REPORT TO THE EMERGENCY SERVICES FOUNDATION

TOXIC CHEMICAL ANALYSIS

VAPOUR PLUME MODELLING

HEALTH MONITORING OF EMERGENCY SERVICE PERSONELL

SUBMITTED BY
STATION OFFICER
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METROPOLITAN FIRE BRIGADE
MELBOURNE

FOREWORD

As a result of the ever present threat to the population and greater extent to Emergency Service Workers from exposure to toxic substances, the emphasis of this report is one of safety in dealing with chemical hazards in the preplanning of, during and after the activity of a Hazardous Material Emergency.

The purpose of the overseas study tour conducted by myself has been to study the effect of technology on the operations of various Fire Departments in the US and their uses of this technology and the beneficial effects that may be gained by our use of this technology.

My primary objective has been to examine the applications of MS/GC (mass spectrometer/gas chromatography) for the identification of toxic substances and fire investigation.

The secondary consideration in this study was to evaluate the latest developments in Plume Modelling, which is a computer generated map to assist in the tracking of a hazardous chemical release in the air or in water.

Finally and most importantly, was to monitor the trend in the US as to Health Monitoring of all emergency service workers in the post-incident phase, and by the early detection of toxic or otherwise harmful substances entering the body as a result of our work.

America is a centre of high technology, and with regard to their Fire Services this technology is being utilised as their budgets allow, the US Fire Services in general and especially those sections associated with Hazardous Materials are highly motivated professionals dedicated to their task and committed to their profession.

SECTION ONE

HAZARDOUS CHEMICAL ANALYSIS

Fire Departments in the US are not always users of the highest form of technology available for the detection and identification of hazardous materials, however they have access to laboratory facilities for these processes and are quite expert in the techniques of sample collection and preparation, as well as following the guidelines established to maintain the chain of evidence.

Laboratories generally use the Gas Chromatograph or Gas Chromatograph/Mass Spectrometer for the identification of the unknown samples as well as a range of Infra Red and Spectraphotometric equipment.

1. Testing Techniques

The most common form of on scene analyses performed are several types of Wet Chemistry requiring a considerable amount of time along with a reasonable amount of expertise and chemical indicators, the most common of which is the:

1.1.1. "Hazcat" Kit - this is a basic portable chemistry lab consisting of sample collection and testing glassware and is equipped with a range of indicator solutions and a complicated instruction chart.

1.1.2. "Spil-Fyter" - is a far simpler indicator strip containing a series of coated test indicators that will give a five way test when immersed in the sample. This is a very simple although not foolproof way of obtaining the chemical characteristics of the sample *(see appendix 1a).*

The above techniques are an excellent means of finding the characteristics of a particular unknown chemical sample eg. acid or base, but will not identify any latent hazards of that particular chemical or a specific identification. For instance it may be identified as an acid, but which acid? Is it Hydrochloric Acid or could it be Chromic Acid - both would be indicated as acidic but the health risks associated with each and means of disposal would vastly differ.

1.2 **Electronic Testing Instruments;** the majority of US Fire Departments employ several types of electronic instrumentation for the detection of Flammable, Toxic or otherwise Hazardous Chemicals, the types and brands vary and most are of the electrochemical detector single substance type with the exception of;

1.2.1 **"Miran 1B"** - this instrument is of the Infra Red Absorption Spectrometer type and is in use with the

(filled out with the job details and signed by the investigator).

An attached triplicate receipt details the contents of the can and is signed by the investigator, the person who conveys the can to the lab and by the person who receives the can at the lab.

This chain of evidence is strictly necessary under US Law and a break in this chain could result in wasted work for all concerned *(see appendix 1b).*

The major problem that confronts any Fire Investigator when probing a fire scene is that although the fire origin may be clearly determined. Which portion of the debris would contain enough evidence for a successful prosecution?

Electrochemical Detectors may indicate that an accelerant is present, but that detector may not be able to discriminate between the background "noise" caused by the other burnt substances that may be releasing hydrocarbons or a true sample of a detected accelerant.

On the other hand would a sample of carpet contain enough residual accelerant to register and be admissible as evidence, clearly portable electronic detectors are not as sensitive as even the human nose.

The need for a method of obtaining accurate samples in the shortest possible time to make the Fire Investigators and the Laboratories job easier has been addressed by the Fairfax County "CANINE ACCELERANT PROGRAM".

This has given the Fairfax County Investigators an Instrument with up to 100 times the sensitivity and discrimination (17 commonly used accelerant so far) of the human nose and proven to be 99% effective at present with no signs of deterioration.

The utilisation of dogs in the detection of accelerants has proven to be the most effective and cost efficient method of detection according to the Fairfax County Investigators *(see appendix 1c).*

2.2 **Laboratory Techniques** - once received at the lab the sample is prepared by immersion in a dry heat bath after a hole has been pierced in the lid to accept a vacuum gas extractor tube. Once the can and contents have reached a temperature of 100 C the vapour contents of the can are extracted, filtered through activated charcoal which is then crushed, washed through with Carbon Disulphide then analysed and compared agains a range of pre-prepared test standards eg. 50% evaporated petrol, 25% evaporated kerosene.

Los Angles City Fire Department. This type of spectrometer was in use with the MFB in the past and was discarded due to it's inability to analyse and quantitate unknown gases and could not accept liquid samples easily.

The main drawback of the Miran was that the substance undergoing the qualitation had to be known prior to the test, and although user friendly had an annoying habit of losing battery power when part way through the test and was not safe to use in flammable atmospheres.

1.3 **Laboratory Testing** - is carried out routinely by all Fire Departments in the US and often involve samples being sent through the post to the laboratory. These labs will analyse the samples utilising GC/MS or other procedures to give a qualitative and quantative identification of the particular sample. These samples are sent by both HAZMAT and Fire Investigation teams.

The main problem encountered is with the time delay in sending the sample for testing and receiving the test results, often the incident has been cleaned up with only the preliminary tests to go on weeks before the lab results have been obtained, only to find that the health of individuals had been placed at risk in the belief that a simple substance had been dealt with.

However the methodology of gathering and packaging should be discussed.

2. Sample Preparation

HAZMAT and Fire Investigation teams have learnt through experience that the preparation and the actual package used to house samples will have a bearing on the quality and even the legal acceptability of the test results obtained from laboratories.

Samples housed in Polythene bags and containing hydrocarbons or certain other chemicals have in the past been analysed only to discover that the bag has been permeated by the chemical, has been holed allowing the ingress of air or has reacted with the chemical and have either given misleading or unsatisfactory results.

Sample collection is best conducted by the following methods;

2.1 **Fire Investigation** - evidence collected by Fire Investigators involve a strict discipline, a sample such as a piece of burnt carpet suspected of containing the residue of flammable liquid (hydrocarbon), is packaged in a new 4 litre paint can and sealed with evidence sealing tape

This analyses is generally carried out utilising a Gas Chromatograph only and the results compared against chromatograms of the test standards.
NOTE: the use of Carbon Disulphide or Ether as a conveyor agent in a mobile laboratory environment is not recommended due to:-

(a) the toxic and cumulative effects of Carbon Disulphide

(b) the danger of Peroxide formation in Ether and it's flammability.

A recommended alternative to either of the above is the use of Chloroform as the conveyor agent, the use of which should however be treated as a safer means but not completely safe as this also has toxic and cumulative effects if improperly used.

2.3 **HAZMAT** - the types of samples collected by HAZMAT Teams are varying in their danger and their ease of collection, in all cases liquid samples are collected in glassware and thoroughly decontaminated on the outside before packaging and shipment to the lab.

Gaseous samples differ as they are harder to collect and may contain vapours that condense onto the outer walls of any container used to ship them, the type of container may well react with the sample or be sufficiently permeable to allow the sample to escape to the atmosphere during transit.

Suitable containers such as TEDLAR gas sample bags or glassware would be used and would be heat soaked prior to sample analyses to a maximum temperature of 35 C.

This would allow the vaporisation of any condensate should there be any appreciable time lag in the collection and sampling , although ideally gas samples are best analysed as soon as possible after collection.

3. Training

The complexity of the techniques mentioned above places a demand on the Fire Departments to have operators highly skilled in the art of identification, analyses (wet and electronic) and sample preparation.

My observations of the people that I came into contact with on this trip was that of highly competent operators.

This was achieved through intensive training and skills acquired up to a national standard, this being to NFPA standards.

These people were also treated as specialists and allowed to utilise these skills in the performance of their duties.

4. Conclusion

The art of identifying unknown substances is a difficult and time consuming exercise involving considerable experience and skill.

Fire Departments both here and in the US use many and varied means for the identification of these chemicals, whether these means are for evidentiary purposes or for the identification of potential life hazards.

The methods used matter little so long as a correct and accurate result can be determined in time to react accordingly.

The experience gathered by this trip is that;

(a) The people that are charged with the duty of gathering a sample of these chemicals must be extremely competent in this field.

(b) Portable electrochemical detectors are of limited value to identify unknown chemicals accurately.

(c) Wet chemistry techniques involve time and experience and will only identify the characteristics of a single particular compound that may well be one of a vast number of compounds in the sample, or may be an airborne sample emanating from an undefined source (sick building syndrome).

(d) The use of detectors such as MS/GC is limited by the cost of the equipment, ease of portability, operator training and the fact that Fire Departments seem to like having equipment that can be used at "the coal face" rather than gathering a sample for later analysis.

It is only when all else fails that this type of chemistry is employed and then it is usually too late to have any effect on the outcome of the incident (see appendix 1d - Chromatogram and Mass Spectra).

Recommendation

1. That the Metropolitan Fire Brigade maximise their efforts to utilise specific detectors such as the Mass Spectrometer/Gas Chromatograph for the analysis of toxic and flammable chemicals.

2. That a National Standard be established for the educational level required for Hazmat Response personnel.

3. That the Fire and Police Arson investigation teams consider the use of arson detection dogs for the early detection of accelerants.

SECTION TWO

HEALTH MONITORING OF EMERGENCY SERVICE WORKERS

The nature of the duties performed by Emergency Services Workers (Fire, Police, Ambulance ect) will have them exposed to toxic or potentially dangerous substances at least once during their service life.

The long term effects of the majority of these substances to the human body (in non lethal or minute amounts), is largely unknown and medical toxicologists must extrapolate data from experiments carried out on rats and guinea pigs.
Immediate effects are dealt with symptomatically but the people showing no effects are generally considered to be not exposed. Just how will the aftermath of an exposure manifest itself?

It could be in the form of;

(a) Extreme allergic reaction - there are some well documented cases of this reaction amongst firefighters in Melbourne.

(b) Carcinogenic reaction - various cancers are associated with the exposure to some chemicals.

(c) Mutagenic reaction - the offspring of exposed individuals suffering from assorted illnesses not normally associated with chemical exposure.

* There has never been a survey of the number of children of emergency service workers afflicted with health problems in any attempt to produce any link.

(d) Target organs - the eventual breakdown of a body organ due to the cumulative effect of toxic chemicals.

The above examples are a sample of the means in which chemicals may surreptitiously effect our bodies, in order that these effects may be understood and countermanded the means by which the US Fire Departments protect their workers should be analysed.

1. Record Keeping

The majority of Fire Departments in the US keep detailed records of the chemical exposures of their members, this is also true for some Fire Services in Australia.

Police and Ambulance do not keep the same for their members and as far as I can ascertain Melbourne is the only Fire Service that maintains records of ALL personnel who attend Chemical Incidents.

These records though are primarily used as a means to protect the individual immediately after the exposure and are generally not used for any statistical or medical pre-emptive health monitoring of those who have been placed most at risk *(see appendix 2a).*

2. Medical Follow-up

Personnel attending Chemical Incidents in the US are not required to attend for Medical Examination following these incidents, but they are required to attend regular fitness assessments.

These assessments could flag a condition the individual is suffering from, and a more detailed analyses would be required to establish if the unusual condition could be of concern.

Some Fire Departments in the US, particularly Prince George's County and Fairfax County conduct compulsory Urinalyses of the Firefighters in their employ.

This is primarily a search for drug abuse but would also detect the presence of harmful chemicals or a peculiarity in the sample requiring additional specialist attention *(see appendix 2b).*

3. Assessment Equipment

As mentioned in the previous section the Gas Chromatograph\Mass Spectrometer is the tool that would be most commonly employed for Urinalyses, especially if drug detection is being undertaken.

This equipment is capable of doing the majority of the analysis required for detection of dangerous or toxic chemicals encountered in the human body.

GC/MS analysis will identify all substances except for Bacterial contamination or Heavy Metal Poisoning but could identify the presence of the toxic emissions that the body will produce through contamination.

These analyses require extremely skilled use and interpretation to successfully diagnose a problem, however these conditions become symptomatic at the early stages and would be detectable by normal medical means.

The simple act of taking and analysing urine or blood samples of those exposed at chemical incidents could prevent the possible onset of complications caused through delayed treatment or go unnoticed for years to do untold bodily damage.

The majority of analytical laboratories would use the following types of equipment for analyses of samples;

Gas Chromatograph/Mass Spectrometer - toxic chemicals-drugs - internal radiation

Photospectrometer - heavy metals

Liquid Chromatograph - toxic chemicals

Microscope - bacteria, virus.

4. Sample Gathering

The type of sample to be taken (blood or urine) would determine the methodology and the qualifications of those taking the sample.

A blood sample is the realm of those medically qualified and will be discussed no further, urine samples however can be collected by any person sufficiently skilled in the correct procedure.

Should the sample be collected for the purpose of drug screening, then the chain of evidence regime would be of importance as well as the possibility of the patient diluting, exchanging, contaminating or otherwise interfering with the sample to escape detection.

On the other hand if the sample is for the detection of possible chemical poisoning the patient would be anxious to have the results, in all cases these samples are to be treated with extreme care to avoid accidental contamination, loss or mix - ups.

The sample should be collected in a new hermetically sealed plastic or glass bottle, Modern plastic specimen bottles offer convenience, low cost, are disposable and should contain a temperature indicator strip to prevent the possibility of exchanging a sample *(see appendix 2c).*

5. Conclusion

A physician will react to the symptoms that are presented to him, but to be truly proactive in the field of safeguarding the health and well being of those in our charge, we are required to act before the onset of symptoms.

We provide workplaces that are as safe as possible, protective clothing and medical help when needed. Should we not provide health care for the healthy to ensure that they will remain in that condition.

Emergency Services both in the US and Australia provide exceptional care and support for injured workers but are not providing sufficient care for the healthy. More effort is required to completely mitigate a chemical incident by the following - up of the health of our own people.

Recommendation

1. That a Statewide Register of Emergency Worker Exposure to Hazardous Materials be established to record and monitor each individual's health status.

2. That a series of diagnostic tests be conducted annually for those personnel most at risk, and such tests eventually to cover all Emergency Service Workers.

SECTION 3

CHEMICAL VAPOUR PLUME MODELLING

Modern manufacturing of synthetic products usually involves the storage or transport of bulk supplies of hazardous chemicals, should there be an accidental release of these chemicals and if the chemicals produce vapour, an extremely dangerous and potentially lethal situation could occur.

With the scenario of a large vapour cloud moving through populated areas the best that any Emergency Service can hope for is to remove the population from it's path.

The need arises for an accurate "real time" and future prediction ability of where this vapour cloud is going or will go, and where to move the population from and to would be an absolute necessity.

Fire Departments in the US have been utilising Computer Vapour Plume Model Programs for some years, the type and capability vary but all have the capacity as a preplanning tool as well as an emergency management tool.

PLUME MODEL OPERATION

The basis of a Plume Model, is that it is simply a computer program using a mathematical formula that will calculate the dispersal of a known chemical in air (or water).

This equation must also take into account the varying effects of wind, temperature, topography and other atmospheric effects such as inversion layers ect to produce a visible map of the path and possible concentration of the plume.

Data on the chemical in question is drawn from a database encompassing such features of that chemical such as specific gravity, vapour density, solubility and dispersal rate.
To accomplish the complex mathematics that are required to run a Plume model in "real time" manually would be next to impossible, involving several thousand calculations per minute and the brain of Einstein.

In order that the Plume Model will run with the least amount of setup time, the designers of the software are required to include certain assumptions that would be common to all chemicals.
These assumptions are such things as, all chemicals would disperse at the same rate given the same conditions, the topography of a specific area would fall into one of several categories, and that a pool of liquid would vaporise evenly over it's entire area (which it does not).

However without building in some assumptions the time taken to input data for the model to run would be unrealistic.
So the best plume models available are those that require the

least amount of operator intervention, take up the smallest amount of RAM possible and use the least amount of assumptions (non input data) as is possible.

Although any kind of model acting as a guide would be of assistance to the emergency services, rather than acting with only the minimum amount of information in what could be a life or death situation.

The following sections describe some of the Plume Modelling software available, as well as some of the ancillary equipment available to make the operation more "user friendly".

1. CAMEO

The majority of Fire Departments in the US are users Of CAMEO mainly due to the fact that this was one of the first available and was produced for use on Mackintosh computers which were abundant at the time, it is an easy to use program and is well accepted by the users *(see appendix 3a).*

Some Fire Departments have reconfigured CAMEO to include specific information relative to the map area on screen, LA City Fire Department have included a program called HYPERCARD to give preplanned information on population, evacuation centres and evacuation routes from a background programme. This is accomplished by the addition of ICONS on the map whose coordinates correspond to a section of the HYPERCARD database, by highlighting the icon with the mouse pointer and activating the prearranged mouse buttons the background programme is activated leaving CAMEO running in the background *(see appendix 3b).*

2. CHARM

This is proprietary software that has been configured specifically for the "PC" or DOS environment system and is similar to CAMEO involving similar user input and assumptions. This software would also support a background database similar to HYPERCARD *(see appendix 3c).*

3. Ancillary Equipment

For any model to operate effectively, information on such things as wind direction and speed, temperature, humidity and synoptic situations is required to be continually updated.

To make this job easier such things as automatic weather station interfacing direct to the computer with automatic updating of weather information are available.

This equipment is commercially available and can be either hardwired to the computer or relayed via radio link from a remote location.

Such a system is the weather and includes such features as automatic compass alignment, wind speed, direction, temperature and humidity *(see appendix 3d).*

4. Future Developments

The future for plume modelling software appears to be reasonably secure, there are many organisations improving and expanding the role of their applications.

Future applications will include the ability to run Plume Models involving liquids, have statistical databases attached to have instant information on population densities, operate in three dimensions and have mapping overlays that will give layouts of drains, gas pipes, sewerage pipes, electrical wires both overhead and underground as well as databases containing information gathered by the users on specific hazards, evacuation centres and local area knowledge.

5. Conclusion

The Plume Modelling Software utilised by Fire Departments in the US have been around for some time and do not have the facilities of the most recent research on plume behaviour or the ability to be developed much further.

Current research as mentioned above will produce totally integrated software capable of much more than their contempories in the US.

The Emergency Services in Australia should make greater efforts to utilise the most up to date technology available in order that a large scale release of a harmful product could be managed effectively.

Recommendation

1. That the Metropolitan Fire Brigade gains access to the best quality Plume Modelling Software available as soon as possible.

2. That the Emergency Services include large scale evaluation exercises utilising the output from the Plume Model annually and to conduct regular table top exercises to familiarise all concerned bodies with its operation and for the purposes of preplanning.

APPENDIX 1

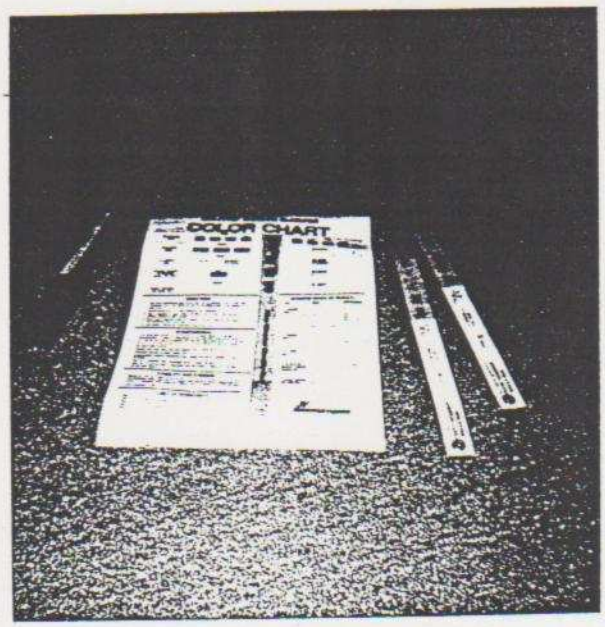
A. *SPIL-FYTER*

B. *CHAIN OF EVIDENCE*

C. *CANINE ACCELERANT PROGRAMME*

D. *MS/GC OUTPUT*

A. SPIL-FYTER

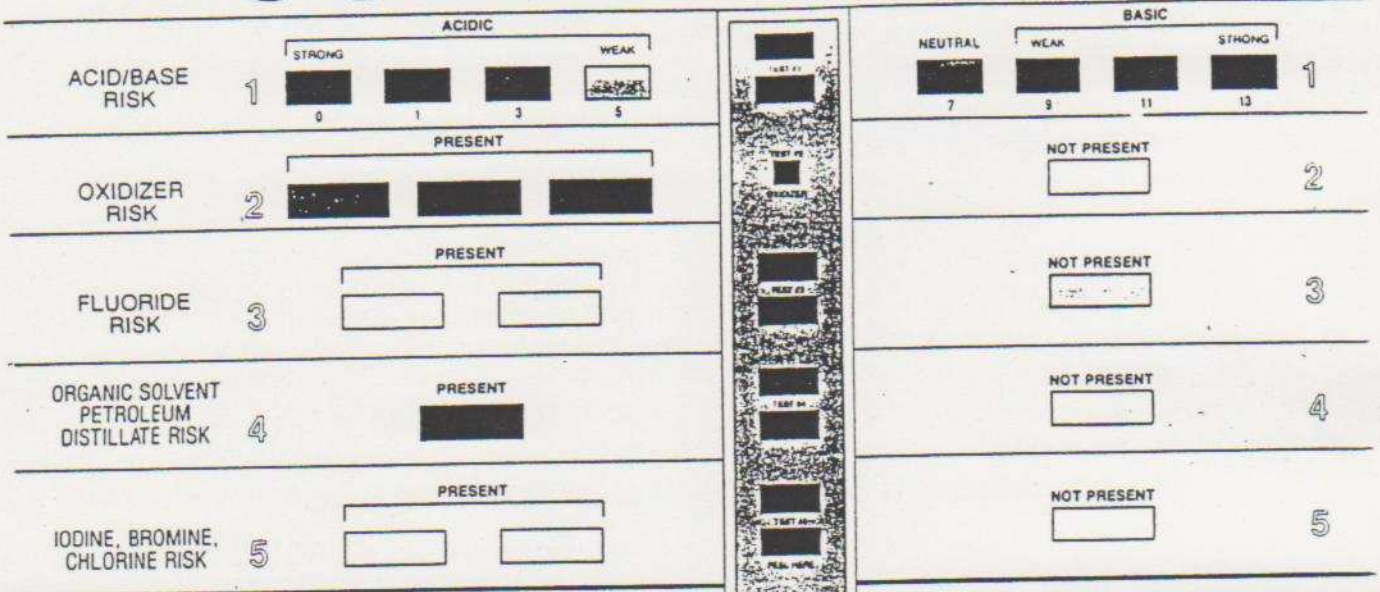


SPIL FYTER

Spil – Fyter colour chart with indicator strips.

SPIL-FYTER CHEMICAL CLASSIFIER

COLOR CHART



Place Chemical Classifier Here

DIRECTIONS

1. Remove protective pink covering from Classifier. CAUTION: Keep Classifier dry until ready to use to avoid premature activation of the test strips.
2. Avoid touching or contaminating the Classifier.
3. Fan Classifier in gas zone just above the level of the solution to be tested, observe test results.
4. Now, wet Classifier with the solution to be analyzed and again immediately read test results.
5. Use each Chemical Classifier only one time.

INTERFERENCES

Concentrated acidic solutions tend to totally destroy indicators impregnated in papers. Bleeding of the indicator dyes and extreme pH values are good evidence of indicator dye destruction. In the event of such a strong solution a 2 to 1 or more dilution may be needed for an accurate analysis.

Heavy oils may saturate test papers and mask test colors.

Opaque solutions may mask colors.

Lightweight organic solvents may cause the blue indicator in test #4 to bleed.

Test #2 - Oxidizer test, strongly acidic, basic solutions.

Test #3 - Fluoride test, Chlorates and Bromates result in a whitening of the test paper.

STABILITY AND STORAGE

Remove only as many strips as are required and reseal the container immediately after use. Do not touch test papers! Avoid exposing the strips to sunlight and moisture. Store the container in a cool dry place.

See expiration date.

LIMIT OF SENSITIVITY

Test #1 — 0 - 13 pH units
Test #2 — 3 mg/l, Hydrogen Peroxide
Test #3 — 20 mg/l, Fluoride
Test #4 — 10 mg/l, Gasoline
Test #5 — 1mg/l, Chlorine

INTERPRETATION OF RESULTS

TEST	COLOR	IDENTIFICATION
#1 ACID/BASE RISK	Red (0)	Strong Acid
	Orange (1, 3)	Moderately Acidic
	Yellow (5)	Weak Acid
	Green (7)	Neutral
	Dark Green (9, 11)	Moderately Basic
	Dark Blue (13)	Strong Base
	(Meaningful for aqueous solutions only)	
#2 OXIDIZER RISK	White	Not Present
	Blue, Red, or any other divergence from white	Present
#3 FLUORIDE RISK	Pink	Not Present
	Yellow	Present
#4 PETROLEUM PRODUCT, ORGANIC SOLVENT RISK	Light Blue	Not Present
	Dark Blue	Present
#5 IODINE, BROMINE, CHLORINE RISK	Peach	Not Present
	White or Yellow	Present

JV MANUFACTURING COMPANY, INC.
963 Ashwaubenon St. • Green Bay, WI 54304 • 414-337-4944
1-800-334-9092 • FAX: 414-337-6282

B. CHAIN OF EVIDENCE

25 (Rev. 3-19-82)

FBI LABORATORY
Washington, D. C.

Date_____
Time _____

EVIDENCE ACKNOWLEDGMENT

Received from _____ of the
(Name and Title)

_____
(Department or Agency)

_____
(Address) (Phone Number)

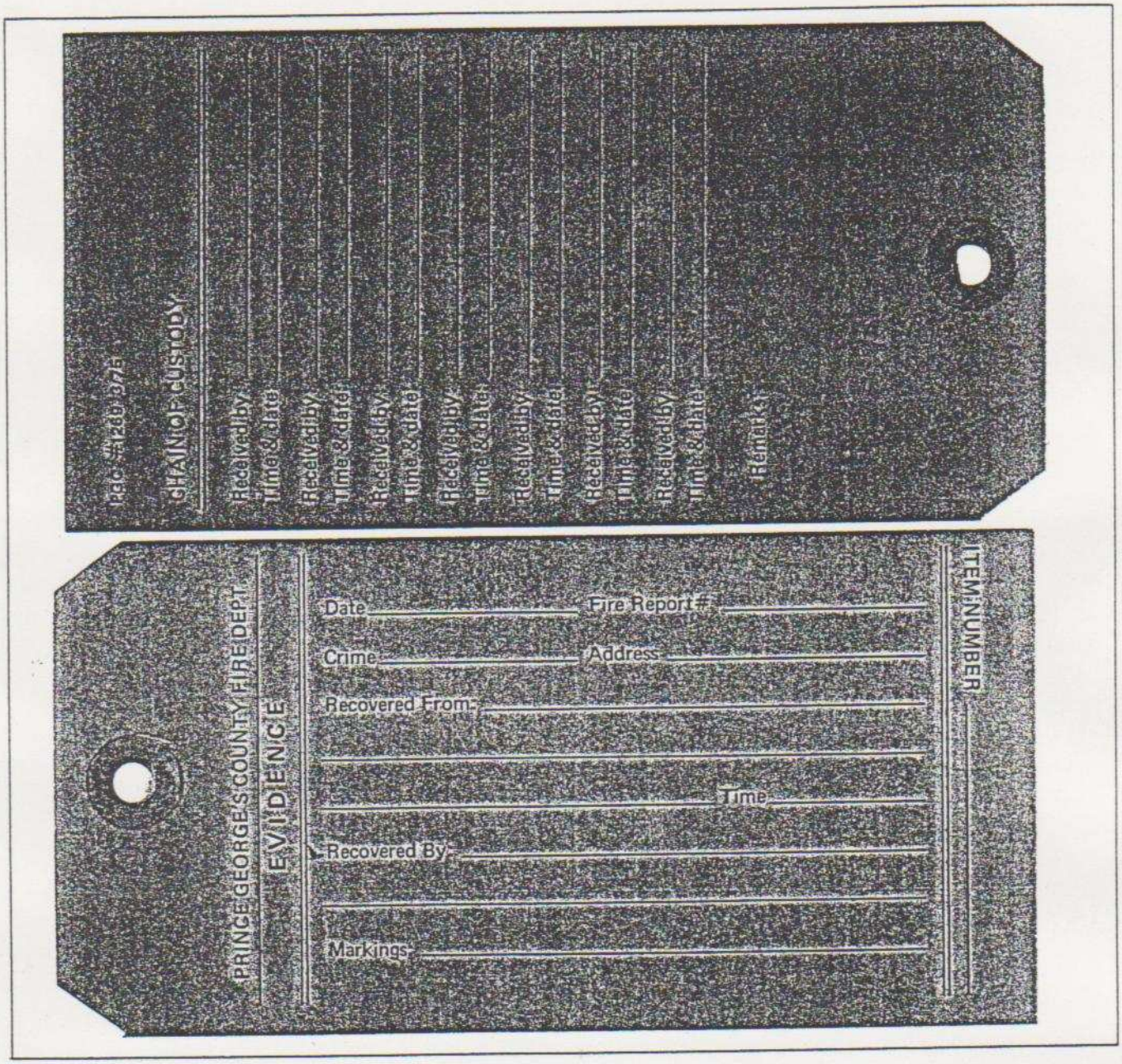
_____ box(es), _____ bag(s), _____ envelope(s), _____ vial(s), _____ object(s)
of sealed evidence for examination in connection with case number _____
entitled _____
_____.

Evidence Should Be
☐ Mailed Back
☐ Picked Up By Contributor

This evidence will remain in the custody of the FBI Laboratory while the examinations are being conducted. Following completion of the examinations, a report containing the results of the examinations and the disposition of the evidence will be forwarded to your department. If evidence is picked up personally, your representative should identify it with the Laboratory case number(s) assigned in the FBI Laboratory report.

Director
Federal Bureau of Investigation

FBI/DO



CHAIN OF EVIDENCE TAGS

DEPARTMENT OF THE TREASURY
BUREAU OF ALCOHOL, TOBACCO AND FIREARMS

EVIDENCE ACKNOWLEDGEMENT

REFER TO

Lab # _____

Received From _____
(Name and Title) (Signature)

of the _____
(Department or Agency) (Telephone)

_____Box(es); _____Bag(s); _____Envelope(s); _____Object(s) of sealed evidence for examination in connection with case number _____

This evidence will remain in the custody of the ATF laboratory while the examinations are being conducted. Following completion of the examinations, a report containing the results of the examination and the disposition of the evidence will be forwarded to your department.

PLEASE REFER TO OUR ATF LABORATORY CASE NUMBER WHEN SUBMITTING ADDITIONAL EVIDENCE OR WHEN REFERRING TO THIS CASE IN ANY CORRESPONDENCE.

Evidence Received By: _____ Date: _____

THE PRINCE GEORGE'S COUNTY GOVERNMENT

FIRE DEPARTMENT
301 772-9080

DATE:

Bureau of Alcohol, Tobacco
and Firearms
Forensic Science Branch
1401 Research Boulevard
Rockville, Maryland 20850

M:
Bureau of Law Enforcement
and Explosives Mitigation
6820 Webster Street
Landover Hills, Maryland 20784

': Arson/Bombing Evidence Examination

:ident Location:
e: Time: Nature:
ident Number: F.D. P.D.
spect: Yes___ No_____

---

e of Examination:

:al Number of Items Enclosed:

dence Items Submitted:

quests for Analysis:

cumstances:

THE PRINCE GEORGE'S COUNTY GOVERNMENT

CONSENT FORM FOR FIRE/EXPLOSIVES SCENE EXAMINATION/SEARCH

I, _____ have been requested to consent to an examination/search of my property located at:

_____

_____

_____

_____

_____

(full description and address of property)

This examination/search is being conducted as part of an investigation of the fire/explosives incident which occurred to this property on _____.

I am the lawful occupant/owner of this property. I have been advised of my constitutional rights to refuse such consent, and to require that a search warrant be obtained prior to any examination/search. I have further been advised that if I do consent to an examination/search, any evidence found as a result of such examination/search can be used against me in a court of law, and that I may withdraw my consent at any time prior to the conclusion of the examination/search.

After having been advised of my constitutional rights as stated above, I hereby voluntarily waive those rights and consent to an examination/search and authorize:

Investigator _____

to conduct a complete examination/search of the above-described property. Further, permission is granted to remove from this property any material deemed pertinent in relation to the investigation of this fire/explosion.

_____

(sign) (date)

Witnesses:

_____

_____

6820 Webster Street, Landover Hills, Maryland 20784

CASE#_____

WAIVER OF RIGHTS AND STATEMENTS

I, _____ have identified myself to you
(Officer)

as a Police Officer of the _____.
(Department)

1. You have the right to remain silent.

2. Anything you say or write may be used against you in a court of law.

3. You have the right to talk to a lawyer before any questioning and to the presence of a lawyer before answering any questions or at any time while questioned.

4. If you want a lawyer and cannot afford to hire one, you shall not be asked any questions and the court will be requested to appoint a lawyer for you.

5. If you agree to make a statement, you may stop at any time and request the presence of a lawyer and that no further questions will be asked of you.

6. I have read or had read to me this explanation of my rights and I understand this explanation. I hereby declare, with full knowledge and understanding of my rights, that I do not want a lawyer at this time. I am willing to answer questions and I wish to make a statement _____.

7. No promises or inducements have been offered to me by anyone; I have not been threatened or intimidated by anyone and I have not been forced to make a statement. My decision to make a statement is entirely free and voluntary. _____

I understand my rights._____

_____ _____
OFFICER ADVISING THE RIGHTS SIGNATURE OF PERSON MAKING STATEMENT

_____ HRS. _____
DATE TIME WITNESS OF THE SIGNATURE

P.G.C. FORM #2628 (Rev. 1/84)

C. CANINE ACCELERANT PROGRAMME

NEWS RELEASE

FAIRFAX COUNTY
FIRE AND RESCUE DEPARTMENT
Chief Warren E. Isman
4031 University Drive
Fairfax, Va 22030
Public Information Office (703) 246-3801

DATE: 11/28/89 FOR RELEASE: IMMEDIATE

Who: Ebby
What: Accelerant Detection Canine
When: 1 p.m. Wednesday, December 6
Where: Fire and Rescue Academy
4600 West Ox Road
Fairfax, Virginia

Smells Like Arson

This month, the Fire and Rescue Department's newest recruit graduated from training and joined the department in a unique position created just for her. She has been assigned to the Fire Prevention Division and is required to respond to all fire incidents investigated by fire investigators. She was recruited for her sharp mind, physical stamina, and keen sense of smell.

Who is this wonder employee? "Ebby" is a three-year old black Labrador retriever specially trained as an Accelerant Detection Canine. Ebby arrived in Fairfax County on November 8 after 16 weeks of intensive training by International Detector Dogs, Ltd. She can detect accelerant substances such as gasoline in quantities less than parts per million.

Since her arrival, Ebby has accompanied investigators to 10 fire scenes, and has detected the use of an accelerant to start an incendiary fire in at least one of those instances. Ebby not only detects the presence of the accelerant, but also tells investigators exactly where to remove a sample for laboratory testing to confirm her findings. It takes Ebby about 10 minutes to search an average room; investigators using mechanical instruments would require about an hour for the same search, and would be less accurate than Ebby.

Ebby is the first accelerant detection dog used in Virginia. Nationwide, there are only a handful of dogs being used for arson investigation.

Come meet Ebby and watch her demonstrate her talents at the Fire and Rescue Academy at 1 p.m. Wednesday, December 6. We will send Ebby into a simulated living room to have her uncover the tiniest amount of accelerant hidden there, and also demonstrate some of her training evolutions.

RESUME

Name: "EBBY"
Address: Fire and Rescue Station 32
Phone: 9-1-1
Breed: Black Labrador Retriever

EDUCATION

International Detector Dogs, Ltd.
Millers Tavern, Virginia

Initial accelerant detection training: Sixteen weeks included obedience training, obstacle work, imprinting and advanced discrimination training.

Field Testing: Two weeks included work with Fairfax County Fire and Rescue Department handlers.

PROFESSIONAL EXPERIENCE

November 8, 1989 - present: Fairfax County Fire and Rescue Department.

Work assignment: Accompany Fire Investigators on all fires investigated by the Department, approximately 50 per month, to determine whether an accelerant was used in the fire; can detect 17 different accelerants, and locate area where sample should be taken for laboratory confirmation.

SPECIAL QUALIFICATIONS

Size: Small enough to get around inside a burned structure.

Instincts: Excellent retrieval instincts

Health: Extremely healthy and strong

Endurance: Can work several fires a day

Work habits: Will work for multiple handlers, minimizing down time due to handler absence

Personality: Well-socialized and friendly; no safety threat to people

SALARY HISTORY

Initial cost: $4,000

Annual Expenses: $700, includes veterinary costs, food and miscellaneous canine equipment

PROFESSIONAL AFFILIATIONS

American Kennel Club

REFERENCES AVAILABLE UPON REQUEST

BY JAMES A. PARCELL—THE WASH

Ebby, posing with fire inspector Terry Hall, can detect 17 flammable liquids. The county paid $4,000 for her.

Labrador Helps Retrieve Clues to Arson in Fair

FIRE DOG, From Page 1

"She was just a natural for it, but then she was bred for it," said Debby Kay, president of the company.

The county paid $4,000 for Ebby and estimates that she will cost $700 a year to maintain, including veterinary and food bills and "miscellaneous canine equipment." She is trained daily and at night and sl with investigators at Station 32 in Burke Centr

In 1986, the Connecticut State Police br board the first arson detection dog in the cou Maryland fire marshal's department's arson ca was begun in 1987 with a black lab named Ba now includes six, a spokesman said.

CANINE ACCELERANT PROGRAM

CHIEF WARREN E. ISMAN
FAIRFAX COUNTY FIRE AND RESCUE DEPARTMENT
JUNE 1989

The Fairfax County Fire and Rescue Department has established high standards for providing essential life-safety services to the County's citizens. Recognizing that the size and composition of this County often yield unique and large-scale problems, the Department has successfully maintained those high standards by approaching solutions through innovative means and processes. This approach has taken many forms in recent years, including new equipment as well as the use of specialty units. To date, the results have been positive, benefitting both the Department and the citizens it serves.

This innovative approach of the Department has been adopted by the Fire Prevention Division. It is readily evidenced within the Investigations Section through their experimentation with several types of detection instruments. These instruments assist investigators in determining the presence of accelerants in a fire scene. However, the Investigators' experiences with these instruments have been consistent with those of other departments, as well as with the findings in formal studies. Those results are that detection instruments present several deficiencies when used in a fire scene:

- Most detection instruments are non-discriminating; therefore, false positive readings are frequent, requiring the fire investigator to obtain multiple samples for laboratory analysis, increasing the on-scene time of the investigator.

- Hydrocarbon and similar detection instruments are sensitive to substances only in the parts per million range.

- Detection instruments are affected by inclement weather and fire scene atmospheres which result in inaccurate findings.

- Detection instruments are susceptible to damage and become technically obsolete within a short time frame, resulting in significant costs for repair and replacement.

- Many of the more sophisticated detection instruments are cumbersome and require lengthy set-up and operating times.

To succeed in their efforts to determine the cause and origin of fires, especially in instances where they have been set intentionally, requires that the Investigations Section utilize the most effective available means to detect the presence of accelerants in a fire scene. A demonstrated need exists to have at the fire investigators' disposal a mechanism with the ability

to differentiate among the products found in a fire scene. That need is met by an accelerant canine detection program. The trained canine has proven instrumental in assisting the fire investigator to determine the presence of accelerants in a fire scene. The success of a canine accelerant program is primarily due to the benefits offered by the canine over traditional detection instruments:

- Unlike mechanical instruments, the canine is trained to disregard the products of pyrolysis which are present in all fire scenes--the canine has the ability to differentiate among accelerants and similar chemical gases normally present in a fire scene;
- Imprinting of the canine permits selective accelerant searches which reduce false positive finds; thus, the need for collecting multiple samples for laboratory testing is eliminated;
- Selective searches also allow the investigator to collect the proper samples which expedite the cause and origin investigation and reduce the on-scene time of the investigator;
- The effectiveness of the canine is not limited by inclement weather or adverse fire scene conditions;
- The canine is more cost-effective than traditional detection instruments. The initial cost of developing a canine accelerant program is offset by the working-life expectancy of the canine (versus instrument repair and replacement costs); and
- The canine's olfactory ability permits the detection of accelerants in less than parts per million, exceeding the capability of all detection instruments.

Background

Law enforcement agencies have used detection canines for numerous years and many experts consider them indispensable. Their use has had a significant impact on Fire Investigations Units across the United States. Presently, several accelerant canines are in use by units within the local area. These include the State of Maryland Fire Marshal's Office and the Arson Unit in Prince George's County, Maryland. The most publicized program is the result of a joint effort between the Bureau of Alcohol, Tobacco and Firearms and the Connecticut State Police. The first working canine to come out of this program, "Mattie," is currently being used by the Connecticut State Police Arson Squad. At one time,

Mattie had worked 49 incidents and in all cases where she detected the presence of an accelerant, her findings were confirmed by a forensic laboratory examination. As a result of the success with the Connecticut Program, several other jurisdictions have established canine teams. A joint effort between the State of Maryland Fire Marshal's Office and the Atlantic City, New Jersey's Police K-9 unit has produced five additional working canines. The State of Maryland Fire Marshal's Office will have six canines strategically placed to cover the entire state. During the canine training period, much experimentation perfected the methods which have ultimately insured the success of each program. This program is considered the most innovative to be initiated in the field of fire investigations within the last 30 years.

Program Implementation

In order to provide our Investigations Section with the most effective means available of detecting the presence of accelerants in a fire scene, the Fire Prevention Division recommends that the Fairfax County Fire and Rescue Department implement an accelerant canine program. The accelerant canine program is to be established and operated by the Fire Prevention Division using personnel currently assigned to that Division. The program specifies the purchase of one fully-trained accelerant canine. The primary function of the canine program will be to assist in fire investigations, although the canines's abilities may also prove beneficial to the Department's public education efforts.

The selected canine will be subjected to a full health examination by a licensed veterinarian, and will receive initial and follow-up training from a recognized specialist in the field of detector dogs. The initial training includes 16 weeks of obedience training, obstacle training, imprinting, and advanced discrimination training, followed by two weeks of field testing. Multiple handlers from existing personnel within the Investigations Section will receive instruction, thus eliminating "down time" due to handlers' vacations, promotions and transfers. The canine will be certified to be well socialized and friendly, posing no safety threat to people. The estimated working life of the canine is 8 years.

The canine will remain with the on-duty investigator, and will accompany the investigator to fire scenes as well as to the Investigations Section's offices. The team will be housed at Fire Station 32, and will require no special or extraordinary accommodations. The canine's diet will consist of Iams Dog Food, and dog treats for motivation in training. Both are readily available at area pet and feed stores. Daily refresher training

will be provided by the on-duty handler on the grounds of Fire Station 32, utilizing a scent wheel which is supplied by the trainer. No other specialized equipment is required.

Accommodations for transportation will be met through the use of a mobile kennel supplied by the trainer. The kennel will be mounted into the rear of a vehicle currently assigned to the Investigations Section.

Financial Impact

The resources required to establish an accelerant canine program are available through court-ordered restitution paid to the Fire and Rescue Department. Sufficient monies exist to initiate and maintain this program. The purchase price of $4000.00 for one fully-trained accelerant canine includes 10 to 12 weeks of professional instruction and 2 weeks of instruction for the dog handlers, aids for refresher training and a complete canine physical examination with guarantee.

The resources required to maintain the canine program include veterinary expenses, food and miscellaneous equipment for training and protection of the canine from injury and illness. The total annual operating expense for program maintenance is estimated to be $700.00. Program costs are detailed in Attachment A.

Conclusion

A decade of feasibility studies, training, re-training and evaluation has provided in the accelerant canine a detection mechanism surpassed by no other. Accelerant canine programs have proven to be extremely beneficial in combatting the most costly crime in America. The use of accelerant canines provides benefits to the fire investigator and the Department which are currently unavailable through any other detection method:

- The elimination of costly detection instruments;
- Discriminating searches which allow the investigator to take the proper samples, thus eliminating unnecessary laboratory analysis;
- The canine generates substantial publicity and thus may prove to be the organization's most effective tool for fire prevention education;

- The on-scene time of fire investigators is shortened considerably due to the canine's ability to react quickly and selectively to accelerants;

- The canine serves as a detection instrument which exceeds all mechanical devices in sensitivity and contributes to a more thorough, timely and efficient investigation; and

- Reinforcement and refresher training allows for the expansion of the program and inherently eliminates the chance of it becoming obsolete.

The goal of every criminal investigation is successful prosecution. The Fire Investigations Section recognizes the canine accelerant program as an opportunity to make a significant contribution to law enforcement in Fairfax County. The abilities of the canine will also strengthen the Investigations Section's cases for prosecution, sending a clear message that Fairfax County will not tolerate arson.

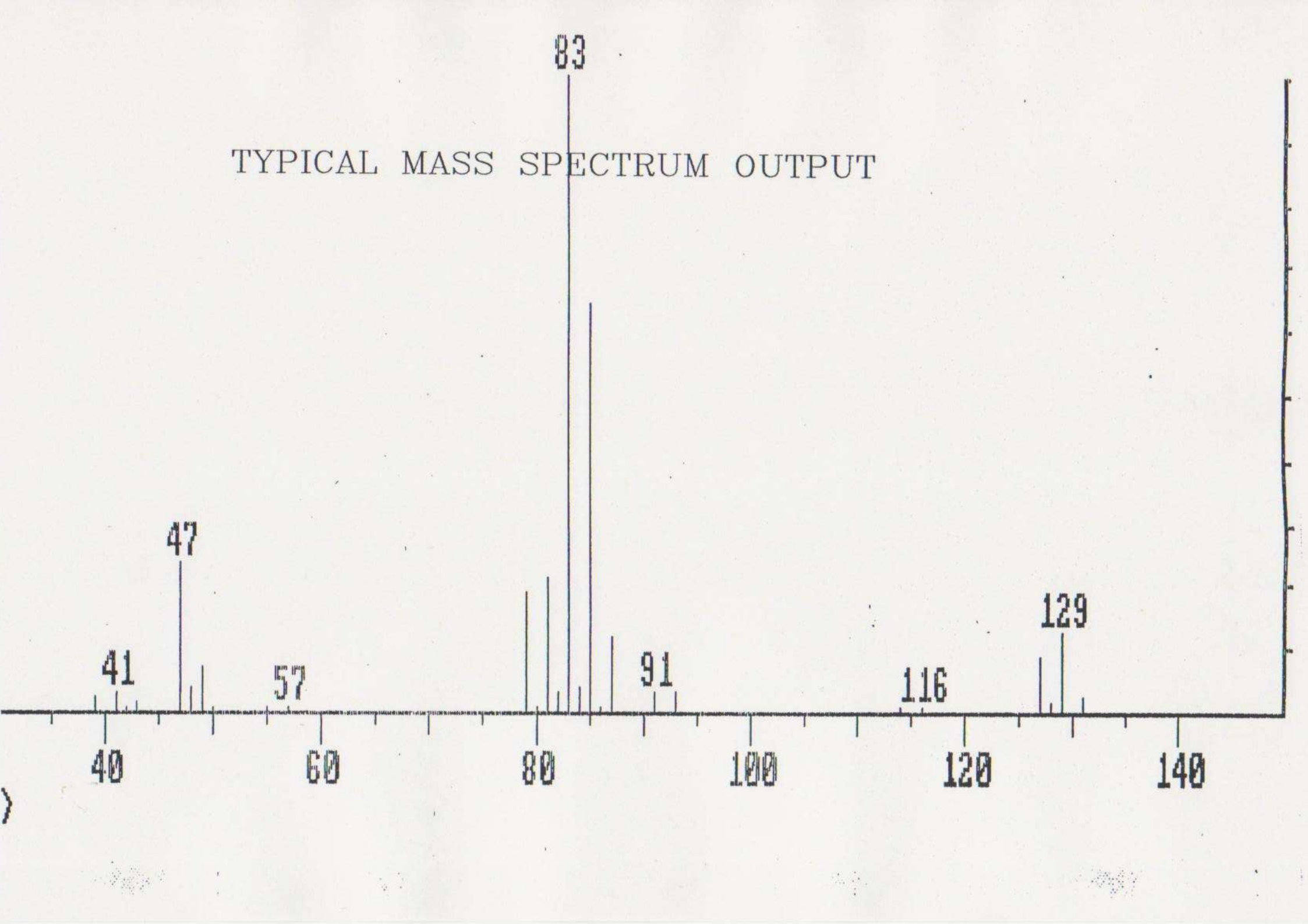
Attachment A

PROGRAM COSTS
ACCELERANT CANINE PROGRAM
FY 1990 IMPLEMENTATION

	FY 1990
Capital Equipment	
(1) Canine, Trained with Certificate of Health	$ 4,000.00
(1) Permanent Accommodations	N/C*
(1) Mobile Accommodations	N/C**
(1) Vehicle	N/C*
(1) Training Scent Wheel	N/C**
Subtotal:	**$ 4,000.00**
Operating Expenses	
Veterinary Costs	$ 200.00
Food	$ 400.00
Handler Training	N/C**
Miscellaneous Canine Equipment (food/water bowls, leads, protective gear, grooming equipment, motivational aids)	$ 100.00
Subtotal:	**$ 700.00**
Personnel	
(3) S-17-07 Investigations Technicians	N/C*
Subtotal:	**$ N/C**
GRAND TOTAL:	**$ 4,700.00**

*Items are already funded as an ongoing program. Therefore, no additional funds are needed.
**Included in canine purchase fee.

D. MS/GC OUTPUT


TYPICAL MASS SPECTRUM OUTPUT
83
47
41
57
91
116
129
40
60
80
100
120
140

APPENDIX 2

A. *EXPOSURE RECORDS*

B. *MEDICAL TOXICOLOGY AND CHAIN OF CUSTODY.*

C. *SPECIMEN BOTTLE*

A. EXPOSURE RECORDS

EXPOSURE

HAZ-MAT MEMBER

June 13, 1988

ASSIGNMENT

ID #

DATE	INC. #	MATERIAL	TIME MIN.	PROTECTIVE EQUIP.	SIDE EFFECTS QUANTITY

TOTAL TIME MIN.

PAGE

DATE	INC. #	MATERIAL	QUANTITY	TIME EXPOSED	PROTECTIVE EQUIPMENT	SIDE EFFECTS, ETC.

NAME:

ASSIGNMENT:

orm 407 (12/82)

[illegible]

DATE__________ LOCATION______________________________

MATERIAL__________________ TYPE OF INC.______________________

QUANTITY__________________ INC. #__________________

NAME	SUIT #	TIME AIR ON	TIME IN AREA	TIME OUT OF AREA	TIME AIR OFF	TOTAL TIME AIR USED	60 Min. SCBA	30 Min. SCBA	Coat, Helmet, Gloves	Full Bunkers	Acid Entry Suit	Disp. Acid Suit	Fire Entry Suit	Other	Other	TASK	COMMENTS, PROBLEMS, SYMPTOMS, ETC.

UNIT 77 RESPONSE SUMMARY

REPORTING MEMBER: _____ CPO _____

INCIDENT #: _____ DATE: _____ TIME: _____

RESPONSE: _____

LOCATION: _____

PROBLEM/SCENE: _____

_____

_____

_____

_____

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_____

ATTACH CHEMICAL DATA SHEET (print-out or work-sheet): YES NO

ACTION TAKEN: _____

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FOLLOW-UP REQUIRED:

RESPONSIBLE PARTY:

ADDITIONAL INFORMATION:

(attach additional pages as required)

B. MEDICAL TOXICOLOGY AND CHAIN OF CUSTODY

AMERICAN MEDICAL LABORATORIES, INC.®

11091 Main Street, P.O. Box 188, Fairfax, Virginia 22030-0188
Phone (703) 691-9100

PLEASE TYPE OR USE BALL POINT PEN AND PRINT. HARD MARK PROCEDURES WITH AN X. ENTER 3 OR 4 DIGIT PROCEDURE NO. FOR OTHER TESTS

LAB NO. (AML USE)

PATIENT (LAST NAME, FIRST) PLEASE PRINT OR TYPE | SEX F M | BIRTHDATE MONTH / DAY / YEAR | DATE RECEIVED (AML USE)

CHECK APPROPRIATE BOX FOR BILLING
☐ CLIENT ☐ PATIENT COMPLETE LINES 1 & 2 ☐ INSURANCE - COMPLETE LINES 1 & 2 - PLUS APPROPRIATE INSURANCE LINE(S)

SPECIMEN TYPE SOURCE | IF URINE: ☐ RANDOM ☐ TIME COLLECTED HRS TV ML

COLLECTION DATE & TIME | REQUESTING PHYSICIAN | HISTORY / PATIENT I.D. | ROOM / BED NO. | STAT ☐ CALL ☐ PHONE ( )

SPECIAL INSTRUCTIONS | PATIENT PHONE NO. | LAB NOTES (AML USE)

COMPLETE THE FOLLOWING FOR PATIENT AND / OR INSURANCE BILLING

RESPONSIBLE PARTY (if patient is a minor) 1 | PHONE NO. ( ) | SYMPTOMS / DIAGNOSIS OR ICD9

ADDRESS 2 | CITY | STATE | ZIP

MEDICARE ☐ PRIMARY INSURANCE ☐ SECONDARY INSURANCE | MEDICARE NO. & LETTER | RAILROAD RETIREES ID (NOS. & LETTERS)

MEDICAID MEDICAID NO. | STATE | EFFECTIVE DATES FROM TO

BLUE SHIELD ☐ PRIMARY INSURANCE ☐ SECONDARY INSURANCE | BLUE SHIELD SUBSCRIBER / CARD HOLDER | RELATION TO PATIENT ☐ SELF ☐ CHILD ☐ SPOUSE ☐ OTHER | BLUE SHIELD SUBSCR. ID #

PATIENT OR AUTHORIZED SIGNATURE | GROUP NO. | LOCATION OF BLUE SHIELD PLAN ☐ D.C. ☐ VA ☐ SW VA ☐ WV ☐ MD ☐ PA ☐ TN ☐ NC ☐ FL ☐ OTHER: | WAS CONDITION RELATED TO ☐ EMPLOYMENT ☐ AUTO ACCIDENT

I authorize the release of any medical information necessary to process the claim and request payment benefits be made to American Medical Laboratories, Inc. $

ALL OTHER INSURANCE CLAIMS MUST BE FILED BY PATIENT

ACCOUNT

3909- 101 | 3909- 101 | 3909- 101 B:V
P.G. COUNTY FIRE DEPARTMENT*
ATTN: MAJOR MICHAEL GRANADOS
7911 ANCHOR STREET
LANDOVER, MD 20785
OM 29 MAY 1990

3909- 101 | 3909- 101

INSTRUCTIONS PEEL OFF LABEL → FROM THE MIDDLE

3909- 101

PLEASE PLACE LABEL AND NAME OF PATIENT ON CONTAINERS

PROCEDURE	PROCEDURE	PROCEDURE	PROCEDURE	DIAGNOSTIC PROFILES	DIAGNOSTIC PROFILES
☐ 781 ACID P'TASE PROSTATIC, EIA	☐ 839 COMPLEMENT, CH50 UNITS	☐ 118 HEMOGLOBIN ELECTROPHORESIS	☐ 353 PROTEIN, TOTAL, URINE	☐ 715 CHEMISTRY-6 GROUP	☐ 866 PRENATAL GROUP #4
☐ 213 ACTIVATED THROMBOPLASTIN TIME	☐ 074 COMPLETE BLOOD COUNT	☐ 718 HEPATITIS B SURFACE ANTIBODY	☐ 241 PROTHROMBIN TIME	☐ 077 CHEMISTRY-14 GROUP	☐ 868 PRENATAL #11
☐ 051 ALCOHOL, ETHYL	☐ 660 CBC WITHOUT DIFFERENTIAL	☐ 453 HEPATITIS B SURFACE ANTIGEN	☐ 230 PROTOPORPHYRIN, ZINC	☐ 1902 CONFIRMED DRUG #1	☐ 904 THYROID ANTIBODY GROUP
☐ 920 ALPHA FETOPROTEIN TUMOR MARKER	☐ 703 CMV IgG Ab. EIA	☐ 1469 HIV-1 Ab. ELISA	☐ 347 RPR	☐ 037 CORONARY RISK PROFILE	☐ 793 HYPERTHYROID GROUP
☐ 1851 AFP (NTD) ____ lbs. Patient Weight ____ wks. Gestational Age ____ L.M.P. Serum ☐ Amniotic Fluid ☐ Multiple Pregnancy? ____	☐ 226 CORTISOL, SERUM	☐ 1863 HIV-1 Ab. PROGRESSIVE	☐ 346 RPR, PREMARITAL	☐ 042 CORONARY RISK W/LIPID FRAC	☐ 792 HYPOTHYROID GROUP
	☐ 642 CK ISOENZYMES	☐ 573 HLA-B27	☐ 2058 RUBELLA VIRUS IgG Ab. EIA	☐ 1040 CORONARY RISK #3	☐ 860 THYROID GROUP #13
	☐ 097 CREATININE	☐ 2396 HPV PROGRESSIVE SOURCE:	☐ 259 SEDIMENTATION RATE, RBC	☐ 2020 DRUG ABUSE W/MARIJUANA	☐ 658 THYROID SCREEN
☐ 027 AMYLASE	☐ 064 DIGOXIN	☐ 640 IMMUNOGLOBULIN E, RIA	☐ 441 TESTOSTERONE, TOTAL	☐ 652 HDL CHOLESTEROL PANEL	☐ 1923 UNCONFIRMED DRUG #1
☐ 093 ANTIBODY SCREEN RED CELL	☐ 440 ELECTROLYTES	☐ 175 IRON & IBC	☐ 631 THEOPHYLLINE	☐ 925 HEPATITIS, VIRAL	
☐ 316 ANTINUCLEAR ANTIBODIES (ANA)	☐ 481 EB-VCA IgG Ab. IFA	☐ 466 LITHIUM	☐ 305 TSH	HEALTH PROFILES	HEALTH PROFILES
☐ 653 BETA-HCG, QUAL.	☐ 859 FERRITIN	☐ 472 LUTEINIZING HORMONE	☐ 299 TOXICOLOGY SCREEN	☐ 737 HEALTH PROFILE #1	☐ 026 HEALTH PROFILE #9
☐ 730 BETA-HCG, QUAN.	☐ 278 FOLATE AND VITAMIN B12	☐ 560 MARIJUANA SCREEN	☐ 315 *TOXOPLASMA GONDII* IgG Ab. IFA	☐ 738 HEALTH PROFILE #2	☐ 977 HEALTH PROFILE #17
☐ 325 BLOOD GROUP AND RH TYPE	☐ 494 FSH, SERUM	☐ 202 *MYCOPLASMA PNEUMONIAE* ANTIBODY, CF	☐ 321 TRIGLYCERIDES	☐ 739 HEALTH PROFILE #3	☐ 2086 HEALTH PROFILE #27
☐ 329 BUN	☐ 062 FTA-ABS	☐ 056 PHENYTOIN	☐ 734 T3 RIA	☐ 741 HEALTH PROFILE #5	☐ 937 HEALTH PROFILE #29
☐ 2138 CA-125	☐ 680 GASTRIN	☐ 227 PLATELET COUNT	☐ 634 T4 RIA	☐ 742 HEALTH PROFILE #6	
☐ 393 CARBAMAZEPINE	☐ 148 GLUCOSE ☐ FASTING OTHER ____	☐ 231 POTASSIUM	☐ 337 URINALYSIS	CODE	ADDITIONAL TEST PROCEDURES
☐ 995 CEA-ABBOTT, EIA	☐ 025 GLYCOHEMOGLOBIN (HbA1c)	☐ 245 PROLACTIN, RIA	☐ 947 VANCOMYCIN		
☐ 080 CHOLESTEROL, TOTAL	☐ 964 HDL CHOLESTEROL	☐ 120 PROTEIN ELECTRO, SERUM	☐ 264 VITAMIN B12		

AML COPY

FOR REFERENCE ONLY — TRANSFER CODES TO FRONT OF FORM

CODE	PROCEDURE NAME
884	Acetylcholine Receptor Binding Antibodies
256	Acetylsalicylic Acid
915	Acid Phosphatase, Fractionation
650	Acid Phosphatase, Prostatic, Enzymatic
220	Acid Phosphatase, Total, Enzymatic
253	ACTH
319	Alanine Transaminase (ALT)
021	Aldolase
022	Aldosterone, RIA
221	Alkaline Phosphatase (ALP)
643	Alkaline Phosphatase Isoenzyme
448	Alpha-1 Antitrypsin
1374	Aluminum
403	Amenorrhea Group
274	Amikacin
890	Amitriptyline
024	Ammonia, Blood
418	Androstenedione, RIA
563	Angiotensin-1-Converting Enzyme
427	Anti-ENA
693	Anti-Mitochondrial Antibodies (AMA), IFA
596	Anti-nDNA Antibodies, RIA
031	Anti-Streptolysin O Antibodies, ASO
700	Anti-Thyroglobulin Antibodies, IHA
904	Anti-Thyroid Antibody Group
1002	Antibody to Hepatitis A Virus
1003	Antibody to Hepatitis A Virus, IgM
035	Arsenic
320	Aspartate Transaminase (AST)
979	Beta-2-Microglobulin
047	Bilirubin, Total
045	Bilirubin, Total Micro
926	C1q Binding Assay
1310	C-Reactive Protein
382	Calcitonin
425	Calcium, Serum
067	Calcium, Serum, Ionized
066	Calcium, Urine
758	Calculus Analysis Crystallography
706	Calculus Analysis Infrared Spec
072	Carotene
833	Catecholamines, Fractionated, Plasma
464	Catecholamines, Fractionated, Urine
1846	Catecholamines, Total, Plasma
644	Cerebrospinal Fluid IgG
2106	Chloramphenicol
082	Cholinesterase, Serum or Plasma
705	Clonazepam
014	Cold Agglutinins
401	Complement C1 Esterase Inhibitor
452	Complement, C3
459	Complement, C4
094	Copper, Serum
609	Cortisol, Urinary, Free
402	Coxsackie B (B1-B6) Virus Antibodies, CF
098	Creatinine Clearance
101	Cryoglobulins, Qualitative
032	Cryptococcal Antigen, Latex Agglutination
334	Cystine and Homocystine, Urine
823	Cytomegalovirus IgM Antibodies, IFA
539	DHEA
145	DHEA Sulfate
275	Differential Count
777	Disopyramide
894	Doxepin
122	Eosinophil Count
481	EB-VCA IgG Ab, IFA
137	EB-VCA IgM Ab, IFA
2080	EBNA-ACIF
1485	EBEA (R + D) Ab, IFA
1482	EBEA (R + D) + (D) Ab, IFA
1497	EB-VCA IgA Ab, IFA
2083	EBV Ab Panel 1, IFA
306	Estradiol, 17 Beta
746	Estriol, Serum
352	Estriol, Urine
131	Fat, Fecal, Qualitative
519	Ferric Chloride Test
804	Folic Acid, Red Blood Cell
265	Folic Acid, Serum
587	Gamma Glutamyl Transpeptidase
709	Gentamicin
151	Glucose Tolerance, 3 Hour Test
111	Glucose-6-Phosphate Dehydrogenase
025	Glycohemoglobin (HbA1c)
478	Growth Hormone
156	Haptoglobin
037	HDL Cholesterol with Fractionation
157	Hematocrit, Automated
158	Hemoglobin
159	Hemoglobin and Hematocrit
128	Hemoglobin F
1006	Hepatitis B e Antigen
559	Hepatitis LEP
656	Herpes Simplex Virus (HSV 1 and 2), IFA
161	Heterophile, Presumptive
279	17-Hydroxycorticosteroids
263	5-Hydroxyindoleacetic Acid (5-HIAA), HPLC
517	Hyperlipidemia Screen
892	Imipramine
170	Immunoglobulins G, A and M
489	Influenza Virus Antibodies (A & B), CF
473	Insulin
174	Iron, Serum
277	17-Ketosteroids
384	L-Lactic Acid (Lactate)
113	Lactic Dehydrogenase (LD)
186	Lead
210	Lecithin Sphingomyelin
873	Legionella Pneumophila Antibodies, IFA
187	Lipase
428	Liver Function Group
195	Magnesium
2054	Manganese
886	Maprotiline
2035	Marijuana & PCP Presumptive Screens
442	Mechocarbital
197	Mercury
1498	Metanephrines, Fractionated
136	Myelin Basic Protein
2290	Myoglobin Quan, Serum
2291	Myoglobin Quan, Urine
2409	Neonatal Hemoglobinopathy Screen
891	Nortriptyline
521	5' Nucleotidase
432	Osmolality
681	Oxalate, (Oxalic Acid), Urine
597	Parathyroid Hormone (PTH), Mid-Molecule
914	PCP Verification and Quantitation by GCMS
214	Phenobarbital
524	Phosphorus, Urine
285	Porphobilinogen Urine
411	Porphyrins, Fractionation, Urine
229	Porphyrins, Urine, Total, Qual
636	Primidone
378	Procainamide
785	Progesterone, 17 Alpha-Hydroxy
535	Rast Panel #1
476	Renin Activity
251	Reticulocyte Count
375	Rheumatoid Factor (RF) Titer
252	Rheumatoid Factor Screen
483	Rubeola Virus Antibodies, HAI
323	Sickle Cell Anemia Screen
271	Sodium
435	TBG
819	Testosterone (Free)
301	Tobramycin
641	Transferrin
1312	Trazodone
838	T4 Free By Dialysis
569	Uric Acid, Urine
564	Urinalysis Chemical with Microscopic
712	Valproic Acid
345	Vanillmandelic Acid
724	VDRL, Cerebrospinal Fluid
934	Vitamin E, HPLC
820	Volatiles Screen
436	Zinc, Serum

MARK ALL TEST REQUESTS ON THE FRONT OF FORM

AMERICAN MEDICAL LABORATORIES, INC.®
11091 Main Street
Fairfax, Virginia 22030
(703) 691-9100

LAB NO. (AML USE)

TOXICOLOGY CHAIN-OF-CUSTODY FORM

INSTRUCTIONS: Fill out AML Test Request Form (FO26) and A, B and C on this form. Collect specimens under your collection protocol. Have patient sign Line D. If Collection was witnessed, have Line E signed by witness. Place number sticker on Request Form No. line in Section D below and on each specimen container. Patient signs first RECEIVED FROM line and collection site person signs first RECEIVED BY line. All transfers of specimens must be shown with signatures as well as that persons purpose for handling specimens.

OPTIONAL URINE DRUG TESTING INSTRUCTIONS TEMP_____ pH_____ S.G._____

To insure confidentiality, use ID No. rather than name on Test Request Form. To aid in maintaining urine integrity, take temperature of urine within four minutes of collection, Use Ames #2300 dipstick to measure pH and specific gravity. Note color and appearance of urine. Indicate all in spaces to right. Note recent medications. Please refer to AML COC urine collection guidelines.

COLOR: Yellow ☐ Pale ☐ Other _____
APPEARANCE: Clear ☐ Cloudy ☐
Other _____
MEDICATIONS TAKEN IN LAST TWO WEEKS:
_____
_____
NOTES _____
_____

A. CLIENT NAME _____

B. TYPE & NUMBER OF SPECIMENS _____ DATE _____

C. EMPLOYEE/PATIENT NAME AND/OR I.D. NO. _____

D. EMPLOYEE/PATIENT SIGNATURE AND RELEASE _____

By signing this form, I acknowledge the specimen(s) that are labelled with Request Form No. _____ to be my specimen(s) and that they have been labelled and sealed in my presence. If collection was witnessed, that I release from liability any and all persons associated with witnessing of collection of my specimen. I also authorize AML to conduct testing for drugs and to report results to my employer or potential employer who require this testing. I certify that the specimen(s) is my own and has not been altered.

E. COLLECTION WITNESS SIGNATURE (IF APPLICABLE) _____

CHAIN OF CUSTODY:

1. RECEIVED FROM _____ DATE _____ TIME _____
   RECEIVED BY _____ FOR PURPOSE OF _____
2. RECEIVED FROM _____ DATE _____ TIME _____
   RECEIVED BY _____ FOR PURPOSE OF _____
3. RECEIVED FROM _____ DATE _____ TIME _____
   RECEIVED BY _____ FOR PURPOSE OF _____
4. RECEIVED FROM _____ DATE _____ TIME _____
   RECEIVED BY _____ FOR PURPOSE OF _____
5. RECEIVED FROM _____ DATE _____ TIME _____
   RECEIVED BY _____ FOR PURPOSE OF _____
6. RECEIVED FROM _____ DATE _____ TIME _____
   RECEIVED BY _____ FOR PURPOSE OF _____

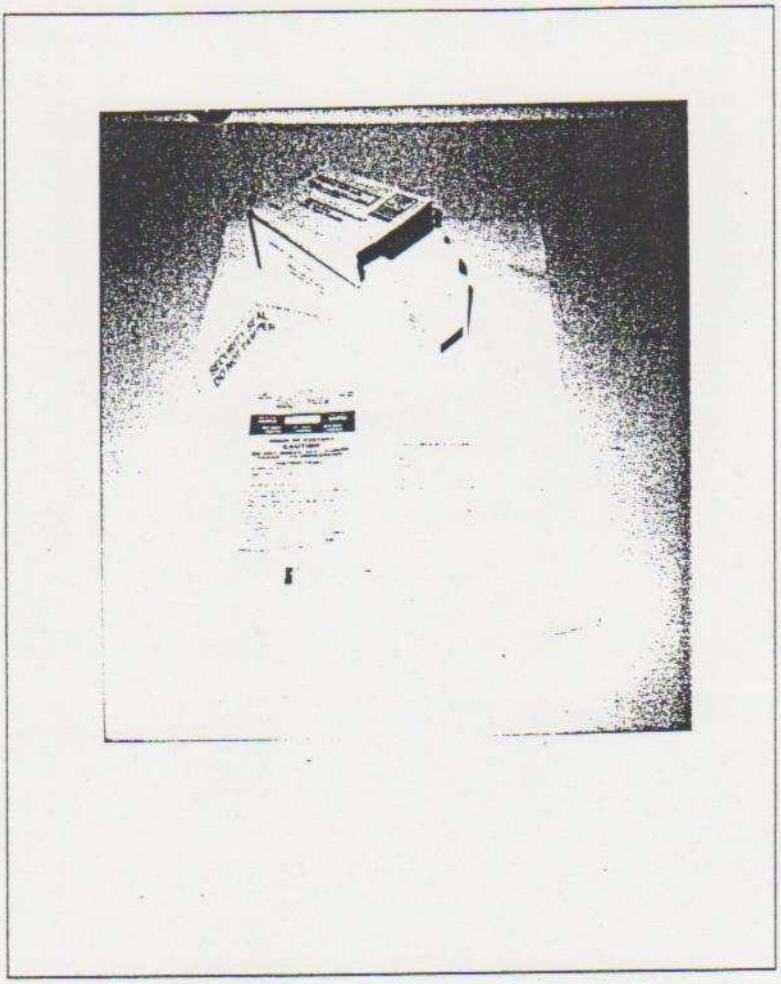
AML ACCESSIONER: WAS SPECIMEN(S) PROPERLY SEALED WHEN RECEIVED?

YES ☐ NO (explain) _____ SIGNATURE _____

WHITE COPY - AML COPY YELLOW COPY - CLIENT COPY

5177

C. SPECIMEN BOTTLE



SPECIMEN BOTTLE

Specimen bottle complete with packaging including adsorption bag and labels.

APPENDIX 3

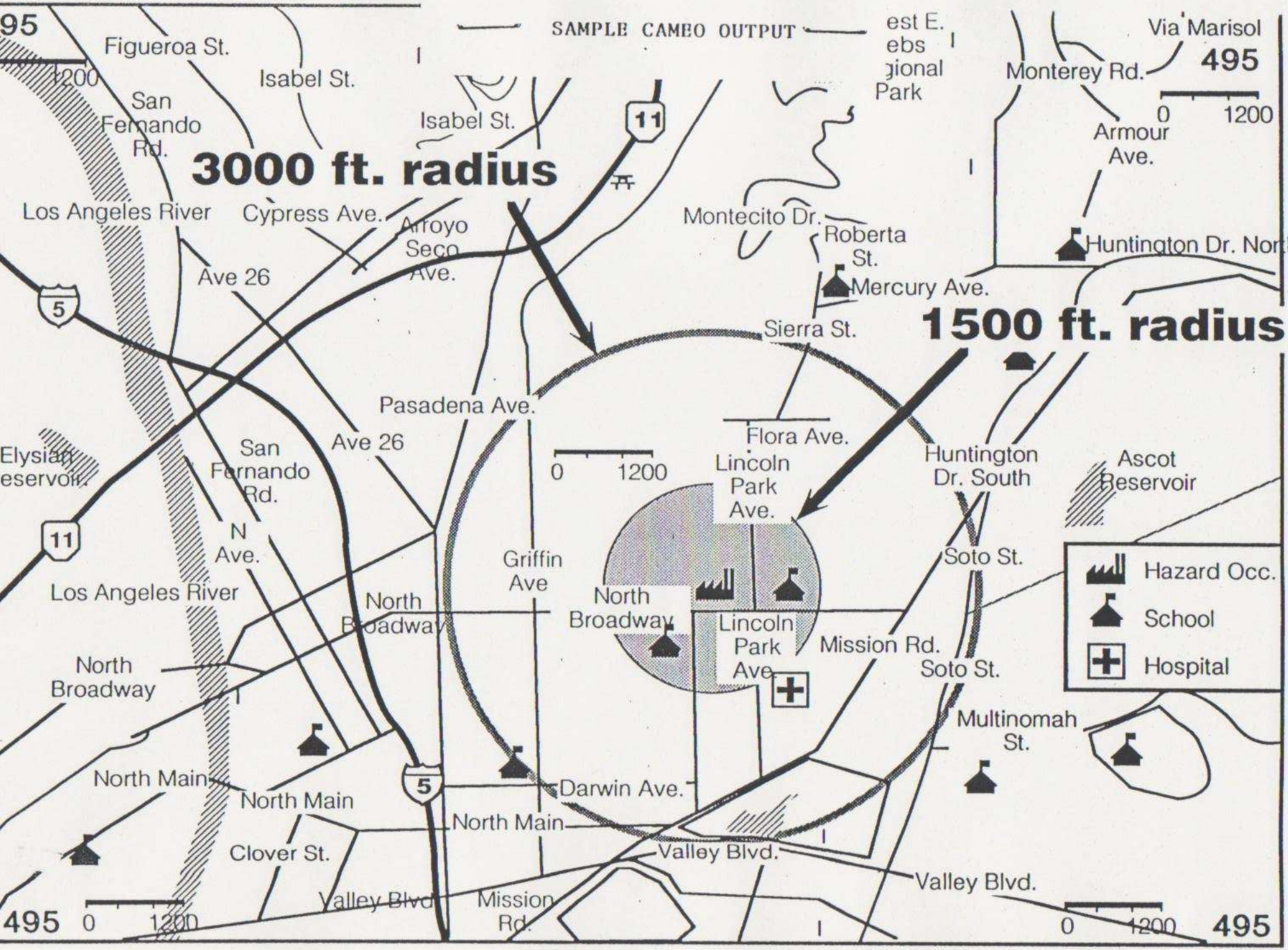
A. *CAMEO OUTPUT*

B. *HYPERCARD*

C. *CHARM*

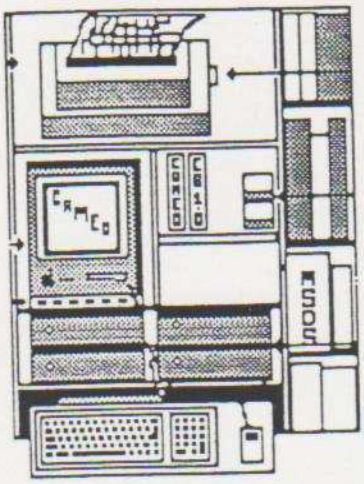
D. *WEATHERPAK*

A. CAMEO OUTPUT

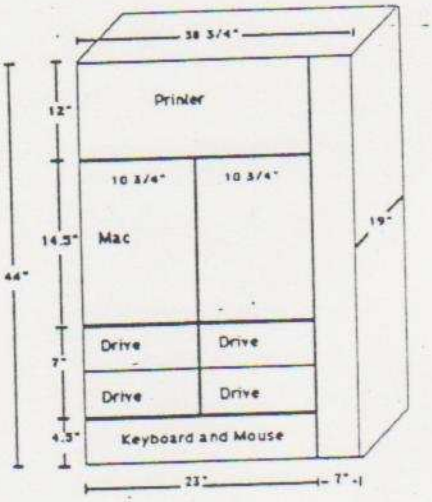

SAMPLE CAMEO OUTPUT
3000 ft. radius
1500 ft. radius
Figueroa St.
Isabel St.
San Fernando Rd.
Los Angeles River
Cypress Ave.
Arroyo Seco Ave.
Ave 26
Pasadena Ave.
Montecito Dr.
Roberta St.
Mercury Ave.
Sierra St.
Monterey Rd.
Via Marisol
Armour Ave.
Huntington Dr. North
Huntington Dr. South
Flora Ave.
Lincoln Park Ave.
Ascot Reservoir
Elysian Reservoir
N Ave.
Griffin Ave
North Broadway
Soto St.
Mission Rd.
Multinomah St.
Darwin Ave.
North Main
Clover St.
Valley Blvd.
Hazard Occ.
School
Hospital
0
1200
495
5
11

Mounting the Mac

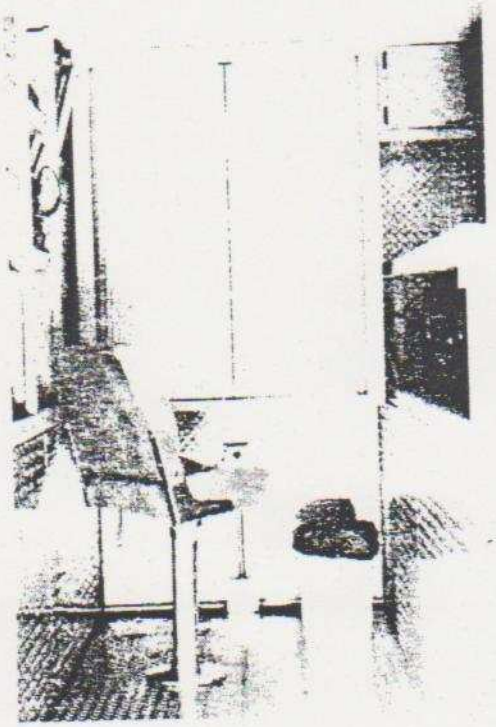
The computer is housed in a wooden cabinet mounted next to a mobile phone.



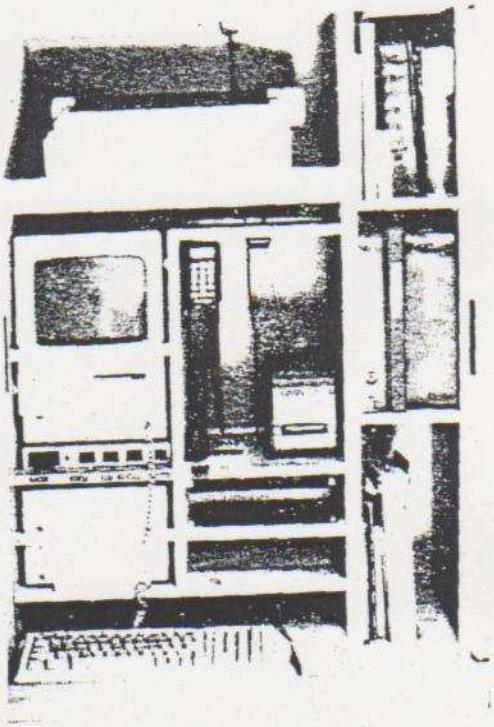
Cabinet Design



Cabinet Dimensions



Closed Cabinet Doors



Open Cabinet Doors

B. HYPERCARD

TARGET HAZARD OCCUPANCY

HAZMAT PRE-INCIDENT INSPECTION

Fire Station: 1 Business No.: 007893-1 Date Due:

Business Name: Vallejo Plating Works Phone No.: (213) 721-8362

Business Address: 2200 North Vallejo Street

Is Business in Station's "Building" Inventory? ☐ Yes ☒ No **If Yes, When Was Last Update?**

Special Populations Occupancies

Name	Address	Phone No.	Non-Amb
Griffin Ave. Elem. School	2025 N. Griffin Avenue	(213) 654-1200	0
Albion Street School	1800 N. Albion Street	(213) 721-1515	0
Our Lady Help/Christ. School	2024 E. Darwin Avenue	(213) 822-3500	2
Rainbow Headstart	2500 N. Griffin Avenue	(213) 821-5000	0
Jardin De Ninos	2422 E. Manitou Avenue	(213) 935-6000	0
Sacred Heart High School	2111 N. Griffin Avenue	(213) 861-2000	0
Sacred Heart Elem. School	2109 N. Sichel Street	(213) 861-2100	0
Vallejo Headstart	2141 N. Workman Avenue	(213) 735-2121	0

Evacuation Centers

Name	Address	Phone No.	Occ Load
Nightingale Jr. High School	3311 N. Figueroa	(213) 632-8400	500
Roosevelt High School	456 S. Mathews Street	(213) 749-1900	800
Wilson High School	4500 E. Multnomah Street	(213) 748-2000	750
Naval Reserve Center	1600 Stadium Way	(213) 668-1500	800
Dodger Stadium	1000 Elysian Park Avenue	(213) 224-1491	4,000

Comments

Dodger Stadium and Naval Reserve Center chosen as Evacuation Center and are not on the list. Albion Street School added to Special Populations Occupancy list.

Major Traffic Arteries

Foothill Fwy (210)		Pasadena Fwy (110)	
Glendale Fwy (2)		San Diego Fwy (405)	
Golden State Fwy (5)	X	Santa Monica Fwy (10)	
Harbor Fwy (110)		Simi Valley Fwy (118)	
Hollywood Fwy (101)		Ventura Fwy (101)	
Hollywood Fwy (170)		Ventura Fwy (134)	

Community Language Considerations

Armenian	
Chinese	X
Japanese	
Korean	X
Russian	
Spanish	X
Vietnamese	X
Other: (Specify)	

COMPLETED BY: (Signature)

Print Name Assignment Date

EVACUATION CENTERS

FS	Map Coordinates Pg.	X	Y	Capacity	Facility Name	Address	Classification
16	495	41	55	250	Multnomah Street School	2101 N Indiana St	Elementary School
16	495	45	55	250	Wilson, Woodrow High School	4500 E Multnomah St	High School
47	495	42	74	100	Huntington Drive School	4435 N Huntington	Elementary School
47	495	36	75	50	Glen Alta School	3410 N Sierra	Elementary School

(EVACUATION CENTERS LISTED BY NO SPECIFIC CLASSIFICATION)

Evacuation Centers

Occupancy Name: Multnomah Street School

Street Address: 2101 N Indiana St

FS District/Centract: 16B

Battalion/Division: 7 / 1

Capacity: 250 902 Code: 213

Occupancy Type: Elementary School

Notes:


Report Card

Evacuation Centers

SORT STACK | FIND | VIEW NEXT | REPORT

Occupancy Name: Wilson, Woodrow High School

Street Address: 4500 E Multnomah St

FS District/Centract: 16B

Battalion/Division: 7 / 1

Occupancy Type: High School

Capacity: 250 902 Code: 215

Notes:

Report Card

Evacuation Centers

SORT STACK FIND

Occupancy Name: Huntington Drive School

Street Address: 4435 N Huntington

FS District/Centract: 47C

Battalion/Division: 7 / 1

Capacity: 50 902 Code: 213

Occupancy Type: Elementary School

Notes:

Report Card

66

Evacuation Centers

SORT STACK FIND

Occupancy Name: Glen Alta School

Street Address: 3410 N. Sierra

FS District/Centract: 47H

Battalion/Division: 7 / 1

Capacity: 50 902 Code: 213

Occupancy Type: Elementary School

Notes:

Report Card

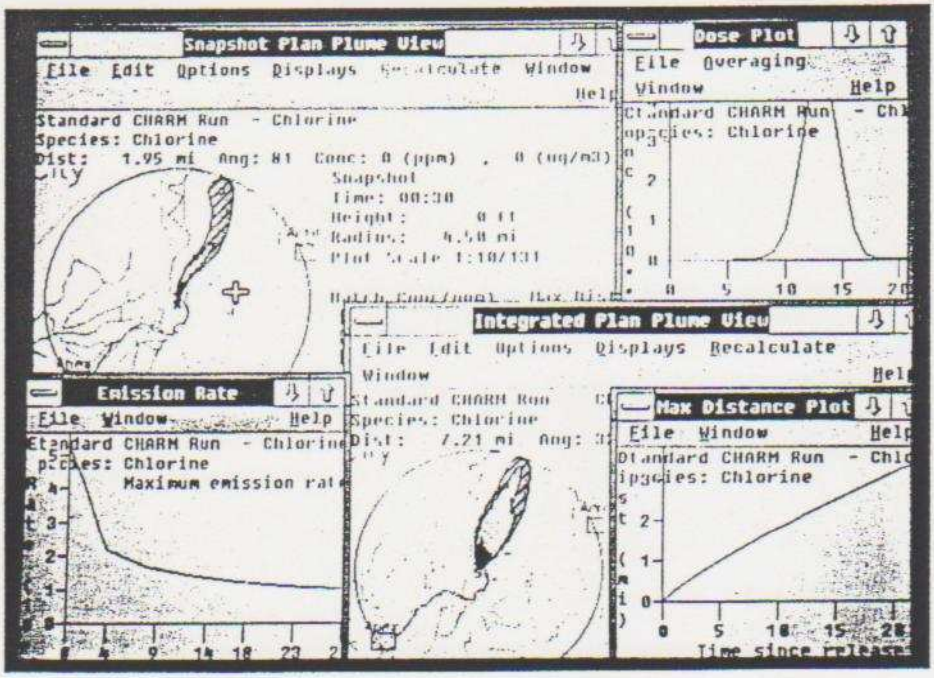
C. CHARM

An Ounce of Prevention... CHARM® Software Helps Countries with Emergency Response Planning

In the heart of the Brazilian jungle, black smoke billows from a fire at a petrochemical plant. A valve at a chemical plant in Japan malfunctions, sending a continuous stream of gases into the atmosphere. A railway car in the U.S. overturns and ruptures, releasing fumes from the chemicals it contains. What do these three scenarios have in common? They all have the potential to become a catastrophic event, and they all have CHARM®. CHARM is Radian Corporation's Complex Hazardous Air Release Model software and is a modeling program that calculates and predicts the movement and concentration of airborne plumes from released chemicals. Whether developing an emergency response plan or responding to an actual event, the CHARM program provides a quick and accurate means to assess potential impacts from airborne releases.

For some time now, government agencies and the chemical industry have been concerned about emergency response to chemical releases, whether that release is within plant boundaries, in a populated area, or in some remote region of the world. Fast, appropriate action can make the difference between a minor inconvenience and a major emergency. More than 150 users in industry and local, state, and federal agencies, as well as a growing number of foreign countries, are using the CHARM program to develop emergency response plans, to train personnel in emergency response procedures, and to assess real-world situations rapidly should they arise. Current users include members of the chemical and petrochemical industry, government agencies charged with emergency response planning, air pollution control agencies, and the Department of Defense.

To know the effects of an actual or potential accident, information is needed on the toxicity of the released substance and how it will disperse under different weather conditions. The CHARM program provides data on physical, chemical, and toxic properties of the chemical released. The user-friendly program allows the operator to describe a release through a list of questions displayed on the computer screen. For example, the identity of the chemical released, whether it is gas or liquid, how it was released, and the current weather conditions can all be entered into the program by simple keyboard strokes or clicks of the mouse. Display screens show the locations, shape, and up to three concentrations isopleths of the chemical plume resulting from the release. These screens also permit the user to specify, and have the system to display, the emergency response procedures to be followed (specific to the particular compound released) and the phone numbers of local authorities and of local sources of help who can respond to an emergency. The CHARM program also provides



A single CHARM screen can display several parameters simultaneously, including source emission rates as a function of time (lower left corner).

hardcopy output of pertinent data.

The versatility of the CHARM model is shown by its flexibility in simulating chemical release scenarios. The user can specify a material that may be heavier or lighter than air, whether a release is an instantaneous or continuous loss of liquid or gas, if the release is at ground level or elevated, or is on ground or water. Complex terrain features can also be considered.

By specifying at what time a concentration isopleth is to be calculated, the user can change the graphic scale or concentration levels and remodel the release under new wind conditions. During an emergency response, the operator obtains meteorological data from instruments brought to the site, from a nearby meteorological station, or from estimates prepared by a remote weather center. In cases in which the CHARM program is set up permanently as part of a facilities operation, it can receive continuous data from a meteorological station.

Once data on the release have been specified, CHARM is ready to calculate and predict the movement and concentration of the chemical plume. Some examples of the type of displays provided by the program are time-history display of impact area; time-history of concentration at any point; radiation from fires; vertical cross-section of the plume; overpressure from explosions; location of maximum concentration as a function of time; and distance from the source of a concentration level as a function of time.

The CHARM program is useful for emergency planning as well as response plan development, in which information describing a specific release scenario can be stored as a file. The prestored file can be accessed easily in the emergency response mode to minimize the time required to obtain impact information. By using CHARM, facility personnel can design response plans, implement training programs, and be better prepared should an accidental release occur.

CHARM offers a database editor routine that lets the user add or delete from the existing database of over 100 compounds; there is virtually no limit to the number of chemicals that the CHARM program can model. Properly scaled, site-specific or area maps can be created with the Microsoft Windows® Paint Program or other more sophisticated Windows-compatible drawing programs. Geographical displays of concentration levels can then be overlaid on the maps to identify local impact areas, allowing quick assessment of response procedures. In addition, the maps can contain locations of releases or other maps for zooming in for closer examination.

With the Windows feature, the user also can view more than one simulation on the screen at a time. Thus, scenarios of the same chemical under different meteorological and/or time-release conditions can be viewed simultaneously. These displays, both text and graphics, can be sent to word processors that are Windows compatible. The Windows feature also allows the CHARM program to be multilingual: CHARM will soon be available in several languages, including Japanese, German, French, and Portuguese. Other program features, such as the ability to be configured either as a desk-top, facility-specific system or as an easily portable unit for use wherever an emergency arises, make Radian's CHARM program one of the most powerful tools available for industry and governments worldwide to model emergency response scenarios.

For more information contact

RADIAN
CORPORATION

(512)454-4797
8501 Mo-Pac Blvd.
P.O. Box 201088
Austin, TX 78720-1088

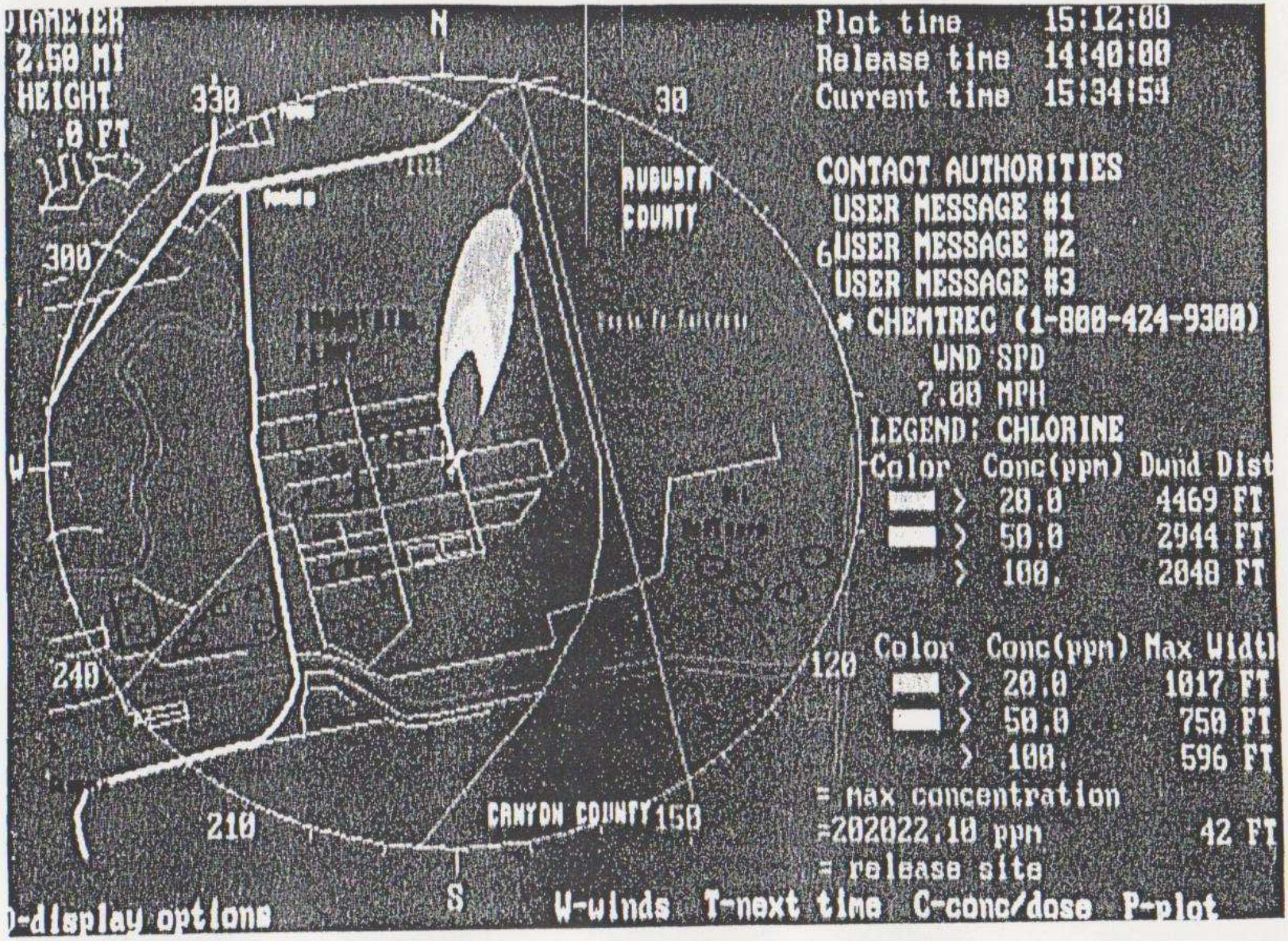


Figure 4-1. Example of CHARM® Output

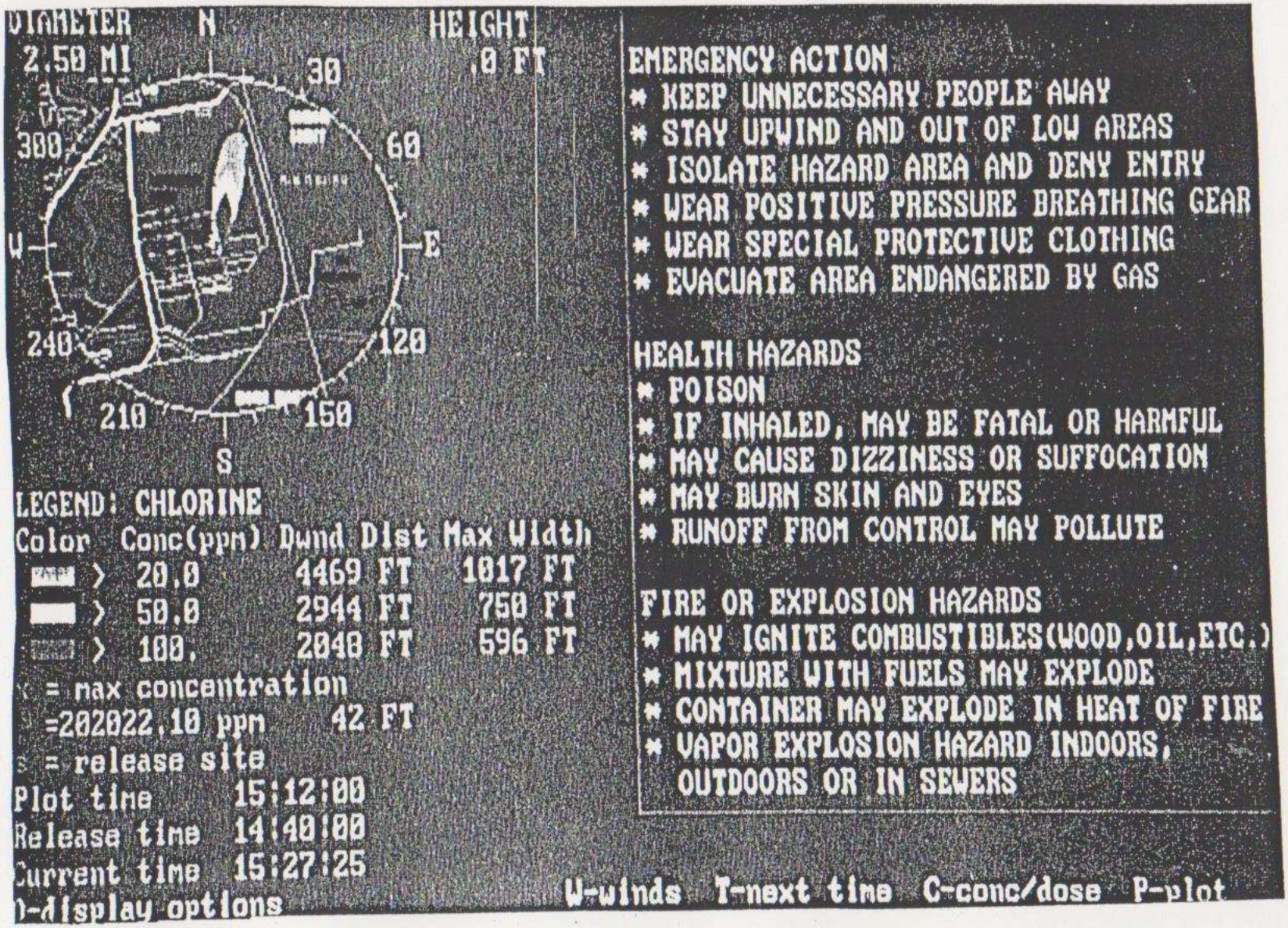


Figure 4-2. Example of CHARM® Output

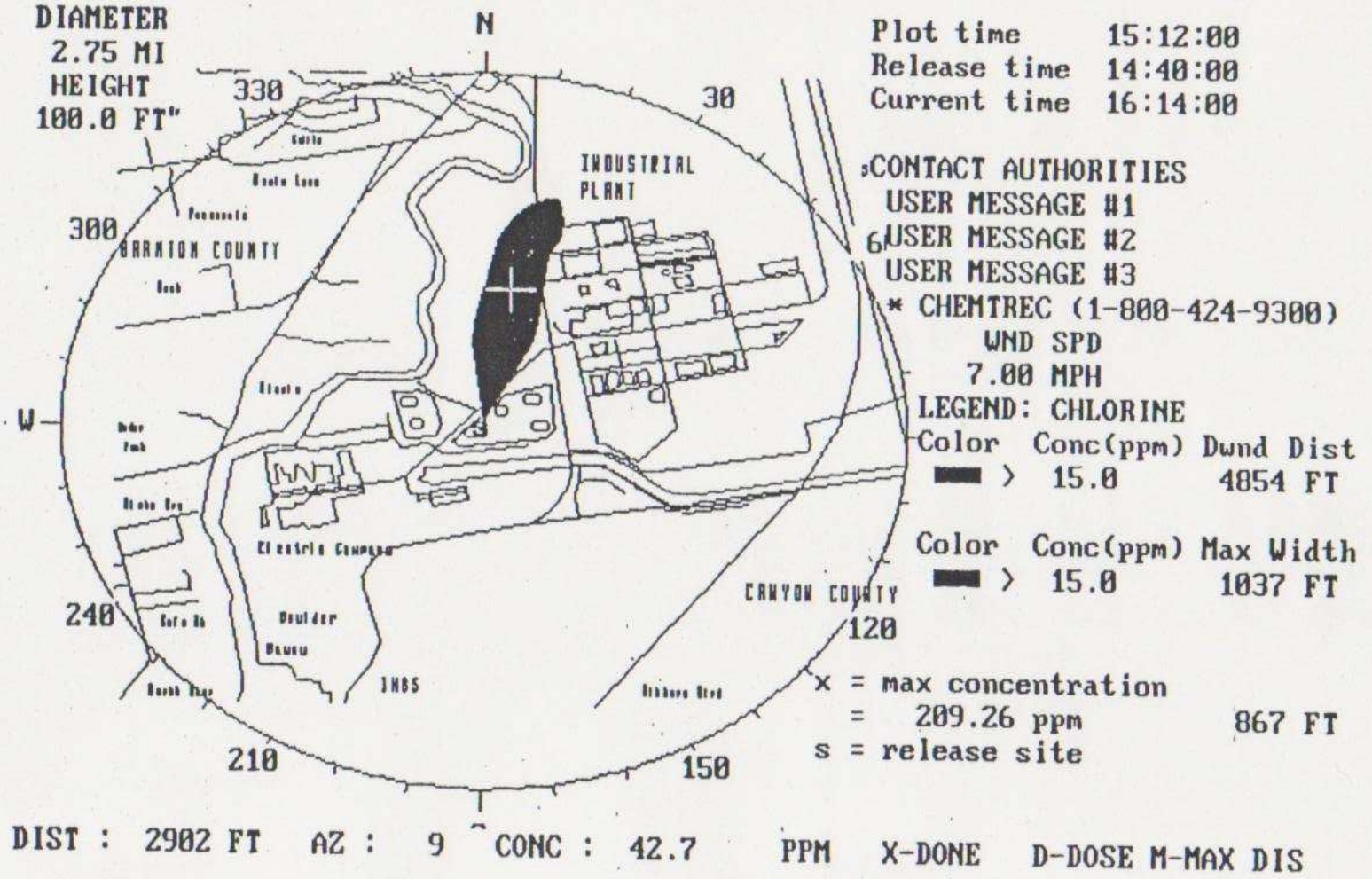


Figure 4-4. Example of Concentration/Dosage Screen Display

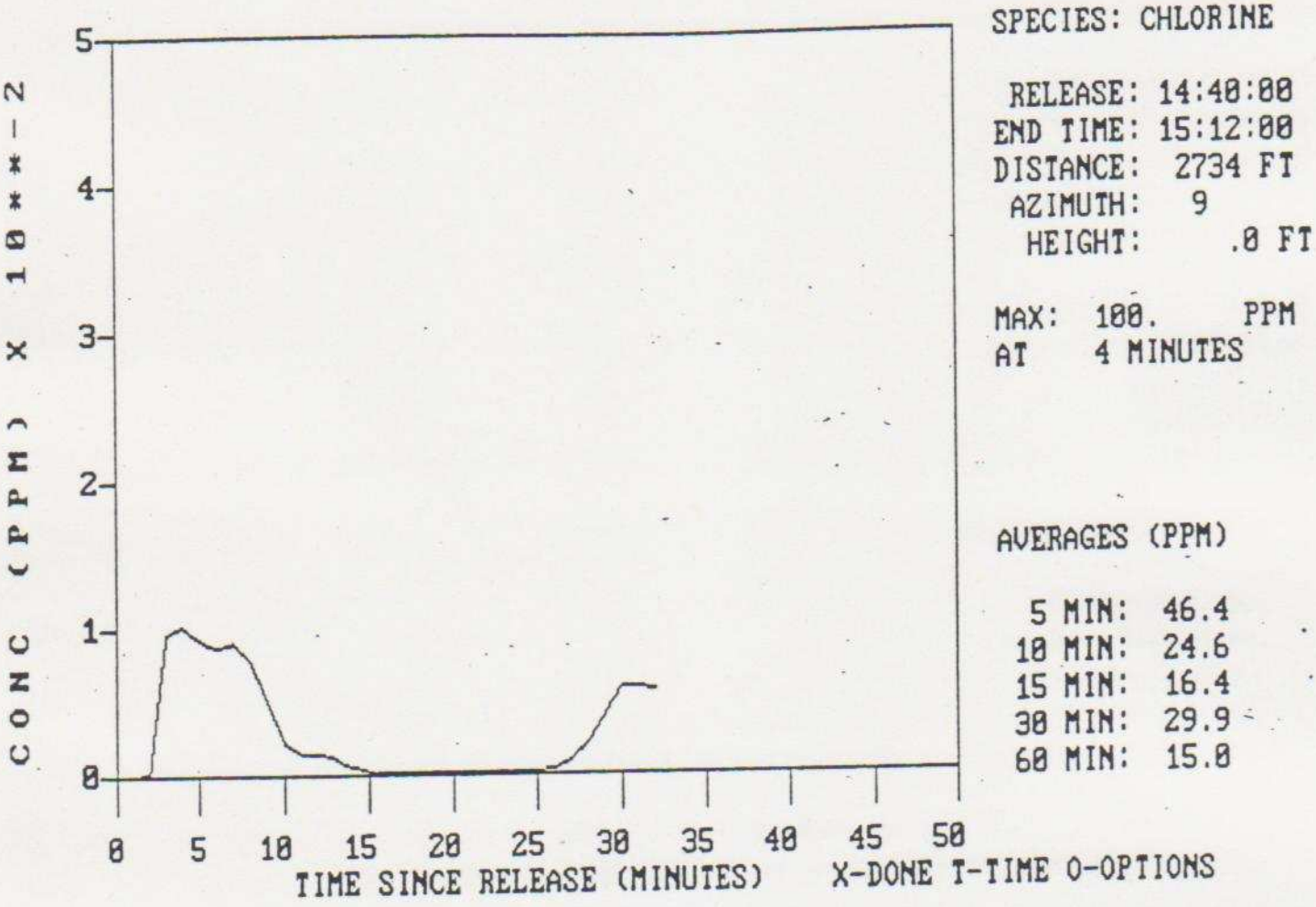


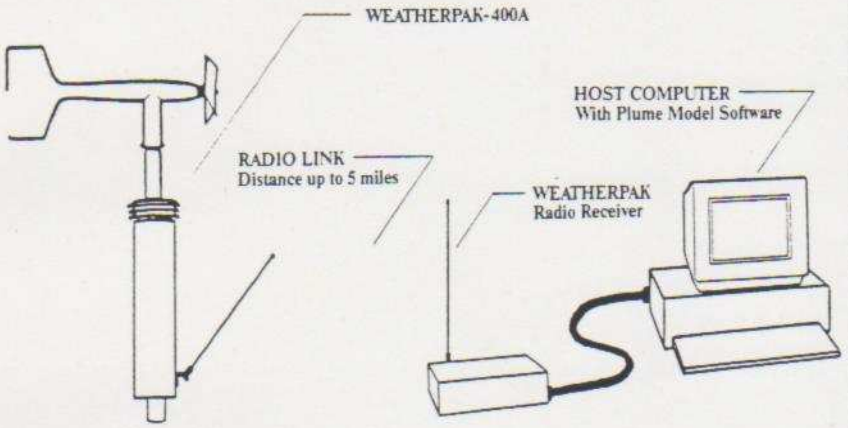
Figure 4-5. Example of Dosage Calculation Display. Note that averages calculated are from End Time (5-minute average represents the period from 15.07 to 15.12).

D. WEATHERPAK
PORTABLE WEATHER STATION

WEATHERPAK

SPECIFICATIONS

HAZMAT SYSTEM CONFIGURATION



PERFORMANCE CRITERIA

SPECIFICATIONS	REASON FOR SPECIFICATIONS
CONTAINS BUILT IN ELECTRONIC COMPASS	Allows user to set up unit in any orientation with no concern to where north is. (Compass does it automatically).
SENSORS, ELECTRONICS, TRANSMITTER AND ANTENNA MUST BE CONTAINED IN A SINGLE HOUSING.	Means no cables to connect or be exposed to corrosion damage. Makes entire system impervious to water and most chemicals. Aids in rapid set-up.
SET UP TIME LESS THAN 2 MINUTES	Essential for response environment.
MUST HAVE AUTOMATIC ON/OFF AND AUTO-BOOT	No switches to fumble with or forget to turn on/eff. No need to expose electronics to atmosphere and no possibility of sparks.
CONSTRUCTED OF 6061-T6 ALUMINUM	Special mil-spec grade aluminum is extra rugged and extra resistant to corrosion.
MUST BE WATER IMMERSIBLE TO 10 FT.	Only way to assure station is "waterproof," assures that decontamination is easy if necessary.
COMPLETE UNIT (ALL COMPONENTS) MUST BE FIELD PROVEN FOR AN EXTENDED PERIOD OF TIME.	Guarantees that the whole system, as-is has been successfully used in the field.
ELECTRONICS GROUNDED AT ONLY ONE POINT	Assures that the station is protected from other radio interference, electrical surges and lightning.
COMPLETE NON-FERROUS CONSTRUCTION OF INSTRUMENT AND TOWER.	Provides a spark free environment.
MUST WEIGHT UNDER 15 POUNDS	Provides for extreme portability and quick and easy set-up.

WEATHERPAK SPECIFICATIONS

ELECTRONICS

Memory—64K to 224K (2500 to 10000 samples stored)
A/D converter—ADC1205—13 bits (12 bits plus sign)
RS232C UART—NSC858—programmable baud rates. 1 stop bit. 1 start bit. 8 data bits. no parity.
EMI/RFI—3 levels of protection on all external lines.
Umbilical cable—Ground
Terminal in
Terminal out
0-5v serial in
+/-5 volt analog
Battery (+8 to +18 volts)
RS-232 in
RS-232 out
0-5v serial out

INTERNAL MEASUREMENTS

(Other sensors are possible in special applications)

Wind Speed/Vane

Accuracy—5m/s/ 2 deg	Resolution—0.1m/s/ 1 deg
Range—0-60 m/s	Survival—80 m/s
Distance Cons.—3/1.3m	Threshold—0.4/0.8 m/s

Air Temperature

Accuracy—0.2 deg C	Resolution—0.1 deg C
Solar heating error full sunlight, 2 m/s	Resolution 0.1 deg

Compass

Accuracy—2 deg	Resolution—1 deg
Tilt limits	12 deg

ENVIRONMENTAL (SURVIVAL)

The WEATHERPAK meets accuracy specifications as described above and in most cases meets or exceeds exposure to the following environmental tests per MIL-STD-810D as follows.

Temperature—Operation from −25 to +70 deg. C
Pressure—Operation from 800 to 1100 mbar
Humidity—Ten day exposure in atmosphere with relative humidity up to 100% condensing with continuous power-on operation of unit.
Solar Radiation—Continuous power-on operation in full solar radiation and ambient temperature of +50 deg. C.
Rain—Continuous power-on operation in rain of 10 cm/hr with 35 m/s winds
Shock & Vibration—The WEATHERPAK will survive desk-to-floor dropping on concrete as well as all transportation handling damage.

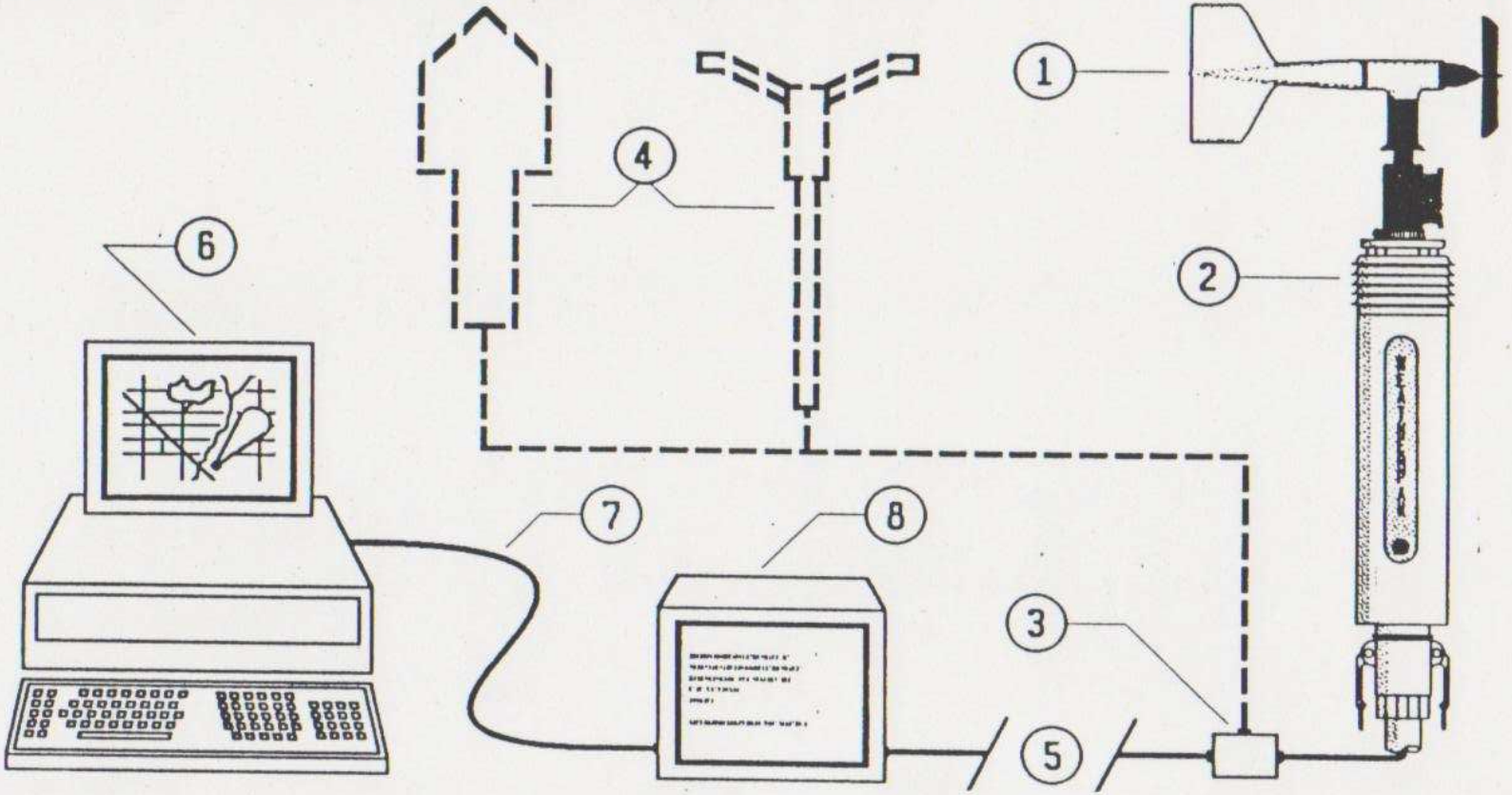
MECHANICAL

Size—Housing 4 x 22.5 ins. (10.3 x 57.2 cm) (base unit w/o wind monitor)
Weight—12.5 pounds (5.7Kg)
Color—White, baked-on polyester powder coating
Material—6061 T6 aluminum, 316SS hardware
SET-UP—Under 2 minutes including tower from case to full operation

W E A T H E R P A K - 4 0 0 i S

for

EMERGENCY RESPONSE, CONTINUOUS MONITORING at INDUSTRIAL SITES



1. WIND MONITOR 2. AIR TEMPERATURE and/or RELATIVE HUMIDITY and/or BAROMETRIC PRESSURE SENSOR 4. OPTIONAL SENSORS 5. CABLE/RADIO/PHONE LINE 6. HOST COMPUTER w/ CAMEO™ or EISC™ 7. DIGITAL (RS-232/422) DATA CABLE 8. MICROPROCESSOR w/ DISPLAY