4 System	Haztech Systems, Inc.	C-304
169	LCD-3 Lightweight Chemical Agent Detector	Smiths Detection	C-254
19	M18A3 Chemical Agent Detector Kit	Truetech, Inc.	C-24
121	M21 Automatic Chemical Agent Alarm	General Dynamics (ECBC)	C-183
20	M272 Water Kit	Truetech, Inc.	C-25
224	M28 (067230COM), M29 (062230COM), and M256A1 (063230COM) Chemical Agent Detector Simulator Training Kits	Anachemia Canada, Inc.	C-349
54	M40 Multi-Gas	Industrial Scientific Corporation	C-82
21	M9 Chemical Agent Detector Paper	Truetech, Inc.	C-26
138	M90-D1-C Chemical Warfare Agent Detector	Envionics USA Inc.	C-211
125	Metrohm Model 861 Advanced Compact IC System	Metrohm-Peak, Inc.	C-188

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87	MicroMAX Plus Portable Gas Detector	Honeywell Analytics Inc.	C-134
77	Mini SA Single Gas Personal Monitor	Scott Health & Safety	C-121
183	MINICAMS Series 2001/3001 Continuous Air Monitoring Systems	CMS Field Products, Division of OI Analytical	C-280
200	MiniMAX PID Portable Gas Detector	Honeywell Analytics Inc.	C-309
199	MiniMAX Pro Portable Gas Detector	Honeywell Analytics Inc.	C-308
86	MiniMAX X4 Portable Gas Detector	Honeywell Analytics Inc.	C-133
85	MiniMAX XP Portable Gas Detector	Honeywell Analytics Inc.	C-132
84	MiniMAX XT Disposable Gas Detector	Honeywell Analytics Inc.	C-131
152	MiniRAE 2000	RAE Systems Inc.	C-231
35	Miniwarn Gas Detector	Draeger Safety, Inc.	C-47
124	Miran SapphIRe Portable Ambient Air Analyzer	Thermo Fisher Scientific	C-187
44	Model TS400 Toxic Gas Detector	General Monitors	C-65
195	Model TS4000 Toxic Gas Detector	General Monitors	C-300
45	Model TS420 Oxygen Deficiency Detector	General Monitors	C-67
211	MSA Chemgard® Photoacoustic Infrared Gas Monitor Series	MSA Instrument Division	C-326
70	MultiCheck 2000 Multi-Gas Monitor	Quest Technologies, Inc.	C-107
71	MultiLog 2000 Multi-Gas Monitor	Quest Technologies, Inc.	C-109
73	MultiRAE Plus Gas Detector (PGM-50 Detector)	RAE Systems Inc.	C-113
40	MX-2100 Portable Gas Detector with 5-Gas Capability	Enmet Corporation	C-57
213	Narco AirClear Kits	Nextteq, LLC	C-330
223	Nerve Agent Vapour Detector (NAVD) (051010)	Anachemia Canada, Inc.	C-347
15	NextStep Plus Portable Toxic Monitor	Scott Health & Safety	C-19
14	No. 1 Mark 1 Detector Kit	Richmond Packaging (UK) Limited	C-18
39	Omni-4000 Gas Detector	Enmet Corporation	C-55
34	Pac 7000 Personal Gas Alarm	Draeger Safety, Inc.	C-45
37	Pac III Single Gas Detector	Draeger Safety, Inc.	C-51
115	Perkin-Elmer Turbo LC Plus HPLC System	Perkin-Elmer LAS Inc.	C-176
27	PhD5 Personal Gas Detector	Biosystems	C-37
176	Portable Isotopic Neutron-Spectroscopy Chemical Assay System	ORTEC	C-265
163	Portable Odor Monitor	Sensidyne, Inc.	C-246

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74	QRAE Plus Hand Held 4 Gas Monitor (Model 2000 Monitor)	RAE Systems Inc.	C-115
144	QSTAR® XL Hybrid LC/MS/MS System	Applied Biosystems/MDS Sciex	C-222
139	Questor Continuous Multiple Chemical Agent Monitoring System	Abb Analytical	C-213
38	RAM 2000™	EDO Corporation	C-53
127	Rapid Alarm and Identification Device-Mobile (RAID-M)	Bruker Daltonics, Inc.	C-192
222	Responder	Smiths Detection	C-345
167	SABRE 2000	Smiths Detection	C-252
11	SafeAir Monitoring System	Morphix Technologies	C-14
168	Safeye Model 400 Gas Detection System	Spectrex, Inc.	C-253
113	Saturn 2000 GC/MS	Varian Instruments	C-173
162	SAW MiniCAD mkII	Microsensor Systems, Inc.	C-244
78	Scout Multi-Gas Personal Monitor	Scott Health & Safety	C-122
79	SensAlarm	Sensidyne, Inc.	C-123
17	Sensidyne Gas Detection Tubes	Sensidyne, Inc.	C-21
207	Sensit® CO	J and N Enterprises, Inc.	C-319
205	Sensit® HXG-2	J and N Enterprises, Inc.	C-317
203	Sensit® HXG-3	J and N Enterprises, Inc.	C-313
201	Sensit®Gold	J and N Enterprises, Inc.	C-310
177	Sensit®Gold CGI	J and N Enterprises, Inc.	C-267
202	Sensit®TKY	J and N Enterprises, Inc.	C-312
116	Shimadzu LC-20A HPLC System	Shimadzu Scientific Instruments	C-177
219	Shimadzu LCMS-2010A LCMS System	Shimadzu Scientific Instruments	C-341
218	Shimadzu QP-2010 Plus GCMS System	Shimadzu Scientific Instruments	C-340
63	SIRIUS Multigas PID Detector	MSA Instrument Division	C-96
62	Solaris® Multigas Detector	MSA Instrument Division	C-94
41	Spectrum SP	Enmet Corporation	C-59
24	SPM Toxic Gas Monitor	Honeywell Analytics Inc.	C-31
128	Stationary Rapid Alarm & Identification Device (RAID-S)	Bruker Daltonics, Inc.	C-194
16	SureSpot Active Sampler	Scott Health & Safety	C-20
164	SXC-20 VOC Monitor	Spectrex Corporation	C-247
51	T40 Rattler Single-Gas Monitor	Industrial Scientific Corporation	C-77
52	T82 Single Gas Monitor	Industrial Scientific Corporation	C-78
42	Target Gas Detector	Enmet Corporation	C-61

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GENERAL

Chemical Agent Liquid Detector, C8 (081030); Chemical Agent Liquid Detector, 3-Way (031010COM); Chemical Agent Liquid Detector, CM9 (091402COM)

Anachemia Canada, Inc.
255 Norman
Lachine, Quebec, Canada
H8R 1A3

Liane Mendelsohn
514-489-5711 (Tel)
514-485-9825 (Fax)

Information Source:

<http://www.anachemia.com/engnew/frame/product10.html>
Chemical Detection Equipment Market Survey for
Emergency Responders, September 23, 1998 (SBCCOM)

Status: Vendor response—12/6/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: C8 (up to 500—\$9.37; 501 to 1000—\$9.27)

3-Way (up to 500—\$6.57; 501 to 1000—\$6.37)

CM9 (up to 500—\$21.57; 501 to 1000—\$20.57)

Availability: 12 wk lead time for C8 and 3-Way; and 16 wk lead time for CM9. Lead times are shorter when items are in stock. C8 is equivalent commercial product to M8; CM9 is equivalent commercial product to M9.

Description: Color Change Chemistry—The Chemical Agent Liquid Detector papers were designed to meet the need for a simple, rapid method of detecting and differentiating between the 3 major groups of liquid CAs. The detectors papers can quickly determine the presence of G, V, or H agents in liquid. The test consists of : (1) Detaching a piece of paper from a booklet or dispenser roll.

Type: Military

Current Users: In service with the Armed Forces of all NATO countries

OPERATIONAL PARAMETERS

CAs Detected: G, V, or H

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Immediate	Detection State: Liquid
Response Time: Immediate	Alarms: Visual alarm M8 (3 colors specific to each G, H, or V agents) M9 (1 color signifying G, H or V agents present) 3-Way (3 colors specific to each G, H or V agents)
Sensitivity: H, G, and V agents in 0.02 mL droplets	Selectivity: Color change may occur with some solvents and solvent/base mixtures

PHYSICAL PARAMETERS

Size: M8 Booklet—25 sheets [10 cm x 6.5 cm (3.9 in x 2.6 in)]

M9 Roll—Dispenser box [7.5 cm x 7.5 cm x 6 cm (3 in x 3 in x 2.4 in)] containing 10 m (32.8 ft) of paper

3-Way Booklet—12 sheets [10 cm x 6.5 cm (3.9 in x 2.6 in)]

Weight: Less than 0.5 kg (1 lb)

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed to operate in harsh environments.

Environmental Considerations: Operates in all environments

Shelf Life: M8—Not applicable; M9—3 yr; 3-Way—Not applicable

Consumables: Sheets of paper

Calibration Requirements: None

Repairs: None

Repair Options: Not specified

Maintenance Costs: Less than \$10

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Not specified

Manuals Available: User manual

Support Equipment: None

Communications Capability: None

Tamper Resistance: None

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Chemical Agent Detector C2 Kit (021330)

Anachemia Canada, Inc.
255 Norman
Lachine, Quebec, Canada
H8R 1A3

Liane Mendelsohn
514-489-5711 (Tel)
514-485-9825 (Fax)

Information Source:

<http://www.anachemia.com/engnew/frame/product10.html>

Army Materiel Command (AMC)-Regulation 385-131,
Army Technical Manual 3-6665-307-10

Status: Vendor response—12/6/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: Up to 50—\$793.12; 51 to 100—\$721.37

Availability: Commercially available (12 wk). Lead times are shorter when items are in stock.

Description: Color Change Chemistry—The Chemical Agent Detector Kit C-2 is designed for issue to a small unit. It is easily operated by one person with a minimum amount of training. The kit may be used for: Determining the presence or absence of Cas, identifying Cas, collecting vapor samples of unknown CAs for laboratory identification, identifying when it is safe to unmask for either short (1/2 h) or long (12 h) periods, and testing for the presence or absence of chemical agents after decontamination operations.

The kit consists of:

- A vinyl coated carrying case designed to withstand severe environmental conditions
- Chemical agent liquid detectors
- Chemical agent vapor detectors
- White band detector tubes
- Plain detector tubes
- Three bottles of chemical reagents
- Air sampling pump
- Other miscellaneous items

Type: Military

Current Users: Fire departments, emergency management agencies, and hazmat teams

OPERATIONAL PARAMETERS

CAs Detected: Nerve agents (GA, GB, GD, and VX) and blister agents (H, HN, T, and CX)

TICS Detected:

- **High Priority:** Blood agents (AC, CK) and choking agents (CG)
- **Medium Priority:** None
- **Low Priority:** Cyanogen chloride

Start-up Time: 3 min to 5 min (inexperienced); 1 min to 3 min (experienced)

Response Time: 20 min to 25 min (experienced and inexperienced)

Detection State: Vapor; aerosol, and liquid (using the component Liquid Chemical Agent Detector Paper)

Alarms: Visual alarm (as per instruction cards contained within the kit)

Sensitivity: GB at 0.001 ppm
VX at 0.002 ppm
H agents at 0.6 ppm
L at 2 ppm
Hydrogen cyanide at 6.2 ppm

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 23 cm x 15 cm x 7 cm (9 in x 5.9 in x 2.8 in)

Weight: 0.5 kg (1 lb)

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed to operate in harsh environments.

Environmental Considerations: Operates in all environments

Shelf Life: 5 yr	Consumables: None
Calibration Requirements: None	Repairs: None
Repair Options: Not specified	Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: High school education (to read and understand operator instructions). Training (performance oriented—practice on at least 6 training sampler detector tickets).

Training Required: A minimum of 4 h to 6 h of performance oriented training is recommended

Training Available: Yes, by distributor— GEOMET Technologies, Inc.

Manuals Available: Instructions are printed on each sampler/detector ticket pouch. A detailed instruction card is attached to each carrying case with waxed cord.

Support Equipment: Training kit	Communications Capability: None
Tamper Resistance: None	Warranty: 5 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

CM256A1 Detector Kit (021330)

Anachemia Canada, Inc.
255 Norman
Lachine, Quebec, Canada
H8R 1A3

Liane Mendelsohn
514-489-5711 (Tel)
514-485-9825 (Fax)

Information Source:

<http://www.anachemia.com/engnew/frame/product10.html>
Chemical Detection Equipment Market Survey for
Emergency Responders, September 23, 1998 (SBCCOM)

Status: Vendor response—12/6/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: Up to 25—\$219.47; 26 to 50—\$204.17

Availability: Equivalent commercial product to M256A1. 12 wk lead time. Lead times are shorter when items are in stock.

Description: Color Change Chemistry—The M256A1 Chemical Agent Detector Kit is a compact, simple-to-use kit designed to detect blister, nerve, blood and lewisite agents.

The kit consists of: A plastic carry case with velcro closure, a booklet of M8 test paper sealed in a plastic bag, attached instruction cards, and 12 pouches containing the chemical agent detector samplers

The test is carried out by following the simple instructions printed on the sampler packet. The test consists of:

1. Activating the sampler by breaking the integral crushable ampoules and releasing test reagents.
2. Exposing the activated test disc to ambient air.
3. Comparing the observed color change to the color chart in the instructions, thereby determining the presence or absence of chemical agents.

Type: Military

Current Users: In service with the Armed Forces of all NATO countries

OPERATIONAL PARAMETERS

CAs Detected: GB, GD, VX, HD, H, and L

TICS Detected:

- **High Priority:** Blood agents (AC and CK)
- **Medium Priority:** None
- **Low Priority:** Cyanogen chloride

Start-up Time: Immediate	Detection State: Vapor and liquid
Response Time: 15 min to 25 min	Alarms: Visual alarm (as per instruction cards contained within the kit)
Sensitivity: HD at 0.31 ppm GB at 0.0008 ppm VX at 0.002 ppm L at 1 ppm Hydrogen cyanide at 7.13 ppm Cyanogen chloride at 3.13 ppm	Selectivity: Some smokes, high temperatures, DS2, and petroleum products may cause false readings

PHYSICAL PARAMETERS

Size: Detector—12.5 cm x 9.5 cm x 1.5 cm (4.9 in x 3.7 in x 0.6 in) l,w,t

Kit—17.5 cm x 12.5 cm x 7.5 cm (6.9 in x 4.9 in x 3 in) w,h,d

Weight: Less than 0.5 kg (1 lb)

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed to operate in harsh environments.

Environmental Considerations: Operates in all environments

Shelf Life: 5 yr	Consumables: M256A1 kit
Calibration Requirements: None	Repairs: None
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Nonformal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: M8 paper	Communications Capability: None
Tamper Resistance: None	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Draeger CDS Kit

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>
 Testing of Commercially Available Detectors Against
 CWAs: Summary Report, February 1999 (SBCCOM)
Status: Vendor response—11/21/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: \$3.4K per complete CDS Kit

Availability: Commercially available

Description: Color Change Chemistry—Draeger colorimetric tubes (Thioether and Phosphoric Acid Ester)

Type: Military and commercial

Current Users: U.S. Army, Navy Regional Fire/Rescue, and fire departments (New York City; Kansas City, and Missouri)

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, DFP, DDVP, and Metasystox

TICS Detected:

- **High Priority:** Arsine, chlorine, hydrogen cyanide, and phosgene
- **Medium Priority:** None
- **Low Priority:** DA, DX, DC, DM at 3 mg/m³

Start-up Time: 1 min

Detection State: Vapor and aerosol

Response Time: 5 min

Alarms: Visual alarm

Sensitivity: GA at 0.025 ppm (as Dichlorovos)

Selectivity: Responds only to chemical agents and TIMs

GB at 0.025 ppm (as Dichlorovos)

GD at 0.025 ppm (as Dichlorovos)

VX at 0.025 ppm (as Dichlorovos)

Sulfur Mustard (HD) at 1 mg/m³

Nitrogen Mustards (HN-1) at 1 mg/m³

Lewisite (L) at 3 mg/m³

Phosgene at 0.2 ppm

Chlorine at 0.2 ppm

Arsine at 0.1 ppm

Hydrogen cyanide (HCN) at 1 ppm

Cyanogen chloride (CK) at 0.25 ppm (v)

DA, DX, DC, and DM @ 3 mg/m³

PHYSICAL PARAMETERS

Size: Kit—49 cm x 39 cm x 19 cm (19.25 in x 15.5 in x 7.5 in)

Weight: <6.8 kg (15 lb)

Power Requirements: None

LOGISTICAL PARAMETERS

Shelf Life: CDS test sets—2 yr shelf life

Consumables: CDS Test Sets

Calibration Requirements: None

Repairs: None

Durability: Contained in durable case with foam inserts for protection

Environmental Considerations: May be used under normal environmental conditions

Maintenance Costs: None

Repair Options: No loaners, but rental program is available; 24 h turn-around time (\$20) or 72 h turn-around time (\$10) to look at the equipment but not repaired and returned. Rental program for most all (not for IMS).

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: 60 min of training is required

Training Available: Yes; operator training CD (CDS)

Manuals Available: User manual and color comparison charts

Support Equipment: Can be provided with Quantimeter 1000 Automatic Pump; CDS Training Sets

Communications Capability: None

Tamper Resistance: None

Warranty: Accuro bellows pump—5 yr warranty

CDS Sets—2 yr according to expiration date

Testing Information: Has been tested by the Edgewood Chemical and Biological Center (ECBC)

Applicable Regulations: None

GENERAL

HazCat® Industrial Chemical and Methamphetamine Identification Kit (Model KT1220)

Haztech Systems, Inc.
 PO Box 929
 Mariposa, California 95338
 Dawn L. Plunkett
 800-543-5487 (Tel)
 209-966-8089 (Fax)
 sales@hazcat.com
Information Source: <http://www.hazcat.com>



Status: Vendor response—11/21/2006

Portability: Handheld Stationary (can air ship)

Technology: Field reagent chemistry

Unit Cost: \$3.64K plus shipping and handling

Availability: 1 d to 10 d delivery

Description: Industrial Chemical and Methamphetamine ID Kit—Qualitative analysis, field reagent chemistry

Type: Commercial

Current Users: FBI, DoD, police departments, fire departments, hazmat teams, military, and commercial users, nationwide

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** All
- **Medium Priority:** All
- **Low Priority:** All

Start-up Time: 15 min or less

Detection State: Solid and liquid

Response Time: 30 min or less

Alarms: None

Sensitivity: Below IDLH

Selectivity: Minimal

PHYSICAL PARAMETERS

Size: 51 cm x 23 cm x 46 cm (20 in x 9 in x 18 in)

Weight: 13.6 kg (30 lb)

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Waterproof, sealed, rugged pelican case

Calibration Requirements: None

Shelf Life: 90 % indefinitely; 10 % 1 yr to 3 yr

Repairs: None

Maintenance Costs: \$100 per yr when continually use d

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity); preferable to maintain above 0 °C (32 °F)

Consumables: Disposable test tubes, pipettes, scoops, test strips, and reagents

Repair Options: If system is down (contamination) will ship another unit to replace the unit. If unit cannot be repaired or decontaminated, will ship another at additional cost. SRTAS (culmination of all kits in one response vehicle). 24 h technical service.

SPECIAL REQUIREMENTS

Operator Skills: High school education

Training Required: Yes

Training Available: #S1753 4 d HazCat, \$750 per person

Communications Capability: Not applicable

Support Equipment: Yes

Warranty: 1 yr parts and labor

Manuals Available: User manual and MSDS manual, flow charts, and field sheet packets

Tamper Resistance: Equipment supplied in convenient, lockable, and durable plastic case

Testing Information: Available on request, included with kit users manuals

Applicable Regulations: Title 29 CFR 1910.120 Req. for I.D., IATA shipping confirmation. DOT Title 49 CFR 173.4, IATA Reg. 2.7, 2.7.5

GENERAL

HazCat® MicroCat/WMD Kit (Model KT1040)

Haztech Systems, Inc.
 PO Box 929
 Mariposa, California 95338
 Dawn L. Plunkett
 800-543-5487 (Tel)
 209-966-8089 (Fax)
 sales@hazcat.com
Information Source: <http://www.hazcat.com>
Status: Vendor response—11/21/2006



Portability: Handheld Stationary

Technology: Microscopy

Unit Cost: \$22K plus shipping and handling

Availability: 30 d delivery

Description: CA qualitative analysis, field portable digital phased microscopy

Type: Military and commercial

Current Users: U.S. Government agencies, CSTs, Marine Corp Air Station, Dugway, police and fire departments in CA, NJ, NC, UT, AZ, GA, NV, NY, OH, PA, and Washington DC

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

BAs Detected: The MicroCat can detect any BA visible in the field of view

Start-up Time: 15 min	Detection State: Solid and liquid
Response Time: 30 min	Alarms: None
Sensitivity: Not specified	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 36 cm x 48 cm x 61 cm (14 in x 19 in x 24 in)	Weight: 22.6 kg (50 lb)
Power Requirements: Rechargeable battery (2 D cell—8 h) or ac	

LOGISTICAL PARAMETERS

Durability: Rugged high impact case, foam lined	Shelf Life: Indefinitely
Calibration Requirements: None	Repairs: None

Maintenance Costs: \$200 per yr

Consumables: Disposable test tubes, pipettes, scoops, test strips, reagents, slides, covers, and stains

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity); preferable to maintain above 0 °C (32 °F)

Repair Options: If system is down (contamination) will ship another unit to replace the unit. If unit cannot be repaired or decontaminated, will ship another at additional cost. SRTAS (culmination of all kits in one response vehicle). 24 h technical service.

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required	Training Required: Yes
Manuals Available: Yes	Tamper Resistance: End user may secure with padlocks
Warranty: 1 yr parts and labor	Testing Information: Available on request

Training Available: Yes, #S1803, 4 d HazCat Workshop \$750 per person

Support Equipment: Yes (wireless digital image transmission equipment for remote MicroCat image transmission)

Communications Capability: Cables supplied for camera; computer interface

Applicable Regulations: Title 29 CFR 1910.120 Req. for I.D., IATA shipping confirmation

GENERAL

HazCat® WMD Kit (Model KT1235)

Haztech Systems, Inc.
 PO Box 929
 Mariposa, California 95338
 Dawn L. Plunkett
 800-543-5487 (Tel)
 209-966-8089 (Fax)
 sales@hazcat.com
Information Source: <http://www.hazcat.com>

Status: Vendor response—11/21/2006



Portability: Handheld Stationary (can air ship)

Unit Cost: \$4.16K plus shipping and handling

Availability: 1 d to 10 d delivery

Description: Screening/Immunochemical

Type: Military and commercial

Current Users: Civil support teams, police, fire departments, FBI, FedEx, and armed services

Technology: Screening

OPERATIONAL PARAMETERS

CAs Detected: G-, V-, and GV-series; binary components (chlorosarin, chlorosaman, etc.); carbamates; dusty and thickened mustard and nerve agents; enhanced commercial pesticides; sulfur-based, arsenic-based, and nitrogen-based

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

BAs Detected: Detects amino acid and protein; screens pesticides; immunoassay tests for anthrax, ricin, and botulinum toxin

Start-up Time: 15 min	Detection State: Solid and liquid
Response Time: 30 min	Alarms: None
Sensitivity: VX at 0.25 ppm GA at <0.5 ppm GB at <0.13 ppm HN at <40 mg HD at <40 mg	Selectivity: Minimal—has a few noncritical interferants

PHYSICAL PARAMETERS

Size: 50 cm x 29 cm x 30 cm (19.5 in x 11.5 in x 11.8 in)	Weight: 10.9 kg (24 lb)
Power Requirements: None (9 V battery for radiation monitor)	

LOGISTICAL PARAMETERS

Durability: Able to operate normally after being moved without regard to handling

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity); preferable to maintain above 0 °C (32 °F)

Shelf Life: 90 % indefinitely; 10 % 1 yr to 3 yr

Consumables: Disposable test tubes, pipettes, scoops, test strips, slides, and reagents

Calibration Requirements: None (factory calibrate radiation monitor annually)

Repairs: Test reagents every few months

Repair Options: If system is down (contamination) will ship another unit to replace the unit. If unit cannot be repaired or decontaminated, will ship another at additional cost. SRTAS (culmination of all kits in one response vehicle). 24 h technical service.

Maintenance Costs: \$100 per yr

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: Yes

Training Available: Yes, #S1803, 4 d HazCat Workshop \$750 per person

Manuals Available: User manual and MSDS manual, flow charts, and field sheet packets

Support Equipment: No

Communications Capability: Not applicable

Tamper Resistance: Not applicable

Warranty: 1 yr parts and labor

Testing Information: Available on request

Applicable Regulations: Title 29 CFR 1910.120 Req. for I.D., IATA shipping confirmation

GENERAL

ChomAir Badges

Morphix Technologies
 2557 Production Road
 Virginia Beach, Virginia 23454
 Customer Service
 800-808-2234 (Tel)
 757-216-6209 (Fax)
 customerservice@morphtec.com
Information Source: <http://www.morphtec.com>
Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Color Change Chemistry

Unit Cost: Detection badges are sold in boxes of 10 for \$110

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial and military

Current Users: NASA, DOW, BASF, DuPont, etc.

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, formaldehyde, and hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** None

Start-up Time: <30 s	Detection State: Vapor or gas
Response Time: 2 min	Alarms: Visual alarm
Sensitivity: Ammonia at 4 ppm•h Chlorine at 0.4 ppm•h Formaldehyde 0.3 ppm•h Hydrogen sulfide at 1 ppm•h Carbon monoxide at 10 ppm•h	Selectivity: Has a few noncritical interferents

PHYSICAL PARAMETERS

Size: 10 cm x 5.5 cm x 0.2 cm (4.1 in x 2.2 in x 0.1 in)	Weight: 11 g (0.38 oz)
Power Requirements: None	

LOGISTICAL PARAMETERS

Durability: Very rugged—able to operate with rough handling

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity)

Shelf Life: Badges may be stored at ambient conditions 20 °C to 27 °C (68 °F to 81 °F) in original container for 3 mo or stored refrigerated or frozen for up to 1 yr

Consumables: Badges	Calibration Requirements: None
Repairs: None	Repair Options: Badges are disposable
Maintenance Costs: None	

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background; no special skills or training required

Training Required: Less than 5 min of training is required	Training Available: Yes, if needed
Manuals Available: User manual	Communications Capability: None
Tamper Resistance: Not applicable	Support Equipment: Strap clip to hold badge to clothing

Warranty: Guaranteed accurate throughout the shelf life period. Labeled with expiration date.

Testing Information: Each badge has its own validation report

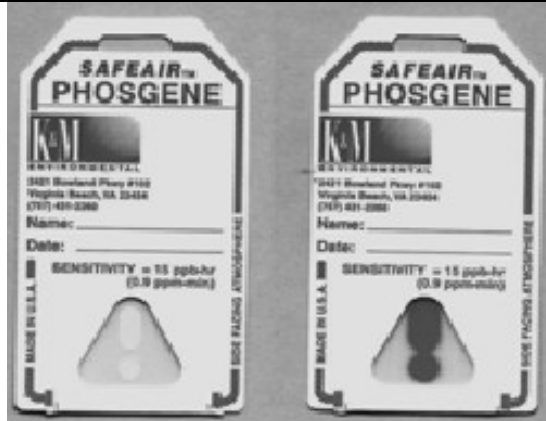
Applicable Regulations: Meets NIOSH accuracy requirements

GENERAL

SafeAir Monitoring System

Morphix Technologies
 2557 Production Road
 Virginia Beach, Virginia 23454
 Customer Service
 800-808-2234 (Tel)
 757-216-6209 (Fax)
 customerservice@morphtec.com
Information Source: <http://www.morphtec.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Color Change Chemistry

Unit Cost: Boxes of 50 are approximately \$125

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial and military

Current Users: NASA, DOW, BASF, DuPont, etc.

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, chlorine, diborane, formaldehyde, hydrogen chloride, hydrogen sulfide, phosgene, and sulfur dioxide
- **Medium Priority:** Acrolein, carbon monoxide, 1,2-dimethylhydrazine, methyl chloroformate, methyl hydrazine, methyl isocyanate, nitrogen dioxide, phosphine, and toluene-diisocyanate
- **Low Priority:** None

Start-up Time: <30 s	Detection State: Vapor or gas
Response Time: 2 min	Alarms: Visual alarm
Sensitivity: Ammonia at 4 ppm•h Arsine at 18 ppb•h Chlorine at 0.18 ppm•h Diborane at 5 ppb•h Formaldehyde 0.4 ppm•h Hydrogen chloride at 2 ppm Hydrogen sulfide at 2 ppm•h Phosgene at 15 ppb•h Sulfur dioxide at 0.2 ppm•h Carbon monoxide at 7 ppm•h 1,2 dimethylhydrazine at 10 ppb•h Methyl hydrazine at 6 ppb•h Methyl chloroformate at 1.5 ppm•min Methyl isocyanate at 3.5 ppb•h Nitrogen dioxide at 1 ppm•h Phosphine at 5 ppb•h	Selectivity: Has a few noncritical interferents

PHYSICAL PARAMETERS

Size: 7.3 cm x 4 cm x 0.1 cm (2.9 in x 1.6 in x 0.04 in)

Weight: 1.5 g (0.05 oz)

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Very rugged—able to operate with rough handling

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity)

Shelf Life: Badges have a 1 yr refrigerated or frozen shelf life or a 3 mo room temperature shelf life

Consumables: Badges

Calibration Requirements: None

Repairs: None

Repair Options: Badges are disposable

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: No special skills or training required

Training Required: Less than 2 min of training is required

Training Available: Not specified

Manuals Available: Operating instructions included in each box

Support Equipment: Strap clip needed to hold badge to clothing

Communications Capability: None

Tamper Resistance: Not applicable

Warranty: Guaranteed accurate throughout the shelf life period. Labeled with expiration date.

Testing Information: Each badge has its own validation report

Applicable Regulations: Meets NIOSH accuracy requirements

GENERAL

Kitagawa Gas Detector Tubes

Matheson Safety Products
 166 Keystone Drive
 Montgomeryville, Pennsylvania 18936
 800-828-4313 (Tel)
 215-619-0458 (Fax)
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)

Status: Vendor response—11/30/2006



Portability: Handheld Portable

Unit Cost: Less than \$400

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial

Current Users: Not specified

Technology: Color Change Chemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Arsine, NH₃, CS₂, Cl₂, B₂, ethylene oxide, formaldehyde, H₂S, nitric acid, phosgene, SO₂, HCN, HCl, HF, and NO₂
- **Medium Priority:** CO, allyl alcohol, carbonyl sulfide, H₂Se, and phosphine
- **Low Priority:** Bromine

Start-up Time: 15 s	Detection State: Vapor
Response Time: <60 s	Alarms: Visual alarm
Sensitivity: Arsine and phosphine at 0.02 ppm Ammonia, nitrogen dioxide, bromine, and sulfur dioxide at 0.1 ppm Carbon disulfide at 0.3 ppm; Chlorine and diborane at 0.01 ppm Ethylene oxide, hydrogen selenide, and nitric acid at 0.5 ppm Formaldehyde, hydrogen sulfide, and phosgene at 0.05 ppm Hydrogen cyanide, hydrogen chloride, and hydrogen fluoride at 0.2 ppm Carbon monoxide at 1 ppm Allyl alcohol at 5 ppm Carbonyl sulfide at 2 ppm	Selectivity: Some interferences: contact vendor for detailed list

PHYSICAL PARAMETERS

Size: 20.3 cm x 5 cm (8 in x 2 in) diameter

Weight: <0.5 kg (<1 lb)

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Robust

Environmental Considerations: Operates in all environments

Shelf Life: 3 mo to 3 yr

Consumables: Specific detector tubes

Calibration Requirements: None

Repairs: None

Repair Options: Disposable

Maintenance Costs: Less than \$50 per unit per yr

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Not specified

Manuals Available: User manual

Support Equipment: Sampling pump

Communications Capability: None

Tamper Resistance: None

Warranty: 5 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

No. 1 Mark 1 Detector Kit

Richmond Packaging (UK) Limited
New Road
Winsford, Cheshire CW7 2NY
United Kingdom
441-606-557422 (Tel)

Information Source: Chemical Detection Equipment
Market Survey for Emergency Responders, September 23,
1998 (SBCCOM)

Status: Vendor response—11/1/2005

Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: <\$500

Availability: Commercial and military

Description: Color Change Chemistry

Type: Military

Current Users: In service with the U.K. armed forces

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, and HN

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 3 min	Detection State: Vapor and aerosol
Response Time: Temperature and agent concentration dependant	Alarms: Visual alarm
Sensitivity: GB and GD at 0.003 ppm VX at 0.004 ppm HD at 0.008 ppm HN at 0.04 ppm GA at 0.004 ppm	Selectivity: False positives with Cl ₂ at concentrations greater than 10 ppm to 20 ppm and SO ₂ at concentrations greater than 3 ppm; or if there is very dense and acrid wood smoke

PHYSICAL PARAMETERS

Size: 15 cm x 13 cm x 5 cm (5.9 in x 5.1 in x 2 in)	Weight: 340 g (12 oz)
Power Requirements: None	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: Not specified
Shelf Life: 4 yr in temperate climates. Laboratory kits show no significant decrease in chemical reactivity after 10 yr.	Consumables: Tickets and chemicals
Calibration Requirements: None	Repairs: None
Repair Options: Not specified	Maintenance Costs: Spare tickets and chemicals available

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: None	Communications Capability: None
Tamper Resistance: None	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

NextStep Plus Portable Toxic Monitor

Scott Health & Safety
 4320 Goldmine Road
 Monroe, North Carolina 28110
 Bryon Gordon
 704-291-8408 (Tel)
 704-291-8420 (Fax)
 brygordon@tycoint.com
Information Source: <http://www.scottinstruments.com>
Status: Vendor response—12/4/2006



Portability: Handheld Portable

Technology: Color Change Chemistry

Unit Cost: \$6.7K

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial

Current Users: U.S. Army (SBBCOM), chemical manufacturers (Dow, Bayer Corp, and BASF)

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Chlorine, formaldehyde, hydrogen chloride, arsine, phosgene, and toluene diisocyanate
- **Medium Priority:** Methyl isocyanate, methyl hydrazine, and phosphine
- **Low Priority:** Diphenylmethane-4,4'- diisocyanate, isopropyl isocyanate, n-butyl isocyanate, tert-butyl isocyanate, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: 20 s	Detection State: Vapor
Response Time: 20 s to 4 min	Alarms: Audible alarm
Sensitivity: Arsine at 0.001 ppm Toluene diisocyanate at 0.001 ppm Phosgene at 0.1 ppm Phosphine at 0.001 ppm	Selectivity: Minimal—heavy dust, particulate matter, and heavy water vapor can interfere

PHYSICAL PARAMETERS

Size: 24 cm x 9.9 cm x 22 cm (9.6 in x 3.9 in x 8.5 in)

Weight: 2.2 kg (4.75 lb)

Power Requirements: Rechargeable lead acid batteries (16 h of operation)

LOGISTICAL PARAMETERS

Durability: For field and outdoor use

Shelf Life: Based on consumables

Calibration Requirements: Yes

Consumables: Paper tape cassette

Repairs: None

Maintenance Costs: Minimal

Environmental Considerations: -10 °C to 40 °C (14 °F to 104 °F) @ 5 % to 95 % rh (operating temperature); -20 °C to 50 °C (-4 °F to 122 °F) @ 5 % to 95 % rh (storage temperature)

Repair Options: Turn around time from 2 wk to 3 wk (can be expedited, done overnight). Tech support 8 am to 5 pm (M through F). Loaners (no set policy, but exceptions can be made on a case by case).

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Minimal

Training Available: Minimal, manual, and manufacturer

Manuals Available: User manual

Support Equipment: Battery charger

Communications Capability: Capable of communicating with a PC

Tamper Resistance: Not specified

Warranty: 1 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

SureSpot Active Sampler

Scott Health & Safety
 4320 Goldmine Road
 Monroe, North Carolina 28110
 Bryon Gordon
 704-291-8408 (Tel)
 704-291-8420 (Fax)
 brygordon@tycoint.com
Information Source: <http://www.scottinstruments.com>



Status: Vendor response—12/4/2006

Portability: Handheld Portable

Technology: Color Change Chemistry

Unit Cost: \$1 to \$3 per badge

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Arsine, diborane, and phosgene
- **Medium Priority:** Phosphine
- **Low Priority:** None

Start-up Time: <30 s	Detection State: Vapor
Response Time: 60 s to 2 min	Alarms: Visual alarm
Sensitivity: Arsine at 0.012 ppm to 0.188 ppm Phosphine at 0.012 ppm to 0.188 ppm Diborane at 0.012 ppm to 0.188 ppm Phosgene at 1 ppm to 250 ppm	Selectivity: Has few noncritical interferences

PHYSICAL PARAMETERS

Size: 4.5 cm x 6.3 cm (1.8 in x 2.5 in)	Weight: <28.3 g (<1 oz)
Power Requirements: Internal rechargeable battery	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: -10 °C to 40 °C (14 °F to 104 °F) operating temperature
Shelf Life: Varies, 5 mo to 12 mo	Consumables: None
Calibration Requirements: None	Maintenance Costs: None
Repairs: None	

Repair Options: Turn around time from 2 wk to 3 wk (can be expedited, done overnight). Tech support 8 am to 5 pm (M through F). Loaners (no set policy, but exceptions can be made on a case by case).

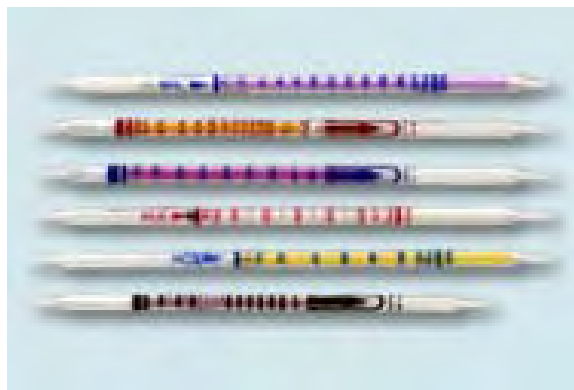
SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: None
Training Available: Yes, minimal	Manuals Available: User manual
Support Equipment: Dose estimator and color wheel	Communications Capability: None
Tamper Resistance: Built in control and reference window	Warranty: Based on shelf life
Testing Information: Reviewed by CMA phosgene panel; no third party testing for arsine	Applicable Regulations: None

GENERAL

Sensidyne Gas Detection Tubes

Sensidyne, Inc.
 16333 Bay Vista Drive
 Clearwater, Florida 34620
 Ronald W. Roberson
 800-451-9444 (Tel)
 727-530-3602 (Tel)
 727-539-0550 (Fax)
 info@sensidyne.com
 rroberson@sensidyne.com
Information Source: <http://www.sensidyne.com>
 Chemical Detection Equipment Market Survey for
 Emergency Responders, September 23, 1998 (SBCCOM)



Status: Vendor response—11/15/2006

Portability: Handheld Portable

Technology: Color Change Chemistry

Unit Cost: \$325 for pump, \$51 to \$54 for box of 10 tubes

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** : NH₃, AsH₃, CS₂, Cl₂, B₂H₆, C₂H₄O, formaldehyde, HBr, HCl, HCN, HF, H₂S, HNO₃, phosgene, SO₂, and H₂SO₄
- **Medium Priority:** C₃H₄O, C₃H₃N, C₃H₆O, CO, COS, C₂H₄Br₂, H₂Se, CH₃Br, methyl hydrazine, methyl mercaptan, NO₂, and phosphine
- **Low Priority:** Bromine, crotonaldehyde, and nitric oxide

Start-up Time: None	Detection State: Vapor
Response Time: Not specified	Alarms: Visual alarm
Sensitivity: Acrolein at 50 ppm to 18 000 ppm Allyl alcohol at 20 to 500 ppm C ₃ H ₃ N at 0.25 ppm to 35,000 ppm Arsine at 0.05 ppm to 160 ppm CS ₂ at 0.8 ppm to 500 ppm Diborane at 0.02 ppm to 5 ppm C ₂ H ₄ Br ₂ at 1 ppm to 50 ppm C ₂ H ₄ O at 1 ppm to 40,000 ppm CH ₂ O at 0.05 ppm to 1500 ppm HCl at 0.4 ppm to 1200 ppm HCN at 0.3 ppm to 30,000 ppm H ₂ S at 0.2 ppm to 40 % CH ₃ Br at 0.4 ppm to 500 ppm CH ₆ N ₂ at 0.1 ppm to 6.0 ppm CH ₄ S at 0.5 ppm to 2400 ppm Nitric acid at 1 ppm to 20 ppm Phosgene at 0.1 ppm to 20 ppm PH ₃ at 0.5 ppm to 3200 ppm SO ₂ at 0.25 ppm to 30 000 ppm Sulfuric acid at 0.5 mg/m ³ to 5.0 mg/m ³ COS at 5 ppm to 60 ppm	Selectivity: Interferents addressed in individual instruction sheets

PHYSICAL PARAMETERS

Size: Not specified

Weight: Not specified

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Lightweight, corrosion-resistant, and spark resistant

Environmental Considerations: Operates in all environments

Shelf Life: Not specified

Consumables: None

Calibration Requirements: None

Repairs: None

Repair Options: Turn around time 5 d to 7 d for calibration, parts take longer

Phone support standard business hours

Loaners not available

Maintenance Costs: Less than \$50 per unit per yr

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Training video

Manuals Available: User manual

Support Equipment: Sampling pump

Communications Capability: Not specified

Tamper Resistance: None

Warranty: Lifetime on pump

Testing Information: Not specified

Applicable Regulations: None

GENERAL

ABC-M8 VGH Chemical Agent Detector Paper

Truetech, Inc.
 680 Elton Street
 Riverhead, New York 11301
 Dan Kohn
 631-727-8600 (Tel)
 631-727-7592 (Fax)
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)



Status: Vendor response—11/22/2006

Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: \$5 per book

Availability: Commercially available

Description: Color Change Chemistry

Type: Military

Current Users: In service with the armed forces of all NATO countries

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, H, and L

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: None	Detection State: Liquid
Response Time: Within 30 s	Alarms: Visual alarm
Sensitivity: Responds to droplets of 5 μ L or larger	Selectivity: M8 paper responds to some common battlefield interferents, such as certain cleaning solvents (ammonia), DS2, “break free” (weapons cleaner and lubricant), high temperatures, and some petroleum products

PHYSICAL PARAMETERS

Size: 10 cm x 5 cm (3.9 in x 2 in)	Weight: Less than 0.5 kg (1 lb)
Power Requirements: None	

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed to operate in harsh environments.	Environmental Considerations: Operates in most environments (M8 paper will not respond to chemical agents when wet)
Shelf Life: 10 yr	Consumables: M8 paper
Calibration Requirements: None	Repairs: None
Repair Options: Disposable	Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Nonformal
Training Available: Not specified	Manuals Available: None
Support Equipment: None	Communications Capability: None
Tamper Resistance: None	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

M18A3 Chemical Agent Detector Kit

Truetech, Inc.
 680 Elton Street
 Riverhead, New York 11301
 Dan Kohn
 631-727-8600 (Tel)
 631-727-7592 (Fax)
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)
Status: Vendor response—11/22/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: \$950

Availability: Commercially available

Description: Color Change Chemistry

Type: Military

Current Users: U.S., U.K., and Canadian armed forces

OPERATIONAL PARAMETERS

CAs Detected: GB, VX, H, HD, HN, HT, and L

TICS Detected:

- **High Priority:** Hydrogen cyanide and phosgene
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Immediate	Detection State: Vapor, aerosol, and liquid
Response Time: 2 min to 4 min	Alarms: Visual alarm
Sensitivity: H, HD, HT, and HN at 0.08 ppm GB at 0.17 ppm (tube) ppm GB at 0.02 ppm (ticket) VX at 0.01 ppm Lewisite at 1 ppm Phosgene at 3 ppm Hydrogen cyanide at 7 ppm	Selectivity: This detector responds to some battlefield interferent materials including smoke and decontaminants

PHYSICAL PARAMETERS

Size: 18 cm x 7.6 cm x 12.5 cm (7 in x 3 in x 5 in)	Weight: 0.92 kg (2 lb)
Power Requirements: None	

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed to operate in harsh environments.	Environmental Considerations: Operates in all environments
Shelf Life: 3 yr	Consumables: M30A1 refill kit
Calibration Requirements: None	Repairs: None
Repair Options: Disposable	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training)	Training Required: Formal
Training Available: Not specified	Manuals Available: None
Support Equipment: M30A1 refill kit	Communications Capability: None
Tamper Resistance: None	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

M272 Water Kit

Truetech, Inc.
680 Elton Street
Riverhead, New York 11301
Dan Kohn
631-727-8600 (Tel)
631-727-7592 (Fax)
Information Source: Chemical Detection Equipment
Market Survey for Emergency Responders, September 23,
1998 (SBCCOM)

Status: Vendor response—11/22/2006



Portability: Handheld Stationary

Unit Cost: \$775

Availability: Commercially available

Description: Color Change Chemistry

Type: Military

Current Users: NATO countries, U.S. Army

Technology: Color Change Chemistry

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, and L

TICS Detected:

- **High Priority:** Hydrogen cyanide
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: None	Detection State: Liquid
Response Time: 6 m to 7 m	Alarms: Visual alarm
Sensitivity: G and V agents at 0.000003 ppm HD at 0.00032 ppm L at 0.00022 ppm Hydrogen cyanide at 0.02 ppm	Selectivity: The M272 Kit may respond to some battlefield interferents

PHYSICAL PARAMETERS

Size: 25 cm x 16 cm x 7.1 cm (9.9 in x 6.2 in x 2.8 in)	Weight: 1.1 kg (2.42 lb)
Power Requirements: None	

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed to operate in harsh environments.	Environmental Considerations: Operates in all environments
Shelf Life: 6 yr	Consumables: Not specified
Calibration Requirements: None	Repairs: None
Repair Options: Disposable	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

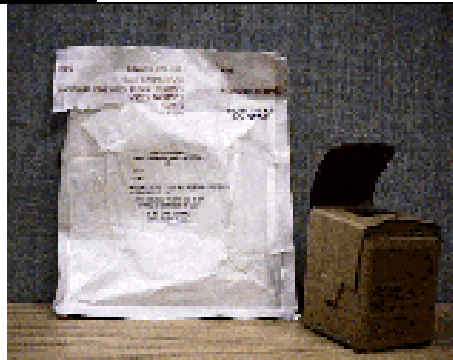
Operator Skills: Nontechnical background	Training Required: Nonformal
Training Available: Not specified	Manuals Available: None
Support Equipment: None	Communications Capability: None
Tamper Resistance: None	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

M9 Chemical Agent Detector Paper

Truetech, Inc.
680 Elton Street
Riverhead, New York 11301
Dan Kohn
631-727-8600 (Tel)
631-727-7592 (Fax)
Information Source: Chemical Detection Equipment
Market Survey for Emergency Responders, September 23,
1998 (SBCCOM)

Status: Vendor response—11/22/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: \$24 per roll

Availability: Commercially available

Description: Color Change Chemistry

Type: Military

Current Users: In service with the armed forces of all NATO countries

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, and L

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Immediate	Detection State: Liquid
Response Time: <20 s	Alarms: Visual alarm
Sensitivity: Responds to 100 μ or larger droplets	Selectivity: M9 paper responds to some common battlefield interferents, such as certain cleaning solvents (ammonia), DS2, “break free” (a weapons cleaner and lubricant), high temperatures, and some petroleum products

PHYSICAL PARAMETERS

Size: Dispenser box—6.3 cm x 8.8 cm x 8.3 cm (2.5 in x 3.5 in x 3.3 in) Detector paper—5 cm (2 in) wide x 9 m (30 ft) long	Weight: Dispenser box—218 g (7 oz)
Power Requirements: None	

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed to operate in harsh environments.

Environmental Considerations: Operates in most environments (M9 paper will not respond to chemical agents when wet)

Shelf Life: 8 yr	Consumables: M9 paper
Calibration Requirements: None	Repairs: None
Repair Options: Disposable	Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Nonformal
Training Available: Not specified	Manuals Available: None
Support Equipment: None	Communications Capability: None
Tamper Resistance: None	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Chemkey TLD Toxic Gas Monitor

Honeywell Analytics Inc.
 405 Barclay Boulevard
 Lincolnshire, Illinois 60069
 Luca Marinelli
 800-323-2000 (Tel)
 847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>
Status: Vendor response—11/21/2005



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, arsine, diborane, hydrogen cyanide, hydrogen sulfide, hydrogen bromide, hydrogen chloride, hydrogen fluoride, nitric acid, sulfuric acid, sulfur dioxide, and phosgene
- **Medium Priority:** Dimethyl hydrazine, hydrogen selenide, and phosphine
- **Low Priority:** Bromine and toluene diisocyanate

Start-up Time: <1 min	Detection State: Vapor
Response Time: 10 s	Alarms: Audible and visual alarm
Sensitivity: Ammonia at 2.6 ppm to 75 ppm Bromine at 11 ppm to 300 ppb Chlorine at 0.1 ppm to 3 ppm Toluene diisocyanate at 2 ppm to 60 ppb Dimethyl hydrazine at 5 ppm to 30 ppb Arsine at 15 ppm to 150 ppb Diborane at 31 ppm to 300 pp Hydrogen selenide at 20 ppm to 150 ppb Hydrogen sulfide at 1.1 ppm to 30 ppm Hydrogen bromide at 0.3 ppm to 9 ppm HCl at 0.5 ppm to 15 ppm Hydrogen fluoride at 0.6 ppm to 9 ppm Nitric acid and sulfur dioxide at 0.2 ppm to 6 ppm Sulfuric acid at 26 ppm to 750 ppb Phosgene at 11 ppm to 300 ppb Phosphine at 32 ppm to 900 ppb	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 17 cm x 21.3 cm x 7.78 cm (6.5 in x 8.4 in x 7 in)

Weight: 4.1 kg (9 lb)

Power Requirements: Battery (rechargeable sealed lead-acid) or 115 V ac, 50/60 Hz

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: 0 °C to 40° C (32 °F to 104 °F) operating temperature

Shelf Life: Not specified

Consumables: Batteries and chemcassettes

Calibration Requirements: Not specified	Repairs: Yes
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: Battery charger	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

CM4 Gas Monitor

Honeywell Analytics Inc.
 405 Barclay Boulevard
 Lincolnshire, Illinois 60069
 Luca Marinelli
 800-323-2000 (Tel)
 847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>

Status: Vendor response—11/21/2005



Portability: Handheld Stationary

Unit Cost: Not specified

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial

Current Users: Not specified

Technology: Color Change Chemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Diborane, hydrogen cyanide, hydrogen sulfide, hydrogen bromide, hydrogen chloride, hydrogen fluoride, phosgene, and arsine
- **Medium Priority:** Hydrogen selenide, phosphine, nitrogen dioxide, and boron trifluoride
- **Low Priority:** Hydrogen iodide

Start-up Time: <1 min	Detection State: Vapor
Response Time: 10 s to 2 min	Alarms: Audible and visual alarm
Sensitivity: Diborane at 15 ppm to 1000 ppb Hydrogen selenide at 6 ppm to 500 ppb Phosphine at 5 ppm to 3000 ppb Hydrogen cyanide at 0.5 ppm to 50 ppm Hydrogen sulfide at 0.5 ppm to 100 ppm Hydrogen bromide at 0.3 ppm to 30 ppm Hydrogen fluoride at 0.3 ppm to 30 ppm Nitrogen dioxide at 0.3 ppm to 30 ppm Phosgene at 7 ppm to 1000 ppb Hydrogen chloride at 0.5 ppm to 30 ppm Arsine at 5 ppm to 500 ppb Boron trifluoride at 100 ppm to 1500 ppb Hydrogen iodide at 0.1 ppm to 25 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 43 cm x 23 cm x 45 cm (17 in x 9.2 in x 17.7 in)

Weight: 25 kg (55 lb)

Power Requirements: 100 V ac/110 V ac @ 50/60 Hz

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: 10 °C to 40 °C (50 °F to 104 °F) operating temperature

Shelf Life: Not specified

Consumables: Chemcassettes

Calibration Requirements: Not specified

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Not specified

Manuals Available: User manual

Support Equipment: None

Communications Capability: A RS-232 port allows data to be sent to a PC

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

SPM Toxic Gas Monitor

Honeywell Analytics Inc.
 405 Barclay Boulevard
 Lincolnshire, Illinois 60069
 Luca Marinelli
 800-323-2000 (Tel)
 847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>

Status: Vendor response—11/21/2005



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, arsine, diborane, hydrogen cyanide, hydrogen sulfide, hydrogen bromide, hydrogen chloride, hydrogen fluoride, nitric acid, sulfuric acid, sulfur dioxide, and phosgene
- **Medium Priority:** Hydrogen selenide, phosphine, and dimethyl hydrazine
- **Low Priority:** Bromine and toluene diisocyanate

Start-up Time: <1 min

Detection State: Vapor

Response Time: 10 s

Alarms: Audible and visual alarm

Sensitivity: Ammonia at 2.6 ppm to 75 ppm
 Bromine at 11 ppm to 300 ppb
 Chlorine at 0.1 ppm to 3 ppm
 Toluene diisocyanate at 2 ppm to 60 ppb
 Dimethyl hydrazine at 5 ppm to 30 ppb
 Arsine at 15 ppm to 150 ppb
 Diborane at 31 ppm to 300 ppb
 Hydrogen selenide at 20 ppm to 150 ppb
 Phosphine at 32 ppm to 900 ppb
 Hydrogen sulfide at 1.1 ppm to 30 ppm
 Hydrogen bromide at 0.3 ppm to 9 ppm
 Hydrogen fluoride at 0.6 ppm to 9 ppm
 Phosgene at 11 ppm to 300 ppb
 Hydrogen chloride at 0.5 ppm to 15 ppm
 Nitric acid and sulfur dioxide at 0.2 ppm to 6 ppm
 Sulfuric acid at 26 ppm to 750 ppb

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 17 cm x 21 cm x 18 cm (6.5 in x 8.4 in x 7 in)

Weight: 4.1 kg (9 lb)

Power Requirements: Battery (rechargeable sealed lead acid) or 115 V ac, 50/60 Hz

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: 10 °C to 40 °C (50 °F to 104 °F) operating temperature

Shelf Life: Not specified	Consumables: Chemcassettes and batteries
Calibration Requirements: Not specified	Repairs: Not specified
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: Battery charger	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: Not specified

GENERAL

C16 PortaSens II Gas Detector

Analytical Technology, Inc.
 6 Iron Bridge Drive
 Collegeville, Pennsylvania 19426
 Bill Popp
 800-959-0299 (Tel)
 610-917-0991 (Tel)
 610-917-0992 (Fax)
 wpopp@analyticaltechnology.com
Information Source: <http://www.analyticaltechnology.com>
Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: \$1.1K plus cost of gas sensor (varies depending on gas type)

Availability: Military and commercially available (2 wk ARO)

Description: Electrochemistry

Type: Military and commercial

Current Users: Praxair, Matheson Gas, BOC Gases, Air Products

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, boron trichloride, boron trifluoride, chlorine, diborane, ethylene oxide, fluorine, formaldehyde, hydrogen bromide, hydrogen chloride, hydrogen cyanide, hydrogen fluoride, hydrogen sulfide, nitric acid, phosgene, phosphorus trichloride, sulfur dioxide, sulfuric acid, and tungsten hexafluoride
- **Medium Priority:** Nitrogen dioxide, carbon monoxide, phosphine, and sulfuryl fluoride.
- **Low Priority:** Bromine, hydrogen iodide, and nitric oxide

Start-up Time: <30 s

Detection State: Vapor and aerosol

Response Time: 1 min to 2 min

Alarms: Audible, visual, and auto alarm

Sensitivity: Carbon monoxide at 1000 ppm

Ethylene oxide at 200 ppm

Ammonia at 500 ppm

Formaldehyde at 200 ppm

Phosgene at 5 ppm

Bromine at 100 ppm

Chlorine at 100 ppm

Fluorine at 100 ppm

HCl at 200 ppm

HCN at 200 ppm

HF at 200 ppm

H₂S at 200 ppm

NO₂ at 200 ppm

Sulfur dioxide at 200 ppm

Arsine at 200 ppm

Diborane 200 ppm

Phosphine at 200 ppm

Hydrogen selenide at 200 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 22 cm x 13 cm (8.5 in x 5 in) diameter

Weight: 1.4 kg (3 lb)

Power Requirements: D cell alkaline battery, Internal rechargeable NiCad (backup)

LOGISTICAL PARAMETERS

Durability: Constructed of a glass-filled polycarbonate material

Environmental Considerations: -25 °C to 50 °C (-13 °F to 122 °F) @ 0 % to 95 % rh (operating temperature)

Shelf Life: Sensor has a shelf life of 2 yr from date of manufacture

Consumables: Calibration kit, batteries, sample filters, and sensors (for each chemical detected)

Calibration Requirements: Yes (sensor calibration every 3 mo to 6 mo)

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: Customer must buy a second unit for backup

7 am to 8 pm EST technical support

Maintenance Costs: Optional factor calibration \$150 per yr

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (no special skills or training required)

Training Required: Formal (manual)

Training Available: Not specified

Manuals Available: User manual (O and M)

Support Equipment: Sampling wand, battery charger, spare filters, flow meter, RS-232 output cable, spare D cell battery, and calibration T-fitting

Communications Capability: An RS-232 output allows stored data to be downloaded to a PC through an interface cable supplied with the unit

Tamper Resistance: None

Warranty: 1 yr parts and labor

Testing Information: Sensor Calibration Certificate

Applicable Regulations: None

GENERAL

AMC Series 1100 Portable Gas Detector

Armstrong Monitoring Corporation
 215 Colonnade Road South
 Nepean, Ontario K2E7K3
 613-225-9531 (Tel)
 800-465-5777 (Tel)
Information Source: <http://www.armstrongmonitoring.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Unit Cost: \$850

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Pulp and paper mills, indoor air quality firms, regional government workers, and tunnel workers

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, hydrogen cyanide, sulfur dioxide, chlorine, ammonia, arsine, boron trifluoride, diborane, fluorine, hydrogen fluoride, and phosgene
- **Medium Priority:** Carbon monoxide, nitrogen dioxide, hydrogen selenide, methyl hydrazine, methyl mercaptan, phosphine, stibine, and sulfuryl fluoride
- **Low Priority:** Carbonyl fluoride and chlorine trifluoride

Start-up Time: <1 min	Detection State: Vapor
Response Time: Typically 10 s to 60 s with a 90 % step change. HCN is less than 100 s within a 90 % stem change.	Alarms: Audible and visual alarm
Sensitivity: Hydrogen cyanide at 20 ppm Hydrogen sulfide at 100 ppm Sulfur dioxide at 20 ppm Nitrogen dioxide at 10 ppm Chlorine at 10 ppm) Carbon monoxide at 500 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 14 cm x 7.9 cm x 3.5 cm (5.7 in x 3.1 in x 1.4 in)	Weight: 227 g (8 oz)
Power Requirements: 9 V alkaline battery (greater than 500 h of operation)	

LOGISTICAL PARAMETERS

Durability: The AMC-1100 is constructed of high impact ABS plastic enclosed inside a heavy duty leather case

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) @ 0 % to 80 % rh (operating temperature)

Shelf Life: Greater than 2 yr for sensors

Consumables: Calibration kit (supplied by other), calibration adapter, 9 V alkaline battery, and sensors (for each chemical detected)

Calibration Requirements: Span gas; use zero and span pots

Repairs: Replacement of batteries after 5 h of operation; replacement of sensors and other maintenance as required by manufacturer

Repair Options: The service department can set-up an exchange program. A replacement, swap-out instrument can be sent immediately. Down time should be minimal (24 h). Telephone technical support is 24/7. ~\$80 fee for a straight calibration.

Maintenance Costs: \$392 per yr

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Yes	Manuals Available: User manual
Support Equipment: Heavy duty leather carry case, belt clip, and earphone jack	Communications Capability: 0 V dc to 1 V dc recorder output
Tamper Resistance: None	Warranty: 1 yr
Testing Information: None	Applicable Regulations: None

GENERAL

PhD5 Personal Gas Detector

Biosystems
 651 South Main Street.
 Middletown, Connecticut 06457
 860-344-1079 (Tel)
 860-344-1068 (Fax)
Information Source: <http://www.biosystems.com>

Status: Vendor response—11/21/2006



Portability: Handheld Portable

Unit Cost: Approximately \$1K to \$3.2K

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, ammonia, chlorine, sulfur dioxide, and hydrogen cyanide
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** None

Start-up Time: Not specified	Detection State: Vapor
Response Time: Not specified	Alarms: Audible and visual alarm
Sensitivity: Detects oxygen, combustible, hydrogen sulfide, ammonia, chlorine, sulfur dioxide, hydrogen cyanide, carbon monoxide, nitrogen dioxide, chlorine dioxide, and phosphine at the Short Term Exposure Level (STEL) and Time Weighted Average (TWA)	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 17 cm x 9.5 cm x 5.1 cm (6.8 in x 3.8 in x 2 in)	Weight: 0.9 kg (2 lb)
Power Requirements: NiCad rechargeable or disposable alkaline (AA) battery	

LOGISTICAL PARAMETERS

Durability: The PhD5 is housed in a super durable, gasketed, water resistant metal plated ABS material designed to minimize the effects of radio frequency interference.

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: Calibration kits and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: Replacement of sensors

Other maintenance as required by manufacturer

Repair Options: Loaner is available through distributor. Distributors will rent instruments if one is needed immediately. Down time is typically 2 wk to 3 wk. When you call the company for a repair if you send the PO number back, you can request express service at no extra charge.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: A training video is included with the PhD5	Manuals Available: User manual and quick reference card
Support Equipment: Calibration adapter/sample draw pump, computer link kit, and battery charger	Communications Capability: Automatic data downloading with Biosystem's data-link kit
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

GasAlert

BW Technologies by Honeywell
 2840 2nd Ave., SE Calgary
 AB Canada T2A 7X9
 800-663-4164 (Tel) 403-248-9226 (Tel) 403-273-3708
 (Fax) 44-0-1869-233004 (Europe) 888-749-8878 (USA)
 raymondj@bwt.net.com

Information Source: <http://www.bwt.net.com>

Status: Vendor response—4/6/2006



Portability: Handheld Portable

Unit Cost: H₂S—U.S. \$350

CO—U.S. \$350

SO₂—U.S. \$450

Prices include instrument, sensors, and 3 yr battery

Availability: Commercially available worldwide

Description: Electrochemistry

Type: Commercial, available worldwide

Current Users: Local firefighters, municipalities, industrial plants, and military

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide and sulfur dioxide
- **Medium Priority:** None
- **Low Priority:** Carbon monoxide

Start-up Time: Less than 10 s	Detection State: Vapor
Response Time: Less than 30 s	Alarms: Audible and visual alarm (built-in vibrator alarm optional)
Sensitivity: H ₂ S at 100 ppm SO ₂ at 50 ppm CO at 500 ppm	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 2.8 cm x 5.1 cm x 9.5 cm (1.1 in x 2.0 in x 3.75 in)	Weight: 82 g (2.9 oz)
Power Requirements: Uses a 3 V lithium battery (camera battery available at local stores) with a battery life of 3 yr (9000 h)	

LOGISTICAL PARAMETERS

Durability: Designed for rugged industrial use, operates in any position, drop-tested

Environmental Considerations: H₂S: -40 °C to 46 °C (-40 °F to 114 °F); Other gases: -20 °C to 50 °C (-4 °F to 122 °F)
 0 % to 95 % rh (noncondensing)

Shelf Life: Not specified

Consumables: Battery (3 yr life), sensors, and sensor filters

Calibration Requirements: Calibrate once every 3 mo. Automatic calibration, automatic zero, and automatic span. Does not need to be performed by factory.

Repairs: Replace sensors every 2 yr. Replace sensor filters as needed. Sensors and sensor filters are easily field replaceable.

Repair Options: Company has a liberal policy for return; call toll free number to return, 7 d to 10 d. Company has an advance replacement program, like a loaner program. 24/7 phone support.

Maintenance Costs: Easily maintained by field personnel

SPECIAL REQUIREMENTS

Operator Skills: No special skills required

Training Required: None

Training Available: Training video and user manuals

Manuals Available: Yes, available in local languages

Support Equipment: Available with an internal vibrator. Additional accessories include remote vibrator alarm, remote audible/visual alarm, earphone, hard hat clip, and alligator clip.

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Full 2 yr nonprorated warranty including sensors (1 yr O2 sensor)

Testing Information: Not specified

Applicable Regulations: UL classified to U.S. and Canadian Standards as intrinsically safe for—Class I, Div. 1, Gr. A,B,C,D; Class 1 Zone 0, Gr. IIC

Cenelec Certified—Eex ia d IIC

Conforms to European Union directives

GENERAL

GasAlertMax

BW Technologies by Honeywell
 2840 2nd Ave., SE Calgary
 AB Canada T2A 7X9
 800-663-4164 (Tel) 403-248-9226 (Tel) 403-273-3708
 (Fax) 44-0-1869-233004 (Europe) 888-749-8878 (USA)
 raymondj@bwt.net.com

Information Source: <http://www.bwt.net.com>

Status: Vendor response—4/6/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: \$1.4K price includes instrument, sensors, internal motorized sampling pump, 2 NiMH batteries, 110 V ac battery charger, 10 ft sampling hose, calibration hose, and carrying holster

Availability: Commercially available worldwide

Description: Electrochemistry

Type: Commercial, available worldwide

Current Users: Local firefighters, municipalities, industrial plants, and military

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide
- **Medium Priority:** None
- **Low Priority:** Carbon monoxide

Start-up Time: Less than 10 s	Detection State: Vapor
Response Time: Less than 30 s	Alarms: Audible and visual alarm
Sensitivity: H2S at 100 ppm CO at 0 ppm to 300 ppm	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 4.1 cm x 7.6 cm x 15 cm (1.6 in x 3.0 in x 5.9 in)	Weight: 437 g (15.4 oz)
Power Requirements: One rechargeable Black & Decker VersaPak battery NiMH (12 h continuous operation)	

LOGISTICAL PARAMETERS

Durability: Designed for rugged industrial use, operates in any position, drop-tested

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) @ 0 % to 95 % rh (noncondensing)

Shelf Life: Not specified

Consumables: One rechargeable Black & Decker VersaPak battery NiMH (12 h continuous operation) or NiCad (8 h continuous operation), sensors, and sensor filters

Calibration Requirements: Calibrate once every 3 mo. Automatic calibration, automatic zero, and automatic span. Does not need to be performed by factory.

Repairs: Replace sensors every 2 yr. Replace sensor filters as needed. Sensors and sensor filters are easily field replaceable.

Repair Options: Company has a liberal policy for return; call toll free number to return, 7 d to 10 d. Company has an advance replacement program, like a loaner program. 24/7 phone support.

Maintenance Costs: Easily maintained by field personnel

SPECIAL REQUIREMENTS

Operator Skills: No special skills required

Training Required: None

Training Available: Training video and user manuals

Manuals Available: Yes, available in local languages

Support Equipment: Available as a Confined Space Entry Kit (First Responder Kit)

Accessories available include external vibrator alarm, external audible/visual alarm, shock resistant case with belt loop, and 2-port vehicle battery charger

Communications Capability: Available soon

Tamper Resistance: Password protected model available at no extra charge

Warranty: Full 2 yr nonprorated warranty including sensors (1 yr O2 sensor)

Testing Information: Not specified

Applicable Regulations: CSA classified to U.S. and Canadian Standards as intrinsically safe for Class I, Div. 1, Gr. A,B,C,D; Class 1 Zone 0, Gr. IIC

Cenelec Certified—Eex ia IIC

Conforms to European Union directives

GENERAL

GasAlert Micro

BW Technologies by Honeywell
 2840 2nd Ave., SE Calgary
 AB Canada T2A 7X9
 800-663-4164 (Tel) 403-248-9226 (Tel) 403-273-3708
 (Fax) 44-0-1869-233004 (Europe) 888-749-8878 (USA)
 raymondj@bwt.net.com

Information Source: <http://www.bwt.net.com>

Status: Vendor response—4/6/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: \$695

\$1.2K with motorized sampling pump

Prices include instrument, sensors, 2 AA batteries, calibration cup, metal clip, and instructions

Availability: Commercially available worldwide

Description: Electrochemistry

Type: Commercial, available worldwide

Current Users: Local firefighters, municipalities, industrial plants, and military

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide
- **Medium Priority:** None
- **Low Priority:** Carbon monoxide

Start-up Time: Less than 10 s	Detection State: Vapor
Response Time: Less than 30 s	Alarms: Audible and visual alarm
Sensitivity: H ₂ S at 0 ppm to 100 ppm CO at 0 ppm to 500 ppm	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 6.1 cm x 10 cm x 3.3 cm (2.4 in x 4 in x 1.3 in)	Weight: 210 g (7.4 oz) including battery
Power Requirements: Two AA alkaline batteries (16 h of continuous operation)	

LOGISTICAL PARAMETERS

Durability: Designed for rugged industrial use, operates in any position, drop-tested

Environmental Considerations: H₂S: -40 °C to 46 °C (-40 °F to 114 °F); other gases: -20 °C to 50 °C (-4 °F to 122 °F)

0 % to 95 % rh (noncondensing)

Shelf Life: Not specified

Consumables: Two AA Alkaline batteries (16 h of continuous operation), sensors, and sensor filters

Calibration Requirements: Calibrate once every 6 mo. Automatic calibration, automatic zero, and automatic span. Does not need to be performed by factory.

Repairs: Replace sensors every 2 yr. Replace sensor filters as needed. Sensors and sensor filters are easily field replaceable.

Repair Options: Company has a liberal policy for return; call toll free number to return, 7 d to 10 d. Company has an advance replacement program, like a loaner program. 24/7 phone support.

Maintenance Costs: Easily maintained by field personnel

SPECIAL REQUIREMENTS

Operator Skills: No special skills required

Training Required: None

Training Available: Training CD and user manuals

Manuals Available: Yes, available in local languages

Support Equipment: Available as a Confined Space Entry Kit (First Responder Kit)

Additional accessories available include manual aspirator pump, motorized sampling pump, shock resistant case with belt loop, and 4-port vehicle battery charger

Communications Capability: Not specified

Tamper Resistance: Password protected model available at no extra charge

Warranty: Full 2 yr nonprorated warranty including sensors (2 yr O2 sensor)

Testing Information: Not specified

Applicable Regulations: CSA classified to U.S. and Canadian Standards—Class I, Div. 1, Gr. A,B,C,D; Class 1 Zone 0, Gr. IIC

Cenelec Certified by LCIE—Eexia d IIC

Certified for use in Australia—Ex ia s IIC for Zone 0

Conforms to European Union directives

GENERAL

Pac 7000 Personal Gas Alarm

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—11/28/2006



Portability: Handheld Portable

Unit Cost: \$375 (CO, H₂S, and O₂); \$495 (PH₃, HCN, Cl₂, and NH₃)

Availability: Commercially available; stock to 3 wk delivery

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide and hydrogen cyanide
- **Medium Priority:** Phosphine, carbon monoxide, and ammonia
- **Low Priority:** None

Start-up Time: Between 31 s and 60 s

Detection State: Vapor

Response Time: <10 s

Alarms: Audible, visual, and vibration alarm

Sensitivity: Carbon monoxide at 1999 ppm

Hydrogen sulfide at 100 ppm

Phosphine at 20 ppm

Hydrogen cyanide at 50 ppm

Chlorine at 20 ppm

Ammonia at 300 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

CO=H₂, C₂H₂, C₂H₄, AsH₃, B₂H₆, GeH₄, SiH₄

H₂S=mercaptan

HCN=Cl₂, PH₃, NO₂

PHYSICAL PARAMETERS

Size: 6.4 cm x 8.4 cm x 2.0 cm (2.5 in x 3.3 in x 0.8 in)

Weight: 120 g (3.8 oz)

Power Requirements: Battery powered (lithium battery)

LOGISTICAL PARAMETERS

Durability: High impact composite material with radio frequency interference (RFI) protection; able to operate with rough handling

Environmental Considerations: -30 °C to 50 °C (-22 °F to 122 °F) at 10 % to 95 % rh

Shelf Life: Sensor life—1 yr to 2 yr (dependent upon sensor)

Consumables: Lithium battery; dust and water filter

Calibration Requirements: Recommend 6 mo interval, user selectable using Draeger Pac Vision or CC Vision software

Repairs: Maintenance free up to 2 yr; battery expected to last 5500 h for toxic sensors

Repair Options: No loaners, but rental program is available

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background; no special skills or training required

Training Required: None

Training Available: Yes, operator training program available as Powerpoint file

Manuals Available: User manual

Support Equipment: None

Communications Capability: Not specified

Tamper Resistance: Locked

Warranty: 2 yr on sensors and instrument

Testing Information: Tested and Certified Intrinsically Safe

Applicable Regulations: OSHA—confined spaces regulation, general industry regulations, construction regulations

Tested and Certified Intrinsically Safe by UL-cUL for Class I & II, Div 1, Group A,B,C,D,E,F,G, Temperature Code T4;

ATEX—I 1 G EEx ia IIC, T4; I M 1 EEx ia I, T4

GENERAL

Miniwarn Gas Detector

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—11/21/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Between \$1.9K and \$2.9K per unit

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, chlorine, diborane, fluorine, hydrogen cyanide, hydrogen sulfide, phosgene, and sulfur dioxide
- **Medium Priority:** Carbon monoxide, hydrogen selenide, phosphine, nitrogen dioxide, and nitrogen oxide
- **Low Priority:** Amines, carbon dioxide, hydrogen, and mercaptans

Start-up Time: Between 30 s and 60 s

Detection State: Vapor

Response Time: Between 10 s and 60 s

Alarms: Audible and visual alarm

Sensitivity: Ammonia at 0 to 300 ppm
 Hydrogen cyanide (AC/HCN) at 0 to 50 ppm
 Arsine at 0 to 20 ppm
 Bromine at 0 to 20 ppm
 Carbon monoxide at 0 to 2000 ppm
 Chlorine at 0 to 20 ppm
 Chlorine dioxide at 0 to 20 ppm
 Hydrogen sulfide at 0 to 100 ppm
 Phosgene at 0 to 3 ppm
 Diborane at 0 to 1 ppm
 Fluorine at 0 to 20 ppm
 Hydrogen selenide at 0 to 1 ppm
 Phosphine at 0 to 10 ppm
 Sulfur dioxide 0 to 100 ppm
 Nitrogen dioxide 0 to 50 ppm
 Nitrogen oxide 0 to 100 ppm
 Carbon dioxide at 0 to 5 volume %
 Amines at 0 to 100 ppm
 Hydrogen at 0 to 4 volume %
 Mercaptan at 0 to 40 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 7.9 cm x 14 cm x 5.8 cm (3.1 in x 5.6 in x 2.3 in)

Weight: <0.5 kg (<1 lb); 450 g (16 oz) with battery

Power Requirements: NiCd rechargeable battery

LOGISTICAL PARAMETERS

Durability: The MiniWarn Gas Detector is constructed of a high impact resistant composite material with radio frequency interference (RFI) protection

Environmental Considerations: -20 °C to 40 °C (-4 °F to 104 °F) at 10 % to 95 % rh (operating temperature)

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: Sensors—every 3 mo to 6 mo

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: No loaners, but rental program is available; 24 h turn-around time (\$20) and 72 h turn-around time (\$10) to look at the equipment, but not repaired and returned. Rental program for most all equipment, but not for IMS.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Yes, operator training CD

Manuals Available: User manual

Support Equipment: Calibration adapter, sample pump, and battery charger

Communications Capability: All stored measurements are transferred to a PC via a wireless infrared interface

Tamper Resistance: Menu structure is password protected

Warranty: 5 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

X-am 7000 Gas Detector

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—4/6/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Between \$2.9K and \$4.6K per unit

Availability: Commercially available

Description: Electrochemistry, Catalytic, IR, and PID

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, chlorine, diborane, fluorine, hydrogen cyanide, hydrogen sulfide, phosgene, and sulfur dioxide
- **Medium Priority:** Carbon monoxide, hydrogen selenide, and phosphine
- **Low Priority:** Amines, carbon dioxide, hydrogen, and mercaptans

Start-up Time: Between 30 s and 60 s

Detection State: Vapor

Response Time: Between 10 s and 60 s

Alarms: Audible and visual alarm

Sensitivity: Ammonia at 0 to 300 ppm

Hydrogen cyanide (AC) at 0 to 50 ppm

Arsine at 0 to 20 ppm

Bromine at 0 to 20 ppm

Carbon monoxide at 0 to 2000 ppm

Chlorine at 0 to 20 ppm

Chlorine Dioxide at 0 to 20 ppm

Hydrogen sulfide at 0 to 100 ppm

Phosgene (CG) at 0 to 3 ppm

Diborane at 0 to 1 ppm

Fluorine at 0 to 20 ppm

Hydrogen selenide at 0 to 1 ppm

Phosphine at 0 to 10 ppm

Sulfur dioxide 0 to 100 ppm

Nitrogen dioxide 0 to 50 ppm

Amines at 0 ppm to 100 ppm

Carbon dioxide at 0 to 5 vol. %

Hydrogen at 0 to 2000 ppm

Mercaptan at 0 to 40 ppm

Nitrogen oxide 0 to 100 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 15 cm x 14 cm x 7.5 cm (5.9 in x 5.6 in x 3.0 in)

Weight: 600 g (21 oz)

Power Requirements: NiMH rechargeable battery; alkaline back-up

LOGISTICAL PARAMETERS

Durability: Constructed of a high impact resistant composite material with radio frequency interference (RFI) protection

Environmental Considerations: -20 °C to 40 °C (-4 °F to 104 °F) at 10 % to 95 % rh (operating temperature)

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: Calibrate sensors every 3 mo to 6 mo

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: No loaners, but rental program is available

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Yes, operator training CD

Manuals Available: User manual

Support Equipment: NiMH battery charger and calibration adapter

Communications Capability: All stored measurements are transferred to a PC via a wireless infrared interface

Tamper Resistance: Password protected for added surety

Warranty: 5 yr instruments; sensors vary 2 yr, 3 yr, or 5 yr; batteries have 1 yr or 2 yr

Testing Information: Not specified

Applicable Regulations: OSHA—confined spaces regulation, general industry regulations, construction regulations

Tested and Certified Intrinsically Safe by UL and CSA for Class I, Div 1, Group ABCD, Temperature Code T4;

ATEX—II 2G EEx ia d IIC T4; I M2 EEx ia d I

GENERAL

Pac III Single Gas Detector

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—11/21/2006



Technology: Electrochemistry

Portability: Handheld Portable

Unit Cost: Between \$500 and \$1.7K per unit

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, chlorine, diborane, fluorine, hydrogen cyanide, hydrogen sulfide, phosgene, and sulfur dioxide
- **Medium Priority:** Carbon monoxide, hydrogen selenide, and phosphine
- **Low Priority:** Bromine

Start-up Time: Between 30 s and 60 s

Detection State: Vapor

Response Time: Between 10 s and 60 s

Alarms: Audible and visual alarm

Sensitivity: Ammonia at 300 ppm

Hydrogen cyanide at 50 ppm

Arsine at 20 ppm

Bromine at 20 ppm

Carbon monoxide at 2000 ppm

Chlorine at 20 ppm

Hydrogen sulfide at 100 ppm

Phosgene at 3 ppm

Diborane at 1 ppm

Fluorine at 20 ppm

Hydrogen selenide at 1 ppm

Phosphine at 10 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 6.6 cm x 12 cm x 3.3 cm (2.6 in x 4.6 in x 1.3 in)

Weight: 0.5 kg (<1 lb)

Power Requirements: 9 V alkaline battery (600 h of operation)

Lithium battery (1100 h of operation)

NiCad battery (200 h of operation)

LOGISTICAL PARAMETERS

Durability: Constructed of a high impact resistant composite material with radio frequency interference (RFI) protection

Environmental Considerations: -20 °C to 40 °C (-4 °F to 104 °F) at 10 % to 95 % rh (operating temperature)

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: 1 button autocalibration

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: No loaners, but rental program is available; 24 h turn-around time (\$20) and 72 h turn-around time (\$10) to look at the equipment, but not repaired and returned. Rental program for most all equipment, but not for IMS.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Yes, operator training CD	Manuals Available: User manual
Support Equipment: Calibration adapter and battery charger	Communications Capability: The Pac III Single Gas Detector can easily communicate with a personal computer
Tamper Resistance: Password protected for added surety	Warranty: 2 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

RAM 2000™

EDO Corporation
 455 Commack Road
 Deer Park, New York 11729
 Bruce Buswell
 631-595-6924 (Tel)
 631-595-6988 (Fax)
 bruce.buswell@dp.ail.com
Information Source:
<http://www.nycedo.com/edocorp/page8.htm>

Status: Vendor response—11/1/2005



Technology: FTIR

Portability: Standoff

Unit Cost: \$150K to \$200K

Availability: 60 d ARO

Description: Active Fourier Transform Infrared Spectroscopy (FTIR)

Type: Commercial

Current Users: NIPA-Harwicke, Bayer, Pennsylvania Department of Environmental Protection, Clarion Life Sciences, and Nepera Incorporated

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, L, HD, and AC

TICS Detected:

- **High Priority:** Ammonia, arsine, boron trichloride, carbon disulfide, ethylene oxide, formaldehyde, hydrogen bromide, hydrogen chloride, hydrogen cyanide, hydrogen fluoride, hydrogen sulfide, nitric acid, phosgene, phosphorous trichloride, and sulfur dioxide
- **Medium Priority:** Acrolein, acrylonitrile, allyl alcohol, carbon monoxide, carbonyl sulfide, methyl hydrazine, methyl mercaptan, nitrogen dioxide, phosphine, silicon, and tetrafluoride
- **Low Priority:** Crotonaldehyde, dimethyl sulfate, hexachlorocyclopentadiene, hydrogen iodide, nitric oxide, and toluene 2,4 diisocyanate

Start-up Time: 15 min	Detection State: Vapor
Response Time: 3 s	Alarms: Visible, audible, and auto alarm
Sensitivity: GA at 0.01 ppm GB at 0.005 ppm GF at 0.008 ppm GD at 0.01 ppm HD at 2.5 ppm L at 0.03 ppm VX at 0.024 ppm	Selectivity: Very High

PHYSICAL PARAMETERS

Size: Monitor/analyzer—64 cm x 38 cm x 84 cm (25.25 in x 15 in x 33 in)

Control rack mount—13 cm x 48 cm x 53 cm (5.25 in x 19 in x 21 in)

Retroreflector—61 cm x 61 cm x 20 cm (24 in x 24 in x 8 in)

Dolch field computer—28 cm x 40.6 cm x 22 cm (11 in x 16 in x 8.5 in)

Weight: Monitor/analyzer—48.5 kg (107 lb)

Control rack mount—11.3 kg (25 lb)

Retroreflector—22.7 kg (50 lb)

Dolch field computer—9.1 kg (20 lb)

Power Requirements: 120 V ac for sensor, PC, and heat lamp. Total of about 500 W.

LOGISTICAL PARAMETERS

Durability: Durable (5 yr demonstrated) if in correct environment. Reflector can degrade if exposed to corrosive vapors/rain (effect reduced if rain shield is used).

Environmental Considerations: Sensor—0 °C to 40 °C (32 °F to 104 °F)

PC—5 °C to 35 °C (41 °F to 95 °F) (operating temperature)

Reflectors—no condensation and no temperature requirements

Shelf Life: 5 yr

Consumables: Liquid nitrogen, lens tissue, and lens cleaning fluid

Calibration Requirements: No

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: About 1 man d per mo (mostly LN2 refill and data archiving)

SPECIAL REQUIREMENTS

Operator Skills: Computer literacy	Training Required: Yes
Training Available: Yes	Manuals Available: Yes
Support Equipment: No	Communications Capability: Ethernet, DCS, and modem
Tamper Resistance: Moderately difficult to spoof. Good data surety.	Warranty: 1 yr
Testing Information: Environmental Protection Agency, Dugway Proving Grounds	Applicable Regulations: Not specified

GENERAL

Omni-4000 Gas Detector

Enmet Corporation
 P.O. Box 979
 Ann Arbor, Michigan 48106-0979
 Ray Kelley
 734-761-1270 (Tel)
 734-761-3220 (Fax)
 Nancy aulisa
 naulisa@enmet.com
Information Source: <http://www.enmet.com>



Status: Vendor response—4/1/2006

Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry, catalytic diffusion, and NDIR

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, chlorine, hydrogen cyanide, hydrogen chloride, sulfur dioxide, ammonia, and ethylene oxide
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** Nitric oxide

Start-up Time: 30 s

Detection State: Vapor

Response Time: 5 s to 60 s (depending on gas/vapor)

Alarms: Audible and visual alarm

Sensitivity: Chlorine at 10 ppm
 Hydrogen sulfide at 100 ppm
 Hydrogen chloride at 30 ppm
 Hydrogen cyanide at 10 ppm
 Sulfur dioxide at 30 ppm
 Carbon monoxide at 1000 ppm
 Nitrogen dioxide at 30 ppm
 Ammonia at 100 ppm
 Ethylene oxide at 30 ppm
 Nitric oxide at 300 ppm

Selectivity: May false alarm to heavy concentrations of other gases and vapors (sensor and gas dependent) and engine exhausts

PHYSICAL PARAMETERS

Size: 19 cm x 12 cm x 5.8 cm (7.6 in x 4.7 in x 2.3 in)

Weight: 2.2 kg (4.84 lb)

Power Requirements: NiCad battery pack (12 h to 14 h of operation); Lithium battery (3 yr to 5 yr) (for data storage)

LOGISTICAL PARAMETERS

Environmental Considerations: -10 °C to 40 °C (14 °F to 104 °F) (operating temperature)

Shelf Life: 18 mo to 30 mo

Consumables: Sensors, calibration kit, and batteries

Calibration Requirements: Yes (vendor recommends every 3 mo)

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: Equipment can be sent back, or repair kits can be bought. Company has service centers. Down time—there is a lease/rental program [minimum of 2 wk (only when emergency)] for older or portable. Availability of parts could be from days to 2 wk or 3 wk. Can expedite if critical. Tech support during office hours only. Safeware distributor can supply service.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Video training tape available	Manuals Available: User manual and internet
Support Equipment: Carrying strap, battery charger, and calibration adapter	Communications Capability: Data can be downloaded to a PC using the COM 4000 software
Tamper Resistance: Key required for maintenance operations	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

MX-2100 Portable Gas Detector with 5-Gas Capability

Enmet Corporation
 P.O. Box 979
 Ann Arbor, Michigan 48106-0979
 Ray Kelley
 734-761-1270 (Tel)
 734-761-3220 (Fax)
 Nancy Aulisa
 naulisa@enmet.com
Information Source: <http://www.enmet.com>
Status: Vendor response—4/1/2006

**Portability:** Handheld Portable**Technology:** Electrochemistry**Unit Cost:** Not specified**Availability:** Commercially available**Description:** Electrochemistry and Catalytic Diffusion**Type:** Commercial**Current Users:** Not specified

OPERATIONAL PARAMETERS

CAs Detected: None**TICS Detected:**

- **High Priority:** Hydrogen sulfide, chlorine, hydrogen cyanide, hydrogen chloride, sulfur dioxide, ammonia, and ethylene oxide
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** None

Start-up Time: 30 s	Detection State: Vapor
Response Time: 5 s to 60 s (depending on gas/vapor)	Alarms: Audible and visual alarm
Sensitivity: Chlorine at 10 ppm Hydrogen sulfide at 100 ppm Hydrogen chloride at 30 ppm Hydrogen cyanide at 10 ppm Sulfur dioxide at 30 ppm Carbon monoxide at 1000 ppm Nitrogen dioxide at 30 ppm Ammonia at 100 ppm Ethylene oxide at 30 ppm Nitric oxide at 300 ppm	Selectivity: May false alarm to heavy concentrations of other gases and vapors (sensor and gas dependent)

PHYSICAL PARAMETERS

Size: 11 cm x 8 cm x 4.5 cm (4.3 in x 3.2 in x 1.8 in)	Weight: 350 g (12 oz)
Power Requirements: Encapsulated NiMH battery pack (rechargeable, standard) or 3 AAA batteries	

LOGISTICAL PARAMETERS

Durability: Impact resistant ABS casing; radio frequency interference (RFI) resistant**Environmental Considerations:** Not specified**Shelf Life:** 18 mo to 30 mo**Consumables:** Sensors, calibration kit, and batteries**Calibration Requirements:** Yes, autozero calibration recommended every 3 mo**Repairs:** Replacement of sensors and other maintenance as required by manufacturer

Repair Options: Equipment can be sent back, or repair kits can be bought. Company has service centers. Down time—there is a lease/rental program [minimum of 2 wk (only when emergency)] for older or portable. Availability of parts could be from days to 2 wk or 3 wk. Can expedite if critical. Tech support during office hours only. Safeware distributor can supply service.
Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Not specified

Manuals Available: User manual and internet

Support Equipment: Calibration adapter and battery charger

Communications Capability: Outputs: RS 232 infrared link: direct to printer for reviews to PC, maintenance, and supervision software, including text output for Excel

Tamper Resistance: Password protected

Warranty: 1 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Spectrum SP

Enmet Corporation
 P.O. Box 979
 Ann Arbor, Michigan 48106-0979
 Ray Kelley
 734-761-1270 (Tel)
 734-761-3220 (Fax)
 Nancy Aulisa
 naulisa@enmet.com
Information Source: <http://www.enmet.com>

Status: Vendor response—4/1/2006



Technology: Electrochemistry

Portability: Handheld Portable

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, chlorine, hydrogen cyanide, sulfur dioxide, ammonia, hydrogen chloride, hydrogen fluoride, phosgene, arsine, ozone, hydrogen, saline, and fluorine
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** Nitric oxide

Start-up Time: 1 min

Detection State: Vapor

Response Time: 5 s to 60 s (depending on gas/vapor)

Alarms: Audible and visual alarm

Sensitivity: Chlorine at 10 ppm; nitric oxide at 100 ppm
 Fluoride, hydrogen fluoride, and nitrogen dioxide at 10 ppm
 Sulfur dioxide and hydrogen chloride at 20 ppm
 Ammonia at 100 ppm
 Carbon monoxide at 1000 ppm
 Phosgene 1 ppm
 Arsine at 1 ppm
 Hydrogen sulfide at 200 ppm

Selectivity: May false alarm to heavy concentrations of other gases and vapors (sensor and gas dependent)

PHYSICAL PARAMETERS

Size: 13 cm x 12 cm x 5 cm (5 in x 4.8 in x 2 in)

Weight: <369 g (13 oz)

Power Requirements: Replaceable 4.8 V NiMH battery

LOGISTICAL PARAMETERS

Durability: The Spectrum SP is constructed of ABS.

Environmental Considerations: -10 °C to 45 °C (14 °F to 113 °F) operating temperature

Shelf Life: 6 mo to 3 yr

Consumables: Calibration kit, batteries, sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: None

Repair Options: Equipment can be sent back, or repair kits can be bought. Company has service centers. Down time—there is a lease/rental program [minimum of 2 wk (only when emergency)] for older or portable. Availability of parts could be from days to 2 wk or 3 wk. Can expedite if critical. Tech support during office hours only. Safeware distributor can supply service.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual and internet
Support Equipment: Not specified	Communications Capability: Not specified
Tamper Resistance: Password protected	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Target Gas Detector

Enmet Corporation
 P.O. Box 979
 Ann Arbor, Michigan 48106-0979
 Ray Kelley
 734-761-1270 (Tel)
 734-761-3220 (Fax)
 Nancy Aulisa
 naulisa@enmet.com
Information Source: <http://www.enmet.com>



Status: Vendor response—4/1/2006

Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry, catalytic, and solid state MOS

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, ammonia, chlorine, hydrogen chloride, hydrogen cyanide, sulfur dioxide, hydrogen fluoride, and arsine
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** Nitric oxide

Start-up Time: 1 min

Detection State: Vapor

Response Time: 5 s to 60 s (depending on gas/vapor)

Alarms: Audible and visual alarm

Sensitivity: Hydrogen sulfide at 200 ppm
 Carbon monoxide at 500 ppm
 Hydrogen fluoride at 10 ppm
 Chlorine at 10 ppm
 Ammonia at 100 ppm
 Nitric oxide at 100 ppm
 Nitrogen dioxide at 30 ppm
 Sulfur dioxide at 30 ppm
 Hydrogen chloride and hydrogen cyanide at 20 ppm
 Arsine at 1 ppm

Selectivity: May false alarm to heavy concentrations of other gases and vapors (sensor and gas dependent)

PHYSICAL PARAMETERS

Size: 15 cm x 11 cm x 4.6 cm (5.9 in x 4.5 in x 1.8 in)

Weight: 907 g (32 oz)

Power Requirements: Nickel metal hydride battery pack or optional alkaline (16 h of operation)

LOGISTICAL PARAMETERS

Durability: The Target is housed in a rugged metal enclosure and designed to minimize radio frequency interference (RFI)

Environmental Considerations: -15 °C to 50 °C (5 °F to 122 °F) @ 5 % to 99 % rh (operating temperature)

Shelf Life: Not specified

Consumables: Sensors, calibration kit, and batteries

Calibration Requirements: Yes, automatic zero calibration recommended every 3 mo

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: Equipment can be sent back, or repair kits can be bought. Company has service centers. Down time—there is a lease/rental program [minimum of 2 wk (only when emergency)] for older or portable. Availability of parts could be from days to 2 wk or 3 wk. Can expedite if critical. Tech support during office hours only. Safeware distributor can supply service.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Not specified

Manuals Available: User manual with instrument and internet

Support Equipment: Battery charger

Communications Capability: Serial communications to PC and Trakker Software

Tamper Resistance: Password protected

Warranty: 2 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

TX-2000 Toxic Gas Detector

Enmet Corporation
 P.O. Box 979
 Ann Arbor, Michigan 48106-0979
 Ray Kelley
 734-761-1270 (Tel)
 734-761-3220 (Fax)
 Nancy Aulisa
 naulisa@enmet.com
Information Source: <http://www.enmet.com>
Status: Vendor response—4/1/2006



Technology: Electrochemistry

Portability: Handheld Portable

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, ammonia, hydrogen chloride, hydrogen cyanide, and chlorine
- **Medium Priority:** Nitrogen dioxide and carbon monoxide
- **Low Priority:** Nitric oxide

Start-up Time: 20 s	Detection State: Vapor
Response Time: Not specified	Alarms: Audible and visual alarm
Sensitivity: Hydrogen sulfide at 100 ppm Carbon monoxide at 500 ppm Ammonia at 100 ppm Nitric oxide at 100 ppm Chlorine at 10 ppm Hydrogen chloride and hydrogen cyanide at 30 ppm Nitrogen dioxide at 30 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 6.1 cm x 8.6 cm x 2.5 cm (2.4 in x 3.4 in x 1 in)	Weight: 94 g (3.3 oz)
Power Requirements: 3 N series alkaline batteries (1000 h of operation)	

LOGISTICAL PARAMETERS

Durability: The TX-2000 is constructed of an anti-static polycarbonate material

Environmental Considerations: -10 °C to 40 °C (14 °F to 104 °F) operating temperature

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes (push button calibration); self-tested when turned on

Repairs: Replacement of batteries after 1000 h of operation. Replacement of sensors and other maintenance as required by manufacturer.

Repair Options: Equipment can be sent back, or repair kits can be bought. Company has service centers. Down time—there is a lease/rental program [minimum of 2 wk (only when emergency)] for older or portable. Availability of parts could be from days to 2 wk or 3 wk. Can expedite if critical. Tech support during office hours only. Safeware distributor can supply service.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual and internet
Support Equipment: Calibration regulator assembly, tool kit, and aspirator	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Model TS400 Toxic Gas Detector

General Monitors
 26776 Simpatica Circle
 Lake Forest, California 92630
 949-581-4464 (Tel)
 949-581-1151 (Fax)
 info@generalmonitors.com
Information Source: <http://www.generalmonitors.com>
Status: Vendor response—11/17/2006



Portability: Fixed-Site Detection

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Chemical processing industry, food and beverage industry, water and waste water treatment, and pulp and paper industry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, hydrogen chloride, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** Nitric oxide

Start-up Time: 1 h	Detection State: Vapor
Response Time: 10 s to 2 min	Alarms: None
Sensitivity: Ammonia at 50 ppm to 100 ppm Chlorine at 10 ppm Chlorine dioxide at 3 ppm Hydrogen chloride at 20 ppm Sulfur dioxide at 20 ppm Carbon monoxide at 100 ppm to 500 ppm Nitrogen dioxide at 20 ppm Nitric oxide at 100 ppm Ozone at 1 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 11 cm x 4.4 cm (4.5 in x 1.8 in)	Weight: 14.2 g (0.5 lb)
Power Requirements: Loop powered or +24 V dc	

LOGISTICAL PARAMETERS

Durability: The TS400 is available with polyester housing (intrinsically safe environments or increased-safety protected installations)

Environmental Considerations: -40 °C to 50 °C (-40 °F to 122 °F) (operating temperature)

-40 °C to 85 °C (-40 °F to 185 °F) (storage temperature)

15 % to 90 % rh (noncondensing)

Shelf Life: Not specified

Consumables: Calibration kits and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: None

Repair Options: 3 d turn around time

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Yes	Manuals Available: User manual
Support Equipment: None	Communications Capability: None
Tamper Resistance: None	Warranty: 1 yr (cell) and 2 yr (electronics)
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Model TS420 Oxygen Deficiency Detector

General Monitors
 26776 Simpatica Circle
 Lake Forest, California 92630
 949-581-4464 (Tel)
 949-581-1151 (Fax)
 info@generalmonitors.com
Information Source: <http://www.generalmonitors.com>
Status: Vendor response—11/17/2006



Portability: Fixed-Site Detection

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Water treatment, wastewater treatment facilities, pharmaceuticals, pulp and paper, chemical plants, refineries, food and beverage, petrochemical, and utilities.

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified

Detection State: Vapor

Response Time: <15 s

Alarms: Not specified

Sensitivity: 0 % to 25 % oxygen

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 11 cm x 4.4 cm (4.5 in x 1.8 in)

Weight: 14.2 g (0.5 lb)

Power Requirements: Loop powered or 10 to 35 V dc

LOGISTICAL PARAMETERS

Durability: The TS420 is available with polyester housing (intrinsically safe environments or increased-safety protected installations)

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) (operating temperature); -20 °C to 50 °C (-4 °F to 122 °F) (storage temperature); 0 % to 99 % rh (noncondensing)

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: Yes

Repairs: Not specified

Repair Options: 3 d turn around time

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Not specified

Training Available: Not specified

Manuals Available: User manual

Support Equipment: None

Communications Capability: None

Tamper Resistance: None

Warranty: 1 yr (cell) and 2 yr (electronics)

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Haz-Alert Gas Detector

Grace Industries
 P.O. Box 1225
 645 Keith Lane
 Owings, Maryland 20736-1225
 800-204-7277 (Tel)
 410-286-2401 (Tel)
 410-286-2410 (Fax)
 ajarboe@gracesales.com
Information Source: <http://www.graceindustries.com>
Status: Vendor response—4/1/2006



Technology: Electrochemistry

Portability: Handheld Portable

Unit Cost: Approximately \$298

Availability: Commercially available

Description: Electrochemistry with metal oxide sensor

Type: Commercial

Current Users: Fire service, hazmat teams, public utilities, safety officers, steel mills, maintenance, refineries, Airports, inspectors, ship yards, mining, and chemical processing

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ethylene oxide, fluorine, formaldehyde, and sulfur dioxide
- **Medium Priority:** Methyl bromide and methyl mercaptan
- **Low Priority:** None

Start-up Time: 2 min	Detection State: Vapor
Response Time: Not specified	Alarms: Audible alarm (95 dB); visual alarm (LED)
Sensitivity: Methane less than 100 ppm (v)	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 5.1 cm x 8.3 cm x 2.8 cm (2 in x 3.25 in x 1.1 in)	Weight: 198 g (7 oz) including battery
Power Requirements: 2 AA alkaline batteries (5 h of use)	

LOGISTICAL PARAMETERS

Durability: The Haz-Alert is housed in a rugged high impact polycarbonate case

Environmental Considerations: Not specified

Shelf Life: Indefinite

Consumables: Calibration kit and batteries

Calibration Requirements: Every 6 mo

Repairs: Replacement of batteries after 5 h to 8 h of operation. Other maintenance as required by manufacturer.

Repair Options: Loaners not available on Haz-Alert Gas Detector. Tech support is during business hours. Turn around time 7 d to 10 d (does not include shipping time). Can be expedited.

Maintenance Costs: \$59 parts and labor for calibration

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: No special training required
Training Available: Instruction manual	Manuals Available: User manual
Support Equipment: Not specified	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

ATX 612 Multi-Gas Aspirated Monitor

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-338-3287 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>

Status: Vendor response—4/1/2006



Portability: Handheld Portable

Unit Cost: Approximately \$1.7K to \$2.6K

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, chlorine, and sulfur dioxide
- **Medium Priority:** Nitrogen dioxide and carbon monoxide
- **Low Priority:** None

Start-up Time: 50 s	Detection State: Vapor
Response Time: 4 s to 20 s	Alarms: Audible and visual alarm
Sensitivity: Carbon monoxide at 0.2 ppm to 999 ppm Hydrogen sulfide at 0.2 ppm to 999 ppm Chlorine at 0.2 ppm to 99.9 ppm Nitrogen dioxide at 0.2 ppm to 99.9 ppm Sulfur dioxide at 0.2 ppm to 99.9 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 21 cm x 9.4 cm x 8.1 cm (8.2 in x 3.7 in x 3.2 in)	Weight: 1.5 kg (3.3 lb)
Power Requirements: Rechargeable nickel-cadmium battery pack (16 h operating time) or alkaline battery pack (20 h operating time)	

LOGISTICAL PARAMETERS

Durability: The ATX612 is constructed of 304 stainless steel, is RFI resistant, and equipped with shock-resistant electronics, preparing it for the worst of impacts

Environmental Considerations: -40 °C to 50 °C (-40 °F to 122 °F) @ 0 % to 90 % rh (operating temperature)

Shelf Life: Not specified

Consumables: Calibration kit, calibration adapter, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Video and tutorial software

Manuals Available: User manual

Support Equipment: Internal sampling pump, battery charger, probes, transport cases, and calibration log

Communications Capability: Capable of interfacing with a PC

Tamper Resistance: Password protected.

Warranty: Lifetime (1 yr on sensors and 1 yr on all other consumable items)

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Gas Badge Plus

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-338-3287 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>

Status: Vendor response—4/1/2006



Technology: Electrochemistry

Portability: Handheld Portable

Unit Cost: \$195 to \$325 manufacturers list

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, sulfur dioxide
- **Medium Priority:** Carbon monoxide, nitrogen dioxide
- **Low Priority:** None

Start-up Time: 20 s

Detection State: Vapor

Response Time: 5 s to 8 s

Alarms: Audible, visual, and vibrating alarm

Sensitivity: Hydrogen sulfide range: 0 ppm to 500 ppm in 0.1 ppm increments

Carbon monoxide range: 0 ppm to 1500 ppm in 1 ppm increments

Oxygen range: 0% to 30% by volume in 0.1 ppm increments

Nitrogen dioxide range: 0 ppm to 150 ppm in 0.1 ppm increments

Sulfur dioxide range: 0 ppm to 150 ppm in 0.1 ppm increments

Selectivity: The GasBadge Single Gas Monitor may false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 8.1 cm x 4.8 cm x 2.8 cm (3.2 in x 1.9 in x 1.1 in)

Weight: 71 g (2.5 oz)

Power Requirements: Lithium battery

LOGISTICAL PARAMETERS

Durability: Rugged, water resistant polycarbonate shell with protective concussion-proof overmold. RFI resistant.

Environmental Considerations: -40 °C to 60 °C (-40 °F to 140 °F), typical; 0 % to 99 % rh (noncondensing), typical

Shelf Life: 1 yr toxic, 6 mo oxygen

Consumables: Calibration gas (for each chemical detected)

Calibration Requirements: Recommended on use

Repairs: Sensor and battery replacement yearly

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Yes

Manuals Available: User manual

Support Equipment: Cal Plus calibration station, constant flow hand aspirated pump, data link

Communications Capability: Interfaces with Cal Plus calibration station and PC

Tamper Resistance: Password protect capability

Warranty: 2 yr

Testing Information: Not specified

Applicable Regulations: UL and cUL—Class I, Div 1, Groups A, B, C, D, T4

Class 1, Zone 0, Aex ia 11L T4 CSA

Class 1, Div 1, Groups A, B, C, D, T4

Ex ia LLC T4

GENERAL

iTX Multi-Gas Monitor

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-338-3287 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>

Status: Vendor response—4/1/2006



Portability: Handheld Portable

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry and Catalytic Diffusion

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, ammonia, chlorine, hydrogen cyanide, hydrogen chloride, and sulfur dioxide
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** Nitric oxide

Start-up Time: 30 s	Detection State: Vapor
Response Time: <10 s	Alarms: Audible and visual alarm
Sensitivity: Hydrogen sulfide and nitric oxide at 999 ppm Carbon monoxide at 999 ppm Sulfur dioxide at 0.2 ppm to 99.9 ppm Nitrogen dioxide at 0.2 ppm to 99.9 ppm Chlorine at 0.2 ppm to 50.0 ppm Hydrogen chloride at 0.2 ppm to 30.0 ppm Hydrogen cyanide at 0.2 ppm to 30.0 ppm Ammonia at 200 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 12 cm x 8.1 cm x 4.3 cm (4.8 in x 3.2 in x 1.7 in) **Weight:** 525 g (19 oz) with lithium ion battery

Power Requirements: Rechargeable lithium-ion battery pack (typical 24 h run time)
AA alkaline battery pack (typical 12 h run time)

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) @ 15 % to 95 % rh (noncondensing)

Shelf Life: Not specified

Consumables: Batteries and sensors

Calibration Requirements: Field calibration after changing sensors

Repairs: Not specified

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Minimal	Training Required: No
Training Available: Yes	Manuals Available: Yes
Support Equipment: Yes	Communications Capability: Yes
Testing Information: Not specified	Warranty: Lifetime

Tamper Resistance: Configurable surety access code protects all calibration and alarm settings

Applicable Regulations: UL and CSA—Class I, Groups A, B, C, D hazardous locations

MSHA—Intrinsically safe for Methane/Air mixtures only

Cenelec (ATEX) and Simtars (Australia)—EEx ia d IIC T4

GENERAL

Gas Badge Pro

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-338-3287 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>

Status: Vendor response—4/1/2006



Portability: Handheld Portable

Unit Cost: \$375 to \$645 list price

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, hydrogen sulfide, chlorine, and sulfur dioxide
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** None

Start-up Time: 20 s

Detection State: Vapor

Response Time: 10 s

Alarms: Audible, visual, and vibrating alarm

Sensitivity: CO range: 0-1,500 ppm in 1 ppm increments

Selectivity: Not specified

H₂S range: 0-500 ppm in 0.1 ppm increments

O₂ range: 0-30% by volume on 0.1 ppm increments

NO₂ range: 0-150 ppm in 0.1 ppm increments

SO₂ range 0-150 ppm in 0.1 ppm increments

NH₃ range: 0-100 ppm in 1 ppm increments

CL₂ range: 0-100 ppm in 0.1 ppm increments

ClO₂ range: 0-1 ppm in .01 ppm increments

PH₃ range 0-10 ppm in 0.01 ppm increments

PHYSICAL PARAMETERS

Size: 9.4 cm x 5.1 cm x 2.8 cm (3.7 in x 2 in x 1.1 in)

Weight: 85 g (3 oz)

Power Requirements: User replaceable 3 V, CR2 lithium battery (2600 h run time)

LOGISTICAL PARAMETERS

Durability: Rugged, water resistant polycarbonate shell with protective concussion-proof overmold. RFI resistant.

Environmental Considerations: -40 °C to 60 °C (-40 °F to 140 °F), typical

Shelf Life: 6 mo oxygen, 1 yr toxic

Consumables: Calibration gas, calibration adapter, sensors (for each chemical detected), and batteries

Calibration Requirements: 30 d recommended

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Not specified

Training Required: Formal

Training Available: An interactive training tutorial in a CD-ROM format is also available from the manufacturer

Manuals Available: User manual

Support Equipment: GasBadge Pro DS2 docking station, GasBadge data link

Communications Capability: Docking station and PC interface

Tamper Resistance: Password protected

Warranty: Lifetime

Testing Information: Not specified

Applicable Regulations: UL and cUL—Class I, Div 1, Groups A, B, C, D, T4

Class 1, Zone 0, Aex ia 11L T4 CSA

Class 1, Div 1, Groups A, B, C, D

T4 Ex ia LLC T4 (pending)

GENERAL

T40 Rattler Single-Gas Monitor

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-338-3287 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>

Status: Vendor response—4/1/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: \$195

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** None

Start-up Time: 20 s	Detection State: Vapor
Response Time: <10s	Alarms: Internal vibrating alarm, audible, and visual alarms
Sensitivity: CO at 999 ppm; H ₂ S at 500 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 8.6 cm x 5.8 cm x 1.9 cm (3.4 in x 2.3 in x 0.75 in)

Weight: 3.5 oz (98 g)

Power Requirements: Single "AA" battery (up to 500 h)

LOGISTICAL PARAMETERS

Durability: High visibility impact resistant composite with radio frequency interference (RFI) protection

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F); 15 % to 95 % rh typical

Shelf Life: Not specified	Consumables: Batteries
Calibration Requirements: 2 button automatic calibration	Repairs: Maintenance free

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: Minimal	Training Required: No
Training Available: Yes	Manuals Available: Yes
Support Equipment: Yes	Communications Capability: None
Tamper Resistance: Not specified	Warranty: 2 yr from the date of manufacture

Testing Information: Not specified

Applicable Regulations: UL and CUL—Class I, Groups A, B, C, D; CENELEC (ATEX) and Australia—EEx ia IIC T4

GENERAL

T82 Single Gas Monitor

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-338-3287 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>

Status: Vendor response—4/1/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available (production lead times of 6 wk to 8 wk may apply to some configurations)

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, hydrogen chloride, hydrogen cyanide, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Carbon monoxide, nitrogen dioxide, and phosphine
- **Low Priority:** Nitric oxide

Start-up Time: Not specified	Detection State: Vapor
Response Time: Not specified	Alarms: Audible, visual, and optional vibrating alarm
Sensitivity: Ammonia at 200 ppm Carbon monoxide at 1500 ppm Chlorine at 0.2 ppm to 50 ppm Phosphine at 10 ppm Hydrogen chloride at 0.2 ppm to 30 ppm Hydrogen sulfide at 500 ppm Hydrogen cyanide, nitrogen dioxide, and sulfur dioxide at 0.2 ppm to 150 ppm Nitric oxide at 1000 ppm	Selectivity: The T80 Single Gas Monitor may false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 10 cm x 6.9 cm x 3 cm (4.1 in x 2.7 in x 1.2 in)

Weight: 198 g (7 oz)

Power Requirements: 9 V alkaline battery (2300 h minimum) or lithium battery (4000 h minimum)

LOGISTICAL PARAMETERS

Durability: The T82 Single Gas Monitor is constructed of a high impact composite with radio frequency interference (RFI) protection

Environmental Considerations: Carbon monoxide, nitrogen dioxide, and sulfur dioxide: -20 °C to 50 °C (-4 °F to 122 °F)

Chlorine and phosphine: -20 °C to 40 °C (-4 °F to 104 °F)

Hydrogen cyanide: -40 °C to 40 °C (-40 °F to 104 °F)

Hydrogen sulfide: -40 °C to 50 °C (-40 °F to 122 °F)

All at 0 % to 90 % rh (operating temperature)

Shelf Life: Not specified

Consumables: Smart sensor modules and batteries

Calibration Requirements: 1 button autocalibration (monthly field calibration recommended)

Repairs: Not specified

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Minimal	Training Required: No
Training Available: Yes	Manuals Available: Yes
Support Equipment: Yes	Communications Capability: Yes

Tamper Resistance: Internally accessible switches to minimize access and tampering with calibration and alarm settings

Warranty: Lifetime warranty (2 yr on CO and H₂S sensors and 1 yr on all other sensors)

Testing Information: Not specified

Applicable Regulations: UL and CUL—Class I, Groups A, B, C, D

MSHA—Intrinsically safe for Methane/Air mixtures only

CENELEC and Australia—EEx ia IIC T4

GENERAL

TMX412 Multi-Gas Monitor

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-338-3287 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>

Status: Vendor response—4/1/2006



Portability: Handheld Portable

Unit Cost: Approximately \$1.2K to \$2.2K

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, chlorine, and sulfur dioxide
- **Medium Priority:** Nitrogen dioxide and carbon monoxide
- **Low Priority:** None

Start-up Time: 45 s	Detection State: Vapor
Response Time: 10 s to 20 s	Alarms: Audible and visual alarm
Sensitivity: Carbon monoxide at 0.2 ppm to 999 ppm Hydrogen sulfide at 0.2 ppm to 999 ppm Chlorine at 0.2 ppm to 99.9 ppm Nitrogen dioxide at 0.2 ppm to 99.9 ppm Sulfur dioxide at 0.2 ppm to 99.9 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 12 cm x 7.1 cm x 5.1 cm (4.8 in x 2.8 in x 2 in)

Weight: 0.7 kg (1.6 lb)

Power Requirements: Rechargeable nickel-cadmium battery pack, 9 V alkaline battery pack, or a lithium battery

LOGISTICAL PARAMETERS

Durability: The TMX412 is constructed of 304 stainless steel, is RFI resistant, and equipped with shock-resistant electronics, preparing it for the worst of impacts

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) @ 0 % to 90 % rh (operating temperature)

Shelf Life: Not specified

Consumables: Calibration kit, calibration adapter, batteries, and sensors (for each chemical detected)

Calibration Requirements: 1 button autocalibration

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Video and tutorial software	Manuals Available: User manual
Testing Information: Not specified	Applicable Regulations: None

Support Equipment: Sampling pump, manual pump, battery charger, probes, transport case, and calibration log software

Communications Capability: The TMX412 can easily communicate with a personal computer

Tamper Resistance: Password protected

Warranty: Lifetime (1 yr on sensors and 1 yr on all other consumable items)

GENERAL

M40 Multi-Gas

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-338-3287 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>

Status: Vendor response—4/1/2006



Technology: Electrochemistry

Portability: Handheld Portable

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** None

Start-up Time: 20 s	Detection State: Vapor
Response Time: 10 s to 20 s	Alarms: Audible, visual, and vibrating alarm
Sensitivity: CO range: 0 ppm to 999 ppm in 1 ppm increments H ₂ S range: 0 ppm to 500 ppm in 1 ppm increments O ₂ range: 0 % to 30 % by volume in 0.1 increments LEL range: 0 % to 100 % LEL in 1% increments (also has LEL over-range protection)	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 11 cm x 6.2 cm x 3.5 cm (4.3 in x 2.5 in x 1.4 in) **Weight:** 0.24 kg (8.6 oz)

Power Requirements: Rechargeable lithium-ion integral battery

LOGISTICAL PARAMETERS

Durability: High visibility, impact resistant composite – RFI, EMI, and IP65 tested and approved

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F); 15 % to 95 % rh, typical, 0 % to 99 % rh intermittent (noncondensing)

Shelf Life: Not specified

Consumables: Calibration gas

Calibration Requirements: Yes

Repairs: Not specified

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Minimal	Training Required: No
Training Available: Yes	Manuals Available: Yes
Support Equipment: Yes	Communications Capability: Yes
Tamper Resistance: Password protected	Warranty: 2 yr

Testing Information: Not specified

Applicable Regulations: UL—Class I, Division 1, Groups A, B, C, D; T4 CSA—Class I, Division 1, Groups A, B, C, D; T4

GENERAL

IQ-250 Single Gas Detector

International Sensor Technology
 3 Whatney
 Irvine, California 92618-2824
 Jeff Lowe
 949-452-9000 (Tel)
 949-452-9009 (Fax)
 jeff.lowe@intlsensor.com
Information Source: <http://www.intlsensor.com>
Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: \$795 to \$1.5K

Availability: Commercially available

Description: Solid State and Electrochemical

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, boron trichloride, boron trifluoride, chlorine, diborane, ethylene oxide, fluorine, formaldehyde, hydrogen bromide, hydrogen chloride, hydrogen cyanide, hydrogen sulfide, hydrogen fluoride, phosgene, sulfur dioxide, and tungsten hexafluoride
- **Medium Priority:** Acrolein, allyl alcohol, carbon monoxide, methyl mercaptan, nitrogen dioxide, phosphine, phosphorous oxychloride, and silicon tetrafluoride
- **Low Priority:** Bromine, cyanogen chloride, nitric oxide, and toluene diisocyanate

Start-up Time: Not specified

Detection State: Vapor

Response Time: 5 s to 60 s

Alarms: Audible and visual alarm

Sensitivity: From low ppm ranges to % by volume

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 16 cm x 7.6 cm x 10.2 cm (6.3 in x 3 in x 4 in)

Weight: 0.6 kg (1.4 lb)

Power Requirements: Four AA alkaline batteries (14 h of operation)

LOGISTICAL PARAMETERS

Durability: The IQ-250 is constructed of aluminum housing

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) @ 0 % to 95 % rh (operating temperature)

Shelf Life: Depends on sensor

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes (every 6 mo recommended)

Repairs: Replacement of batteries after 14 h of operation. Replacement of sensors and other maintenance as required by manufacturer.

Repair Options: Loaner not available, turn around 1 wk to 2 wk. Panther may take up to 3 wk.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Yes

Manuals Available: User manual

Support Equipment: None

Communications Capability: None

Tamper Resistance: None

Warranty: 1 yr electronics and 1 yr sensors

Testing Information: Not specified

Applicable Regulations: None

GENERAL

4000 Series Compact Portable Gas Detector

Interscan Corporation
 P.O. Box 2496
 Chatsworth, California 91313-2496
 Laurie Shaw
 800-458-6153 (Tel)
 818-882-2331 (Tel)
 818-341-0642 (Fax)
 info@gasdetection.com
Information Source: <http://www.gasdetection.com>
Status: Vendor response—11/28/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Approximately \$2K

Availability: Commercially and military available (2 wk ARO)

Description: Electrochemistry—electrochemical voltametric

Type: Commercial and military

Current Users: NASA, all U.S. military agencies, and all major chemical companies

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ethylene oxide, hydrazine, hydrogen cyanide, hydrogen sulfide, sulfur dioxide, chlorine, formaldehyde, and hydrogen chloride
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** None

Start-up Time: <5 min

Detection State: Vapor

Response Time: <30 s for 90 % operability; 2 min for ethylene oxide

Alarms: Audible and visual alarm

Sensitivity: Carbon monoxide at 100 ppm
 Chlorine at 10 ppm
 Ethylene oxide at 10 ppm
 Formaldehyde at 1 ppm
 Hydrogen chloride at 10 ppm
 Hydrogen sulfide at 10 ppm
 Nitrogen dioxide at 10 ppm
 Sulfur dioxide at 10 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts (refer to website)

PHYSICAL PARAMETERS

Size: 18 cm x 10 cm x 23 cm (7 in x 4 in x 8.9 in)

Weight: 2 kg (4.5 lb)

Power Requirements: Rechargeable NiCad batteries (10 h of operation)

LOGISTICAL PARAMETERS

Durability: Very rugged per drop tests

Environmental Considerations: 18 °C to 49 °C (0 °F to 120 °F); operates in most environments

Shelf Life: 5 yr

Consumables: Sensors, filters, and alkaline batteries

Calibration Requirements: Every 3 mo to 12 mo depending on usage

Repairs: Replacement of sensors and alkaline batteries. Other maintenance as required by manufacturer.

Repair Options: No official loaner policy (work with customer if in stock). Turn around time depends on what is wrong—calibration within wk of receipt—also repairs. Tech support limited to business hours; can set up email tech support.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: No special skills or training required

Training Required: None

Training Available: Customer service department has an available 800 telephone number

Manuals Available: User manual (paper and pdf)

Support Equipment: Battery charger, carrying case, and sample probe

Communications Capability: Computer interface and hardwire capability

Tamper Resistance: None

Warranty: 1 yr for instrument (parts and labor) and 6 mo for sensor

Testing Information: Drop tests

Applicable Regulations: UL category—intrinsically safe; CE approved

GENERAL

MicroMax Multigas Monitor

Lumidor Safety Products
 11221 Interchange Circle South
 Miramar, Florida 33020
 800-433-7220 (Tel)
 954-433-7730 (Fax)
Information Source: <http://www.lumidor.com>

Status: Vendor response—4/10/2006



Portability: Handheld Portable

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, hydrogen cyanide, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Carbon monoxide and phosphine
- **Low Priority:** None

Start-up Time: Not specified

Response Time: Not specified

Sensitivity: Ammonia at 500 ppm

Carbon monoxide at 800 ppm

Chlorine at 1000 ppm

Hydrogen cyanide at 800 ppm

Hydrogen sulfide at 500 ppm

Phosphine at 20 ppm

Sulfur dioxide at 20 ppm

Detection State: Vapor

Alarms: Audible (90 dB)

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 12 cm x 7.6 cm x 4.6 cm (4.8 in x 3 in x 1.8 in)

Weight: <0.5 kg (<1 lb)

Power Requirements: Rechargeable NiCad battery pack with quick charge option or two AA alkaline batteries (10 h of operation)

LOGISTICAL PARAMETERS

Durability: The MicroMax is housed in a rugged water resistant anodized aluminum enclosure

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) @ 0 % to 98 % rh (operating temperature)

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes (the MicroMax automatically performs self test and autofunctions)

Repairs: Replacement of batteries after 10 h of operation. Replacement of sensors and other maintenance as required by manufacturer.

Repair Options: For new instruments, loaner is available if one is available. First try to fix over phone, then send back for repairs (few days to few weeks, depending on problem). Company will support obsolete instruments for 3 yr to 4 yr. Toxbee is disposable, replace with Minimax; Unimax replace with Minimax; MicroMax replace with MicroMax Plus or MicroMax Pro, or Impact gas detector, etc.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: Not specified
Support Equipment: Sampling hose and particulate filter	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Toxibee Personal Gas Alarm

Lumidor Safety Products
 11221 Interchange Circle South
 Miramar, Florida 33020
 800-433-7220 (Tel)
 954-433-7730 (Fax)
Information Source: <http://www.lumidor.com>

Status: Vendor response—4/10/2006



Portability: Handheld Portable

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** None

Start-up Time: Not specified

Detection State: Vapor

Response Time: 3 s to 5 s

Alarms: Audible and visual alarm

Sensitivity: Hydrogen sulfide at 1000 ppm
 Carbon monoxide at 500 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 5.6 cm x 7.1 cm x 1.8 cm (2.2 in x 2.8 in x 0.72 in)

Weight: 56.7 g (2 oz)

Power Requirements: Not specified

LOGISTICAL PARAMETERS

Durability: Not specified

Repairs: None

Shelf Life: Not specified

Maintenance Costs: None

Calibration Requirements: Yes

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) operating temperature

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Repair Options: For new instruments, loaner is available if one is available. First try to fix over phone, then send back for repairs (few days to few weeks, depending on problem). Company will support obsolete instruments for 3 yr to 4 yr. Toxibee is disposable, replace with Minimax; Unimax replace with Minimax; MicroMax replace with MicroMax Plus or MicroMax Pro, or Impact gas detector, etc.

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Calibration hose and calibration cup

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: 2 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Unimax II Personal Single Gas Detector

Lumidor Safety Products
 11221 Interchange Circle South
 Miramar, Florida 33020
 800-433-7220 (Tel)
 954-433-7730 (Fax)
Information Source: <http://www.lumidor.com>

Status: Vendor response—4/10/2006



Portability: Handheld Portable

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Carbon monoxide, nitrogen dioxide, and phosphine
- **Low Priority:** None

Start-up Time: Not specified

Response Time: Not specified

Sensitivity: Ammonia at 25 ppm

Carbon monoxide at 35 ppm

Chlorine at 0.5 ppm

Hydrogen sulfide at 10 ppm

Nitrogen dioxide at 3 ppm

Phosphine at 0.3 ppm

Sulfur dioxide at 2 ppm

Detection State: Vapor

Alarms: Audible and visual alarm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 10 cm x 6.4 cm x 2.8 cm (4.1 in x 2.5 in x 1.1 in)

Weight: 141.7 g (5 oz)

Power Requirements: Three AAA alkaline batteries (800 h of operation)

LOGISTICAL PARAMETERS

Durability: The UniMax is RFI/EMI resistant

Environmental Considerations: -15 °C to 45 °C (5 °F to 113 °F) operating temperature

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: Replacement of batteries after 800 h of operation. Replacement of sensors and other maintenance as required by manufacturer.

Repair Options: For new instruments, loaner is available if one is available. First try to fix over phone, then send back for repairs (few days to few weeks, depending on problem). Company will support obsolete instruments for 3 yr to 4 yr. Toxbee is disposable, replace with Minimax; Unimax replace with Minimax; MicroMax replace with MicroMax Plus or MicroMax Pro, or Impact gas detector, etc.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: Not specified
Support Equipment: Calibration hose and calibration cup	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Lifetime (excluding sensors and batteries)
Testing Information: Not specified	Applicable Regulations: None

GENERAL

TOX-BOX Portable Gas Detector

Mil-Ram Technology, Inc.
 4135 Business Center Dr.
 Fremont, California 94538
 510-656-2001 (Tel)
 510-656-2004 (Fax)
 Barbara Milco
 barbm00@aol.com
Information Source: <http://www.mil-ram.com>

Status: Vendor response—11/21/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry, catalytic, infrared, and PID

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, boron trichloride, boron trifluoride, chlorine, diborane, ethylene oxide, fluorine, formaldehyde, hydrogen bromide, hydrogen chloride, hydrogen cyanide, hydrogen fluoride, hydrogen sulfide, nitric acid, phosgene, phosphorus trichloride, sulfur dioxide, sulfuric acid, and tungsten hexafluoride
- **Medium Priority:** Boron tribromide, carbon monoxide, nitrogen dioxide, phosphine, phosphorus oxychloride, phosphorus pentafluoride, silicon tetrafluoride, tellurium hexafluoride, and titanium tetrachloride
- **Low Priority:** Arsenic trichloride, bromine, bromide chloride, bromide pentafluoride, bromide trifluoride, chlorine pentafluoride, chlorine trifluoride, hydrogen iodide, and nitric oxide

Start-up Time: <60 s	Detection State: Vapor
Response Time: <30 s	Alarms: Audible and visual alarm
Sensitivity: Not specified	Selectivity: Has few noncritical interferences

PHYSICAL PARAMETERS

Size: 27 cm x 25 cm x 18 cm (10.6 in x 9.75 in x 6.9 in)	Weight: <2.3 kg (<5 lb)
Power Requirements: Battery powered	

LOGISTICAL PARAMETERS

Durability: The TOX-BOX is constructed of high impact structural copolymer and is dust, water, chemical, and corrosion resistant.

Environmental Considerations: -15 °C to 50 °C (4 °F to 122 °F) @ 5 % to 95 % rh (operating temperature)

Shelf Life: Sensor life greater than 3 yr

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: Replacement of batteries; replacement of sensors, and other maintenance as required by manufacturer

Repair Options: Loaners are not provided, but it is negotiable. Turn around time is 3 d to 5 d (excludes shipping). Phone support can diagnose common problems, and part can be sent to customer. Phone support 6:30 AM to 5 PM.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: Not specified	Communications Capability: RS 485 modbus RTU, 2 wire or 4 wire
Tamper Resistance: None	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Solaris® Multigas Detector

MSA Instrument Division
 P.O. Box 427
 Pittsburgh, Pennsylvania 15230
 Evan Erickson
 724-733-9247 (Tel)
 724-733-8573 (Fax)
 evan.erickson@msanet.com
Information Source: <http://www.msanet.com>

Status: Vendor response—12/27/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified (GSA pricing available)

Availability: Commercially available and GSA. Typical 1 d delivery; call for availability.

Description: Electrochemical and catalytic

Type: Commercial and military

Current Users: Government, military, fire service, law enforcement, utilities, chemical processing industry, water treatment, and wastewater treatment

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** None

Start-up Time: Between 60 s and 90 s

Detection State: Vapor and aerosol

Response Time: Between 11 s and 60 s

Alarms: Auto, visible, audible, and vibrating alarm

Sensitivity: Hydrogen sulfide at 200 ppm
 Carbon monoxide at 500 ppm

Selectivity: Cross-interferent table available upon request

PHYSICAL PARAMETERS

Size: 11 cm x 6.4 cm x 3.2 cm (4.5 in x 2.5 in x 1.25 in)

Weight: 227 g (0.5 lbs)

Power Requirements: Battery powered (Lithium Ion 14 h)

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling. Able to operate normally after being moved without regard to handling.

Environmental Considerations: Normal -10 °C to 40 °C (14 °F to 104 °F); extended -20 °C to 50 °C (-4 °F to 122 °F); operates in most environments

Shelf Life: Indefinite; sensors and batteries >2 yr

Consumables: Sensors

Calibration Requirements: Yes, one button autocalibration or Galaxy Automated Calibration system compatible

Repairs: Full support provided for repair, service, preventative maintenance, and training

Repair Options: Not specified

Maintenance Costs: Not specified (GSA pricing available)

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: Minimal care and use training

Training Available: ePartner Training

Manuals Available: User manuals available in English and Spanish; documentation available at www.msanet.com; video and CD

Support Equipment: Calibration equipment

Communications Capability: Computer interface

Tamper Resistance: Setup password protected

Warranty: Case and electronics—lifetime

Sensors and consumables—2 yr

Testing Information: Not specified

Applicable Regulations: North American UL913 and CSA C22.2 for use in Class I, Division 1, Groups A,B,C and D; European- and Australian approvals. IP65 rated

GENERAL

SIRIUS Multigas PID Detector

MSA Instrument Division
 P.O. Box 427
 Pittsburgh, Pennsylvania 15230
 Evan Erickson
 724-733-9247 (Tel)
 724-733-8573 (Fax)
 evan.erickson@msanet.com
Information Source: <http://www.msanet.com>
Status: Vendor response—12/27/2006



Technology: Photo Ionization

Portability: Handheld Portable

Unit Cost: Not specified (GSA pricing available)

Availability: Commercially available

Description: Photo Ionization, Electro Chemical Cells, and Catalytic Combustion

Type: Commercial

Current Users: Government, military, fire service, law enforcement, utilities, chemical processing industry, water, and wastewater treatment

OPERATIONAL PARAMETERS

CAs Detected: Variety of VOCs, CO, H₂S

TICS Detected:

- **High Priority:** Combustible gas, hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** Not specified

Start-up Time: 2 min	Detection State: Vapor and gas
Response Time: 20 s to 90 s	Alarms: Visible and audible alarm
Sensitivity: 0.1 ppm on PID channels 1 ppm on toxic channels	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 18 cm x 10 cm x 5.8 cm (7.1 in x 3.4 in x 2.3 in) **Weight:** 0.62 kg (1.36 lb)

Power Requirements: Alkaline or rechargeable Li—Ion battery pack

LOGISTICAL PARAMETERS

Durability: High strength noncorrosive plastic case, IP54

Environmental Considerations: Normal 0 °C to 40 °C (32 °F to 104 °F); 0 to 95% rh (noncondensing)

Shelf Life: Not specified	Consumables: Sensors and filters
Calibration Requirements: Yes, periodically	Repair Options: Not specified

Maintenance Costs: Not specified

Repairs: Full support provided for repair, service, preventative maintenance, and training

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Training Required: Minimal care and use training	Training Available: Interactive CD Rom
Communications Capability: IRDA	Tamper Resistance: Calibration and set up lock out
Applicable Regulations: ATEX/CSA/UL	Testing Information: ATEX/CSA/UL

Warranty: 2 yr

Manuals Available: Tri-lingual user manual, documentation available at www.msanet.com; video, and CD

Support Equipment: Alkaline battery pack, sampling line & probe, PVC case, calibration equipment

GENERAL

HAZMATCAD Chemical Agent Detector

MSA Instrument Division
 P.O. Box 427
 Pittsburgh, Pennsylvania 15230
 Evan Erickson
 724-733-9247 (Tel)
 724-733-8573 (Fax)
 evan.erickson@msanet.com
Information Source: <http://www.msanet.com>



Status: Vendor response—12/27/2006

Portability: Handheld Portable

Technology: SAW and Electrochemistry

Unit Cost: Not specified (GSA pricing available)

Availability: Commercially available and GSA. Typical 1 d delivery; call for availability.

Description: SAW and Electrochemistry

Type: Commercial and military

Current Users: Government, military, fire service, law enforcement, 1st responders

OPERATIONAL PARAMETERS

CAs Detected: Nerve (GA, GB, GD, GF, VX) and blister (HD)

TICS Detected:

- **High Priority:** Hydrogen cyanide or phosgene
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Between 20 s and 60 s	Detection State: Vapor and aerosol
Response Time: Between 20 s and 120 s	Alarms: Auto, visible, and audible alarm
Sensitivity: Nerve agents at 0.01 to 0.03 ppm Blister agents at 0.04 ppm Hydrogen cyanide at 5 ppm Phosgene at 0.3 ppm	Selectivity: Cross-interferent table available upon request

PHYSICAL PARAMETERS

Size: 5.8 cm x 6.4 cm x 19.8 cm (2.3 in x 2.5 in x 7.8 in) **Weight:** 0.63 kg (22 oz)
Power Requirements: Battery Powered (lithium battery 8 to 12 h)

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling. Able to operate normally after being moved without regard to handling.	Environmental Considerations: Normal -10 °C to 40 °C (14 °F to 104 °F)
Shelf Life: 6 mo	Consumables: None
Calibration Requirements: None	Repairs: None
Repair Options: Not specified	Maintenance Costs: Not specified (GSA pricing available)

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required	Training Required: Minimal care and use training
Training Available: ePartner Training	Manuals Available: Tri-lingual user manual, documentation available at www.msanet.com ; video, and CD
Support Equipment: None	Communications Capability: Computer interface, either Infrared or RS232 cable
Tamper Resistance: Not specified	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

HAZMATCAD Plus Chemical Agent Detector

MSA Instrument Division
 P.O. Box 427
 Pittsburgh, Pennsylvania 15230
 Evan Erickson
 724-733-9247 (Tel)
 724-733-8573 (Fax)
 evan.erickson@msanet.com
Information Source: <http://www.msanet.com>



Status: Vendor response—12/27/2006

Portability: Handheld Portable

Technology: SAW and Electrochemistry

Unit Cost: Not specified (GSA pricing available)

Availability: Commercially available and GSA. Typical 1 d delivery; call for availability.

Description: SAW and Electrochemistry

Type: Commercial and military

Current Users: Government, military, fire service, law enforcement, 1st responders

OPERATIONAL PARAMETERS

CAs Detected: Nerve (GA, GB, GD, GF, VX) and blister (HD)

TICS Detected:

- **High Priority:** Hydrogen cyanide, phosgene, halogen gases, hydride gases
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Between 20 s and 60 s	Detection State: Vapor and aerosol
Response Time: Between 20 s and 120 s	Alarms: Auto, visible, and audible alarm
Sensitivity: Hydrogen cyanide at 5 ppm Nerve agents at 0.01 to 0.03 ppm Blister agents at 0.04 ppm Phosgene at 0.3 ppm Halogen at 10 ppm Hydride gases at 0.5 ppm	Selectivity: Cross-interferent table available upon request

PHYSICAL PARAMETERS

Size: 5.8 cm x 20 cm x 25 cm (2.3 in x 7.9 in x 9.8 in)	Weight: 1.43 kg (50 oz)
Power Requirements: Battery Powered (lithium battery 8 to 12 h)	

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling. Able to operate normally after being moved without regard to handling.

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F)

Shelf Life: 6 mo	Consumables: None
Calibration Requirements: None	Repairs: None
Repair Options: Not specified	Maintenance Costs: GSA pricing available

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required	Training Required: Minimal care and use training
Training Available: ePartner Training	Support Equipment: None
Manuals Available: Tri-lingual user manual, documentation available at www.msanet.com ; video, and CD	Communications Capability: Computer interface, either Infrared or RS232 cable
Tamper Resistance: Not specified	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

API 5000™ LC/MS/MS System

Applied Biosystems/MDS Sciex
 71 Four Valley Drive
 Concord, Ontario, Canada L4K4V8
 Byron Kieser or Joe Analceto
 905-660-9005 (Tel)
 905-660-2605 (Fax)
 kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>

Status: Vendor response—11/14/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry—hybrid linear ion trap/triple quadruple, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min

Detection State: Vapor, aerosol, and liquid

Response Time: >2 min

Alarms: None

Sensitivity: This detector has not been tested against CAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.

Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferences.

PHYSICAL PARAMETERS

Size: 56 cm x 135 cm x 51 cm (22 in x 53 in x 20 in)

Weight: 136 kg (300 lb)

Power Requirements: 207 V ac to 242 V ac

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 1 yr parts and labor

Testing Information: Not specified

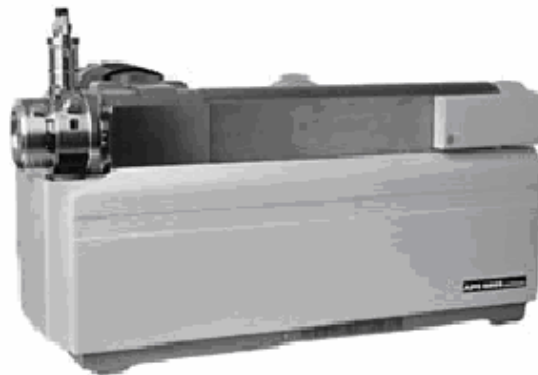
Applicable Regulations: None

GENERAL

4000 OTRAP® LC/MS/MS System

Applied Biosystems/MDS Sciex
 71 Four Valley Drive
 Concord, Ontario, Canada L4K4V8
 Byron Kieser or Joe Analceto
 905-660-9005 (Tel)
 905-660-2605 (Fax)
 kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>

Status: Vendor response—11/14/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry—hybrid linear ion trap/triple quadrupole, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min	Detection State: Vapor, aerosol, and liquid
Response Time: >2 min	Alarms: None
Sensitivity: This detector has not been tested against CAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.	Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferents.

PHYSICAL PARAMETERS

Size: 56 cm x 135 cm x 51 cm (22 in x 53 in x 20 in)	Weight: 136.1 kg (300 lb)
Power Requirements: 207 V ac to 242 V ac	

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 1 yr parts and labor

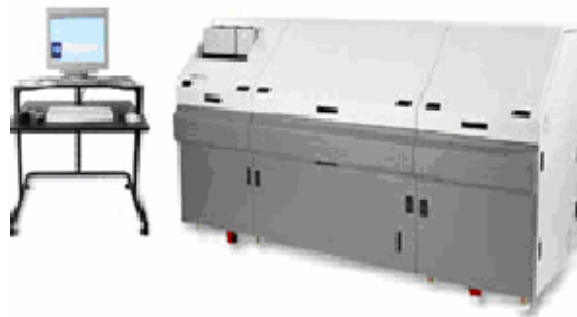
Testing Information: Not specified

Applicable Regulations: None

GENERAL

4700 Proteomics Analyzer with TOF/TOF™ Optics

Applied Biosystems/MDS Sciex
 71 Four Valley Drive
 Concord, Ontario, Canada L4K4V8
 Byron Kieser or Joe Analceto
 905-660-9005 (Tel)
 905-660-2605 (Fax)
 kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>



Status: Vendor response—11/14/2005

Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry—hybrid linear ion trap/triple quadruple, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min

Detection State: Vapor, aerosol, and liquid

Response Time: >2 min

Alarms: None

Sensitivity: This detector has not been tested against CAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.

Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferences.

PHYSICAL PARAMETERS

Size: 56 cm x 135 cm x 51 cm (22 in x 53 in x 20 in)

Weight: 136 kg (300 lb)

Power Requirements: 100 V ac to 250 V ac at 50 or 60 Hz

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 1 yr parts and labor

Testing Information: Not specified

Applicable Regulations: None

GENERAL

4800 MALDI TOF/TOF™ Analyzer

Applied Biosystems/MDS Sciex
 71 Four Valley Drive
 Concord, Ontario, Canada L4K4V8
 Byron Kieser or Joe Analceto
 905-660-9005 (Tel)
 905-660-2605 (Fax)
 kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>

Status: Vendor response—11/14/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry—hybrid linear ion trap/triple quadruple, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min

Detection State: Vapor, aerosol, and liquid

Response Time: >2 min

Alarms: None

Sensitivity: This detector has not been tested against CAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.

Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferences.

PHYSICAL PARAMETERS

Size: 239 cm x 109 cm x 81 cm (94 in x 43 in x 32 in)

Weight: 657 kg (1448 lb)

Power Requirements: 207 V ac to 242 V ac

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 1 yr parts and labor

Testing Information: Not specified

Applicable Regulations: None

GENERAL

MultiCheck 2000 Multi-Gas Monitor

Quest Technologies, Inc.
 1060 Corporate Center Drive
 Oconomowoc, Wisconsin 53066
 Gerry Fleisher
 800-245-0779, ext. 152 (Tel)
 414-567-4047 (Fax)
 gfleisher@quest-technologies.com
Information Source: <http://www.quest-technologies.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Unit Cost: \$1.5K

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, ammonia, hydrogen cyanide, ethylene oxide, chlorine, and sulfur dioxide
- **Medium Priority:** Carbon monoxide, nitric oxide, and nitrogen dioxide
- **Low Priority:** None

Start-up Time: <1 min	Detection State: Vapor
Response Time: 25 s to 2 min	Alarms: Audible and visual alarm
Sensitivity: Carbon monoxide at 999 ppm Hydrogen sulfide at 500 ppm Chlorine at 20 ppm Hydrogen cyanide at 50 ppm Ammonia at 50 ppm Sulfur dioxide at 50 ppm Nitrogen dioxide at 50 ppm Ethylene oxide at 20 ppm Nitric oxide at 100 ppm	Selectivity: Has many interferences

PHYSICAL PARAMETERS

Size: 18 cm x 8.6 cm x 5.1 cm (6.9 in x 3.4 in x 2 in)	Weight: 0.6 kg (1.32 lb)
Power Requirements: Two C alkaline batteries (16 h of operation) or NiCad rechargeable battery pack (10 h to 12 h operation)	

LOGISTICAL PARAMETERS

Durability: The MultiCheck 2000 Multi-Gas Monitor is constructed of a nickel alloy plated high impact ABS polycarbonate material which is RFI/EMI protected

Environmental Considerations: -10 °C to 40 °C (14 °F to 104 °F) operating temperature

-15 °C to 60 °C (5 °F to 140 °F) storage temperature

Shelf Life: Indefinite; sensors must be replaced.

Consumables: Calibration kit, calibration adapter, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: Replacement of batteries after 16 h of operation. Recharge batteries after 10 h to 12 h of operation. Replacement of sensors and other maintenance as required by manufacturer.

Repair Options: Loaners are available thru rental division. Tech support by phone (ext 123), during business hours. Turn around time within 3 d to 5 d of receipt of instrument. Rush service is available (warranty given priority) for an additional cost.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Available: Yes

Support Equipment: None

Tamper Resistance: Set-up menu protected by password

Warranty: Instrument—2 yr

Sensors—2 yr for hydrogen sulfide and carbon monoxide; 1 yr on all others except ammonia

Testing Information: Not specified

Training Required: Informal

Manuals Available: User manual

Communications Capability: None

Applicable Regulations: OSHA confined space

GENERAL

MultiLog 2000 Multi-Gas Monitor

Quest Technologies, Inc.
 1060 Corporate Center Drive
 Oconomowoc, Wisconsin 53066
 Gerry Fleisher
 800-245-0779, ext. 152 (Tel)
 414-567-4047 (Fax)
 gfleisher@quest-technologies.com
Information Source: <http://www.quest-technologies.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Unit Cost: \$1.7K

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, ammonia, hydrogen cyanide, ethylene oxide, chlorine, and sulfur dioxide
- **Medium Priority:** Carbon monoxide, nitric oxide, and nitrogen dioxide
- **Low Priority:** None

Start-up Time: <1 min	Detection State: Vapor
Response Time: 25 s to 2 min	Alarms: Audible and visual alarm
Sensitivity: Carbon monoxide at 999 ppm Hydrogen sulfide at 500 ppm Chlorine at 20 ppm Hydrogen cyanide at 50 ppm Ammonia at 50 ppm Sulfur dioxide at 50 ppm Nitrogen dioxide at 50 ppm Ethylene oxide at 20 ppm Nitric oxide at 100 ppm	Selectivity: Has many interferences

PHYSICAL PARAMETERS

Size: 18 cm x 8.6 cm x 5.1 cm (6.9 in x 3.4 in x 2 in)

Weight: 0.6 kg (1.32 lb)

Power Requirements: Two C alkaline batteries (16 h of operation)

Rechargeable battery packs available, NiCad and nickel metal hydride (10 h to 12 h of operation)

LOGISTICAL PARAMETERS

Durability: Constructed of a nickel alloy plated high impact ABS polycarbonate material which is RFI/EMI protected

Environmental Considerations: -10 °C to 40 °C (14 °F to 104 °F) operating temperature

-15 °C to 60 °C (5 °F to 140 °F) storage temperature

Shelf Life: Indefinite; sensors must be replaced

Consumables: Calibration Gas/Kit, calibration, adapter, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: Replacement of batteries after 16 h of operation. Recharge batteries after 10 h to 12 h of operation. Replacement of sensors. Other maintenance as required by manufacturer.

Repair Options: Loaners are available thru rental division. Tech support by phone (ext 123), during business hours. Turn around time within 3 d to 5 d of receipt of instrument. Rush service is available (warranty given priority) for an additional cost.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Informal
Training Available: Yes	Manuals Available: User manual
Support Equipment: None	Communications Capability: None
Testing Information: Not specified	Applicable Regulations: OSHA confined space

Tamper Resistance: Set-up menu protected by password

Warranty: Instrument—2 yr; Sensors—2 yr for carbon monoxide and hydrogen sulfide sensors

GENERAL

AreaRAE Wireless Gas Detection System

RAE Systems Inc.
 3775 N 1st St
 San Jose, California 95134
 408-952-8200 (Tel)
 408-952-8480 (Fax)
 aleet@raesystems.com
Information Source: <http://www.raesystems.com>

Status: Vendor response—4/9/2006



Portability: Fixed-Site Analytical Laboratory

Technology: Electrochemistry

Unit Cost: \$5K AreaRAE Monitor; \$3K ProRAE Remote Controller Package

Availability: Commercially available

Description: Electrochemical and/or Photoionization Detector (PID); up to 5-gas configurable

Type: Commercial

Current Users: National Guard, Civil support teams (2nd, 6th, 7th), and U.S. Coast Guard

OPERATIONAL PARAMETERS

CAs Detected: GB, GD, L, and SA

TICS Detected:

- **High Priority:** H₂S, SO₂, Cl₂, HCN, ammonia, dimethyl sulfate, ethyl chlorothioformate, perchloromethyl mercaptan, s-butyl isocyanate, tetraethyl lead, tetramethyl lead, and toluene-2,6-diisocyanate
- **Medium Priority:** CO, acetone cyanohydrin, acrolein, C₃H₆O, allylamine, allyl chlorocarbonate, chloroacetone, diketene, 1,2-dimethylhydrazine, C₂H₄Br₂, H₂Se, CH₃Br, methylhydrazine, methyl isocyanate, methyl mercaptan, NO₂, phosphine, stibine, and n-octyl mercaptan
- **Low Priority:** Allyl isothiocyanate, Br₂, chloroacetyl chloride, crotonaldehyde, dimethyl sulfate, C₃H₅ClOS, ethyleneimine, C₅Cl₆, HI, iron pentacarbonyl, isopropyl isocyanate, n-butyl isocyanate, NO, CCl₄S, s-butyl isocyanate, tetraethyl lead, tetramethyl lead, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: 1 min

Detection State: Vapor

Response Time: 15 s to 3 min

Alarms: Audible, visual, and optional vibration alarm

Sensitivity: CO at 1 ppm to 500 ppm

H₂S at 1 ppm to 20 ppm

SO₂ at 0.1 ppm to 100 ppm

NO₂ at 0.1 ppm to 20 ppm

Cl₂ at 0.1 ppm to 50 ppm

HCN at 1 ppm to 100 ppm

Ammonia at 1 ppm to 50 ppm

Phosphine at 0.1 ppm to 5 ppm

NO at 1 ppm to 250 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts. PID is a broadband detector and will respond to many organic vapors.

PHYSICAL PARAMETERS

Size: 24 cm x 13 cm x 24 cm (9.3 in x 5 in x 9.3 in)

Weight: 3.9 kg (8.5 lbs)

Power Requirements: 7.4 V, 4.5 Ah, rechargeable Lithium ion (24 h to 36 h operating time) or six C-cell alkaline battery adapter, field replaceable (18 h operating time)

LOGISTICAL PARAMETERS

Durability: Constructed of a composite material with weather-proof rubber boot and is RFI protected

Environmental Considerations: -20 °C to 45 °C (-4 °F to 113 °F) @ 0 % to 95 % rh

Shelf Life: Not specified

Consumables: Sensors, calibration kit, and batteries

Calibration Requirements: Two point field calibration for zero and standard reference gas

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: No loaner, but if equipment is sent back for repair, rental is available for 50 % off regular rental cost. Conservatively, turn around time is 3 wk, but for government, it is faster. Tech service is 9 am to 9 pm east coast time.

Maintenance Costs: 4 yr repair and replacement contract available for \$1.45K to \$1.58K

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Yes

Manuals Available: User manual

Support Equipment: Battery adapter, calibration adapter, inlet probe, water trap filter, carbon filters, rubber boot, and carrying case

Communications Capability: Data download to PC and parameter upload from PC. Wireless data transmission standard though built-in modem to receiving host computer up to 2 mi away. Host computer can interact with up to 128 AreaRAE monitors (16 standard).

Tamper Resistance: Optional password protected calibration settings, alarm limits, and stored data

Warranty: 1 yr on unit; 1 yr or 2 yr on sensors depending on type; optional 4 yr warranty available

Testing Information: Not specified

Applicable Regulations: None

GENERAL

MultiRAE Plus Gas Detector (PGM-50 Detector)

RAE Systems Inc.
3775 N 1st St
San Jose, California 95134
408-952-8200 (Tel)
408-952-8480 (Fax)
aleet@raesystems.com
Information Source: <http://www.raesystems.com>
RAE Technical Notes 106, 114, and 159;

Status: Vendor response—4/9/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: \$3.2K

Availability: Commercially available

Description: Electrochemical, catalytic bead, and/or Photoionization Detector (PID); up to 5-gas configurable

Type: Commercial

Current Users: DOJ, FBI, Coast Guard, U.S. Army, U.S. Navy, and USAF

OPERATIONAL PARAMETERS

CAs Detected: GB, GD, L, and GA; no phosgene or VX

TICS Detected:

- **High Priority:** H₂S, SO₂, Cl₂, HCN, NH₃, AsH₃, CS₂, and ethylene oxide
- **Medium Priority:** Acetone cyanohydrin, acrolein, allyl alcohol, allylamine, allyl chlorocarbonate, CO, chloroacetone, diketene, 1,2-dimethylhydrazine, ethylene dibromide, H₂Se, CH₃Br, methylhydrazine, methyl isocyanate, methyl mercaptan, NO₂, octyl mercaptan, phosphine, stibine
- **Low Priority:** Allyl isothiocyanate, bromine, n-butyl chloroformate, n-butyl isocyanate, chloroacetaldehyde, chloroacetyl chloride, crotonaldehyde, dimethyl sulfate, ethyl chlorothioformate, ethyleneimine, hydrogen iodide, iron pentacarbonyl, isobutyl chloroformate, isopropyl chloroformate, isopropyl isocyanate, nitric oxide, perchloromethyl mercaptan, s-butyl chloroformate, t-butyl isocyanate, tetraethyl lead, tetraethyl pyrophosphate, tetramethyl lead, toluene-2,4-diisocyanate, and toluene-2,6-diisocyanate

Start-up Time: 1 min	Detection State: Vapor
Response Time: 15 s to 3 min	Alarms: Audible, visual, and optional vibration alarm
Sensitivity: GA at 0.7 mg/m ³ or 0.1 ppm GB at 1.7 mg/m ³ or 0.3 ppm GD at 2.2 mg/m ³ or 0.3 ppm GF at ~2 mg/m ³ or 0.3 ppm AC at 1 ppm HD at 1.3 mg/m ³ or 0.2 ppm HN-1 at 1.4 mg/m ³ or 0.2 ppm L at 1.7 mg/m ³ or 0.2 ppm NH ₃ at 1 ppm to 50 ppm Arsine at 0.2 ppm to 2000 ppm CS ₂ at 0.1 ppm to 2000 ppm Cl ₂ at 0.1 ppm to 50 ppm HCN at 1 ppm to 100 ppm (1.1 to 110 mg/m ³) H ₂ S at 1 ppm to 100 ppm SO ₂ at 0.1 ppm to 20 ppm Bromine at 0.2 ppm to 2000 ppm CO at 1 ppm to 500 ppm Hydrogen selenide at 0.2 ppm to 2000 ppm Phosphine at 0.1 ppm to 5 ppm NO ₂ at 0.1 ppm to 20 ppm NO at 1 ppm to 250 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts. PID is a broadband detector and will respond to many organic vapors.

Methylmetacrylate at 0.2 ppm to 2000 ppm
Ethylacetate at 0.5 ppm to 2000 ppm
Toluene diisocyanate at 0.2 ppm to 2000 ppm
Phosphorus trichloride at 1 ppm to 2000 ppm
Ethylene oxide at 1 ppm to 2000 ppm

PHYSICAL PARAMETERS

Size: 12 cm x 7.6 cm x 4.8 cm (4.6 in x 3 in x 1.9 in)

Weight: 0.5 kg (1 lb)

Power Requirements: 3.6 V, 3.0 Ah Li-ion or 4.8 V, 1.4 Ah, NiCad battery pack, 4 AA alkaline battery adapter, field replaceable (10 h operating time)

LOGISTICAL PARAMETERS

Environmental Considerations: -20 °C to 45 °C (-4 °F to 113 °F) @ 0 % to 95 % rh

Shelf Life: Not specified

Consumables: Sensors, calibration kit, and batteries

Calibration Requirements: 2 point field calibration for zero and standard reference gas

Repairs: Replacement of sensors and other maintenance as required

Repair Options: No loaner, but if equipment is sent back for repair, rental is available for 50 % off regular rental cost. Conservatively, turn around time is 3 wk, but for government, it is faster. Tech service is 9 am to 9 pm east coast time.

Maintenance Costs: 4 yr repair and replacement contract available for \$875

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Yes

Manuals Available: User manual

Support Equipment: Battery adapter, calibration adapter, inlet probe, water trap filter, carbon filters, rubber boot with belt clip, and carrying case

Communications Capability: Data download to PC and parameter upload from PC. Wireless data transmission option available.

Tamper Resistance: Optional password protected calibration settings, alarm limits, and stored data

Warranty: Lifetime on unit exclusive of consumable parts; 1 yr or 2 yr on electrochemical sensors depending on type. Optional 4 yr warranty available.

Testing Information: Not specified

Applicable Regulations: None

Operator Skills: Nontechnical background

Training Required: Nonformal

GENERAL

ORAE Plus Hand Held 4 Gas Monitor (Model 2000 Monitor)

RAE Systems Inc.
 3775 N 1st St
 San Jose, California 95134
 408-952-8200 (Tel)
 408-952-8480 (Fax)
 aleet@raesystems.com
Information Source: <http://www.raesystems.com>

Status: Vendor response—4/9/2006



Portability: Handheld Portable

Unit Cost: \$1.1K to 2.0K

Availability: Commercially available

Description: Electrochemical, catalytic bead, and/or, oxygen sensor; up to 4-gas configurable

Type: Commercial

Current Users: 34th Civil Support Team

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, sulfur dioxide, chlorine, hydrogen cyanide, and ammonia
- **Medium Priority:** Nitrogen dioxide, carbon monoxide, and phosphine
- **Low Priority:** Nitric oxide

Start-up Time: 1 min	Detection State: Vapor
Response Time: 15 s to 3 min	Alarms: Audible, visual, and optional vibration alarm
Sensitivity: Carbon monoxide at 1 ppm to 500 ppm Hydrogen sulfide at 1 ppm to 100 ppm Sulfur dioxide at 0.1 ppm to 20 ppm Nitrogen dioxide at 0.1 ppm to 20 ppm Chlorine at 0.1 ppm to 50 ppm Hydrogen cyanide at 1 ppm to 100 ppm Ammonia at 1 ppm to 50 ppm Phosphine at 0.1 ppm to 5 ppm Nitric oxide at 1 ppm to 250 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 11 cm x 7.6 cm x 4.6 cm (4.5 in x 3 in x 1.8 in)

Weight: 425 g (15 oz)

Power Requirements: Rechargeable, field replaceable lithium ion battery pack (up to 20 h of operation), two AA alkaline battery adapter (10 h of operation)

LOGISTICAL PARAMETERS

Environmental Considerations: -20 °C to 45 °C (-4 °F to 113 °F) operating temperature; 0 % to 95 % rh

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors

Calibration Requirements: 2 point field calibration of zero and span gas

Repairs: Replacement of sensors and other maintenance as required

Repair Options: No loaner, but if equipment is sent back for repair, rental is available for 50 % off regular rental cost. Conservatively, turn around time is 3 wk, but for government, it is faster. Tech service is 9 am to 9 pm east coast time.

Maintenance Costs: 4 yr repair and replacement contract available for \$550

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Yes

Manuals Available: User manual

Support Equipment: Sampling pump and battery charger

Communications Capability: Data download to PC and parameter upload from PC

Tamper Resistance: Optional password protected calibration settings, alarm limits, and stored data

Warranty: Lifetime on unit exclusive of consumable parts; 1 yr or 2 yr on electrochemical sensors depending on type.
Optional 4 yr warranty available.

Testing Information: Not specified

Applicable Regulations: None

GENERAL

ToxiRAE Plus Personal Gas Monitor

RAE Systems, Inc.
3775 N 1st St
San Jose, California 95134
408-952-8200 (Tel)
408-952-8480 (Fax)
aleet@reasystems.com
Information Source: <http://www.raesystems.com>



Status: Vendor response—4/1/2006

Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: PGM-35: Electrochemical Detector—\$495

PGM-30: PID Detector—\$1.75K

Availability: Commercially available

Description: Electrochemical (Model PGM-35); Photoionization (Model PGM-30); single-gas configurable

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: PGM-35—none; PGM-30—GB, GD, L, and SA

TICS Detected:

- **High Priority:** PGM-35: H₂S, SO₂, chlorine, ammonia, and hydrogen cyanide
- PGM-30: Ammonia, arsine, carbon disulfide, hydrogen sulfide, ethylene oxide, and phosphorus trichloride
- **Medium Priority:** PGM-35: Carbon monoxide, nitrogen dioxide, and phosphine
- PGM-30: Acetone cyanohydrin, acrolein, allyl alcohol, allylamine, allyl chlorocarbonate, chloroacetone, diketene, 1,2-dimethylhydrazine, ethylene dibromide, hydrogen selenide, methyl bromide, methylhydrazine, methyl isocyanate, methyl mercaptan, nitrogen dioxide, phosphine, stibine, and n-octyl mercaptan
- **Low Priority:** PGM-35: Nitric oxide; PGM-30: Allyl isothiocyanate, Br₂, chloroacetyl chloride, crotonaldehyde, dimethyl sulfate, ethyl chlorothioformate, ethyleneimine, hexachlorocyclopentadiene, HI, iron pentacarbonyl, isopropyl isocyanate, n-butyl isocyanate, nitric oxide, perchloromethyl mercaptan, s-butyl isocyanate, tetraethyl lead, tetramethyl lead, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: 1 min	Detection State: Vapor
Response Time: 15 s to 3 min	Alarms: Audible alarm, visual alarm, and optional vibration alarm
Sensitivity: PGM-35—CO at 1 ppm to 500 ppm H ₂ S at 1 ppm to 100 ppm SO ₂ at 0.1 ppm to 20 ppm NO ₂ at 0.1 ppm to 20 ppm Cl ₂ at 0.1 ppm to 50 ppm HCN at 1 ppm to 100 ppm Ammonia at 1 ppm to 50 ppm Phosphine at 0.1 ppm to 5 ppm Nitric oxide at 1 ppm to 250 ppm PGM-30—organic vapors (TIMs) at 0.1 ppm to 1000 ppm	Selectivity: May false alarm with heavy concentrations of various smokes and engine exhausts. Broad-band detector responds to many organic vapors.

PHYSICAL PARAMETERS

Size: 15 cm x 4.6 cm x 2.5 cm (6 in x 1.8 in x 1 in)

Weight: 198 g (7 oz)

Power Requirements: PGM-35—2 AAA alkaline batteries (1000 h of operation)

PGM-30—rechargeable NiCad battery (10 h of operation)

LOGISTICAL PARAMETERS

Durability: Constructed of a rugged, weatherproof composite material

Environmental Considerations: -15 °C to 40 °C (5 °F to 104 °F) at 0 % to 95 % rh (operating)

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors

Calibration Requirements: 2 point field calibration for zero and standard reference gas

Repairs: Replacement of batteries after 1000 h of operation. Replacement of sensors and other maintenance as required by manufacturer.

Repair Options: No loaner, but if equipment is sent back for repair, rental is available for 50 % off regular rental cost. Conservatively, turn around time is 3 wk, but for government, it is faster. Tech service is 9 am to 9 pm east coast time.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Yes

Manuals Available: User manual

Support Equipment: Calibration adapter, hand pump, carrying case, and batteries

Communications Capability: PGM-35—none

PGM-30—data download to PC and parameter upload from PC

Tamper Resistance: PGM-35: None; PGM-30: password protection configurable

Warranty: PGM-35—lifetime on unit exclusive of consumable parts; 1 or 2 yr on electrochemical sensors depending on type.

PGM-30—1 yr on unit and 10.6 eV PID lamp

Testing Information: Not specified

Applicable Regulations: None

GENERAL

VRAE Hand Held 5 Gas Surveyor (Model 7800 Monitor)

RAE Systems Inc.
3775 N 1st St
San Jose, California 95134
408-952-8200 (Tel)
408-952-8480 (Fax)
aleet@raesystems.com
Information Source: <http://www.raesystems.com>

Status: Vendor response—4/9/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: \$1.4K to \$2.2K

Availability: Commercially available

Description: Electrochemical and/or catalytic bead and/or oxygen sensor; up to 5-gas configurable

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, sulfur dioxide, chlorine, hydrogen cyanide, and ammonia
- **Medium Priority:** Nitrogen dioxide, carbon monoxide, and phosphine
- **Low Priority:** Nitric oxide

Start-up Time: 1 min	Detection State: Vapor
Response Time: 15 s to 3 min	Alarms: Audible, visual, and optional vibration alarm
Sensitivity: Carbon monoxide at 1 ppm to 500 ppm Hydrogen sulfide at 1 ppm to 100 ppm Sulfur dioxide at 0.1 ppm to 20 ppm Nitrogen dioxide at 0.1 ppm to 30 ppm Chlorine at 0.1 ppm to 50 ppm Hydrogen cyanide at 1 ppm to 100 ppm Ammonia at 1 ppm to 50 ppm Phosphine at 0.1 ppm to 5 ppm Nitric oxide at 1 ppm to 250 ppm Chlorine dioxide at 0.01 ppm to 1 ppm	Selectivity: May false alarm: heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 21 cm x 7.6 cm x 4.8 cm (8.3 in x 3 in x 1.9 in)	Weight: 0.6 kg (1.25 lb)
Power Requirements: Rechargeable, field replaceable 4.8 V, 1.1 Ah NiMH battery pack; four AA alkaline battery adapter (10 h of operation)	

LOGISTICAL PARAMETERS

Durability: RFI resistant

Environmental Considerations: -20 °C to 45 °C (-4 °F to 113 °F) operating temperature; 0 % to 95 % rh

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: 2 point field calibration of zero and span gas

Repairs: Replacement of sensors and other maintenance as required by manufacturer

Repair Options: No loaner, but if equipment is sent back for repair, rental is available for 50 % off regular rental cost. Conservatively, turn around time is 3 wk, but for government, it is faster. Tech service is 9 am to 9 pm east coast time.
Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Yes

Manuals Available: User manual

Support Equipment: Sampling pump and battery charger

Communications Capability: Data download to PC and parameter upload from PC

Tamper Resistance: Optional password protected calibration settings, alarm limits, and stored data

Warranty: Lifetime on unit exclusive of consumable parts; 1 yr or 2 yr on electrochemical sensors depending on type

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Mini SA Single Gas Personal Monitor

Scott Health & Safety
 4320 Goldmine Road
 Monroe, North Carolina 28110
 Bryon Gordon
 704-291-8408 (Tel)
 704-291-8420 (Fax)
 brygordon@tycoint.com
Information Source: <http://www.scottinstruments.com>
Status: Vendor response—12/4/2006



Technology: Electrochemistry

Portability: Handheld Portable

Unit Cost: \$405 to \$630

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, hydrogen cyanide, sulfur dioxide, and hydrogen sulfide
- **Medium Priority:** Carbon monoxide, nitrogen dioxide, and phosphine
- **Low Priority:** None

Start-up Time: Not specified	Detection State: Vapor
Response Time: Not specified	Alarms: Audible, visual, and vibratory alarms
Sensitivity: Ammonia at 200 ppm Carbon monoxide at 999 ppm Sulfur dioxide at 99.9 ppm Chlorine, nitrogen dioxide, and hydrogen cyanide at 99.9 ppm Hydrogen sulfide at 500 ppm Phosphine at 9.99 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 7.9 cm x 7.9 cm x 2.5 cm (3.1 in x 3.1 in x 1 in)	Weight: 128 g (4.5 oz)
Power Requirements: AAA batteries	

LOGISTICAL PARAMETERS

Durability: Not specified	Shelf Life: Not specified
Consumables: Not specified	Calibration Requirements: Automatic calibration
Repairs: Not specified	Maintenance Costs: Not specified

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) continuous; -40 °C to 55 °C (-40 °F to 131 °F) intermittent

Repair Options: Turn around time from 2 wk to 3 wk (can be expedited, done overnight). Tech support 8 am to 5 pm (M through F). Loaners (no set policy, but exceptions can be made on a case by case).

SPECIAL REQUIREMENTS

Operator Skills: Not specified	Training Required: Not specified
Training Available: Not specified	Manuals Available: Operation and maintenance manual
Support Equipment: Not specified	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Lifetime on instrument and 2 yr on sensor

Testing Information: Not specified

Applicable Regulations: UL and ULc (CAN/CSA C22.2 no. 157-92) for intrinsic safety to Class 1, Division 1 Groups A, B, C, and D

GENERAL

Scout Multi-Gas Personal Monitor

Scott Health & Safety
 4320 Goldmine Road
 Monroe, North Carolina 28110
 Bryon Gordon
 704-291-8408 (Tel)
 704-291-8420 (Fax)
 brygordon@tycoint.com
Information Source: <http://www.scottinstruments.com>
Status: Vendor response—11/15/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: \$1.4K

Availability: Commercially available

Description: Electrochemistry, catalytic bead, photo ionization detector (PID)

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, hydrogen cyanide, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Carbon monoxide, nitrogen dioxide, and phosphine
- **Low Priority:** Nitric oxide

Start-up Time: Not specified	Detection State: Vapor
Response Time: <30 s	Alarms: Visual and audible Alarm
Sensitivity: CO at 500 ppm; H ₂ S at 100 ppm	Selectivity: Information available in user manual

PHYSICAL PARAMETERS

Size: 19 cm x 6.7 cm x 10 cm (7.5 in x 2.6 in x 4 in)

Weight: 747 g (24 oz) alkaline version with batteries

Power Requirements: Three C batteries or lithium ion battery pack; inductive battery charger

LOGISTICAL PARAMETERS

Durability: Not specified

Shelf Life: Not specified

Consumables: Sensors, batteries, and calibration equipment

Maintenance Costs: Not specified

Environmental Considerations: -40 °C to 50 °C (-40 °F to 122 °F)

Calibration Requirements: Calibration should be performed using a self determined schedule that takes into account instrument use and environment conditions. Additionally the Scout should always be re-calibrated after exposure to high concentrations of combustible gases, vapors, or toxic gases.

Repairs: A set maintenance schedule is not required

Repair Options: Turn around time from 2 wk to 3 wk (can be expedited, done overnight). Tech support 8 am to 5 pm (M through F). Loaners (no set policy, but exceptions can be made on a case by case).

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Minimal

Training Available: Not specified

Manuals Available: Operators guide and programmers guide

Support Equipment: Not specified

Communications Capability: Not specified

Tamper Resistance: Password protected

Testing Information: Not specified

Warranty: Lifetime on electronics, 2 yr for carbon monoxide, hydrogen sulfide sensors, pump, and lithium ion battery, and 1 yr on all other sensors and accessories

Applicable Regulations: Classified by Underwriters Laboratories, Inc., as to intrinsic safety for use in hazardous locations—Class 1, Division 1, Groups A, B, C, and D

GENERAL

SensAlarm

Sensidyne, Inc.
 16333 Bay Vista Drive
 Clearwater, Florida 33760
 Ronald W. Roberson
 800-451-9444 (Tel)
 727-530-3602 (Tel)
 727-539-0550 (Fax)
 info@sensidyne.com
 rroberson@sensidyne.com
Information Source: <http://www.sensidyne.com>

Status: Vendor response—11/15/2006



Technology: Electrochemistry

Portability: Fixed-Site Detection

Unit Cost: \$1.6K to \$2K

Availability: Commercially available—2 wks lead time

Description: Electrochemistry and Catalytic Bead

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** None

Start-up Time: <1 min	Detection State: Gas
Response Time: <1 min	Alarms: Auto, visible, and audible alarm
Sensitivity: H ₂ S—1 ppm to 100 ppm; CO—1 ppm to 500 ppm	Selectivity: Has a few noncritical interferents

PHYSICAL PARAMETERS

Size: 23 cm x 50 cm x 175 cm (9.2 in x 19.7 in x 6.5 in)	Weight: 3.8 kg (8.3 lb)
Power Requirements: Stationary unit, hard wired	

LOGISTICAL PARAMETERS

Durability: Able to operate continuously, NEMA 4X enclosure

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity)

Shelf Life: 3 mo for sensors	Consumables: None
Calibration Requirements: Monthly (span calibration)	Repairs: None

Repair Options: Turn around time 5 d to 7 d for calibration, parts take longer. Phone support standard business hours. Loaners not available.

Maintenance Costs: About \$300 for calibration equipment

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required	Training Required: None. Manual review only. User friendly and intuitive.
Training Available: Operations manual review	Manuals Available: User manual only
Support Equipment: Calibration kit	Communications Capability: None
Tamper Resistance: Only accessible button is self test	Warranty: 1 yr
Testing Information: Not applicable	Applicable Regulations: OSHA

GENERAL

Improved Automatic Continuous Environmental Monitor (IACEM) 980

CDS Analytical, Inc.
 Dynatherm Product Line
 465 Limestone Road
 P.O. Box 277
 Oxford, Pennsylvania 19363-0277
 888-900-ACEM (2236) (Tel)
 610-932-4158 (Fax)
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)

Status: Vendor response—4/1/2006



Portability: Fixed-Site Detection
Unit Cost: \$20.2K (IACEM 980 only)

Availability: Commercially available

Description: Gas Chromatography

Type: Military

Current Users: US Army Chemical Materials Agency; US Army RDECOM/ ECBE

Technology: Gas Chromatography

OPERATIONAL PARAMETERS

CAs Detected: GB, GD, VX, and HD

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified	Detection State: Vapor
Response Time: 7 min to 11 min	Alarms: None
Sensitivity: IDLH, TWA, and GPL (with appropriate GC configuration)	Selectivity: Most site specific interferences can be separated with proper GC

PHYSICAL PARAMETERS

Size: 31 cm x 33 cm x 51 cm (12 in x 13 in x 20 in)	Weight: 15.9 kg (35 lb)
Power Requirements: 120 V, 50 Hz to 60 Hz, 8 A	

LOGISTICAL PARAMETERS

Durability: Must remain stationary (can be mounted in a mobile laboratory)

Environmental Considerations: 0 °C to 50 °C (32 °F to 122 °F) (operating temperature); 5 % to 95 % rh

Shelf Life: Indefinite, within range of environmental conditions

Consumables: Sample collection tubes, focus traps, ferrules, and fused silica

Calibration Requirements: Though auxiliary gas chromatography and software

Repairs: Yes

Repair Options: Loaners not available. 1 wk to 2 wk turn around time when sent back for repairs. Service contract is available.

Maintenance Costs: Average 13 % of purchase price per year plus consumables

SPECIAL REQUIREMENTS

Operator Skills: Technical background

Training Required: Formal

Training Available: Training available on-site or in factory laboratory

Manuals Available: User manual, tutorials, and training manual

Support Equipment: Required to operate—hookup to a gas chromatograph with appropriate software to control analysis and report data

Required to operate as continuous monitor—vacuum pump, heated sample line (i.e. from source to be monitors outside mobile lab to ACEM inside) . IACEM system can also transfer to GC samples collected on tubes at remote sites, requires battery powered AirPro two tube sampler.

Communications Capability: Remote start output to GC, GC ready input, external sample output, external ready input. PC software controls IACEM through an MS Windows environment. The software is compatible with Windows 98 SE, NT, 2000, and XP versions.

Tamper Resistance: Not specified

Warranty: 1 yr parts and labor

Testing Information: FOCIS Associates, Inc., Evaluation of Monitoring Technologies, Phases 1 and 2, Final Report, October 14, 2004. Battelle Associates, Inc., Blue Grass Chemical Agent Destruction Pilot Plant, Test Plan for Air Monitoring Interferences, Jan. 2005.

Applicable Regulations: Not specified

GENERAL

Automatic Continuous Environmental Monitor (ACEM) 9305

CDS Analytical, Inc.
 Dynatherm Product Line
 465 Limestone Road
 P.O. Box 277
 Oxford, Pennsylvania 19363-0277
 888-900-ACEM (2236) (Tel)
 610-932-4158 (Fax)
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)

Status: Vendor response—4/1/2006



Portability: Fixed-Site Detection

Technology: Gas Chromatography

Unit Cost: \$14.5K (ACEM 9305 NRT only)

Availability: Commercially available

Description: Gas Chromatography with on-line sampling (9305 NRT)—All models in the ACEM 9300 series have totally redesigned electronic control with plug-in handheld user interface and a direct communication interface for PC control. The flexible transfer line with Silcosteel™ liner provides direct connection to GC column for maximum sensitivity. Basic model, replaces ACEM 900.

Type: Military

Current Users: US Army Chemical Materials Agency; US Army RDECOM/ ECBE

OPERATIONAL PARAMETERS

CAs Detected: GB, GD, VX, and HD

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified	Detection State: Vapor
Response Time: 11 min to 7 min	Alarms: None
Sensitivity: IDLH, TWA, and GPL (with appropriate GC configuration)	Selectivity: Most site specific interferences can be separated with proper GC

PHYSICAL PARAMETERS

Size: 23 cm x 25 cm x 30 cm (9 in x 10 in x 12 in)	Weight: 9.1 kg (20 lb)
Power Requirements: 120 V or 220/240 V, 50 Hz to 60 Hz, 7.5 A	

LOGISTICAL PARAMETERS

Durability: Must remain stationary (can be mounted in a mobile laboratory)

Environmental Considerations: 0 °C to 50 °C (32 °F to 122 °F) (operating temperature); 5 % to 95 % rh

Shelf Life: Indefinite, within range of environmental conditions

Consumables: Sample collection tubes, focus traps, ferrules, and fused silica

Calibration Requirements: Though auxiliary gas chromatography and software

Repairs: Yes

Repair Options: Loaners not available. 1 wk to 2 wk turn around time when sent back for repairs. Service contract is available.

Maintenance Costs: Average 13 % of purchase price per year plus consumables

SPECIAL REQUIREMENTS

Operator Skills: Technical background

Training Required: Formal

Training Available: Training available on-site or in factory laboratory

Manuals Available: User manual, tutorials, and training manual

Support Equipment: Required to operate—hookup to a gas chromatograph with appropriate software to control analysis and report data

Required to operate as continuous monitor—vacuum pump, heated sample line (i.e. from source to be monitors outside mobile lab to ACEM inside) . IACEM system can also transfer to GC samples collected on tubes at remote sites, requires battery powered AirPro two tube sampler.

Communications Capability: Remote start output to GC, GC ready input, external sample output, external ready input. PC software controls IACEM through an MS Windows environment. The software is compatible with Windows 98 SE, NT, 2000, and XP versions.

Tamper Resistance: Not specified

Warranty: 1 yr parts and labor

Testing Information: Not specified

Applicable Regulations: UL/CE pending

GENERAL

Genesis Portable Gas Monitor

Thermo Fisher Scientific
 27 Forge Parkway
 Franklin, Massachusetts 02038
 508-520-0430 (Tel)
 508-520-1460 (Fax)
 508-520-1460 (Fax)
 donna.cohn@thermofisher.com
Information Source: <http://www.gastech.com>

Status: Limited vendor information



Portability: Handheld Portable

Unit Cost: \$795 to \$1.3K

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, hydrogen sulfide, chlorine, sulfur dioxide, and hydrogen cyanide
- **Medium Priority:** Carbon monoxide, nitrogen dioxide, and phosphine
- **Low Priority:** Nitric oxide

Start-up Time: Not specified

Detection State: Vapor

Response Time: 60 s

Alarms: Audible and visual alarm

Sensitivity: Ammonia at 100 ppm

Chlorine at 9.9 ppm

Sulfur dioxide at 9.9 ppm

Hydrogen cyanide at 30 ppm

Carbon monoxide at 250 ppm

Nitrogen dioxide at 9.9 ppm

Phosphine at 3 ppm

Hydrogen sulfide at 200 ppm

Nitric oxide at 100 ppm

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 5.8 cm x 9.4 cm x 15.2 cm (2.3 in x 3.7 in x 6 in)

Weight: 0.5 kg (1 lb)

Power Requirements: Three AA alkaline (22 h of operation) or NiHy battery pack (16 h of operation)

LOGISTICAL PARAMETERS

Durability: The Genesis is constructed of a powder coated die cast aluminum with molded end caps

Environmental Considerations: -20 °C to 45 °C (-4 °F to 113 °F) operating temperature; 0 % to 95 % rh

Shelf Life: Not specified

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: Replacement of batteries after 22 h of operation. Replacement of sensors and other maintenance as required by manufacturer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual and quick reference card
Support Equipment: Battery charger and sample pump	Communications Capability: Capable of interfacing with a PC
Tamper Resistance: Password protection for added surety	Warranty: 2 yr (parts and labor)
Testing Information: Not specified	Applicable Regulations: None

GENERAL

GT Series Portable Gas Monitor

Thermo Fisher Scientific
 27 Forge Parkway
 Franklin, Massachusetts 02038
 508-520-0430 (Tel)
 508-520-1460 (Fax)
 508-520-1460 (Fax)
 customerservice@thermoei.com
Information Source: <http://www.gastech.com>
Status: Limited vendor information

**Technology:** Electrochemistry**Portability:** Handheld Portable**Unit Cost:** \$1.4K to \$2.3K**Availability:** Commercially available**Description:** Electrochemistry**Type:** Commercial**Current Users:** Not specified

OPERATIONAL PARAMETERS

CAs Detected: None**TICS Detected:**

- **High Priority:** Ammonia, chlorine, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** None

Start-up Time: Not specified	Detection State: Vapor
Response Time: 30 s to 150 s	Alarms: Audible and visual alarm
Sensitivity: Ammonia at 100 ppm Chlorine at 10 ppm Carbon monoxide at 300 ppm Hydrogen sulfide at 200 ppm Sulfur dioxide at 10 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 25 cm x 15 cm x 18 cm (10 in x 6 in x 5 in)	Weight: 2.2 kg (4.95 lb)
Power Requirements: Four D alkaline (20 h of operation) or NiCad batteries (10 h of operation)	

LOGISTICAL PARAMETERS

Durability: The GT Series Portable Gas Monitor is constructed of high impact, chemical and RFI resistant, polycarbonate-polyester plastic**Environmental Considerations:** -20 °C to 45 °C (-4 °F to 113 °F) operating temperature; 0 % to 95 % rh**Consumables:** Calibration kit, batteries, and sensors (for each chemical detected)**Repairs:** Replacement of batteries after 10 h to 20 h of operation. Replacement of sensors and other maintenance as required by manufacturer.

Shelf Life: Not specified	Calibration Requirements: Yes
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: Sample pump	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: 1 yr (parts and labor)
Testing Information: Not specified	Applicable Regulations: None

GENERAL

MiniMAX XT Disposable Gas Detector

Honeywell Analytics Inc.
 405 Barclay Boulevard
 Lincolnshire, Illinois 60069
 Luca Marinelli
 800-323-2000 (Tel)
 847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>
Status: Vendor response—11/21/2005



Portability: Handheld Stationary

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry—Minimax XT is technically crafted to be the easiest and most cost effective to use single gas on the market. Utilizing patented sensing technologies, the Minimax XT provides 24/7 user confidence.

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Yes

Start-up Time: <1 min

Detection State: Vapor

Response Time: 10 s to 2 min

Alarms: Audible and visual alarm

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 8.6 cm x 5.1 cm x 2.8 cm (3.4 in x 2 in x 1.1 in)

Weight: 71 g to 82 g (2.5 oz to 2.9 oz)

Power Requirements: 3.6 V nonreplaceable Lithium battery

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) operating temperature

Shelf Life: 6 mo to 12 mo before activation

Consumables: None

Calibration Requirements: Not specified

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Not specified

Training Available: Not specified

Manuals Available: User manual

Support Equipment: None

Communications Capability: None

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

MiniMAX XP Portable Gas Detector

Honeywell Analytics Inc.
 405 Barclay Boulevard
 Lincolnshire, Illinois 60069
 Luca Marinelli
 800-323-2000 (Tel)
 847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>
Status: Vendor response—11/21/2005



Portability: Handheld Stationary

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry—Minimax XP delivers advanced, full feature functionality, user configurability with cost effective serviceability for a wide range of toxic gases. The market demands more than small size and good looks in a new generation single gas monitor.

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Yes

Start-up Time: <1 min	Detection State: Vapor
Response Time: 10 s to 2 min	Alarms: Audible, visual, and vibrating alarm
Sensitivity: Not specified	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 9.1 cm x 5.1 cm x 2.8 cm (3.6 in x 2 in x 1.1 in)	Weight: 79 g to 94 g (2.8 oz to 3.3 oz)
Power Requirements: 3.0 V replaceable Lithium battery	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) operating temperature
Shelf Life: Not specified	Consumables: None
Calibration Requirements: Every 12 mo maximum	Repairs: Not specified
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Not specified
Training Available: Not specified	Manuals Available: User manual
Support Equipment: None	Communications Capability: None
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: Not specified

GENERAL

MiniMAX X4 Portable Gas Detector

Honeywell Analytics Inc.
405 Barclay Boulevard
Lincolnshire, Illinois 60069
Luca Marinelli
800-323-2000 (Tel)
847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>

Status: Vendor response—11/21/2005



Portability: Handheld Stationary

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry—Minimax X4 is a portable gas detector for protection against flammable, oxygen, carbon monoxide, and hydrogen sulfide gas hazards. It's ideal for use by companies wanting advanced performance, reliability and ease of use, without the high costs of long term maintenance.

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Yes

Start-up Time: <1 min	Detection State: Vapor
Response Time: 10 s to 2 min	Alarms: Audible, visual, and vibrating alarm
Sensitivity: Not specified	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 12.4 cm x 7.6 cm x 3.6 cm (4.9 in x 3 in x 1.4 in)	Weight: 210 g to 258 g (7.4 oz to 9.1 oz)
Power Requirements: 3.0 V alkaline or rechargeable NiMH batteries	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) operating temperature
Shelf Life: Not specified	Consumables: None
Calibration Requirements: Not specified	Repairs: Not specified
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: None	Communications Capability: None
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: Not specified

GENERAL

MicroMAX Plus Portable Gas Detector

Honeywell Analytics Inc.
405 Barclay Boulevard
Lincolnshire, Illinois 60069
Luca Marinelli
800-323-2000 (Tel)
847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>

Status: Vendor response—11/21/2005



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry—microprocessor controlled multi-gas monitor that is easy to use, reliable, highest quality, economical, lightweight, shortest response time, and a lifetime warranty.

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Yes

Start-up Time: <1 min

Detection State: Vapor

Response Time: 10 s to 2 min

Alarms: Audible and visual alarm

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 12.1 cm x 7.6 cm x 4.6 cm (4.75 in x 3 in x 1.8 in)

Weight: <0.5 kg (17.6 oz)

Power Requirements: 6.0 V alkaline or rechargeable NiMH batteries

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) operating temperature

Shelf Life: Not specified

Consumables: None

Calibration Requirements: Not specified

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Not specified

Manuals Available: User manual

Support Equipment: None

Communications Capability: Multiuse port allows data to be sent to a PC

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

UC AP4C CW & Toxic Industrial Materials Detector (M910 E00 003)

Proengin SA
 1 Rue de L'industrie
 78210 Saint Cyr l'Eclole, France
 Mr. Eric Damiens
 011-331-30584734 (Tel)
 011-331-30589351 (Fax)
 Subsidiary:
 Proengin Inc.
 405 NE 8th Street
 Fort Lauderdale, Florida 33304
 Mr. Sid Sidebotham
 954-760-9990 (Tel)
 954-760-9955 (Fax)
Information Source: <http://www.proengin.com>
<http://www.proenginusa.com>

Status: Vendor response—11/16/2006



Portability: Handheld Portable

Technology: Flame Spectrophotometer

Unit Cost: \$2.73K

Availability: Commercially available

Description: Flame Spectrophotometer

Type: Civil defense and industrial risk

Current Users: French civil security, USA

OPERATIONAL PARAMETERS

CAs Detected: All G agents to include GA, GB, GD, GE, GF, and VX, VS, VN, VE, VG, H, HD, HDL, HL, and HT

TICS Detected:

- **High Priority:** Carbon disulfide, hydrogen sulfide, sulfur dioxide, sulfuric acid, phosphorus trichloride, arsine, ammonia, and HCN
- **Medium Priority:** Carbonyl sulfide, chlorosulfonic acid, methanesulfonyl chloride, phosphorus oxychloride, PF5, sulfur trioxide, sulfuryl chloride, and sulfuryl fluoride
- **Low Priority:** Arsenic trichloride, dimethyl sulfate, ethyl phosphonothioic dichloride, ethyl phosphoric dichloride, and tetraethyl pyrophosphate

Start-up Time: 20 s

Detection State: Vapor, liquid, aerosol, particle, droplets, and dust

Response Time: 2 s

Alarms: Audible and visual alarm

Sensitivity: All detected G agents 4.5 ppm
 All detected V agents 4.5 ppm
 All detected H agents 120 ppm
 NH3 5 ppm
 HCN 1.5 ppm
 All detected arsenic TIMs 1.5 ppm

Selectivity: No false negative alarms

PHYSICAL PARAMETERS

Size: 35 cm x 14 cm x 9.5 cm (13.8 in x 5.5 in x 3.8 in)

Weight: 2 kg (4.5 lb)

Power Requirements: Lithium battery and manufacturers rechargeable battery

LOGISTICAL PARAMETERS

Durability: Military Specifications: Rugged NATO standard

Environmental Considerations: Unaffected by the environment; -32 °C to 55 °C (-25 °F to 131 °F) (operating); 3 °C to 71 °C (-38 °F to 160 °F) (storage), 0 % to 95 % rh

Shelf Life: 25 yr

Consumables: Batteries and hydrogen gas

Calibration Requirements: Self test on start up requires no user input

Repairs: Circulator replaced every 1000 accumulative hours

Repair Options: Loaner has a cost unless part of maintenance package. 24/7 tel number for phone tech support, plus field tech support by appointment. 30 d turn around.

Maintenance Costs: Subject to level of use but typically less than 3.5 % of unit cost

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: 1 h

Training Available: Manufacturer training

Manuals Available: Yes

Support Equipment: Intrinsically safe chemical detector for CAs TICs and TIMs. Complete kit includes batteries, hydrogen, 1 x S4PE liquid sampler and consumables in a pelican case.

Communications Capability: Not specified

Tamper Resistance: Password protection for calibration

Warranty: 1 yr

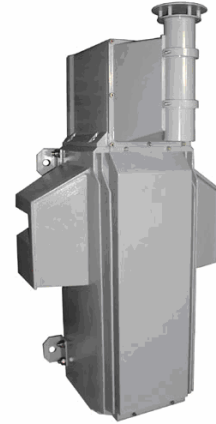
Testing Information: Not specified

Applicable Regulations: Requires an end user certificate

GENERAL

ADLIF Fixed Continuous Chemical Detector (M276 E00 000)

Proengin SA
 1 Rue de L'industrie
 78210 Saint Cyr l'Eclole, France
 Mr. Eric Damiens
 011-331-30584734 (Tel)
 011-331-30589351 (Fax)
 Subsidiary:
 Proengin Inc.
 405 NE 8th Street
 Fort Lauderdale, Florida 33304
 Mr. Sid Sidebotham
 954-760-9990 (Tel)
 954-760-9955 (Fax)
 sid@proenginusa.com
Information Source: <http://www.proengin.com>
<http://www.proenginusa.com>
 CEB, France



Status: Vendor response—11/16/2006

Portability: Fixed-Site Detection

Technology: Flame Spectrophotometer

Unit Cost: \$114K

Availability: Commercially available

Description: Flame Spectrophotometer and Agent Dose Meter. A local detection equipment for fixed installation designed to operate continuously under severe conditions for over 2 yr without special maintenance. The ADLIF continuously analyzes the surrounding air and instantaneously detects organophosphorus gases (G and Vx) and organosulphurous gases (HD and V).

Type: Military and civil surety

Current Users: France, Kuwait, Saudi Arabia, and Taiwan

OPERATIONAL PARAMETERS

CAs Detected: All G agents to include GA, GB, GD, GE, GF, and VX, VS, VN, VE, VG, H, HD, HDL, HL, and HT

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Continuously running

Detection State: Vapor, aerosol, particle, droplets, and dust

Response Time: 2 s

Alarms: Audible and visual alarm

Sensitivity: All detected G agents at 5 µg/m³

Selectivity: No false negative alarms

All detected V agents 5 µg/m³

All detected H agents 400 µg/m³ (36 ppb)

PHYSICAL PARAMETERS

Size: 91 cm x 48 cm x 43 cm (36 in x 19 in x 17 in)

Weight: 45.4 kg (100 lb)

Power Requirements: ac or dc powered

LOGISTICAL PARAMETERS

Durability: Military Specifications: Rugged NATO standard

The ADLIF has been specially designed to operate under severe conditions for over 2 yr without special maintenance

Environmental Considerations: Unaffected by the environment. -32 °C to 55 °C (-25 °F to 131 °F) (operating temperature); -39 °C to 71 °C (-38 °F to 160 °F) (storage temperature); 0 % to 95 % rh.

Shelf Life: 25 yr

Consumables: Water

Calibration Requirements: None

Repairs: No maintenance for 2 yr of continuous use

Repair Options: 7 d turn around if part of maintenance package (60 d if not) although a loaner can be arranged as part of the maintenance package. There is a 24/7 telephone number for phone tech support plus field tech support by appointment.

Maintenance Costs: Subject to level of use but typically less than 5 % of unit cost

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: 1 h
Training Available: Manufacturer training	Manuals Available: Yes
Support Equipment: Display box and control box	Communications Capability: RS485 capable to allow interface software
Tamper Resistance: Password protection for calibration	Warranty: 1 yr
Testing Information: Testing at CEB, France	Applicable Regulations: Requires an end user certificate

GENERAL

AP2C Vapor and Liquid Agent Detector (M266 E10 000)

Proengin SA
1 Rue de L'industrie
78210 Saint Cyr l'Eclole, France
Mr. Eric Damiens
011-331-30584734 (Tel)
011-331-30589351 (Fax)

Subsidiary:
Proengin Inc.
405 NE 8th Street
Fort Lauderdale, Florida 33304
Mr. Sid Sidebotham
954-760-9990 (Tel)
954-760-9955 (Fax)

Information Source: <http://www.proengin.com>
Chemical detection equipment survey for emergency responders, September 23, 1998
SBCCOM ARSSB-RRT, APG MD 21010, May 2001

Status: Vendor response—11/16/2006



Portability: Handheld Portable

Technology: Flame Spectrophotometer

Unit Cost: \$15.2K

Availability: Commercially available

Description: Flame Spectrophotometer

Type: Military and civil surety

Current Users: Land, air and sea forces from 40 countries including civil, security units, and international organizations

OPERATIONAL PARAMETERS

CAs Detected: All G agents to include GA, GB, GD, GE, GF, and VX, VS, VN, VE, VG, H, HD, HDL, HL, and HT

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 20 s

Detection State: Vapor, liquid, aerosol, particle, droplets, and dust

Response Time: 2 s

Alarms: Audible and visual alarm

Sensitivity: All detected G agents 1.5 ppb
All detected V agents 1.6 ppb
All detected H agents 60 ppb

Selectivity: No false negative alarms

PHYSICAL PARAMETERS

Size: 35 cm x 14 cm x 9.5 cm (13.9 in x 5.5 in x 3.8 in)

Weight: 2 kg (4.5 lb)

Power Requirements: Lithium battery and manufacturers rechargeable battery

LOGISTICAL PARAMETERS

Durability: Military Specifications: Rugged NATO standard

The AP2C is particularly suitable for military use in rough conditions. It has fast turn on, immediate identification and measurement, single-handed operation, simplicity of use, and ability to be turned off without precautions.

Environmental Considerations: Unaffected by the environment. -32 °C to 55 °C (-25 °F to 131 °F) (operating); 3 °C to 71 °C (-38 °F to 160 °F) (storage); 0 % to 95 % rh.

Shelf Life: 25 yr

Consumables: Batteries and hydrogen gas

Calibration Requirements: Self test on start up requires no user input

Repairs: Circulator replaced every 1000 accumulative hours

Repair Options: Loaner has a cost unless it is part of maintenance package. 24/7 telephone number for phone tech support, plus field tech support by appointment. 7 d turn around.

Maintenance Costs: Subject to level of use but typically less than 2.9 % of unit cost

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: 1 h

Training Available: Manufacturer training and self training using available simulator

Manuals Available: Yes

Support Equipment: AP2C diagnostic module, remote alarm unit, and alarm module

Communications Capability: RS485 capable to allow interface software

Tamper Resistance: Password protection for calibration

Warranty: 1 yr

Testing Information: Testing at TNO, Netherlands, CEB France, Israel, Sweden, Singapore; Testing of Detectors Against CWAs—Summary Report UC AP2C Portable Chemical Contamination Control Monitor Collective Unit (SBCCOM, May 2001)

Applicable Regulations: Requires an end user certificate

GENERAL

AP2Ce Vapor and Liquid Agent Detector (M232 E10 000)

Proengin SA
 1 Rue de L'industrie
 78210 Saint Cyr l'Eclole, France
 Mr. Eric Damiens
 011-331-30584734 (Tel)
 011-331-30589351 (Fax)
 Subsidiary:
 Proengin Inc.
 405 NE 8th Street
 Fort Lauderdale, Florida 33304
 Mr. Sid Sidebotham
 954-760-9990 (Tel)
 954-760-9955 (Fax)
Information Source: <http://www.proengin.com>
<http://www.proenginusa.com>



Status: Vendor response—11/16/2006

Portability: Handheld Portable

Technology: Flame Spectrophotometer

Unit Cost: \$18.3K

Availability: Commercially available

Description: Flame Spectrophotometer (for use in explosive environments). The AP2Ce is a special version of the AP2C, designed to be used in an explosive atmosphere.

Type: Military and civil surety

Current Users: Land, air, and sea forces from 40 countries including civil, security units, and international organizations

OPERATIONAL PARAMETERS

CAs Detected: All G agents to include GA, GB, GD, GE, GF, and VX, VS, VN, VE, VG, H, HD, HDL, HL, and HT

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 20 s	Detection State: Vapor, liquid, aerosol, particle, droplets, and dust
Response Time: 2 s	Alarms: Audible and visual alarm
Sensitivity: All detected G agents 1.5 ppb All detected V agents 1.6 ppb All detected H agents 60 ppb	Selectivity: No false negative alarms

PHYSICAL PARAMETERS

Size: 35 cm x 14 cm x 9.5 cm (13.8 in x 5.5 in x 3.8 in)	Weight: 2 kg (4.5 lb)
Power Requirements: Lithium battery and manufacturers rechargeable battery	

LOGISTICAL PARAMETERS

Durability: Military Specifications: Rugged NATO standard

Environmental Considerations: Unaffected by the environment. -32 °C to 55 °C (-25 °F to 131 °F) (operating); -39 °C to 71 °C (-38 °F to 160 °F) (storage); 0 % to 95 % rh.

Shelf Life: 25 yr

Consumables: Batteries and hydrogen gas

Calibration Requirements: Self test on start up requires no user input

Repairs: Circulator replaced every 1000 accumulative hours

Repair Options: Loaner has a cost unless it is part of maintenance package. 24/7 telephone number for phone tech support, plus field tech support by appointment. 7 d turn around.

Maintenance Costs: Subject to level of use but typically less than 3.5 % of unit cost

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: 1 h

Training Available: Manufacturer training and self training using available simulator

Manuals Available: Yes

Support Equipment: AP2C diagnostic module, remote alarm unit, and alarm module

Communications Capability: RS485 capable with the addition of the alarm module alarm box to allow interface with remote alarm or software

Tamper Resistance: Password protection for calibration

Warranty: 1 yr

Testing Information: Testing at SBCCOM, Aberdeen Proving Grounds; CEB, France

Applicable Regulations: Requires an end user certificate

GENERAL

AP2C-V Mobile Detector (M268 E00 000)

Proengin SA
 1 Rue de L'industrie
 78210 Saint Cyr l'Eclole, France
 Mr. Eric Damiens
 011-331-30584734 (Tel)
 011-331-30589351 (Fax)
 Subsidiary:
 Proengin Inc.
 405 NE 8th Street
 Fort Lauderdale, Florida 33304
 Mr. Sid Sidebotham
 954-760-9990 (Tel)
 954-760-9955 (Fax)
Information Source: <http://www.proengin.com>
<http://www.proenginusa.com>
 Chemical Detection Equipment Market Survey for
 Emergency Responders, September 23, 1998 (SBCCOM)



Status: Vendor response—11/16/2006

Portability: Vehicle Mounted

Technology: Flame Spectrophotometer

Unit Cost: \$42.2K

Availability: Commercially available

Description: Flame Spectrophotometer and Agent Dose Meter. The AP2C-V is a CA detector used in fixed positions (shelters, storage areas) or mobile (reconnaissance vehicles, light vehicles).

Type: Military and civil surety

Current Users: French army, U.S. civil responders

OPERATIONAL PARAMETERS

CAs Detected: All G agents to include GA, GB, GD, GE, GF, and VX, VS, VN, VE, VG, H, HD, HDL, HL, and HT

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 20 s	Detection State: Vapor, aerosol, particle, droplets, and dust
Response Time: 2 s	Alarms: Audible, visual, and remote visual/audible alarm
Sensitivity: All detected G agents 1.5 ppb All detected V agents 1.6 ppb All detected H agents 60 ppb	Selectivity: No false negative alarms

PHYSICAL PARAMETERS

Size: 31 cm x 23 cm x 17 cm (12.3 in x 9 in x 6.85 in)	Weight: 4.8 kg (10.5 lb)
Power Requirements: dc vehicle power or ac power through inverter	

LOGISTICAL PARAMETERS

Durability: Military Specifications and rugged NATO standard

Environmental Considerations: Unaffected by the environment. -32 °C to 55 °C (-25 °F to 131 °F) (operating temperature); -39 °C to 71 °C (-38 °F to 160 °F) (storage temperature); 0 % to 95 % rh; speeds of up to 68 mph.

Shelf Life: 25 yr

Consumables: Hydrogen

Calibration Requirements: Self test on start up; no user input required

Repairs: Circulator replaced every 1000 accumulative hours (optional 10 000 h circulator available)

Repair Options: Loaner has a cost unless it is part of maintenance package. 24/7 telephone number for phone tech support, plus field tech support by appointment. 7 d turn around.

Maintenance Costs: Subject to level of use but typically less than 2 % of unit cost

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: 1 h
Training Available: Yes	Manuals Available: Yes
Support Equipment: Not applicable	Communications Capability: RS485 capable to allow interface with software
Tamper Resistance: Password protection for calibration	Warranty: 1 yr
Testing Information: Testing at CEB, France	Applicable Regulations: Requires an end user certificate

GENERAL

APACC Chemical Control Alarm Portable Apparatus (M266 E10 000 and M452 E10 000)

Proengin SA
1 Rue de L'industrie
78210 Saint Cyr l'Eclole, France
Mr. Eric Damiens
011-331-30584734 (Tel)
011-331-30589351 (Fax)

Subsidiary:
Proengin Inc.
405 NE 8th Street
Fort Lauderdale, Florida 33304
Mr. Sid Sidebotham
954-760-9990 (Tel)
954-760-9955 (Fax)

Information Source: <http://www.proengin.com>
Chemical Detection Equipment Market Survey for
Emergency Responders, September 23, 1998 (SBCCOM)

Status: Vendor response—11/16/2006



Portability: Handheld Portable

Technology: Flame Spectrophotometer

Unit Cost: \$21.3K

Availability: Commercially available

Description: Flame Spectrophotometer and Agent Dose Meter. When the Alarm Box is connected with the AP2C, this set becomes the APACC (portable chemical control and alarm device) for CAs. The Alarm Box is fitted to the AP2C in place of the battery tray. However, the AP2C can still be used as a monitor device for chemical contamination.

Type: Military and civil surety

Current Users: Land, air, and sea forces from 40 countries including civil, security units, and international organizations

OPERATIONAL PARAMETERS

CAs Detected: All G agents to include GA, GB, GD, GE, GF, and VX, VS, VN, VE, VG, H, HD, HDL, HL, and HT

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 20 s

Detection State: Vapor, liquid, aerosol, particle, droplets, and dust

Response Time: 2 s

Alarms: APACC monitors average air concentration (dose) and only alarms when a preset detection limit is set. Audible, visual, and remote visual/audible alarm.

Sensitivity: All detected G agents 1.5 ppb
All detected V agents 1.6 ppb
All detected H agents 60 ppb

Selectivity: No false negative alarms

PHYSICAL PARAMETERS

Size: 39 cm x 14 cm x 9.5 cm (15.5 in x 5.5 in x 3.75 in)

Weight: 2.3 kg (5 lb)

Power Requirements: Lithium battery, vehicle power though battery block, or ac power though inverter

LOGISTICAL PARAMETERS

Durability: Military Specifications: Rugged NATO standard

Environmental Considerations: Unaffected by the environment. -32 °C to 55 °C (-25 °F to 131 °F) (operating); -39 °C to 71 °C (-38 °F to 160 °F) (storage); 0 % to 95 % rh.

Shelf Life: 25 yr

Consumables: Batteries and hydrogen gas

Calibration Requirements: Self test on start up requires no user input

Repairs: Circulator replaced every 1000 accumulative hours

Repair Options: Loaner has a cost unless it is part of maintenance package. 24/7 telephone number for phone tech support, plus field tech support by appointment. 7 d turn around.

Maintenance Costs: Subject to level of use but typically less than 2.9 % of unit cost

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: 1 h

Training Available: Yes

Manuals Available: Yes

Support Equipment: AP2C diagnostic module, remote alarm unit, and remote display box for viewing up to 1 km away

Communications Capability: RS485 capable to allow interface with remote alarm or software

Tamper Resistance: Password protection for calibration

Warranty: 1 yr

Testing Information: Testing at SBCCOM, Aberdeen Proving grounds; CEB, France

Applicable Regulations: Requires an end user certificate

GENERAL

UC TIMs Detector (M629 E00 001)

Proengin SA
1 Rue de L'industrie
78210 Saint Cyr l'Eclole, France
Mr. Eric Damiens
011-331-30584734 (Tel)
011-331-30589351 (Fax)

Subsidiary:
Proengin Inc.
405 NE 8th Street
Fort Lauderdale, Florida 33304

Mr. Sid Sidebotham
954-760-9990 (Tel)
954-760-9955 (Fax)

Information Source: <http://www.proengin.com>
<http://www.proenginusa.com>

Status: Vendor response—11/16/2006



Portability: Handheld Portable

Technology: Flame Spectrophotometer

Unit Cost: \$19.6K

Availability: It is commercialized in a suitcase under the name UC TIMS DETECTOR (ref. M629 E00 001)

Description: Flame Spectrophotometer. The TIMs detector is a flameproof portable equipment for chemical contamination control.

Type: Civil defense and industrial risk

Current Users: French civil surety, Spain, Canada, Russia, Sweden, and U.S.

OPERATIONAL PARAMETERS

CAs Detected: All G agents to include GA, GB, GD, GE, GF, and VX, VS, VN, VE, VG, H, HD, HDL, HL, and HT

TICS Detected:

- **High Priority:** Carbon disulfide, H₂S, sulfur dioxide, sulfuric acid, phosphorus trichloride, arsine, ammonia, and HCN
- **Medium Priority:** Carbonyl sulfide, chlorosulfonic acid, methanesulfonyl chloride, phosphorus oxychloride, PF₅, sulfur trioxide, sulfuryl chloride, and sulfuryl fluoride
- **Low Priority:** Arsenic trichloride, dimethyl sulfate, ethyl phosphonothioic dichloride, ethyl phosphoric dichloride, and tetraethyl pyrophosphate

Start-up Time: 20 s	Detection State: Vapor, aerosol, particle, droplets, and dust
Response Time: 2 s	Alarms: Audible and visual alarm
Sensitivity: All detected G and V agents 0.2 ppm All detected H agents 0.15 ppm NH ₃ and HCN 5 ppm All detected arsenic TIMs 1.5 ppm	Selectivity: No false negative alarms

PHYSICAL PARAMETERS

Size: 35 cm x 14 cm x 9.5 cm x (13.8 in x 5.5 in x 3.75 in) **Weight:** 2 kg (4.5 lb)

Power Requirements: Lithium battery and manufacturers rechargeable battery

LOGISTICAL PARAMETERS

Durability: Military Specifications: Rugged NATO standard

The detector is particularly suitable for use in rough conditions. It has fast turn-on, immediate identification and measurements, single-handed operation, simplicity of use, and can be turned off without precautions.

Environmental Considerations: Unaffected by the environment. -32 °C to 55 °C (-25 °F to 131 °F) (operating); -39 °C to 71 °C (-38 °F to 160 °F) (storage); 0 % to 95 % rh. Safe in explosive atmospheres; flame proof.

Shelf Life: 25 yr

Consumables: Batteries and hydrogen gas

Calibration Requirements: Self test on start up requires no user input

Repairs: Circulator replaced every 1000 accumulative hours

Repair Options: Loaner has a cost unless part of maintenance package. 24/7 tel number for phone tech support, plus field tech support by appointment. 30 d turn around.

Maintenance Costs: Subject to level of use but typically less than 3.5 % of unit cost

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: 1 h
Training Available: Manufacturer training	Manuals Available: Yes
Support Equipment: Not applicable	Communications Capability: Not specified
Tamper Resistance: Password protection for calibration	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: Requires an end user certificate

GENERAL

Automatic Continuous Air Monitoring System (ACAMS)

Abb Process Analytics
 843 North Jefferson St.
 P.O. Box 843
 Lewisburg, West Virginia 24901
 John Barnes
 304-647-1710 (Tel)
 304-647-1833 (Fax)
 john.barnes@us.abb.com
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)

Status: Vendor response—11/1/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Gas Chromatography

Unit Cost: \$35K

Availability: Commercially available

Description: Gas Chromatography with Flame Photometric Detection (FPD)

Type: Military

Current Users: U.S. Army chemical demilitarization facilities

OPERATIONAL PARAMETERS

CAs Detected: GB, VX, and HD

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 1 d to 2 d for equipment to become operational from a cold start

Detection State: Vapor and aerosol

Response Time: GB and HD at their TWA concentrations in 3 min
 VX at the TWA concentration in 5 min
 GB, VX, and HD at their IDLH concentrations in 2 min

Alarms: Audible and visual alarm

Sensitivity: HD at 0.0006 ppm
 GB at 0.000017 ppm
 VX at 0.00001 ppm

Selectivity: The ACAMS may false alarm to some ambient volatile compounds and some organic compounds

PHYSICAL PARAMETERS

Size: ACAMS Monitor—43.2 cm x 48.3 cm x 22.9 cm (17 in x 19 in x 9 in)

Strip Chart Recorder—27.9 cm x 17.8 cm x 12.7 cm (11 in x 7 in x 5 in)

Sample Pump—45.7 cm x 15.2 cm x 15.2 cm (18 in x 6 in x 6 in)

Computer Interface—15.2 cm x 17.8 cm x 12.7 cm (6 in x 7 in x 5 in)

Weight: 31.9 kg (70.4 lb)

Power Requirements: 115 V ac (approximately 600 W)

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed for use in harsh environments. System is available for mounting in a vehicle.

Environmental Considerations: Not specified

Shelf Life: Indefinite

Consumables: Support gases (hydrogen, nitrogen, and air)

Calibration Requirements: Yes

Repairs: Yes

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Technical background	Training Required: Formal (2 wk operational training)
Training Available: Yes	Manuals Available: User manual
Support Equipment: Sample system	Communications Capability: Capable of interfacing with a data communication system
Tamper Resistance: None	Warranty: 1 yr
Testing Information: Complete test data available	Applicable Regulations: Not specified

GENERAL

Agilent 6850; Agilent 6850 Series II Network GC; Agilent 6852—GSA

Agilent Technologies
2850 Centerville Road
Wilmington, Delaware 19808
Mr. Tom Fenton
302-633-8160 (Tel)
609-714-3498 (Fax)
tom_fenton@agilent.com
Information Source: <http://www.chem.agilent.com>

Status: Vendor response—12/7/2006



Technology: Detector

Portability: Fixed-Site Detection; Vehicle Transportable

Unit Cost: \$45K to \$85K (configuration dependent)

Availability: Commercially available; COTS/GSA

Description: Gas Chromatography with Flame Photometric Detection and/or Mass Selective Detector

Analysis of air samples collected on sorbet tubes; extracted liquid samples

Type: Commercial

Current Users: Contact POC above for information

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, VX, H, HT, and HD (chemical agent configuration)

TICS Detected:

- **High Priority:** Carbon disulfide, hydrogen sulfide, sulfur dioxide (chemical agent configuration)
- **Medium Priority:** Carbonyl sulfide, methyl mercaptan, phosphine, and n-octyl mercaptan (chemical agent configuration)
- **Low Priority:** Parathion (chemical agent configuration)

BAs Detected: Biological agent configuration—Bacillus anthracis (anthrax), Brucella melitensis (brucellosis), Burkholderia mallei (Glanders), Burkholderia pseudomallei (Melioidosis), Francisella tularensis (Tularemia), Yersinia pestis (plague)

Start-up Time: 2 h

Detection State: Vapor and liquid

Response Time: <30 min

Alarms: Audible and visual alarm

Sensitivity: GA at 0.0000045 ppm

GB at 0.0000008 ppm

VX at 0.00000009 ppm

HD, H, and HT at 0.00006 ppm

Sensitivity for TIMs is method dependent

Selectivity: High selectivity and method dependent

PHYSICAL PARAMETERS

Size: 58 cm x 31 cm x 56 cm (23 in x 12 in x 22 in)

Weight: ~29.5 kg (65 lb) for the system

Power Requirements: 110 V ac

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling (some calibration may be needed). Can be mounted in a mobile laboratory.

Environmental Considerations: -20 °C to 35 °C (-4 °F to 95 °F) at 0 % to 95 % rh (operating temperature)

Shelf Life: Not applicable

Consumables: Helium, hydrogen, nitrogen, GC columns, ferrules, injection port liners, and standards for calibration. Sample preparation consumables (biological agent configuration).

Calibration Requirements: Yes

Repairs: Periodic consumables replacement

Repair Options: Not specified

Maintenance Costs: Configuration dependant

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required (chemical agent system). Biological sample handling (for biological agent identification).

Training Required: Instrument—data system operation

Training Available: Yes, onsite or offsite

Manuals Available: User manual

Support Equipment: Thermal adsorption equipment purchased separately. See required consumables.

Communications Capability: Data system is Windows XP based. Can output results to Excel or database via TCP/IP or modem.

Tamper Resistance: Password protected

Warranty: 1 yr

Testing Information: Contact vendor for complete test data available; included in the TRRP-03 air monitoring evaluation

Applicable Regulations: Not specified

GENERAL

Agilent 6890N

Agilent Technologies
2850 Centerville Road
Wilmington, Delaware 19808
Mr. Tom Fenton
302-633-8160 (Tel)
609-714-3498 (Fax)
tom_fenton@agilent.com
Information Source: <http://www.chem.agilent.com>
Status: Vendor response—12/7/2006



Portability: Fixed-Site Detection; Vehicle Transportable

Technology: Detector

Unit Cost: \$45k to \$100k (configuration dependent)

Availability: Commercially available; COTS/GSA

Description: Gas Chromatography with Flame Photometric Detection and/or Mass Selective Detector

Analysis of air samples collected on sorbet tubes; extracted liquid samples

Type: Commercial

Current Users: Contact POC above for information

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, VX, H, HT, and HD

TICS Detected:

- **High Priority:** Carbon disulfide, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Carbonyl sulfide, methyl mercaptan, phosphine, and n-octyl mercaptan
- **Low Priority:** Parathion

Start-up Time: 2 h	Detection State: Vapor and liquid
Response Time: <30 min	Alarms: Audible and visual alarm
Sensitivity: GA at 0.0000045 ppm GB at 0.0000008 ppm VX at 0.00000009 ppm HD, H, and HT at 0.00006 ppm	Selectivity: High selectivity and method dependent

PHYSICAL PARAMETERS

Size: 51 cm x 58 cm x 51 cm (20 in x 23 in x 20 in)	Weight: ~44.9 kg (99 lb) for the system
Power Requirements: 110 V ac	

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling (some calibration may be needed)

Environmental Considerations: -20 °C to 35 °C (-4 °F to 95 °F) at 0 % to 95 % rh (operating temperature)

Consumables: Helium, hydrogen, nitrogen, GC columns, ferrules, injection port liners, and standards for calibration

Shelf Life: Not applicable	Repairs: Periodic consumables replacement
Calibration Requirements: Yes	Maintenance Costs: Configuration dependant
Repair Options: Not specified	

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Available: Yes, onsite or offsite

Tamper Resistance: Password protected

Testing Information: Not specified

Support Equipment: See required consumables Thermal adsorption equipment purchased separately. See required consumables

Communications Capability: Data system is Windows XP based. Can output results to Excel or database via TCP/IP or modem.

Training Required: Instrument—data system operation

Manuals Available: User manual

Warranty: 1 yr

Applicable Regulations: None

GENERAL

Agilent 6890N-5975B GC/MSD

Agilent Technologies
 2850 Centerville Road
 Wilmington, Delaware 19808
 Mr. Tom Fenton
 302-633-8160 (Tel)
 609-714-3498 (Fax)
 tom_fenton@agilent.com
Information Source: <http://www.chem.agilent.com>

Status: Vendor response—12/7/2006



Portability: Fixed-Site Detection; Vehicle Transportable

Technology: Detector

Unit Cost: \$75k to \$110K (configuration dependent)

Availability: Commercially available; COTS/GSA

Description: Gas Chromatography with Mass Spectrometry

Analysis of air samples collected on sorbet tubes; extracted liquid samples

Type: Commercial

Current Users: Contact POC above for information

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, H, HD, HN, and L

TICS Detected:

- **High Priority:** Ammonia, arsine, carbon disulfide, chlorine, ethylene oxide, formaldehyde, hydrogen cyanide, hydrogen sulfide, sulfur dioxide (multiple analyses—different configurations)
- **Medium Priority:** Acrolein, acrylonitrile, allyl alcohol, allylamine, carbon monoxide, carbonyl sulfide, chloroacetone, chloroacetonitrile, diketene, ethylene dibromide, hydrogen selenide, methyl bromide, methyl mercaptan, phosphine, and n-octyl mercaptan (may require multiple analyses with different configurations)
- **Low Priority:** Crotonaldehyde, parathion, tetraethyl lead (may require multiple analyses with different configurations)

Start-up Time: 4 h

Detection State: Vapor, aerosol, and liquid

Response Time: 5 min to 30 min

Alarms: None

Sensitivity: Femtogram level sensitivity. Concentration MDL dependent on sampling method.

Selectivity: Highly selective. Positive identification with spectral confirmation. Potential interferences include gasoline, diesel fuel, wood smoke, and kerosene.

PHYSICAL PARAMETERS

Size: 51 cm x 99 cm x 56 cm (20 in x 39 in x 22 in)

Weight: ~90.7 kg (200 lb) for entire system

Power Requirements: 120 V ac, 20 A

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling (some calibration may be needed)

Environmental Considerations: 0 °C to 35 °C (32 °F to 95 °F)

Shelf Life: Not applicable

Consumables: Helium, GC columns, ferrules, injection port liners, and standards for calibration

Calibration Requirements: Yes

Repairs: Periodic consumables replacement by user, hardware repairs by the manufacturer

Repair Options: Not specified

Maintenance Costs: Configuration dependant

SPECIAL REQUIREMENTS

Operator Skills: Chemist or other scientific background preferred. System can be operated remotely by scientist while having field technician follow instructions.

Training Required: 2 wk to 4 wk

Training Available: Yes, onsite or offsite

Manuals Available: Yes

Support Equipment: See required consumables

Communications Capability: Local Area Network (LAN), Inter/Intra net, and modem

Tamper Resistance: Password protected

Warranty: 1 yr

Testing Information: Evaluation of the Agilent GC-SPD/MSD System Against CAs Summary Report (SBCCOM, October 2002)

Applicable Regulations: Not specified

GENERAL

ChemDisk™ Diffusive Sampler

Assay Technology, Inc.
 1252 Quarry Lane
 Pleasanton, California 94566
 CR (Gus) Manning, PhD, CIH
 800-833-1258 (Tel)
 925-461-7149 (Tel)
 gmanning@assaytech.com
Information Source: <http://www.assaytech.com>

Status: Vendor response—4/6/2006



Portability: Handheld Portable

Technology: Gas Chromatography

Unit Cost: Sampler—ca. \$10 to \$20 per test

GC detector—\$10K

UV-VIS detector—\$1K

Availability: Commercially available

Lead time for stock products—1 wk

Lead time for custom products as quoted—6 wk to 12 wk (nonstandard analyte applications and field-portable units)

Description: Gas Chromatography or UV-VIS Spectroscopy

Type: Commercial and military

Current Users: Hospitals, chemical manufacturers, consulting firms, U.S. Navy (SAHAP), and NASA

OPERATIONAL PARAMETERS

CAs Detected: VX and others (GC detector), mustards (UV-VIS detector)

TICS Detected:

- **High Priority:** Ethylene oxide and formaldehyde
- **Medium Priority:** Allyl alcohol
- **Low Priority:** Chloroacetaldehyde and crotonaldehyde

Start-up Time: <5 min	Detection State: Vapor
Response Time: >1 h	Alarms: None
Sensitivity: VX and mustards at 1 ppb Formaldehyde, chloroacetaldehyde, and crotonaldehyde at 0.1 ppm to 1 ppm Ethylene oxide at 0.1 ppm to 1 ppm Allyl alcohol at 0.1 ppm to 1 ppm	Selectivity: GC detector—responds only to CW agents and TIMs UV-VIS detector—has a few noncritical interferents

PHYSICAL PARAMETERS

Size: Sampler—2.5 cm x 2.5 cm x 1.3 cm (1 in x 1 in x 0.5 in)
 GC detector—315 cm x 61 cm x 31 cm (12 in x 24 in x 12 in)
 UV-VIS detector—31 cm x 315 cm x 15 cm (12 in x 12 in x 6 in) or smaller

Weight: Sampler—<28.3 g (<1 oz)
 GC Detector—4.5 kg (10 lb.+)
 UV-VIS detector—0.5 kg (1 lb) or less

Power Requirements: Operates on standard and readily available batteries for 8 h of continuous use (UV-VIS detector)
 Operates on nonstandard or special order batteries (GC detector)

LOGISTICAL PARAMETERS

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity). Best at 10 °C to 40 °C (50 °F to 104 °F).

Shelf Life: 1 yr

Consumables: Consumable samplers provided in a foil pouch

Calibration Requirements: Yes (each use)

Repairs: None

Repair Options: Can expire but can't break. The sampler is worn as a monitor and then sent back to company to be read. Replace with another.

Maintenance Costs: UV-VIS detector—\$100/yr

SPECIAL REQUIREMENTS

Operator Skills: No special skills or training required for GC detector or UV-VIS detector. Special skills required to operate the equipment (GC—chemistry; UV-VIS—easy).

Training Required: Formal. Sampler plus UV-VIS detector—1 h; sampler plus GC detector—1 mo.

Training Available: None

Manuals Available: User manual

Support Equipment: GC detector—lab chemicals and supplies

Communications Capability: Computer (control), computer interface, networking Capability, and installed data processing equipment

Tamper Resistance: None

Warranty: 1 yr

Testing Information: On file and at www.assaytech.com

Applicable Regulations: Not specified

GENERAL

Infrared Detector for Gas Chromatograph

Analytical Solutions and Providers (ASAP)
 1511 Neave St.
 Covington, Kentucky 41011
 859-581-6990 (Tel)
 877-987-2800 (TF)
 859-581-6821 (Fax)
 Don Harris
 don_h@asapanalytical.com
Information Source: <http://www.asapanalytical.com>
 Chemical Detection Equipment Market Survey for
 Emergency Responders, September 23, 1998 (SBCCOM)
Status: Vendor response—11/17/2006



Portability: Fixed-Site Analytical Laboratory

Technology: Gas Chromatography

Unit Cost: Approximately \$75K complete with computer system and spectral libraries (does not include a GC)

Availability: Commercially available. System comes complete with IRD, computer, and software.

Description: Gas Chromatography with Infrared Spectrometry

Type: Commercial

Current Users: Drug enforcement agencies and forensic and crime labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: 30 min	Detection State: Vapor, aerosol, and liquid
Response Time: Limited by the gas chromatograph	Alarms: Visual alarm
Sensitivity: This detector has not been tested against CAs. It will detect nanogram quantities of organics and, therefore, should detect similar quantities of CAs.	Selectivity: No false alarms

PHYSICAL PARAMETERS

Size: 33 cm x 76 cm x 76 cm (13 in x 30 in x 30 in) does not include a GC

Weight: 52.9 kg (117 lb) (does not include a GC)

Power Requirements: Two 110 V ac lines with stabilized voltage

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: Not specified
Shelf Life: Not specified	Consumables: 4 L liquid nitrogen per day
Calibration Requirements: Yes	Repairs: Yes

Repair Options: There is a loaner program. If an instrument is down it is given priority in the service organization. The cost of paid service is \$190/h labor and an additional charge for travel. For the IR detectors there is paid service or warranty only. There is free technical support throughout the life of an instrument.

Maintenance Costs: \$1.5K per tune-up (1 time per year) plus cost of liquid nitrogen

SPECIAL REQUIREMENTS

Operator Skills: Technical background	Training Required: Yes
Training Available: Yes	Manuals Available: User manual
Support Equipment: GC and computer system	Communications Capability: LAN
Tamper Resistance: Yes	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Trace Ultra High Sensitivity

Biorad, Digilab Division (Varian)
 237 Putnam Ave.
 Cambridge, Massachusetts 02139
 800-225-1248 (Tel)
 617-234-7045 (Fax)
 richard.coull@varianinc.com
Information Source: CSEPP Chemical Detection
 Equipment Assessment Volume II, July 1998 (SBCCOM)

Status: Varian, Inc. has divested it's interest in the IRD
 product line



Portability: Fixed-Site Analytical Laboratory

Technology: Gas Chromatography

Unit Cost: \$200K

Availability: No longer in production

Description: Gas Chromatography with Fourier Transform Infrared Spectroscopy

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GB, VX, and HD

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: <10 min (does not include initial setup)	Detection State: Vapor, aerosol, and liquid
Response Time: <1 h	Alarms: Not specified
Sensitivity: HD at 0.00046 ppm GB at 0.000017 ppm VX at 0.0000009 ppm	Selectivity: Dependent on chromatography column

PHYSICAL PARAMETERS

Size: Not specified	Weight: Not specified
Power Requirements: House current	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: Not specified
Shelf Life: Not specified	Consumables: Carrier gasses for GC
Calibration Requirements: Yes	Repairs: Not specified

Repair Options: There is no loaner program. If an instrument is down it is given priority in the service organization. The cost of paid service is \$250/h labor and travel. For the Saturn and HPLC there are various support agreements available. For the Infra-red detectors there is paid service or warranty only. For technical support there is free support throughout the life of an instrument. If a product is under support agreement and warranty there is a live priority support 9 am to 5 pm CST. If the system is not under a support agreement or warranty, there is free call-back technical support.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Technical background	Training Required: Formal
Training Available: Not specified	Manuals Available: Not specified
Support Equipment: Not specified	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Bruker Viking 573

Bruker Daltonics, Inc.
 40 Manning Road
 Billerica, Massachusetts 01821
 Brian Turk
 978- 663-3660, ext. 1333 (Tel)
 978- 667-5993 (Fax)
 jbt@bdal.com
Information Source: <http://www.bdal.com>

Status: Vendor response—11/1/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Gas Chromatography

Unit Cost: \$120K to \$140K depending upon application (U.S. only)

Availability: Commercially available (90 d to 120 d depending on production demand)

Description: Gas Chromatograph with Mass Spectrometry

Thermal adsorption—Analysis of air samples collected on sorbet tubes

Type: Commercial

Current Users: Organization for Prevention of Chemical Weapons (OPCW), German Army, Federal Bureau of Investigation (FBI), Uniformed Services University of Health Sciences, National Institute for Occupational Safety and Health (NIOSH), Alcohol, Tobacco, & Firearms (ATF), and Pennsylvania Department of Environmental Protection

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, H, HD, HN, and L

(NIST library of 174 000 compounds)

TICS Detected:

- **High Priority:** All compounds except for inorganic and organo-metallic compounds
- **Medium Priority:** All compounds except for inorganic and organo-metallic compounds
- **Low Priority:** All compounds except for inorganic and organo-metallic compounds

Start-up Time: >30 min	Detection State: Vapor, aerosol, and liquid
Response Time: >2 min	Alarms: None
Sensitivity: GA, GB, GD, VX, HD, HN, and L at 5 ppb	Selectivity: Responds only to CW agents and TIMs

PHYSICAL PARAMETERS

Size: 47 cm x 61 cm x 32 cm (18.5 in x 24 in x 12.6 in)	Weight: 38.9 kg (85.8 lb)
Power Requirements: ac powered	

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling. Calibration verification every 12 h. Compact, lightweight, and robust, the Viking 573 can be easily deployed to the point of analytical need, where it can be ready to analyze samples within minutes of arrival.

Environmental Considerations: Restricted to certain environments (climate controlled)

Shelf Life: 10 yr

Consumables: Helium gas, GC column, injector septa and syringe, and calibration samples

Calibration Requirements: If system is to be used for identification (checked daily and retuned if necessary), tuning is performed by the operator (takes ~15 min). For quantization, calibration should be checked daily and recalibrated if necessary.

Repairs: Ion source and injection port cleaning. Parts—ion source filaments, injector liners, injector septa, injector syringes, fixed traps, and spare GC-columns.

Repair Options: Not specified

Maintenance Costs: \$1K to \$5K per year depending on number of samples

SPECIAL REQUIREMENTS

Operator Skills: Special skills required to operate the equipment (college degree with chemistry and engineering background)

Training Required: A 1 wk training course is required for all users. Additional courses in chromatography and mass spectrometry are helpful and recommended for the advanced user.

Training Available: Operation, maintenance, advanced, and custom courses

Manuals Available: Technical manual for operation and maintenance

Support Equipment: Appropriate gases and generator for field applications

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Password protected

Warranty: 1 yr factory warranty standard

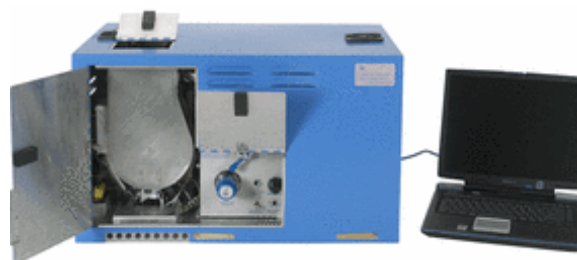
Testing Information: Not specified

Applicable Regulations: None

GENERAL

CT-1128 Portable GC-MS

Constellation Technology Corporation
 7887 Bryan Dairy Road
 Suite 100
 Largo, Florida 33777
 John Hintenach
 727-547-0600, ext. 6151 (Tel)
 727-545-6150 (Fax)
 hintenach@contech.com
Information Source: vwww.contech.com



Status: Vendor response—11/30/2006

Portability: Vehicle Mounted

Technology: Gas Chromatography

Unit Cost: Approximately \$135K to \$150K

Availability: Commercially available (12 wk to 14 wk)

Description: Gas Chromatograph with Mass Spectrometry

Type: Military and commercial

Current Users: Kobe Steel, Lawrence Livermore National Laboratory, and LA County Sheriffs Department

OPERATIONAL PARAMETERS

CAs Detected: Nerve agents—GA, GB, GD, GF, and VX

Blister agents—H, HD, HN, and L

TICS Detected:

- **High Priority:** All compounds classified as VOCs or SV materials can be detected
- **Medium Priority:** All compounds classified as VOCs or SV materials can be detected
- **Low Priority:** All compounds classified as VOCs or SV materials can be detected

Start-up Time: 30 min to 60 min	Detection State: Vapor, liquid, and aerosol
Response Time: Depends upon the operational mode. The analysis can be from as quick as 1 min to an 1 h. A typical analysis range is 5 min to 30 min.	Alarms: None
Sensitivity: Method sensitivity is analyte dependent Detector sensitivity—mass Spectrometry is highly selective	Selectivity: The ability to further perform GC/MS analysis virtually eliminates all false positive and negative alarms

PHYSICAL PARAMETERS

Size: 66 cm x 42 cm x 39 cm (26 in x 16.5 in x 15.5 in)	Weight: 31.8 kg (70 lb)
Power Requirements: Vehicle, ac power, or generator	

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling

Environmental Considerations: 10 °C to 35 °C (50 °F to 95 °F) @ 5 % to 95 % rh

Shelf Life: The life expectancy will be at least 10 yr

Consumables: Carrier gas, injector liners, septa, ferrules, syringes, and o-rings

Calibration Requirements: Autocalibration as needed

Repairs: Normal consumables replacement

Repair Options: Not specified

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: Designed to be operated by chemistry technicians or chemists with training in GC-MS sample preparation

Training Required: Technical background, or special training required

Training Available: Manufacturer offers a 2 d and/or 4 d training course

Manuals Available: A training manual is available

Support Equipment: Chromatography supplies such as syringes, septa, and chemical standards. Consumable kits and other supplies are available from the manufacturer.

Communications Capability: A laptop computer with Ethernet is available. Communications interfaces can be customized.

Tamper Resistance: Can be configured with extensive surety features including password protection, firewalls, and blinded software

Warranty: 1 yr parts and labor (depot level) standard

Testing Information: Testing has been performed by a wide variety of accredited sources. All instruments must pass a rigorous in-house validation test prior to delivery. CA testing was performed by LLNL.

Applicable Regulations: Not specified

GENERAL

Automatic Continuous Environmental Monitor (ACEM) 900

CDS Analytical, Inc.
 Dynatherm Product Line
 465 Limestone Road
 P.O. Box 277
 Oxford, Pennsylvania 19363-0277
 888-900-ACEM (2236) (Tel)
 610-932-4158 (Fax)
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)

Status: Vendor response—4/1/2006



Portability: Fixed-Site Detection

Technology: Gas Chromatography

Unit Cost: \$15.5K (ACEM 900 only)

Availability: Commercially available

Description: Gas Chromatography

Type: Military

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GB, GD, VX, and HD

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Not specified	Detection State: Vapor
Response Time: 11 min to 7 min	Alarms: None
Sensitivity: IDLH, TWA, and GPL (with appropriate Gas Chromatograph configuration)	Selectivity: Most site specific interferences can be separated with proper GC

PHYSICAL PARAMETERS

Size: 24 cm x 37 cm x 38 cm (9.25 in x 14.6 in x 15 in) **Weight:** 11.3 kg (25 lb)

Power Requirements: 120 V, 50 Hz to 60 Hz, 7.5 A

LOGISTICAL PARAMETERS

Durability: Must remain stationary (can be mounted in a mobile laboratory)

Environmental Considerations: 0 °C to 50 °C (32 °F to 122 °F) operating temperature; 5 % to 95 % rh

Shelf Life: Indefinite, within range of environmental conditions

Consumables: Sample collection tubes, focus traps, ferrules, and fused silica

Calibration Requirements: Though auxiliary gas chromatography and software

Repairs: Yes

Repair Options: Loaners not available. 1 wk to 2 wk turn around time when sent back for repairs. Service contract is available.

Maintenance Costs: Average 13 % of purchase price per year plus consumables

SPECIAL REQUIREMENTS

Operator Skills: Technical background

Training Required: Formal

Training Available: Training available on-site or in factory laboratory

Manuals Available: User manual, tutorials, and training manual

Support Equipment: Required to operate—hookup to a gas chromatograph with appropriate software to control analysis and report data

Required to operate as continuous monitor—vacuum interface Model 225 FF/Can, vacuum pump, mass flow controller needle valve restrictor, and mass flow meter

Communications Capability: Remote start output to GC, GC ready input, external sample output, external ready input, and RS-232 interface

Tamper Resistance: Not specified

Warranty: 1 yr parts and labor

Testing Information: Not specified

Applicable Regulations: UL/CE Approved

GENERAL

Hapsite®

INFICON
Two Technology Place
East Syracuse, New York 13057-9714
Ben Shultes
315-434-1188 (Tel)
315-437-3803 (Fax)
Ben.Shultes@inficon.com
Information Source: <http://www.inficon.com>



Status: Vendor response—11/28/2006

Portability: Handheld Portable, Handheld Stationary, Vehicle Mounted, or Fixed-Site Detection

Technology: Gas Chromatography

Unit Cost: \$80K to \$95K

Availability: Commercially available

Description: Gas Chromatography with Mass Spectrometry

Type: Commercial and military

Current Users: U.S. Army TEU, TAML, Bases; U.S. Air Force; U.S. Navy NEPMUs; U.S. Marine Corps; National Guard CSTs; UNMOVIC; FBI; allied foreign military; other federal, state, county, and local first responders

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, and HD

TICS Detected:

- **High Priority:** Carbon disulfide, ethylene oxide, formaldehyde, hydrogen cyanide, and hydrogen sulfide (some compounds may require a different column/configuration)
- **Medium Priority:** Acetone cyanohydrin, acrolein, acrylonitrile, allyl alcohol, crotonaldehyde, dimethyl sulfate, ethylene dibromide, methyl bromide, methyl mercaptan, n-butyl isocyanate, and trichloroacetyl chloride
- **Low Priority:** Chloroacetaldehyde, chloroacetyl chloride, isopropyl isocyanate, tert-butyl isocyanate, tetraethyl lead, and tetramethyl lead

Start-up Time: 20 min to 30 min

Detection State: Vapors (with the headspace accessory, it is possible to analyze for liquid and solid samples)

Response Time: Near real-time in MS-only mode
~15 min in GC/MS mode

Alarms: Audible, visible, and auto alarm

Sensitivity: Detection limit is compound dependent, but typically in the low ppb range (0.1 ppb to 10 ppb range)

Selectivity: Not prone to false positives. Highly selective detector, able to differentiate between chemicals of interest and those that could be considered interferents.

PHYSICAL PARAMETERS

Size: 46 cm x 43 cm x 18 cm (18 in x 17 in x 7 in)

Weight: 15.9 kg (35 lb); 19.1 kg (42 lb) with battery installed

Power Requirements: Battery (operates on nonstandard or special order NiMH batteries), ac, or vehicle powered

LOGISTICAL PARAMETERS

Durability: Very rugged. Designed to be used in harsh environments. Tested against military standards.

Environmental Considerations: 0 °C to 45 °C (32 °F to 113 °F) operating temperature

Operates in most environments (rain, snow, fog, and high humidity), cold weather insulating bag, and insulation available

Shelf Life: Required to maintain vacuum in MS, requires operating at a minimum every 3 wk

Consumables: Nitrogen carrier gas, internal standard gas, NEG vacuum pump, and battery (rechargeable)

Calibration Requirements: Yes (daily autotune)

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: \$20 per hour to operate (assuming continuous running of samples)

SPECIAL REQUIREMENTS

Operator Skills: Technical background useful but not required

Training Required: Formal (3-d training by factory certified instructors)

Training Available: Yes

Manuals Available: User manual and training manuals

Support Equipment: Laptop computer. Ruggedized laptop computer available.

Communications Capability: Ethernet communications to external laptop computer for transfer of raw data and results. Data files are stored on the Hapsite hard drive. The data files are also transferable to the laptop through Hapsite software or automatically saved on the laptop when connected. Wireless data transmission is available between the command computer provided with Hapsite. Wireless data transmission is currently under development for Hapsite (scheduled wireless release 12/06).

Tamper Resistance: Yes (computer can be password protected)

Warranty: 2 yr return to factory. Parts, labor, and return shipping included. Consumables not covered under warranty.

Testing Information: Tested for volatile organic compounds (VOCs) in air, soil, and water; EPA reports available. Tested for response to chemical warfare agents. Test reports restricted.

Applicable Regulations: Not specified

GENERAL

Voyager Portable Gas Chromatograph

Photovac, Inc.
 176 Second Avenue
 Waltham, Massachusetts 02451-1166
 781-290-0777 (Tel)
 781-290-4884 (Fax)
 Tom Smith
 tsmith@photovac.com
Information Source: www.photovac.com
Status: Vendor response—4/10/2006



Portability: Handheld Stationary

Technology: Gas Chromatography

Unit Cost: \$19K to \$22K

Availability: Commercially available

Description: Gas Chromatography

Type: Commercial

Current Users: Environmental consultants, industrial hygienists, remediation project managers, and government regulator agencies

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, carbon disulfide, ethylene oxide, hydrogen sulfide, and phosgene
- **Medium Priority:** Acrolein, acrylonitrile, allyl alcohol, and phosphine
- **Low Priority:** None

Start-up Time: Less than 20 min	Detection State: Vapor
Response Time: 5 min to 15 min	Alarms: Audible and visual alarm
Sensitivity: Compound dependent—detects in the ppb to ppm range	Selectivity: Has few noncritical interferences

PHYSICAL PARAMETERS

Size: 39 cm x 7.6 cm x 5.1 cm (15.4 in x 3 in x 2 in)	Weight: 6.8 kg (14.96 lb)
Power Requirements: Battery operated	

LOGISTICAL PARAMETERS

Durability: The Voyager is designed for outdoor use in rugged environments

Environmental Considerations: 0 °C to 40 °C (32 °F to 104 °F) at 0 % to 100 % rh

Shelf Life: Not specified

Consumables: Carrier gas

Calibration Requirements: Yes (vendor recommends every 8 h)

Repairs: None

Repair Options: Loaner is not formal policy but is availability driven. Charge upfront, and refund when send back. There is a demo disclaimer form. 8:30 am to 5 pm EST. Instrument can be fixed and sent back within 1 wk. Voyager may have backorder of parts.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Technical background

Training Required: Formal

Training Available: Yes—1 d paid training available and strongly recommended

Manuals Available: User manual and site chart software manual

Support Equipment: Battery pack, ac adapter, communication cable kit, 10 fluorophore membrane filters, carrying strap, carrier gas connection kit, tool kit, and site chart LX software

Communications Capability: A RS-232 cable allows data to be sent to a PC using Photovac Sitechart software

Tamper Resistance: Password protected

Warranty: 1 yr

Testing Information: EPA ETV program verification

Applicable Regulations: Not specified

GENERAL

CMS200

INFICON
 Two Technology Place
 East Syracuse, New York 13057-9714
 Ben Shultes
 315-434-1188 (Tel)
 Jessica Krokowski
 315-434-1298 (Tel)
 Jessica.Krokowski@inficon.com
Information Source: <http://www.inficon.com>
Status: Vendor response—11/27/2006



Portability: Handheld Stationary (Transportable)

Technology: Gas Chromatography

Unit Cost: \$41K

Availability: Commercially available

Description: Gas Chromatography with Micro Argon Ionization Detection (MAID) or Micro Electron Capture Detection (ECD)

Type: Commercial

Current Users: Water and analysis

OPERATIONAL PARAMETERS

CAs Detected: Yes

TICS Detected:

- **High Priority:** Yes
- **Medium Priority:** Yes
- **Low Priority:** Yes

Start-up Time: Greater than 24 h

Detection State: Vapor, liquid, and aerosol

Response Time: Less than 2 min

Alarms: Yes

Sensitivity: TCE at 1 ppb

Selectivity: Depends on target compounds

PHYSICAL PARAMETERS

Size: 15 cm x 51 cm x 51 cm (6 in x 20 in x 20 in)

Weight: 14 kg (30.8 lb)

Power Requirements: Rechargeable battery (battery charger supplied)

LOGISTICAL PARAMETERS

Durability: Designed for field use

Environmental Considerations: Up to 95 % humidity; -5 °C to 40 °C (23 °F to 104 °F)

Shelf Life: Not applicable

Consumables: Argon gas (ultra high purity), syringes, teller bags, water vials, and calibration standards

Calibration Requirements: Once weekly

Repairs: Factory service only

Repair Options: Not specified

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Technical background

Training Required: Formal, recommended (from INFICON)

Training Available: On-site or factory training

Manuals Available: User manual

Support Equipment: Not applicable

Communications Capability: RS232 communication

Tamper Resistance: Not applicable

Warranty: 1 yr

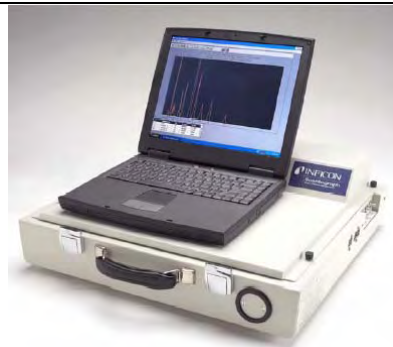
Testing Information: Test data available upon request

Applicable Regulations: Under NRC General License, FCC

GENERAL

CMS100

INFICON
 Two Technology Place
 East Syracuse, New York 13057-9714
 Ben Shultes
 315-434-1188 (Tel)
 Jessica Krokowski
 315-434-1298 (Tel)
 Jessica.Krokowski@inficon.com
Information Source: <http://www.inficon.com>



Status: Vendor response—11/27/2006

Portability: Handheld Stationary (Transportable)

Technology: Gas Chromatography

Unit Cost: \$36K

Availability: Commercially available

Description: Gas Chromatography with Micro Argon Ionization Detection (MAID)

Type: Commercial

Current Users: Air analysis only

OPERATIONAL PARAMETERS

CAs Detected: Yes

TICS Detected:

- **High Priority:** Yes
- **Medium Priority:** Yes
- **Low Priority:** Yes

Start-up Time: Greater than 24 h

Detection State: Vapor, liquid, and aerosol

Response Time: Less than 2 min

Alarms: Yes

Sensitivity: TCE at 1 ppb

Selectivity: Depends on target compounds

PHYSICAL PARAMETERS

Size: 17 cm x 34 cm x 50 cm (6.5 in x 13.5 in x 19.5 in)

Weight: 22 kg (48.4 lb)

Power Requirements: Rechargeable battery

LOGISTICAL PARAMETERS

Durability: Designed for field use

Environmental Considerations: Up to 95 % humidity; -5 °C to 40 °C (23 °F to 104 °F)

Shelf Life: Not applicable

Consumables: Argon gas (ultra high purity), syringes, teller bags, and calibration standards

Calibration Requirements: Once weekly

Repairs: Factory service only

Repair Options: Not specified

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Technical background

Training Required: Formal, recommended (from INFICON)

Training Available: On-site or factory training

Manuals Available: User manual

Support Equipment: Not applicable

Communications Capability: RS232 communication

Tamper Resistance: Not applicable

Warranty: 1 yr

Testing Information: Test data available upon request

Applicable Regulations: Under NRC General License, FCC

GENERAL

Dual-Flame Photometric Detector

SRI Instruments, Inc.
20720 Earl St.
Torrance, California 90503
Hugh Goldsmith
310-214-5092 (Tel)
310-214-5097 (Fax)

Information Source: Chemical Detection Equipment
Market Survey for Emergency Responders, September 23,
1998 (SBCCOM)

Status: Vendor response—11/30/2006



Portability: Fixed-Site Analytical Laboratory

Technology: Gas Chromatography

Unit Cost: Not specified

Availability: Commercially available

Description: Gas Chromatography with Flame Photometry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: 20 min

Detection State: Vapor, aerosol, and liquid

Response Time: 1 min to 10 min

Alarms: Audible and visual alarm

Sensitivity: Validation of testing with chemical agents is unknown. The expected sensitivity of this instrument is 1 ppb with concentrator and 1 ppm without concentrator.

Selectivity: Dependent on chromatography column used. FPD detection should be sensitive to nerve and sulfur based blister agents. Sulfur gases could cause interference.

PHYSICAL PARAMETERS

Size: 8610 GC Series—50 cm x 37 cm x 32 cm (19.5 in x 14.5 in x 12.5 in)

310 GC Series—32 cm x 37 cm x 32 cm (12.5 in x 14.5 in x 12.5 in)

Weight: 8610 GC Series 88—153.7 kg (338.8 lb) depending on configuration

3110 GC Series 66—109.8 kg (242 lb) depending on configuration

Power Requirements: 120 V ac or 220 V ac, or operated from generator or inverter

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: Compressed gases

Calibration Requirements: Yes

Repairs: By manufacturer only

Repair Options: Loaner not available, instrument is custom made for user. Turn around within 24 h to 48 h. Tech support during business hours, also fax support and email support; no field service.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Technical background

Training Required: Formal

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Not specified

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Saturn 2000 GC/MS

Varian Instruments
 2700 Mitchell Drive
 Walnut Creek, California 94598
 800-926-3000 (Tel)
 1-925-939-2400 (International Tel)
 925-945-2102 (Fax)
 customer.service@varianinc.com
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)

Status: Vendor response—11/15/2006



Portability: Fixed-Site Analytical Laboratory
Unit Cost: \$65K to \$82k plus operator training course
Availability: Commercially available
Description: Gas Chromatography with Mass Spectrometry
Type: Commercial
Current Users: Not specified

Technology: Gas Chromatography

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, H, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: 30 min to 8 h	Detection State: Vapor, aerosol, and liquid
Response Time: Approximately 30 min after the injection of sample	Alarms: Not specified
Sensitivity: This detector has not been tested against CAs. The estimated sensitivity is based on the technology and is below the 8 h TWA.	Selectivity: Little interference—low probability of false alarms

PHYSICAL PARAMETERS

Size: 122 cm x 61 cm x 56 cm (48 in x 24 in x 22 in)	Weight: Approximately 69.9 kg (154 lb)
Power Requirements: 110 V ac, 20 A	

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: Ultra pure helium, standards, and labware

Calibration Requirements: Yes

Repairs: Qualified Varian engineer for other than routine maintenance

Repair Options: There is no loaner program. If an instrument is down it is given priority in our service organization. The cost of paid service is \$265/h labor and travel. For the Saturn and HPLC there are various support agreements available. For the Infra-red detectors there is paid service or warranty only.

For technical support there is free support throughout the life of an instrument. If a product is under support agreement and warranty there is live priority support 9 am to 5pm CST. If the system is not under paid support or warranty, there is a free call-back technical support.

Maintenance Costs: \$5.89K to \$7.2K per yr for maintenance contract and preventative maintenance service

SPECIAL REQUIREMENTS

Operator Skills: Technical background

Training Required: Formal—mandatory (operators course)

Training Available: Operator 4 d training course: \$2.6K per person (\$2.5K per day on-site; 1 to 5 people)

Manuals Available: User manual

Support Equipment: Ultra pure helium in tank, miscellaneous lab-ware, and GC equipment

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Agilent 1200 Series LC

Agilent Technologies
2850 Centerville Road
Wilmington, Delaware 19808
Mr. Tom Fenton
302-633-8160 (Tel)
609-714-3498 (Fax)
tom_fenton@agilent.com

Information Source: <http://www.chem.agilent.com>

Status: Vendor response—12/7/2006



Technology: Detector

Portability: Vehicle Transportable; Fixed-Site Detection

Unit Cost: Modular system—configuration dependent

Availability: Commercially available; COTS/GSA

Description: High Performance Liquid Chromatography

Type: Commercial

Current Users: Contact POC above for information

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Formaldehyde
- **Medium Priority:** None
- **Low Priority:** Crotonaldehyde, diphenylmethane-4,4'-diisocyanate, isopropyl isocyanate, n-butyl isocyanate, parathion, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: Not specified

Detection State: Liquid

Response Time: Not specified

Alarms: Not specified

Sensitivity: Detector dependent

Selectivity: Sample dependent

PHYSICAL PARAMETERS

Size: Modular system—configuration dependent

Weight: Modular system—configuration dependent, approximately 59 kg (125 lb)

Power Requirements: Modular system—configuration dependent. All Agilent 1200 modules have automatic line sensing, wide ranging power supplies. All modules operate with line voltages in the range of 100 V ac to 240 V ac, +/-10 %. An ac power outlet is required for each module, in addition to the computer system.

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling (some calibration may be needed)

Environmental Considerations: Modular system—configuration dependent; transportable

Consumables: Standards for calibration, vials/caps, solvents, and columns

Repairs: Periodic consumables replacement by user; hardware repairs by the manufacturer

Shelf Life: Not applicable

Calibration Requirements: Yes

Repair Options: Not specified

Maintenance Costs: Configuration dependent

SPECIAL REQUIREMENTS

Operator Skills: Chemist or other scientific background preferred

Training Required: Operator dependent

Training Available: Yes, onsite or offsite

Manuals Available: Yes

Tamper Resistance: Password protected

Warranty: 1 yr

Testing Information: Not specified

Applicable Regulations: Not specified

Support Equipment: Consumables needed but dependent on sample load and type

Communications Capability: Windows XP based. Can output results to Excel or database via TCP/IP or modem.

GENERAL

Perkin-Elmer Turbo LC Plus HPLC System

Perkin-Elmer LAS Inc.
710 Bridgeport Avenue
Shelton, Connecticut 06484
800-762-4000 (Tel)
Information Source: <http://www.perkin-elmer.com>

Status: Vendor response—11/1/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Detector

Unit Cost: Not specified

Availability: Commercially available

Description: High Performance Liquid Chromatography

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified

Detection State: Not specified

Response Time: Not specified

Alarms: Not specified

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified

Weight: Not specified

Power Requirements: Not specified

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: Not specified

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Not specified

Training Required: Not specified

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Not specified

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

Shimadzu LC-20A HPLC System

Shimadzu Scientific Instruments
 7102 Riverwood Drive
 Columbia, Maryland 21046
 Norman Brach
 443-690-5520 (Tel)
Information Source: <http://www.ssi.shimadzu.com>

Status: Vendor response—11/27/2006



Portability: Mobile Laboratory Detection Equipment;
 Vehicle Mounted

Unit Cost: Not specified

Availability: Commercially available

Description: High Performance Liquid Chromatography

Type: Commercial

Current Users: Not specified

Technology: High Performance Liquid Chromatography

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified

Detection State: Not specified

Response Time: Not specified

Alarms: Not specified

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified

Weight: Not specified

Power Requirements: Not specified

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: Not specified

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Not specified

Training Required: Not specified

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Not specified

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

Varian ProStar Analytical HPLC System

Varian Instruments
 2700 Mitchell Drive
 Walnut Creek, California 94598
 800-926-3000 (Tel)
 1-925-939-2400 (International Tel)
 925-945-2102 (Fax)
 customer.service@varianinc.com
Information Source: <http://www.varianinc.com>



Status: Vendor response—4/6/2006

Portability: Fixed-Site Analytical Laboratory

Technology: High Performance Liquid Chromatography

Unit Cost: Not specified

Availability: Commercially available

Description: High Performance Liquid Chromatography

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified

Detection State: Not specified

Response Time: Not specified

Alarms: Not specified

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified

Weight: Not specified

Power Requirements: Not specified

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: Not specified

Repairs: Not specified

Maintenance Costs: Not specified

Repair Options: There is no loaner program. If an instrument is down it is given priority in our service organization. The cost of paid service is \$250/h labor and travel. For the Saturn and HPLC there are various support agreements available. For the Infra-red detectors there is paid service or warranty only. For technical support there is free support throughout the life of an instrument. If a product is under support agreement and warranty there is live priority support 9 am to 5pm CST. If the system is not under paid support or warranty, there is a free call-back technical support.

SPECIAL REQUIREMENTS

Operator Skills: Not specified

Training Required: Not specified

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Not specified

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

HAWK Long Range Chemical Detector

Bruker Daltonics, Inc.
 40 Manning Road
 Billerica, Massachusetts 01821
 Brian Turk
 978-663-3660, ext. 1333 (Tel)
 978-667-5993 (Fax)
 jbt@bdal.com
Information Source: <http://www.bdal.com>

Status: Vendor response—11/1/2005



Portability: Standoff

Technology: Passive Fourier Transform Infrared Spectroscopy

Unit Cost: Approximately \$200K depending on options

Availability: Commercially available (60 d to 120 d depending upon production demand)

Description: Passive Fourier Transform Infrared Spectroscopy—The HAWK is a highly reliable infrared detector for stand-off detection of chemical agent clouds. All known CAs and important TICs are automatically monitored. The lightweight system can be mounted on vehicles, ships and helicopters, and performs real-time field screening while underway. Sensor, scanner, electronics and control unit are integrated in one compact housing.

Type: Military and commercial

Current Users: Spanish Army, Egypt MOD, U.S. government agencies

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GBD, GD, GF, HN, L, and HD

TICs Detected:

- **High Priority:** AC, CG, SO₂, and NH₃
- **Medium Priority:** Acrolein and acrylonitrile
- **Low Priority:** BCM 74-97-5

Start-up Time: <30 min

Detection State: Vapor

Response Time: Instantly

Alarms: Auto, visible, and audible alarm

Sensitivity: GF at 17 ppm to 34 ppm

GA at 15 ppm to 45 ppm

GB at 35 ppm to 70 ppm

AC at 140 ppm to 2700 ppm

CG at 90 ppm to 230 ppm

NH₃ at 4.8 ppm

BCM 74-97-5 at 110 ppm to 210 ppm

GD at 40 ppm to 85 ppm

HD at 500 ppm to 250 ppm

L at 280 ppm to 700 ppm

Selectivity: Responds only to CAs and TIMs

PHYSICAL PARAMETERS

Size: 39 cm x 33 cm x 50 cm (15.2 in x 13 in x 19.7 in)

Weight: 28.6 kg (63.1 lb)

Power Requirements: The system requires a power supply of 20 V to 32 V. Commercial batteries can be used (i.e., 24 V car batteries).

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling

Environmental Considerations: -51 °C to 71 °C (-60 °F to 160 °F) (storage temperature); -18 °C to 49 °C (0 °F to 120 °F) (operating temperature); 0 % to 95 % rh

Shelf Life: 5 yr shelf life with PMCS if stored more than 1 yr

Consumables: Desiccant cartridges

Calibration Requirements: System automatically performs self calibration with internal black-body (heated) sources. This can be programmed to be performed automatically at set intervals.

Repairs: Replacement of desiccants annually and purge housing annually by a trained service technician

Repair Options: Not specified

Maintenance Costs: Extended factory warranties are \$15K annually. Service contracts are \$25K annually. \$1K estimated annual maintenance cost.

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: Self training with operator manual sufficient (2 h to 4 h)

Training Available: Training provided at additional cost for operators

Manuals Available: User manual

Support Equipment: None

Communications Capability: Computer (control), computer interface, networking capability, hardwire capability, and installed data processing equipment

Tamper Resistance: Password protection available

Warranty: 1 yr factory warranty standard

Testing Information: Tests conducted at Dugway Proving Ground, Utah; Sweden, Korea, and Singapore

Applicable Regulations: Approved: Military Standard 810D & 461D; UL 3111

GENERAL

Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)

General Dynamics
 Armament and Technical Products
 Four LakePointe Plaza,
 2118 Water Ridge Parkway
 Charlotte, North Carolina 28217
 Janet Guertin
 704-714-8290 (Tel)
 704-714-8232 (Fax)
 jguertin@gdatp.com
Information Source: <http://www.gdatp.com>



Status: Vendor response—12/18/2006

Portability: Standoff Detection (Ground Fixed Site, Ground Mobile, Aerial Mobil, or Shipboard)

Technology: FTIR

Unit Cost: Not specified

Availability: Commercially available

Description: Fourier Transform Infrared Spectroscopy

Type: Military and commercial

Current Users: In process of development for all service branches

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, Vx, HD, HN₃, L, AC, and CK

TICS Detected:

- **High Priority:** Can be trained to recognize vapors with infrared signatures in the 7 μ to 14 μ range
- **Medium Priority:** Can be trained to recognize vapors with infrared signatures in the 7 μ to 14 μ range
- **Low Priority:** Can be trained to recognize vapors with infrared signatures in the 7 μ to 14 μ range

Start-up Time: Between 5 min and 10 min

Detection State: Vapor

Response Time: Between 60 s and 120 s

Alarms: Auto alarm, visible alarm, and audible alarm

Sensitivity: GA at 135 mg/m²

GB at 135 mg/m²

GD at 135 mg/m²

GF at 135 mg/m²

VX at 135 mg/m²

Vx at 135 mg/m²

HD at 3300 mg/m²

L at 3300 mg/m²

HN₃ at 3300 mg/m²

AC at 14 700 mg/m²

CK at 13 500 mg/m²

Selectivity: "Trained" to recognize agent in the presence of common battlefield interferants

PHYSICAL PARAMETERS

Size: SEM/Scanner module—84 cm x 20 cm, diameter (33 in x 8 in)

Operator display unit—28 cm x 22 cm x 8.6 cm (11.2 in x 8.7 in x 3.4 in)

Power adapter—32 cm x 26 cm x 13 cm (12.4 in x 10.1 in x 5 in)

Weight: SEM/Scanner module: 19.5 kg (43 lb)

Operator display unit: 4.5 kg (10 lb)

Power adapter: 6.4 kg (14 lb)

Power Requirements: SEM/Scanner Module—28 V dc

Operator display unit—28 V dc and 110 V ac

Power adapter—110 V ac to 220 V ac

LOGISTICAL PARAMETERS

Durability: Designed to be operated in harsh environments. Should only be transported in a transit case.

Environmental Considerations: Operates in all environments and extreme temperature conditions: -32 °C to 49 °C (-25 °F to 120 °F)

Shelf Life: 10 yr—purge and pressurize SEM; replace ODU RTC battery

Consumables: None

Calibration Requirements: None

Repairs: Available

Repair Options: LRU and SRU level

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Training Required: Minimal training required for operator

Training Available: Yes

Manuals Available: Operator and unit maintenance manual; direct support and general support maintenance manual

Support Equipment: Vehicle or fixed-site installation hardware

Communications Capability: Command, Control, Communications, Computers, Information, and Intelligence (C⁴I²) capability, M42 interface ability, JWARN (Joint Warning and Reporting Network) ability, and DoD JTA (Joint Service Technical Architecture) compliant

Tamper Resistance: Password protected ODU over operating system and advanced user features

Warranty: Not specified

Testing Information: Completed IOT&E on NBCRV and LAV Reconnaissance Programs; Milestone C Decision, FRP in 1Q 2007

Applicable Regulations: None

GENERAL

M21 Automatic Chemical Agent Alarm

General Dynamics (ECBC)
 Armament and Technical Products
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)

Status: Limited vendor information



Technology: FTIR

Portability: Standoff

Unit Cost: Currently out of production. Price dependent on quantity.

Availability: Currently out of production (call for details)

Description: Fourier Transform Infrared Spectroscopy

Type: Military

Current Users: U.S. Army and U.S. Marine Corp.

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, HD, and L

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 3 min to 14 min

Detection State: Vapor

Response Time: <1 min

Alarms: Audibly by horn and visually by illuminating either a blister or nerve light

Sensitivity: GA at 12 ppm

GB at 15.3 ppm

GD at 13.5 ppm

HD at 460 ppm

L at 50 ppm

Selectivity: The M21 is "trained" to recognize agent in the presence of most common battlefield interferants. However, large quantities of military Halon (a fire suppressant), organophosphorus insecticides, and alcohols could cause a false positive. The presence of direct, low angle sunlight in the field of view may cause blister false alarms.

PHYSICAL PARAMETERS

Size: Detector—48 cm x 53 cm x 33 cm (19 in x 21 in x 13 in)

Transit case—76 cm x 76 cm x 56 cm (30 in x 30 in x 22 in)

Tripod bag assembly—91 cm x 25 cm x 25 cm (36 in x 10 in x 10 in)

Weight: Detector—24.5 kg (54 lb)

Transit case—23.1 kg (51 lb)

Tripod bag assembly—18.6 kg (41 lb)

Power Requirements: Requires power source with 80 W instantaneous power capacity

LOGISTICAL PARAMETERS

Durability: Designed to be operated in harsh environments. Should only be transported in a transit case.

Environmental Considerations: -32 °C to 49 °C (-25.6 °F to 120.2 °F) operating temperature. -41 °C to 60 °C (-41.8 °F to 140 °F) storage temperature.

Shelf Life: Greater than 10 yr

Consumables: None

Calibration Requirements: None

Repairs: Periodic purging and recharging with dry nitrogen may be required

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Training Required: Minimal half day training recommended

Training Available: Self-directed operator and unit/DS maintenance training CD-ROMs are available

Manuals Available: TM 3-6665-315-10 Operator's Manual, TM 3-6665-315-23&P Unit and Direct Support Maintenance Manual

Support Equipment: Power source and tripod bag (contains the detector tripod, the M42 remote alarm, and miscellaneous items of support equipment)

Communications Capability: A RS-232 cable allows data to be communicated with a PC

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: None

GENERAL

HazMatID

Smiths Detection
 21 Commerce Drive
 Danbury, Connecticut 06810
 Bob Bohn
 National Sales Manager Emergency Response Division
 203-207-9700 (Tel)
 203-207-9780 (Fax)
 bob.bohn@smithsdetection.com
Information Source: <http://www.smithsdetection.com>



Status: Vendor response—11/16/2006

Portability: Handheld Stationary

Technology: FTIR

Unit Cost: \$53K to \$87K

Availability: Commercially available

Description: Fourier Transform Infrared Spectroscopy

Type: Commercial

Current Users: United Nations weapons inspection team, FBI hazardous materials response team, FBI explosives unit, National Guard WMD teams, state and local hazmat teams, DEA, EPA, ATF, DOD, and SBCCOM

OPERATIONAL PARAMETERS

CAs Detected: WMD Nerve and blister agents (GA,GB, GD, DF, and VX) , TIMs, and common chemicals

TICS Detected:

- **High Priority:** Not specified—see General Detection Limit
- **Medium Priority:** Not specified—see General Detection Limit
- **Low Priority:** Not specified—see General Detection Limit

Start-up Time: Between 61 s and 5 min	Detection State: Liquid, solid, powder, paste, and gel
Response Time: 20 s	Alarms: Visible flashing screen
Sensitivity: FTIR with a diamond single reflection sample interface is sensitive enough to detect a material that is present at levels greater than 10 % in a mixture Sample dependent—single drop of liquid or flake of powder	Selectivity: Noncritical interferents, i.e., water and mixtures

PHYSICAL PARAMETERS

Size: 46 cm x 289 cm x 188 cm (18 in x 11 in x 7 in)	Weight: 10.4 kg (23 lb)
Power Requirements: 110 V mains, cigarette lighter, or battery pack	

LOGISTICAL PARAMETERS

Durability: Designed for infield use to give flexibility. ZnSe Beam splitter—Unlike KBR the ZnSe beamsplitter, it can be exposed to elements, such as humidity, without destroying beamsplitter. Vibration/drop test—Each HazMatID undergoes a series of drop and vibration tests to test the ruggedness of the product.

Environmental Considerations: Waterproof; impervious to rain, fog, and high humidity

Shelf Life: More than 5 yr on all components except laser and source

Consumables: None

Calibration Requirements: No user calibration required

Repairs: Laser and source need replacing every 2 yr to 3 yr. Source is user installable in the field.

Repair Options: Loaner option is available. Turn around time for repair is typically 5 d for depot repair. Field technical support is not typical, but phone technical support is 24/7.

Maintenance Costs: \$4.5K to \$15K for warranty packages

SPECIAL REQUIREMENTS

Operator Skills: Low—system is prompt driven

Training Required: 1 d

Training Available: 1 d on-site

Manuals Available: Yes, PDF format

Support Equipment: None required

Communications Capability: Wireless connectivity with incident command using industry-standard 802.11B-compliant technology

Tamper Resistance: Password protected interface

Warranty: 1 yr

Testing Information: Testing at SBCCOM

Applicable Regulations: None

GENERAL

Miran SapphIRe Portable Ambient Air Analyzer

Thermo Fisher Scientific
 27 Forge Parkway
 Franklin, Massachusetts 02038
 866-282-0430 (Tel)
 508-520-0430 (Tel)
 508-520-1460 (Fax)
 donna.cohn@thermofisher.com
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)



Status: Limited vendor information

Portability: Handheld Stationary

Unit Cost: \$21K

Availability: Commercially available

Description: Infrared Spectroscopy (filter based)

Type: Commercial

Current Users: Not specified

Technology: Infrared Spectroscopy

OPERATIONAL PARAMETERS

CAs Detected: GB, VX, and HD

TICS Detected:

- **High Priority:** Hydrogen cyanide and phosgene
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: <5 min

Detection State: Vapor and aerosol

Response Time: 10 s

Alarms: Visual alarm

Sensitivity: Detects GB, VX, HD, H, hydrogen cyanide,
and phosgene at their IDLH concentrations

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Roughly the size of a large briefcase

Weight: 8.2 kg (18 lb)

Power Requirements: Battery powered

LOGISTICAL PARAMETERS

Durability: Designed to be used in harsh environments

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: Carrier gas and battery

Calibration Requirements: Baseline spectrum required

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Not specified

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Testing of MIRAN SapphIRe Portable
Ambient Air Analyzers Against Chemical Warfare Agents
Summary Report (SBCCOM, July 2000)

Applicable Regulations: Not specified

GENERAL

Metrohm Model 861 Advanced Compact IC System

Metrohm-Peak, Inc.
 12521 Gulf Freeway
 Houston, Texas 77034
 281-484-5000 (Tel)
 281-484-5001 (Fax)
 info@metrohm-peak.com
 Martin Brewer
 m@mp-ic.com
Information Source: <http://www.metrohm-peak.com>

Status: Vendor response—4/1/2006



Portability: Fixed-Site Analytical Laboratory (or in-field use with power source)

Technology: Ion Chromatography

Unit Cost: \$12.9K to \$18.9K

Availability: Commercially available (15 d lead time)

Description: Ion Chromatography

Type: Commercial and military

Current Users: Environmental, pharmaceutical, industrial—chemical, petrochemical, power generation, and semiconductor

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ionic states of ammonia, chloride, fluoride, bromide, cyanide, sulfide, nitrate, and sulfate
- **Medium Priority:** Ionic states of: cations, anions, organic acids, metals
- **Low Priority:** Ionic states of: cations, anions, organic acids, metals

Start-up Time: Application specific

Detection State: Aqueous, ionized

Response Time: Application specific

Alarms: Audible alarm (triggered)

Sensitivity: Ng/L to %

Selectivity: Application specific

PHYSICAL PARAMETERS

Size: 26 cm x 36 cm x 45 cm (10.2 in x 14 in x 18.4 in)

Weight: 21.7 kg (47.8 lb)

Power Requirements: 115 V, 50 Hz to 60 Hz

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: 5 °C to 45 °C (41 °F to 113 °F) at 20 % to 80 % atmospheric humidity (operating range); -20 °C to 70 °C (-4 °F to 158 °F) (storage temperature); -40 °C to 70 °C (-40 °F to 158 °F) (transport temperature)

Shelf Life: Indefinite if prepared for long-term storage

Consumables: Solutions, analytical column, filters, spare parts, pistons, seals, and other miscellaneous parts

Calibration Requirements: Periodic external calibration

Repairs: Manufacturer offers PM service on routine basis for periodic fee. Operator may execute PM as well. Three month maintenance includes Peri pump tubing, filters, and general inspection. Column maintenance as needed includes guard replacements or analytical column replacement.

Repair Options: On-site tech support within 24 hr. Turn around time depends on problem (if overnight something it can be returned the following day). Loaner is available if repairs take a long time—depending on circumstances (i.e., parts not available). Tech 8 am to 6 pm central time.

Maintenance Costs: Yearly operational cost <\$1K

SPECIAL REQUIREMENTS

Operator Skills: Analytical aptitude, Windows environment, general lab practice, basic chemistry, and mathematics

Training Required: Metrohm-Peak training is required

Training Available: Comprehensive IC training course, IC maintenance and troubleshooting, advanced operations course, and custom training course

Manuals Available: Yes—user manual provided

Support Equipment: Solutions, external standards, and operator intervention

Communications Capability: Yes—computer (control), computer interface, and networking capability

Tamper Resistance: Yes

Warranty: 1 yr hardware, 90 d consumables

Testing Information: IQOQ/PQ available

Applicable Regulations: Not specified

GENERAL

IMS 2000E Chemical Warfare Agent Detector

Bruker Daltonics, Inc.
 40 Manning Road
 Billerica, Massachusetts 01821
 Brian Turk
 978-663-3660, ext. 1333 (Tel)
 978-667-5993 (Fax)
 jbt@bdal.com
Information Source: <http://www.bdal.com>

Status: Vendor response—11/1/2005



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: \$9K

Availability: Commercially available (7 d to 90 d depending upon production demand)

Description: Ion Mobility Spectrometry

Type: Commercial and military

Current Users: British Ministry of Defense, Irish army, Bahain military, and Swiss Defense Forces

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX/Vx, L, AC, CG, and HD

TICS Detected:

- **High Priority:** Hydrogen cyanide and phosgene
- **Medium Priority:** None
- **Low Priority:** Cyanogen chloride

Start-up Time: Less than 2 min	Detection State: Vapor
Response Time: <1 min	Alarms: Audible, visual, and auto alarm
Sensitivity: GA at 0.003 ppm GB at 0.0034 ppm GD at 0.013 ppm VX at 0.0018 ppm Hydrogen cyanide at 12 ppm Phosgene at 12 ppm GF at 0.013 ppm Cyanogen chloride at 0.4 ppm HD at 0.0045 ppm L at 0.0034 ppm	Selectivity: It has been demonstrated to detect GB in the presence of many interferents. Has a few noncritical interferents: vinegar, JP8, bleach, floor wax, and burning fuels.

PHYSICAL PARAMETERS

Size: 35 cm x 10 cm x 15 cm (13.8 in x 4 in x 6 in)

Weight: 2.2 kg (4.8 lb)

Power Requirements: Battery, vehicle, or ac powered (operates on standard and readily available batteries for 8 h of continuous use)

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling

Environmental Considerations: Operates in all environments and extreme temperature conditions

Shelf Life: 1 yr to 2 yr

Consumables: Batteries, filters, and dopant

Calibration Requirements: No

Repairs: User level filter, and dopant replacement every 500 h

Repair Options: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Training Required: Operator self-training with manual for 2 h

Training Available: Video or off/on-site training available for additional fee

Manuals Available: User manual

Support Equipment: None

Communications Capability: Command control communications, computer (control), and computer interface

Tamper Resistance: Not applicable

Warranty: 1 yr factory warranty standard

Testing Information: Tested under the Edgewood SBCCOM Domestic Preparedness Program 2002

Applicable Regulations: The Bruker Point Chemical Detector (PCD) contains a radioactive source licensed for use by the U.S. NRC. NRC and applicable local regulations must be followed for storage, shipment, and disposal.

GENERAL

Rapid Alarm and Identification Device-Mobile (RAID-M)

Bruker Daltonics, Inc.
 40 Manning Road
 Billerica, Massachusetts 01821
 Brian Turk
 978-663-3660, ext. 1333 (Tel)
 978-667-5993 (Fax)
 jbt@bdal.com
Information Source: <http://www.bdal.com>

Status: Vendor response—11/1/2005



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: \$12.5K (includes all consumables)

Availability: Commercially available (7 d to 90 d depending upon production demand)

Description: Ion Mobility Spectrometry

Type: Commercial and military

Current Users: German armed forces, Greek armed forces, industrial chemical companies in Europe, civil defense forces Saudi Arabia, Canadian health ministry, research applications with MIT, Los Alamos, and Canadian Custom

Bruker Daltonics RAID-M Chemical Agent Detector is accepted into the U.S. DHS Commercial Equipment Direct Assistance Program (CEDAP)

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, AC, and L

TICS Detected:

- **High Priority:** Chlorine, hydrogen cyanide, hydrogen chloride, and sulfur dioxide
- **Medium Priority:** None
- **Low Priority:** Toluene 2,4-diisocyanate and toluene 2,6-diisocyanate

Start-up Time: 1 min to 5 min

Detection State: Vapor

Response Time: <1 min

Alarms: Audible, visual, and auto alarm

Sensitivity: GB at 0.006 ppm

VX at 0.003 ppm

GA at 0.006 ppm

GD at 0.006 ppm

GF at 0.006 ppm

AC at 4 ppm

CG at 2 ppm

CL2 at 3 ppm

HD at 0.005 ppm

L at 0.03 ppm

HN at 0.03 ppm

Selectivity: Has a few noncritical interferents: can be affected by high concentrations of JP-8, gasoline, floor wax, and Windex

PHYSICAL PARAMETERS

Size: 40 cm x 11 cm x 17 cm (15.7 in x 4.5 in x 6.5 in)

Weight: 3.4 kg (7.5 lb) with batteries

Power Requirements: Battery or ac powered (operates on nonstandard or special order batteries—lithium batteries for 6 h intermittent use)

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling

Environmental Considerations: Operates in all environments and extreme temperature conditions [Mil Standard 810E: -9 °C to 43 °C (-15 °F to 110 °F)]

Shelf Life: 1 yr to 2 yr without servicing

Consumables: Rechargeable batteries, dopant, dust filter, purge filter, and drying filter rated to a minimum of 500 operating hours

Calibration Requirements: None

Repairs: User level filter and dopant replacement every 500 h

Repair Options: Not specified

Maintenance Costs: \$850 annually

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: Self-training with provided operator manual sufficient (2 h to 4 h)

Training Available: Off or on-site training available for additional fee

Manuals Available: User manual

Support Equipment: None

Communications Capability: Computer (control) and computer interface

Tamper Resistance: Password protection capable

Warranty: 1 yr factory warranty standard

Testing Information: Tested under the Edgewood SBCCOM Domestic Preparedness Program 2002

Applicable Regulations: UL 3111 & Mil Standard 810F

The RAID-M contains a radioactive source licensed for use by the U.S. NRC

GENERAL

Stationary Rapid Alarm & Identification Device (RAID-S)

Bruker Daltonics, Inc.
 40 Manning Road
 Billerica, Massachusetts 01821
 Brian Turk
 978-663-3660, ext. 1333 (Tel)
 978-667-5993 (Fax)
 jbt@bdal.com
Information Source: <http://www.bdal.com>

Status: Vendor response—11/1/2005



Portability: Fixed-Site Detection

Technology: Ion Mobility Spectrometry

Unit Cost: \$16K to \$27K depending on options

Availability: Commercially available (60 d to 120 d depending upon production demands)

Description: Ion Mobility Spectrometry

Type: Commercial and military

Current Users: Canadian navy, German navy, Italian navy, Prague subway station, Czech Republic, and Spanish navy

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HN, L, AC, and HD

TICS Detected:

- **High Priority:** Ammonia, chlorine, hydrogen cyanide, sulfur dioxide, and phosgene
- **Medium Priority:** None
- **Low Priority:** Toluene 2,4-diisocyanate and toluene 2,6-diisocyanate

Start-up Time: 1 min to 5 min

Detection State: Vapor

Response Time: Less than 1 min

Alarms: Audible, visual, and auto alarm

Sensitivity: GA, GB, and GD at 0.012 ppm

VX at 0.007 ppm

AC at 2.85 ppm

CG at 2.28 ppm

CL at 4.12 ppm

Chlorine at 5.92 ppm

Hydrogen cyanide at 3.201 ppm

Phosgene at 9.36 ppm

HD, HN, and L at 0.005 ppm

Selectivity: Has a few noncritical interferents: high concentrations of Windex, spray 7, gasoline, and floor wax

PHYSICAL PARAMETERS

Size: 41 cm x 51 cm x 13 cm (16 in x 20 in x 5 in)

Weight: 12 kg (26.4 lb)

Power Requirements: ac powered

LOGISTICAL PARAMETERS

Durability: Must remain stationary

Environmental Considerations: -25 °C to 55 °C (-13 °F to 131 °F)

Shelf Life: 1 yr to 2 yr

Consumables: Drying filters and backflush filters

Calibration Requirements: None

Repairs: Annual filter replacement

Repair Options: Not specified

Maintenance Costs: \$2K annually

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: 2 h to 4 h of training

Training Available: Off or on-site training available for additional fee

Manuals Available: User manual

Support Equipment: None

Communications Capability: Command control communications, computer (control), computer interface, networking capability, and hardwire capability

Tamper Resistance: Password protection capable

Warranty: 1 yr factory warranty standard

Testing Information: Tested under the Edgewood SBCCOM Domestic Preparedness Program 2002

Applicable Regulations: German Military Standard BV 0430 & BV 0440

Environmental testing VG 95332 & VG 95373

The RAID-S contains a radioactive source licensed for use by the U.S. NRC

GENERAL

AirSentry-IMS® Ambient Air Analyzer

Particle Measuring Systems
 5475 Airport Blvd
 Boulder, Colorado 80301
 303-546-7331 (Fax)
 Rich Witte, Account Manager
 303-944-1565 (Tel)
 rwitte@pmeasuring.com
 Steven Rowley, Product Line Manager
 303-443-7100 (Tel)
 srowley@pmeasuring.com
Information Source:
<http://www.pmeasuring.com/molecular>

Status: Vendor response—11/21/2006



Portability: Fixed-Site Detection

Technology: Ion Mobility Spectrometry

Unit Cost: \$22K to 48K, depending on accessories and options

Availability: Commercially available (90 d)

Description: Ion Mobility Spectrometry

Type: Commercial

Current Users: Exxon, Shell, BP, Marathon, Univen, Amoco, DuPont, Dow, Air Products, Air Liquide, Alcoa, BOC, ISK Biosciences, Samsung, Micron, TSMC, Symbios Logic, Atmel, UMC, Intel, Hyundai, LSI, Cypress, SVG, AMD, SMIC, Lucent, Maxtor, Motorola, ST Micro, IBM, Ames Laboratory, NOAA, CDC/NIOSH, Underwriters Labs, and USEPA

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Chlorine, fluorine, hydrogen bromide, hydrogen chloride, hydrogen cyanide, hydrogen fluoride, and phosgene
- **Medium Priority:** Methyl bromide and nitrogen dioxide
- **Low Priority:** Bromine, dimethyl sulfate, hydrogen iodide, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: >30 min	Detection State: Vapor
Response Time: Between 60 s and 2 min	Alarms: Auto alarm
Sensitivity: Sub-ppb to percent concentration levels	Selectivity: In general, few interferences, but depends on gas and application

PHYSICAL PARAMETERS

Size: 51 cm x 51 cm x 23 cm (20 in x 20 in x 9 in) w,d,h	Weight: 20.5 kg to 38.5 kg (45 lb to 85 lb)
Power Requirements: 115 V ac or 230 V ac, 50 Hz to 60 Hz	

LOGISTICAL PARAMETERS

Durability: Dependable, unattended operation in harsh or hazardous conditions

Environmental Considerations: -40 °C to 50 °C (-40 °F to 122 °F); 0 % to 100 % rh

Shelf Life: Indefinite shelf life, but consumables should be replaced

Consumables: No reagents, paper tape, or expensive consumables

Calibration Requirements: Equipment comes calibrated from factory; can be supplied with on-board calibration (OBC). Calibration takes approximately 10 min, once every 6 mo.

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: \$15 to \$400 per year, depending on application

SPECIAL REQUIREMENTS

Operator Skills: Basic

Training Required: Typically 3 h, including maintenance and troubleshooting

Training Available: Optional with purchase

Manuals Available: User Manual, includes minor troubleshooting, maintenance, and operation

Support Equipment: Optional support equipment includes onboard calibration, purge system, and multi-point sampling

Communications Capability: Digital display, 4 mA to 20 mA loop, 2 alarm relay, 1 fault relay, and RS-232 with MODBUS protocol

Tamper Resistance: Can be locked out and password protected

Warranty: 1 yr parts and labor

Testing Information: Well characterized by customers

Applicable Regulations: CE and Atex Certified

GENERAL

Advanced Portable Detector (APD) 2000

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: Call for current pricing

Availability: Commercially available

Description: Ion Mobility Spectrometry

Type: Commercial

Current Users: FBI, Capitol police, U.S. EPA, state and local police, fire, and emergency response teams

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, and L, pepper spray, and mace

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 3 min to 4 min	Detection State: Vapor
Response Time: Less than 30 s	Alarms: Audible and visual alarm
Sensitivity: G at 0.015 ppm VX at 0.004 ppm HD and HN at 0.300 ppm L at 0.200 ppm	Selectivity: Low incidence of false alarms. Simultaneous detection of nerve and blister agents.

PHYSICAL PARAMETERS

Size: 9.9 cm x 8.9 cm x 28 cm (3.9 in x 3.5 in x 11 in)

Weight: 2.7 kg (6 lb) including batteries

Power Requirements: 6 standard or rechargeable C type batteries, ac operation, or 9 V dc to 18 V dc

LOGISTICAL PARAMETERS

Durability: ABS plastic casing

Environmental Considerations: -30 °C to 52 °C (-22 °F to 126 °F) operating temperature; -62 °C to 71 °C (-80 °F to 160 °F) storage temperature

Shelf Life: Not specified

Consumables: Batteries, nozzle filters, and confidence tester

Calibration Requirements: Autocalibration

Repairs: 5 min per 24 h of continuous operation

Repair Options: APD 2000 turn around time 10 d, include shipping (cost includes one way shipping); 3 or 4 loaners are on hand—can accommodate customer. Phone technical service is during normal business hours.

Maintenance Costs: Contact manufacturer for current pricing

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Training Required: Formal

Training Available: Training CD

Manuals Available: User manual

Support Equipment: Not specified

Communications Capability: RS-232C, data logging, software/detection upgrades, and RF transmitter module

Tamper Resistance: Not specified

Warranty: 1 yr

Testing Information: Testing of APD2000 has been tested by the US Army Edgewood Chemical and Biological Center (ECBE) Domestic Preparedness Test Program

Applicable Regulations: NRC and applicable local regulations must be followed for storage, shipment, and disposal. NRC regulations include licensing and tracking of radiation source and annual wipe-test.

GENERAL

Centurion

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>

Status: Vendor response—11/17/2006



Portability: Fixed-Site Detection

Technology: Ion Mobility Spectrometry

Unit Cost: Call manufacturer for current pricing

Availability: Commercially available

Description: Ion Mobility Spectrometry

Type: Commercial

Current Users: Local, state and federal government, and commercial entities

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, Vx, HD, and HN3

TICS Detected:

- **High Priority:** Chlorine, hydrogen chloride, nitric acid, sulfur dioxide, hydrogen cyanide, phosgene, ammonia, ethylene oxide, formaldehyde, hydrogen fluoride, and hydrogen sulfide
- **Medium Priority:** Programmable
- **Low Priority:** Programmable

Start-up Time: 20 min to 30 min	Detection State: Vapor
Response Time: 5 s to 10 s (response time for all TICS is <30 s)	Alarms: Software for multiple alarm capability
Sensitivity: Call manufacturer for details	Selectivity: Very low incidence of false alarms (algorithms)

PHYSICAL PARAMETERS

Size: Detector—46 cm x 41 cm x 289 cm (18 in x 16 in x 11 in)

Air purification/pump box—51 cm x 33 cm x 51 cm (20 in x 13 in x 20 in)

Weight: Detector—14.1 kg (31 lb)

Power Requirements: 110 V ac to 220 V ac

LOGISTICAL PARAMETERS

Must remain stationary.

Environmental Considerations: 10 °C to 40 °C (50 °F to 104 °F); <95% rh

Shelf Life: Not specified

Consumables: LLAPU refill kit (nonindicating drierite, drierite/charcoal indicating bottle) every 4 mo to 6 mo

Pump module assembly every 2 yr (two pumps provided)

Negative calibrant (4-nitrobenzotrile, 98 %) every 5 yr

Positive calibrant (nicotnamide, 98 %) every 5 yr

Calibration Requirements: Autocalibrating

Repairs: As needed

Repair Options: Please provide details of the locations and quantity of units under consideration for loaner availability. Turn around time is typically 5 d for depot repair. Field technical service is available, as is 24/7 phone technical support.

Maintenance Costs: Contact manufacturer for current pricing

SPECIAL REQUIREMENTS

Operator Skills: No special skills required

Training Required: Recommended

Training Available: Yes, included in price of equipment

Manuals Available: Owners manual

Support Equipment: Control computer

Communications Capability: RS485 interface and ethernet available

Tamper Resistance: Password protected, factory password for selectivity/sensitivity settings

Warranty: 1 yr

Testing Information: Tested at ECBC and other government labs

Applicable Regulations: Contains a radioactive source licensed for use by the U.S. NRC. NRC and applicable local regulations must be followed for storage, shipment, and disposal. NRC regulations include licensing and tracking of radiation source and annual wipe-test.

GENERAL

Chemical Agent Monitor (CAM-2)

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>
 Chemical Detection Equipment Market Survey for
 Emergency Responders, September 23, 1998 (SBCCOM)

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: Contact manufacturer for current pricing

Availability: Commercially available

Description: Ion Mobility Spectrometry

Type: Commercial

Current Users: The CAM is in service with 31 countries (~62K units in service) including Australia, Bahrain, Belgium, Canada, Denmark, Italy, Netherlands, Norway, Spain, Sweden, Turkey, U.K., U.S., and some Middle Eastern countries

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF VX, L, and HN

TICS Detected:

- **High Priority:** Phosgene and Chlorine
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Approximately 1 min

Detection State: Vapor

Response Time: 30 s to 1 min

Alarms: Audible and visual alarm

Sensitivity: Meets Mil-Specs. Contact manufacturer for details.

Selectivity: May false alarm when used in enclosed spaces or when sampling near strong vapor sources (i.e., in dense smoke). Some vapors known to give false readings are aromatic vapors, cleaning compounds, smoke, fumes, and some wood preservatives.

PHYSICAL PARAMETERS

Size: 39 cm x 15 cm x 7.6 cm (15.5 in x 6 in x 3 in)

Weight: 1.8 kg (4 lb) with battery

Power Requirements: Operates on 1 internal 6 V lithium-sulfur dioxide battery (6 h to 8 h of operation)

LOGISTICAL PARAMETERS

Durability: Mil-Spec

Environmental Considerations: -25 °C to 45 °C (-13 °F to 113 °F) operating temperature; -55 °C to 70 °C (-67 °F to 158 °F) storage temperature

Shelf Life: 5 yr

Consumables: BA-5800/U batteries and filters

Calibration Requirements: None

Repairs: Weekly preventative maintenance checks and services are required to maintain the operational readiness of the ICAM. Internal ICAM sieve pack and 1 nut and screw needs to be replaced every 400 h of operation. Other repairs by manufacturer.

Repair Options: Loaner option is not available. Turn around time is typically 14 d to 21 d for depot repair. Field tech support is available, and phone tech support is during business hours.

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)	Training Required: Formal
Training Available: Yes, included in price of equipment	Manuals Available: User manual
Support Equipment: None	Communications Capability: Not specified
Tamper Resistance: None	Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Contains a radioactive source licensed for use by the NRC. NRC and applicable local regulations must be followed for storage, shipment, and disposal. NRC regulations include licensing and tracking of radiation source and annual wipe-test. Meets Mil-Spec.

GENERAL

GID-2A™ Chemical Warfare Agent Detection System

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>

Status: Vendor response—11/17/2006



Technology: Detector

Portability: Fixed-Site Detection

Unit Cost: Contact manufacturer for current pricing

Availability: Commercially available

Description: Designed for maritime operations

Type: Military and commercial

Current Users: U.K. Ministry of Defense and other NATO nations

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Chlorine, hydrogen cyanide, and phosgene. Call for list of programmable chemicals.
- **Medium Priority:** Call for list of programmable chemicals
- **Low Priority:** Call for list of programmable chemicals

Start-up Time: <5 min from stand-by mode.

Detection State: Vapor and aerosol

Response Time: <1 s

Alarms: Audible and visual alarm

Sensitivity: Meets Mil-Specs

Selectivity: <5 % false positive rate

PHYSICAL PARAMETERS

Size: 22 cm x 56 cm x 28 cm (8.5 in x 22 in x 11 in)

Weight: 16.8 kg (37 lb)

Power Requirements: Powered by ac

LOGISTICAL PARAMETERS

Environmental Considerations: Designed to operate in a wide range of environmental conditions 10 °C to 55 °C (50 °F to 131 °F at 5 % to 95 %)

Shelf Life: Greater than 10 yr

Consumables: None

Calibration Requirements: Self calibrating

Repairs: Designed to operate continuously for 1 yr without maintenance activity (new sieve required ~1 time each year of operation)

Repair Options: Loaner is not available, turn around time is about 1 wk (could include shipping); can be accommodating, especially on warranty. \$295 for assessment charge if not under warranty, and increases time for repair (about 1 wk). No field service reps. Although equipment is not our principal product of concern, we may be able to provide on-site service for these units. Please provide details of the locations and quantity of units under consideration. Phone technical service is during normal business hours.

Maintenance Costs: Contact manufacturer for current pricing

SPECIAL REQUIREMENTS

Operator Skills: None

Training Required: Operator training can commonly be completed within 2 h

Training Available: Yes

Manuals Available: Operator manual available

Support Equipment: None

Communications Capability: A RS-485 cable port allows unit to be connected to a network

Tamper Resistance: None

Warranty: 1 yr

Testing Information: Live agent testing was conducted by U.K. MoD

Applicable Regulations: Item contains a low powered radioactive source. Unit is distributed under manufacturer's general NRC license. NRC regulations include licensing and tracking of radiation source and annual wipe-test.

GENERAL

GID-3™, Chemical Agent Detection System

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: SBCCOM
<http://www.smithsdetection.com>

Status: Vendor response—11/17/2006



Portability: Fixed-Site Detection

Technology: Ion Mobility Spectrometry

Unit Cost: Contact manufacturer for current pricing

Availability: Commercially available

Description: Ion Mobility Spectrometry

Type: Commercial and military

Current Users: U.S., DoD, U.K., MoD, Canadian DND, Australian army, USMC CBIRF team, and militaries of other nations, including the Middle East

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Chlorine, hydrogen cyanide, and phosgene. Call for list of programmable chemicals.
- **Medium Priority:** Call for list of programmable chemicals
- **Low Priority:** Call for list of programmable chemicals

Start-up Time: <3 min

Detection State: Vapor and aerosol

Response Time: <3 s

Alarms: Audible and visual alarm

Sensitivity: Meets Mil-Specs

Selectivity: <5 % false positive rate

PHYSICAL PARAMETERS

Size: 17 cm x 18 cm x 28 cm (6.5 in x 7 in x 11 in)

Weight: 4.8 kg (10.6 lb)

Power Requirements: Lithium sulfur dioxide military batteries, NiCad rechargeable batteries, and main power supply options

LOGISTICAL PARAMETERS

Durability: Ruggedized to full military standards

Tested in extreme environments

Environmental Considerations: -6 °C to 50 °C (22 °F to 122 °F) at 5 % to 100 % rh operating temperature

-40 °C to 70 °C (-40 °F to 158 °F) at 5 % to 100 % rh storage temperature

Shelf Life: Greater than 10 yr

Consumables: Batteries and protective caps

Calibration Requirements: None

Repairs: Service recommended approximately every 1500 h of operation

Repair Options: Loaner is not available, turn around time is about 1 wk (could include shipping); can be accommodating, especially on warranty. \$295 for assessment charge if not under warranty, and increases time for repair (about 1 wk). No field service reps. Although equipment is not our principal product of concern, we may be able to provide on-site service for these units. Please provide details of the locations and quantity of units under consideration. Phone technical service is during normal business hours.

Maintenance Costs: Contact manufacturer for current pricing

SPECIAL REQUIREMENTS

Training Required: Operator training can commonly be completed within 2 h

Training Available: Yes

Manuals Available: Operation and maintenance manuals and training documentation

Support Equipment: None

Communications Capability: Communications port provides a data output in a RS-232 format

Tamper Resistance: Internal core is tamper proof

Warranty: 1 yr

Testing Information: Contact manufacturer for testing information

Applicable Regulations: The GID-3 contains a radioactive source licensed for use by the U.S. NRC. NRC and applicable local regulations must be followed for storage, shipment, and disposal. NRC regulations include licensing and tracking of radiation source and annual wipe test.

GENERAL

GID-3 (24/7) Chemical Warfare Agent Detection System

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>
Status: Vendor response—11/17/2006



Portability: Fixed-Site Detection

Technology: Ion Mobility Spectrometry

Unit Cost: Contact manufacturer for current pricing

Availability: Commercially available

Description: Ion Mobility Spectrometry

Type: Commercial and military

Current Users: DOE and commercial users

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, L, CG, and AC

TICS Detected:

- **High Priority:** Chlorine and phosgene
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: <3 min	Detection State: Vapor
Response Time: <3 s	Alarms: Signals computer control
Sensitivity: Meets Mil-Specs	Selectivity: <5 % false positive rate

PHYSICAL PARAMETERS

Size: 65 cm x 45 cm x 24.9 cm (25.6 in x 17.7 in x 9.8 in)	Weight: 29.9 kg (66 lb)
Power Requirements: 115 V (60 Hz), 230 V (50 Hz), ac	

LOGISTICAL PARAMETERS

Environmental Considerations: -6 °C to 50 °C (22 °F to 122 °F) at 5 % to 100 % rh operating temperature; 4 °C to 70 °C (40 °F to 158 °F) at 5 % to 100 % rh storage temperature

Repairs: Designed to run continuously for a minimum of 2 yr without maintenance

Repair Options: Loaner is not available, turn around time is about 1 wk (could include shipping); can be accommodating, especially on warranty. \$295 for assessment charge if not under warranty, and increases time for repair (about 1 wk). No field service reps. Although equipment is not our principal product of concern, we may be able to provide on-site service for these units. Please provide details of the locations and quantity of units under consideration. Phone technical service is during normal business hours.

Maintenance Costs: Not specified	Shelf Life: Not specified
Consumables: Sieve packs and pumps every 2 yr	Calibration Requirements: Auto calibration

SPECIAL REQUIREMENTS

Operator Skills: No special skills required	Training Required: Recommended
Training Available: Included in price of equipment	Manuals Available: Owners manual
Support Equipment: None	Tamper Resistance: Yes
Warranty: 1 yr	

Communications Capability: Network capable, RS-232 data port, and ethernet

Testing Information: Contact manufacturer for testing information

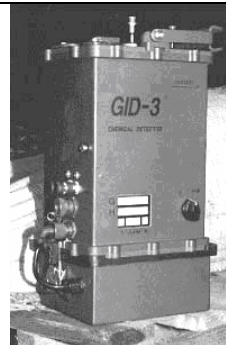
Applicable Regulations: The GID-3 contains a radioactive source licensed for use by the U.S. NRC. NRC and applicable local regulations must be followed for storage, shipment, and disposal. NRC regulations include licensing and tracking of radiation source and annual wipe test. Mil-Spec detector.

GENERAL

ACADA

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>
 Chemical Detection Equipment Market Survey for
 Emergency Responders, September 23, 1998 (SBCCOM)

Status: Vendor response—11/17/2006



Portability: Fixed-Site Detection

Unit Cost: Contact manufacturer for pricing information

Availability: Commercially available as GID-3

Description: Ion Mobility Spectrometry

Type: Military

Current Users: U.S. Armed Forces

Technology: Ion Mobility Spectrometry

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Chlorine, hydrogen cyanide, and phosgene
- Call for list of programmable chemicals
- **Medium Priority:** Call for list of programmable chemicals
- **Low Priority:** Call for list of programmable chemicals

Start-up Time: <3 min

Detection State: Vapor and aerosol

Response Time: <3 s

Alarms: Audible and visual alarm

Sensitivity: Meets military requirements

Selectivity: <5 % false positive rate

PHYSICAL PARAMETERS

Size: 16.5 cm x 17.8 cm x 27.9 cm (6.5 in x 7 in x 11 in)

Weight: 4.8 kg (10.6 lb)

Power Requirements: Lithium sulfur dioxide military batteries, NiCad rechargeable batteries, and main power supply options

LOGISTICAL PARAMETERS

Durability: Ruggedized to military standards

Tested in extreme environments

Environmental Considerations: -6 °C to 50 °C (22 °F to 122 °F) at 5 % to 100 % rh (operating temperature); -40 °C to 70 °C (-40 °F to 158) °F at 5 % to 100 % rh (storage temperature)

Shelf Life: Greater than 10 yr

Consumables: Batteries and protective caps

Calibration Requirements: None

Repairs: Service recommended every 1500 h of operation

Repair Options: No loaner available, turn around time is about a week (could include shipping); can be accommodating, especially on warranty. \$295 for assessment charge if not under warranty, and increases time for repair (about 1 wk). No field service reps. Although not our principal product of concern, we may be able to provide on-site service for these units. Provide details of the locations and quantity of units under consideration. Phone technical service is during normal business hours.

Maintenance Costs: Subject to level of use, however commonly below 20 % of purchase cost for the life-time of the equipment

SPECIAL REQUIREMENTS

Operator Skills: Basic

Training Required: Operator training can commonly be completed within 2 h

Training Available: Yes

Manuals Available: Operation and maintenance manuals; training documentation

Support Equipment: None

Communications Capability: Communications port provides a data output in a RS-232 format

Tamper Resistance: Internal core is tamper proof

Warranty: 1 yr

Testing Information: Contact manufacturer for testing information

Applicable Regulations: Contains a radioactive source licensed for use by the U.S. Nuclear Regulatory Commission (NRC). NRC and applicable local regulations must be followed for storage, shipment, and disposal. NRC regulations include licensing and tracking of radiation source and annual wipe test.

GENERAL

M90-D1-C Chemical Warfare Agent Detector

Envionics USA Inc.
4401 Eastport Parkway
Port Orange, Florida 32127
Sales Office
386-304-5252 (Tel)
386-304-5251 (Fax)

Information Source: <http://www.envionicsusa.com>
Chemical Detection Equipment Market Survey for
Emergency Responders, September 23, 1998 (SBCCOM)
ECBC Domestic Preparedness Test Report: Evaluation of
M90-D1-C CWA Detector December 2000

Status: Vendor response—11/15/2006



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: \$17.5K with a standard accessory kit or GSA schedule

Availability: Commercially available and GSA schedule

Description: Ion Mobility Spectrometry

Type: Military

Current Users: U.S. DOD, Finland, Norway, Japan, Italy, Saudi Arabia, Kuwait, Turkey, and Greece

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, AC and L

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Automatic start up time—5 min

Detection State: Vapor and aerosol

Response Time: Typically: <10 s for nerve; <60 s for blister

Alarms: Audible and visual alarm

Sensitivity: GB and GD at 0.001 ppm
VX at 0.001 ppm
HD at 0.005 to 0.03 ppm
L at 0.09 ppm

Selectivity: U.S. Army data show potential problems with high concentrations of gasoline/diesel exhausts. False alarm rate: <4%.

PHYSICAL PARAMETERS

Size: 30 cm x 10 cm x 28 cm (11.8 in x 4.1 in x 11 in)

Weight: 4.7 kg (10.34 lb)

Power Requirements: Can be powered by external power supply

Battery BA5598/U, 17 h life @ 21 °C (70 °F), one required

dc batteries—NiCad (8 h) MB

Vehicle power—standard cigarette lighter

ac power—110 V to 220 V

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: -30 °C to 55 °C (-22 °F to +131 °F) (operating temperature); -40 °C to 70 °C (-40 °F to +158 °F) (storage temperature)

Shelf Life: Not specified

Consumables: Batteries, external micro filter, inside filter, and test sample kit

Calibration Requirements: None

Repairs: Replace internal dust filter and external dust filter as required. Replace semiconductor cell after every 3000 h.

Repair Options: Flexible policy; overnight mail (24 h turn-around time); loaner possible; 24/7 tech support. Service contract with different options (extended warranty or maintenance contract). Tailored to support customer requirements.

Maintenance Costs: Minimal

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training)

Training Required: Formal

Training Available: Yes

Manuals Available: Yes

Support Equipment: Yes

Communications Capability: RS-232/RS-485/RS-422

Tamper Resistance: Not specified

Warranty: 1 yr

Testing Information: Tested by the U.S. Army ECBC

Applicable Regulations: Contains a radioactive source which is exempt by the U.S. NRC, which does not require licensing, tracking of radiation source or annual wipe test

GENERAL

Questor Continuous Multiple Chemical Agent Monitoring System

Abb Analytical
 843 North Jefferson St.
 Lewisburg, West Virginia 24901
 John Barnes
 304-647-1710 (Tel)
 304-647-1833 (Fax)
 john.barnes@us.abb.com
Information Source: <http://www.abb.com>

Status: Vendor response—11/1/2005



Portability: Fixed-Site Detection

Technology: Mass Spectrometry

Unit Cost: \$65K

Availability: Commercially available (120 d lead-time upon ordering)

Description: Mass Spectrometry

Type: Military and commercial

Current Users: New product

OPERATIONAL PARAMETERS

CAs Detected: Product will detect all known CAs

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified

Detection State: Gas, vapor, and aerosol

Response Time: Not specified

Alarms: Auto, visible, and audible alarm

Sensitivity: Less than 10 ppb

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 125 cm x 64 cm x 64 cm (49 in x 25 in x 25 in)

Weight: Not specified

Power Requirements: 115 V ac

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling (autocalibration)

Environmental Considerations: Maintain room temperature

Shelf Life: Not specified

Consumables: None

Calibration Requirements: Autocalibration

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: Factory training

Training Available: Yes

Manuals Available: User manual

Support Equipment: PC

Warranty: 1 yr

Tamper Resistance: Not specified

Testing Information: Not specified

Applicable Regulations: None

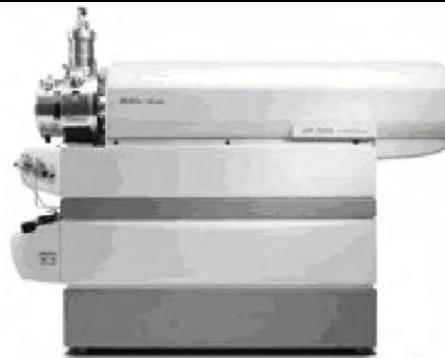
Communications Capability: Command control communications, computer (control), computer interface, intelligence standardization, interoperability, commonality, radio frequency (RF) communication, networking capability, hardware capability, and installed data processing equipment

GENERAL

API 3200™ LC/MS/MS System

Applied Biosystems/MDS Sciex
 71 Four Valley Drive
 Concord, Ontario, Canada L4K4V8
 Byron Kieser or Joe Analceto
 905-660-9005 (Tel)
 905-660-2605 (Fax)
 kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>

Status: Vendor response—11/14/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry with single quadrupole, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min	Detection State: Vapor, aerosol, and liquid
Response Time: >2 min	Alarms: None
Sensitivity: This detector has not been tested against CWAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.	Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferents.

PHYSICAL PARAMETERS

Size: 64 cm x 104 cm x 51 cm (25 in x 41 in x 20 in)	Weight: 111 kg (244 lb)
Power Requirements: 207 V ac to 242 V ac	

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 1 yr parts and labor

Testing Information: Not specified

Applicable Regulations: None

GENERAL

API 2000™ LC/MS/MS System

Applied Biosystems/MDS Sciex
71 Four Valley Drive
Concord, Ontario, Canada L4K4V8
Byron Kieser or Joe Analceto
905-660-9005 (Tel)
905-660-2605 (Fax)
kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>



Status: Vendor response—11/14/2005

Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry with triple quadrupole, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min

Detection State: Vapor, aerosol, and liquid

Response Time: >2 min

Alarms: None

Sensitivity: This detector has not been tested against CWAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.

Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferences.

PHYSICAL PARAMETERS

Size: 64 cm x 104 cm x 51 cm (25 in x 41 in x 20 in)

Weight: 111 kg (244 lb)

Power Requirements: 207 V ac to 242 V ac

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 90 d parts and labor

Testing Information: Not specified

Applicable Regulations: None

GENERAL

API3000™ LC/MS/MS System

Applied Biosystems/MDS Sciex
71 Four Valley Drive
Concord, Ontario, Canada L4K4V8
Byron Kieser or Joe Analceto
905-660-9005 (Tel)
905-660-2605 (Fax)
kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>



Status: Vendor response—11/14/2005

Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry with triple quadrupole, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min

Detection State: Vapor, aerosol, and liquid

Response Time: >2 min

Alarms: None

Sensitivity: This detector has not been tested against CAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.

Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferences.

PHYSICAL PARAMETERS

Size: 56 cm x 135 cm x 51 cm (22 in x 53 in x 20 in)

Weight: 136 kg (300 lb)

Power Requirements: 207 V ac to 242 V ac

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 90 d parts and labor

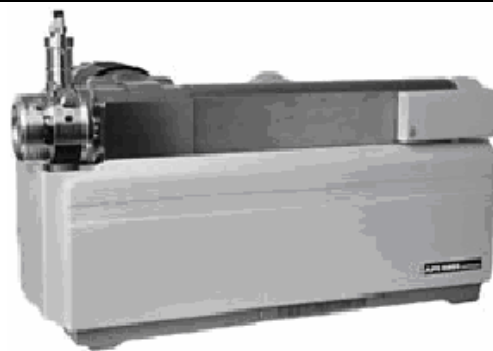
Testing Information: Not specified

Applicable Regulations: None

GENERAL

API4000™ LC/MS/MS System

Applied Biosystems/MDS Sciex
 71 Four Valley Drive
 Concord, Ontario, Canada L4K4V8
 Byron Kieser or Joe Analceto
 905-660-9005 (Tel)
 905-660-2605 (Fax)
 kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>



Status: Vendor response—11/14/2005

Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry with triple quadrupole, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min

Detection State: Vapor, aerosol, and liquid

Response Time: >2 min

Alarms: None

Sensitivity: This detector has not been tested against CAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.

Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferences.

PHYSICAL PARAMETERS

Size: 56 cm x 135 cm x 518 cm (22 in x 53 in x 20 in)

Weight: 136 kg (300 lb)

Power Requirements: 207 V ac to 242 V ac

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 90 d parts and labor

Testing Information: Not specified

Applicable Regulations: None

GENERAL

OSTAR® XL Hybrid LC/MS/MS System

Applied Biosystems/MDS Sciex
 71 Four Valley Drive
 Concord, Ontario, Canada L4K4V8
 Byron Kieser or Joe Analceto
 905-660-9005 (Tel)
 905-660-2605 (Fax)
 kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>

Status: Vendor response—11/14/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry—hybrid quadruple time-of-flight, liquid inlet, atmospheric pressure ionization, optional MALDI ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min	Detection State: Vapor, aerosol, and liquid
Response Time: >2 min	Alarms: None
Sensitivity: This detector has not been tested against CAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.	Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferents.

PHYSICAL PARAMETERS

Size: 137 cm x 165 cm x 79 cm x (54 in x 65 in x 31 in)	Weight: 591 kg (1302 lb)
Power Requirements: 207 V ac to 242 V ac	

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Kit includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 1 yr parts and labor

Testing Information: Not specified

Applicable Regulations: None

GENERAL

3200 OTRAP® LC/MS/MS System

Applied Biosystems/MDS Sciex
71 Four Valley Drive
Concord, Ontario, Canada L4K4V8
Byron Kieser or Joe Analceto
905-660-9005 (Tel)
905-660-2605 (Fax)
kieserbn@sciex.com
Information Source: <http://www.sciex.com>
<http://www.appliedbiosystems.com>

Status: Vendor response—11/14/2005



Portability: Fixed-Site Analytical Laboratory

Technology: Mass Spectrometry

Unit Cost: Not specified

Availability: Commercially available (2 wk to 8 wk)

Description: Mass Spectrometry—hybrid linear ion trap/triple quadruple, liquid inlet, atmospheric pressure ionization

Type: Commercial

Current Users: All major pharmaceutical companies, many universities, and environmental labs

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Between 5 min and 30 min

Detection State: Vapor, aerosol, and liquid

Response Time: >2 min

Alarms: None

Sensitivity: This detector has not been tested against CAs or TIMs, however, analytical equipment of this type should be able to detect all chemical agents with a molecular weight above 50 that can be dissolved in a solvent.

Selectivity: Detector is sensitive to all compounds. Used in conjunction with LC, detector is selective. Mass filter may be used to eliminate all interferents.

PHYSICAL PARAMETERS

Size: 64 cm x 104 cm x 51 cm (25 in x 41 in x 20 in)

Weight: 111 kg (244 lb)

Power Requirements: 207 V ac to 242 V ac

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling

Environmental Considerations: Operation is restricted to certain environments (climate controlled—20 % to 80 % rh; temperature regulated)

Shelf Life: Indefinite; long-term storage may increase set-up time but should not affect operation

Consumables: Compressed gases including compressed air, UHP air, and UHP nitrogen

Calibration Requirements: Yes—autocalibration desirable monthly

Repairs: Preventative maintenance is available. Rough pump oil, seals, and other parts may be replaced at the discretion of the service engineer.

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Operator training required. At least one experienced Mass Spectrometrists should be available to support users; users typically have college degrees in science, chemistry, physics, or biology.

Training Required: Formal (approximately 1 wk)

Training Available: A variety of courses, from basic MS to advanced operator training is available

Manuals Available: Operator manuals, software manuals, and maintenance manuals are all available in electronic format

Support Equipment: Includes all necessary equipment (instrument and pumps)

Communications Capability: Computer (control), computer interface, networking capability, and installed data processing equipment

Tamper Resistance: Cannot be opened without tools. Software prevents unauthorized access to instrument functions and data.

Warranty: 1 yr parts and labor

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Chemical Biological Mass Spectrometer (CBMS)

Bruker Daltonics, Inc.
 40 Manning Road
 Billerica, Massachusetts 01821
 Brian Turk
 978- 663-3660, ext. 1333 (Tel)
 978- 667-5993 (Fax)
 jbt@bdal.com
Information Source: <http://www.bdal.com>

Status: Vendor response—11/1/2005



Portability: Vehicle Mounted

Technology: Mass Spectrometry

Unit Cost: GSA—\$240K for the base unit

Availability: Commercially available (3 mo to 6 mo)

Description: Mass Spectrometry—Ion Trap MS/MS; Pyrolysis Mass Spectrometry

Type: Military and commercial

Current Users: U.S. Army, Canada customs, Berlin, Germany LKA, and South Korean ADD

OPERATIONAL PARAMETERS

CAs Detected: GB, GD, VX, HD, and L

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

BAs Detected: All (classification of spores, toxins, and cells)

Start-up Time: <20 min	Detection State: Vapor (CWA) and liquid/aerosol (biological)
Response Time: <1 min for chemical agents 3 min for biological agents	Alarms: Audible, visual, and auto alarm
Sensitivity: GB at 0.007 ppm GD at 0.006 ppm VX at 0.002 ppm HD at 0.01 ppm L at 0.16 ppm	Selectivity: Mass spectrometry is highly selective. The ability to further perform MS/MS analysis when a compound is detected to confirm the detection virtually eliminates all false positive and negative alarms.

PHYSICAL PARAMETERS

Size: 65 cm x 47 cm x 35 cm (25.5 in x 18.5 in x 13.8 in) **Weight:** 21.8 kg (48 lb)

Power Requirements: Vehicle or ac powered

LOGISTICAL PARAMETERS

Durability: The CBMS is designed to meet the requirements of Military Standard 810E. Able to operate with rough handling.

Environmental Considerations: The CBMS is designed to meet the requirements of Military Standard 810E. Operates in all environments and extreme temperature conditions.

Shelf Life: Highly sophisticated MS that requires start up and operation monthly to keep at peak operating performance

Consumables: Pyrolysis tubes

Calibration Requirements: System automatically performs self-test when turned on. An autotune is performed automatically when needed.

Repairs: Tuning required depending upon usage. Operator should run system monthly.

Repair Options: Not specified

Maintenance Costs: \$5K to \$30K annually depending upon usage

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: One day of initial operator training and monthly operations training required

Training Available: Off or on-site training available for additional fee

Manuals Available: A technical manual for operation and maintenance of the CBMS is available

Support Equipment: None

Communications Capability: Command control communications, computer (control), and computer interface

Tamper Resistance: The CBMS can be set up with password protection

Warranty: 1 yr factory warranty

Testing Information: Extensive testing conducted by the U.S. Army after the DOD funded research and development program was completed and during acceptance of every CBMS during production contracts

Applicable Regulations: Tested to all applicable U.S. Army MIL-STDs

GENERAL

VX500 Photo Ionization Detector

Industrial Scientific Corporation
 1001 Oakdale Road
 Oakdale, Pennsylvania 15071-1500
 Bill Smith
 800-352-3169 (Tel)
 412-788-8353 (Fax)
 bsmith@indsci.com
Information Source: <http://www.indsci.com>
Status: Vendor response—4/1/2006



Technology: Photoionization

Portability: Handheld Portable

Unit Cost: Not specified

Availability: Commercially available

Description: Photoionization

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Carbon disulfide, ethylene oxide, formaldehyde, and phosgene
- **Medium Priority:** Acrolein, acrylonitrile, allyl alcohol, allylamine, 1,2-dimethylhydrazine, ethylene dibromide, methyl bromide, methyl chloroformate, methyl hydrazine, methyl isocyanate, methyl mercaptan, and stibine
- **Low Priority:** Chloroacetaldehyde, crotonaldehyde, ethyleneimine, and tetramethyl lead

Start-up Time: Not specified

Detection State: Not specified

Response Time: Not specified

Alarms: Audible and visual alarm

Sensitivity: 0 ppm to 5000 ppm

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 25 cm x 7.4 cm x 4.8 cm (10 in x 2.9 in x 1.9 in)

Weight: 726 g (25.6 oz)

Power Requirements: Lithium-ion rechargeable battery (up to 18 h run time) or replaceable alkaline batteries (up to 7 h of continuous monitoring)

LOGISTICAL PARAMETERS

Environmental Considerations: -10 °C to 40 °C (14 °F to 104 °F); 0 % to 90% rh (noncondensing)

Consumables: Field replaceable, plug-in detectors, interchangeable 10.6 eV or 11.7 eV lamps, and batteries

Calibration Requirements: Single button, automated calibration

Repair Options: Rental program (decision made by sales person). Sometimes will get loaners; customer and urgency dependent. There is a rental price list available. Turn around time 10 d (depends of customer and urgency). Telephone technical service is 24/7, 365 d/yr. Field representatives are available.

Shelf Life: Not specified

Repairs: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Minimal

Training Required: No

Training Available: Yes

Manuals Available: Yes

Support Equipment: Yes

Communications Capability: Yes

Tamper Resistance: Security access code protection of all calibration and alarm setting, time-delay on/off

Applicable Regulations: UL, cUL—Class I, Groups A,B,C,D; CENELEC (ATEX) and Australia—Eex ia IIC T4

Testing Information: Not specified

Warranty: Lifetime

GENERAL

TLV Panther Gas Detector

International Sensor Technology
 3 Whatney
 Irvine, California 92618-2824
 Jeff Lowe
 949-452-9000 (Tel)
 949-452-9009 (Fax)
 jeff.lowe@intsensor.com
Information Source: <http://www.intsensor.com>



Status: Vendor response—11/17/2006

Portability: Handheld Portable

Unit Cost: \$3.5K

Availability: Commercially available

Description: Photoionization

Type: Commercial

Current Users: Not specified

Technology: Photoionization

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, ethylene oxide, and hydrogen sulfide
- **Medium Priority:** Methyl bromide and phosphine
- **Low Priority:** None

Start-up Time: 1 min	Detection State: Vapor
Response Time: <20 s	Alarms: Audible and visual alarm
Sensitivity: Ammonia at 2400 ppm Ethylene oxide at 260 ppm Hydrogen sulfide at 70 ppm Methyl bromide at 35 ppm Phosphine at 60 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 239 cm x 11 cm x 14 cm (9 in x 4.5 in x 5.4 in)	Weight: 2.7 kg (5.99 lb)
Power Requirements: Six D size alkaline or nickel cadmium batteries (14 h of operation)	

LOGISTICAL PARAMETERS

Durability: The TLV Panther is constructed of an aluminum housing	Environmental Considerations: 0 °C to 50 °C (32 °F to 122 °F) @ 0 % to 99 % rh operating temperature
Shelf Life: Not specified	Consumables: Not specified
Calibration Requirements: Yes (every 6 mo recommended)	Repair Options: International Sensor does not have loaner, turn around 1 wk to 2 wk. Panther may take up to 3 wk.
Maintenance Costs: None	Repairs: None

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)	Communications Capability: An RS-232 port allows data to be sent to a PC
Training Available: Yes	Training Required: Formal
Manuals Available: User manual	Support Equipment: None
Tamper Resistance: Password protected	Warranty: 1 yr electronics and 1 yr sensor
Testing Information: Not specified	Applicable Regulations: None

GENERAL

2020 Photoionization Monitor

Photovac, Inc.
176 Second Avenue
Waltham, Massachusetts 02451-1166
781-290-0777 (Tel)
781-290-4884 (Fax)
Information Source: <http://www.photovac.com>

Status: Vendor response—4/10/2006



Technology: Photoionization

Portability: Handheld Portable

Unit Cost: \$3.4K

Availability: Commercially available

Description: Photoionization

Type: Commercial

Current Users: Environmental consultants, industrial hygienists, remediation project managers, and government regulator agencies

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, arsine, carbon disulfide, ethylene oxide, hydrogen sulfide, and phosgene
- **Medium Priority:** Acrolein, acrylonitrile, allyl alcohol, and phosphine
- **Low Priority:** Not specified

Start-up Time: <1 min

Detection State: Vapor

Response Time: <3 s

Alarms: Audible and visual alarm

Sensitivity: Detects in the range of 0.5 ppm to 2000 ppm

Selectivity: Has many interferants (nonspecific)

PHYSICAL PARAMETERS

Size: 25 cm x 7.6 cm x 5.1 cm (10 in x 3 in x 2 in)

Weight: 0.8 kg (1.8 lb)

Power Requirements: 7.2 V field-replaceable NiCad or ac operation from charger

LOGISTICAL PARAMETERS

Durability: The Photovac 2020 is designed for outdoor use in rugged environments

Environmental Considerations: 0 °C to 41 °C (32 °F to 105 °F) operating temperature

Shelf Life: Not specified

Consumables: None

Repairs: None

Maintenance Costs: Less than \$100/yr

Calibration Requirements: Yes (vendor recommends every 8 h)

Repair Options: Loaner is not formal policy but is availability driven. Charge upfront, and refund when send back. There is a demo disclaimer form. 8:30 am to 5 pm EST. Instrument can be fixed and sent back within 1 wk. Voyager may have backorder of parts.

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Communications Capability: A RS-232 port allows data to be sent to a PC using Windows Hyperterminal

Training Required: Nonformal (read manual)

Training Available: Yes

Tamper Resistance: Password protected

Testing Information: Not specified

Warranty: 1 yr

Support Equipment: 10.6 eV lamp, 10 h rechargeable battery pack, 115 V ac adapter, Teflon sampling probe with spring relief, 10 fluoropore membrane filters, and adjustable wrist strap

GENERAL

MiniRAE 2000

RAE Systems, Inc.
3775 N 1st St
San Jose, California 95134
408-952-8200 (Tel)
408-952-8480 (Fax)
aleet@reasystems.com
Information Source: Chemical Detection Equipment
Market Survey for Emergency Responders, September 23,
1998 (SBCCOM)
Testing of Commercially Available Detectors Against
Chemical Warfare Agents: Summary Report, February 1999
(SBCCOM)



Status: Vendor response—4/9/2006

Portability: Handheld Portable

Technology: Photoionization

Unit Cost: \$3.3K

Availability: Commercially available

Description: Photoionization—portable VOC with 10.6 eV or 11.7 eV lamp

Type: Commercial,

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, HD, HN, L, and SA

TICS Detected:

- **High Priority:** Ammonia, arsine, CS₂, Cl₂, diborane, ethylene oxide, formaldehyde, H₂S, phosgene, and phosphorus trichloride
- **Medium Priority:** Acetone cyanohydrin, acrolein, acrylonitrile, allyl alcohol, allylamine, C₄H₅ClO₂, BBr₃, carbonyl sulfide, C₃H₅ClO, diketene, 1,2-dimethylhydrazine, C₂H₄Br₂, H₂Se, CH₃Br, methyl chloroformate, methyl chlorosilane, CH₆N₂, methyl isocyanate, methyl mercaptan, NO₂, phosphine, Cl₃OP, stibine, n-octyl mercaptan, and C₂Cl₄O
- **Low Priority:** Allyl isothiocyanate, ArCl₃, Br₂, BrCl, C₂H₃ClO, C₂H₂Cl₂O, C₄H₆O, C₂H₆O₄S, C₃H₅ClO₂, C₃H₅ClOS, ethyleneimine, C₅Cl₆, HI, iron pentacarbonyl, C₅H₉ClO₂, C₄H₇ClO₂, isopropyl isocyanate, n-butyl chloroformate, n-butyl isocyanate, NO, n-propyl chloroformate, CCl₄S, s-butyl chloroformate, s-butyl isocyanate, tetraethyl lead, TEPP, tetramethyl lead, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: 1 min

Detection State: Vapor

Response Time: <3 s for isobutylene

Alarms: Audible, visual, and optional vibration alarm

Sensitivity: GA at 0.5 ppm
HD at 0.26 ppm

Selectivity: PID is a broadband detector and will respond to many organic vapors

PHYSICAL PARAMETERS

Size: 21 cm x 7.6 cm x 5.1 cm (8.2 in x 3 in x 2 in)

Weight: 553 g (20 oz)

Power Requirements: Rechargeable, external, field replaceable NiMH battery pack. Alkaline battery holder (for 4 AA alkaline batteries). 10 h continuous operation.

LOGISTICAL PARAMETERS

Durability: Resistant to radio frequency interferences (RFI)

Environmental Considerations: -10 °C to 40 °C (14 °F to 104 °F) at 0 % to 95 % rh

Shelf Life: Not specified

Consumables: Calibrating gas and dust filters

Calibration Requirements: 2 point field calibration of zero and standard reference gas

Repairs: Yes

Repair Options: No loaner, but if equipment is sent back for repair, rental is available for 50 % off regular rental cost. Conservatively, turn around time is 3 wk, but for government, it is faster. Tech service is 9 am to 9 pm east coast time.
Maintenance Costs: 4 yr repair and replacement contract available for \$825

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Yes

Manuals Available: User manual

Support Equipment: 110 V ac adapter/charger and remote probe

Communications Capability: Data download to PC and parameter upload from PC. Wireless data transmission option available.

Tamper Resistance: Optional password protected calibration settings, alarm limits, and stored data

Warranty: Lifetime on unit exclusive of consumable parts; 3 yr on 10.6 eV lamp; 1 mo on 11.7 eV lamp; optional 4 yr warranty available.

Testing Information: The MiniRae Plus has been tested by the U.S. Army Edgewood Chemical and Biological Center (ECBC)

Applicable Regulations: None

GENERAL

ppbRae

RAE Systems Inc.
 3775 N 1st St
 San Jose, California 95134
 408-952-8200 (Tel)
 408-952-8480 (Fax)
 aleet@reasystems.com
Information Source: Rae Systems
Status: Vendor response—4/9/2006



Portability: Handheld Portable

Technology: Photoionization

Unit Cost: \$6.2K

Availability: Commercially available

Description: Photoionization—portable VOC with 10.6 eV lamp

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, HD, HN, L, and SA

TICS Detected:

- **High Priority:** Ammonia, arsine, carbon disulfide, hydrogen sulfide, ethylene oxide, and phosphorus trichloride
- **Medium Priority:** Acetone cyanohydrin, acrolein, allyl alcohol, allylamine, allyl chlorocarbonate, chloroacetone, diketene, 1,2-dimethylhydrazine, ethylene dibromide, hydrogen selenide, methyl bromide, methylhydrazine, methyl isocyanate, methyl mercaptan, nitrogen dioxide, phosphine, stibine, and n-octyl mercaptan
- **Low Priority:** Allyl isothiocyanate, bromine, chloroacetaldehyde, chloroacetyl chloride, crotonaldehyde, dimethyl sulfate, ethyl chlorothioformate, ethyleneimine, hexachlorocyclopentadiene, hydrogen iodide, iron pentacarbonyl, isobutyl chloroformate, isopropyl chloroformate, isopropyl isocyanate, n-butyl chloroformate, n-butyl isocyanate, nitric oxide, perchloromethyl mercaptan, s-butyl chloroformate, s-butyl isocyanate, tetraethyl lead, tetraethyl pyrophosphate, tetramethyl lead, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: 1 min	Detection State: Vapor
Response Time: <3 s for isobutylene	Alarms: Audible and visual alarm
Sensitivity: Detection range is 5 ppb to 199 ppm	Selectivity: PID is a broadband detector and will respond to many organic vapors

PHYSICAL PARAMETERS

Size: 21 cm x 7.6 cm x 5.1 cm (8.2 in x 3 in x 2 in)	Weight: 553 g (20 oz) with battery pack
Power Requirements: Rechargeable, external, field replaceable NiMH battery pack. Alkaline battery holder (for 4 AA alkaline batteries). 10 h of continuous operation.	

LOGISTICAL PARAMETERS

Durability: The ppbRAE is resistant to radio frequency interferences (RFI), rubber protective boot

Environmental Considerations: -20 °C to 45 °C (-4 °F to 113 °F) at 0 % to 95 % rh (noncondensing)

Shelf Life: Not specified

Consumables: Sensors, calibrating gas, lamp, and batteries

Calibration Requirements: 2 point field calibration of zero and standard reference gas

Repairs: Replacement of sensor and other maintenance as needed

Repair Options: No loaner, but if equipment is sent back for repair, rental is available for 50 % off regular rental cost. Conservatively, turn around time is 3 wk, but for government, it is faster. Tech service is 9 am to 9 pm east coast time.

Maintenance Costs: 4 yr repair and replacement contract available for \$1.3K

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Nonformal

Training Available: Yes

Manuals Available: User manual

Support Equipment: 110 V ac adapter/charger and remote probe

Communications Capability: Data download to PC and parameter upload from PC. Wireless data transmission option available.

Tamper Resistance: Optional password protected calibration settings, alarm limits, and stored data

Warranty: 1 yr on unit; 1 yr or 2 yr on electrochemical sensors; optional 4 yr warranty available

Testing Information: Testing of RAE Systems ppbRAE Volatile Organic Compound (VOC) Monitor Photo-Ionization Detector (PID) Against Chemical Warfare Agents Summary Report (SBCCOM, September 2001)

Applicable Regulations: None

GENERAL

TVA-1000B (FID or FID/PID) Toxic Vapor Analyzer

Thermo Fisher Scientific
 27 Forge Parkway
 Franklin, Massachusetts 02038
 866-282-0430 (Tel)
 508-520-0430 (Tel)
 508-520-1460 (Fax)
 donna.cohn@thermofisher.com
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)
 Testing of Commercially Available Detectors Against
 Chemical Warfare Agents: Summary Report, February 1999
 (SBCCOM)

Status: Limited vendor information



Technology: Flame Ionization

Portability: Handheld Stationary

Unit Cost: Not specified

Availability: Commercially available

Description: Flame Ionization or Flame Ionization/Photoionization

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GA and HD

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified	Detection State: Vapor and aerosol
Response Time: 3.5 s	Alarms: Not specified
Sensitivity: GA at 0.61 ppm HD at 0.29 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 34 cm x 25 cm x 8.1 cm (13.5 in x 10 in x 3.2 in)	Weight: 5.6 kg (12.3 lb)
Power Requirements: Rechargeable NiCad battery	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: Not specified
Shelf Life: Not specified	Consumables: Hydrogen source and rechargeable lithium NiCad battery
Calibration Requirements: Yes	Repairs: Not specified
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: Not specified	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Innova Type 1412 Multigas Monitor

California Analytical Instruments, Inc.
 1312 West Grove Avenue
 Orange, California 92865-4134
 Hal Peper
 714-974-5560 (Tel)
 714-921-2531 (Fax)
 hpeper@gasanalyzers.com
Information Source: <http://www.innova.dk>
 Chemical Detection Equipment Market Survey for
 Emergency Responders, September 23, 1998 (SBCCOM)



Status: Vendor response—11/17/2006

Portability: Handheld Stationary

Technology: PIR

Unit Cost: \$36K (base) plus Optical Filters

Availability: Commercially available

Description: Photoacoustic Infrared (PIR) Spectroscopy

Type: Commercial

Current Users: DTRA

OPERATIONAL PARAMETERS

CAs Detected: GB, VX, and HD

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: <30 min	Detection State: Vapor and aerosol
Response Time: <1 min	Alarms: Audible alarm
Sensitivity: GB in the 0.01 ppm to 1 ppm VX in the 0.01 ppm to 1.0 ppm HD in the 0.01 ppm to 1.0 ppm	Selectivity: Automatically compensates for interferences caused by environmental fluctuations

PHYSICAL PARAMETERS

Size: 18 cm x 40 cm x 30 cm (6.9 in x 15.6 in x 11.8 in)	Weight: 9 kg (20 lb)
Power Requirements: 100 V to 127 V and 200 V to 240 V (50 Hz to 400 Hz); battery powered (optional)	

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling	Environmental Considerations: 5 °C to 40 °C (41 °F to 104 °F) operating temperature
Shelf Life: Indefinite	Consumables: Particulate filters
Calibration Requirements: Yes, semiannual	Repairs: Particulate filters need to be changed (as required)
Repair Options: Not specified	Maintenance Costs: \$1K per year

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Some special training required
Training Available: Formal factory training available	Manuals Available: User manual
Support Equipment: Service available at Orange, California	Communications Capability: RS-232 and REE 488
Tamper Resistance: Data tamper proof	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Innova Type 1314 Multigas Monitor

California Analytical Instruments, Inc.
 1312 West Grove Avenue
 Orange, California 92865-4134
 Hal Peper
 714-974-5560 (Tel)
 714-921-2531 (Fax)
 hpeper@gasanalyzers.com
Information Source: <http://www.innova.dk>



Status: Vendor response—11/17/2006

Portability: Handheld Stationary

Technology: PIR

Unit Cost: \$39.7K (base) plus Optical Filters

Availability: Commercially available

Description: Photoacoustic Infrared (PIR) Spectroscopy

Type: Commercial

Current Users: DTRA

OPERATIONAL PARAMETERS

CAs Detected: GB, VX, and HD

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: No warm-up necessary	Detection State: Vapor and aerosol
Response Time: <1 min	Alarms: Audible alarm
Sensitivity: GB in the 0.01 ppm to 1 ppm VX in the 0.01 ppm to 1.0 ppm HD in the 0.01 ppm to 1.0 ppm	Selectivity: Automatically compensates for interferences caused by environmental fluctuations

PHYSICAL PARAMETERS

Size: 18 cm x 40 cm x 30 cm (6.9 in x 15.6 in x 11.8 in)	Weight: 14 kg (31 lb)
Power Requirements: 100 V to 127 V and 200 V to 240 V (50 Hz to 60 Hz); battery powered (optional)	

LOGISTICAL PARAMETERS

Durability: Able to operate with rough handling	Environmental Considerations: 5 °C to 40 °C (41 °F to 104 °F) operating temperature
Shelf Life: Indefinite	Consumables: Particulate filters
Calibration Requirements: Yes, semiannual	Repairs: Internal filters need to be changed (as required)
Repair Options: Not specified	Maintenance Costs: Minimum \$1K per year

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Some special training required
Training Available: Formal factory training available	Manuals Available: User manual
Support Equipment: Service available at Orange, California	Communications Capability: RS-232, REE 488, and CAN
Tamper Resistance: Data tamper proof	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

GENERAL

4200 Vapor Detector

Electronic Sensor Technology
1077 Business Center Circle
Newbury Park, California 91320

Ken Zeiger
805-480-1994 (Tel)
805-480-1994 (Fax)
kzeiger@estcal.com

Information Source: Chemical Detection Equipment
Market Survey for Emergency Responders, September 23,
1998 (SBCCOM)

Status: Vendor response—11/1/2005



Portability: Handheld Stationary

Technology: Gas Chromatography

Unit Cost: \$24K to \$30K

Availability: Commercially available (normally 4 wk to 6 wk ARO)

Description: Gas Chromatography with Surface Acoustic Wave Detection

Type: Commercial

Current Users: U.S. Army, U.S. Navy, U.S. Air Force, NASA, FDA, EPA, USDA, and many commercial companies in U.S., Asia, Europe, Australia, and Africa

OPERATIONAL PARAMETERS

CAs Detected: GB and GD

TICS Detected:

- **High Priority:** Arsine, BCl₃, BF₃, carbon disulfide, HBr, phosgene, phosphorus trichloride, SO₂, sulfuric acid, and WF₆
- **Medium Priority:** Acetone cyanohydrin, allyl chlorocarbonate, BBr₃, chloroacetone, ClCH₂CN, ClSO₂OH, diketene, C₂H₄Br₂, H₂Se, methanesulfonyl chloride, CH₃Br, C₂H₃ClO₂, CH₃ClSi, CH₃NCO, NO₂, phosphorus oxychloride, PF₅, SeF₆, SiF₄, stibine, SO₃, Cl₂O₂S, F₂O₂S, TeF₆, n-octyl mercaptan, TiCl₄, CCl₃COCl, and trifluoroacetyl chloride
- **Low Priority:** Allyl isothiocyanate, ArCl₃, Br₂, BrCl, BrF₅, BrF₃, CF₂O, ClF₅, ClF₃, chloroacetaldehyde, chloroacetyl chloride, crotonaldehyde, dimethyl sulfate, diphenylmethane-4,4'-diisocyanate, C₃H₅ClO₂, ethyl chlorothioformate, C₂H₅Cl₂PS, C₂H₅Cl₂OP, C₅Cl₆, HI, iron pentacarbonyl, isobutyl chloroformate, isopropyl chloroformate, isopropyl isocyanate, n-Butyl chloroformate, n-Butyl isocyanate, n-Propyl chloroformate, parathion, CCl₄S, s-Butyl chloroformate, tert-butyl isocyanate, tetraethyl lead, tetraethyl pyrophosphate, tetramethyl lead, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: 15 min	Detection State: Vapor
Response Time: 10 s	Alarms: Audible and visual alarm
Sensitivity: This detector has not been tested against CAs. Sensitivity is in the low ppb level for most industrial compounds.	Selectivity: Gas chromatograph separates CAs from interferents

PHYSICAL PARAMETERS

Size: 31 cm x 25 cm x 15 cm (12 in x 10 in x 6 in)	Weight: 9.1 kg (20 lb) case; 3.2 kg (7 lb) head
Power Requirements: 90 V to 260 V ac	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: 0 °C to 40 °C (32 °F to 104 °F) at 0 % to 99 % rh
Shelf Life: Not specified	Consumables: Helium gas
Calibration Requirements: Yes	Repairs: None
Repair Options: Not specified	Maintenance Costs: About \$90 per year

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background when using EST method and calibration

Training Required: Formal

Training Available: Yes (3 d classroom training)

Manuals Available: User manual

Support Equipment: Pentium or greater class lap top personal computer running Windows 98, Windows 2000, or Windows XP

Communications Capability: An RS-232 port allows data to be sent to a PC

Tamper Resistance: Password protection available on system controller

Warranty: 1 yr (parts and labor)

Testing Information: Not specified

Applicable Regulations: None

GENERAL

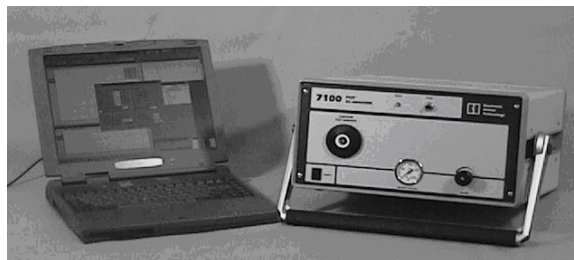
7100 Vapor Detector

Electronic Sensor Technology
1077 Business Center Circle
Newbury Park, California 91320

Ken Zeiger
805-480-1994 (Tel)
805-480-1994 (Fax)
kzeiger@estcal.com

Information Source: Chemical Detection Equipment
Market Survey for Emergency Responders, September 23,
1998 (SBCCOM)

Status: Vendor response—11/1/2005



Portability: Handheld Stationary

Technology: Gas Chromatography

Unit Cost: \$20K to \$31K

Availability: Commercially available (normally 4 wk to 6 wk ARO)

Description: Gas Chromatography with Surface Acoustic Wave Detection

Type: Commercial

Current Users: U.S. Army, U.S. Navy, U.S. Air Force, NASA, FDA, EPA, USDA, and many commercial companies in U.S., Asia, Europe, Australia, and Africa

OPERATIONAL PARAMETERS

CAs Detected: GB and GD

TICS Detected:

- **High Priority:** Acetone cyanohydrin, allyl chlorocarbonate, BBr_3 , chloroacetone, ClCH_2CN , ClSO_2OH , diketene, $\text{C}_2\text{H}_4\text{Br}_2$, H_2Se , methanesulfonyl chloride, CH_3Br , $\text{C}_2\text{H}_3\text{ClO}_2$, CH_3ClSi , CH_3NCO , NO_2 , phosphorus oxychloride, PF_5 , SeF_6 , SiF_4 , stibine, SO_3 , $\text{Cl}_2\text{O}_2\text{S}$, $\text{F}_2\text{O}_2\text{S}$, TeF_6 , n-Octyl mercaptan, TiCl_4 , CCl_3COCl , and trifluoroacetyl chloride
- **Low Priority:** Allyl isothiocyanate, ArCl_3 , Br_2 , BrCl , BrF_5 , BrF_3 , CF_2O , ClF_5 , ClF_3 , chloroacetaldehyde, chloroacetyl chloride, crotonaldehyde, dimethyl sulfate, diphenylmethane-4,4'-diisocyanate, $\text{C}_3\text{H}_5\text{ClO}_2$, ethyl chlorothioformate, $\text{C}_2\text{H}_5\text{Cl}_2\text{PS}$, $\text{C}_2\text{H}_5\text{Cl}_2\text{OP}$, C_5Cl_6 , HI, iron pentacarbonyl, isobutyl chloroformate, isopropyl chloroformate, isopropyl isocyanate, n-Butyl chloroformate, n-Butyl isocyanate, n-Propyl chloroformate, parathion, CCl_4S , s-Butyl chloroformate, tert-Butyl isocyanate, tetraethyl lead, tetraethyl pyrophosphate, tetramethyl lead, toluene 2,4-diisocyanate, and toluene 2,6-diisocyanate

Start-up Time: 15 min	Detection State: Vapor
Response Time: 10 s	Alarms: Audible and visual alarm
Sensitivity: This detector has not been tested against CAs. Sensitivity is in the low ppb level for most industrial compounds.	Selectivity: Gas chromatograph separates CAs from interferents

PHYSICAL PARAMETERS

Size: 36 cm x 19 cm x 36 cm (14.2 in x 7.5 in x 14.2 in)	Weight: 13.6 kg (29.9 lb)
Power Requirements: 90 V to 260 V ac	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: 0 °C to 40 °C (32 °F to 104 °F) at 0 % to 99 % rh
Shelf Life: Not specified	Consumables: Helium gas
Calibration Requirements: Yes	Repairs: None
Repair Options: Not specified	Maintenance Costs: About \$90 per year

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background when using EST method and calibration

Training Required: Formal

Training Available: Yes (3 d classroom training)

Manuals Available: User manual

Support Equipment: Pentium or greater class laptop personal computer running Windows 98 or Windows 2000

Communications Capability: An RS-232 port allows data to be sent to a PC

Tamper Resistance: Password protection available on system controller

Warranty: 1 yr (parts and labor)

Testing Information: Not specified

Applicable Regulations: None

GENERAL

CW Sentry 3G

Microsensor Systems, Inc.
62 Corporate Court
Bowling Green, Kentucky 42103
Gerry Flanagan
270-745-0099 (Tel)
270-745-0095 (Fax)
Information Source: Chemical Detection Equipment
Market Survey for Emergency Responders, September 23,
1998 (SBCCOM)

Status: Vendor response—4/1/2006



Portability: Fixed-Site Detection
Unit Cost: \$17K to \$27K—depending on options
Availability: Commercially available
Description: Surface Acoustic Wave
Type: Commercial
Current Users: Various federal agencies

Technology: Surface Acoustic Wave

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, and HN3

TICS Detected:

- **High Priority:** Arsine, chlorine, diborane, ethylene oxide, fluorine, hydrogen cyanide, phosgene, and sulfur dioxide
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 60 s to 90 s

Detection State: Vapor and aerosol

Response Time: 30 s

Alarms: Audible and visual alarm

Sensitivity: GA at 0.0133 ppm

GB at 0.017 ppm

GD at 0.015 ppm

VX at 0.01 ppm

HD at 0.09 ppm

HN-3 at 0.06 ppm

Arsine at 0.5 ppm

Chlorine at 10 ppm

Diborane at 0.3 ppm

Hydrogen cyanide at 5 ppm

Phosgene at 0.3 ppm

Sulfur dioxide at 3 ppm

Selectivity: SAW sensors—greater than 95 % resistance to interferents
Electrochemical cells—less selective; depends on the selected cell

PHYSICAL PARAMETERS

Size: 23 cm x 41 cm x 18 cm (9.2 in x 16.1 in x 7.2 in)

Weight: 18.1 kg (40 lb)

Power Requirements: 115 V 60 Hz or 220 V 50 Hz

LOGISTICAL PARAMETERS

Durability: Designed to operate in a controlled environment. Additional modifications are required to operate outdoors.

Environmental Considerations: -10 °C to 50 °C (14 °F to 122 °F) at 0 % to 95 % rh

Shelf Life: 5 yr operating; 10 yr nonoperating

Consumables: Particulate filters

Calibration Requirements: SAW sensors—no calibration

Electrochemical cells—every 6 mo (sold as an option)

Repairs: If electrochemical cell option is exercised, replacement of the sensor will be required every 1 yr

Repair Options: Loaners are available depending on critical need

Turn around time about 1 wk to 2 wk (faster is available)

Tech support is available

Maintenance Costs: If electrochemical cell option is exercised, replacement of the sensor will be about \$250 a piece

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: 30 min of training is required

Training Available: Yes

Manuals Available: User manual

Support Equipment: None

Communications Capability: RS-232 interface. Designed to integrate with common surety and fire systems.

Tamper Resistance: None

Warranty: 1 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

SAW MiniCAD mkII

Microsensor Systems, Inc.
 62 Corporate Court
 Bowling Green, Kentucky 42103
 Gerry Flanagan
 270-745-0099 (Tel)
 270-745-0095 (Fax)
 gerry.flanagan@msanet.com
Information Source: <http://www.sawtek.com>
 Chemical Detection Equipment Market Survey for
 Emergency Responders, September 23, 1998 (SBCCOM)
 The Emergency Responder's Ability to Detect Chemical
 Agent Critical Review/Technology Assessment, July 1998
 (DTIC)



Status: Vendor response—4/1/2006

Portability: Handheld Portable

Technology: Surface Acoustic Wave

Unit Cost: \$5.5K

Availability: Commercially available

Description: Surface Acoustic Wave

Type: Commercial

Current Users: Federal agencies, special warfare communities, and first responders

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, and HD

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 2 min	Detection State: Vapor and aerosol
Response Time: 60 s	Alarms: Audible and visual alarm
Sensitivity: GA at 0.04 ppm GB at 0.17 ppm GD at 0.02 ppm GF at 0.03 ppm VX at 0.01 ppm HD at 0.09 ppm	Selectivity: Not prone to interferences—1 % Windex only one shown

PHYSICAL PARAMETERS

Size: 3.3 cm x 11 cm x 13 cm (1.3 in x 4.3 in x 5.2 in)	Weight: 510 g (18 oz)
Power Requirements: Four (4) lithium cells, Type DL 123A An external 6.3 V, 3.4 A-h, rechargeable, fully sealed, lead-acid, gel-cell is supplied with every MiniCAD A battery charger for the external rechargeable battery is supplied with every MiniCAD	

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: 5 °C to 40 °C (41 °F to 104 °F) (operating temperature)

Shelf Life: 10 yr nonoperating

Consumables: Batteries

Calibration Requirements: Calibration not required

Repairs: None

Repair Options: Loaners are available depending on critical need. Turn around time about 1 wk to 2 wk (faster is available).
Tech support is available.

Maintenance Costs: \$75 every 6 mo to 8 mo to replace check source

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Training Required: Formal

Training Available: Not specified

Manuals Available: User manual

Support Equipment: A small vapor diffusion kit is supplied with the MiniCAD mkII that permits vapor testing of the instrument in the field

Communications Capability: RS-232 cable port allows data to be communicated with a network

Tamper Resistance: Not specified

Warranty: 1 yr or 500 h of operation (parts and labor)

Testing Information: The US Army Edgewood Chemical and Biological Center (ECBC) is planning on testing the SAW Minicad MKII in FY2000

Applicable Regulations: None

GENERAL

Portable Odor Monitor

Sensidyne, Inc.
 16333 Bay Vista Drive
 Clearwater, Florida 33760
 Ronald W. Roberson
 800-451-9444 (Tel)
 727-530-3602 (Tel)
 727-539-0550 (Fax)
 info@sensidyne.com
 rroberson@sensidyne.com
Information Source: <http://www.sensidyne.com>
 Chemical Detection Equipment Market Survey for
 Emergency Responders, September 23, 1998 (SBCCOM)
Status: Vendor response—11/15/2006

**Portability:** Handheld Stationary**Technology:** Thermal and Electrical Conductivity**Unit Cost:** Not specified**Availability:** Commercially available**Description:** Thermal and Electrical Conductivity**Type:** Commercial**Current Users:** Not specified

OPERATIONAL PARAMETERS

CAs Detected: None**TICS Detected:**

- **High Priority:** Ammonia and formaldehyde
- **Medium Priority:** Methyl mercaptan and carbon monoxide
- **Low Priority:** None

Start-up Time: None	Detection State: Vapor
Response Time: 1 min to 2 min	Alarms: None built in. Has 0 mV dc to 200 mV dc output.
Sensitivity: Sensitivity is expected to be around 10 ppb	Selectivity: Very nonspecific—responds to changes in a known vapor concentration

PHYSICAL PARAMETERS

Size: 8.4 cm x 19 cm x 4.1 cm (3.3 in x 7.5 in x 1.6 in)	Weight: 0.8 kg (1.5 lb)
Power Requirements: 4 AA batteries (10 h of operation), ac adapter	

LOGISTICAL PARAMETERS

Durability: The Odor Monitor is housed in a high impact, corrosion-resistant, and dust tight plastic case. It is suitable for use in both harsh environments or in environments which require extremely sanitary and hygienic samplings.

Environmental Considerations: 0 °C to 40 °C (32 °F to 104 °F) (operating temperature)

Repair Options: Turn around time 5 d to 7 d for calibration, parts take longer. Phone support standard business hours. Loaners not available (portable odor monitor is not standard equipment).

Maintenance Costs: Replacement of batteries

Shelf Life: 5 yr for sensor	Consumables: Batteries
Calibration Requirements: None	Repairs: None

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: None	Tamper Resistance: Not specified
Testing Information: Response chart available upon request	Warranty: 1 yr
Communications Capability: Recorder output 0 mV dc to 200 mV dc	Applicable Regulations: None

GENERAL

SXC-20 VOC Monitor

Spectrex Corporation
 3580-T Haven Avenue
 Redwood City, California 94063-4603
 800-822-3940 (Tel)
 650-365-6567 (Tel)
 650-365-5845 (Fax)
Information Source: Chemical Detection Equipment
 Market Survey for Emergency Responders, September 23,
 1998 (SBCCOM)

Status: Vendor response—4/10/2006



Portability: Handheld Portable

Technology: Thermal and Electrical Conductivity

Unit Cost: \$1.4K plus minimal training cost

Availability: Commercially available

Description: Thermal and Electrical Conductivity

Type: Commercial

Current Users: U.S. Army and U.S. Marine Corp.

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, diborane, hydrogen bromide, hydrogen chloride, hydrogen cyanide, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Allyl alcohol, carbon monoxide, and phosphine
- **Low Priority:** None

Start-up Time: 10 s

Detection State: Vapor

Response Time: 10 s to 60 s

Alarms: Audible and visual alarm

Sensitivity: Minimum detection range is between 3 ppm to 5 ppm

Selectivity: Detects all volatile organic compounds specific with charcoal tube detector

PHYSICAL PARAMETERS

Size: 12 cm x 10 cm x 6.1 cm (4.6 in x 4.1 in x 2.4 in)

Weight: 0.9 kg (2 lb)

Power Requirements: 12 V dc or 110 V ac

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: Not specified

Shelf Life: Indefinite

Consumables: None

Calibration Requirements: Yes (with standard gases)

Repairs: By manufacturer only

Repair Options: No loaner. 3 d to 4 d turn around time. Company has good technical support.

Maintenance Costs: \$100 to \$200 per year for maintenance and \$100 per year for support

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training)

Manuals Available: TM 3-6665-315-10 Operator's Manual; TM 3-6665-315-23&P Unit and Direct Support Maintenance Manual

Training Available: Manual is sufficient

Training Required: Nonformal (good manual)

Support Equipment: None

Communications Capability: Interface to computer

Tamper Resistance: Not specified

Warranty: 90 d

Testing Information: Not specified

Applicable Regulations: None

GENERAL

HAZMATCAD Plus

Microsensor Systems, Inc.
62 Corporate Court
Bowling Green, Kentucky 42103
Gerry Flanagan
270-745-0099 (Tel)
270-745-0095 (Fax)
Information Source: Chemical Detection Equipment
Market survey for emergency responders, September 23,
1998 (SBCCOM)



Status: Vendor response—4/1/2006

Portability: Handheld Portable

Technology: Surface Acoustic Wave

Unit Cost: \$4.8K to \$8.4K

Availability: Commercially available

Description: Surface Acoustic Wave

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN3

TICS Detected:

- **High Priority:** Hydrogen cyanide, chlorine, phosgene, diborane, arsine, hydrogen sulfide
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 90 s

Detection State: Vapor and aerosol

Response Time: High Sensitive mode—2 min
Fast Response—20 s

Alarms: Audible and visual alarm

Sensitivity: GA at 0.0133 ppm
GB at 0.017 ppm
GD at 0.015 ppm
GF at 0.01 ppm
VX at 0.01 ppm
Hydrogen cyanide at 5 ppm
HD at 0.09 ppm
HN-3 at 0.06 ppm
Phosgene at 0.3 ppm
Arsine at 0.5 ppm
Chlorine at 10 ppm
Diborane at 0.3 ppm
Hydrogen sulfide at 3 ppm

Selectivity: SAW sensors—greater than 95% resistance to interferents 1% Windex is only source shown
Electrochemical cells—less selective

PHYSICAL PARAMETERS

Size: 6.9 cm x 6.4 cm x 20 cm (2.7 in x 2.5 in x 7.9 in)

Weight: 624 g (22 oz) including batteries

Power Requirements: Sony NP-F550 Li ion internal rechargeable batteries

LOGISTICAL PARAMETERS

Durability: Very rugged, encased with a rubber boot

Environmental Considerations: -10 °C to 50 °C (14 °F to 122 °F) at 0 % to 95 % rh

Shelf Life: 5 yr operating; 10 yr nonoperating

Consumables: Sensors

Calibration Requirements: SAW sensors—no calibration

Repairs: Electrochemical cell replacement every 1 yr; SAW sensor replacement every 5 yr

Repair Options: Loaners are available depending on critical need. Turn around time about 1 wk to 2 wk (faster is available). Tech support is available.

Maintenance Costs: If electrochemical cell option is exercised, replacement of the sensor will be about \$900 a piece

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: 30 min of training is required

Training Available: Yes

Manuals Available: User manual

Support Equipment: None

Communications Capability: 9600 baud IrDA, RS-232 interface

Infrared data port

Tamper Resistance: None

Warranty: 1 yr

Testing Information: Testing of HAZMATCAD Detectors against CAs, SBCCOM 2003 January

Applicable Regulations: None

GENERAL

ECAM (Enhanced Chemical Agent Monitor)

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Unit Cost: Contact manufacturer for current pricing

Availability: Commercially available

Description: Ion Mobility Spectrometry

Type: Military

Current Users: CAM has been used by allied forces in Operation Desert Storm and by the UN, UNSCOM, and OPCW

Technology: Ion Mobility Spectrometry

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HN, and L

TICS Detected:

- **High Priority:** Hydrogen cyanide, phosgene, and chlorine
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 5 min to 30 min	Detection State: Vapor
Response Time: Typically less than 3 s	Alarms: Visible, audio, and remote alarms
Sensitivity: Levels of detection for each agent are in line with or exceed the present NATO requirements	Selectivity: The ECAM may false alarm when used in enclosed spaces or when sampling near strong vapor sources (i.e., in dense smoke). Some vapors known to give false readings are aromatic vapors, cleaning compounds, smoke, fumes, and some wood preservatives.

PHYSICAL PARAMETERS

Size: 39 cm x 15 cm x 7.6 cm (15.5 in x 6 in x 3 in)

Weight: 1.8 kg (4 lb) with battery

Power Requirements: Single 6 V battery (sealed Li/SO₂ system).

LOGISTICAL PARAMETERS

Durability: DEFSTAN 07-55

Environmental Considerations: Successfully undergone extensive environmental testing against damage due to shock, vibration, NEMP, 1 m drop, low pressure and humidity for operating and storage. -25 °C to 40 °C (-13 °F to 104 °F) (operating temperature); -25 °C to 60 °C (-13 °F to 140 °F) (storage temperature).

Shelf Life: Not specified

Consumables: Charcoal canister, sieve pack, and confidence samples

Calibration Requirements: None

Repairs: Replace charcoal filter once every 72 h. Replace internal sieve pack (1 nut and screw) every 400 h of operation. Each accumulated operating time of 12 h. Requires 3 min for routine service and operator tests.

Repair Options: Loaner option is not available. Turn around time is typically 14 d to 21 d for depot repair. Field tech support is available, and phone tech support is during business hours.

Maintenance Costs: Contact manufacturer for current pricing

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Training Required: Formal

Training Available: Not specified

Manuals Available: Operator manual and maintenance manual

Support Equipment: Not specified

Communications Capability: A RS232 cable port allows data to be communicated with a data communications system

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Contains a radioactive source licensed for use by the U.S. NRC. NRC and local applicable regulations must be followed for storage, shipment, and disposal. Regulations include licensing and tracking of radiation source and annual wipe-test.

GENERAL

SABRE 2000

Smiths Detection
2202 Lakeside Boulevard
Edgewood, Maryland 21040
410-510-9100 (Tel)
410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: Contact manufacturer for current pricing

Availability: Commercially available

Description: Ion Mobility Spectrometry

Type: Commercial

Current Users: Customs agents and first responder organizations

OPERATIONAL PARAMETERS

CAs Detected: CW agents include nerve and blister agents such as tabun, sarin, soman, cyclosarin, agents VX and Vx, HN3, and others

TICS Detected:

- **High Priority:** Chlorine, hydrogen chloride, ammonia, and others
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: <10 min

Detection State: Particles and vapor

Response Time: 15 s to 20 s analysis time

Alarms: Audible and visual alarms

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 33 cm x 10.2 cm x 11.4 cm (13 in x 4 in x 4.5 in)

Weight: <2.6 kg (5.8 lb) including a battery

Power Requirements: Optional dc adapter

LOGISTICAL PARAMETERS

Durability: Some rough handling

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: None

Calibration Requirements: Autocalibration

Repairs: As needed

Maintenance Costs: Not specified

Repair Options: Although not our principal product of concern, we may be able to provide on-site service for these units. Please provide details of the locations and quantity of units under consideration. Typical turn around time is 14 d to 21 d for depot repair. Field tech support is not available, but phone tech support is 24/7.

SPECIAL REQUIREMENTS

Operator Skills: No special skills required

Training Required: Recommended

Training Available: Included with purchase of equipment

Manuals Available: Owners manual

Support Equipment: None

Communications Capability: None

Tamper Resistance: None

Warranty: 1 yr

Testing Information: FAA Tech Center

Applicable Regulations: Contains a radioactive source licensed for use by the U.S. NRC. NRC and local applicable regulations must be followed for storage, shipment, and disposal. NRC regulations include licensing and tracking of radiation source and annual wipe-test.

GENERAL

Safeye Model 400 Gas Detection System

Spectrex, Inc.
 218 Little Falls Road
 Cedar Grove, New Jersey 07009
 Eric Zin
 973-239-8398 (Tel)
 800-452-2107 (Tel)
 973-239-7614 (Fax)
Information Source: <http://www.spectrex-inc.com>

Status: Vendor response—4/10/2006



Portability: Handheld Stationary

Technology: Ultraviolet Spectroscopy

Unit Cost: \$8K to \$10K

Availability: Commercially available

Description: Ultraviolet Spectroscopy

Type: Commercial

Current Users: Petrochemical industry, oil, and gas industry (BP and Shell)

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide, ammonia, benzene, and aromatic compounds
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 1 min	Detection State: Vapor
Response Time: 1s to 5 s	Alarms: Audible alarm, optional output (4 mA to 20 mA)
Sensitivity: Hydrogen sulfide at 500 ppm Ammonia at 500 ppm	Selectivity: Has few noncritical interferences

PHYSICAL PARAMETERS

Size: 13.2 cm x 13.2 cm (5.2 in x 5.2 in)	Weight: 4 kg (8.8 lb)
Power Requirements: 24 V dc	

LOGISTICAL PARAMETERS

Durability: Explosion proof and radio frequency interference (RFI) resistant

Environmental Considerations: -20 °C to 55 °C (-4 °F to 131 °F) at 0 % to 95 % rh (operating temperature); -40 °C to 65 °C (-40 °F to 149 °F) at 0 % to 95 % rh (storage temperature)

Shelf Life: Greater than 5 yr	Consumables: Calibration kit
Calibration Requirements: Autocalibration	Repairs: Yes
Repair Options: No loaner. 3 d to 4 d turn around time. Company has good technical support.	Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Yes	Manuals Available: User manual
Support Equipment: None	Warranty: 2 yr
Tamper Resistance: None	Applicable Regulations: None
Testing Information: Not specified	

Communications Capability: An optional RS-485 output provides data communication for a single system or a network to a host computer for central monitoring

GENERAL

LCD-3 Lightweight Chemical Agent Detector

Smiths Detection
 2202 Lakeside Boulevard
 Edgewood, Maryland 21040
 410-510-9100 (Tel)
 410-510-9496 (Fax)
Information Source: <http://www.smithsdetection.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: Call manufacturer for current pricing

Availability: Commercially available

Description: Ion Mobility Spectrometry

Type: Commercial and military

Current Users: U.S. Special Forces, U.S. Department of Energy, and Canadian DND

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, HD, HN, and L

TICS Detected:

- **High Priority:** Chlorine, hydrogen cyanide, and phosgene
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 5 s

Detection State: Vapor and aerosol

Response Time: <10 s in most instances

Alarms: Audible and visual alarm

Sensitivity: Meets military requirements

Selectivity: <5 % false positive rate

PHYSICAL PARAMETERS

Size: 18 cm x 8.9 cm x 4.1 cm (7 in x 3.5 in x 1.6 in)

Weight: 0.5 kg (1.2 lb)

Power Requirements: Four AA batteries

LOGISTICAL PARAMETERS

Durability: Used by Navy Seals; Mil-Spec

Shelf Life: Greater than 10 yr

Calibration Requirements: None

Consumables: Batteries

Repairs: New sieve required approximately every 500 h of operation

Environmental Considerations: Designed to operate in a wide range of environmental conditions: -10 °C to 35 °C (14 °F to 95 °F) at 5 % to 95 % rh

Maintenance Costs: Subject to level of use, however commonly below 20 % of purchase cost for the life-time of the equipment

Repair Options: Although not our principal product of concern, we may be able to provide on-site service for these units. Please provide details of the locations and quantity of units under consideration. Phone technical service is during normal business hours.

SPECIAL REQUIREMENTS

Operator Skills: No special skills required

Manuals Available: Operator manual available

Training Available: Yes

Support Equipment: Earpiece

Tamper Resistance: None

Warranty: 1 yr

Applicable Regulations: Not specified

Testing Information: Live agent testing was conducted by U.S. Army; testing done at APGEA

Training Required: Operator training can commonly be completed within 2 h

Communications Capability: Can interface with computer via RS-232 data port

GENERAL

ChemPro100

Envionics USA Inc.
 4401 Eastport Parkway
 Port Orange, Florida 32127
 Sales Office
 386-304-5252 (Tel)
 386-304-5251 (Fax)
Information Source: <http://www.envionicsusa.com>

Status: Vendor response—11/15/2006



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: Contact manufacturer or GSA schedule

Availability: Commercially available and GSA schedule

Description: Patented Ion Mobility Spectrometry and Multisensor

Type: Military and commercial

Current Users: Selected DOD units, U.S. Army Medical Command, Italy, Japan, France, Finland, Canada, Germany, and Korea

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** NH₃, CS₂, Cl₂, HCl, HCN, H₂S
- **Medium Priority:** CK, acrylonitrile, methylmetacrylate, ethylacetate, toluene diisocyanate, and ETOX
- **Low Priority:** Acetic acid, methanol, toluene, acetaldehyde, acetone, ethanol, i-butanol, i-propanol, MTBE, acetonitrile, and methyl mercaptan

Start-up Time: Between 61 s and 5 min	Detection State: Vapor and aerosol
Response Time: Typically: <10 s for nerve and blood; <30 s for blister	Alarms: Audible and visual alarm
Sensitivity: GA, GB, GD, GF, VX at 0.001 ppm TIC dependant: 0.033 ppm to 100 ppm	Selectivity: Has a few noncritical interferents (high levels of gasoline and diesel and some solvents at concentrations higher than OSHA allows)

PHYSICAL PARAMETERS

Size: 10.2 cm x 22.9 cm x 5.1 cm (4 in x 9 in x 2 in)

Weight: 0.6 kg (1.3 lb); 0.8 kg (1.8 lb) with battery

Power Requirements: Battery, ac, or vehicle power (8 h continuous use with optional AA battery case or 10 h to 12 h with rechargeable Li Ion battery pack)

LOGISTICAL PARAMETERS

Durability: Ruggedized for operational environments, MIL STD 810 tested

Environmental Considerations: Operates in all environments and extreme temperature conditions.

Shelf Life: 10 yr

Consumables: Inlet particulate filter. Unit provides indication to operator when filter is contaminated and needs replacement.

Calibration Requirements: None

Repairs: SC cell/pump module every 3000 operating hours

Repair Options: Flexible policy; overnight mail (24 h turn around time); loaner possible; 24/7 tech support. Service contract with different options (extended warranty or maintenance contract). Tailored to support customer requirements.

Maintenance Costs: Routine maintenance: None

Scheduled maintenance: <\$800 at 3000 h

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: 1 h review of operator screens

Training Available: Operator training course (manufacturer will conduct on-site or off-site)

Manuals Available: Operators manual and quick reference guide available

Support Equipment: ac power supply/battery charger, included standard. Add-on modules available for Radiation, BioReader, GPS, and earphone.

Communications Capability: Computer (control), computer interface, networking capability

Tamper Resistance: Sealed with tamperproof screws and critical operator selectable features password protected

Warranty: 1 yr factor warranty; does not cover misuse or mishandling

Testing Information: Tested by the Finnish Defense Forces Research Center (Explosives and NBC Defense Section)

Applicable Regulations: The ChemPro100 Chemical Profiler contains a radioactive source which is exempt by the U.S. NRC and does not require licensing, tracking of radiation source or annual wipe test

GENERAL

BadgeRAE

RAE Systems Inc.
3775 N 1st St
San Jose, California 95134
408-952-8200 (Tel)
408-952-8480 (Fax)
aleet@reasystems.com
Information Source: <http://www.raesystems.com>

Status: Vendor response—4/9/2006



Portability: Handheld Portable

Unit Cost: \$96 to \$130

Availability: Commercially available

Description: Electrochemistry—single gas

Type: Commercial

Current Users: Not specified

Technology: Electrochemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** H₂S
- **Medium Priority:** Carbon monoxide
- **Low Priority:** None

Start-up Time: Press and hold button for 5 s. After beep, the unit will count down 30 s to warm-up.

Detection State: Vapor

Response Time: 1 min

Alarms: Pre-set low and high alarms: Bright LED alarm light; loud buzzer; and standard built-in vibration alarm

Sensitivity: Carbon monoxide at 1 ppm to 300 ppm
Hydrogen sulfide at 1 ppm to 100 ppm

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 9.4 cm x 4.9 cm x 2.3 cm (3.7 in x 1.94 in x 0.9 in)

Weight: 82.2 g (2.9 oz)

Power Requirements: Built-in, 2 yr battery. Replace battery if the detector undergoes >12 h of alarm. Use RAE Systems batteries.

LOGISTICAL PARAMETERS

Durability: Highly impact resistant carbon-loaded ABS housing, IP-55 rated weather proof, RFI and EMI protected

Environmental Considerations: -20 °C to 40 °C (-4 to 114 °F) at 0 % to 95% rh (noncondensing)

Shelf Life: Not specified

Consumables: None

Calibration Requirements: No calibration

Repairs: 2 yr of continuous protection

- Once activated BadgeRAE is always on and monitoring
- No Maintenance (no battery replacement, sensor replacement, or calibration)

Repair Options: No loaner, but if equipment is sent back for repair, rental is available for 50 % off regular rental cost. Conservatively, turn around time is 3 wk, but for government, it is faster. Tech service is 9 am to 9 pm east coast time.

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: None

Training Required: No

Training Available: Yes

Manuals Available: User manual

Support Equipment: Test gas, gas regulator with flow controller, functional gas test adapter, hard transport case, automatic test station, and protective rubber boot

Communications Capability: None

Tamper Resistance: Yes

Warranty: Lifetime (2 yr) warranty for instrument and sensor

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Civil Defense Kits

Nextteq, LLC
 8406 Benjamin Road, Suite J
 Tampa, Florida 33634
 877-312-2333 (Tel)
 877-312-2444 (Fax)
 info@nextteq.com
Information Source: <http://www.nextteq.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Color Change Chemistry

Unit Cost: Please contact Nextteq or an authorized distributor

Availability: Authorized distributors. United States and international.

Description: Colorimetric—detector tube and detection paper. CA test kits. Electric, manual, or venturi gas sampling pumps and detector tubes for gas and vapor chemical warfare agents. M8, M9, and 3-Way detection paper for liquid CAs.

Type: Commercial

Current Users: Hazmat teams, first responders, firefighters, and occupational health and safety industries

OPERATIONAL PARAMETERS

CAs Detected: Simultaneously test for 21 of the most common military designated CAs including blister, blood, choking, pulmonary, and nerve

TICS Detected:

- **High Priority:** Hydrogen cyanide, phosgene, and other CAs
- **Medium Priority:** None
- **Low Priority:** Cyanogen chloride and other CAs

Start-up Time: No warmup time required. <5 min to assemble.

Detection State: Gas, vapor, and liquid CAs

Response Time: Complete sampling in as fast as 2 min—60 % faster than a leading competitor

Alarms: None

Sensitivity: Minimum detection limits significantly below the U.S. Joint Services Operational Requirements (JSOR) to provide early warning and improve safety

Selectivity: Unlike PIDs and FIDs, there are no false positives from gasoline, diesel fuel, aqueous fire fighter's foam (AFFF), burning tires, or burning wood

PHYSICAL PARAMETERS

Size: 49.5 cm x 39.4 cm x 19 cm (19.5 in x 15.5 in x 7.5 in) | **Weight:** 6.8 kg (15 lb)

Power Requirements: Choice of manual, venturi, or electric gas sampling pump. Electric gas sampling pump available with either rechargeable or disposable batteries.

LOGISTICAL PARAMETERS

Durability: Rugged, high impact case

Environmental Considerations: Detector tubes operating conditions: 10 °C to 40 °C (50 °F to 104 °F); 10 % to 80 % rh PyroPaq, an instant tube warmer, is available for use when sampling in environments cooler than 10 °C (50 °F)

Shelf Life: Shelf life for detector tubes up to 2 yr from date of manufacture

Consumables: Batteries—electric gas sampling pump; detector tubes; and detection papers

Calibration Requirements: Detector tubes and manual gas sampling pump are precalibrated. Electric pump requires calibration.

Repairs: Not applicable

Repair Options: Please contact Nextteq at 877-312-233

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Minimal

Training Required: Minimal—simple, illustrated, step-by-step instructions provided

Training Available: Training simulation kits available for safe, realistic training. Highly trained customer support and technical team available to answer questions. Telephone Nextteq at 877-312-2333 ext. 20.

Manuals Available: Comprehensive manual provided

Support Equipment: Not applicable

Communications Capability: None

Tamper Resistance: Rugged, high-impact case

Warranty: Yes

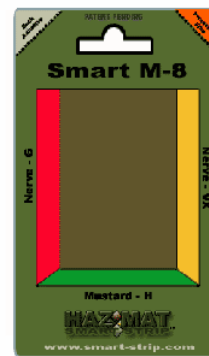
Testing Information: Available on request

Applicable Regulations: Not applicable

GENERAL

The HazMat Smart M-8 Simple Nerve Agent Detection

Safety Solutions Inc.
 4672 Bucida Road
 Boynton Beach, Florida 33436
 561-738-7086 (Tel)
 561-742-5739 (Fax)
 866-248-1050 (Tel)
 info@safetysolutions.us
Information Source: <http://www.smart-strip.com>
Status: Vendor response—4/6/2006



Portability: Handheld Portable

Technology: Color Change Chemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Color Change Chemistry. Each Smart M-8 consists of a reagent strip which when in contact with a nerve agent produces an instantaneous color change.

Type: Commercial

Current Users: Hazmat

OPERATIONAL PARAMETERS

CAs Detected: G, H, and V

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Immediate

Detection State: Not specified

Response Time: The nerve reagent is selfcontained and is activated by removing the protective covering that is designed to preserve the indicator layer until ready for use

Alarms: Visible

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Clip-on

Weight: Not specified

Power Requirements: None required

LOGISTICAL PARAMETERS

Durability: Technical description: The HazMat Smart M-8 is equipped with a peel and stick backing or can be clipped to the clothing ensemble

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: None

Calibration Requirements: None

Repairs: None

Repair Options: Disposable

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: One benefit of the HazMat Smart M-8 is its ease of use

Training Required: Training can be conducted before use and requires minimal instructional time

Training Available: Not specified

Manuals Available: One benefit of the HazMat Smart M-8 is its ease of use

Support Equipment: Not specified

Communications Capability: Not applicable

Tamper Resistance: Not applicable

Warranty: Not specified

Testing Information: Applicable Standards and Test Evaluation Results:

The HazMat Smart M-8 uses technologies that have been tested in various markets

DoD has tested the nerve agent with positive results and the Smart M-8 meets military specifications for M-8 paper

The HazMat Smart M-8 is proven technology that has been shown to be viable in detecting warfare grade nerve agents by independent laboratories

Applicable Regulations: Not specified

GENERAL

Dräger IMS 5100

Dräger Safety AG & Co. KGaA
 Volmerstrasse 7b
 12489 Berlin, Federal Republic of Germany
 Dräger Safety Inc.
 Houston, Texas
 281-207-1212 (Tel)
 281-498-5190 (Fax)
 victor.hoang@draeger.com
Information Source: <http://www.draeger.com>
<http://www.draeger-safety.com>



Status: Vendor response—4/10/2006

Portability: Fixed-Site Detection

Technology: Ion Mobility Spectrometry

Unit Cost: Dräger IMS 5100 and Dräger GC-IMS 5700 each cost \$45K per unit, and up to \$65K for full performance

Availability: Commercially available (4 wk to 6 wk lead time)

Description: Ion Mobility Spectrometry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, L, GF, HN, and HCN

TICS Detected:

- **High Priority:** Ammonia, CS₂, chlorine, hydrogen bromide, hydrogen chloride, hydrogen cyanide, and phosgene.
- Note: Other TIMs on request. LODs specified for 20 °C (68 °F) and 50 % rh. Some substances detectable as a group.
- **Medium Priority:** Other TIMs on request. LODs specified for 20 °C (68 °F) and 50 % rh. Some substances detectable as a group.
- **Low Priority:** Other TIMs on request. LODs specified for 20 °C (68 °F) and 50 % rh. Some substances detectable as a group.

Start-up Time: Sample throughput 144 samples/h
 (sequentially)
 Clear down time approximately 60 s

Detection State: Liquid and gaseous

Response Time: <30 s

Alarms: Visual alarm

Sensitivity: LODs specified for 20 °C / 68 °F and 50 % rh.
 Some substances detectable as a group.

Selectivity: Clear down time approximately 60s

GA (liquid) at 0.06 ppb

GB (liquid) at 0.2 ppb

GD (liquid) at 0.6 ppb

VX (liquid) at 0.04 ppb

HD (liquid) at 0.4 ppb

L (liquid) at 1.8 ppb

GF (liquid) at 1 ppb

Ammonia (liquid) at 10 ppb

CS₂ (gaseous) at 10 ppb

Chlorine (gaseous) at 10 ppb

Hydrogen bromide (gaseous) at 50 ppb

Hydrogen chloride (gaseous) at 10 ppb

Hydrogen cyanide (gaseous) at 20 ppb

Phosgene (gaseous) at 10 ppb

Note: Other TIMs on request.

PHYSICAL PARAMETERS

Size: 35 cm x 46 cm x 13 cm (13.8 in x 18 in x 5.1 in) for a 48 cm (19 in) rack mount

Weight: 10 kg (22 lb)

Power Requirements: 24 V dc, ac on request

LOGISTICAL PARAMETERS

Durability: Enclosure

- Type: for 48 cm (19 in) rack mount
- Material: aluminum

Environmental Considerations: Environment

- Operating temperature: 0 °C to 50 °C (32 °F to 122 °F)
- Gas inlet pressure/ambient pressure: 700 hPa to 1150 hPa
- Humidity: 0 to 90 % rh noncondensing
- Electromagnetic interference: 80 MHz to 1000 MHz: 10 V/m (EN 50082-2)

Shelf Life: 6 mo filter change; filter is accessible from the front

Consumables: Not specified

Calibration Requirements: Regular bump test

Repairs: Circuit filter replacement at 6 mo interval

Parts: circuit filter. No special tools.

Repair Options: Loaner available for monitoring only because it is not calibrated (qualitative and not quantitative)

Turn around time—done in Germany (Luebeck) 4 wk not including shipping

Tech service—on site (three technicians are available); phone tech during office hours

Maintenance Costs: Operational and maintenance costs >\$500

SPECIAL REQUIREMENTS

Operator Skills: None

Training Required: For service technicians

Training Available: On request

Manuals Available: Maintenance manual on request. User manual, Release: IMS 5100–1.00e, April 2003.

Support Equipment: Not specified

Communications Capability: Output—8 channel, 4 to 20 mA (sink)

Maximum resistance (per wire)—maximum 25 Ohm

Relay output—fault relay

Digital output—RS232

Tamper Resistance: Not specified

Warranty: 1 year

Testing Information: Various validation tests at Battelle, USA; TNO, Netherlands; WIS, Germany with CAs and with stimulants including methylcaprolate and diethylsebacate. TIM validation by ISO certified labs in Germany.

Applicable Regulations: NRC License, March 4th, 2004

GENERAL

Portable Isotopic Neutron-Spectroscopy Chemical Assay System

ORTEC
 801 S. Illinois Ave.
 Oak Ridge, TN 37831
 Contact the Main Sales Office
 800-251-9750 (Tel)
 865-482-4411 (Tel)
 865-483-0396 (Fax)
 801 South Illinois Avenue
 Oak Ridge, TN 37830
 info@ortec-online.com
Information Source: <http://www.ortec-online.com/pdf/pins.pdf>

Status: Vendor response—11/21/2006



Technology: Neutron-Spectroscopy

Portability: Vehicle Mounted

Unit Cost: Not specified

Availability: Not specified

Description: Neutron-Spectroscopy—This is a nondestructive assay system capable of assaying the contents of a closed container for chemical weapons, explosives and/or toxic industrial chemicals. It includes:

HPGe PINS GMX detector

DigiDART portable spectrometer

ORTEC high-resolution nondestructive chemical assay tool

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GA, GB (sarin), VX, HD, HN, HT (mustard gases), CG, CK, and lewisite

TICS Detected:

- **High Priority:** PINS can identify containers filled with military screening smokes, such as titanium tetrachloride (FM) and white phosphorus (WP)
- **Medium Priority:** Not specified
- **Low Priority:** Identifies contents of munitions and chemical-storage containers safely and reliably by use of special fingerprinting algorithms
- Explosives detected include ANFO, C4, Composition B, RDX, TNT, C4, HMX, LX-17, PBX-9502, PETN, and TATB

Start-up Time: Not specified

Detection State: Not specified

Response Time: 100 s to 1000 s

Alarms: Not specified

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified

Weight: Weight—3 containers 92 kg (201 lb)

Power Requirements: Battery powered. Lifetime limited by notebook computer—battery swap or recharge. DigiDart MCA 8 h battery—swap.

LOGISTICAL PARAMETERS

Durability: Rugged enough for military or civil defense use

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: 1.2 L cryostat/dewar must be refilled with liquid nitrogen every 18 h

Calibration Requirements: Not specified

Repairs: The digiDART supplies power to the Ge detector; the latter, although totally portable in its “all attitude” 1.2 L cryostat/dewar, must be refilled with liquid nitrogen every 18 h

Repair Options: ORTEC offers service contracts that could include a guaranteed loaner and 24/7 support. The standard 12 mo warranty does not include loaner and our normal business hours are 8 am to 4:30 pm EST. Standard repair times are dependant on several factors. The first level standard repair for HpGe detectors has a 2 wk to 3 wk average cycle time. We also offer a 1 wk rush service for an additional premium. Note: in approximately 25 % of the cases a detector cannot be successfully repaired with our standard repair, in which case a “complex” repair will be needed.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Easy to use

Training Required: Not specified

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Support table and shields, neutron source (available separately), safety signs and tools, 30 L storage-fill dewar, tool bag with hand tools, cable bag with NOMAD Plus cable, safety rope, safety signs (2), extension power cord, and safety equipment

Communications Capability: Notebook computer and PINS software

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: May 1992 Anniston Army Depot, Alabama

September 1992 Rexburg, Idaho

December 1992 Naval Explosive Ordnance Disposal Technical Center, Indian Head, Maryland

January 1993 Washington DC

February 1993 Redstone Arsenal, Alabama

May 1993 Dugway Proving Ground, Utah

June 1993 Rigby, Idaho

April 1994 Eglin AFB, Florida

May 1994 Washington DC

June 1994 Fort Lewis, Washington

Applicable Regulations: Not specified

GENERAL

Sensit®Gold CGI

J and N Enterprises, Inc.
 851 Transport Drive
 Valparaiso, Indiana 46383
 888-473-6748 (Tel)
 (U.S. and Canada only)
 219-465-2700 (Tel)
 219-465-2701 (Fax)
 judym@gasleaksensors.com
Information Source: <http://www.gasleaksensors.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable (hard carrying case included)

Technology: Semiconductor

Unit Cost: Not specified

Availability: Commercially available

Description: Semiconductor, Thermoconductivity, Electrochemistry—all-in-one combustible gas indicator

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia and hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** Combustible gases and oxygen

Start-up Time: 30 s	Detection State: Gas
Response Time: Instantaneous gas readings	Alarms: Visual and audio alarm
Sensitivity: Resolution: 0.1 % LEL 0.1% oxygen 1 ppm CO 1 ppm H ₂ S	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 29 cm x 7.6 cm x 5.9 cm (11.5 in x 3 in x 2.3 in)

Weight: 0.54 kg (1.2 lbs)

Power Requirements: 3 C alkaline batteries. An optional recharge kit is available for most models. Battery life is approximately 16 h of continuous operation regardless of the use of alkaline or rechargeable (NiMH only).

LOGISTICAL PARAMETERS

Durability: A cycloloy case which is impact and water resistant. A water/dirt filter covers the sensor preventing any dirt, water, or debris from poisoning the sensor. The same filter protects the internal pump and internal sensors.

Environmental Considerations: Operation temperature: -17.8 °C to 10 °C (0 °F to 120 °F); storage temperature: -28.9 °C to 55.6 °C (-20 °F to 132 °F)

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: The instrument should be tested each day it is used. Bump or calibration check gas is available. The instrument will alert the operator if scheduled calibration is overdue based on 30 d, 45 d, 90 d, or 180 d company standards. If the operation of the instrument is ever in question, it should be checked using a known gas sample.

Repairs: Sensor replacement: 3 yr to 5 yr except Oxygen every 2 yr

Repair Options: Turn around time within 5 d. Tech support is available during work hours.

Maintenance Costs: Lowest cost of ownership

SPECIAL REQUIREMENTS

Operator Skills: No

Training Required: No

Training Available: Yes

Manuals Available: Yes

Support Equipment: All Sensit® Gold CGI's can have additional sensors, circuitry, and programming done at J and N's location or a factory authorized repair center for a charge. Complete accessories including probes, calibration kits, hydrocarbon filters and infrared printers are available.

Communications Capability: Infrared downloading allows easy tracking of calibration and operation data for record keeping purposes

Tamper Resistance: This data is time and date stamped with the use of the on-board clock. The Sensit® Gold can provide a complete paper trail to reduce liability.

Warranty: The limited warranty covers materials and workmanship on all parts and labor (including sensors) for a period of 2 yr from date of purchase. The internal combustible gas sensor that measures the volume range of gas is warranted for 5 yr. Excludes calibration and batteries.

Testing Information: Not specified

Applicable Regulations: The Sensit® Gold CGI instruments are approved UL913 for class 1, Division 1, Groups C and D hazardous locations when used with alkaline batteries. Company is ISO 9001: 2000 certified.

GENERAL

HazMat Kits

Nextteq, LLC
 8406 Benjamin Road, Suite J
 Tampa, Florida 33634
 877-312-2333 (Tel)
 877-312-2444 (Fax)
 info@nextteq.com
Information Source: <http://www.nextteq.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Colorimetric

Unit Cost: Please contact Nextteq or an authorized distributor

Availability: Authorized distributors—United States. HazMat Kits feature gas sampling pumps and detector tubes manufactured by the Gastec Corporation. Nextteq is Gastec's exclusive U.S. master wholesale distributor.

Description: Colorimetric—detector tube and detection paper. Kit to identify unknown gases. Manual gas sampling pump and detector tubes for identifying unknown gases and vapors. M8 Detection Paper for identifying liquid CAs.

Type: Commercial

Current Users: Hazmat teams, first responders, firefighters, and occupational health and safety industries

OPERATIONAL PARAMETERS

CAs Detected: Accurate identification of up to 88 gases, vapors, and liquids—over 500 % more contaminants than the leading competitor

TICS Detected:

- **High Priority:** Yes
- **Medium Priority:** Yes
- **Low Priority:** Yes

Start-up Time: No warmup time required. Less than 1 min to assemble

Detection State: Gas, vapor, and liquid contaminants

Response Time: Nextteq kits require fewer pump strokes and provide faster results than the leading competitor. Direct-read detector tubes expedite accurate sampling without the need for confusing dual-scales or concentration charts.

Alarms: None

Sensitivity: Broader detection ranges mean you can measure contaminants that competitor products can miss. For those chemicals with Threshold Limit Values (TLVs), over 95 % of the kits' quantitative tubes and over 60 % of the kit's qualitative tubes detect at or below the TLV.

Selectivity: Few, if any, interferences

PHYSICAL PARAMETERS

Size: 50 cm x 39 cm x 19 cm (20 in x 16 in x 7.5 in)

Weight: ~6.4 kg (14 lb)

Power Requirements: Always ready. Intrinsically safe, manual operation. No power required.

LOGISTICAL PARAMETERS

Durability: Rugged, high-impact case

Environmental Considerations: Detector tubes operating temperature: 0 °C to 40 °C (32 °F to 104 °F); Detector tubes operating relative humidity: 0 % to 90 % rh

Shelf Life: Shelf life for detector tubes up to 2 yr from date of manufacture

Consumables: Detector tubes and detection papers

Calibration Requirements: No calibration required. All detector tubes and the gas sampling pump are precalibrated.

Repairs: Not applicable

Repair Options: Please contact Nextteq at 877-312-233

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Minimal

Training Required: Simple, step-by-step instructions provided

Training Available: Highly trained customer support and technical team available to answer questions. Telephone Nextteq at 877-312-2333 ext. 20.

Manuals Available: Comprehensive instructions provided

Support Equipment: None

Communications Capability: None

Tamper Resistance: Rugged, high-impact case

Warranty: Yes

Testing Information: Available on request

Applicable Regulations: Not applicable

GENERAL

Aim Commander

Aim
 6555 S. Kenton St., Suite 304
 Centennial, Colorado 80111
 303-781-4062 (Tel)
 800-275-4246 (Tel)
 303-761-6640 (Fax)
 sblado@aeriontech.com
 info@aimsafety.com
 www.aimsafety.com
Information Source:
<http://www.aimsafety.com/Commander.html>

Status: Vendor response—11/15/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry Sensors—electrochemical, catalytic bead, metal oxide semiconductor, and PID sensor

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Carbon monoxide, hydrogen sulfide, sulfur dioxide, chlorine, ammonia, hydrogen cyanide, phosphine, MOS, and PID
- **Medium Priority:** Not specified
- **Low Priority:** Nitric oxide, nitrogen dioxide, and chlorine dioxide

Start-up Time: Not specified

Detection State: Gas and vapor

Response Time: Not specified

Alarms: Alarms/indicators: LED high/low and audible (103 dB @ 1 ft)

Sensitivity: Carbon monoxide at 0 ppm to 500 ppm
 Hydrogen sulfide at 1 ppm to 100 ppm
 Combustible at 0 % to 100 % LEL
 Oxygen at 0 % to 25 %
 Nitric oxide at 0 ppm to 250 ppm
 Nitrogen dioxide at 0 ppm to 20 ppm
 Sulfur dioxide at 0.2 ppm to 20 ppm
 Chlorine at 0.1 ppm to 20 ppm
 Ammonia at 0 ppm to 100 ppm
 Hydrogen at 0 ppm to 1000 ppm
 Hydrogen cyanide at 0 ppm to 30 ppm
 Chlorine dioxide at 0.01 ppm to 1 ppm
 Phosphine at 0.01 ppm to 1 ppm
 MOS at 0 to 500 (not measured in ppm, only a numerical range value)
 PID 10.6 eV at 0 ppm to 1999 ppm

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 15 cm x 13 cm x 7.1 cm (5.9 in x 5.2 in x 2.8 in)

Weight: 595.3 g (21 oz) without pump; 649.2 g (22.9 oz) with pump

Power Requirements: Battery—alkaline (AA batteries) or rechargeable Nickel Metal Hydride (NiMH)
Operating time—alkaline: 28 h (diffusion), 16 h (with pump)
NiMH: 22 h (diffusion), 12 h (with pump)

LOGISTICAL PARAMETERS

Durability: Radio frequency protection —shielded against radio frequency and electromagnetic interferences

Environmental Considerations: -40 °C to 50 °C (-40 °F to 122 °F)—may vary depending on sensor; 0 % to 99 % rh—may vary depending on sensor

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: Not specified

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Display—large LCD with designated line for each sensor reading

Training Required: Not specified

Training Available: Not specified

Manuals Available: Quick start instruction booklet and comprehensive CD manual

Support Equipment: Heavy-duty belt clip; dual cal/pump hood; 16 ft tubing and filter (with pump models); charger adapter (with NiMH models); Know Your Air PC software; and technical support

Communications Capability: Standard software with each model allows you to change your configurations (i.e., alarm settings) and download, view, graph, and analyze measurement data. The data logging models are capable of storing >800 h worth of data and communicate with a PC via use of an IR communication adapter (IR adapter sold separately).

Tamper Resistance: Not specified

Warranty: Standard 2 yr or optional lifetime on electronics; 2 yr on battery cartridges, NiMH battery, sensors (CO, H₂S, LEL, OX) and pump; 1 yr on toxic sensors and PID sensor

Testing Information: Not specified

Applicable Regulations: Hazardous area rating: Intrinsically safe—Class 1, Division 1, Groups A, B, C, and D; CSA approved

GENERAL

Cyranose® 320

Smiths Detection
73 N Vinedo Avenue
Pasadena, California 91107
877-744-1700 (Tel)
626-744-1777 (Fax)
Information Source: <http://www.smithsdetection.com>

Status: Vendor response—11/14/2006



Portability: Handheld Portable

Technology: Polymer Composite; Sensors

Unit Cost: GSA contract number is GS-07F-0582N

Availability: Commercially available

Description: Polymer Composite

Sensors—32 channel polymer composite sensor array

Display—320 x 200 graphic w/LED backlight

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Wide range of organic compounds
- **Medium Priority:** Wide range of organic compounds
- **Low Priority:** Wide range of organic compounds

BAs Detected: Bacteria and natural products

Start-up Time: 10 s	Detection State: Vapor
Response Time: Not specified	Alarms: Not specified
Sensitivity: Not specified	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 10 cm x 22 cm x 5 cm (3.9 in x 8.7 in x 1.97 in)

Inlet probe—5.1 cm (2 in) and 10.2 cm (4 in) needle interchangeable with any standard female Luer lock or slip adapter

Weight: <907 g (32 oz)

Power Requirements: Battery type—NiMH, 4 AA battery pack or 4 AA alkaline

Battery life (normal operating conditions) 3 h

Battery charging—<3 h with external adapter

Universal power adapter—110 V ac to 240 V ac external power adapter

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: Operating temperature—0 °C to 40 °C (32 °F to 104 °F). Humidity—0 % to 95 %, noncondensing. Storage temperature—-20 °C to 50 °C (-4 °F to 122 °F)

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: Field calibration—to be determined

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Not specified

Training Required: Not specified

Training Available: To help you get the most out of your Cyranose™ 320, a 1 d, hands-on, application development course is available. The 1 d course costs \$1K for up to 4 people plus travel expenses for the instructor. Additional attendees will be charged \$500 each.

Manuals Available: Each participant with a Cyranose™ 320 to operate for the duration of the course. Installation copies of the Cyranose™ 320 software (PCnose) for all participants. A copy of all the materials presented during the course.

Support Equipment: Not specified

Communications Capability: Number of methods—5 onboard Cyranose® 320, infinite on PC

Number of classes per method—6

Number of training exposures per class—10

Number of saved identifications—up to 100 logged on Cyranose® 320

Communication*—RS-232 link, up to 57600 bps

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

IlluminatIR ML Package

Smiths Detection Danbury
 21 Commerce Drive
 Danbury, Connecticut 06810
 Ben Twombly
 203-207-9787 (Tel)
 703-753-8485 (Fax)
 ben.twombly@smithsdetection.com
Information Source: <http://www.sensir.com>

Status: Vendor response—11/16/2006



Portability: Vehicle Mounted

Technology: Infrared Micro-Spectroscopy

Unit Cost: \$93K

Availability: 90 d

Description: Infrared Micro-Spectroscopy—Infrared spectrometer mounts to most infinity corrected optical microscopes, thus adding the ability to obtain the infrared fingerprint of the unknown microsample

Type: Commercial

Current Users: This is a technology that has been in use for more than 20 yr and is legally acceptable as scientific evidence in a court of law. This microscope technology has both first responder and public health lab applications, in addition to many other commercial applications such as drug analysis, micro-contamination, chemical, and polymer analysis.

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, and H

Capable of identifying other CAs; requires access to these materials for library development

TICS Detected:

- **High Priority:** Vendor supplied
- **Medium Priority:** Vendor supplied
- **Low Priority:** Vendor supplied

Start-up Time: Between 5 min and 30 min	Detection State: Liquid, powder, or gel
Response Time: Collect a sample—11 s to 60 s Analyze a sample—61 s to 2 min Total time—>2 min	Alarms: Visible alarm
Sensitivity: Level of detection (LOD) identification for powder and liquid	Selectivity: Noncritical interferents, i.e., water and mixtures

PHYSICAL PARAMETERS

Size: 48 cm x 41 cm x 67 cm (19 in x 16 in x 26 in) in addition to laptop computer	Weight: 22.7 kg (50 lb)
Power Requirements: 12 V vehicle power or ac powered	

LOGISTICAL PARAMETERS

Durability: Able to operate after being moved but with considerable regard to handling. Auto calibrates.

Environmental Considerations: Operation is restricted to certain environments (climate controlled)—10 °C to 40 °C (50 °F to 104 °F)

Shelf Life: Source, laser and laser power supply should be replaced every 2 yr to 3 yr

Consumables: Not applicable

Calibration Requirements: System automatically calibrates itself before every use

Repairs: Smiths Detection provides a 24 h, 7 d a week support capability. This program provides assistance in the identification of chemicals and chemical compounds as well as technical support on system operation and troubleshooting by Smiths Detection spectroscopists, chemists, electrical engineers, and software engineers.

Repair Options: Turn around time for repair is typically 5 d to 10 d for depot repair. Field technical support is typical; phone technical support is 24/7.

Maintenance Costs: \$4.5K every 2 yr to 3 yr for source, laser and laser power supply, to be installed by certified Smiths Detection technician

SPECIAL REQUIREMENTS

Operator Skills: Minimal training; push button operation

Training Required: 1.5 d

Training Available: 1.5 d training at Danbury, Connecticut; on-site available

Manuals Available: User and software manuals

Support Equipment: None required

Communications Capability: Computer control, computer interface, networking capability, hardwire capability, and installed data processing equipment

Tamper Resistance: Password protected interface

Warranty: 1 yr

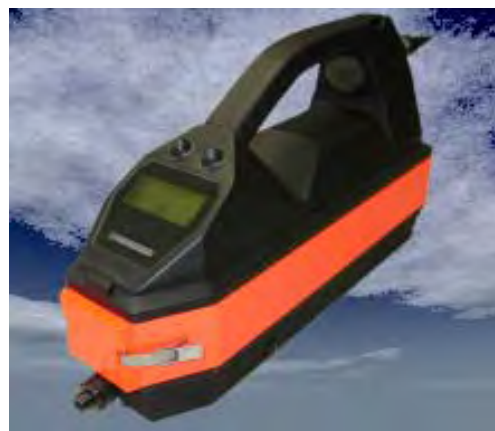
Testing Information: System automatically aligns itself and continually runs self diagnostic program to ensure optimal performance

Applicable Regulations: None

GENERAL

Airsense Model (GDA-II GDA-II-NA)

Airsense Analytics
 North American POC
 Airsense NA/JLA
 14114 Briarhills Parkway
 Houston, Texas 77077
 David Long
 281-759-4644 (Tel)
 281-870-8229 (Fax)
 jdavidlong@sbcglobal.net
Information Source: <http://www.airsense.com>
 AirsenseNA@msn.com
 jdavidlong@sbcglobal.net
 info@airsense.com



Status: Vendor response—4/1/2006

Portability: Handheld Portable; Handheld Stationary (with computer interface); or Vehicle Mounted

Technology: Ion Mobility Spectrometer

Unit Cost: \$48K to \$54K in single unit lots

Availability: Detector availability will depend on the size of the individual order, the existence of a production backlog, or any special modifications required by the ordering agency. (We make custom modifications to production units**.) Allow 6 wk to 8 wk for delivery (**especially changes in the substance data base).

Description: Ion Mobility Spectrometer—TICs

PID—General detector for TICs/TIMs but preferred sensitivity for aromatic compounds

ECC—Broadening the spectrum for special toxic compounds

SC—Additional chemo-electric sensors with selectivity for some members or groups of the TICs but in general leading to the very broad detection capability

Unique combination of different detectors (ion mobility spectrometry, photoionization detector, electrochemical cell, metal oxide sensor technology). Detectors operate concurrently, to determine if gaseous compounds being sampled are of sufficient concentrations to be identified as a threat. Instrument carries out the sampling by the use of the internal pump.

Type: Commercial

Current Users: Homeland security, police, fire, EMS, and military. The equipment is in field test in Germany and Italy, it has been “tested” by German government, developed in close cooperation with first responders over the past 4 yr.

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Ammonia, carbon disulfide, chlorine, formaldehyde, hydrogen chloride, hydrogen cyanide, hydrogen fluoride, hydrogen sulfide, phosgene, and sulfur dioxide
- **Medium Priority:** Acrolein, acrylonitrile, carbon monoxide, nitrogen dioxide, and phosphine
- **Low Priority:** Acetic acid, acetone, benzene, carbon dioxide, chlorobenzene, chloroacetylene, hydrazine, ethanol, hexane-n-, methanol, styrene, tetrachloroethylene, toluene, toluene diisocyanate, trichloroethane 1,1,1-, trichloroethane 1,1,2-, trichloroethylene, and vinyl chloride

Start-up Time: 30 s to 3 min equipment set-up time
 60 s to 5 min detector warm-up time

Detection State: Vapor and aerosol
 Expansion with KNG device (desorber option) enables the detection of compounds adsorbed onto surfaces

Response Time: 1) Collect a sample (instantly); 2) analyze the sample (5 s to 1 min); 3) identify the sample and obtain results (1 min to 5 min)

Alarms: Audible, visible, and auto alarm

Sensitivity: IMS, SC: Acetic acid at 20 ppm, acrylonitrile at 20 ppm, methanol at 500 ppm, and tetrachloroethylene at 100 ppm

IMS, PID, SC: Acetone at 500 ppm, ethanol at 3000 ppm, and styrene at 40 ppm

IMS, EC, SC: Ammonia at 50 ppm (IMS, EC, SC)

IMS, EC: Chlorine at 1 ppm, hydrogen chloride at 5 ppm, hydrogen cyanide at 5 ppm, hydrogen fluoride at 5 ppm,

hydrogen sulfide at 10 ppm, sulfur dioxide at 1 ppm, and sulfur dioxide at 1 ppm
IMS: Carbon disulfide at 10 ppm, chloroacetylene at 0.3 ppm, hydrazine at 1 ppm, nitrogen dioxide at 1 ppm, toluene diisocyanate at 0.02 ppm, trichloroethane 1,1,1- at 300 ppm, trichloroethane 1,1,2- at 25 ppm
IMS, PID: Trichloroethylene at 100 ppm
PID, SC: Benzene at 20 ppm, chlorobenzene at 100 ppm, hexane-n- at 200 ppm, and toluene at 100 ppm
PID, SC, EC: Vinyl chloride at 100 ppm
SC: Acrolein at 0.2 ppm, carbon monoxide at 100 ppm, and formaldehyde at 1 ppm
EC: Phosgene at 0.1 ppm and phosphine at 0.5 ppm
Carbon dioxide at 10 000 ppm

Selectivity: False negatives are minimized due to broad sensing capability. False positives are similar compounds having same chemical nature, functional groups, and molecule size. The instrument uses the multiple sensor technology, thus a lot of orthogonal information and partially user interaction, in order to reduce interferences.

PHYSICAL PARAMETERS

Size: 20 cm x 38 cm x 10 cm (8 in x 15 in x 4 in)

Weight: 3.5 kg (7.7 lb) without battery; 4.2 kg (9.2 lb) battery powered

Power Requirements: Battery and ac powered

Battery powered (operates on nonstandard or special order batteries Lithium ion, 14 V, 4.5 Ah)

Vehicle 12 V DC negative ground or ac powered; ac autoranging power supply

LOGISTICAL PARAMETERS

Durability: Capable of normal operation without regard to handling beyond normal reasonable care. Will not sustain operation following free fall drop onto concrete from any height. System autocalibrates or can be calibrated at the factory.

Environmental Considerations: X housing is water-proof, no droplets should be sucked in with the sample gas

Operates in most environments (rain, snow, fog, and high humidity)— -15 °C to 35 °C (5 °F to 95 °F) during operation

Shelf Life: Electrochemical cell has to be exchanged after 1 yr storage; longer storage times (>1 wk, >1 mo) cause a prolonged set up time (>3 min to <15 min); clean storage environment is preferable

Consumables: Spare set of zero filters, electrochemical cell, test solutions, calibration substances, inlet particle filters, and tubing

Calibration Requirements: System check (no calibration but validation of functionality (once a week or just before use, automatic)—12 min

Sensor calibration (automatic, once a week)—10 min

PID calibration (as known from various PID instrumentation)—5 min (once a year or more often, depends on use)

Repairs: To maintain operational readiness, it is required, that the user keeps up with plans for system check procedure, which he carries out on his own. Important maintenance procedures (flush with clean air, exchange of filters, exchange electrochemical Cell, 1 yr factory service for IMS required. Fed. Reg. not withstanding.) can be carried out by the user himself.

Repair Options: Plan to have 24 h turn around; plan to have loaner if need arises.

Technical support (18 h/d depending on time difference). Currently 13 wk backlog on instruments.

Maintenance Costs: Airsense Annual Maintenance Contract: Covers all parts and labor associated with scheduled routine maintenance, including air freight charges to and from location, and Replace consumable supplies when needed, including batteries. \$3.1K/yr. Contact for details.

SPECIAL REQUIREMENTS

Operator Skills: No special skills above minimal training required at level one operation. Level two operation requires special training and experiential skills. Level three operation requires special skill and special training.

Training Required: Level one: 1 d; Level two: 3 d; and Level three: 3 d

Training Available: Training results in certification/recertification

Manual and CD/DVD training available

Manuals Available: Complete manual, short instruction manual for on-site operation, guidelines, procedures, and forms for reports on CD

Support Equipment: None for level one operation computer with serial interface (or USB/Ser-Adapter), additional test gases can be provided. New option: clean storage accessory allows GDA to be stored in “operation immediate ready” condition allowing instant access to clean instrument. No further equipment is required if complete package is acquired.

Communications Capability: Command control communications (from the computer that is attached); computer (control); computer interface; interoperability (Windows); radio frequency (RF) communication (planned future option); networking capability; hardwire capability (RS-232); and installed data processing equipment

Tamper Resistance: Level one is simply activated during switch-on. Level two/three operability is password protected (password protection for setup changes).

Warranty: 1 yr from date of delivery. Recommended use according to technical specifications and guidelines and observation of handling rules and guidelines. Check procedures and service procedures are required. Parts and labor are covered.

Testing Information: System is in various validation programs. Some of the reports are expected soon to be made public.

Applicable Regulations: The GDA 2 contains a radioactive source (Ni63) in the process of being licensed for use by the U.S. NRC. With European regulations, no license is needed to use and operate the GDA2 instrument, since the radioactive source has an activity below the limit that requires any licenses (100MBeq with Ni63). A user in the U.S. needs a license for operation of the instrument.

GENERAL

MINICAMS Series 2001/3001 Continuous Air Monitoring Systems

CMS Field Products, Division of OI Analytical
 2148 Pelhem Parkway
 Building 400
 Pelhem, Alabama 35124-1131
 Greg Houston, Sales Manager
 205-733-6900 (Tel)
 205-733-6919 (Fax)
 cmssales@oico.com
Information Source: <http://www.oico.com>

Status: Vendor response—4/1/2006



Portability: Fixed-Site, Cart, or Vehicle Mounting/Operation

Technology: Gas Chromatography

Unit Cost: Varies with configuration; information available upon request

Availability: Commercially available

Description: Gas Chromatography with element-selective detection and integral sample collection with solid adsorbent preconcentration or fixed-volume loop. Accessories for continuous sampling, multi-point sampling, and status reporting are available as part of the product line.

Multiple point sampling for trace or high-level detection—The MINICAMS is an automated continuous air monitoring system. It collects an air sample, performs an analysis, and reports the result. Various plug-in GC modules maximize selectivity and sensitivity for detection of all CAs and a variety of other compound classes. Available detectors include: FPD; PFPD; XSD; PID; and FID.

Type: Commercial

Current Users: Field proven capabilities with operational systems in various stockpile and nonstockpile destruction facilities

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, HN1, HN₂, HN₃ and L

TICS Detected:

- **High Priority:** Includes Carbon disulfide; ethylene oxide; hydrogen sulfide; phosgene; additional application information available upon request
- **Medium Priority:** Includes acrolein; acrylonitrile; methyl bromide; methyl mercaptan; phosphine; additional application information available upon request
- **Low Priority:** Includes cyanogen chloride; dimethyl sulfate; additional application information available upon request

Start-up Time: <30 min

Detection State: Vapor and aerosol

Response Time: The MINICAMS cycle times are as short as 3 min to detect extremely low levels of CAs. Response times are method-dependent.

Alarms: Integral audible/visual alarms; remote notification via process control interface or CHROM-NET monitoring data acquisition and reporting network.

Sensitivity: Capable of monitoring CW agents at their respective STELs with cycle times of 5 min to 10 min; near-real-time monitoring of agents at the WPL when properly configured. Cycle times and sensitivities for most compounds are method-dependent; additional information regarding specific applications is available upon request.

Selectivity: PFPD, XSD provide extremely high sensitivity for S-, P-, and Cl-containing species

PHYSICAL PARAMETERS

Size: 31 cm x 31 cm x 25 cm (12 in x 12 in x 10 in)
 Footprint: 774 cm² (120 in²); volume: 0.024 m³ (1440 in³)

Weight: 8.2 kg (18 lb)

Power Requirements: 110 (+/-10 %) V ac, 50 Hz to 60Hz; 600 W peak

LOGISTICAL PARAMETERS

Durability: MINICAMS and its accessories are designed for use in the most rugged environments. The equipment can be packaged in high-impact, foam-lined plastic cases or in rugged fly-away packages designed for rapid deployment in response to CA emergencies. Numerous CMS customers also have mounted the MINICAMS in mobile trucks or vans and use the

MINICAMS routinely to monitor hundreds of widely separated storage igloos at eight different U.S. CA storage sites and to monitor demilitarization sites during destruction operations.

Environmental Considerations: Operating temperature: 0 °C to 40 °C (32 °F to 104 °F)

Storage temperature: -10 °C to 60 °C (14 °F to 140 °F)

Shelf Life: Not applicable

Consumables: Carrier gas (nitrogen or helium); detector operating gases (hydrogen and/or air); electrical power; preconcentration tubes; specific information on consumption rates is available upon request

Calibration Requirements: Yes

Repairs: The plug-in sample-analysis modules can be replaced with no special tools within 2 min to minimize downtime and to facilitate reconfiguration

Repair Options: No loaners, but if one is available, it may be loaned, depending on the critical mission. A spare module would be a good purchase. No set policy on loaners. Turn around time depends on what is wrong with the instrument. Case by case basis, unlimited phone support during business hours (8 am to 5 pm central time) at no charge to customer. On site service is available through service contract. Can overnight a part if customer can fix it himself.

Maintenance Costs: Varies with configuration; information available upon request

SPECIAL REQUIREMENTS

Operator Skills: Operator training; no special skills

Training Required: Operator training is strongly recommended

Training Available: Operator certification; maintenance certification; custom training options are available

Manuals Available: Operation manuals

Support Equipment: CMS has created a family of accessories that allows a MINICAMS monitoring system to be used for multiple applications, including monitoring at very low agent concentrations and at much higher concentrations simultaneously.

Communications Capability: Process control interface allows configurable relay and 4/20mA output to a PLC; CHROM-NET monitoring data acquisition network logs chromatograms, operating conditions, parameter changes, and monitoring data for up to 32 MINICAMS per host; multi-host networks are available; CHROM-NET data can be exported to a LIMS or FCS; remote Monitoring Status Panels allow CHROM-NET to transmit monitoring status to work zones or other remote areas

Tamper Resistance: CHROM-NET provides comprehensive parameter change tracking

Warranty: All MINICAMS come with a limited 1-yr factory warranty. Extended service contracts are available.

Testing Information: Evaluation of new methods and hardware is ongoing. MINICAMS have been independently vapor-validated for CA monitoring. Information is available upon request.

Applicable Regulations: Series 3001 systems are classified as a defense article under the ITAR and require a DOS export license for international sales

GENERAL

Toxalert TOXCONTROL Gas Detection Systems
Tox-Control (Tox-C)

ToxAlert, Inc.
P.O. Box 159
Mound, Minnesota 55364
952-472-4541 (Tel)
952-472-4960 (Fax)
mail@toxalert.com
Information Source: <http://www.toxalert.com>



Status: Vendor response—11/17/2006

Portability: Fixed-Site Detection

Technology: Controller

Unit Cost: Not specified

Availability: 4 wk

Description: Controller for continuous space monitoring. Electrochemical, metal-oxide semiconductor, and infrared.

Type: Commercial

Current Users: Commercial/industrial, municipal, governmental, and military

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Toxics
- **Medium Priority:** Not specified
- **Low Priority:** Combustibles, oxygen depletion, and refrigerants

Start-up Time: Not specified

Detection State: Vapor

Response Time: 90 s

Alarms: Visual and audible

Sensitivity: Below IDLHs

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified

Weight: Not specified

Power Requirements: ac

LOGISTICAL PARAMETERS

Durability: Must remain stable

Shelf Life: 1 yr

Repairs: Not specified

Maintenance Costs: Not specified

Consumables: Sensors, availability 4 wk

Environmental Considerations: Operating temperature -18 °C to 50 °C (0 F to 122 °F); relative humidity 5 % to 95 % noncondensing

Calibration Requirements: Frequency—3 mo intervals. Can be done by end user or manufacturer.

Repair Options: Toxalert does not have a loaner control unit because each controller is built according to job specifications. The specifications may vary from just a little to a great deal on each job, therefore, there are no loaner control units. The lead time for sensors to be repaired also varies. Depending on sensor type, turn-around time may vary from a few days to 6 wk. There is a tech support 24/7 number for toxic gases; otherwise 8 am to 4:30 pm.

SPECIAL REQUIREMENTS

Operator Skills: No special skills required but training is recommended

Training Required: 1 h

Training Available: Factory or field

Manuals Available: User manual

Support Equipment: None

Communications Capability: BACnet protocol

Tamper Resistance: Key locking and password

Warranty: 1 yr

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

Griffin 300

ICx Griffin Analytical Technologies
 3000 Kent Avenue
 West Lafayette, Indiana 47906
 765-775-1701 (Tel)
 765-496-6489 (Fax)
 info@griffinanalytical.com
 sales@griffenanalytical.com
Information Source: <http://www.griffinanalytical.com>

Status: Vendor response—11/21/2006



Portability: Fixed-Site Analytical Laboratory

Technology: GC/MS/MS

Unit Cost: \$57K base price

Availability: Commercially available. In production.

Description: GC/MS/MS—Our technology and expertise enable us to bring the laboratory “gold standard” of MS into the field, providing customers the unique ability to perform analysis on-site and in real-time. Griffin’s patented core CIT analyzer technology allows for miniaturization without sacrificing performance [Griffin’s products are distinguished as the only fieldable GC/MS systems capable of multidimensional mass analysis (MS/MS)]. MS/MS provides unparalleled selectivity by offering two levels of analysis: one that determines if the analyte of interest is present in the sample, and a second, which further confirms the analyte’s identity. The question of “how much?” can also be addressed with accurate quantitative analysis. Specialized for research, teaching, and method development, the Griffin 300 provides fast chemical analysis in a small, durable form factor. Because the 300 employs the same CIT technology as other Griffin products, chemical analysis methods can be developed on the instrument in a laboratory environment and then transferred easily, directly, and safely to other Griffin products. This flexibility adds value by allowing these methods to be taken into the field by users with varying levels of expertise.

Type: Commercial

Current Users: We currently deliver value to our customers in broadly defined markets including defense, homeland security, environmental health and safety, and research and development. By integrating our unique analyzer technology with specialized form factors and user-appropriate software, Griffin’s products can be deployed to an array of environments, from the safety of a laboratory to the most dangerous “hot zones.”

OPERATIONAL PARAMETERS

CAs Detected: Yes

TICS Detected:

- **High Priority:** Yes
- **Medium Priority:** Yes
- **Low Priority:** Yes

Start-up Time: 20 min to 30 min	Detection State: Molecular
Response Time: Seconds to minutes	Alarms: Visual
Sensitivity: Griffin GC/MS and MS/MS products positively confirm the presence of CAs, explosives, TICs and other organic compounds, including both volatile and many semi-volatile components at parts-per-trillion concentrations in air, soil, water, and food	Selectivity: No interferents

PHYSICAL PARAMETERS

Size: 38 cm x 25 cm x 50 cm (15.5 in x 10.2 in x 20.4 in)	Weight: 17.7 kg (39 lb)
Power Requirements: 115 V ac to 220 V ac, 50/60 Hz (UL approved power supply)	

LOGISTICAL PARAMETERS

Durability: Rugged unit, easy access side doors and top hatch for routine maintenance.

Environmental Considerations: Not specified

Shelf Life: Years

Consumables: Carrier gas available from many sources

Calibration Requirements: Mass calibration is automatic or manually performed. Compound calibration is manually performed.

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Multilevel software available to meet the operator skill and analysis requirements

Training Available: Yes

Support Equipment: None

Tamper Resistance: Not specified

Testing Information: Available upon request and clearances

Training Required: Yes

Manuals Available: Yes

Communications Capability: Yes

Warranty: 90 d on expendables; 1 yr for instrumentation

Applicable Regulations: Not specified

GENERAL

Draeger Hazmat Kit

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—11/21/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: \$2.2K per complete HazMat Kit

Availability: Commercially available

Description: Color Change Chemistry

Type: Military and commercial

Current Users: U.S. Army, Navy Regional Fire/Rescue, and fire departments (New York City, Kansas City, and Missouri)

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Arsine, chlorine, hydrogen cyanide, and phosgene
- **Medium Priority:** Carbon monoxide, hydrogen selenide, and phosphine
- **Low Priority:** Perchloroethylene, toluene, hydrocarbons, acetone, alcohols, and trichloroethylene

Start-up Time: 1 min	Detection State: Vapor and aerosol
Response Time: 20 min to 30 min for complete tube unknowns capability	Alarms: Visual alarm
Sensitivity: Ammonia (NH ₃) at 0.25 ppm Chlorine (Cl ₂) at 0.2 ppm Hydrogen cyanide (HCN) at 2 ppm Hydrogen sulfide at 5 ppm Nitric acid (HNO ₃), fuming—qualitative Carbon monoxide at 10 ppm Nitrogen dioxide at 0.5 ppm (as NOX) Nitrogen oxide at 0.5 ppm (as NOX) 200 ppm Ethylacetate at 200 ppm	Selectivity: Responds only to chemical agents and TIMs

PHYSICAL PARAMETERS

Size: 49 cm x 39 cm x 19 cm (19.3 in x 15.5 in x 7.5 in)

Weight: 6.8 kg (15 lb)

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Contained in durable case with foam inserts for protection

Environmental Considerations: May be used under normal environmental conditions

Shelf Life: Detector tubes—2 yr shelf life

Consumables: 17 boxes of Hazmat Kit contains 17 boxes of regular short term Draeger Tubes and you follow a decision matrix

Calibration Requirements: None

Repairs: None

Repair Options: No loaners, but rental program is available; 24 h turn-around time (\$20) and 72 h turn-around time (\$10) to look at the equipment, but not repaired and returned. Rental program for most all equipment, but not for IMS.

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: 60 min of training is required
Training Available: Yes; operator training CD (tubes)	Manuals Available: User manual and matrix charts
Support Equipment: None	Communications Capability: None
Tamper Resistance: None	Applicable Regulations: None

Testing Information: None

Warranty: Accuro bellows pump—5 yr warranty; CDS Sets—2 yr according to expiration date

GENERAL

Draeger Hazmat Simultest Kit

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—11/21/2006



Portability: Handheld Portable

Unit Cost: Approximately \$1.6K

Availability: Commercially available

Description: Color Change Chemistry

Type: Commercial

Current Users: Not specified

Technology: Color Change Chemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** HCl, HCN, NH₃, phosgene, and chlorine
- **Medium Priority:** CO and H₂S
- **Low Priority:** SO₂, NO_x, and organics

Start-up Time: Not applicable

Detection State: Gas and vapor (semi-quantitative)

Response Time: 1 min

Alarms: None

Sensitivity: Ammonia 50 ppm to 250 ppm
 Hydrogen cyanide 10 ppm to 50 ppm
 Hydrogen chloride 5 ppm to 25 ppm
 Carbon monoxide 30 ppm to 150 ppm
 Chlorine 2.5 ppm
 Hydrogen sulfide 10 ppm to 50 ppm
 Phosgene 0.5 ppm
 Phosphine 0.1 ppm to 5000 ppm
 Sulfur dioxide 10 ppm
 Nitrous gases 5 ppm to 25 ppm
 Alcohols 100 ppm to 500 ppm
 Ketones 50 ppm to 100 ppm
 Aromatics 50 ppm to 100 ppm
 Aliphatics 200 ppm to 1000 ppm
 Chlorinated hydrocarbons 1000 ppm to 5000 ppm

Selectivity: Tube dependent

PHYSICAL PARAMETERS

Size: 49 cm x 39 cm x 19 cm (19.3 in x 15.5 in x 7.5 in)

Weight: 6.8 kg (15 lb)

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Impact resistant. It is a padded kit with handle.

Environmental Considerations: 10 °C to 30 °C (50 °F to 86 °F) up to 95 % rh

Shelf Life: Tubes—2 yr

Consumables: Detector tubes

Calibration Requirements: None

Repairs: None

Repair Options: No loaners, but rental program is available; 24 h turn-around time (\$20) and 72 h turn-around time (\$10) to look at the equipment, but not repaired and returned. Rental program for most all equipment, but not for IMS.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Minimal
Training Available: Yes, operator training CD	Manuals Available: Sampling pump
Support Equipment: None	Communications Capability: None
Tamper Resistance: Not specified	Warranty: 5 yr (pump)
Testing Information: Not specified	Applicable Regulations: Tube disposal

GENERAL

CMS Analyzer

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—11/21/2006



Portability: Handheld Portable

Unit Cost: Approximately \$1.7K

Availability: Commercially available

Description: Color Change Chemistry/Optics

Type: Commercial

Current Users: Not specified

Technology: Color Change Chemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Formaldehyde, HCl, HCN, NH₃, H₂S, phosgene, and chlorine
- **Medium Priority:** CO and phosphine
- **Low Priority:** SO₂, NOX, vinyl chloride, organics

Start-up Time: 10 s	Detection State: Gas and vapor
Response Time: 30 s to 10 min	Alarms: None
Sensitivity: Ammonia 0.2 ppm to 2000 ppm Hydrogen cyanide 2 ppm to 50 ppm Hydrogen chloride 1 ppm to 500 ppm Formaldehyde 0.2 ppm to 5 ppm Carbon monoxide 5 ppm to 150 ppm Chlorine 0.2 ppm to 10 ppm Hydrogen sulfide 0.2 ppm to 2500 ppm Phosgene 0.05 ppm to 2 ppm Phosphine 0.1 ppm to 5000 ppm Sulfur dioxide 0.4 ppm to 150 ppm Nitrous gases 0.5 ppm to 200 ppm Vinyl chloride 0.3 ppm to 250 ppm	Selectivity: Chip dependent

PHYSICAL PARAMETERS

Size: 10 cm x 22 cm x 6.4 cm (4.1 in x 8.5 in x 2.5 in)

Weight: 726 g (25.6 oz)

Power Requirements: Four 1.5 V AA batteries

LOGISTICAL PARAMETERS

Durability: Impact resistant

Environmental Considerations: 0 °C to 40 °C (32 °F to 104 °F) up to 95 % rh

Shelf Life: Chips—2 yr

Consumables: Measuring chips and batteries

Calibration Requirements: No gas calibration required

Repairs: Annual maintenance

Repair Options: No loaners, but rental program is available; 24 h turn-around time (\$20) and 72 h turn-around time (\$10) to look at the equipment, but not repaired and returned. Rental program for most all equipment, but not for IMS.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Minimal
Training Available: Yes, operator training CD	Manuals Available: User manual
Support Equipment: Remote sampling system	Communications Capability: None
Tamper Resistance: Not specified	Warranty: 1 yr
Testing Information: 3rd party validation	Applicable Regulations: None

GENERAL

Draeger CMS Emergency Response Kit

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—11/21/2006



Portability: Handheld Portable

Unit Cost: Approximately \$3.6K

Availability: Commercially available

Description: Color Change Chemistry/Optics

Type: Commercial

Current Users: Not specified

Technology: Color Change Chemistry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Formaldehyde, HCl, HCN, NH₃, H₂S, phosgene, and chlorine
- **Medium Priority:** CO and phosphine
- **Low Priority:** SO₂, NOX, vinyl chloride, organics

Start-up Time: 10 s	Detection State: Gas and vapor
Response Time: 30 s to 10 min	Alarms: None
Sensitivity: Ammonia 0.2 ppm to 2000 ppm Hydrogen cyanide 2 ppm to 50 ppm Hydrogen chloride 1 ppm to 500 ppm Formaldehyde 0.2 ppm to 5 ppm Carbon monoxide 5 ppm to 150 ppm Chlorine 0.2 ppm to 10 ppm Hydrogen sulfide 0.2 ppm to 2500 ppm Phosgene 0.05 ppm to 2 ppm Phosphine 0.1 ppm to 5000 ppm Sulfur dioxide 0.4 ppm to 150 ppm Nitrous gases 0.5 ppm to 200 ppm Vinyl chloride 0.3 ppm to 250 ppm	Selectivity: Chip dependent

PHYSICAL PARAMETERS

Size: 49 cm x 39 cm x 19 cm (19.3 in x 15.5 in x 7.5 in)

Weight: 7.3 kg (16 lb)

Power Requirements: Four 1.5 V AA batteries

LOGISTICAL PARAMETERS

Durability: Impact Resistant

Environmental Considerations: 0 °C to 40 °C (32 °F to 104 °F) up to 95 % rh

Shelf Life: Chips—2 yr

Consumables: Measuring chips and batteries

Calibration Requirements: No gas calibration required

Repairs: Annual maintenance. Check

Repair Options: No loaners, but rental program is available; 24 h turn-around time (\$20) and 72 h turn-around time (\$10) to look at the equipment, but not repaired and returned. Rental program for most all equipment, but not for IMS.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Minimal
Training Available: Yes, operator training CD	Manuals Available: User manual
Support Equipment: Remote sampling system	Communications Capability: None
Tamper Resistance: Not specified	Warranty: 1 yr
Testing Information: 3rd party validation	Applicable Regulations: None

GENERAL

Draeger Multi-IMS

Draeger Safety, Inc.
 101 Technology Drive
 Pittsburgh, Pennsylvania 15275
 412-787-8383 (Tel)
 800-922-5518 (Tel)
 800-922-5519 (Fax)
 ed.ligus@draeger.com
Information Source: <http://www.draeger.com>

Status: Vendor response—11/21/2006



Portability: Handheld Portable

Technology: Ion Mobility Spectrometry

Unit Cost: <\$10K

Availability: Commercially available (no military)

Description: Ion Mobility Spectrometry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, HN, and HCN

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Acrylonitrile, acetic acid, pentane, n-hexane
- **Low Priority:** Not specified

Start-up Time: 3 min	Detection State: Gas and vapor
Response Time: <5 s	Alarms: Audible and visual alarm
Sensitivity: Nerve at 0.01 mg/m ³ to 0.1 mg/m ³ Blister at 0.5 mg/m ³ to 2.0 mg/m ³ Blood at 20 mg/m ³ to 50 mg/m ³	Selectivity: Cross sensitivities inherent to technology

PHYSICAL PARAMETERS

Size: 24 cm x 10 cm x 4.6 cm (9.5 in x 4 in x 1.8 in)	Weight: 794 g (28 oz)
Power Requirements: Li Ion rechargeable battery	

LOGISTICAL PARAMETERS

Durability: MIL-STD-810E	Environmental Considerations: -29 °C to 49 °C (-20 °F to 120 °F) up to 95 % rh
Shelf Life: Not specified	Consumables: Inlet filter (6 mo)
Calibration Requirements: Not specified	Repairs: Pump (3000 h)

Repair Options: No loaners, but rental program is available; 24 h turn-around time (\$20) and 72 h turn-around time (\$10) to look at the equipment, but not repaired and returned. Rental program for most all equipment, but not for IMS.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Yes, operator training CD	Manuals Available: User manual
Support Equipment: Battery charger and test gas	Communications Capability: RS-232
Tamper Resistance: Not specified	Warranty: 1 yr
Testing Information: SBBCOM	Applicable Regulations: NRC License

GENERAL

DAXEL 2C

MGP Instruments
 5000 Highlands Pkwy
 Suite 150
 Smyrna, Georgia 30082
 770-432-2744 (Tel)
 770-432-9179 (Fax)
 770-432-2744 (Tel)
Information Source: <http://www.mgpi.com>
Status: Vendor response—11/1/2005



Portability: Vehicle Mounted (stand-alone for mobile field identification)

Technology: Gas Chromatography

Unit Cost: Not specified

Availability: Commercially available

Description: Gas Chromatography, Pyrolysis, and Mass Spectrometry—The essential elements of DAXEL 2C were selected and adapted to obtain high performance analysis in the field: a fast GC is used for a quick separation of mixture; a Metastable Atom Bombardment © 1 source as a low energy ion source which improves molecular ion intensity; and a Time Of Flight (TOF) mass analyzer ensures high sensitivity and fast data acquisition.

Type: Commercial

Current Users: DAXEL 2C is an advanced technology instrument designed to analyze chemical compounds in the field. It can be used for evaluation of military and terrorism threats, risk assessments from chemical industries, on-line environmental monitoring, and identification of illegal compounds and explosives.

OPERATIONAL PARAMETERS

CAs Detected: CA detection and identification

TICS Detected:

- **High Priority:** TIC detection and identification
- **Medium Priority:** TIC detection and identification
- **Low Priority:** TIC detection and identification

Start-up Time: Start up time: <30 min (device under atmospheric pressure)	Detection State: Inlet lines for solid, liquid, and gaseous samples
Response Time: Response time: 1 min to 10 min (GC run)	Alarms: Identification is achieved by comparison with a database and delivers directly the name of the compound and its safety information
Sensitivity: Performances: Mass range: 1 amu to 1500 amu Maximum full scan acquisition rate: 100 spectra/s Dynamic range: >10 ⁵ , counting Resolution: >1400 Sensitivity: ppb level (depending on the sample and the inlet system used)	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 50 cm x 60 cm x 70 cm (19.6 in x 23.6 in x 27.5 in) and 50 cm x 60 cm x 40 cm (19.6 in x 23.6 in x 15.7 in)

The device is compact, two cases ready for transportation and requires only a power source

Weight: 89.8 kg (198 lb); 59.9 kg (132 lb)

Power Requirements: 220 V, 50 Hz; 110 V, 60 Hz (option); power consumption: 1.8 kW

LOGISTICAL PARAMETERS

Durability: Ruggedized compact stand-alone device

Environmental Considerations: Temperature range: 5 °C to 45 °C (41 °F to 113 °F) (operating environment); -30 °C to 60 °C (-22 °F to 140 °F) (storage condition); and <80 % rh, non condensing

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: Not specified

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Provides intuitive screens for instrument's operation and maintenance. Specifically designed for nonspecialized operators. Safety information screen on detected products.

Training Required: Not specified

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Standard compounds database: NIST library >140 000 chemicals ©^2; library creation tools; historical logfile

Communications Capability: The integrated computer manages the instrument's operation, acquisition, processing of the analysis, and enables data export for further analysis. Data export function for further evaluation.

Dedicated software on two levels: Supervisor with full access to instrument's configuration and operator with easy and user friendly interface

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: The DAXEL technology has been validated by the FDA (U.S.), the DSTL (U.K.), and the DDSSC (F)

Applicable Regulations: Not specified

GENERAL

Dräger GC-IMS 5700

Dräger Safety AG & Co. KGaA
 Volmerstrasse 7b
 12489 Berlin, Federal Republic of Germany
 Dräger Safety, Inc.
 Houston, Texas
 281-207-1212 (Tel)
 281-498-5190 (Fax)
 victor.hoang@draeger.com
Information Source: <http://www.draeger-safety.com>



Status: Vendor response—4/10/2006

Portability: Fixed-Site Detection

Technology: Ion Mobility Spectrometry

Unit Cost: Dräger IMS 5100 and Dräger GC-IMS 5700 each cost \$45K per unit, and up to \$65K for full performance

Availability: Commercially available (4 wk to 6 wk lead time)

Description: Ion Mobility Spectrometry with integrated CG column

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, VX, HD, L, GF, HN, and HCN

TICS Detected:

- **High Priority:** Ammonia, CS₂, chlorine, hydrogen bromide, hydrogen chloride, hydrogen cyanide, and phosgene.
- Note: Other TIMs on request. LODs specified for 20 °C (68 °F) and 50 % rh. Some substances detectable as a group.
- **Medium Priority:** Other TIMs on request. LODs specified for 20 °C (68 °F) and 50 % rh. Some substances detectable as a group.
- **Low Priority:** Other TIMs on request. LODs specified for 20 °C (68 °F) and 50 % rh. Some substances detectable as a group.

Start-up Time: Sample throughput 40 samples per hour (sequentially). Clear down time approximately 60 s.

Detection State: Gaseous, vapor, and liquid (at room temperature)

Response Time: <90s

Alarms: Visual alarm

Sensitivity: LODs specified for 20 °C (68 °F) and 50 % rh. Some substances detectable as a group.

Selectivity: Clear down time approximately 60 s

GA (liquid) at 0.06 ppb

GB (liquid) at 0.2 ppb

GD (liquid) at 0.6 ppb

VX (liquid) at 0.04 ppb

HD (liquid) at 0.4 ppb

L (liquid) at 1.8 ppb

GF (liquid) at 1 ppb

Ammonia (liquid) at 10 ppb

CS₂ (gaseous) at 10 ppb

Chlorine (gaseous) at 10 ppb

Hydrogen bromide (gaseous) at 50 ppb

Hydrogen chloride (gaseous) at 10 ppb

Hydrogen cyanide (gaseous) at 20 ppb

Phosgene (gaseous) at 10 ppb

Note: Other TIMs on request

PHYSICAL PARAMETERS

Size: 35 cm x 46 cm x 13 cm (13.8 in x 18 x 5.1 in) for 48 cm (19 in) rack mount

Weight: 10 kg (22.1 lb)

Power Requirements: 24 V dc, ac on request

LOGISTICAL PARAMETERS

Durability: Aluminum enclosure for 19 in rack mount

Environmental Considerations: Operating temperature: 0 °C to 50 °C (32 °F to 122 °F)

Gas inlet pressure/ambient pressure: 700 h Pa to 1150 h Pa

0 % to 90 % rh noncondensing

Electromagnetic—Interference 80 MHz to 1000 MHz: 10 V/m (EN 50082-2)

Shelf Life: 6 mo filter change; filter is accessible from the front

Consumables: Not specified

Calibration Requirements: Regular bump test

Repairs: Preventive maintenance: filter replacement (6 mo interval)

Repair Options: Loaner available for monitoring only because it is not calibrated (qualitative and not quantitative). Turn around time—done in Germany (Luebeck) 4 wk not including shipping. Tech service—on site (three technicians are available); phone tech during office hours.

Maintenance Costs: Operational and maintenance costs >\$500

SPECIAL REQUIREMENTS

Operator Skills: None

Training Required: For service technicians

Training Available: On request

Manuals Available: User manual on request. Release: IMS 5100-1.00e, April 2003.

Support Equipment: Not specified

Communications Capability: Output—8 channel 4 mA to 20 mA (sink)

Maximum resistance (per wire)—maximum 25 Ohm

Relay output—fault relay

Digital output—RS232

Tamper Resistance: Not specified

Warranty: 1 yr

Testing Information: Various validation tests at Battelle, U.S.; TNO, Netherlands; WIS, Germany

CAs testing with stimulants, including methylcaprolate and diethylsebacate

TIM validation by ISO certified laboratories in Germany

Applicable Regulations: NRC License March 4th, 2004

GENERAL

Toxi Pro Gas Detector

Biosystems
651 South Main Street
Middletown, Connecticut 06457
860-344-1079 (Tel)
860-344-1068 (Fax)
Information Source: <http://www.biosystems.com>

Status: Vendor response—11/21/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, chlorine dioxide, sulfur dioxide, and hydrogen sulfide, carbon monoxide, nitrogen dioxide, oxygen, phosphine, hydrogen cyanide
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: Not specified

Detection State: Vapor

Response Time: Not specified

Alarms: Audible and visual alarm

Sensitivity: Not specified

Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 8.4 cm x 5.6 cm x 3 cm (3.3 in x 2.2 in x 1.2 in)

Weight: 99 g (3.5 oz)

Power Requirements: Replaceable lithium battery

LOGISTICAL PARAMETERS

Environmental Considerations: Not specified

Shelf Life: Not specified

Calibration Requirements: Yes

Maintenance Costs: Not specified

Durability: Constructed of clear polycarbonate material. It includes a protective TPE overmold boot.

Consumables: Calibration kit, batteries, and sensors (for each chemical detected)

Repairs: Replacement of batteries; replacement of sensors, and other maintenance as required by manufacturer

Repair Options: Loaner is available through distributor. Distributors will rent instruments if one is needed immediately. Down time is typically 2 wk to 3 wk. When you call the company for a repair if you send the PO number back, you can request express service at no extra charge.

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background

Training Required: Formal

Training Available: A training video is supplied with the Toxi Pro Gas Detector

Manuals Available: Reference manual and quick reference card

Support Equipment: Calibration adapter

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: None

GENERAL

Formaldemeter htV

Enmet Corporation
 P.O. Box 979
 Ann Arbor, Michigan 48106-0979
 Ray Kelley
 734-761-1270 (Tel)
 734-761-3220 (Fax)
 Nancy Aulisa
 naulisa@enmet.com
Information Source: <http://www.enmet.com>
Status: Vendor response—4/1/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Formaldehyde
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 20 s	Detection State: Vapor
Response Time: <10 s	Alarms: Audible and visual alarm
Sensitivity: Formaldehyde 0.05 to 10 ppm	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 15 cm x 8.3 cm x 3.2 cm (6 in x 3.3 in x 1.3 in)	Weight: 283 g (10 oz)
Power Requirements: 9 V alkaline battery	

LOGISTICAL PARAMETERS

Environmental Considerations: Not applicable

Shelf Life: Not specified

Durability: The Formaldemeter is constructed of an ABS plastic

Consumables: Instrument kit with 10 phenol filters, thermometer, pen calibration standard, and case, batteries, and sensors (for each chemical detected)

Calibration Requirements: Yes, simple in field calibration

Repairs: Replacement of sensors, batteries and other maintenance as required by manufacturer

Repair Options: Equipment can be sent back, or repair kits can be bought. Company has service centers. Down time—there is a lease/rental program [minimum of 2 wk (only when emergency)] for older or portable. Availability of parts could be from days to 2 wk or 3 wk. Can expedite if critical. Tech support during office hours only. Safeware distributor can supply service.

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Communications Capability: Yes
Tamper Resistance: Not specified	Warranty: 1 yr
Testing Information: Not specified	Applicable Regulations: None

Manuals Available: User manual with instrument and internet

Support Equipment: Calibration standard, Phenol filters, AMS 2 base unit

GENERAL

Model TS4000 Toxic Gas Detector

General Monitors
 26776 Simpatica Circle
 Lake Forest, California 92630
 949-581-4464 (Tel)
 949-581-1151 (Fax)
 info@generalmonitors.com
Information Source: <http://www.generalmonitors.com>

Status: Vendor response—11/17/2006



Portability: Fixed-Site Detection

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry

Type: Commercial

Current Users: Chemical processing industry, food and beverage industry, water and waste water treatment, and pulp and paper industry

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, chlorine, hydrogen chloride, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Carbon monoxide and nitrogen dioxide
- **Low Priority:** Nitric oxide

Start-up Time: 1 h	Detection State: Vapor
Response Time: 10 s to 2 min	Alarms: None
Sensitivity: Ammonia at 50 ppm to 100 ppm Chlorine at 10 ppm Chlorine dioxide at 3 ppm Hydrogen chloride at 20 ppm Hydrogen sulfide at 100 ppm Sulfur dioxide at 20 ppm Carbon monoxide at 100 ppm to 500 ppm Nitrogen dioxide at 20 ppm Nitric oxide at 100 ppm Oxygen deficiency 0 to 25% by volume Ozone at 1 ppm	Selectivity: May false alarm to heavy concentrations of various smokes and engine exhausts

PHYSICAL PARAMETERS

Size: 11 cm x 4.4 cm (4.5 in x 1.8 in)

Weight: 14 g (0.5 lb)

Power Requirements: Loop powered or +24 V dc

LOGISTICAL PARAMETERS

Durability: The TS4000 is available with explosion proof housing

Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) (operating temperature); -40 °C to 85 °C (-40 °F to 185 °F) (storage temperature); 15 % to 90 % rh (noncondensing)

Shelf Life: Not specified

Consumables: Calibration kits and sensors (for each chemical detected)

Calibration Requirements: Yes

Repairs: None

Repair Options: 3 d turn around time

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Yes	Manuals Available: User manual
Support Equipment: None	Communications Capability: Modbus RS485 output optional
Tamper Resistance: None	Warranty: 1 yr (cell) and 2 yr (electronics)
Testing Information: Not specified	Applicable Regulations: None

GENERAL

Griffin 400

ICx Griffin Analytical Technologies
 3000 Kent Avenue
 West Lafayette, Indiana 47906
 765-775-1701 (Tel)
 765-496-6489 (Fax)
 info@griffinanalytical.com
 sales@griffenanalytical.com
Information Source: <http://www.griffinanalytical.com>

Status: Vendor response—11/21/2006



Portability: Fixed-Site Detection and Vehicle Mounted

Technology: GC/MS/MS

Unit Cost: \$85K base price

Availability: Commercially available. In production.

Description: GC/MS/MS—Specialized for transportable and mobile applications, the Griffin 400 provides laboratory quality chemical analysis at the site of interest. Our technology and expertise enable us to bring the laboratory “gold standard” of mass spectrometry into the field, providing customers the unique ability to perform analysis on-site and in-real time. Griffin’s patented core CIT analyzer technology allows for miniaturization without sacrificing performance [Griffin’s products are distinguished as the only fieldable GC/MS systems capable of multidimensional mass analysis (MS/MS)]. MS/MS provides unparalleled selectivity by offering two levels of analysis: one that determines if the analyte of interest is present in the sample, and a second which further confirms the analyte’s identity. The question of “how much?” can also be addressed with accurate quantitative analysis.

Type: Commercial

Current Users: We currently deliver value to our customers in broadly defined markets including defense, homeland security, environmental health and safety, and research and development. By integrating our unique analyzer technology with specialized form factors and user-appropriate software, Griffin’s products can be deployed to an array of environments, from the safety of a laboratory to the most dangerous “hot zones.”

OPERATIONAL PARAMETERS

CAs Detected: Yes

TICS Detected:

- **High Priority:** Yes
- **Medium Priority:** Yes
- **Low Priority:** Yes

Start-up Time: 20 min to 30 min

Detection State: Molecular

Response Time: Seconds to minutes

Alarms: Visual

Sensitivity: Griffin GC/MS and MS/MS products positively confirm the presence of CAs, explosives, TICs and other organic compounds, including both volatile and many semi-volatile components at parts-per-trillion concentrations in air, soil, water, and food.

Selectivity: No interferents

PHYSICAL PARAMETERS

Size: 49 cm x 49 cm x 50 cm (19.2 in x 19.2 in x 46 in)

Weight: 34 kg (75 lb)

Power Requirements: 115 V ac to 220 V ac, 50/60 Hz (UL approved power supply)

LOGISTICAL PARAMETERS

Durability: To enhance its mobile capabilities, the analytical components of the Griffin 400 have been shock mounted and placed on a durable and rugged chassis. This shock mounting system makes the Griffin 400 operational in more aggressive environments such as vehicles and mobile analytical labs that are taken directly to the site of interest.

Environmental Considerations: Not specified

Shelf Life: Years

Consumables: Carrier gas available from many sources

Calibration Requirements: Mass calibration is automatic or manually performed. Compound calibration is manually performed.

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Multilevel software available to meet the operator skill and analysis requirements

Training Required: Yes

Training Available: Yes

Manuals Available: Yes

Support Equipment: None

Communications Capability: Yes

Tamper Resistance: Not specified

Warranty: 90 d on expendables; 1 yr for instrumentation

Testing Information: Available upon request and clearances

Applicable Regulations: Not specified

GENERAL

KT1050 HazCat Tier 4 System

Haztech Systems, Inc.
 PO Box 929
 Mariposa, California 95338
 Dawn L. Plunkett
 800-543-5487 (Tel)
 209-966-8089 (Fax)
 sales@hazcat.com
Information Source: <http://www.hazcat.com>

Status: Vendor response—11/21/2006



Portability: Mobile Laboratory Detection Equipment

Technology: Optical; Microscopy

Unit Cost: \$38.8K plus shipping and handling

Availability: Military and commercial—30 d from placement of order

Description: Optical; Microscopy—H.H.A's, portable phase microscopy, qualitative analysis, field reagent chemistry. Field detection and screening of unknown substances.

Type: Military and commercial

Current Users: U.S. Army, U.S. Air Force, U.S. Coast Guard, Police Departments, Fire Departments, HazMat Teams across the nation, Cleveland Health Hospital, Cleveland Ohio, FBI, and CDC

OPERATIONAL PARAMETERS

CAs Detected: Qualitative analysis, field reagent chemistry. Field detection and screening of unknown substances.

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

BAs Detected: Detects Anthrax, Brucellosis, Tularemia, Meliodidosis, Salmonellosis, Cholera, Plague, E. coli, Q fever, Epidemic Typhus, Chikungunya Hemorrhagic Fever, Ebola, Cryptosporidiosis, Botulism, Bot Tox, Clostridium perfringens, toxins, ricin, and SEB

Start-up Time: 15 min	Detection State: Solid, liquid, air, sludge, and surface wipes
Response Time: 15 min to 30 min	Alarms: No alarm, but result is visually displayed
Sensitivity: All under physical observation	Selectivity: Physical observation for screening

PHYSICAL PARAMETERS

Size: 1 case at 36 cm x 48 cm x 61 cm (14 in x 19 in x 24 in); 1 case at 53 cm x 41 cm x 46 cm (21 in x 16 in x 18 in); 2 cases at 51 cm x 41 cm x 20 cm (20 in x 16 in x 8 in)

Weight: Combined weight 61 kg (135 lb)

Power Requirements: One 9 V battery for radiation monitor (WMD Kit); 2 D cell batteries for microscope; internal batteries for CommandCat or 110 V

LOGISTICAL PARAMETERS

Durability: All systems are encased in rugged Pelican cases

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity); preferable to maintain above 0 °C (32 °F)

Shelf Life: Reagents—90 % can be stored indefinitely and 10 % can be stored for 1 yr to 3 yr

Consumables: Disposable test tubes, pipettes, scoops, test strips, and reagents

Calibration Requirements: Instrument requires one calibration at start up, whenever it is moved, and a separate calibration with every sample

Repairs: There are procedures for testing reagents every few months in the the user's manual. Routine maintenance is suggested for microscope.

Repair Options: If system is down (contamination) company will ship another unit to replace the unit. If it cannot be repaired or decontaminated, company will ship another at additional cost. SRTAS (culmination of all kits in one response vehicle). 24 h technical service.

Maintenance Costs: Depends upon usage

SPECIAL REQUIREMENTS

Operator Skills: No special skills, but training required

Training Required: Yes

Training Available: Yes, #S1803, 4 d HazCat Workshop \$750 per person. Training results in certification.

Manuals Available: User manual and MSDS manual, flow charts, and field sheet packets

Support Equipment: Yes

Communications Capability: All data and images are stored in the Technical Reference Center Computer for future use and reports

Tamper Resistance: Equipment supplied in convenient lockable, durable Pelican cases

Warranty: 1 yr parts and labor

Testing Information: Science paper supplied upon request

Applicable Regulations: Not specified

GENERAL

HazCat® CommandCat Kit (Model KT1044)

Haztech Systems, Inc.
 PO Box 929
 Mariposa, California 95338
 Dawn L. Plunkett
 800-543-5487 (Tel)
 209-966-8089 (Fax)
 sales@hazcat.com
Information Source: <http://www.hazcat.com>
Status: Vendor response—11/21/2006



Portability: Handheld Stationary (can air ship)

Technology: Screening

Unit Cost: \$12.8K plus shipping and handling

Availability: Military and commercial—30 d delivery

Description: Screening—wireless transmission of microscope data and images to microbiologist

Type: Military and commercial

Current Users: States—California, New Jersey, North Carolina, Utah, Arizona, Georgia, Nevada, New York, Ohio, Pennsylvania, and Washington DC.

U.S. Government agencies—U.S. Army

OPERATIONAL PARAMETERS

CAs Detected: Not applicable

TICS Detected:

- **High Priority:** Not applicable
- **Medium Priority:** Not applicable
- **Low Priority:** Not applicable

Start-up Time: Results are ready as soon as the test is done. Results are transmitted from the hot zone to command wirelessly.

Detection State: Not applicable

Response Time: Results are ready as soon as the test is done.

Alarms: Technical reference center displays the determination as soon as it is transmitted

Sensitivity: Not applicable

Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 53 cm x 41 cm x 46 cm (21 in x 16 in x 18 in)

Weight: 21.3 kg (47 lb) total weight for both hot zone and technical reference center computers

Power Requirements: 120V AC to recharge batteries

LOGISTICAL PARAMETERS

Durability: Rugged high impact cases, foam lined

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity): preferable to maintain above 0 °C (32 °F)

Shelf Life: Indefinitely

Consumables: Not applicable

Calibration Requirements: None

Repairs: None

Repair Options: If system is down (contamination) company will ship another unit to replace the unit. If it cannot be repaired or decontaminated, company will ship another at additional cost. SRTAS (culmination of all kits in one response vehicle). 24 h technical service.

Maintenance Costs: There is technical support and emergency support provided via telephone or e-mail

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: Yes

Training Available: Yes, #S1803 4 d HazCat WMD Workshop, \$750 per person. Training results in certification and recertification. Training is offered either at manufacturers or where equipment is used or stored.

Manuals Available: Yes

Support Equipment: None

Communications Capability: Amplified WiFi

Tamper Resistance: End user may secure with padlocks

Warranty: 1 yr parts and labor

Testing Information: Available on request

Applicable Regulations: Title 29 CFR 1910.120 Req. for I.D., IATA shipping confirmation

GENERAL

MiniMAX Pro Portable Gas Detector

Honeywell Analytics Inc.
 405 Barclay Boulevard
 Lincolnshire, Illinois 60069
 Luca Marinelli
 800-323-2000 (Tel)
 847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>
Status: Vendor response—11/21/2005



Portability: Handheld Stationary

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemistry—Minimax Pro has been designed for day-to-day use in industrial environments. While being small and lightweight, its tough design ensures that it can take the everyday knocks during normal use. Instantaneous and time weighted alarms are preconfigured; however, user adjustment is easy using the intuitive menu system. Peak readings are also held for review when required.

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: <1 min	Detection State: Vapor
Response Time: 10 s to 2 min	Alarms: Audible and visual alarm
Sensitivity: Not specified	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 12 cm x 7.6 cm x 4.6 cm (4.8 in x 3 in x 1.8 in)	Weight: 0.5 kg (1.1 lb)
Power Requirements: 6.0 V alkaline or rechargeable NiMH batteries	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) (operating temperature)
Shelf Life: Not specified	Consumables: None
Calibration Requirements: Not specified	Repairs: Not specified
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

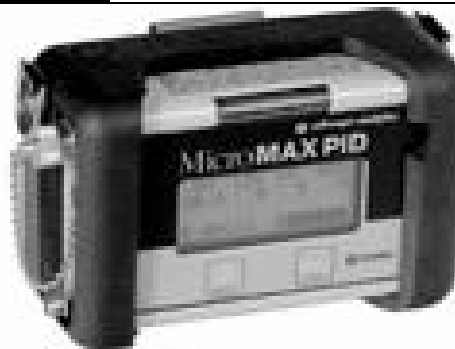
Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: None	Communications Capability: Multiuse port allows data to be sent to a PC
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: Not specified

GENERAL

MiniMAX PID Portable Gas Detector

Honeywell Analytics Inc.
 405 Barclay Boulevard
 Lincolnshire, Illinois 60069
 Luca Marinelli
 800-323-2000 (Tel)
 847-634-1371 (Fax)
Information Source: <http://www.honeywellanalytics.com>

Status: Vendor response—11/21/2005



Portability: Handheld Stationary

Technology: Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Electrochemical/Infrared

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: <1 min	Detection State: Vapor
Response Time: 10 s to 2 min	Alarms: Audible and visual alarm
Sensitivity: Not specified	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 12 cm x 7.6 cm x 4.6 cm (4.8 in x 3 in x 1.8 in)	Weight: 0.5 kg (1.1 lb)
Power Requirements: 6.0 V alkaline or rechargeable NiMH batteries	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: -20 °C to 50 °C (-4 °F to 122 °F) (operating temperature)
Shelf Life: Not specified	Consumables: None
Calibration Requirements: Not specified	Repairs: Not specified
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background	Training Required: Formal
Training Available: Not specified	Manuals Available: User manual
Support Equipment: None	Communications Capability: Multiuse port allows data to be sent to a PC
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: Not specified

GENERAL

Sensit®Gold

J and N Enterprises, Inc.
 851 Transport Drive
 Valparaiso, Indiana 46383
 888-473-6748 (Tel)
 (U.S. and Canada only)
 219-465-2700 (Tel)
 219-465-2701 (Fax)
 judym@gasleaksensors.com
Information Source: <http://www.gasleaksensors.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable (hard carrying case included)

Technology: Semiconductor, Electrochemistry

Unit Cost: Not specified

Availability: Commercially available

Description: Semiconductor, Electrochemistry—all-in-one combustible gas indicator

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia and hydrogen sulfide
- **Medium Priority:** Carbon monoxide (optional)
- **Low Priority:** Combustible gases and oxygen

Start-up Time: 30 s	Detection State: Gas
Response Time: Instantaneous gas readings	Alarms: Not specified
Sensitivity: Resolution: 0.1 % LEL 0.1% oxygen 1 ppm CO 1 ppm H ₂ S	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 29 cm x 7.6 cm x 5.9 cm (11.5 in x 3 in x 2.32 in)	Weight: 0.54 kg (1.2 lb)
Power Requirements: 3 C alkaline batteries. An optional recharge kit is available for most models. Battery life is approximately 16 h of continuous operation regardless of the use of alkaline or rechargeable (NiMH only).	

LOGISTICAL PARAMETERS

Durability: A cyclopolycarbonate case which is impact and water resistant. A water/dirt filter covers the sensor preventing any dirt, water, or debris from poisoning the sensor. The same filter protects the internal pump and internal sensors.

Environmental Considerations: Operation temperature: -17.8 °C to 10 °C (0 °F to 120 °F)

Storage temperature: -28.9 °C to 55.6 °C (-20 °F to 132 °F)

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: The instrument should be tested each day it is used. Bump or calibration check gas is available. The instrument will alert the operator if scheduled calibration is overdue based on 30 d, 45 d, 90 d, or 180 d company standards. If the operation of the instrument is ever in question, it should be checked using a known gas sample.

Repairs: Sensor replacement: 3 to 5 yr except oxygen every 2 yrs

Repair Options: Turn around time within 5 d. Tech support is available during work hours.

Maintenance Costs: Lowest cost of ownership

SPECIAL REQUIREMENTS

Operator Skills: No

Training Required: No

Training Available: Yes

Manuals Available: Yes

Support Equipment: All Sensit® Gold's can have additional sensors, circuitry, and programming done at J and N's location or a factory authorized repair center for a charge. Complete accessories including probes, calibration kits, hydrocarbon filters and infrared printers are available.

Communications Capability: Infrared downloading allows easy tracking of calibration and operation data for record keeping purposes

Tamper Resistance: This data is time and date stamped with the use of the on-board clock. The Sensit® Gold can provide a complete paper trail to reduce liability.

Warranty: The limited warranty covers materials and workmanship on all parts and labor (including sensors) for a period of 2 yr from date of purchase. Excludes calibration and batteries.

Testing Information: Not specified

Applicable Regulations: The Sensit® Gold instruments are approved UL913 for class 1, Division 1, Groups C and D hazardous locations when used with alkaline batteries. Company is ISO 9001: 2000 certified.

GENERAL

Sensit®TKY

J and N Enterprises, Inc.
 851 Transport Drive
 Valparaiso, Indiana 46383
 888-473-6748 (Tel)
 (U.S. and Canada only)
 219-465-2700 (Tel)
 219-465-2701 (Fax)
 judym@gasleaksensors.com
Information Source: <http://www.gasleaksensors.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable (carrying case included)

Technology: Semiconductor

Unit Cost: Not specified

Availability: Commercially available

Description: Semiconductor—combustible gas leak detector

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** Combustible gases

Start-up Time: 60 s	Detection State: Gas
Response Time: Instantaneous gas readings	Alarms: Not specified
Sensitivity: To 25 ppm methane	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 8.9 cm x 25 cm x 4.1 cm (3.5 in x 10 in x 1.6 in)	Weight: 0.59 kg (1.3 lb)
Power Requirements: 3 C alkaline batteries. Battery life is approximately 30 h of continuous operation.	

LOGISTICAL PARAMETERS

Durability: High impact ABS	Environmental Considerations: Not specified
Shelf Life: Not specified	Consumables: Not specified
Calibration Requirements: Not applicable	Repairs: Sensor replacement: 3 to 5 yr
Repair Options: Turn around time within 5 d. Tech support is available during work hours.	Maintenance Costs: Lowest cost of ownership

SPECIAL REQUIREMENTS

Operator Skills: No	Training Required: No
Training Available: Yes	Manuals Available: Yes
Support Equipment: Not specified	Communications Capability: Not specified
Tamper Resistance: Not specified	Testing Information: Not specified

Warranty: The limited warranty covers materials and workmanship on all parts and labor for a period of 1 yr from date of purchase. Excludes sensor calibration and batteries.

Applicable Regulations: The Sensit® TKX instruments are approved UL913 for class 1, Division 1, Groups C and D hazardous locations when used with alkaline batteries. Company is ISO 9001: 2000 certified.

GENERAL

Sensit® HXG-3

J and N Enterprises, Inc.
 851 Transport Drive
 Valparaiso, Indiana 46383
 888-473-6748 (Tel)
 (U.S. and Canada only)
 219-465-2700 (Tel)
 219-465-2701 (Fax)
 judym@gasleaksensors.com
Information Source: <http://www.gasleaksensors.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable (hard carrying case included)

Technology: Semiconductor

Unit Cost: Not specified

Availability: Commercially available

Description: Semiconductor—combustible gas leak detector

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** None
- **Medium Priority:** Not specified
- **Low Priority:** Combustible gases

Start-up Time: 30 s	Detection State: Gas
Response Time: <1 s	Alarms: Not specified
Sensitivity: To 10 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 30 cm x 7.6 cm x 5.9 cm (11.5 in x 3 in x 2.3 in)	Weight: 0.54 kg (1.2 lb)
Power Requirements: 3 C alkaline batteries. Battery life is approximately 30 h of continuous operation.	

LOGISTICAL PARAMETERS

Durability: A cycloloy case which is impact and water resistant.

Environmental Considerations: Operation temperature: -17.8 °C to 10 °C (0 °F to 120 °F)

Storage temperature: -28.9 °C to 55.6 °C (-20 °F to 132 °F)

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: The instrument should be tested each day it is used. Bump or calibration check gas is available. The instrument will alert the operator if scheduled calibration is overdue based on 30 d, 45 d, 90 d, or 180 d company standards. If the operation of the instrument is ever in question, it should be checked using a known gas sample.

Repairs: Sensor replacement: 3 yr to 5 yr

Repair Options: Turn around time within 5 d. Tech support is available during work hours.

Maintenance Costs: Lowest cost of ownership

SPECIAL REQUIREMENTS

Operator Skills: No

Training Required: No

Training Available: Yes

Manuals Available: Yes

Support Equipment: Complete accessories including probes, calibration kits, and hydrocarbon filters are available.

Communications Capability: Infrared downloading allows easy tracking of calibration and operation data for record keeping purposes

Tamper Resistance: This data is time and date stamped with the use of the on-board clock. The Sensit® HXG-3 can provide a complete paper trail to reduce liability.

Warranty: The limited warranty covers materials and workmanship on all parts and labor for a period of 2 yr from date of purchase. Excludes sensors, calibration and batteries.

Testing Information: Not specified

Applicable Regulations: The Sensit® HXG-3 instruments are approved UL913 for class 1, Division 1, Groups C and D hazardous locations when used with alkaline batteries. Company is ISO 9001: 2000 certified.

GENERAL

Trak-It®III CGI

J and N Enterprises, Inc.
 851 Transport Drive
 Valparaiso, Indiana 46383
 888-473-6748 (Tel)
 (U.S. and Canada only)
 219-465-2700 (Tel)
 219-465-2701 (Fax)
 judym@gasleaksensors.com
Information Source: <http://www.gasleaksensors.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable (padded carrying case included)

Technology: Semiconductor

Unit Cost: Not specified

Availability: Commercially available

Description: Semiconductor, Thermoconductivity, Electrochemistry—all-in-one combustible gas indicator

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Hydrogen sulfide
- **Medium Priority:** Carbon monoxide
- **Low Priority:** Combustible gases

Start-up Time: 30 s	Detection State: Gas
Response Time: Instantaneous gas reading	Alarms: Not specified
Sensitivity: Resolution: 0.1 % LEL 0.01 % gas 0.1 % oxygen 1 ppm CO 1 ppm H ₂ S	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 17 cm x 10 cm x 11 cm (6.5 in x 4 in x 4.3 in)	Weight: 1.3 kg (2.8 lb)
Power Requirements: 4 D alkaline batteries. Battery life approximately 20 h of continuous operation.	

LOGISTICAL PARAMETERS

Durability: Stainless steel case is impact and water resistant.

Environmental Considerations: Operation temperature: -17.8 °C to 10 °C (0 °F to 120 °F); Storage temperature: -28.9 °C to 55.6 °C (-20 °F to 132 °F)

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: The instrument should be tested each day it is used. Bump or calibration check gas is available. The instrument will alert the operator if scheduled calibration is overdue based on 30 d, 45 d, 90 d, or 180 d company standards. If the operation of the instrument is ever in question, it should be checked using a known gas sample.

Repairs: Sensor replacement: 3 to 5 yr except oxygen sensor every 2 yr

Repair Options: Turn around time within 5 d. Tech support is available during work hours.

Maintenance Costs: Lowest cost of ownership

SPECIAL REQUIREMENTS

Operator Skills: No

Training Required: No

Training Available: Yes

Manuals Available: Yes

Support Equipment: All Trak-It®III CGI's can have additional sensors, circuitry, and programming done at J and N's location or a factory authorized repair center for a charge. Complete accessories including probes, calibration kits, hydrocarbon filters and infrared printers are available.

Communications Capability: Infrared downloading allows easy tracking of calibration and operation data for record keeping purposes

Tamper Resistance: This data is time and date stamped with the use of the on-board clock. The Trak-It® III CGI can provide a complete paper trail to reduce liability.

Warranty: The limited warranty covers materials and workmanship on all parts and labor (including sensors) for a period of 2 yr from date of purchase. The internal combustible gas sensor that measure the volume range of gas is warranted for 5 yr.

Testing Information: Not specified

Applicable Regulations: The Trak-It®III CGI instruments are approved UL913, for class 1, division 1, groups C and D hazardous locations when used with alkaline batteries. Company is ISO 9001: 2000 certified.

GENERAL

Sensit® HXG-2

J and N Enterprises, Inc.
 851 Transport Drive
 Valparaiso, Indiana 46383
 888-473-6748 (Tel)
 (U.S. and Canada only)
 219-465-2700 (Tel)
 219-465-2701 (Fax)
 judym@gasleaksensors.com
Information Source: <http://www.gasleaksensors.com>
Status: Vendor response—11/17/2006



Portability: Handheld Portable (hard carrying case included)

Technology: Semiconductor

Unit Cost: Not specified

Availability: Commercially available

Description: Semiconductor, Electrochemistry—combustible gas leak detector

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** Combustible gases

Start-up Time: 30 s	Detection State: Gas
Response Time: <1 s	Alarms: Not specified
Sensitivity: To 10 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 8.9 cm x 25 cm x 4.1 cm (3.5 in x 10 in x 1.6 in)	Weight: 0.59 kg (1.3 lb)
Power Requirements: 3 C alkaline batteries. Battery life is approximately 30 h of continuous operation.	

LOGISTICAL PARAMETERS

Durability: High impact ABS	Shelf Life: Not specified
Consumables: Not specified	Repairs: Sensor replacement: 3 yr to 5 yr

Environmental Considerations: Operation temperature: -17.8 °C to 10 °C (0 °F to 120 °F)

Calibration Requirements: The instrument should be tested each day it is used. Bump or calibration check gas is available. If the operation of the instrument is ever in question, it should be checked using a known gas sample.

Repair Options: Turn around time within 5 d. Tech support is available during work hours.

Maintenance Costs: Lowest cost of ownership

SPECIAL REQUIREMENTS

Operator Skills: No	Training Required: No
Training Available: Yes	Manuals Available: Yes
Tamper Resistance: Not specified	Communications Capability: Not specified

Testing Information: Not specified

Support Equipment: Complete accessories including probes and calibration kits are available.

Warranty: The limited warranty covers materials and workmanship on all parts and labor for a period of 2 yr from date of purchase. Excludes sensors, calibration and batteries.

Applicable Regulations: The Sensit® HXG-2 instruments are approved UL913 for class 1, Division 1, Groups C and D hazardous locations when used with alkaline batteries. Company is ISO 9001: 2000 certified.

GENERAL

Gas Trac®

J and N Enterprises, Inc.
 851 Transport Drive
 Valparaiso, Indiana 46383
 888-473-6748 (Tel)
 (U.S. and Canada only)
 219-465-2700 (Tel)
 219-465-2701 (Fax)
 judym@gasleaksensors.com
Information Source: <http://www.gasleaksensors.com>
Status: Vendor response—11/17/2006



Portability: Handheld Portable (carrying case included)

Technology: Combustible gas leak detector

Unit Cost: Not specified

Availability: Commercially available

Description: Solid state—combustible gas leak detector

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** Combustible gases

Start-up Time: 60 s	Detection State: Gas
Response Time: Less than 2.5 s	Alarms: Not specified
Sensitivity: <100 ppm methane	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 4.1 cm x 6.4 cm x 37 cm (1.6 in x 2.5 in x 14.6 in)	Weight: 0.9 kg (2 lb)
Power Requirements: 2 D and 2 AA alkaline batteries. Battery life approximately 10 h of continuous operation.	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: 0 °C to 37.8 °C (32 °F to 100 °F); 10% to 90% RH
Shelf Life: Not specified	Consumables: Not specified
Repairs: Sensor replacement: 3 yr to 5 yr	Maintenance Costs: Lowest cost of ownership

Calibration Requirements: The instrument should be tested each day it is used. Calibration check gas is available. If the operation of the instrument is ever in question, it should be checked using a known gas sample.

Repair Options: Turn around time within 5 d. Tech support is available during work hours.

SPECIAL REQUIREMENTS

Operator Skills: No	Training Required: No
Training Available: Yes	Manuals Available: Yes
Tamper Resistance: Not specified	Communications Capability: Not specified

Testing Information: Not specified

Support Equipment: Complete accessories including probes, calibration kits, and hydrocarbon filters are available

Warranty: The limited warranty covers materials and workmanship on all parts and labor for a period of 1 yr from date of purchase. Excludes sensors, calibration and batteries.

Applicable Regulations: The Gas Trac® is intrinsically safe for class 1, division 1, groups C and D hazardous locations when used with alkaline batteries. Company is ISO 9001: 2000 certified.

GENERAL

Sensit® CO

J and N Enterprises, Inc.
 851 Transport Drive
 Valparaiso, Indiana 46383
 888-473-6748 (Tel)
 (U.S. and Canada only)
 219-465-2700 (Tel)
 219-465-2701 (Fax)
 judym@gasleaksensors.com
Information Source: <http://www.gasleaksensors.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable (hard carrying case included)

Technology: Electrochemical

Unit Cost: Not specified

Availability: Commercial and military

Description: Electrochemical—carbon monoxide analyzer

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** None
- **Medium Priority:** Carbon monoxide
- **Low Priority:** Not specified

Start-up Time: 60 s	Detection State: Gas
Response Time: 3 s	Alarms: Not specified
Sensitivity: Resolution: 1 ppm carbon monoxide	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 8.9 cm x 31 cm x 4.1 cm (3.5 in x 12 in x 1.6 in)	Weight: 0.54 kg (1.2 lb)
Power Requirements: 3 C alkaline batteries. Battery life is approximately 20 h of continuous operation.	

LOGISTICAL PARAMETERS

Durability: ABS construction which is impact and water resistant.

Environmental Considerations: -17.8 °C to 40 °C (0 °F to 104 °F)

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: The instrument should be tested each day it is used. Bump or calibration check gas is available. The instrument will alert the operator if scheduled calibration is overdue based on 30 d, 45 d, 90 d, or 180 d company standards. If the operation of the instrument is ever in question, it should be checked using a known gas sample.

Repairs: Sensor replacement: 3 yr to 5 yr

Repair Options: Turn around time within 5 d. Tech support is available during work hours.

Maintenance Costs: Lowest cost of ownership

SPECIAL REQUIREMENTS

Operator Skills: No

Training Required: No

Training Available: Yes

Manuals Available: Yes

Support Equipment: Complete accessories including probes, calibration kits, and infrared printers are available.

Communications Capability: Infrared downloading allows easy tracking of calibration and operation data for record keeping purposes

Tamper Resistance: This data is time and date stamped with the use of the on-board clock. The Sensit® CO can provide a complete paper trail to reduce liability.

Warranty: The limited warranty covers materials and workmanship on all parts and labor (including sensors) for a period of 2 yr from date of purchase. Excludes calibration and batteries.

Testing Information: Not specified

Applicable Regulations: The Sensit® CO instruments are approved UL913 for class 1, Division 1, Groups C and D hazardous locations when used with alkaline batteries. Company is ISO 9001: 2000 certified.

GENERAL

Chameleon Chemical Detection System (Armband Model: 085100)

Morphix Technologies
 2557 Production Road
 Virginia Beach, Virginia 23454
 Customer Service
 800-808-2234 (Tel)
 757-216-6209 (Fax)
 customerservice@morphtec.com
Information Source: <http://www.morphtec.com>
 Responder Knowledge Data Base
Status: Vendor response—11/17/2006



Portability: Handheld Portable (hands-free)

Technology: Colorimetric

Unit Cost: Starter kit available for \$195; boxes of 50 chemical cassettes \$150, box of 5 armbands is \$150

Availability: Commercially available

Description: Colorimetric—Through a development grant from the Marine Corps, Morphix has taken simple colorimetric technology and revolutionized it to be rugged, resilient, and water resistant. The Chameleon is field-configurable chemical detection that provides a low-cost, easy-to-use, accurate solution for first responders and emergency personnel. The Chameleon's rugged design allows for use in harsh environments including arctic, tropic and desert conditions. The Chameleon can even be immersed in water. Armband is reusable and adjustable.

Type: Commercial and military

Current Users: Delaware Fire Department, Dallas/Fort Worth Airport, Chicago HazMat Team, Chesapeake, VA SWAT Team, and NYPD and USMC Chemical Biological Incident Response Force

OPERATIONAL PARAMETERS

CAs Detected: Phosgene

TICS Detected:

- **High Priority:** High pH (base), low pH (acid), chlorine, fluorine, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Phosphine
- **Low Priority:** Iodine

Start-up Time: <30 s	Detection State: Vapor or gas
Response Time: 1 min to 3 min	Alarms: Visual alarm
Sensitivity: High pH >8.5 Low pH <5 Chlorine—5 ppm Fluorine—5 ppm Hydrogen sulfide—50 ppm Phosgene—1 ppm Iodine—1 ppm, Phosphine—25 ppm Sulfur dioxide—50 ppm	Selectivity: Has a few noncritical interferents

PHYSICAL PARAMETERS

Size: 10.6 cm (4 in) long	Weight: 56.7 g (2 oz)
Power Requirements: None	

LOGISTICAL PARAMETERS

Durability: Very rugged—able to operate with rough handling

Environmental Considerations: Operates in most environments (rain, snow, fog, and high humidity), immersion in fresh and salt water possible

Shelf Life: Chemical cassettes have a 1 yr shelf life at room temperature [20 °C to 27 °C (68 °F to 81 °F)]

Consumables: Chemical cassettes

Calibration Requirements: None

Repairs: None

Repair Options: Cassettes are disposable

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: No special skills or training required

Training Required: Less than 2 min of training is required

Training Available: Not specified

Manuals Available: Operating instructions included in each box

Support Equipment: None needed

Communications Capability: None

Tamper Resistance: Not applicable

Warranty: Guaranteed accurate throughout the shelf life period. Labeled with expiration date.

Testing Information: Test data available upon request

Applicable Regulations: Meets NIOSH accuracy requirements

GENERAL

Gastec Gas Sampling Pumps and Detector Tubes

Nextteq, LLC
 8406 Benjamin Road, Suite J
 Tampa, Florida 33634
 877-312-2333 (Tel)
 877-312-2444 (Fax)
 info@nextteq.com
Information Source: <http://www.nextteq.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Colorimetric

Unit Cost: Please contact Nextteq or an authorized distributor

Availability: Authorized distributors—United States. Gastec Gas Sampling Pumps and Detector Tubes are manufactured by the Gastec Corporation. Nextteq is Gastec's exclusive U.S. master wholesale distributor.

Description: Colorimetric detector tube. Manual gas sampling pump and detector tubes for measuring gases and vapors. Easily correct for temperature extremes on-the-spot with industry's first and only pump with ambient temperature measurement.

Type: Commercial

Current Users: Hazmat teams, first responders, firefighters, and occupational health and safety industries

OPERATIONAL PARAMETERS

CAs Detected: Over 600 applications

TICS Detected:

- **High Priority:** Yes
- **Medium Priority:** Yes
- **Low Priority:** Yes

Start-up Time: No warmup time required. Less than 1 min to assemble.	Detection State: Gas, vapor, and liquid chemicals
Response Time: Fewer pump strokes and faster results than leading competitor	Alarms: None
Sensitivity: Broad detection range. Advanced technology provides more reliable analysis with lower standard deviation.	Selectivity: Few, if any, interferents

PHYSICAL PARAMETERS

Size: 23 cm x 11 cm x 5.1 cm (9 in x 4.5 in x 2 in)

Weight: 0.45 kg (1 lb)

Power Requirements: Always ready. Intrinsically safe. No power required.

LOGISTICAL PARAMETERS

Durability: Rugged. Field-tested.

Environmental Considerations: Operating conditions: 0 °C to 40 °C (32 °F to 104 °F); 0 % to 90 % rh

Shelf Life: Detector tubes have a shelf life of up to 2 yr from the manufacture date

Consumables: Detector tubes

Calibration Requirements: No calibration required. Gas sampling pump and detector tubes are precalibrated.

Repairs: Not applicable

Repair Options: Please contact Nextteq at 877-312-233

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: Minimal

Training Required: Simple, step-by-step instructions provided

Training Available: Highly trained customer support and technical team available to answer questions. Telephone Nextteq at 877-312-2333 ext. 20.

Manuals Available: Comprehensive instructions provided

Support Equipment: Not applicable

Communications Capability: None

Tamper Resistance: Not applicable

Warranty: Yes

Testing Information: Available on request

Applicable Regulations: Inherently safe

GENERAL

Ahura First Defender Chemical ID System

Ahura Corporation
 46 Jonspin Road
 Wilmington, Massachusetts 01887
 978-657-5555 (Tel)
 978-657-5921 (Fax)
Information Source: <http://www.ahuracorp.com>
 Responder Knowledge Data Base



Status: Limited vendor information

Portability: Handheld Portable

Technology: Raman Spectrometer

Unit Cost: \$25K to \$49K

Availability: Commercial—currently available

Description: Raman Spectrometer—The FirstDefender is a handheld, rugged instrument for in-the-field identification of toxic industrial chemicals (TICs), narcotics, contraband, chemical weapons, and white powders. Dual modes of use: Free-space (“point-and-shoot”), integrated sample vial compartment, line-of-sight Identification, operates through glass or plastic bottles, operates through plastic bags, avoids contamination and maintains evidence, nondestructive testing, and does not consume any sample.

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: Detects multiple nerve and blister agents

TICS Detected:

- **High Priority:** ITF40 chemicals, formaldehyde, fuming nitric acid, and sulfuric acid
- **Medium Priority:** Acrylonitrile, allyl chlorocarbonate, allylamine, chloroacetonitrile, diketene, methyl hydrazine, methanesulfonyl chloride, n-Octyl mercaptan, sulfuryl chloride, and trichloroacetyl chloride
- **Low Priority:** Allyl isothiocyanate, arsenic trichloride, chloroacetyl chloride, ethyl chloroformate, hexachlorocyclopentadiene, isobutyl chloroformate, isopropyl isocyanate, n-Butyl chloroformate, tert-butyl isocyanate, and toluene 2,4-diisocyanate

Start-up Time: None	Detection State: Solids and liquids
Response Time: <30 s	Alarms: Yes
Sensitivity: Not applicable	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 28 cm x 14 cm x 5 cm (11 in x 5.5 in x 2 in)	Weight: >1.81 kg (4 lb)
Power Requirements: >5 h operational battery life; single lithium ion battery	

LOGISTICAL PARAMETERS

Durability: Rugged, waterproof, and chemical resilient Mil Spec 810F for ruggedness, IP67 waterproof	Environmental Considerations: -20 °C to 40 °C (-4 °F to 104 °F)
Shelf Life: Not applicable	Consumables: None
Calibration Requirements: Self calibrating	Repairs: Included in warranty
Repair Options: Not specified	Maintenance Costs: Included in warranty

SPECIAL REQUIREMENTS

Operator Skills: Hazmat	Training Required: 8 h training included
Training Available: 8 h training included	Manuals Available: Included
Support Equipment: None	Communications Capability: Not applicable
Tamper Resistance: Not applicable	Warranty: 1 yr, 3 yr, or additional
Testing Information: Available on request	Applicable Regulations: UL and OSHA

GENERAL

MSA Chemgard® Photoacoustic Infrared Gas Monitor Series

MSA Instrument Division
 P.O. Box 427
 Pittsburgh, Pennsylvania 15230
 Evan Erickson
 724-733-9247 (Tel)
 724-733-8573 (Fax)
 evan.erickson@msanet.com
Information Source: <http://www.MSAnet.com>
 Responder Knowledge Data Base

Status: Vendor response—12/27/2006



Portability: Fixed-Site Detection

Technology: Photoacoustic Infrared Detector

Unit Cost: Not specified

Availability: Commercial—immediately available

Description: Photoacoustic Infrared Detector—The MSA Chemgard® Gas Monitor, utilizing photoacoustic infrared (IR) sensing technology, provides precise, low-cost, high-performance monitoring for a variety of gases such as hydrocarbons, solvents, alcohols, alkenes, and toxics. The Chemgard Gas Monitor is extremely stable and highly selective to the gas of interest. The Chemgard Monitor can operate for months with virtually no zero drift. The instrument has detectability as low as 0.01 ppm for certain applications. Three different enclosure styles allow for installation in explosion-proof, NEMA 4, or rack-mounted configurations. The NEMA 4 and the rack-mount versions of the Chemgard Monitor are easy to use and maintain, with only four front-panel push buttons to configure the instrument. The explosion-proof model is easily configured using a four-button, wireless IR transmitter which communicates through the front panel window. For most installations, gas monitoring begins after simply mounting the instrument, connecting the sample line and powering the unit. The instrument typically draws the gas sample via an internal pump. This allows the unit to be mounted in a convenient location for the operator if the area to be monitored is inaccessible. A pressurized sample can also be delivered to the unit, eliminating the need for an internal pump. An internal flow switch alerts the operator if the gas sample is blocked by either a dirty end-of-line filter or clogged sample line. The direct-reading display shows the actual gas value as well as any alarms and diagnostic messages.

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, ethylene oxide, and phosgene
- **Medium Priority:** Carbon monoxide and acrylonitrile
- **Low Priority:** None

Start-up Time: >30 min

Detection State: Vapor and aerosol

Response Time: Between 11 s and 60 s

Alarms: Auto, visible, and audible alarm

Sensitivity: Ammonia at 3 ppm (v) (below IDLH)

Ethylene oxide at 3 ppm (v) (below IDLH)

Phosgene at 0.5 ppm (v) (below IDLH)

Carbon monoxide at 3 ppm (v) (below IDLH)

Acrylonitrile at 3 ppm (v) (below IDLH)

Selectivity: Cross-interferent table available upon request

PHYSICAL PARAMETERS

Size: 18 cm x 41 cm x 46 cm (7 in x 16 in x 18 in)

Weight: 20 kg (45 lb) general-purpose

45 kg (100 lb) explosion-proof

Power Requirements: ac powered

LOGISTICAL PARAMETERS

Durability: Must remain stationary

Environmental Considerations: 0 °C to 50 °C (32 °F to 122 °F); 0 % to 99 % rh noncondensing

Shelf Life: Indefinite

Consumables: Filter and calibration gas

Calibration Requirements: Yes (factory calibrated on delivery)

Repairs: Full support provided for repair, service, preventative maintenance, and training

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: User manual

Training Available: Customized; online

Manuals Available: User manuals, documentation available at www.msanet.com and on CD

Support Equipment: Calibration equipment

Communications Capability: Command control communications and hardwire capability

Tamper Resistance: Password protected

Warranty: 18 mo from shipment or 1 yr from date of installation

Testing Information: Not specified

Applicable Regulations: None

GENERAL

GasAlert Micro5 PID

BW Technologies by Honeywell
 2840 2nd Ave., SE Calgary
 AB Canada T2A 7X9
 800-663-4164 (Tel) 403-248-9226 (Tel) 403-273-3708
 (Fax) 44-0-1869-233004 (Europe) 888-749-8878 (USA)
 raymondj@bwt.net.com

Information Source: [http://: www.gasmonitors.com](http://www.gasmonitors.com)

Status: Vendor response—4/1/2006



Portability: Handheld Portable

Technology: Electrochemistry

Unit Cost: Monitor with O₂/LEL/CO/H₂S/PID sensor starting at \$1.5K

Availability: Commercial, available worldwide

Description: Electrochemistry and Photo Ionization

Type: Commercial, available worldwide

Current Users: Local firefighters, municipalities, industrial plants, military, DHS

OPERATIONAL PARAMETERS

CAs Detected: None

TICS Detected:

- **High Priority:** Ammonia, carbon disulfide, chlorine, ethylene oxide, hydrogen sulfide, and sulfur dioxide
- **Medium Priority:** Acrolein, allyl alcohol, carbon monoxide, diketene, ethylene dibromide, methyl hydrazine, methyl isocyanate, nitrogen dioxide, and phosphine
- **Low Priority:** Bromine, crotonaldehyde, ethyl chloroformate, ethyleneimine, isopropyl chloroformate, nitric oxide, toluene 2,4-diisocyanate, and carbon monoxide

Start-up Time: Less than 30 s	Detection State: Vapor
Response Time: Less than 30 s	Alarms: Audible, visual, and vibrating
Sensitivity: O ₂ —0 % to 30 % H ₂ S—0 ppm to 300 ppm CO—0 ppm to 999 ppm PH ₃ —0 ppm to 5.0 ppm SO ₂ —0 ppm to 100 ppm NO ₂ —0 ppm to 99.9 ppm HCN—0 ppm to 30 ppm CL ₂ —0 ppm to 50 ppm NH ₃ —0 ppm to 100 ppm CLO ₂ —0 ppm to 1.0 ppm O ₃ —0 ppm to 1.0 ppm COC—0 ppm to 1000 ppm LEL—0 % to 100 % LEL	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 15 cm x 7.4 cm x 3.8 cm (5.7 in x 9 in x 1.5 in)

Weight: 370 g (13 oz) including battery

Power Requirements: Three AA alkaline batteries and/or NiMH rechargeable

LOGISTICAL PARAMETERS

Durability: Designed for rugged industrial use, operates in any position, drop-tested

Environmental Considerations: VOC (PID): -10 °C to 40 °C (14 °F to 104 °F)

Other gases: -20 °C to 50 °C (-4 °F to 122 °F)

Humidity: 0 % to 95% rh (noncondensing)

Shelf Life: Not specified

Consumables: Three AA Alkaline batteries (12 h of continuous operation), sensors, and sensor filters

Calibration Requirements: Calibrate once every 6 mo. Automatic calibration, automatic zero, and automatic span. Does not need to be performed by factory.

Repairs: Replace sensors every 2 yr. Replace sensor filters as needed. Sensors and sensor filters are easily field replaceable.

Repair Options: Company offers advanced replacement and loaner if necessary

Maintenance Costs: Easily maintained by field personnel

SPECIAL REQUIREMENTS

Operator Skills: No special skills required

Training Required: None

Training Available: Training CD and user manuals

Manuals Available: Yes, available in local languages

Support Equipment: Available as a Confined Space Entry Kit (First Responder Kit)

Additional accessories available include manual aspirator pump, motorized sampling pump, and vehicle battery charger

Compatible with the MicroDock2 automatic bump and calibration system

Communications Capability: Not specified

Tamper Resistance: Password protected for advanced settings

Warranty: Full 2 yr nonprorated warranty including sensors (1 yr on PID and NH₃ sensor)

Testing Information: Performance testing conducted on all sensors by ECBC Applied Test Team

Applicable Regulations: CSA classified to U.S. and Canadian Standards—Class I, Div. 1, Gr. A,B,C,D; Class 1 Zone 0, Gr. IIC

Cenelec Certified by LCIE—Eexia d IIC

Certified for use in Australia—Ex ia s IIC for Zone 0

Conforms to European Union directives

GENERAL

Narco AirClear Kits

Nextteq, LLC
 8406 Benjamin Road, Suite J
 Tampa, Florida 33634
 877-312-2333 (Tel)
 877-312-2444 (Fax)
 info@nextteq.com
Information Source: <http://www.nextteq.com>
Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Colorimetric

Unit Cost: Please contact Nextteq or an authorized distributor

Availability: Commercially available. Authorized distributors. United States and international.

Description: Colorimetric—detector tube. Clandestine lab test kits. Electric or manual gas sampling pumps and detector tubes for detecting gases commonly found at clandestine lab sites.

Type: Commercial

Current Users: Hazmat teams, first responders, firefighters, and occupational health and safety industries

OPERATIONAL PARAMETERS

CAs Detected: Not applicable

TICS Detected:

- **High Priority:** Simultaneous testing of 7 specific gases and total organics as well as sampling for over 150 organics and inorganics. Specific gases include: acetic acid, ammonia, hydrochloric acid, iodine, phosgene, and phosphine.
- High priority TIMs include: Ammonia, phosgene, polar and nonpolar organics
- **Medium Priority:** Phosphine, polar and nonpolar organics
- **Low Priority:** Polar and nonpolar organics

Start-up Time: No warm-up time required. Less than 5 min to assemble.

Detection State: Gases and vapors

Response Time: Complete sampling in as fast as 3 min

Alarms: None

Sensitivity: Accurate, direct-read results with lower detection limits than the leading competitor. Detection limits meet or exceed standards.

Selectivity: Few, if any, interferences. Also, unlike PIDs and FIDs, there are no false positives from gasoline, diesel fuel, aqueous fire fighter's foam (AFFF), burning tires, or burning wood.

PHYSICAL PARAMETERS

Size: 50 cm x 395 cm x 19 cm (19.5 in x 15.5 in x 7.5 in)

Weight: 7.4 kg (16.4 lb)

Power Requirements: Choice of manual gas sampling pump or electric gas sampling pump with rechargeable batteries. Intrinsically safe.

LOGISTICAL PARAMETERS

Durability: Rugged, high-impact case

Environmental Considerations: Operating conditions: 0 °C to 40 °C (32 °F to 104 °F); 5 % to 85 % rh

Shelf Life: Shelf life for detector tubes up to 2 yr from date of manufacture

Consumables: Batteries—rechargeable; tubes

Calibration Requirements: Detector tubes and manual gas sampling pump are precalibrated. Electric pump requires calibration.

Repairs: Not applicable

Repair Options: Please contact Nextteq at 877-312-233

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Minimal

Training Required: Simple, step-by-step instructions provided

Training Available: Highly trained customer support and technical team available to answer questions. Telephone Nextteq at 877-312-2333 ext. 20.

Manuals Available: Comprehensive manual provided

Support Equipment: Not applicable

Communications Capability: None

Tamper Resistance: Rugged, high-impact case

Warranty: Yes

Testing Information: Available on request

Applicable Regulations: Not applicable

GENERAL

Deluxe NarcoWipe Kit

Nextteq, LLC
 8406 Benjamin Road, Suite J
 Tampa, Florida 33634
 877-312-2333 (Tel)
 877-312-2444 (Fax)
 info@nextteq.com
Information Source: <http://www.nextteq.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Colorimetric

Unit Cost: Please contact Nextteq or an authorized distributor

Availability: Commercially available. Authorized distributors. United States and international.

Description: Colorimetric—direct-read, colorimetric surface wipe. Clandestine lab test kit. The industry's first colorimetric surface wipe kit for detecting chemicals commonly found at clandestine lab sites.

Type: Commercial

Current Users: Hazmat teams, first responders, firefighters, and occupational health and safety industries

OPERATIONAL PARAMETERS

CAs Detected: Not applicable

TICS Detected:

- **High Priority:** The Deluxe NarcoWipe Kit contains 8 wipe types. Each type is highly sensitive and specific to an individual chemical such as methamphetamine, iodine, nickel, mercury, or lead. Nextteq offers the first wipe in the nation to detect red phosphorus.
- High priority TIMs include: Not applicable
- **Medium Priority:** Not applicable
- **Low Priority:** Not applicable

Start-up Time: Ready to use. No mixing or prep work required. Each kit is complete with everything necessary for chemical analysis.

Detection State: Trace chemical residues on surfaces

Response Time: Direct-read wipes provide on-the-spot results

Alarms: None

Sensitivity: NarcoWipes offer low minimum detection limits that meet or exceed regulatory standards

Selectivity: Few, if any, interferents

PHYSICAL PARAMETERS

Size: 50 cm x 395 cm x 19 cm (19.5 in x 15.5 in x 7.5 in)

Weight: 5.1 kg (11.3 lb)

Power Requirements: No power required. Intrinsically safe and ready to use anytime, anywhere.

LOGISTICAL PARAMETERS

Durability: Rugged, high-impact case

Environmental Considerations: Wipes can be used on virtually any surface, including walls and ceilings. regardless of potential surface dirt or debris. Operating conditions: 4 °C to 60 °C (39 °F to 140 °F); 10 % to 98 % rh.

Shelf Life: Shelf life of wipes is 1 yr from date of manufacture

Consumables: Wipes and solutions

Calibration Requirements: No calibration required

Repairs: Not applicable

Repair Options: Please contact Nextteq at 877-312-233

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Minimal

Training Required: Simple, illustrated, step-by-step instructions provided

Training Available: Highly trained customer support and technical team available to answer questions. Telephone Nextteq at 877-312-2333 ext. 20.

Manuals Available: Comprehensive manual provided

Support Equipment: Not applicable

Communications Capability: None

Tamper Resistance: Rugged, high-impact case

Warranty: Yes

Testing Information: Available on request

Applicable Regulations: Not applicable

GENERAL

Training/Certification Kit (Civil Defense Detector Tubes)

Nextteq, LLC
 8406 Benjamin Road, Suite J
 Tampa, Florida 33634
 877-312-2333 (Tel)
 877-312-2444 (Fax)
 info@nextteq.com
Information Source: <http://www.nextteq.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Colorimetric

Unit Cost: Please contact Nextteq or an authorized distributor

Availability: Commercially available. Authorized distributors. United States and international.

Description: Colorimetric—CA simulants. The Nextteq Training/Certification Kit for Civil Defense-Detector Tubes safely simulates CA gases in compact simulant tubes for realistic field training. The Training/Certification Kit is specifically designed for use with the gas sampling pumps in Nextteq Civil Defense Kits, enabling first responders to become proficient with actual equipment.

Type: Commercial

Current Users: Hazmat teams, first responders, firefighters, and occupational health and safety industries

OPERATIONAL PARAMETERS

CAs Detected: Realistically and safely simulate common CAs including blister, blood, choking, and nerve. For use with Nextteq Civil Defense Kits.

TICS Detected:

- **High Priority:** Not applicable
- **Medium Priority:** Not applicable
- **Low Priority:** Not applicable

Start-up Time: Ready to use. No warm-up time required.	Detection State: Gas simulants
Response Time: Ready to use. On-the-spot results.	Alarms: None
Sensitivity: Not applicable	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 48 cm x 36 cm x 17 cm (19 in x 14 in x 6.5 in)	Weight: 3.4 kg (7.5 lb)
Power Requirements: Always ready. No power required.	

LOGISTICAL PARAMETERS

Durability: Rugged, high-impact case

Environmental Considerations: Operating conditions: 10 °C to 40 °C (50 °F to 104 °F); 10 % to 80 % rh. PyroPac, an instant tube warmer, is available for use when sampling in environments cooler than 10 °C (50 °F).

Shelf Life: Shelf life for tubes up to 2 yr from date of manufacture

Consumables: Simulant tubes and training tubes

Calibration Requirements: No calibration required

Repairs: Not applicable

Repair Options: Please contact Nextteq at 877-312-233

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Minimal

Training Required: Simple, illustrated, step-by-step instructions provided

Training Available: Highly trained customer support and technical team available to answer questions. Telephone Nextteq at 877-312-2333 ext. 20.

Manuals Available: Comprehensive instructions provided

Support Equipment: For use with Nextteq Civil Defense Kits

Communications Capability: None

Tamper Resistance: Rugged, high-impact case

Warranty: Yes

Testing Information: Available on request

Applicable Regulations: Not applicable

GENERAL

Training/Certification Kit (Civil Defense Detection Papers)

Nextteq, LLC
 8406 Benjamin Road, Suite J
 Tampa, Florida 33634
 877-312-2333 (Tel)
 877-312-2444 (Fax)
 info@nextteq.com
Information Source: <http://www.nextteq.com>

Status: Vendor response—11/17/2006



Portability: Handheld Portable

Technology: Colorimetric

Unit Cost: Please contact Nextteq or an authorized distributor

Availability: Commercially available. Authorized distributors. United States and international.

Description: Colorimetric—CA simulants. The Nextteq Training/Certification Kit for Civil Defense-Detection Papers safely simulates liquid CAs for realistic field training. The Training/Certification Kit is specifically designed for use with Nextteq Civil Defense Kits and Detection Papers (M8, M9, and 3-Way), enabling first responders to gain hands-on training.

Type: Commercial

Current Users: Hazmat teams, first responders, firefighters, and occupational health and safety industries

OPERATIONAL PARAMETERS

CAs Detected: Realistically and safely simulate common CAs including blister, blood, choking, and nerve. For use with Nextteq Civil Defense Kits and/or detection papers.

TICS Detected:

- **High Priority:** Not applicable
- **Medium Priority:** Not applicable
- **Low Priority:** Not applicable

Start-up Time: Ready to use. No warm-up time required.	Detection State: Liquid simulants
Response Time: Ready to use. On-the-spot results.	Alarms: None
Sensitivity: Not applicable	Selectivity: Not applicable

PHYSICAL PARAMETERS

Size: 34 cm x 25 cm x 11 cm (13.5 in x 10 in x 4.5 in)	Weight: 1.7 kg (3.8 lb)
Power Requirements: Always ready. No power required.	

LOGISTICAL PARAMETERS

Durability: Rugged, high-impact case

Environmental Considerations: Simulants operating temperature: 4 °C to 40 °C (39 °F to 104 °F). Tubes operating relative humidity: 10 % to 80 % rh.

Shelf Life: Simulant shelf life for tubes up to 1 yr from date of manufacture

Consumables: Simulant and detection papers (M8, M9, and/or 3-Way)

Calibration Requirements: No calibration required

Repairs: Not applicable

Repair Options: Please contact Nextteq at 877-312-233

Maintenance Costs: Not applicable

SPECIAL REQUIREMENTS

Operator Skills: Minimal

Training Required: Simple, illustrated, step-by-step instructions provided

Training Available: Highly trained customer support and technical team available to answer questions. Telephone Nextteq at 877-312-2333 ext. 20.

Manuals Available: Comprehensive manual provided

Support Equipment: For use with Nextteq Civil Defense Kit and/or Detection Papers (M8, M9, and 3-Way)

Communications Capability: None

Tamper Resistance: Rugged, high-impact case

Warranty: Yes

Testing Information: Available on request

Applicable Regulations: Not applicable

GENERAL

CP100T

EnviroNics USA, Inc.
 4401 Eastport Parkway
 Port Orange, Florida 32127
 Sales Office
 386-304-5252 (Tel)
 386-304-5251 (Fax)
Information Source: <http://www.enviroNicsusa.com>

Status: Vendor response—11/15/2006



Portability: Handheld Portable

Technology: on Mobility Spectrometry

Unit Cost: Contact manufacturer or GSA schedule

Availability: Commercially available and GSA schedule

Description: Patented Ion Mobility Spectrometry and Multisensor

Type: Commercial

Current Users: Selected DOD units

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN, and L

TICS Detected:

- **High Priority:** Ammonia, carbon disulfide (CS₂), chlorine (Cl₂), phosgene, hydrogen sulfide (H₂S), hydrogen cyanide, HNO₃, and ethylene oxide
Planned Tics: NH₃, CS₂, Cl₂, HCl, HCN, H₂S, CK
- **Medium Priority:** Acrylonitrile. Planned TICs include methyl mercaptan.
- **Low Priority:** Acetic acid, acetone, DC, diethyl ether, DMMP, dimethyl phosphate, ethanol, ethyl acetate, HCL, isopropanol, methanol, methylmetacrylate, n-hexane, pentane, pinacolyl alcohol, and thiodiglycol. Planned TICs include methylmetacrylate, ethylacetate, toluene diisocyanate, acetaldehyde, ethanol, i-butanol, i-propanol, mtbe, acetonitrile, and methyl mercaptan

Start-up Time: Between 61 s and 5 min	Detection State: Vapor and aerosol
Response Time: Typically: <20 s	Alarms: Audible and visual alarm
Sensitivity: CAs at 0.001 ppm Hydrogen fluoride at 2 ppm to 5 ppm Acetonitrile at 30 ppm to 100 ppm Toluene diisocyanate at 0.04 ppm to 0.06 ppm HD and HN at 0.033 ppm	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 10.2 cm x 22.9 cm x 5.1 cm (4 in x 9 in x 2 in)	Weight: 0.6 kg (1.3 lb); 0.8 kg (1.8 lb) with battery
Power Requirements: Battery, ac, or vehicle power (8 h continuous use with optional AA battery case or 10 h to 12 h with rechargeable Li Ion battery pack)	

LOGISTICAL PARAMETERS

Durability: Ruggedized for operational environments, MIL STD 810 tested

Environmental Considerations: Operates in all environments and extreme temperature conditions

Shelf Life: 10 yr

Consumables: Inlet particulate filter. Unit provides indication to operator when filter is contaminated and needs replacement.

Calibration Requirements: None

Repairs: SC cell/pump module every 3000 operating hours

Repair Options: Flexible policy; overnight mail (24 h turn around time); loaner possible; 24/7 tech support. Service contract with different options (extended warranty or maintenance contract). Tailored to support customer requirements.

Maintenance Costs: Routine maintenance: None

Scheduled maintenance: <\$800 at 3000 h

SPECIAL REQUIREMENTS

Operator Skills: No special skills but training required

Training Required: 1 h review of operator screens

Training Available: Operator training course (manufacturer will conduct on-site or off-site)

Manuals Available: Operators manual and quick reference guide available

Support Equipment: ac power supply/battery charger, included standard

Communications Capability: Computer (control), computer interface, networking capability

Tamper Resistance: Sealed with tamperproof screws and critical operator selectable features password protected

Warranty: 1 yr factor warranty; does not cover misuse or mishandling

Testing Information: Tested by the Finnish Defense Forces Research Center (Explosives and NBC Defense Section)

Applicable Regulations: The ChemPro100 Chemical Profiler contains a radioactive source which is exempt by the U.S. NRC and does not require licensing, tracking of radiation source or annual wipe test

GENERAL

Shimadzu OP-2010 Plus GCMS System

Shimadzu Scientific Instruments
 7102 Riverwood Drive
 Columbia, Maryland 21046
 Norman Brach
 443-690-5520 (Tel)
Information Source: <http://www.ssi.shimadzu.com>

Status: Vendor response—11/27/2006



Portability: Mobile Laboratory Detection Equipment;
 Vehicle Mounted

Technology: GC/MS

Unit Cost: ~\$75K

Availability: Commercially available

Description: Gas Chromatography/Mass Spectroscopy

Type: Commercial

Current Users: U.S. Army National Guard

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified	Detection State: Not specified
Response Time: Not specified	Alarms: Not specified
Sensitivity: Not specified	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified	Weight: Not specified
Power Requirements: Not specified	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: Not specified
Shelf Life: Not specified	Consumables: Not specified
Calibration Requirements: Not specified	Repairs: Not specified
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Not specified	Training Required: Not specified
Training Available: Not specified	Manuals Available: Not specified
Support Equipment: Not specified	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: Not specified

GENERAL

Shimadzu LCMS-2010A LCMS System

Shimadzu Scientific Instruments
 7102 Riverwood Drive
 Columbia, Maryland 21046
 Norman Brach
 443-690-5520 (Tel)
Information Source: <http://www.ssi.shimadzu.com>

Status: Vendor response—11/27/2006



Portability: Mobile Laboratory Detection Equipment;
 Vehicle Mounted

Unit Cost: Not specified

Availability: Commercially available

Description: Liquid Chromatography/Mass Spectroscopy

Type: Commercial

Current Users: Not specified

Technology: LC/MS

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified	Detection State: Not specified
Response Time: Not specified	Alarms: Not specified
Sensitivity: Not specified	Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified	Weight: Not specified
Power Requirements: Not specified	

LOGISTICAL PARAMETERS

Durability: Not specified	Environmental Considerations: Not specified
Shelf Life: Not specified	Consumables: Not specified
Calibration Requirements: Not specified	Repairs: Not specified
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Not specified	Training Required: Not specified
Training Available: Not specified	Manuals Available: Not specified
Support Equipment: Not specified	Communications Capability: Not specified
Tamper Resistance: Not specified	Warranty: Not specified
Testing Information: Not specified	Applicable Regulations: Not specified

GENERAL

Axima TOF(2) Maldi MS System

Shimadzu Scientific Instruments
 7102 Riverwood Drive
 Columbia, Maryland 21046
 Norman Brach
 443-690-5520 (Tel)
Information Source: <http://www.ssi.shimadzu.com>

Status: Vendor response—11/27/2006

Technology: TOF/MS

Portability: Fixed-Site Analytical Laboratory

Unit Cost: Not specified

Availability: Commercially available

Description: Time of Flight Mass Spectrometry

Type: Commercial

Current Users: Not specified

OPERATIONAL PARAMETERS

CAs Detected: Not specified

TICS Detected:

- **High Priority:** Not specified
- **Medium Priority:** Not specified
- **Low Priority:** Not specified

Start-up Time: Not specified

Detection State: Not specified

Response Time: Not specified

Alarms: Not specified

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified

Weight: Not specified

Power Requirements: Not specified

LOGISTICAL PARAMETERS

Durability: Not specified

Environmental Considerations: Not specified

Shelf Life: Not specified

Consumables: Not specified

Calibration Requirements: Not specified

Repairs: Not specified

Repair Options: Not specified

Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Not specified

Training Required: Not specified

Training Available: Not specified

Manuals Available: Not specified

Support Equipment: Not specified

Communications Capability: Not specified

Tamper Resistance: Not specified

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Not specified

GENERAL

GasID

Smiths Detection
 21 Commerce Drive
 Danbury, Connecticut 06810
 Bob Bohn
 National Sales Manager Emergency Response Division
 203-207-9700 (Tel)
 203-207-9780 (Fax)
 bob.bohn@smithsdetection.com
Information Source: <http://www.smithsdetection.com>
Status: Vendor response—12/4/2006



Portability: Handheld Stationary

Technology: FTIR

Unit Cost: \$62.5K

Availability: Commercially available

Description: Fourier Transform Infrared Spectroscopy

Type: Commercial

Current Users: National Guard WMD teams, state and local hazmat teams, EPA, and DOD

OPERATIONAL PARAMETERS

CAs Detected: WMD Nerve and blister agents (GA, GB, GD, GF, HD, L, and HN)

TICS Detected:

- **High Priority:** TIMs and common chemicals—see General Detection Limit
- **Medium Priority:** TIMs and common chemicals—see General Detection Limit
- **Low Priority:** TIMs and common chemicals—see General Detection Limit

Start-up Time: Between 61 s and 5 min	Detection State: Gases and vapors
Response Time: 20 s	Alarms: Visible flashing screen
Sensitivity: GasID is capable of identifying most compounds well below their IDLH levels (often 100 ppm to 1000 ppm) making it very useful for emergency response and homeland security applications	Selectivity: Noncritical interferents, i.e., water and mixtures

PHYSICAL PARAMETERS

Size: 46 cm x 289 cm x 188 cm (18 in x 11 in x 7 in)	Weight: 11.3 kg (25 lb)
Power Requirements: 110 V mains, cigarette lighter, or battery pack	

LOGISTICAL PARAMETERS

Durability: Designed for infield use to give flexibility.

ZnSe Beam splitter—Unlike KBR, the ZnSe beamsplitter can be exposed to elements such as humidity, without destroying beamsplitter.

Vibration/drop test—Each GasID undergoes a series of drop and vibration tests to test the ruggedness of the product.

Environmental Considerations: Operational in extreme weather and temperatures ranging from -7 °C to 50 °C (19 °F to 122 °F). Humidity ranging from 0 % to 80 %.

Shelf Life: More than 5 yr on all components except laser and source

Consumables: The Thermal Desorption tubes remain sealed prior to use and have a 4 yr shelf life. Tubes cost \$5.50 each and are sold in packs of 100.

Calibration Requirements: No user calibration required

Repairs: Laser and source need replacing every 2 yr to 3 yr. Source is user installable in the field.

Repair Options: Loaner option is available. Turn around time for repair is typically 5 d for depot repair. Field technical support is not typical, but phone technical support is 24/7.

Maintenance Costs: 1 yr plus 3 yr partnership program (warranty)

SPECIAL REQUIREMENTS

Operator Skills: Low—system is prompt driven

Training Required: 1 d

Training Available: 1 d on-site

Manuals Available: PDF format

Support Equipment: None required

Communications Capability: Embedded computer can be networked

Tamper Resistance: Password protected interface

Warranty: 1 yr

Testing Information: Testing by Navy Environmental and Preventive Medicine Unit No. 2

Applicable Regulations: None

GENERAL

RespondeR

Smiths Detection
 21 Commerce Drive
 Danbury, Connecticut 06810
 Bob Bohn
 National Sales Manager Emergency Response Division
 203-207-9700 (Tel)
 203-207-9780 (Fax)
 bob.bohn@smithsdetection.com
Information Source: <http://www.smithsdetection.com>

Status: Vendor response—12/4/2006



Technology: Raman Spectroscopy

Portability: Handheld Stationary

Unit Cost: \$30K

Availability: Commercially available

Description: Raman Spectroscopy

Type: Commercial

Current Users: State and local hazmat teams

OPERATIONAL PARAMETERS

CAs Detected: WMD Nerve and blister agents (GA, GB, GD, VX, HD, L, and HN)

TICS Detected:

- **High Priority:** TIMs and common chemicals—see General Detection Limit
- **Medium Priority:** TIMs and common chemicals—see General Detection Limit
- **Low Priority:** TIMs and common chemicals—see General Detection Limit

Start-up Time: Between 61 s and 15 min	Detection State: Solids and liquids
Response Time: 40 s	Alarms: Visible screen
Sensitivity: Raman spectroscopy is sensitive enough to identify the minor component of most mixtures at 1 % to 5 % concentration depending on the sample. Approximately 10 mg or 0.2 mL of sample is needed for measurement.	Selectivity: Noncritical interferents, i.e., mixtures

PHYSICAL PARAMETERS

Size: 22.2 cm x 19 cm x 10.1 cm (8.75 in x 7.5 in x 4 in)	Weight: 3.1 kg (6.9 lb)
Power Requirements: 110 V mains or battery pack	

LOGISTICAL PARAMETERS

Durability: Designed for infield use to give flexibility. Vibration/drop test—Each GasID undergoes a series of drop and vibration tests to test the ruggedness of the product.

Environmental Considerations: Operational in extreme weather and temperatures ranging from -7 °C to 50 °C (19 °F to 122 °F). Humidity ranging from 0 % to 80 %.

Shelf Life: More than 5 yr on all components

Consumables: Sample vials cost \$0.50 each and are sold in packs of 100. They have unlimited shelf life.

Calibration Requirements: A calibration check feature tests the calibration when prompted by user (typically every hour). The system will automatically perform a calibration with the internal standard if needed.

Repairs: No standard repair is expected for 5 yr

Repair Options: Loaner option is available. Turn around time for repair is typically 5 d for depot repair. Field technical support is not typical, but phone technical support is 24/7.

Maintenance Costs: 1 yr plus 3 yr partnership program (warranty)

SPECIAL REQUIREMENTS

Operator Skills: Low—system is prompt driven

Training Required: 1 d

Training Available: 1 d on-site

Manuals Available: PDF format

Support Equipment: None required

Communications Capability: Wireless communication available to combine results between the RespondeR and the Smiths Detection HazmatID

Tamper Resistance: Password protected interface

Warranty: 1 yr

Testing Information: Currently ongoing

Applicable Regulations: Class 3 b laser device

GENERAL

Nerve Agent Vapour Detector (NAVD)
(051010)

Anachemia Canada, Inc.
255 Norman
Lachine, Quebec, Canada
H8R 1A3

Liane Mendelsohn
514-489-5711 (Tel)
514-485-9825 (Fax)

Information Source:

<http://www.anachemia.com/engnew/frame/product10.html>

Status: Vendor response—12/6/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: Up to 500—\$5.97; 501 to 1000—\$5.87

Availability: Commercially available (12 wk). Lead times are shorter when items are in stock.

Description: Color Change Chemistry—Detector is a simple, inexpensive, expendable device designed for the individual soldier to detect nerve gas vapors.

The detectors can be used to quickly determine if a chemical attack detected by a “gas alarm” system is dangerous in the immediate vicinity of the individual and when it is safe to unmask.

The detector consists of a plastic detector body containing an enzyme impregnated test paper; a plastic holder containing a chemically impregnated test paper; and an instruction sheet.

The test consists of:

1. Moistening the test paper in the detector body and exposing it to the atmosphere.
2. Pressing the detector body into the holder so that the papers contact. The test paper will change color to blue or green in absence of nerve agent vapor. If nerve agent vapor is present or the test has been incorrectly performed, the color of the test paper will remain unchanged.

Type: Military

Current Users: Fire departments, emergency management agencies, and hazmat teams

OPERATIONAL PARAMETERS

CAs Detected: G and V

TICS Detected:

- **High Priority:** None
- **Medium Priority:** None
- **Low Priority:** None

Start-up Time: 3 min to 5 min (inexperienced); 1 min to 3 min (experienced)

Detection State: Vapor

Response Time: 20 min to 25 min (experienced and inexperienced)

Alarms: Visual alarm. Blue or green in absence of nerve agents.

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: 5.5 cm x 2.5 cm x 0.2 cm (2.2 in x 0.98 in x 0.08 in)

Weight: Not specified

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Plastic body

Environmental Considerations: Operates in all environments

Shelf Life: 5 yr

Consumables: None

Calibration Requirements: None

Repairs: None

Repair Options: Not specified

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: High school education (to read and understand operator instructions). Training (performance oriented—practice on at least 6 training sampler detector tickets).

Training Required: A minimum of 4 h to 6 h of performance oriented training is recommended

Training Available: Yes, by distributor— GEOMET Technologies, Inc.

Manuals Available: Instructions are printed on each sampler/detector ticket pouch. A detailed instruction card is attached to each carrying case with waxed cord.

Support Equipment: Training kit

Communications Capability: None

Tamper Resistance: None

Warranty: 5 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

M28 (067230COM), M29 (062230COM), and M256A1 (063230COM) Chemical Agent Detector Simulator Training Kits

Anachemia Canada, Inc.
255 Norman
Lachine, Quebec, Canada
H8R 1A3

Liane Mendelsohn
514-489-5711 (Tel)
514-485-9825 (Fax)

Information Source:

<http://www.anachemia.com/engnew/frame/product10.html>

Status: Vendor response—12/6/2006



Portability: Handheld Stationary

Technology: Color Change Chemistry

Unit Cost: CM256A1 Simulator (up to 25—\$504.67; 26 to 50—\$489.57)

CM28 and CM 29 Simulator (up to 25—\$460.27; 26 to 50—\$432.67)

Availability: Equivalent commercial products to M256A1, M28, and M29 Simulator Training Kits (12 wk lead time). Lead times are shorter when items are in stock.

Description: Color Change Chemistry—Training Kits are designed for classroom training situations and simulate the presence or absence of nerve, blister or blood agents. Trainees use hinged protective strips that contain needed ampoules for simulating blood, blister or nerve agents.

The kits consist of a corrugated box containing the simulators; instructions manual; and a total of 36 pouches which include the simulators and blank samplers.

The test is carried out by following the simple instructions printed on the inside of the box, on the sampler packet and in the instruction manual.

The M28 Chemical Agent Simulator Detector Kit simulates the presence or absence of Nerve Agents.

The M29 Chemical Agent Simulator Detector Kit simulates the presence or absence of Blister Agents.

The M256A1 is used to train personnel in the detection of Blood, Blister or Nerve Agents.

Type: Military

Current Users: Fire departments, emergency management agencies, and hazmat teams

OPERATIONAL PARAMETERS

CAs Detected: Simulator:

M28 (T500)—SAFE “ALL CLEAR”—Negative nerve, blister, and blood; (T501)—“DANGER”—Positive nerve (G) or (V)

M29 (T500)—SAFE “ALL CLEAR”—Negative nerve, blister, and blood; (T501)—“DANGER”—Positive blister (H) mustard

M256A1 (T500)—SAFE “ALL CLEAR”—Negative nerve, blister, and blood; (T501)—“DANGER”—Positive nerve (G) or (V); M256A1 (T502)—“DANGER”—Positive blister (H) mustard

TICS Detected:

- **High Priority:** Simulator:

- M256A1 (T503)—“DANGER”—Positive blister (CX) phosgene oxime

- M256A1 (T504)—“DANGER”—Positive blood (AC) hydrogen cyanide or (CK) cyanogen chloride (strong)

- M256A1 (T505)—“DANGER”—Positive blood (AC) hydrogen cyanide or (CK) cyanogen chloride (weak)

- **Medium Priority:** Not applicable

- **Low Priority:** Not applicable

Start-up Time: 3 min to 5 min (inexperienced); 1 min to 3 min (experienced)

Detection State: Vapor

Response Time: 20 min to 25 min (experienced and inexperienced)

Alarms: Visual alarm

Sensitivity: Not specified

Selectivity: Not specified

PHYSICAL PARAMETERS

Size: Not specified

Weight: Not specified

Power Requirements: None

LOGISTICAL PARAMETERS

Durability: Plastic body

Environmental Considerations: Operates in all environments

Shelf Life: 5 yr

Consumables: None

Calibration Requirements: None

Repairs: None

Repair Options: Not specified

Maintenance Costs: None

SPECIAL REQUIREMENTS

Operator Skills: High school education (to read and understand operator instructions). Training (performance oriented—practice on at least 6 training sampler detector tickets).

Training Required: A minimum of 4 h to 6 h of performance oriented training is recommended

Training Available: Yes, by distributor— GEOMET Technologies, Inc.

Manuals Available: Instructions are printed on each sampler/detector ticket pouch. A detailed instruction card is attached to each carrying case with waxed cord.

Support Equipment: Training kit

Communications Capability: None

Tamper Resistance: None

Warranty: 5 yr

Testing Information: Not specified

Applicable Regulations: None

GENERAL

JUNO™

General Dynamics
 Armament and Technical Products
 Four LakePointe Plaza,
 2118 Water Ridge Parkway
 Charlotte, North Carolina 28217
 Janet Guertin
 704-714-8290 (Tel)
 704-714-8232 (Fax)
 jguertin@gdatp.com
Information Source: <http://www.gdatp.com>



Status: Vendor response—12/18/2006

Portability: Handheld Portable

Technology: DMS

Unit Cost: Range dependent

Availability: Commercially available (6 mo)

Description: Differential Mobility Spectrometry (DMS)—separates ions by measuring the difference between ion mobilities as they pass through applied electrical fields

Type: Military and commercial

Current Users: Edgewood Chemical Biological Center

OPERATIONAL PARAMETERS

CAs Detected: GA, GB, GD, GF, VX, HD, HN₃, L, AC, and CK

TICS Detected:

- **High Priority:** Can be trained to recognize vapors
- **Medium Priority:** Can be trained to recognize vapors
- **Low Priority:** Can be trained to recognize vapors

Start-up Time: Between 2 min and 3 min	Detection State: Vapor
Response Time: Between 10 s and 60 s	Alarms: Visible alarm and audible alarm
Sensitivity: Not specified	Selectivity: Classifier recognizes agent in the presence of common battlefield interferants

PHYSICAL PARAMETERS

Size: 194 mm x 100 mm x 55.9 mm (7.64 in x 3.95 in x 2.2 in) l,w,d

Weight: ~2 lb including battery

Power Requirements: 5 V dc to 12 V dc

LOGISTICAL PARAMETERS

Durability: Designed to be operated in harsh environments. Should only be transported in a transit case.

Environmental Considerations: Operates in all environments and extreme temperature conditions: -32 °C to 49 °C (-25 °F to 120 °F)

Shelf Life: 10 yr—membranes may need reconditioning	Consumables: Sieve
Calibration Requirements: Annual	Repairs: Available
Repair Options: Not specified	Maintenance Costs: Not specified

SPECIAL REQUIREMENTS

Operator Skills: Nontechnical background (with some special training required)

Training Required: Not specified

Training Available: Yes

Manuals Available: Operator and unit maintenance manual; direct support and general support maintenance manual

Support Equipment: Vehicle or fixed-site installation hardware

Communications Capability: Command control communications, computer interface, and networking capability

Tamper Resistance: Password protected over operating system and advanced user features

Warranty: Not specified

Testing Information: Not specified

Applicable Regulations: Nuclear Regulatory Commission materials license Part 30.20. JUNO™ currently holds a general distribution license (exempt distribution Sep 07)

**APPENDIX D—IMMEDIATELY DANGEROUS TO LIFE AND
HEALTH VALUES (IDLH)**

**APPENDIX D—IMMEDIATELY DANGEROUS TO LIFE AND HEALTH VALUES
(IDLH)**

Chemical Name	Chemical Abstract Service No.	MW	Mg/m³	IDLH (PPM)
GA/Tabun	77-81-6	162.1	0.1	0.0151
GB/Sarin	107-44-8	140.1	0.1	0.0175
GD/Soman	96-64-0	182.2	0.05	0.00671
GF	329-99-7	180.2	0.05	0.00678
VX	50782-69-9	267.4	0.003	0.00027
H/Mustard	505-60-2	159.1	0.7	0.10757
L/Lewisite	541-25-3	207.3	0.00254	0.0003

Chemical Name	Chemical Abstract Service No.	MW	Mg/m³	IDLH (PPM)
1,2-Dimethylhydrazine	540-73-8	60.10	36.87	15
Acetone cyanohydrin	75-86-5	85.10		
Acrolein	107-02-8	56.07	4.59	2
Acrylonitrile	107-13-1	53.07	184.5	85
Allyl alcohol	107-18-6	58.09	47.52	20
Allyl chlorocarbonate	2937-50-0	120.534		
Allyl isothiocyanate	57-06-7	99.16		
Allylamine	107-11-9	57.11		
Ammonia	7664-41-7	17.04	209.08	300
Arsenic trichloride	7784341	181.27		
Arsine	7784-42-1	77.95	9.56	3
Boron tribromide	10294-33-4	250.54		
Boron trichloride	10294-34-5	117.16	95.83	20
Boron trifluoride	7637072	67.81	69.34	25
Bromine	7726956	159.80	19.61	3
Bromine chloride	13863417	115.36		
Bromine pentafluoride	7789302	174.91		
Bromine trifluoride	7787715	136.91	139.989	25
Carbon disulfide	75-15-0	76.13	1556.9	500
Carbon monoxide	630-08-0	28.01	1374.7	1200
Carbonyl fluoride	353504	66.01		
Carbonyl sulfide	463-58-1	60.07		
Chlorine	7782-50-5	70.90	29	10
Chlorine pentafluoride	13637633	130.45		
Chlorine trifluoride	7790912	92.45	75.62	20
Chloroacetaldehyde	107200	78.50	144.5	45
Chloroacetone	78-95-5	92.53		

Chemical Name	Chemical Abstract Service No.	MW	Mg/m ³	IDLH (PPM)
Chloroacetonitrile	107-14-2	75.50		
Chloroacetyl chloride	79049	112.94		
Chlorosulfonic acid	7790-94-5	116.52		
Crotonaldehyde	4170303	70.09	143.3	50
Cyanogen chloride	506774	61.47		NA
Diborane	19287-45-7	27.67	16.98	15
Diketene	674-82-8	84.08		
Dimethyl sulfate	77781	126.14	36.1	7
Dimethylhydrazine	57-14-7	60.12	36.9	15
Diphenylmethane-4,4'-diisocyanate	101-68-8	250.3	75	
Diphosgene	503-38-8	197.8	16.18	2
Ethyl phosphonic dichloride	2025-56-1	29.06		
Ethyl phosphonothioic dichloride	993-43-1	163.006		
Ethyl chloroformate	541413	108.53		
S-Ethyl chlorothiolfomate	2941-64-2	124.590		
Ethylene dibromide	106-93-4	187.88	768.4	100
Ethylene oxide	75-21-8	44.06	1441.6	800
Ethyleneimine	151564	43.08	176.2	100
Fluorine	7782-41-4	38.00	38.85	25
Formaldehyde (37 %)	50-00-0	30.03	24.56	20
Hexachlorocyclopentadiene	77474	272.75		
Hydrazine	302-01-2	32.05	65.54	50
Hydrogen bromide	10035-10-6	80.92	99.3	30
Hydrogen chloride	7647-01-0	36.46	74.6	50
Hydrogen cyanide	74-90-8	27.03	11.055	10
Hydrogen fluoride	7664-39-3	20.01	24.55	30
Hydrogen iodide	10034-85-2	127.91		
Hydrogen selenide	7783075	80.98	3.31	1
Hydrogen sulfide	7783064	34.08	139.4	100
Iron pentacarbonyl	13463406	195.90		
Isobutyl chloroformate	543-27-1	136.58		
Isopropyl chloroformate	108236	122.56		
Isopropyl isocyanate	1795-48-8	85.105		
Methanesulfonyl chloride	124630	114.55		
Methyl bromide	74839	94.95	970.9	250
Methyl chloroformate	79-22-1	94.50		
Methyl chlorosilane	993-00-0	80.59		
Methyl hydrazine	60-34-4	46.07	37.69	20

Chemical Name	Chemical Abstract Service No.	MW	Mg/m ³	IDLH (PPM)
Methyl isocyanate	624-83-9	57.06	7	3
Methyl mercaptan	74-93-1	48.11	295.2	150
n-Butyl chloroformate	592-34-7	136.58		
n-Butyl isocyanate	111-36-4	99.13		
Nitric acid, fuming	7697-37-2	63.02	64.44	25
Nitric oxide	10102439	30.01	122.7	100
Nitrogen dioxide	10102-44-0	46.01	37.64	20
n-Octyl mercaptan	111-88-6	146.29		
n-Propyl chloroformate	109-61-5	122.55		
Parathion	56382	291.28	9.53	0.8
Perchloromethyl mercaptan	594423	185.87	76.02	10
Phosgene	75-44-5	98.91	8.09	2
Phosphine	7803-51-2	34.00	69.53	50
Phosphorus oxychloride	10025873	153.32		
Phosphorus pentafluoride	7647-19-0	125.97		
Phosphorous trichloride	7719122	137.32	280.818	50
sec-Butyl chloroformate	17462-58-7			
Selenium hexafluoride	7783-79-1	192.96	15.78	2
Silicon tetrafluoride	7783-61-1	104.08		
Stibine	7803-52-3	124.78	25.52	5
Sulfur dioxide	7446095	64.06	262.09	100
Sulfur trioxide	7446119	80.06	3.27	1
Sulfuric acid, concentrated	7664-93-9	98.08	16.05	4
Sulfuryl chloride	7791-25-5	134.96		
Sulfuryl fluoride	2699-79-8	102.06	834.85	200
Tellurium hexafluoride	7783-80-4	241.60	9.88	1
tert-Butyl isocyanate	1609-86-5	99.13		
n-Octyl mercaptan	111-88-6	146.3		
Tetraethyl lead	78002	323.47	39.69	3
Tetraethyl pyrophosphate	107493	290.22	4.75	0.4
Tetramethyl lead	78002	323.47	36.69	3
Titanium tetrachloride	7550-45-0	189.70		
Toluene 2,4-diisocyanate	584849	174.17	17.81	2.5
Toluene 2,6-diisocyanate	91087	174.17	17.81	2.5
Trichloroacetyl chloride	76-02-8	181.82		
Trifluoroacetyl chloride	354-42-5	132.47		
Tungsten hexafluoride	7783-83-6	297.85		

**APPENDIX E—INDEX OF CHEMICAL DETECTOR
CHANGES**

APPENDIX E—INDEX OF CHEMICAL DETECTOR CHANGES

Detectors Updated Since March 2005 Draft

ID #	Detector Name	Change	Reason for change
1	Bio-Rad BioFocus 200 System CZE	Deleted this detector entry from guide	Manufacturer request
5	ChemSentry™ 150C Point Chemical Vapor	Deleted this detector entry from guide	Manufacturer request
5	JCAD ChemSentry™ Point Chemical Vapor Detector	Added this detector entry to guide	Manufacturer request
7	HazCat® Chemical Identification Kit (Model KT1006)	Deleted this detector entry from guide	Manufacturer request
7	HazCat® Industrial Chemical and Mehamphetamine Identification Kit (Model KT1220)	Added this detector entry to guide	Manufacturer request
8	HazCat® MicroCat/WMD Kit (Model KT1040)	Data sheet updated	Manufacturer request
9	HazCat® WMD Kit (Model KT1035)	Data sheet updated	Manufacturer request
10	Chom Air Badges	Data sheet updated	Manufacturer request
11	SafeAir Monitoring System	Data sheet updated	Manufacturer request
15	AutoStep Plus Portable Toxic Monitor	Deleted this detector entry from guide	Manufacturer request
15	NextStep Plus Portable Toxic Monitor	Added this detector entry to guide	Manufacturer request
16	SureSpot Active Sampler	Data sheet updated	Manufacturer request
17	Sensidyne Gas Detection Tubes	Data sheet updated	Manufacturer request
22	Chemkey TLD Toxic Gas Monitor	Data sheet updated	Manufacturer request
23	CM4 Gas Monitor	Data sheet updated	Manufacturer request
24	SPM Toxic Gas Monitor	Added this detector entry to guide	Manufacturer request
25	C16 PortaSens II Gas Detector	Data sheet updated	Manufacturer request
27	PhD2 Personal Gas Detector	Deleted this detector entry from guide	Manufacturer request
27	PhD5 Personal Gas Detector	Added this detector entry to guide	Manufacturer request
28	Toxi Gas Detector	Data sheet updated	Manufacturer request
29	Toxi Plus Gas Detector	Data sheet updated	Manufacturer request
30	Toxi Ultra Gas Detector	Data sheet updated	Manufacturer request
39	Omni-4000 Gas Detector	Data sheet updated	Manufacturer request

ID #	Detector Name	Change	Reason for change
40	Quadrant Portable Gas Detector	Deleted this detector entry from guide	Manufacturer request
40	MX-2100 Portable Gas Detector with 5-Gas Capability	Added this detector entry to guide	Manufacturer request
41	Spectrum	Deleted this detector entry from guide	Manufacturer request
41	Spectrum SP	Added this detector entry to guide	Manufacturer request
42	Target Gas Detector	Data sheet updated	Manufacturer request
43	TX-2000 Toxic Gas Detector	Data sheet updated	Manufacturer request
44	Model TS400 Toxic Gas Detector	Data sheet updated	Manufacturer request
45	Model TS420 Oxygen Deficiency Detector	Data sheet updated	Manufacturer request
46	Haz-Alert Gas Detector	Data sheet updated	Manufacturer request
47	ATX 612 Multi-Gas Aspirated Monitor	Data sheet updated	Manufacturer request
48	Gas Badge Personal Gas Alarm	Deleted this detector entry from guide	Manufacturer request
48	Gas Badge Plus	Added this detector entry to guide	Manufacturer request
49	iTX Multi-Gas Monitor	Data sheet updated	Manufacturer request
50	LTX312/LTX311 Multi-Gas Monitor	Deleted this detector entry from guide	Manufacturer request
50	Gas Badge Pro	Added this detector entry to guide	Manufacturer request
51	T40 Rattler Single-Gas Monitor	Data sheet updated	Manufacturer request
52	T82 Single Gas Monitor	Data sheet updated	Manufacturer request
53	TMX412 Multi-Gas Monitor	Data sheet updated	Manufacturer request
54	WorksAlone 2/Transmitter 2	Deleted this detector entry from guide	Manufacturer request
54	M40 Multi-Gas	Added this detector entry to guide	Manufacturer request
56	4000 Series Compact Portable Gas Detector	Data sheet updated	Manufacturer request
61	Tox-Array 1000 Gas Detector	Deleted this detector entry from guide	Manufacturer request
61	TOX-BOX Portable Gas Detector	Added this detector entry to guide	Manufacturer request
62	FiveStar® Alarm	Deleted this detector entry from guide	Manufacturer request

ID #	Detector Name	Change	Reason for change
62	Solaris® Multigas Detector	Added this detector entry to guide	Manufacturer request
63	Orion® G Multigas and Leak Detector	Deleted this detector entry from guide	Manufacturer request
63	SIRIUS Multigas PID Detector	Added this detector entry to guide	Manufacturer request
64	Orion® Multigas Detector	Deleted this detector entry from guide	Manufacturer request
64	HAZMATCAD Chemical Agent Detector	Added this detector entry to guide	Manufacturer request
65	PULSAR™ Single-Gas Detector	Deleted this detector entry from guide	Manufacturer request
65	HAZMATCAD Plus Chemical Agent Detector	Added this detector entry to guide	Manufacturer request
66	PULSAR™ + Single-Gas Detector	Deleted this detector entry from guide	Manufacturer request
66	API 5000™ LC/MS/MS System	Added this detector entry to guide	Manufacturer request
67	Titan™ Combustible Gas Detector	Deleted this detector entry from guide	Manufacturer request
67	4000 QTRAP® LC/MS/MS System	Added this detector entry to guide	Manufacturer request
68	Toxgard® II Series Gas Monitors	Deleted this detector entry from guide	Manufacturer request
68	4700 Proteomics Analyzer with TOF/TOF™ Optics	Added this detector entry to guide	Manufacturer request
69	Ultima® X Series Gas Monitors	Deleted this detector entry from guide	Manufacturer request
69	4800 MALDI TOF/TOF™ Analyzer	Added this detector entry to guide	Manufacturer request
70	MultiCheck 2000 Multi-Gas Monitor	Data sheet updated	Manufacturer request
71	MultiLog 2000 Multi-Gas Monitor	Data sheet updated	Manufacturer request
73	MultiRae Plus Gas Detector MultiRae PGM-50 Detector	Data sheet updated	Manufacturer request
77	Mini SA Single Gas Personal Monitor	Data sheet updated	Manufacturer request
78	Scout Multi-Gas Personal Monitor	Data sheet updated	Manufacturer request
79	SensAir	Deleted this detector entry from guide	Manufacturer request
79	SensAlarm	Added this detector entry to guide. Replaced #79, #80, and #81.	Manufacturer request

ID #	Detector Name	Change	Reason for change
80	SensAir-4	Deleted this detector entry from guide	Manufacturer request
80	Improved Automatic Continuous Environmental Monitor (IACEM) 980	Added this detector entry to guide	Manufacturer request
81	SensAir-Plus	Deleted this detector entry from guide	Manufacturer request
81	Automatic Continuous Environmental Monitor (ACEM) 9305	Added this detector entry to guide	Manufacturer request
84	ProtectAir Personal Multi-Gas Monitor Model 8570	Deleted this detector entry from guide	Manufacturer request
84	MiniMAX XT Disposable Gas Detector	Added this detector entry to guide	Manufacturer request
85	Gas Beacon/ Gas Leader	Deleted this detector entry from guide	Manufacturer request
85	MiniMAX XP Portable Gas Detector	Added this detector entry to guide	Manufacturer request
86	MiniGas-XL Multi-Gas Monitor	Deleted this detector entry from guide	Manufacturer request
86	MiniMAX X4 Portable Gas Detector	Added this detector entry to guide	Manufacturer request
87	Neotox-XL Single Gas Monitor	Deleted this detector entry from guide	Manufacturer request
87	MicroMAX + Portable Gas Detector	Added this detector entry to guide	Manufacturer request
88	AP4C CW & Toxic industrial Materials Detector (M910 E00 001)	Added this detector entry to guide	Manufacturer request
97	Agilent 6850	Data sheet updated	Manufacturer request
98	Agilent 6890N	Data sheet updated	Manufacturer request
99	Agilent 6890N-5973N, GC/MSD	Data sheet updated	Manufacturer request
104	Miniature Air Sampling System (MASS)	Deleted this detector entry from guide	Manufacturer request
106	Automatic Continuous Environmental Monitor (ACEM) 900	Data sheet updated	Manufacturer request
107	Inficon Hapsite® Field Portable System	Deleted this detector entry from guide	Manufacturer request
107	Hapsite®	Added this detector entry to guide. Placed previous system.	Manufacturer request
114	Agilent 1100 Series LC	Data sheet updated	Manufacturer request
123	TravelIR HCl	Deleted this detector entry from guide	Manufacturer request
125	Metrohm Model 761Compact IC System	Data sheet updated	Manufacturer request

ID #	Detector Name	Change	Reason for change
130	Advanced Portable Detector (APD) 2000	Data sheet updated	Manufacturer request
131	Centurion	Data sheet updated	Manufacturer request
132	Chemical Agent Monitor (CAM-2)	Data sheet updated	Manufacturer request
133	GID-2A Chemical Warfare Agent Detection System	Data sheet updated	Manufacturer request
134	GID-3, Chemical Agent Detection System	Data sheet updated	Manufacturer request
135	GID-3 (24/7) – Chemical Warfare Agent Detection System	Data sheet updated	Manufacturer request
136	LCD-3 - Lightweight Chemical Agent Detector	Data sheet updated	Manufacturer request
137	MCAD-Manportable Chemical Agent Detector	Deleted this detector entry from guide	Manufacturer request
138	M90-D1-C Chemical Warfare Agent Detector	Data sheet updated	Manufacturer request
140	API 150EX	Deleted this detector entry from guide	Manufacturer request
140	API 3200™ LC/MS/MS System	Added this detector entry to guide	Manufacturer request
141	API2000™ LC/MS/MS System	Data sheet updated	Manufacturer request
142	API3000™ LC/MS/MS System	Data sheet updated	Manufacturer request
143	API4000™ LC/MS/MS System	Data sheet updated	Manufacturer request
144	QSTAR® XL Hybrid LC/MS/MS System	Data sheet updated	Manufacturer request
145	QTRAP® Hybrid Linear Ion Trap – Triple Quadruple LC/MS/MS System	Deleted this detector entry from guide	Manufacturer request
145	3200 QTRAP® LC/MS/MS System	Added this detector entry to guide	Manufacturer request
147	VX500 PhotoIonization Detector	Data sheet updated	Manufacturer request
149	MSA Passport PID II Monitor	Deleted this detector entry from guide	Manufacturer request
158	Chemgard™ Infrared Gas Monitors	Deleted this detector entry from guide	Manufacturer request
159	4200 Vapor Detector	Data sheet updated	Manufacturer request
160	7100 Vapor Detector	Data sheet updated	Manufacturer request
161	CW Sentry Plus	Data sheet updated	Manufacturer request
162	SAW MiniCAD mkII	Data sheet updated	Manufacturer request

ID #	Detector Name	Change	Reason for change
163	Portable Odor Monitor	Data sheet updated	Manufacturer request
165	HAZMATCAD Plus	Data sheet updated	Manufacturer request
166	ECAM (Enhanced Chemical Agent Monitor)	Data sheet updated	Manufacturer request
167	SABRE 2000	Data sheet updated	Manufacturer request
168	Safeye Model 400 Gas Detection System	Data sheet updated	Manufacturer request
169	ACADA	Data sheet updated	Manufacturer request
170	ChemPro100	Data sheet updated	Manufacturer request
172	Civil Defense Kit (CDK)	Data sheet updated	Manufacturer request
176	Portable Isotopic Neutron-Spectroscopy Chemical Assay System	Data sheet updated	Manufacturer request
177	Sensit®Gold CGI	Data sheet updated	Manufacturer request
178	Proficiency Certification Test (PCT) Kit	Deleted this detector entry from guide	Manufacturer request
178	HazMat Kits	Added this detector entry to guide	Manufacturer request
182	Airsense Model—GDA-II GDA-II-NA	Data sheet updated	Manufacturer request
183	MINICAMS Series 3000 Continuous Air Monitoring Systems	Deleted this detector entry from guide	Manufacturer request
183	MINICAMS Series 2001/3001 Continuous Air Monitoring Systems	Added this detector entry to guide. Replaced previous system.	Manufacturer request
185	Minotaur 500	Deleted this detector entry from guide	Manufacturer request
185	Minotaur 300	Added this detector entry to guide. Replaced previous detector.	Manufacturer request
193	Toxi Pro Gas Detector	Added this detector entry to guide	Manufacturer request
194	Formaldemeter htV	Added this detector entry to guide	Manufacturer request
195	Model TS4000 Toxic Gas Detector	Added this detector entry to guide	Manufacturer request
196	Minotaur 400	Added this detector entry to guide	Manufacturer request
197	HazCat® Anthrax Screening Kit (Model KT1030)	Added this detector entry to guide	Manufacturer request

ID #	Detector Name	Change	Reason for change
198	HazCat® CommandCat Kit (Model KT1044)	Added this detector entry to guide	Manufacturer request
199	MiniMAX Pro Portable Gas Detector	Added this detector entry to guide	Manufacturer request
200	MiniMAX PID Portable Gas Detector	Added this detector entry to guide	Manufacturer request
201	Sensit®Gold	Added this detector entry to guide	Manufacturer request
202	Sensit®TKY	Added this detector entry to guide	Manufacturer request
203	Sensit® HXG-3	Added this detector entry to guide	Manufacturer request
204	Trak-It®III CGI	Added this detector entry to guide	Manufacturer request
205	Sensit® HXG-2	Added this detector entry to guide	Manufacturer request
206	Gas Trac®	Added this detector entry to guide	Manufacturer request
207	Sensit® CO	Added this detector entry to guide	Manufacturer request
208	Chameleon Chemical Detection System	Added this detector entry to guide	Manufacturer request
209	Gastec Gas Sampling Pumps and Detector Tubes	Added this detector entry to guide	Manufacturer request
210	Ahura First Defender Chemical ID System	Added this detector entry to guide	Manufacturer request
211	MSA Chemgard® Photoacoustic Infrared Gas Monitor Series	Added this detector entry to guide	Manufacturer request
212	GasAlert Micro5 PID	Added this detector entry to guide	Manufacturer request
213	Narco AirClear Kits	Added this detector entry to guide	Manufacturer request
214	Deluxe NarcoWipe Kit	Added this detector entry to guide	Manufacturer request
215	Training/Certification Kit—Civil Defense Detector Tubes	Added this detector entry to guide	Manufacturer request
216	Training/Certification Kit—Civil Defense Detection Papers	Added this detector entry to guide	Manufacturer request

All manufacturers were contacted on or around April 2006 for information concerning the type of customer service they provide. This information was added to the database.

All manufacturers were contacted on or around November 2006 to review and update their datasheets. The following changes were made to the database as of December 14, 2006.

Detectors Added or Removed Since April 2006

ID #	Detector Name	Addition or Deletion	Reason for change
5	ChemSentry™ 150C Point Chemical Vapor	Remove this detector entry	Manufacturer (BAE) request
28	Toxi Gas Detector	Remove this detector entry, was replaced by #193 Toxi Pro Gas Detector	Biosystems request
29	Toxi Plus Gas Detector	Remove this detector entry, was replaced by #193 Toxi Pro Gas Detector	Biosystems request
30	Toxi Ultra Gas Detector	Remove this detector entry, was replaced by #193 Toxi Pro Gas Detector	Biosystems request
34	MicroPac Plus Personal Gas Alarm	Replaced by Pac 7000 Personal Gas Alarm (same number)	Draeger request
36	Multiwarn II Gas Detector	Replaced by X-am 7000 Gas Detector (same number)	Draeger request
57	Logic 400 series (Model 450) Personal Air Monitor	Remove this detector entry. Replaced by Commander with PID sensor (#179).	Manufacturer (IST-AIM) request
94	Remote APACC Chemical Control Alarm Portable Apparatus (M266 E10 000, M352 E30 000 & M452 E20 000)	Remove this detector entry	Manufacturer (Proengin) request
173	CT-1128 GC-MS Portable	Remove this detector entry	Manufacturer (Constellation Corporation) request
197	HazCat® Anthrax Screening Kit (Model KT1030)	Replaced by KT1050 HazCat Tier 4 System (same number)	Haztech request
217	CP100T	Added this detector entry	Manufacturer (Enviroics USA, Inc.) request
218	Shimadzu QP-2010 Plus GCMS System	Added this detector entry	Shimadzu request
219	Shimadzu LCMS-2010A LCMS System	Added this detector entry	Shimadzu request

ID #	Detector Name	Addition or Deletion	Reason for change
220	Axima TOF(2) Maldi MS System	Added this detector entry	Shimadzu request
221	GasID	Added this detector entry	Manufacturer (Smiths) request
222	ResponderR	Added this detector entry	Manufacturer (Smiths) request
223	Nerve Agent Vapour Detector (NAVD) (051010)	Added this detector entry	Manufacturer (Anachemia) request
224	M28 (067230COM), M29 (062230COM), and M256A1 (063230COM) Chemical Agent Detector Simulator Training Kits	Added this detector entry	Manufacturer (Anachemia) request
225	JUNO™	Added this detector entry	Manufacturer (General Dynamics) request

Detectors Updated Since April 2006

ID #	Detector Name	Change	Reason for change
2	Chemical Agent Liquid Detector, C8 ((081030) Chemical Agent Liquid Detector, 3-Way (031010COM) Chemical Agent Liquid Detector, CM9 (091402COM)	Name change	Anachemia request
31	GasAlert	BW Technologies to BW Technologies by Honeywell	Company name changed
32	GasAlertMax	BW Technologies to BW Technologies by Honeywell	Company name changed
33	GasAlert Micro	BW Technologies to BW Technologies by Honeywell	Company name changed
34	Pac 7000 Personal Gas Alarm (new) keep number 34	Replaced MicroPac Plus Personal Gas Alarm	Draeger Safety, Inc. request
36	X-am 7000 Gas Detector (new) keep number 36	Replaced Multiwarn II Gas Detector	Draeger Safety, Inc. request
82	Genesis Portable Gas Monitor	Thermo GasTech to Thermo Fisher Scientific	Company name changed
83	GT Series Portable Gas Monitor	Thermo GasTech to Thermo Fisher Scientific	Company name changed

ID #	Detector Name	Change	Reason for change
101	Infrared Detector for Gas Chromatograph	Biorad to Analytical Solutions and Providers (ASAP)	Manufacturer changed
105	CT-1128 Portable GC-MS	Name change (added portable)	Constellation request
110	CMS200 (new name and company)	Was Scentograph Plus II; Sentex to INFICON	Change both product and company name (now INFICON)
111	CMS100 (new name and company)	Was Scentoscreen (GC) with Argon Ionization Detector; Sentex to INFICON	Change both product and company name (now INFICON)
116	Shimadzu LC-20A HPLC System (new name)	Was Shimadzu LC-10 HPLC System	Shimadzu request
121	M21 Automatic Chemical Agent Alarm	ECBE?	Manufacturer changed
124	Miran SapphIRe Portable Ambient Air Analyzer	Thermo Fisher Scientific	Company name changed
129	AirSentry-IMS® Ambient Air Analyzer	Molecular Analytics Inc. to Particle Measuring Systems	Name and manufacturer changed
136	ACADA	Was 169 LCD-3—Lightweight Chemical Agent Detector	Changed numbering per Smiths request
154	TVA-1000B (FID or FID/PID) Toxic Vapor Analyzer	Thermo Fisher Scientific	Company name changed
156	Innova Type 1412 Multigas Monitor (new)	Was Type 1312	California Analytical Instruments request
161	CW Sentry 3G	Was CW Sentry Plus; Microsensor Systems, Inc. to MSA	Name and manufacturer changed
162	SAW MiniCAD mkII	Microsensor Systems, Inc. to MSA	Manufacturer changed
165	HAZMATCAD Plus	Microsensor Systems, Inc. to MSA	Manufacturer changed
169	LCD-3—Lightweight Chemical Agent Detector	Was 136 ACADA	Changed numbering per Smiths request
176	Portable Isotopic Neutron-Spectroscopy Chemical Assay System	ORTEC new, was Frontier	Company name changed
179	Aim Commander	IST-AIM to Aim (Aerion Technologies)	Manufacturer changed
185	Griffin 300 (was Minotaur 300)	ICx Griffin Analytical Technologies	Detector and manufacturer name change

ID #	Detector Name	Change	Reason for change
196	Griffin 400 (was Minotaur 400)	ICx Griffin Analytical Technologies	Detector and manufacturer name change
197	KT1050 HazCat Tier 4 System (new) keep number 197	Replaced HazCat® Anthrax Screening Kit (Model KT1030)	Haztech request
212	GasAlert Micro5 PID	BW Technologies to BW Technologies by Honeywell	Company name changed

As of December 18, 2006, the *Guide for the Selection of Chemical Detection Equipment for Emergency First Responders* had 207 detector equipment items (112 detector equipment items which were updated November or December 2006).