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LETTER REGARDING THE ADDENDUM TO PHASE III REMEDIAL INVESTIGATION WORK PLAN AND QUALITY ASSURANCE PROJECT PLAN PHASE III REMEDIAL INVESTIGATION/FEASIBILITY STUDY NAWC WARMINSTER PA
04/12/1995
HALLIBURTON NUS CORPORATION

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HNPH/51-4-5-48

April 12, 1995

Project Number 1412

Mr. Lonnie Monaco
Naval Facilities Engineering Command (NAVFACENGCOM)
Northern Division
Environmental Contracts Branch, Mail Stop No. 82
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Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Order (CTO) No. 159

Subject: Addendum to Phase III RI Work Plan and Quality Assurance Project Plan
Phase III Remedial Investigation/Feasibility Study (RI/FS)
Naval Air Warfare Center (NAWC) Warminster, Pennsylvania

Dear Mr. Monaco:

This letter updates the status of Halliburton NUS Corporation (HNUS) efforts with regard to source characterization work being performed at NAWC Warminster as part of Phase III RI work. More specifically, attached to this letter is an addendum to the Phase III RI work plan (dated January 1995) and quality assurance project plan (QAPP) (dated February 1995) for radioactive waste monitoring during intrusive field work activities. As you are aware, these types of activities are scheduled to begin around April 12, 1995 for subsurface waste sampling at Site 4 (North Runway Landfill).

Copies of this letter and the attachment are being provided to NAWC Warminster and United States Environmental Protection Agency (EPA) officials. Please contact Jeff Orient or me if you have any questions or comments.

Sincerely,

Neil Teamerson
Neil Teamerson
Phase III RI Coordinator

ANT/dhd

Attachment

c: Raymond Mannella (NAVFACENGCOM)
Thomas Ames (NAWC Warminster)
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ADDENDUM TO PHASE III RI WORK PLAN AND QAPP
(dated April 12, 1995)

1. PURPOSE

a. This addendum amends the Halliburton NUS Corporation (HNUS) Phase III RI Work Plan for NAWC Warminster (dated January 1995) with regard to radiation monitoring during intrusive site activities. These activities include sampling and investigation of surface soils, subsurface soils, and subsurface wastes which may be contaminated with radioactive materials. The following guidance and procedures apply to Task 5 (Test Pit Excavations and Sampling), Task 6 (Soil Borings and Soil Sampling), and Task 7 (Surface Soil Sampling) of Section 4.0 of the subject document, pages 4-7 and 4-8.

b. In addition, this guidance applies to Section 5.3 (Test Pit Excavation and Subsurface Soil Sampling), Section 5.4 (Soil Borings and Subsurface Soil Sampling), Section 5.5 (Surface Soil Sampling), and Section 5.6 (Background Soil Sampling) of the HNUS Phase III RI Quality Assurance Project Plan (QAPP) (dated February 7, 1995), pages 5-2 through 5-5.

2. GENERAL

a. Two types of radiation survey instruments will be used to screen for the presence of radioactive wastes during intrusive activities:

(1) The Radiation Alert - Monitor 4 will be used to direct site operations, to screen for the presence of radioactive activity, and to conduct health and safety monitoring for all field personnel. The Monitor 4 is a miniaturized Geiger counter designated for personal monitoring as well as general area radiation monitoring. The Monitor 4 provides semi-quantitative measurements for gamma radiation.

(2) If necessary, the Thyac III (Model 490) will be used to provide non-qualitative, semi-quantitative data to detect the presence of radioactive wastes. The Thyac III is a sensitive portable pulse count rate meter designed to detect all types of radiation (i.e., alpha, beta, and gamma) and provides in-situ real-time relative concentration readings.

b. The radiation survey instruments will be used at those sites at NAWC Warminster where the possible presence of buried radioactive wastes cannot be ruled out. In general, the instruments will not have to be used at those sites (e.g., Site 8 - Fire Fighting Training Area; Area C - Maintenance Area) where only surface disposal of non-radioactive wastes may have occurred.

c. The instruments will not have to be used for surface soil samples collected at, or near, sites where wastes are not anticipated to be present near the surface. For example, Site 4 reportedly was covered by at least 2 feet of clean fill during trench closure.

d. The Thyac III will be used only at those sites, test pits, or sample locations where the presence of radioactivity above background levels has been confirmed by the Monitor 4.

3. PROCEDURES

a. Halliburton NUS Corporation (HNUS) SOP ME-09 establishes the general procedure for the use and calibration of radiation survey meters.

b. Normal background measurements for ionizing radiation are between 0.01 to 0.02 milliroentgens per hour (mR/hr) when using the Monitor 4. The range switch will be set on the X1 scale. If readings are greater than 0.3 mR/hr but less than 2 mR/hr, the field team will continue the investigation with caution and will monitor the survey instrument more frequently. If greater than 2 mR/hr, the field team will cease investigation activity and evacuate the site.

c. For the Thyac III, normal background measurements are between 10 to 20 counts per minute (CPM). The switch on the instrument will be set on the X100 scale. If readings are greater than 20 CPM but less than 200 CPM, the field team will continue the investigation with caution and will monitor the survey instrument more frequently. If greater than 200 CPM, the field team will cease investigation activity and evacuate the site.

d. Radiation readings will be taken at the beginning of intrusive activities for each discrete site or source and will be recorded in the field logbook. Readings will be continuous and will be recorded for applicable surface soil samples and all subsurface soil and waste samples.

e. Before beginning sampling or test pit excavations, background radiation levels from surrounding soils will be measured using the Monitor 4 to establish the range of soil activity present. The Monitor 4 will be held 0.25-inch above the ground surface with the window facing downward.

f. During sample collection (including samples from test pits), the Monitor 4 will be held 0.50-inch from the soils/wastes being sampled with the window pointing downward.

4. REFERENCES

a. HNUS SOP ME-09 (attached).

b. Use, Calibration, and Maintenance of the Thyac III, Model 490 (attached).

c. Use, Calibration, and Maintenance of the Radiation Alert, Monitor 4 (attached).

NUS CORPORATION ENVIRONMENTAL MANAGEMENT GROUP	STANDARD OPERATING PROCEDURES	Number: ME-09	Page: 1 of 5
		Effective Date: 05/04/90	Revision: 1
		Applicability: EMG	
		Prepared: Health and Safety	
Subject: RADIATION SURVEY METERS		Approved: D. Senovich	

TABLE OF CONTENTS

1.0 PURPOSE

To establish a procedure for the use and calibration of Radiation Survey Meters.

2.0 SCOPE

Applies to each usage of radiation survey meters by NUS/EMG personnel.

3.0 GLOSSARY

Alpha Radiation - Particles, consisting of two protons and two neutrons, equivalent to the nucleus of a helium atom. Tissue (skin) is almost opaque to alpha radiation.

Beta Radiation - Electrons emitted during the radioactive decay of certain nuclei. Depending upon electron energy, will penetrate tissue from 0.05 to 8 mm.

Gamma Radiation - Electromagnetic radiation produced in atomic nuclei. Highly penetrating, passing through the body and through long distances in air. Gamma radiation constitutes the most common type of external radiation exposure.

4.0 RESPONSIBILITIES

Office Health and Safety Supervisor (OHSS) - The OHSS shall ensure that the radiation survey instrument user has been properly trained and certified in the use of the instrument. He shall also audit that the instrument is properly maintained and is calibrated according to manufacturer recommendations, or at least every 12 months.

5.0 PROCEDURES

5.1 INTRODUCTION

None of the ionizing radiations is detectable by any of man's five senses. Therefore, all indications of their presence and intensity must be obtained by instruments. Radiation detection devices, like other measuring instruments, operate because of some effect the phenomenon being measured has on matter. In the case of radiation, this effect is ionization. Survey meters are similar to other radiation detection instruments in their operational characteristics. A good survey meter should be portable, rugged, sensitive, simple in construction, and reliable. Portability implies lightness and compaction with a suitable handle or strap for carrying. Ruggedness requires that an instrument be capable of withstanding mild shock without damage. Sensitivity demands an instrument which will respond to the type and energy of radiation being measured. Rarely does one find an instrument capable of measuring all types and energies of radiation that are encountered in practice. "Simplicity in construction" necessitates convenient arrangement of components and "simple circuitry" is comprised of parts which may be replaced easily. "Reliability" is that attribute which implies ability to duplicate response under similar circumstances. All these conditions are not met in any one instrument, but they are approached in many. In any monitoring operation, one must select the proper instrument, use it intelligently, and then be able to interpret the results of the meter readings.

5.2 TYPES OF RADIATION SURVEY METERS

5.2.1 Ionization Chambers

Ionization chambers are instruments in which the ionization, initially produced within the chamber by radiation, is measured without further gas-amplification. Primary ions formed in the chamber are attracted to their respective electrodes and the current pulses are amplified externally to a measurable current. The gas-amplification factor is, thus, one.

Ionization chambers are usually about 30 to 50 cubic inches in volume and are filled with air at atmospheric pressure. The chamber wall design and type of material used in its construction determine its characteristics and, thus, the radiation energy to which it is sensitive. The larger the chamber, the more sensitive the instrument will become. Also, greater voltage will be required for proper operation of the larger chambers. In ionization chamber instruments with movable shields, it is possible to discriminate between types of radiation. In general, ionization chamber survey meters are used to measure relatively high level intensities. Their low sensitivity enhances their capacity to measure radiation at higher dosages or exposure rates.

Most ionization chamber survey instruments have a selector switch marked "off," "wait," and X1, X10, X100. When the switch is off, the batteries are disconnected and the meter is short-circuited, making the instrument inoperative. With the switch in the wait position, the batteries are connected, permitting the circuit to warm up and the instrument to be zeroed, after a warmup period of from 1 to 5 minutes. The meter is connected while the ionization chamber is disconnected, making it possible to adjust the meter accurately to zero, even in the presence of radiation.

No aural indication is typically used in ionization chamber instruments. Thus, the operator must constantly watch the meter to ascertain the field intensity. There is a lag between the instant radiation enters the chamber and the time when the meter reaches its maximum reading. Therefore, one must allow time for the meter to reach its maximum before taking a reading. This interval is usually just a few seconds.

Perhaps the most widely used and one of the most versatile ionization chamber instruments available for radiological survey work is the "Cutie Pie." These instruments are available with maximum scale readings up to 50 roentgens/hour.

5.2.2 Geiger-Mueller Instruments

Essentially, the theory of ion collection in the Geiger-Mueller type detector is the same as for the ionization chamber instrument, except that there is the formation of secondary electrons. In this process, primary ions, formed by the incident radiations, are accelerated (given energy) by the high voltage potential. This added energy enables them to produce secondary ion-pairs. For control of the amplification, a quenching gas is introduced. An ionization avalanche, caused by radiation entering the Geiger-Mueller tube, sends a pulse to the indicating unit of the survey instrument. The quenching gas functions to stop the avalanche and makes the Geiger-Mueller ready for another ionization event. The amplification, inherent in the detector tube, allows a single beta particle or gamma proton to be detected.

Most Geiger-Mueller tube walls are designed so that all but the weakest beta particles may enter. Allowing for the errors due to simultaneous entry, each and every beta particle entering the tube will be counted. Gamma ray counting is not nearly so efficient.

Since one measures each beta particle and each gamma ray that produces ionization within the sensitive tube volume, the instrument is extremely sensitive to radiation. On the most sensitive scales, background levels can be read.

A discriminating shield is usually provided for the Geiger-Mueller tube or probe which, when open, admits both beta and gamma particles. With the shield closed, only gamma is admitted.

To count efficiently, Geiger-Mueller tubes must have adequate means for quenching the ionization avalanche started by a particle entering the tube. In survey Geiger-Mueller counters, the tubes are invariably self-quenching. That is, the gas within the tube contains from 10 to 25 percent vapor of a substance, such as ethylene or iso-butane. Quenching gas is decomposed by radiation. Hence, a self-quenching tube has a limited lifetime. Therefore, a Geiger-Mueller counter should not be left turned on when not in use, especially near a source of radiation.

The indicating mechanism on most Geiger-Mueller counters is usually two-fold; that is, earphones for aural indication and a meter for visual indication. The meters are in reality microammeters that indicate radiation intensity by a pointer on a scale. The pointer or needle will waver slightly and an average reading should be used. In general, the dial is calibrated either in counts/minute or in milliroentgens (mr)/hour, or both. Also, the instrument has a switch for selecting different ranges of sensitivity. For the mr/hr scale, the sensitivities are usually indexed, indicating full scale values at a particular switch position. The counts/minute scale is usually marked by X1, X10, x100, or X1000 of full scale, as read on the face of the dial.

Equipment failure is generally due to batteries (some instruments have a battery check in the "on" position), loose connections, or faulty Geiger-Mueller tube.

The operation of the Geiger-Mueller Survey Instrument is essentially the same as that of the ionization chamber survey instrument. The warmup period is much less critical, and usually 5 to 10 seconds is ample. Care should be taken not to exceed the maximum capacity of the instrument. Such excessive exposure will likely damage the Geiger-Mueller detecting tube. The Geiger-Mueller tube is in operation when it is in the "on" position and no zero adjustment is possible. It is important to remember that Geiger-Mueller survey meters are sensitive instruments and, in general, do not read high levels of radiation intensity.

5.2.3 Other Radiation Survey Instruments

Other radiation survey instruments which operate under different physical principles are available, but are not usually used in waste site survey activity. These are: (1) proportional survey instruments utilized primarily in specialized alpha surveys and, (2) scintillation survey instruments, which are extremely sensitive, but radiation type-selective, depending upon the scintillating phosphor or crystal used.

5.3 CALIBRATION

Instruments are designed by manufacturers to read directly in radiation intensity units, generally mr/hr or r/hr; however, there is considerable error in a direct reading, since the characteristics of individual components causes variations in instrument response. Each instrument must be calibrated for accurate interpretation. Instrument response (intended by the manufacturer) is related to one type of radiation, usually of a definite energy range. If radiation of a different energy or type is measured, the results will be incorrect. Thus the instrument must be recalibrated with radiation of the same type and energy that is to be measured.

Gamma ray calibration instruments can be checked by placing them in a known field of radiation. Radium and Co_{60} are the most frequently-used sources for gamma calibration. A plot of scale readings versus true radiation intensity is made, by comparing scale readings at known distances from the source against the true intensities at these distances, employing the formula given below.

$$I = \frac{milligrams\,of\,Ra}{D^2}, or\,I = \frac{1.59\,x\,millicuries\,of\,Co^{60}}{D^2}$$

where: I = Intensity, mr/hr
D = Distance from source to detector, yards

Five to ten equally-spaced scale readings shall be taken. A graph of these values versus the calculated intensities at the corresponding points is plotted on linear graph paper. A typical calibration curve plots meter readings on the ordinate and corresponding "true" intensities on the abscissa.

When calibrating an instrument, the reference point of the instrument is generally considered as the center of the sensitive volume. It should be pointed out that the ionization chamber-type survey instrument, when properly calibrated, will give a good measurement of x-ray or gamma radiation intensity. However, for alpha and beta radiation, only qualitative measurements can be made.

In calibrating Geiger-Mueller instruments, a less intense radiation source shall be used, since the sensitivity is much greater than that of the ionization chamber-type instrument.

6.0 REFERENCES

None.

7.0 ATTACHMENTS

None.

SOP I 10 USE, CALIBRATION, AND MAINTENANCE OF THE MODEL 490, THYAC III

1.0 Purpose

To establish a policy for the use, maintenance, and calibration of the Model 490, Thyac III.

2.0 Applicability

2.1 This procedure is applicable to all Model 490, Thyac III for radiation monitoring by HNUS.

2.2 The routine field use of the Model 490, Thyac III for radiation monitoring provides non-qualitative, semi-quantitative data for directing field operations. The measurements obtained are intended to provide in situ real-time relative-concentration readings to allow the project manager to properly adjust work activities for health and safety concerns. The data generated and reported as a result of following these procedures are not intended to prove evidentiary qualitative or quantitative measurements. If the Model 490, Thyac III is to be used to provide such data, a case-specific quality assurance work plan addressing the measurement techniques and procedures to be used should be prepared.

3.0 Definitions

3.1 The Model 490, Thyac III is a sensitive portable pulse count rate meter designed to detect all types of radiation within these limits:

- alpha - greater than 4 mev
- beta - greater than 70 kev
- gamma - greater than 6 kev

4.0 Discussion

The Model 490, Thyac III, although a simple instrument to use, can be incorrectly operated if the user is not familiar with the instrument's operation. All users should read this SOP prior to using this instrument in the field. Appropriate training will be conducted for instrument users.

5.0 Responsibilities

5.1 It is the responsibility of the equipment manager to ensure that the instrument is calibrated and operating when it is issued for field use. It is also his or her responsibility to see that the necessary maintenance has been performed on the instrument and that all the required documentation regarding this equipment is recorded when it is issued for field use.

5.2 It is the responsibility of the equipment user to ensure that the equipment is operational and used according to this SOP. It is also the user's responsibility to clean the instrument after its use and report any malfunctions to the equipment manager. If field work extends beyond one week, it is the user's responsibility to see that the instrument is recalibrated.

6.0 Procedure

6.1 Start-Up Procedures

6.1.1 Connect the detector probe by inserting the connector on the probe cable into the coaxial receptacle to the right of the handle post. Press down, turn clockwise for about 1/4 turn, and then release to lock the bayonet catches on their mating connector pins.

6.1.2 Turn the instrument on to the battery check position. Check to insure that the indicator reads within the "bat check" zone.

6.1.3 For the probe this office uses, set the switch on the X100 scale (probe - Model 489-110 pancake probe).

6.1.4 Set the response on the medium position. The slower the response, the more accurate the reading; however, for this probe, the manufacturer recommends the medium response.

6.1.5 No adjustments or calibrations are necessary because these have been taken care of by the equipment manager or outside agency.

6.1.6 Detach probe from the handle/holder and begin survey. A small low-level beta source is attached to the side of the Victoreen to test the needle deflection.

6.2 Shut-Down Procedures

6.2.1 Turn switch to "off" position.

6.2.2 Replace probe on handle/holder.

6.3 Maintenance and calibration schedule:

Function	Frequency
routine calibration using radiation source	prior to each use
factory checkout and calibration	annual
replace batteries	as needed
check batteries	prior to each use

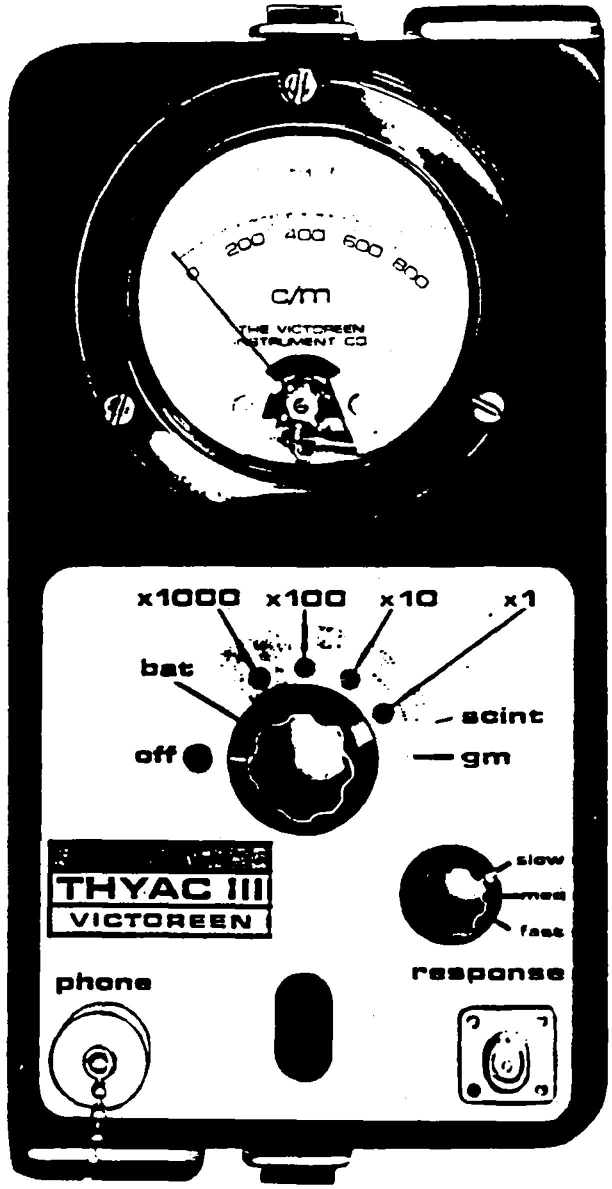
6.4 The equipment manager or his designee will keep a log of the necessary calibration information for this instrument (see figure 2 on page 5 for copies of the equipment log sheets).

6.5 References

6.5.1 Victoreen, Incorporated. Instruction Manual for Model 490, Thyac III. 1976.

6.6 Records

Training records will be maintained by the training coordinator. Maintenance and calibration records will be maintained by the equipment manager.



Model 490, Thyac III
(View of Operating Controls)

Figure 1

MODEL 490, THYAC III

MANUFACTURER CALIBRATION ______________ MODEL ______________

EXPIRATION DATE ______________ EPA ID No ______________

MONTH ______________ NUS ID No ______________

ACTIVITIES PERFORMED IN OFFICE
IF NOT CHECKED

	☑ SENT TO MANUFACTURER
	☑ RETURNED FROM MANUFACTURER

FIELD USE

DATE	NAME	BATTERY CHECK	RAD SOURCE CHECK	UNIT USED WITHIN PAST 12 MONTHS YES	NO	COMMENTS

MAINTENANCE

DATE	NAME	ACTIVITY

Figure 2

SOP I 2 USE, CALIBRATION, AND MAINTENANCE OF THE RADIATION ALERT - MINI AND RADIATION ALERT - MONITOR 4

1.0 Purpose

To establish a policy for the use, maintenance, and calibration of the Radiation Alert - Mini and Radiation Alert - Monitor 4

2.0 Applicability

This procedure is applicable to the radiation alert - mini and radiation alert - monitor 4 when in use for directing site operations and conducting health and safety monitoring by HNUS, . The use of these instruments for purposes other than worker health and safety is not addressed by this SOP. If evidentiary radiation measurements are to be obtained, a case-specific quality assurance work plan, identifying the instruments, their use, and operating procedures, should be prepared.

3.0 Definitions

The radiation alert - mini and radiation alert - monitor 4 are miniaturized Geiger counters designated for personal monitoring as well as general area radiation monitoring.

3.1 Nomenclature

R	=	Roentgen
mR	=	milliRoentgen
rad	=	radiation absorbed dose
rems	=	radiation dose equivalent in man

3.2 Definitions

R = unit measurement of the ionization produced in the air by gamma or x-radiation. It is the amount of gamma or x-radiation that will produce one electrostatic unit of charge in one cc of dry air.

rad = measure of the dose of any ionizing radiation to body tissues in terms of the energy absorbed per unit of mass of the tissue. Measurement of the quantity of radiation required for 100 ergs of energy to be absorbed by 1 gram of body tissue. A dose of .83 to .93 rads of gamma = 1 Roentgen (depending on the energy level of the radiation).

rem = measures the dose received in terms of its estimated biological effect on man relative to a dose of one Roentgen of X-rays. Calculated by multiplying the rad value by a quality factor (QF) that has been determined for the various forms of radiation (rems = rads x QF).

4.0 Discussion

The radiation alerts, although relatively simple instruments to use, can be incorrectly operated if the user is not familar with the instrument's operation. All users should read this SOP prior to using either of these instruments in the field. Appropriate training will be conducted for instrument users.

5.0 Responsibilities

5.1 It is the responsibility of the equipment manager to ensure that the instrument is calibrated and operating when it is issued for field use. It is also his or her responsibility to see that the necessary maintenance has been performed on the instrument and that all the required documentation regarding this equipment is recorded when it is issued for field use.

5.2 It is the responsibility of the equipment user to ensure that the equipment is operated properly and according to this SOP. It is also the user's responsilibity to clean the instrument after its use and report any malfunctions to the equipment manager.

6.0 Procedure

6.1 Start Up for Radiation Alert - Mini

6.1.1 Select range by moving range switch to X1 (0.1 to 0.3) position (see figure 1).

6.1.2 Turn unit to audio position.

6.1.3 Check battery. As the battery weakens, the count light dims and eventually fails to light with each random count heard. (Alarm lights and beeper may continue to operate somewhat beyond this point).

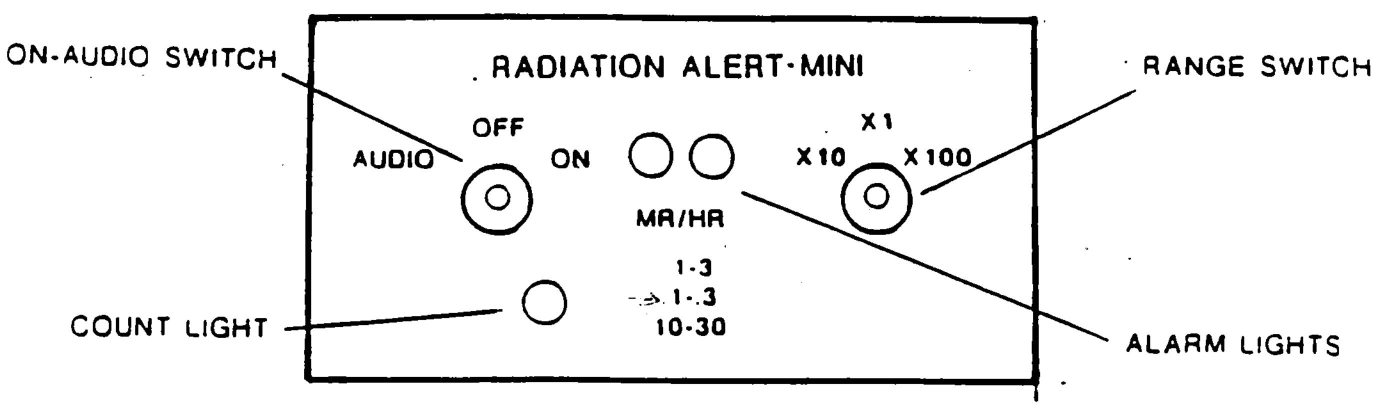
6.1.4 If radiation source is available (i.e., the Victorean radiation meter), test instrument response.

6.1.5 Select desired range for field use [preferably X1 (0.1 to 0.3 mR/hr)].

6.2 Shut Down for Radiation Alert - Mini.

6.2.1 Turn On-Audio switch to OFF position.

RADIATION ALERT - MINI - Figure 1



6.3 Proper Interpretation of Readings from the Radiation Alert - Mini.

In audio position, each incoming geiger count will be heard as a beep.

Ranges:

x1 range
- left alarm indicates at least .1 mR/hr
- right alarm light indicates .3 mR/hr
- a two-second alarm tone sounds every 45 seconds above .1 mR/hr

x10 range
- left alarm light indicates 1 mR/hr
- right alarm light indicates 3 mR/hr
- alarm tone sounds above 1 mR/hr

x100 range
- left alarm light indicates 10 mR/hr
- right alarm light indicates 30 mR/hr
- alarm tone sounds above 10 mR/hr

If both of the alarm lights are lit in one of the lower ranges, change to the next higher range.

6.4 Start Up for the Radiation Alert - Monitor 4

6.4.1 Set range switch to the battery check position (batt) (see figure 2).

6.4.2 Turn off-on-audio switch to audio position.

6.4.3 Check the battery; the meter reading should be in the battery area.

6.4.4 If a radiation source is available (i.e., the Victorean radiation meter), test the instrument's response with the range switch in the X1 position.

6.4.5 Select the desired range for field use. This should be the X1 range, which gives a reading in the 0.0 to 0.5 mR/hr range.

6.5 Proper Interpretation of Readings from the Radiation Alert - Monitor 4.

6.5.1 In the audio position, each incoming Geiger count will be heard as a beep.

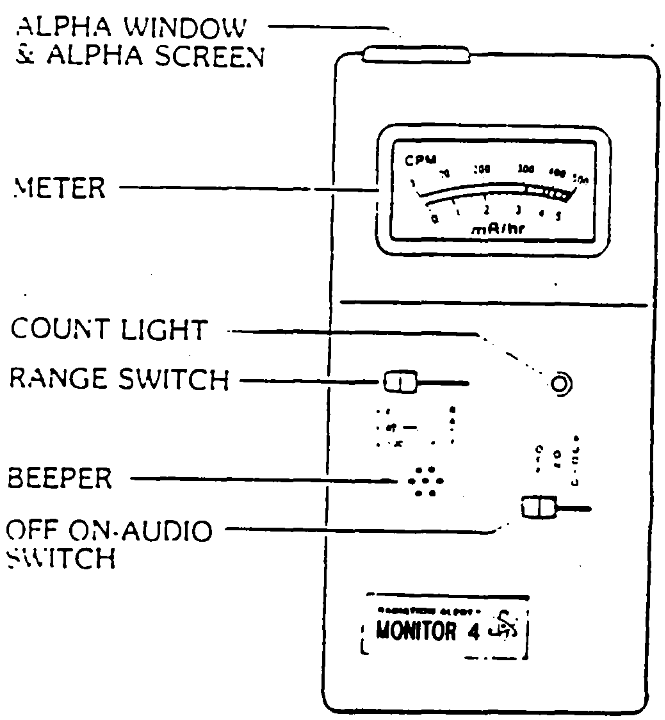
6.5.2 Ranges

X1 meter reading is 0.0 to 0.5 mR/hr

X10 meter reading is 0.0 to 5.0 mR/hr

X100 meter reading is 0.0 to 50.0 mR/hr

RADIATION ALERT - MONITOR 4 - Figure 2



6.5.3 If the needle goes off the scale to the right, move the range switch to the next higher setting.

6.6 Shut Down of the radiation alert - monitor 4.

6.6.1 Turn off-on-audio switch to the OFF position.

6.7 Maintenance and Calibration Schedule for the Radiation Alert - Mini and Radiation Alert - Monitor 4.

Function	Frequency
Response Check	Prior to each use
Battery Check	Prior to each use
Manufacturer Calibration	Annually

6.7.1 The equipment manager or his designee will keep a log of the necessary calibration information for this instrument (see figure 3 on page 7 for a copy of the equipment log sheet).

7.0 <u>Records</u>

Training records will be maintained by the HNUS training coordinator. Maintenance and calibration records will be generated and maintained by the HNUS equipment manager.

RADIATION ALERT-MINI AND MONITOR 4

LEGEND

ACTIVITIES PERFORMED IN OFF[illegible]
IF NOT CHECKED

☑ SENT TO MANUFACTURE[illegible]

☑ RETURNED FROM MANUFACTURER

MANUFACTURER CALIBRATION ____________ MODEL ____________

EXPIRATION DATE ____________ EPA ID No ____________

MONTH ____________ NUS ID No ____________

FIELD USE

DATE	INIT	BATTERY CHECK	RAD SOURCE CHECK	UNIT USED WITHIN PAST 12 MONTHS YES	NO	COMMENTS

MAINTENANCE

DATE	NAME	ACTIVITY

Figure 3