CENTRAL RESEARCH LIBRARY
DOCUMENT COLLECTION

OAK RIDGE NATIONAL LABORATORY
operated by
UNION CARBIDE CORPORATION
NUCLEAR DIVISION
for the
U.S. ATOMIC ENERGY COMMISSION

LOCKHEED MARTIN ENERGY RESEARCH LIBRARIES
3 4456 0513279 0

ORNL-TM-1766
COPY NO. - 27
DATE - April 3, 1967

DESCRIPTION OF FACILITY RADIATION AND CONTAMINATION ALARM SYSTEMS INSTALLED IN THE TRANSURANIUM PROCESSING PLANT, BUILDING 7920

J. H. Holladay D. J. Knowles

1. ABSTRACT

Facility radiation and contamination alarm systems were installed in the Transuranium Processing Plant, Building 7920, to continuously and automatically monitor the air contamination level and gamma radiation level in the entire facility.

The monitoring instruments in the network are used to provide health physics monitoring information, local alarms when abnormal conditions occur, and remote alarms on a central monitoring panel located in the operating area. Fourteen alpha constant air monitors and six beta-gamma constant air monitors continuously sample the air in the building for radioactive particulate matter. Ten of the fourteen alpha constant air monitors and four of the six beta-gamma constant air monitors are used in the facility contamination system. Two monitrons, not part of the system, continuously monitor for gamma radioactivity. All monitors annunciate at the central monitoring panel.

Operating personnel are first given warning when air-borne contamination detected by an air monitor reaches a preset caution level, and a second warning is given when a "high level" is detected. The monitrons give warning when the radiation level reaches 7.5 mr/hr.

The building evacuation system operates automatically when two or more selected alpha air monitors or two or more selected beta-gamma air monitors detect a high level of air contamination.

OAK RIDGE NATIONAL LABORATORY
CENTRAL RESEARCH LIBRARY
DOCUMENT COLLECTION
LIBRARY LOAN COPY

DO NOT TRANSFER TO ANOTHER PERSON
If you wish someone else to see this document, send in name with document and the library will arrange a loan.
UCN-7969
(3 2-67)

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report.

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

CONTENTS

		Page
1	ABSTRACT	1
2	INTRODUCTION	4
3	DESCRIPTION	4
3 1	System	4
3 2	Components	7
3 2 1	Panel Board	7
3 2 2	Air Monitors	7
3 2 3	Remote Monitron	11
3 2 4	Indicator Module	12
3 2 5	Coincidence Module	12
3 2 6	Buzzer Module	14
3 2 7	Air Whistle and Beacon Lights	14
3 2 8	Control Switches	16
3 2 9	Power Supplies	16
3 3	Drawings	16
4	CHECKOUT AND OPERATING PROCEDURES	17

LOCKHEED MARTIN ENERGY RESEARCH LIBRARIES

3 4456 0513279 0

2 INTRODUCTION

The Transuranium Processing Plant, Building 7920, is one of 17 facilities at Oak Ridge National Laboratory being equipped with networks of radiation and air monitoring instruments connected to a central control room within the building and to the Laboratory Emergency Control Center [1] A facility radiation and contamination alarm system was installed in Building 7920 to continuously and automatically determine the radiation condition of the entire facility and to report this information to a central control panel within the building Should the air activity in a large portion of the building exceed preset values, audible alarms in the building will be actuated, warning lights outside the building will flash, and an alarm signal will be transmitted to the Emergency Control Center, Building 2500 Other radiation instruments monitor for alpha or beta-gamma contamination and gamma radiation, causing audible and visible alarms in the building without actuating the horns or outside warning lights or transmitting an alarm signal to the Emergency Control Center

3 DESCRIPTION

3 1 System

Air is monitored for alpha emitting particles by fourteen alpha constant air monitors located throughout the building and for beta-gamma emitting particles by six constant air monitors located throughout the building The gamma radiation level is monitored by two monitrons (Table 1)

Since none of the health physics functions originally designed into these monitors were altered, each instrument is an independent unit that retains all of its local alarm features The alpha constant air monitor sounds a buzzer to indicate a caution alarm at 500 counts/min and a bell (high-level alarm) at 800 counts/min The beta-gamma constant air monitor sounds a buzzer (caution alarm) at 1000 counts/min and a bell (high-level alarm) at 4000 counts/min The gamma monitron sounds a bell (caution alarm) at 7 5 mr/hr In addition, each instrument is connected to an individual indicator lamp assembly on the central alarm panel in the operating area By means of three colored lamps, which normally glow with a dim light, an indicator module indicates the condition of the instrument to which it is connected, that is, a white lamp burns at full intensity if the instrument becomes inoperative, an amber lamp burns at full intensity if the "caution alarm level" is reached, and a red lamp burns at full intensity if the "high alarm level" is reached (Table 2) If the intensity of any lamp (except the amber lamps for the alpha constant air monitors) should change from dim to bright, a buzzer will sound Because of frequent temperature

---

[1] D J Knowles et al , Instrumentation and Controls Div Ann Progr Rept Sept 1, 1963, ORNL-3578, pp 37-40

Table 1 Radiation and Air Contamination Monitors Installed in Building 7920

Location	Monitor Number
Facility Contamination Alarm Monitors	
Room 120[a]	CAM 1
Room 118[a]	CAM 2
Room 213[a]	CAM 3
Room 216[b]	CAM 4
Top of cells[b]	CAM 5
Room 116[a]	CAM 6
Room 116, east[d]	CAAM 7
Top of cell[d]	CAAM 8
Room 216[d]	CAAM 9
Room 213, east[d]	CAAM 10
Room 120[c]	CAAM 11
Room 118[c]	CAAM 12
Room 108[c]	CAAM 13
Room 109[c]	CAAM 14
Room 111[c]	CAAM 15
Room 116, west[c]	CAAM 16
Room 213, west[c]	CAAM 17
Room 208[c]	CAAM 18
Room 209[c]	CAAM 19
Room 211[c]	CAAM 20
Facility Radiation Monitors	
Room 107[e]	M 21
Room 118[e]	M 22

[a]These ORNL model Q 2240 beta gamma constant air monitors are connected to the facility radiation and contamination alarm system If two of these four monitors detect a high level of contamination a coincidence module will cause the building evacuation alarms to operate

[b]These ORNL model Q 2240 beta gamma constant air monitors are not connected to the facility system

[c]These ORNL model Q 2340 alpha constant air monitors are connected to the facility system A high level of contamination detected in coincidence by two of the six monitors on the first floor or two of four on the second floor will cause the building evacuation alarms to operate

[d]These ORNL model Q 2340 alpha constant air monitors are not connected to the facility system

[e]These ORNL model Q 1154B monitrons are not connected to the facility system Both monitrons are gamma sensitive, and in addition, the Q 1154B in room 118 is neutron sensitive

inversions at ORNL, during which the alpha air monitor responds to radon and thoron in the atmosphere and actuates the caution alarm, the caution alarm signal from the alpha constant air monitor is not connected to the buzzer module

The high-level alarm outputs of the alpha constant air monitors are connected to a coincidence module so that the building is evacuated if high-level signals are received from two out of six selected monitors on the first floor or two out of four selected monitors on the second floor (Table 1) The high-level alarm outputs of the beta-gamma constant air monitors are connected to a coincidence module so that the building is evacuated if high-level signals are received from two out of four selected monitors

Table 2 Central Control Panel Alarm Indications for Monitrons and Air Monitors

Instrument Alarm Condition	Lamp Intensities		
	Red	Amber	White
Normal operation	Dim	Dim	Dim
Caution level[a]	Dim	Bright	Dim
High level[b]	Bright	Bright	Dim
Instrument trouble or out of service	Dim	Dim	Bright
Instrument removed[c]	Bright	Bright	Bright

[a]Caution level for a beta-gamma air monitor is 1000 counts/min, for the alpha air monitor is 500 counts/min, and for the monitron is 7 5 mr/hr

[b]High level for the beta-gamma air monitor is 4000 counts/min and for the alpha air monitor is 800 counts/min

[c]Lamp intensities exist until a maintenance connection is made giving "out of service" indication

3 2 Components

3 2 1 Panel Board

The central panel board for the entire system (Fig 1) on panels 6 and 7 in the operating area, consists of four 12-module racks, a modular alarm control panel, and a dc power supply The racks contain one indicating module for each instrument, a coincidence module for each group of instruments in the contamination alarm system, a buzzer module, and a manual evacuation module The racks and modules are anodized aluminum with anodized Metalphoto front panels A Metalphoto text strip at the top of each rack identifies each instrument

The modular alarm control panel below the module racks has two lamps to indicate abnormal horn pressure, a lamp to indicate when dc power is on, an Evacuation Alarm key switch, and a 'Buzzer Power Reset push-button This panel also contains manual switches, timers, relays, and monitoring equipment that are part of the system but are not installed in modules

The two lower module racks also contain indicator modules related to process radiation alarms and are so labeled to differentiate them from the indicators that are part of the radiation and contamination alarm system The portion of the panel containing process radiation alarms is described in a separate report [2]

3 2 2 Air Monitors

The beta-gamma air monitors are designated ORNL model Q-2240 (Fig 2), the alpha air monitors are model Q-2340 (Fig 3) Except for the detectors, both types of air monitors operate essentially the same Each has an aspirating system, a paper-tape filter, a radiation detector, a linear count-rate meter, a recorder, and visible and audible alarms Air is drawn through the filter by a Roots blower The flow rate through the filter is manually adjusted to 3 cfm The material collected on the filter paper is monitored by the model Q-2240 monitor for beta-gamma activity by a halogen-type Geiger-Mueller detector tube and by the model Q-2340 monitor for alpha activity by a scintillation detector The filter paper is advanced automatically every 24 hr it can be advanced manually at any time The detector counts the sample as it is being collected The count-rate meter is a linear duty-cycle type utilizing a single range and having a high-voltage supply as an integral part The normal range of the model Q-2240 beta-gamma monitor is 5000 counts/min, and of the model Q-2340 alpha monitor is 1000 counts/min Ranges of 0 to 250, 0 to 1000, and 0 to 10,000 counts/min at full scale can be obtained by relocating two jumper wires under the

---

[2] J H Holladay and D J Knowles, Description of Process Radiation Monitoring Instrumentation in the Transuranium Processing Plant, Building 7920, ORNL-TM-1774 (to be published)

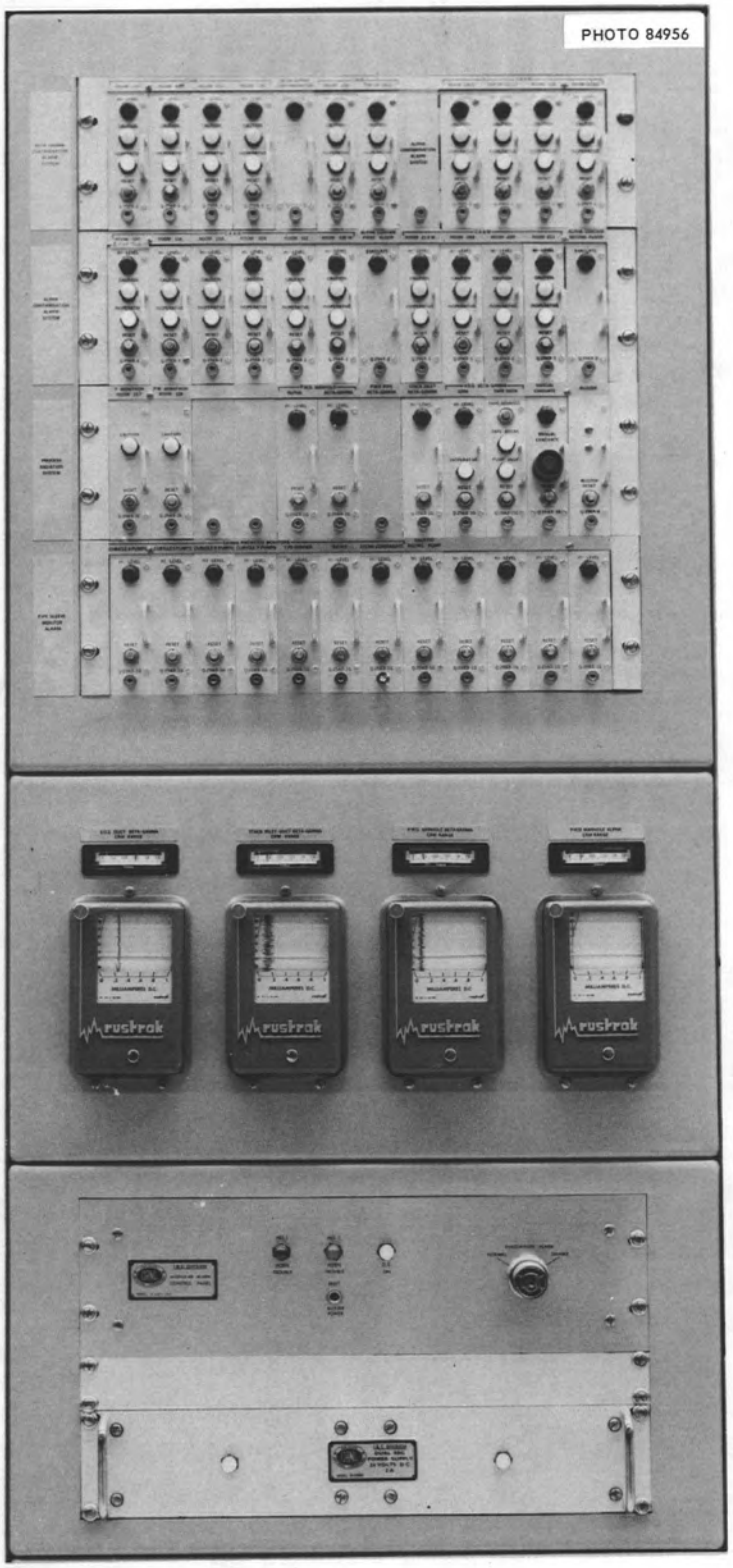

Fig. 1. Central Panel Board for the Facility Radiation and Contamination Alarm System in Building 7920.

Fig. 2. Beta-Gamma Constant Air Monitor, ORNL Model Q-2240.

Fig. 3. Alpha Constant Air Monitor, ORNL Model Q-2340.

chassis The input-voltage sensitivity of the rate meter is 200 mv The over-all accuracy of the rate meter, including the effect of long-term drift, is within 5% The corona-regulated high-voltage supply is nominally 900 v with ±150-v adjustment The maximum load current is 20 μa

The rate meter has adjustable high-level and caution alarms and puts out a 1-ma full-scale signal to drive an integrally mounted Rustrak recorder The caution-alarm set point is adjustable over the range of approximately 2 to 58%, and the high-level alarm set point is adjustable from the caution-alarm set point to full scale The caution alarm is an electronic circuit which employs a dual triode and plate relay with potentiometer adjustment The relay is energized below the trip point and is de-energized by current transfer from one triode to the other by a diode that couples the cathode circuits Hysteresis is approximately 4% of full scale The high-level trip is accomplished by the high contact on a contact-making meter The associated high-level relay is de-energized below the set point Upon reaching the set point, the meter contacts and relay are locked in these can be released only by depression of the reset pushbutton A low-level pointer on the panel meter has no contacts and is used only as a visible indicator This pointer should be set at the level corresponding to the caution-alarm set point

The air monitors have an alarm panel with four lights, a bell, and a buzzer When the caution-alarm set point is reached, an amber light comes on and the buzzer is energized There is no switch to silence the buzzer For the model Q-2240 beta-gamma air monitor, an operator is expected to advance the tape when the caution alarm sounds For the model Q-2340 alpha air monitor, the buzzer is de-energized after 15 sec of operation If the caution radiation alarm continues for 10 min, an automatic tape advance is begun Also, the tape can be advanced manually during the 10-min interval After the tape is advanced, the count rate will decrease and the alarm will be reset When the high-level trip point is reached, a red light comes on and the bell rings The bell can be silenced by a toggle switch, and when this is done, a red neon indicator comes on

When the filter tape breaks, an amber neon indicator is energized, and the caution circuit is energized through a flasher The neon bulb burns continuously and the caution light and the buzzer come on intermittently If a tape breaks, and at the same time the caution alarm sounds, the tape-break neon light, the caution light, and the buzzer will be on continuously A test pushbutton permits checking the alarm panel by simultaneously simulating tape-break and high-level alarm signals

In addition to these standard features, each air monitor at Building 7920 has an accessory chassis, Q-2311C-4, containing a meter-relay (Fig 4) to indicate when the instrument is not operating The chassis is mounted inside and at the rear of the air-monitor cabinet

The alarms in the control room operate as follows

1 The accessory meter-relay connected to the 0- to 1-ma output of the count-rate meter will cause the white 'inoperative" light on the central

Fig. 4. Constant Air Monitor, Inoperative Instrument Alarm, ORNL Model Q-2311C-4.

panel to burn brightly whenever the meter pointer drops to zero, indicating that no signal is being received from the instrument. The white light resets itself when the trouble is cleared.

2. At the caution level of 1000 counts/min on the model Q-2240 beta-gamma air monitor or 500 counts/min on the model Q-2340 alpha air monitor, an electronic alarm circuit will cause the yellow lamp in the control room to burn brightly, and the buzzer will sound at the panel. The caution-level alarm resets at the instrument itself when the filter is changed, but the yellow lamp must be reset manually.

3. At the high level of 4000 counts/min on the model Q-2240 monitor or 800 counts/min on the model Q-2340 monitor, the panel-meter relay on the instrument will cause the red lamp in the control room to burn brightly and the buzzer to sound. The alarm is reset by advancing the filter and pressing the manual reset button on the monitor. The control room indicator must also be reset manually.

A time delay is incorporated in the air monitor to prevent caution-level and high-level alarms from operating for 60 sec after the instrument is turned on. During this period the "inoperative" alarm lamp will be lighted at the central alarm panel; it will clear after 60 sec.

3.2.3 Remote Monitron

The Remote Monitron, ORNL model Q-1154B (Fig. 5), is an ac-powered, null-type radiation detection instrument for monitoring gamma radiation. The monitron consists of two basic units: (1) a control chassis, which contains the power supply, the main amplifier, a radiation-level indicating meter, and the controls; and (2) a preamplifier and ion-chamber detector assembly. The detector assembly can be located remotely up to 100 ft from the control chassis. A 0- to 10-mv recorder or a 0- to 1-ma recorder can be connected to the monitron.

The range of the meter is 0 to 25 mr/hr, and the calibrated accuracy of the meter is within 3% for gamma radiation The zero setting is checked by means of a pushbutton

An alarm circuit in the main chassis operates a bell and a red light on the instrument when the alarm set point is exceeded This internal alarm will also cause the yellow lamp on the central panel to burn brightly The alarm is automatically reset at the instrument when the radiation level decreases below 7 5 mr/hr A time delay relay is incorporated into the instrument to prevent the caution alarm from being actuated during the warm-up period When a power failure occurs, this relay will cause the instrument 'inoperative' alarm to be actuated at the central panel

3 2 4 Indicator Module

The Indicator Module, ORNL model Q-2563-1 (Fig 6), consists of three independent transistorized channels, each operating an indicator lamp and providing a dc-voltage-shift signal for alarm or control purposes and a voltage-pulse signal for operating the buzzer module The three lamps and a pushbutton are on the front panel Each module is 35 8 mm wide, 120 mm high, and 125 8 mm deep All connections are made on printed strip connections at the rear edge of the plug-in module

When the instrument connected to an indicator module is operating normally, all lamps on that module are dim (Table 2) When the module receives a signal that the instrument is operating abnormally or that the caution-level or the high-level alarm values have been exceeded, the lamps burn at full intensity white for an inoperative instrument, yellow for caution level, and red for high level A signal from the module causes a buzzer to sound The white lamp will remain bright until the condition causing the alarm is corrected, at which time the lamp will become dim The red and yellow lights will remain bright even after the condition causing the alarm is corrected until they are manually reset by means of the pushbutton on the indicator module If the pushbutton is depressed to reset the indicator module when the condition causing an alarm has not been corrected, the lamps will momentarily dim while the button is depressed and then will become bright and the buzzer will sound again when the reset button is released

A variation of the indicator module is used for the monitron indicator For this application, operation is the same except that only the yellow and white lamps are used

3 2 5 Coincidence Module

The Coincidence Module, ORNL model Q-2563-2 (Fig 7), consists of a transistorized circuit that accepts a dc-shift alarm signal from as many as six indicator module channels The circuit can be adjusted by internal jumper connections to operate a relay for alarm or control purposes

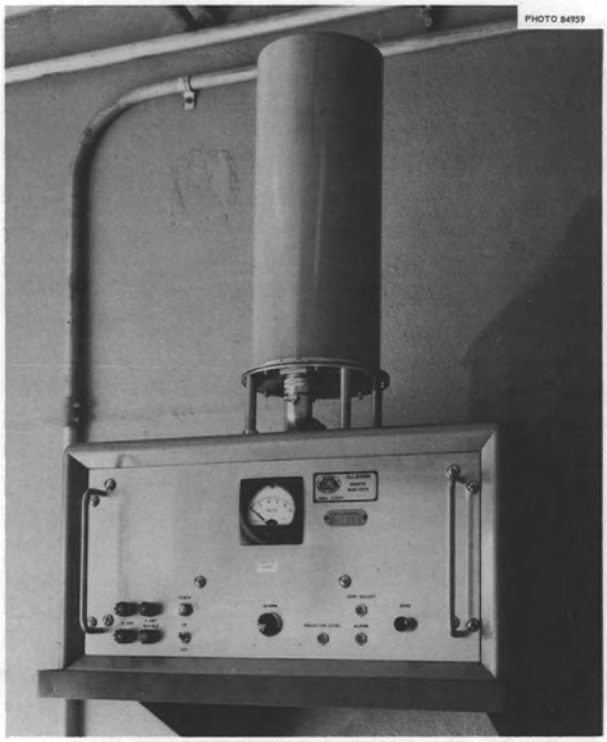

Fig. 5. Remote Monitron, ORNL Model Q-1154B.

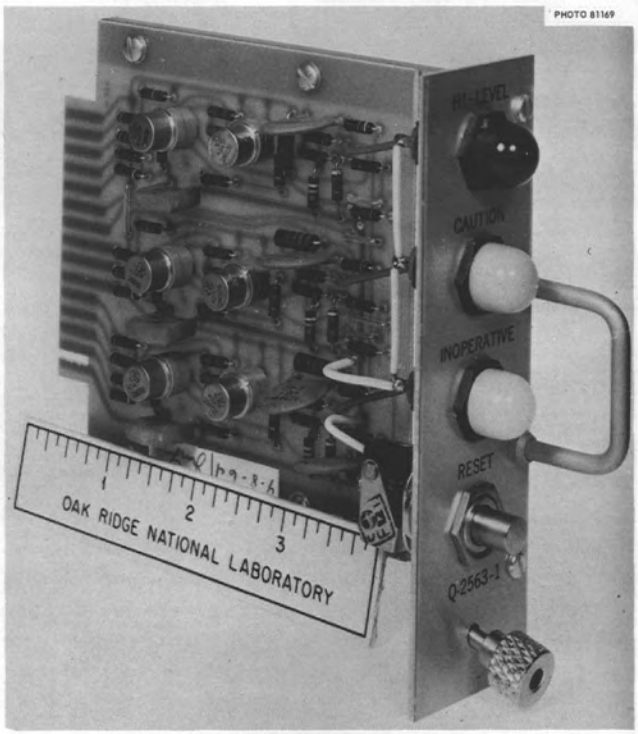

Fig. 6. Indicator Module, ORNL Model Q-2563-1.

on any combination of one to six input signals Each module is 35 8 mm wide, 120 mm high, and 125 8 mm deep All connections are made on printed strip connections at the rear edge of the plug-in module

When two or more preselected air-monitor indicator modules receive high-level alarm signals, the associated coincidence module will actuate the building warning and evacuation equipment and will transmit a signal to the Emergency Control Center A red lamp on the affected coincidence module will indicate which set of instruments has detected an abnormal condition

When the indicator modules showing an abnormal condition are reset manually, the coincidence module will also be reset

3 2 6 Buzzer Module

The Buzzer Module, ORNL model Q-2563-4 (Fig 8), consists of a transistorized trigger circuit that operates a silicon controlled rectifier to actuate a buzzer when a voltage-shift pulse is received from an indicator module or the horn-trouble panel The buzzer module is the same size as all other modules and is interchangeable with other buzzer modules

The buzzer module gives audible notice that an indicator module has received one of three input signals The buzzer module, which serves all indicator modules and horn control panel, is reset when a pushbutton at the front of the module is depressed

After being reset, the buzzer will sound again whenever an input signal is received by one of the indicator modules For example, a change from a normal condition to a "caution alarm level' will start the buzzer After it is reset, a change to "high-alarm level' or to "inoperative instrument will start the buzzer again

3 2 7 Air Whistle and Beacon Lights

Air Whistle -- When a coincidence module has been energized by two or more air monitors, two air whistles are actuated by nitrogen gas bottles (one for each whistle) to notify the building occupants to leave the building The air whistle, a 'Clarion Whistle" by Westinghouse Air Brake Company, will sound about 4 min on one filled gas bottle A control box for each whistle contains a pressure valve, pressure switches which monitor supply and regulated pressures, and a solenoid valve that is opened by an electrical signal from the coincidence module A momentary signal will open the solenoid valve, and the valve will remain open until it is closed manually by pressing the mushroom head of the valve stem inward Two nitrogen tanks are connected to each horn box one tank should have its valve open the other tank should have its valve closed and be used as an installed spare should the first tank be exhausted

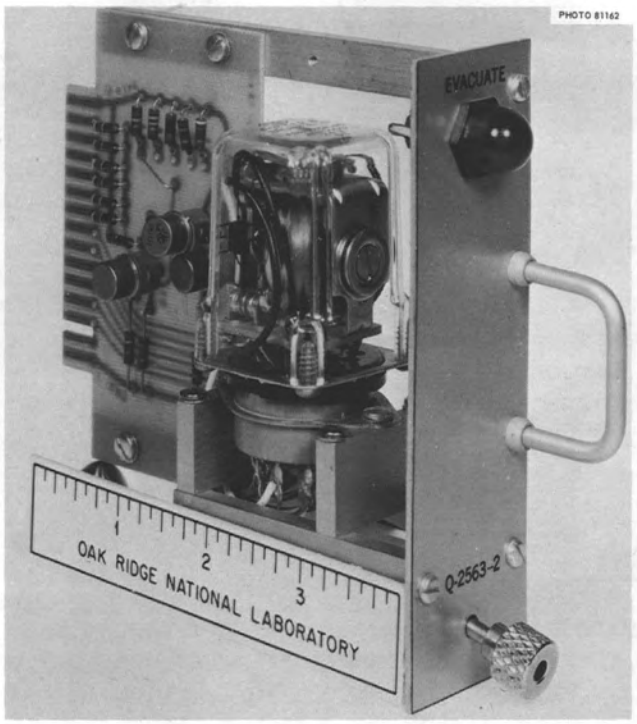

Fig. 7. Coincidence Module, ORNL Model Q-2563-2.

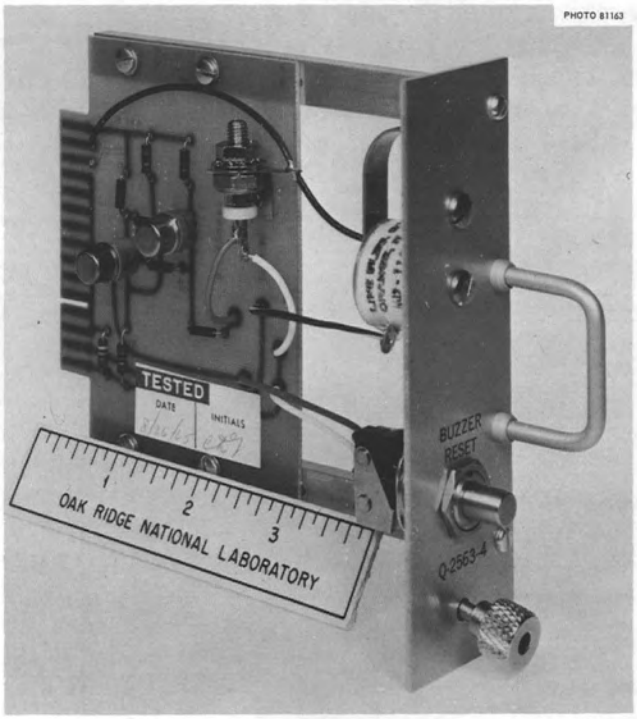

Fig. 8. Buzzer Module, ORNL Model Q-2563-4.

The normal gas pressures for proper operation of the whistles are not less than 1000 psig tank pressure and 80 to 120 psig line pressure to the solenoid valve Abnormal pressures are indicated by red lamps (labeled 'horn trouble") on the central control panel board, one lamp for each whistle, and by the buzzer on the central panel A dim lamp indicates normal pressures, and a bright lamp indicates abnormal pressures Inspection of the gages will indicate whether the tank pressure or the line pressure is abnormal

Beacon Lights -- Four Federal Sign and Signal Corp , Model 27S, 110-v beacons with magenta colored lens are installed on the exterior of the building to warn personnel outside that the building has been evacuated These beacons are actuated by a signal from a coincidence module, and they are automatically stopped when the coincidence module has returned to a normal condition

3 2 8 Control Switches

The key-operated switch, labeled "evacuation alarm,' on the central panel board may be used to disconnect the air whistles and beacons during maintenance or abnormal operation periods Since the Emergency Control Center receives an alarm signal when the switch is moved to the "disable position, the Control Center should be notified before the switch is set at this position

A large, red pushbutton labeled 'manual evacuate" is on the right side of the third rack from the top of the central panel board This module, ORNL model Q-2563-16 (Fig 9), actuates the air whistles and beacons and transmits an alarm signal to the Emergency Control Center (if the Center has not already received an alarm), regardless of the position of the normal-disable switch If the manual evaucation pushbutton has been depressed, it must be reset by pressing the "reset" pushbutton on the module to restore the system to normal

3 2 9 Power Supplies

Main power for the system is 120 v, 60 Hz, and is supplied from the emergency power bus in the building to the 24-v dc power supplies and the monitoring instruments

Two saturating-core-type supplies are connected in parallel to supply 24 v dc to the system A green "power on" lamp on the control chassis will be brightly lighted to indicate that the power supplies are operating

3 3 Drawings

The Facility Radiation and Contamination Alarm System for Building 7920 is described in the following ORNL Instrumentation and Controls Division drawings

1.	I-10001-Q301 through -Q341,	Instrument Location and Wiring Diagrams.
2.	Q-2563-1, -2, and -4,	Plug-In Modules.
3.	Q-2563-25A,	Horn Control Box.
4.	Q-2563-18,	Central Alarm Panel.
5.	Q-2340-1,	Alpha Constant Air Monitor.
6.	Q-2240-1,	Beta-Gamma Constant Air Monitor.
7.	Q-2311C-4,	Constant Air Monitor Instrument Inoperative Panel.
8.	Q-1154B-1 through -14,	Monitron.

4. CHECKOUT AND OPERATING PROCEDURES

Although the central panel board serves as an aid in operating the facilities in the building, its primary purpose is to provide automatic radiation and contamination alarms required by ORNL safety and radiation control regulations. An "inoperative instrument" alarm and radiation

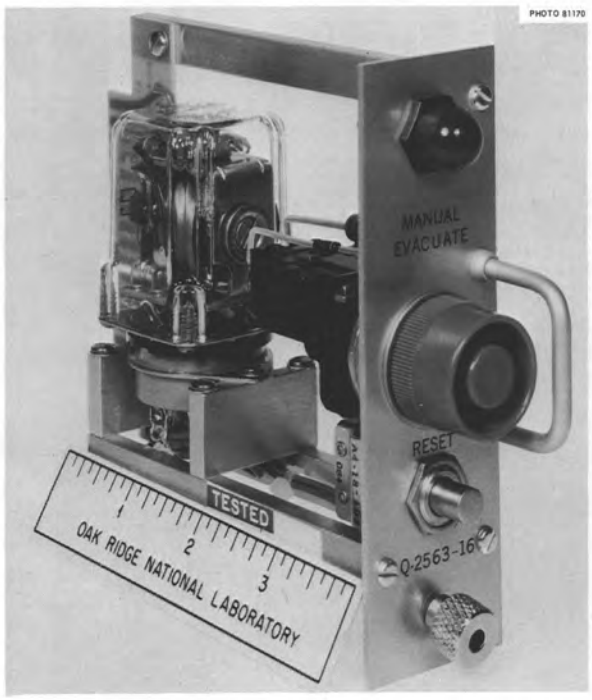

Fig. 9. Manual-Evacuate Module, ORNL Model Q-2563-16.

alarms from the 22 fixed-installation health physics monitoring instruments in the facility are indicated on the central alarm panel High-level alarm signals from 14 instruments actuate the evacuation alarm when the alarm limit is reached on two or more selected air monitors

To utilize the indications efficiently, the instruments should be reset, the alarm signals should be cleared, and burned out lamps, horn pressure alarms, and other abnormalities should be corrected promptly An alarm signal can be cleared by performing the following steps

1 Press the reset button on the buzzer module This permits the audible alarm to be sounded again if another alarm is actuated before the first alarm can be cleared

2 Check conditions at the instrument, and reset the instrument if required (air monitor filter change or air-monitor high-level alarm) The air monitor caution' and "instrument inoperative' alarms and all monitron alarms are self-resetting when the radiation level is reduced below the alarm values or the trouble causing the alarm is corrected The air-monitor high-level alarm must be manually reset if the alarm has operated

3 Reset the module on the central alarm panel by pressing the button at the bottom of the module

Whenever the local evacuation alarm is sounded in Building 7920, an alarm signal is also indicated and sounded in the Emergency Control Center, Building 2500

A key-operated 'normal-disable" switch located on the central alarm panel can be used to prevent the system from causing unnecessary evacuation of the building or from sending false signals to the Emergency Control Center during maintenance or abnormal operating conditions Since an alarm indication will show at the Emergency Control Center when the key-operated switch is in the "disable" position, the Emergency Control Center must be notified (phone 3-6646) before the switch is operated

A procedure for checking the instruments and their indicators for proper operation and a sheet for recording the test results are given on the following pages

FACILITY RADIATION AND CONTAMINATION SYSTEM
CHECK OUT PROCEDURE

DATE _____

BUILDING 7920

TEST	PURPOSE AND PROCEDURE	CORRECT OPERATION
1 Pr l minary Di bl ti p rti f y t	Pr p t t t y t l C t t Em g y Co trol C t (ph 3 6646) d tify di p t h f ıng larm	
	2 Obt l fro th p rato d ha t t un d p bl dd y t	
	3 Turn k y it h t Di bl d l val N_2 t k f h rn	Di t ti h rn d b light Gi va ti l rm ign l t Em g y Co trol Ce t
b Ch k p l lamp	Ex mi ll pa l lamp	All l mp di
2 Fa lity Bet Gamma Co t mi ti Sy t	Te t ll m ito ind idually (h k t h t f l ti)	
In p rati l rm	1 Unpl g i trum t	Bu und d h t l mp gl b ightly Bu b t b t l mp t b t
	2 Pl g i ın trum t	Aft l mın d l y hit l mp ill t
b Ca t l rm	1 In gamma unt rat ith t ti l rm l l 1000 unt /mi	Bu ou d d y ll l mp gl b ghtly Bu b t b t l p t b t
	2 Re until th unt rat i b l ti l l	Y ll l mp an b t
H gh Le l l rm	1 In unt rat th t h gh l rm l l 4000 unt / i	Bu und nd y ll and d l mp gl b ightly Bu b t b t th l mp b t
	2 Re ur re t i tru t	Y ll d d l mp b t
3 Fa il ty Alph Co t nati Sy t m	Te t ll it i di idually (h k t h t f l ti)	
In p rati l rm	1 Unpl g i tru t	Bu d d hit l mp glow b ightly Bu b t b t l mp nn t b t
	2 Pl g ın trume t	Aft l mı d l y hit l p ill t
b C t l rm	1 In lph t rat ith t 500 t /m	Bu ın trume t und f 15 Tap ill dva i 10 i Y ll l mp t t l p l gl b ightly No b t tral p l
	2 Re until th ount rat l th 500 ount /mi	Y llow l mp b re t
High Le l l rm	1 In unt rat ith t 800 unt /mın	Bu und and y ll d d l mp gl b ightly Bu b t b t l mp nn t b t
	2 Remo ur	Y llow d red lamp an b re t
4 G mma Radıati Syst	T t ll m itro i d d lly (h k t h t f l ti)	
In p rati larm	1 Unpl g i tru t	Bu d d hit l mp glow b ightly Bu b t b t l mp nn t b t
	2 Pl g i tru t	Aft l in d l y it l mp ll re t
b Ca t larm	1 In di ti l l ith t 7 5 mr/h	Bu d d y ll l p glow b ightly Bu b re t b t lamp t b t
	2 Re ur unt l radi ti l l i l th 7 5 mr/h	Y ll l mp b t
5 Return y t t rmal	Turn k y it h t N rmal	Permit b light d Em g y Co trol C t indi t to p rat l rm diti Em g y Co trol Ce t l rms ill t
6 Ev uati System	Ch k ll f t f cu ti y te f t p rati	A in d f tw high l l larm fro Fa ility Co ta in t Sy t h uld p rat th va uati h rn mag ta light t id b ildi g h ld fl h d Bldg 2500 h uld i l rm light Key it h l k t f h rn and light d ga tank p it h h ld perat tly

TEST	PURPOSE AND PROCEDURE	CORRECT OPERATION
Ch k f trol tp t f d l rm	1 Turn k y it h t Di bl ft ta ting Em g y Co trol C t	Ch k Em g y Co trol Ce t A ta i t l rm h ld b t d t Bldg 2500
	2 Ch k uati d l f t minati larm y t	A d f t h gh l l l rms from Fa ility Co tami t Sy t hould p rat th pprop t Eva uat m d l Red lamp pprop t mod l h ld b b ght
	In d ti t it t high l rm l l	Red d y ll lamp thi d l b b ght d b d Re t b Do t t light
	b In radi t t d mo it i am y te t h gh l rm l l	Red d y ll l mp b b ight d mod l d b und Red lamp va ua ti mod l b b ght Re t b
	Remo radi t	Al rm l mp d b may b t Ev uat l rm h ld t t mati lly h th l rm l d
	d Diff t pai f tru t h ld b d h t th t t mad	
b Ch k t l rm q ip t	1 Cl l ll h rn N_2 tank (f t p ly d i Part 1)	
	2 Pl g h rn tro bl t t b t h rn trol b	
	3 M k y it h fro Di bl t N rmal	Al rm l ght t Em g y Co t l Ce t l
	4 Set t i id t High Le l larms th Fa l ty Co t inat Syst	Bu hann l l rms d in d l rm t d t l p l Horn d h rt bl t l rm h ld d t t Em g y Co trol Ce t d fl h g light t d b ld g h ld t t Horn tro bl l ght t t l p l b m b ight Low li p d l t k p r light h t t b
	5 Red radiat l l t rmal d t larm d l	All mod l l Em g y Co t l Ce t l rms l d fl ing b t p
	6 Re t h rn l d l ma lly p t k l til l p l rms t t b l	H rn t bl l rms l
	7 Te t h gh pre ure l rm by ra ing p gul t tt g h rn b t mo th 120 p	Horn tro bl light h ld b High p l rm indi t d by t t b
	8 Cl t k l Set t id l rms Fa l ty Rad t Sy t	Bu ha l l rm d i id larm t d tral pa l H rn und h rt bla t larm h ld d t t Em g y Co trol Ce t and fl h g l ght t d b ild g h ld t rt Horn tro bl l ght t tral p l b b ght Lo p ur l rm light t t b l ght d
	9 Red diat l t rma and l rm mod l	All mo l l ar Em g y Co trol Ce l rms l and fl hing b t p
	10 Re t h rn l d l ma ually p t k l d dj t gul to t 100 p tp t p re	Ga yli d p ur ga g h uld h 1800 p i t k d f gul t d b tw 80 d 100 p h rn d N th h gh p l p ur l rm h ld how t t b H rn tro bl light b me d All l rms in ll l t h ld b l
	11 Cl l tank d p h ma ual uat b tt	Sa St p 4 pt b h l l rms d ly d ti (d) l ght pp t th t l p l d t th Em g y C trol C t
	12 Re t ma l uat mod l d p t St p 6	End f t t
Co l d t t	Ret rn ll t l d i tru t t rmal d t	

Ch k Li t

1 N l rm light tral p l f Em g y Co t l Ce t

2 H rn ga t k l p d gulat dj t d (N t th re t ta k f h h Only tank l p h rn h ld b p)

3 Key t h i N rmal po t

4 Notify Em g y Co trol C t d b ld i g p l f d f t t p d

FACILITY RADIATION AND CONTAMINATION SYSTEM CHECK SHEET

MONTHLY ☐
QUARTERLY ☐
ANNUAL ☐

BLDG: 7920
CHECKED BY: _____
DATE: _____

MONITOR	LOCATION	INOP	RADIATION					REMARKS
		AC OFF	METER	CAUTION	HIGH	EVAC		
β-γ CONTAMINATION								
CAM 1	Room 120							
CAM 2	Room 118							
CAM 3	Room 213							
CAM 6	Room 116 West							
Coincidence module checked using station_____with all other modules								
CAM 4	Room 216					X		
CAM 5	Top of Cells					X		
α CONTAMINATION 1st Floor								
CAAM 11	Room 120							
CAAM 12	Room 118							
CAAM 13	Room 108							
CAAM 14	Room 109							
CAAM 15	Room 111							
CAAM 16	Room 116 West							
Coincidence module checked using station_____with all other modules								
CAAM 7	Room 116 East					X		
α CONTAMINATION 2nd Floor								
CAAM 17	Room 213 West							
CAAM 18	Room 208							
CAAM 19	Room 209							
CAAM 20	Room 211							
Coincidence module checked using station_____with all other modules								
CAAM 8	Top of Cells					X		
CAAM 9	Room 216					X		
CAAM 10	Room 213 East					X		
RADIATION			X		X	X		
M 21	Room 107		X		X	X		
M 22	Room 118		X		X	X		

* Manual evacuation checked ☐

BEACON*	LOCATION	ON	ROTATING	HORN	LOCATION	ALARM LIGHTS: LOW CYL	LOW HORN	HIGH HORN*	CYL PRESS: LOW	HIGH
1	Bldg Corner NW			1	Room 116					
2	Bldg Corner NE			2	Room 213					
3	Bldg Corner SW									
4	Bldg Corner SE									

ALARMS AT BLDG 2500—KEY SWITCH DISABLED: Contamination_____Buzzer_____

* Quarterly and annual checks only

DISTRIBUTION

1- 2	J	D	Blanton
3	C	J	Borkowski
4	B	F	Bottenfield
5	F	R	Bruce
6	W	D	Burch
7	L	H	Chase
8	H	E	Cochran
9	R	A	Dandl
10	E	P	Epler
11	C	C	Hall
12	C	S	Harrill
13-14	J	H	Holladay
15	T	W	Hungerford
16	W	H	Jordan
17-18	D	J	Knowles
19	R	E	Leuze
20	F	W	Manning
21	J	L	Matherne
22	R	W	Peelle
23	F	L	Peishel
24	J	A	Russell
25	G	S	Sadowski
26	O	O	Yarbro
27-28	Central Research Library		
29	Document Reference Section		
30-32	Laboratory Records Department		
33	Laboratory Records, ORNL R C		
34	ORNL Patent Office		
35-49	Division of Technical Information Extension		
50	Research and Development Division, ORO		