FACILITY INCIDENT REPORTING UTILITY SYSTEM (FIRUS)

INTRODUCTION

Facility Information Reporting Utility System (FIRUS) is a computer system that monitors and reports on the status of various fire, security and utility sensors positioned throughout the Laboratory buildings, experiments and systems. Internal diagnostic systems provide for constant monitoring and reporting of the system to key manned and unmanned operating positions. In the event of sensor being activated, disconnected or communications between the sensors, mini, console and front in is disrupted, selected, manned consoles are provided audible alerting and written pre-prepared instructions on which the Operator reacts.

RESPONSIBILITIES

The Division/Section(D/S) is responsible for

- Coordinating and ensuring the installation of necessary detection and other monitoring devices within facilities and experimental areas/equipment.
- Providing a Fire Watch appropriate for the facility and duration of the problem.

Accelerator Division Controls Hardware Group is responsible for

- Serving as first point of contact for all FIRUS users for technical support
- The schedule and unscheduled maintenance of the head-ends, consoles, minis communication paths and all other associated equipment used for FIRUS.
- Maintaining, publishing and issuing copies of the FIRUS Mini-matrix
- Ensuring the FIRUS system is up and running at all times
- Providing detailed information to the Communications Center, Fermi lab Fire Department (FFD), and the FESS Fire Systems Maintenance (FSM) technicians and appropriate SSO's as to problems rendering portions of the system inoperative (i.e. bad mini)
- Responsible for installing and maintaining specialty connections to FIRUS that are not covered by Fire Techs, FE Operations or Security.

Accelerator Division Controls Software Group is responsible for

- Ensuring the software and resulting data is maintained in a functional state
- Upgrading backbone system components as necessary.

ESH- Fire Protection Engineer is responsible for the overall integration of fire protection and detection systems. This includes chairing coordination meetings amongst all responsible parties.

ESH Emergency Planner is responsible for

- Coordinating and maintaining a functional FIRUS program amongst all parties
- Providing quality control to the input of FIRUS messages.
- Co-chairing coordination meetings amongst all responsible parties

Business Services (BS) -Fire Department is responsible for responding to activations of fire, emergency and similar FIRUS alarms.

BS-Security is responsible for

- Responding to FIRUS security, fire, and emergency alarms
- Assisting, when possible, D/S requiring fire watches.
- Coordination of contracts pertaining to installed security systems
- Point of contact for questions arising as to security sensors not covered under contract.

BS-Communications Center is responsible for

- Monitoring FIRUS on a 24 hour basis
- Notifying/Dispatching personnel as directed by received FIRUS messages.
- Providing timely status updates to the ESH- Fire Protection Engineer and Fire Department when reported problems can not be resolved in a timely manner

FESS Fire Systems Maintenance (FSM) Technicians are responsible for

- The installation, maintenance for all fire protection systems.
- The input of message for fire protection systems into FIRUS
- Responding requests to reset, repair or replacement of activated sensors.
- Providing assistance to all Laboratory groups as needed.

FESS Operations is responsible for

- Installation, maintenance and input of messages for certain utility detection sensors.
- Responding to requests to reset, repair, or replace activated sensors

FIRUS COMPONENT DESCRIPTION

FIRUS-88 provides alarm and monitoring services through a user-friendly interface and field devices connected to multiple local area networks (**LANS**). The basic configuration consists of a **front-end** pair, 1 to 24 **consoles**, and field devices called "**Minis**".

Head Ends

The front end provides multi-tasking environment where the database, data pool, and alarms process run. Multiple front ends provide parallel and redundant processing to service incoming alarms and console requests. The head ends equipment include: Pentium 4, 2.4Ghz, and 768MB ram, 3-mirrored scsi drives. The system provides a high degree of system reliability through the implementation of an on-line redundant front-end. The front-end pair normally shares the responsibility of monitoring MINIs until a processor has failed or is shutdown. Each front-end has an identical copy of the database and is physically connected to each LAN. The ARCNET LANs have the capability of redundant cabling for automatic fail-over in case of single cable break. The front-ends are located in the Lower Level of the Cross Gallery.

Consoles

The console is a Pentium based personal computer that provides for the interface to a windowing environment and provides the following functions: data base entry/modifications, alarm logging, prioritized alarms, chronological alarms, parameter readings via a list or pictures, plotting, and data logging. The console has numerous aids to tailor the console to an area's needs such as control of alarm annunciation and type of alarms received. Based on the Users needs, access to the FIRUS database is limited/tailored to their specific needs. Consoles are located in strategic locations such as the ESH Communications Center, AD Main Control Rooms, and other selected sites. Refer to Appendix D for site-specific locations of the consoles.

Minis

The Minis are intelligent processors connected to a LAN, which provide unsolicited alarms and a query capability. Z80 based processor, with 7-slot expansion, 24-hour battery backed. Minis are located in each serviced facility and support up to 7 I/O STD cards for alarms and data acquisition. Software supports a 16 bit digital I/O card and a 16 channel A/D card. A contact point must be stable for 5 secs (50 readings) before the condition is reported. The analog channel is designed for utility devices with a relatively slow integration time (400 ms) and 15 bits plus sign accuracy. The A/D card has an 8 Kbyte RAM buffer to maintain a local data log for each of the 16 channels providing over 30 minutes of historical data.

Sensors

Numerous types of sensors are used to monitor the status of a various systems, devices and processes occurring throughout the Lab. Included but not limited to: fire detection, suppression, alerting sensors, security sensors for duress alarms, access alarms; utility alarms including temperature, water, etc. Once installed, the sensor is then connected to a local Mini, a prepared message is added to the database and the sensor becomes another of the actively monitored devices.

As a general rule, the party installing the sensor will be responsible for the installation, maintenance and any further removal/install of components as required. For security systems with a security panel the Contractor has responsibility for all functions downstream of the FIRUS connection into their panel. Security sensors connected directly into FIRUS-repairs, maintenance and reinstallation issues will be coordinated through BS Security; Fire sensors- FE Fire Techs, Utility Sensors FE Operations and selected, unique sensors are the responsibility of the AD Controls Hardware Group.

PROCEDURES

Request for Access to FIRUS Database

The FIRUS database is a restricted database, accessible only to those Fermi personnel that have an absolute need. Access to Consoles and the ability to read, write or change Fire, Security, Utility or Trouble message parameters is further controlled, allowing personnel privileges only to the extent required of their particular job.

Approval Process

The Division/Section SSO will initiate the request for access to the FIRUS database by completing the form located at Appendix A. The document will then be routed to the appropriate groups for approval.

Revoking of Access Privileges

Revoking of access to the FIRUS database may be done under the following conditions:

- employee has been relived of duties associated with FIRUS
- employee has been terminated
- upon recommendation of the FIRUS committee

The AD Controls Software Group will be notify immediately by electronic means and provided with the name and title of person in order for the password access of the individual to be rendered inoperative on the FIRUS system.

Additions, Deletions and Modifications to Messages and Sensors

The AD Controls is responsible for the FIRUS Network and hardware. The users are responsible for the field wiring, sensors, message and testing of sensor. Users having access to the database will add, delete, or bypass messages and devices as needed in their daily activities for repair, testing, new installations, or removal of equipment being monitored by FIRUS. If something is impaired or failed and will stay that way unattended (not being worked on or under the control of a knowledgeable person), then notifications shall be made as in the "If FIRUS says off-line" section.

Sensor installation, maintenance and servicing falls into four managed fields of responsibility: Fire related sensor-FE Fire Techs; Utility related-FE Operations; Security systems and sensors- BS Security; All other- AD FIRUS Operations Hardware Group.

Upon removal of a sensor from the FIRUS System, all accompanying messages shall to removed promptly from the database.

Any additions to the FIRUS database must follow the format as outlined in the Message Preparation Section of this document. Additionally the User must ensure that appropriate backup, open and ground entries are made in additional to the primary message.

The ESH Emergency Planner, as the FIRUS Manager, reserves the right to modify messages to ensure standardization of message and compliance with the Message Preparation format.

Message Preparation:

General Instructions

In preparation for the sensor to be installed, the requestor will provide specific information to the designated authority for a message to be constructed and placed into the database.

1. Type of message: ("Code 1", "Security Entry", "High Water", "Power Loss", etc..
2. Building number (using formal FIMS building names - not Fermi common use names).
3. Location in building" (if appropriate) "Zone" (to identify a specific alarm panel zone if appropriate.
4. Action message" to instruct COMM Center Operators ("Dispatch Fire Department", "Dispatch Security", "Notify NAME X-4538, P-0713", etc., Where applicable use of title rather than individual name should be utilized.

The designated authority will then develop, in the required format, using the approved abbreviations where necessary and assigning priorities appropriate to the messages for input for the primary, backup, ground and open messages associated with the device.

Formatting Instructions:

1. "Alert Message" ("Code 1", "Security Entry", "High Water", "Power Loss", etc.,) followed by a colon and one space. Typical entries are included on the attached sheet.
2. "Building" (using formal FIMS building names - not Fermi common use names) followed by one space.
3. "Location in building" (if appropriate) followed by a comma and one space.
4. "Zone" (to identify a specific alarm panel zone if appropriate), followed by a period and one space.
5. "FIMS No." (in parenthesis, e.g. (FIMS 325)) followed by one space.
6. "Action message" to instruct COMM Center Operators ("Dispatch Fire Department", "Dispatch Security", "Notify NAME X-4538, P-0713", etc., followed by a period. Typical entries are included on the attached sheet.
7. Additional valuable information not read as part of the code shall be in parenthesis.

Capital letters are used only for the first letters of "Alert Message" words and other normally capitalized words (e.g. building names). Words describing equipment, etc. should not normally be capitalized. The long text should not use abbreviations unless necessary to provide all the text needed. Keep the messages

brief and to the point (i.e. saying "Dispatch Security" is sufficient, adding the word "Immediately" is unnecessary). Only the approved abbreviations as listed in Appendix C, will be utilized in the construction of the message.

AD Controls Hardware Group will provide the necessary Trunk, node, slot, channel setting and a name for the device to be installed.

Standardization for the "NAME" field has also been developed. The first two entries are numbers indicating the FIRUS trunk where the alarm points are located. This is followed by a period. The remaining twelve spaces are available to indicate the building and specific alarm identifiers using all capital letters. Any spaces should be filled with a dash (not a period) for the last twelve items. For example, "01.AP50 -S-GAS10" is the entry for the AP50 Service Building south end 10% LEL flammable gas alarm.

Utilizing the FIRUS User Manual, Chapter 3 the author of the message will complete the various settings required to bring the message online.

Alarm Priority Assignments

Alarms are assigned a priority based on the type of alarm (Fire, security, etc) and the system being reported. The highest priority is for fire alarms in high population/critical facilities. Refer to Appendix B to determine the appropriate priority code for the message(s) being developed.

Approved Abbreviations

Only the abbreviations listed in Appendix C are to be used in the construction of FIRUS messages. Deviation from this approved list may provide emergency responders bad, poor or incorrect information if used.

Sensor Type	Coordination Requirements
Fire	Comm Center, Fire Dept, Fire Prot Engr
Security	Comm Center, SD Supervisor
Utility	Comm Center, FESS Opns, Div/Sec SSO, Bldg Manager

For additional abbreviations to be added, the request must be forwarded to the FIRUS Manager for consideration and approval from the FIRUS Group prior to use.

Tracking Message Modifications
All modifications to the FIRUS database entries will be electronically captured by the AD Software group and emailed to the following: Firus Manager, AD Controls, Fire Chief and Fire Techs.

Cyclic Review of By-passed Messages

By-passed messages should be reviewed by local authorities on a frequent basis to ensure the by-pass is still warranted.

SSO's and personnel having had sensors installed on the FIRUS system must, on a cyclic basis review the messages to ensure the sensor/message continues to exist and requires the particular message. For sensors no longer needed, they should be removed from the system along with all associated messages.

Global Changes to Messages
For message changes, it is normally the responsibility of the author that originally inputted the message to make the change. In situations in which numerous messages are to be changed (i.e. change of pager number), coordination with the AD Controls Software Group is permitted.

Primary and Backup Locations for Receiving FIRUS Messages
The primary location for receiving the FIRUS message is at the Communication Center located on the ground floor of Wilson Hall.

The alternate location for Communications Center activities is at Site 52 , in the event the primary location is compromised.

Based on the situation, other consoles can be reconfigured to receive messages but limitation exist as to the ability to dispatch fire, security and duty personnel in response to a received message.

Power Outages Affecting FIRUS

<u>Planned Power Outages</u>
Upon receipt of work notification that power will be dropped from a given area, it will be the responsibility of the following groups to ensure appropriate coverage (i.e. safety

systems related to FIRUS is maintained): AD Controls Group, Div/Sec SSO's and Construction Coordinator/Task Manger. AD Controls will need to examine the outage message and further clarify the specific geographical areas (buildings) that will be impacted by this outage.

For short term outages (minutes to several hours), the system is capable of maintaining itself on battery backup and no additional effort is required, unless there are indications of local problems.

For longer term outages, coordination and plans for replacing batteries, obtaining generator or similar efforts will be lead by AD Controls who will utilize any expertise they need from other Div/Sec's to maintain FIRUS operations. Situation updates will need to be provided to the ESH Fire Protection Engineer and Emergency Planner throughout the outage to ensure a coordinated effort is taking place. As these efforts are underway the deployment of Fire Watches will be the Div/Sec SSO's responsibility based on input from the FESS-Fire Systems Maintenance, Fire Department or the ESH Fire Protection Engineer.

Any question that can not be resolved is to be routed to the ESH Fire Protection Engineer immediately using the most expeditious means.

Unplanned Power Outages

Upon receipt of notification that power has been dropped from a given area, it will be the responsibility of the following groups to ensure appropriate coverage (i.e. safety systems related to FIRUS is maintained): AD Controls Group, FESS-Fire Systems Maintenance, SSO's and Building Owner. Coordination and plans for replacing batteries, obtaining generator or similar efforts will be lead by the AD Controls who will utilize any expertise they need from other Div/Sec's to maintain FIRUS operations. AD Controls, FESS-Fire Systems Maintenance, and FESS Operations must maintain communication.

Any question that can not be resolved is to be routed to the ESH Fire Protection Engineer immediately using the most expeditious means.

For short term outages (those expected last only to a maximum of a few hours), the system is capable of maintaining itself on battery backup additional efforts will not be required. It will be necessary that tests from the affected area(s) be conducted by FESS-Fire Systems Maintenance personnel to ensure the Communication Center is receiving message traffic.

For longer term outages, coordination and plans for replacing batteries, obtaining generator or similar efforts will be lead by AD Controls who will utilize any expertise

they need from other Div/Sec's to maintain FIRUS operations. Situation updates will need to be provided to the ESH Fire Protection Engineer and Emergency Planner throughout the outage to ensure a coordinated effort is taking place. As these efforts are underway the deployment of Fire Watches will be the Div/Sec SSO's responsibility based on input from the FESS-Fire Systems Maintenance, Fire Department or the ESH Fire Protection Engineer.

If FIRUS Stays Off Line

If FIRUS cannot be restored, the AD Controls group shall notify the proper Div/Sec SSO's, area, and building managers and affected groups. If there are fire points being monitored the FESS-Fire Systems Maintenance shall be notified. For security points, ESH Security must be notified. For utility and pump vault duress alarm points FESS Operations must be notified. For ODH and Flammable Gas alarm points, the Fire Department shall be notified. All other groups that may be affected (i.e. Main Control Room, Central Utility Building, Feynman Computing Center) must be notified as well.

Maintenance/Upgrade of the System

The FIRUS system has a self-monitoring diagnostic component that continually scans the system for faults/errors. Upon detection of a problem, an error/trouble message will appear on various consoles, initiating the corrective action,

On an annual basis the batteries are tested when the buildings transformers are shutdown. See Appendix F for details.

As basic components of the FIRUS system become obsolete, it is the responsibility of the AD Control Hardware and Software Groups to replace the items with more state-of-the-art, in kind replacements.

For basic components of the FIRUS backbone requiring maintenance, a logging and reporting system will need to be developed. At a minimum, the date, problem, location and action taken and the amount of time spent at this task will need to be captured. At the end of the month, this log is to be electronically forwarded to the ESH Fire Protection Engineer and Emergency Planner. Refer to Appendix H FIRUS Hardware Repairs/Status.

Notification of Significant Work

Whenever work on the Head-ends, software or any component that is a radical change from the current operating system/protocol, it will be necessary that a plan be developed for this procedure and be provided to the ESH Fire Protection Engineer for concurrence, prior to any work being performed.

At a minimal the following information will be required:

- Date and Time work is to begin and estimated time of completion
- Type and nature of work
- Potential problems that may be encountered
- Means to address problems should they arise

After concurrence of the ESH Fire Protection Engineer, the following personnel to be notified by email in advance at a minimal of 48 hours and provided a lead time to prepare for any unusual events that may arise. For FIRUS work involving trunks, minis, etc, notification will be required.

- ESH Fire Protection Engineer
- ESH Fire Department – Battalion Chief
- FESS-Fire Systems Maintenance
- SSO(s) of the affected building
- ESH Communications Center

Required Testing Written Documentation

The following information is required to be part of the testing documentation

- Title (Reason tests are being conducted, i.e. change out head, replacement of mini at XXX location)
- Date and time of test
- Building location, area identification, and sensor activated
- Results
- Name of person conducting the test

Reporting Problems

In addition to the self-reporting of system problems, it is the responsibility of all that use, respond to alarms or responsible for a facility that if a problem is noted, it is to be reported to the ES&H Fire Protection Engineer and the FIRUS Manager.

Testing Protocol After Work Has Been Completed

Immediately following the initial installation, programming, move or other significant effort on the system, the Comm Center, Fire Techs and FIRUS personnel will perform a series of tests of the system. The initial test will include the physical activation of alarms from the affected area and from (CDF, D0, FCC) upon completion of work. This to insure there are no immediate problems.

Following the initial testing, a test protocol, testing with a minimal number and type of alarms for each trunk and especially of key facilities will be done each day at various times for a period of seven (7) days by the Fire Techs and other designated personnel (i.e. Security, FESS Ops) to verify that the system is operating as designed and that no unexpected problems arise. The results of the tests-date time location and result will be sent to the ES&H Fire Protection Engineer. If problems are noted, then contact with the appropriate personnel will be required at the time of discovery.

Fire Watch Protocols

In the event a portion of the fire detection, protection or suppression system is rendered inoperative a Fire-Watch will be required.

The Division/Section SSO upon notification that the fire detection, protection or suppression system is rendered inoperative for a facility from FSM, Fire Department or other recognized authority, will need to ensure that a Fire Watch, as appropriate, is established for the duration of the problem. Refer to FESHM 6030.14.

Appendix A Request Form

FIRUS PASSWORD AND ACCESS PRIVELEGE REQUEST FORM

Requestor: _____ Ext. _____

Group: _____ Date: _____

New Password: _____

ACCESS PRIVILEGES REQUESTED (CHECK OFF SELECTION):

	FIRE	EMERGENCY	SECURITY	UTILITY	SYSTEM	TROUBLE*
Add/Delete						
Bypass						
Modify						
Change Limits						

* Trouble category is only applicable to GEM system. NT changeover will merge trouble alarms with appropriate main alarm category.

COMMENT SECTION (REQUEST JUSTIFICATION):

APPROVALS:

Password: _____ Accelerator Division.

Fire: _____ W. James

Emergency: _____ Supervisor

Security: _____ Security

Utility: _____ Supervisor

System: _____ Accelerator Division

Trouble: _____ Supervisor

Appendix B MESSAGE PRIORITY PROTOCOL

	ALARM	SUPERVISORY	TROUBLE
FIRE PROTECTION SYSTEMS			
LIFE SAFETY Wilson Hall, Curia I, Residential	63	40	20
MASTER SUBSTATION	62	39	19
INDUSTRIAL/OFFICE/GENERAL Labs, Ind. Bldgs., etc	59	38	18
LOW HAZARD Barns, trailers, etc.	58	38	18
EMERGENCY SYSTEMS			
LIFE SAFETY Wilson Hall, Curia I, Residential	56	35	16
MASTER SUBSTATION	55	35	16
HIGH VALUE/MISSION CRITICAL/ HIGH HAZARD Footprint, Main Ring, Beamlines Casey's Pond, etc.	54	35	16
INDUSTRIAL/OFFICE/GENERAL Labs, Ind. Bldgs., etc	52	33	14
LOW HAZARD Barns, trailers, etc.	51	33	14
SECURITY SYSTEMS			
DURESS	62	39	19
LIFE SAFETY Wilson Hall, Curia I,Residential	49	31	12
MASTER SUBSTATION	48	31	12
HIGH VALUE / MISSION CRITICAL/ HIGH HAZARD Footprint, Main Ring, Beamlines Casey's Pond, etc.	47	31	12
INDUSTRIAL/OFFICE/GENERAL Labs, Ind. Bldgs., etc.	45	29	10
LOW HAZARD Barns, trailers, etc.	44	29	10
SYSTEM (FIRUS)			

ALL	43	27	8
UTILITY SYSTEMS			
LIFE SAFETY/HIGH VALUE/ MISSION CRITICAL/HIGH HAZARD	42	25	6
INDUSTRIAL/OFFICE/GENERAL / LOW HAZARD	42	23	4
MISCELLANEOUS			
ALL	41	21	2
ACKNOWLDEDGE SYSTEM RESTORATION			
ALL			

PRIORITY ORDER

FIRE -	ALARM
EMERGENCY -	ALARM
SECURITY -	ALARM
SYSTEM -	ALARM
UTILITY -	ALARM
MISC. -	ALARM
FIRE -	SUPERVISORY
EMERGENCY -	SUPERVISORY
SECURITY -	SUPERVISORY
SYSTEM -	SUPERVISORY
UTILITY -	SUPERVISORY
MISC. -	SUPERVISORY
FIRE -	TROUBLE
EMERGENCY -	TROUBLE
SECURITY -	TROUBLE
SYSTEM -	TROUBLE
UTILITY -	TROUBLE
MISC. -	TROUBLE
ACKNOWLEDGE	ALARM CLEAR

Appendix C Approved Abbreviations

Abbrev	Full Name	Category	Abbrev	Full Name	Category
$	Mini Alarms	Fire Sys	G	Ground	Word
#	Grounded Cable	Area	GLYC	Glycol	Word
*	Trouble, Default alarm	Fire Sys	GLS	Glass	Word
	Open Cable	Area	GT	Gate	Word
@	Out of Service/Bypassed/disabled	Word	H	Halon	Fire Sys
ADD	Addition	Word	HI	High	Word
AP	Anti-Proton	Bldg	HIT	High Temperature	Word
			KRSS	Kautz Road Sub Station	
ASIL	Aisle	Area	LA	Liquid Argon	Area
AUX	Auxiliary	Bldg	LAB	Lab	Area
BAT	Low Battery	Word	LIN	Linac	Bldg
BGL	Booster Gallery	Bldg	LK	Leak	Word
BHK	Blackhawk	Area	LO	Low	Word
BTWR	Booster Tower	Bldg	LOB	Low Battery	Word
C4P	C4 Pump House	Bldg	LOP	Low Pressure	Word
CAB	Cabinet	Word	LOT	Low Temperature	Word
CDF	Collider Detector Facility	Bldg	LVL	Level	Word
CH	Collision Hall	Bldg	MCH	Movable Counting House	Bldg
CHE	Cheche Pinque	Area	MCH1	Movable Counting House1st flr	Bldg
CHL	Central Helium Liquefier	Bldg	MES	Meson	Area
CHLOR	Chlorine	Word	MEZ	Mezzanine	Area
CMPT	Computer	Word	MR	Main Ring	Area
CPSR	Compressor Room	Bldg	MSUB	Master Substation	Bldg
CR	Control Room	Bldg	MU	Muon Lab	Bldg
CRYO	Cryogenics	Fire Sys	MVR	Major Vehicle Access	Bldg
CSY	Casey's Pond	Bldg	N	North	Compass
CUB	Central Utility Bldg	Bldg	NEQ	Neuqua	Area
D	Detector	Fire Sys	NEU	Neutrino	Area
DAB	D-0 Assembly Bldg	Bldg	ODR	Overhead door	Bldg
DC	Dry Chemical	Fire Sys	OFC	Office	Area
DCHG	Discharge	Fire Sys	P	Pull Box	Fire Sys
DCT	Duct Detectors	Fire Sys	PK	Portakamp	Bldg
DR	Door	Word	PL	Panel	Fire Sys
E	East	Compass	PLT	Platform	Area
EQ	Equipment	Word	PMP	Pump	Word
EMPWR	Emergency Power	Word			
ENCL	Enclosure	Bldg	POT	Potawattomi	Area
FCC	Feynman Computer Center	Bldg	PRG	Purge	Word
FL	Fail/failed	Word	PRO	Proton	Word
FLR	Floor	Word	PSI	Pressure	Word

Abbrev	Full Name	Category
PWR	Power	Word
QC	Quality Control	Word
REFGR	Refrigerator/Refrigeration	Word
RM	Room	Area
S	South	Compass
SB	Service Bldg	Bldg
SGAS	South Gas Room	Bldg
SHB	Shabbona	Area
SKB	Sauk Blvd	Area
SP	Sprinkler	Fire Sys
SSB	Switchyard Service Bldg	
STG	Stage	Word
STK	Stockroom	Area
STO	Storage	Area
STWY	Stairway	Area
SUP	Super Shed	Bldg
S37	Site #37	Area
S38	Site #38	Area
S39	Site #39	Area
VEH	Vehicle	Word
T	Trouble, Default alarm	Fire Sys
TEC	Tech	Word
TN	Tunnel or Pit	Bldg
TP	Tape	Word
TPL	Tagged Photon Lab	Bldg
TRG	Trigger Rack	Area
TST	Test	Word
TX	Telephone	Word
UC	Users Center	Bldg
UNFLR	underfloor	Area
UTL	Utility	Fire Sys
VEH	VESDA	Fire Sys
VIL	Village	Area
VLO	Vesda Low air flow	
VLT	Vault	Area
W	West	Compass
WAL	Wall	Area
WRNVL	Warrenville	City
WIN	Winnebago	Area

Abbrev	Full Name	Category
WH	Wilson Hall	Bldg
WIN	Winnebago	Area
WL3	Well #3	Bldg
WTR	Water	Word
XFR	Transfer	Word
XGL	Cross Gallery	Bldg
Z	Zone	Fire Sys
01	WH, Bsmnt, CUB,LIN, AntiProt	Area
02	MR 1st half A0-DAB	Area
03	MR D1-F4	Area
06	Neutrino Sites 37,38,39 Fire	Area
07	Meson Line	Area

APPENDIX D

FIRUS Console Locations

Trunk / Node	Console Location	Data Base Name
1/134	Main Control Room - MCR	01.XGL.CNS.MCR
1/147	FIRUS - Front End Room	01.CNS.FIRUS RM
1/156	Central Utility Building - CUB	01.CNS.CUB ROOM
2/138	CDF – Control Room	02.CNS.MR.CDF
2/145	D-0 Assembly Cryo Room	02.CNS_DAB_CRYO
2/146	D-0 Assembly Control Room	02.CNS_DAB_CNTL
2/159	CDF – Cryo Room	02.CNS.CDF.CRYO
2/160	Feynman Computing – FCC	02.CNS.FCC.CNS
4/135	Communication Center	04.CNS.COMCENTR
4/148	Communication Center (Spare)	04.CNS.T_CONSOE
4/154	WH 7 East Bill James Office	04.CNS.JAMES
5/128	Village FIRUS Hut	05.CNS.FIRUSHUT
5/130	Legan Office	05.CNS.LEGAN
5/133	FIRUS Lab – Alarm Console	05.CNS.FIRUSLAB
5/139	Site 52 - Security	05.CNS.SECURTY
5/149	FIRUS Lab – Hardware Alarms	05.CNS.TROUBLE
6/137	Fire Department	06.CNS.FIREDEPT
6/140	FESS Site 38 #1	06.CNS.FOEENGR
6/141	FESS Site 38 #2	06.CNS.FAC-OPS
6/142	Site 39 Fire Engineers	06.CNS.FIR_ENG
6/144	FESS Site 38 #3	06.CNS.C_WORBLY

Appendix E

FIRUS Mini Map

Firus_Mini_Flow[1].pdf

Appendix F

FIRUS Battery/UPS Requirements

National Fire Alarm Code® 2002 Edition with an effective date of August 8, 2002, and supersedes all previous editions.

10.4.3* Testing Frequency

Testing shall be performed in accordance with the schedules in Table 10.4.3, except as modified in other paragraphs of 10.4.3, or more often if required by the authority having jurisdiction.

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Table 10.4.3 Testing Frequencies

Component	Initial	Monthly	Quarterly	Semi Annual	Annual
1. Control Equipment — Building Systems Connected to Supervising Station					
(a) Functions	x	-	-	-	x
(b) Fuses	x	-	-	-	x
(c) Interfaced equipment	x	-	-	-	x
(d) Lamps and LEDs	x	-	-	-	x
(e) Primary (main) power supply	x	-	-	-	x
(f) Transponders	x	-	-	-	x
2. Control Equipment — Building Systems Not Connected to a Supervising Station					
(a) Functions	x	-	x	-	-
(b) Fuses	x	-	x	-	-
(c) Interfaced equipment	x	-	x	-	-
(d) Lamps and LEDs	x	-	x	-	-
(e) Primary (main) power supply	x	-	x	-	-
(f) Transponders	x	-	x	-	-
3. Engine-Driven Generator — Central Station Facilities and Fire Alarm Systems	x	x	-	-	-
4. Engine-Driven Generator — Public Fire Alarm Reporting Systems	**X weekly**	-	-	-	-

5. Batteries — Central Station Facilities					
(a) Lead-acid type — — — — —					
1. Charger test (replace battery as needed.)	x				x
2. Discharge test (30 minutes)	X	x	-	-	-x
3. Load voltage test	X	X	-	-	-
4. Specific gravity	X	-	-	X	-
(b) Nickel-cadmium type					
1. Charger test (replace battery as needed)	X	-	X	-	-
2. Discharge test (30 minutes)	X	-	-	-	x
3. Load voltage test	X	-	-	-	x
(c) Sealed lead-acid type	X	X	-	-	-
1. Charger test (replace battery within 5 years after manufacture or more frequently as needed.)	-	-	X	X	-
2. Discharge test (30 minutes)	X	X	-	-	-
3. Load voltage test	X	X	-	-	-
6. Batteries — Fire Alarm Systems					
(a) Lead-acid type					
1. Charger test (replace battery as needed.)	X	-	-	-	x
2. Discharge test (30 minutes)	X	-	-	X	-
3. Load voltage test	X	-	-	X	-
4. Specific gravity	X	-	-	X	-
(b) Nickel-cadmium type					
1. Charger test (replace battery as needed.)	X	-	-	-	x
2. Discharge test (30 minutes)	X	-	-	-	x
3. Load voltage test	X	-	-	X	-
(c) Primary type (dry cell					
1. Load voltage test	X	-	X	-	-
(d) Sealed lead-acid type					
1. Charger test (replace battery within 5 years after manufacture or more frequently as needed.)	X	-	-	-	x
2. Discharge test (30 minutes)	x		-	-	x
3. Load voltage test	X	-	-	X	-
7. Batteries — Public Fire Alarm Reporting Systems Voltage tests in accordance with Table 10.4.2.2, items 7(1)–(6)	X **Daily**				
(a) Lead-acid type					
1. Charger test (replace battery	X	-	-	-	x

as needed.)					
2. Discharge test (2 hours)	X	-	x	-	-
3. Load voltage test	X	-	X	-	-
4. Specific gravity	X	-	-	X	-
(b) Nickel-cadmium type					
1. Charger test (replace battery as needed.)	X	-	-	-	x
2. Discharge test (2 hours) X	x	-	-	-	x
3. Load voltage test	X	-	X	-	-
(c) Sealed lead-acid type					
1. Charger test (replace battery within 5 years after manufacture or more frequently as needed.)	X	-	-	-	X
2. Discharge test (2 hours)	X	-	-	-	x
3. Load voltage test	X	-	X	-	-
8. Fiber-Optic Cable Power	x	-	-	-	x
9. Control Unit Trouble Signals	x	-	-	-	x
10. Conductors — Metallic	x	-	-	-	-
11. Conductors — Nonmetallic	x	-	-	-	-
12. Emergency Voice/Alarm Communications Equipment	x	-	-	-	x
13. Retransmission Equipment (The requirements of 10.4.7 shall apply.)	x	-	-	-	x
14. Remote Annunciators	X	-	-	-	x
15. Initiating Devices					
(a) Duct detectors					
(b) Electromechanical releasing device	x	-	-	-	x
(c) Fire extinguishing system(s) or suppression system(s) switches	x	-	-	-	x
(d) Fire–gas and other detectors	x	-	-	-	x
(e) Heat detectors (The requirements of 10.4.3.4 shall apply.)	x	-	-	-	x

Table 10.4.2.2 Test Methods
Device Method

1. Control Equipment

(a) Functions

At a minimum, control equipment shall be tested to verify correct receipt of alarm, supervisory, and trouble signals (inputs), operation of evacuation signals and auxiliary functions (outputs), circuit supervision including detection of open circuits

and ground faults, and power supply supervision for detection of loss of ac power and disconnection of secondary batteries.

(b) Fuses
The rating and supervision shall be verified.

(c) Interfaced equipment
Integrity of single or multiple circuits providing interface between two or more control panels shall be verified. Interfaced equipment connections shall be tested by operating or simulating operation of the equipment being supervised. Signals required to be transmitted shall be verified at the control panel.

(d) Lamps and LEDs.
Lamps and LEDs shall be illuminated.

(e) Primary (main) power supply.
All secondary (standby) power shall be disconnected and tested under maximum load, including all alarm appliances requiring simultaneous operation. All secondary (standby) power shall be reconnected at end of test. For redundant power supplies, each shall be tested separately.

2. Engine-Driven Generator

If an engine-driven generator dedicated to the fire alarm system is used as a required power source, operation of the generator shall be verified in accordance with NFPA 110, *Standard for Emergency and Standby Power Systems*, by the building owner.

3. Secondary (Standby) Power Supply

All primary (main) power supplies shall be disconnected and the occurrence of required trouble indication for loss of primary power shall be verified. The system's standby and alarm current demand shall be measured or verified and, using manufacturer's data, the ability of batteries to meet standby and alarm requirements shall be verified. General alarm systems shall be operated for a minimum of 5 minutes and emergency voice communications systems for a minimum of 15 minutes. Primary (main) power supply shall be reconnected at end of test.

4. Uninterrupted Power Supply (UPS)

If a UPS system dedicated to the fire alarm system is used as a required power source, operation of the UPS system shall be verified by the building owner in accordance with NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*.

5. Batteries — General Tests

Prior to conducting any battery testing, the person conducting the test shall ensure that all system software stored in volatile memory is protected from loss.

(a) Visual inspection

Batteries shall be inspected for corrosion or leakage. Tightness of connections shall be checked and ensured. If necessary, battery terminals or connections shall be cleaned and coated. Electrolyte level in lead-acid batteries shall be visually inspected.

(b) Battery replacement
Batteries shall be replaced in accordance with the recommendations of the alarm equipment manufacturer or when the recharged battery voltage or current falls below the manufacturer's recommendations.

(c) Charger test Operation of battery charger shall be checked in accordance with charger test for the specific type of battery.

(d) Discharge test
With the battery charger disconnected, the batteries shall be load tested following the manufacturer's recommendations. The voltage level shall not fall below the levels specified.

Exception: An artificial load equal to the full fire alarm load connected to the battery shall be permitted to be used in conducting this test.

(e) Load voltage test
With the battery charger disconnected, the terminal voltage shall be measured while supplying the maximum load required by its application. The voltage level shall not fall below the levels specified for the specific type of battery. If the voltage falls below the level specified, corrective action shall be taken and the batteries shall be retested.

Exception: An artificial load equal to the full fire alarm load connected to the battery shall be permitted to be used in conducting this test.

6. Battery Tests (Specific Types)

(a) Primary battery load voltage test
The maximum load for a No. 6 primary battery shall not be more than 2 amperes per cell. An individual (1.5-volt) cell shall be replaced when a load of 1 ohm reduces the voltage below 1 volt. A 6-volt assembly shall be replaced when a test load of 4 ohms reduces the voltage below 4 volts.

(b) Lead-acid type

1. Charger test With the batteries fully charged and connected to the charger, the voltage across the batteries shall be measured with a voltmeter. The voltage shall be 2.30 volts per cell ±0.02 volts at 25°C (77°F) or as specified by the equipment manufacturer.
2. Load voltage test Under load, the battery shall not fall below 2.05 volts per cell.
3. Specific gravity

The specific gravity of the liquid in the pilot cell or all of the cells shall be measured as required. The specific gravity shall be within the range specified by the manufacturer. Although the specified specific gravity varies from manufacturer to manufacturer, a range of 1.205–1.220 is typical for regular lead-acid batteries, while 1.240–1.260 is typical for high-performance batteries. A hydrometer that shows only a pass or fail condition of the battery and does not indicate the specific gravity shall not be used, because such a reading does not give a true indication of the battery condition.

(c) Nickel Cadmium type

1. Charger test - With the batteries fully charged and connected to the charger, an ampere meter shall be placed in series with the battery under charge. The charging current shall be in accordance with the manufacturer's recommendations for the type of battery used. In the absence of specific information, to of the battery rating shall be used.
2. Load voltage test - Under load, the float voltage for the entire battery shall be 1.42 volts per cell, nominal. If possible, cells shall be measured individually.

(d) Sealed lead acid type

1. Charger test - With the batteries fully charged and connected to the charger, the voltage across the batteries shall be measured with a voltmeter. The voltage shall be 2.30 volts per cell ±0.02 volts at 25°C (77°F) or as specified by the equipment manufacturer.
2. Load voltage test - Under load, the battery shall perform in accordance with the battery manufacturer's specifications

APPENDIX H FIRUS BATTERY LOCATIONS

Trunk #	Mini Node#	Location
0		"Red" Front-End UPS
0		"Blue" Front-End UPS
0		FIRUS DEV UPS

Trunk #	Mini Node#	Location
1	1	MCR
1	2	Booster West
1	3	Linac
1	4	MuCool
1	5	Science Ed Center
1	6	MiniBoone
1	7	Minos
1	11	Switch Yard S.B.
1	21	CUB #1
1	22	CUB #2
1	31	AntiProton #0
1	32	AntiProton #10
1	33	Antiproton #30
1	34	AntiProton #50
1	233	FIRUS Room

Trunk #	Mini Node#	Location
2	42	A0 Kicker
2	1	M.R. SB. # A1
2	2	M.R. SB. # A2
2	3	M.R. SB. # A3
2	4	M.R. SB. # A4
2	5	M.R. SB. # B0
2	6	M.R. SB. # B1
2	7	M.R. SB. # B2
2	8	M.R. SB. # B3
2	9	M.R. SB. # B4
2	10	M.R. SB. # C0
2	11	M.R. SB. # C1
2	12	M.R. SB. # C2
2	13	M.R. SB. # C3
2	14	M.R. SB. # C4
2	15	M.R. SB. # D0
2	32	D0 Detector #1
2	34	CDF Detector
2	35	Industrial Bldg. Center
2	36	Industrial Bldg. #1
2	37	Industrial Bldg. #3
2	38	Feynman Computer Center
2	40	Central Helium Liquifier
2	50	D0 Detector #2

Trunk #	Mini Node#	Location
3	16	M.R. SB. # D1
3	17	M.R. SB. # D2
3	18	M.R. SB. # D3
3	19	M.R. SB. # D4
3	20	M.R. SB. # E0
3	21	M.R. SB. # E1
3	22	M.R. SB. # E2
3	23	M.R. SB. # E3
3	24	M.R. SB. # E4
3	25	M.R. SB. # F0
3	26	M.R. SB. # F0 - R.F.
3	27	M.R. SB. # F1
3	28	M.R. SB. # F2
3	29	M.R. SB. # F3
3	30	M.R. SB. # F4
3	44	M.R. SB. # A0 LN

Trunk #	Mini Node#	Location
4	1	Wilson Hall Grnd Floor
		All of Wilson hall is backed up by
		one UPS located on the ground floor East Side
4	44	Wilson Hall Basement #1
4	45	Wilson Hall Basement #2
4	46	Ramsey Auditorium

Trunk #	Mini Node#	Location
5	41	Proton S.B. #1 - PS1
5	42	Proton High Intensity Lab - HIL
5	43	Proton S.B. #3 - PS3
5	44	Proton S.B. #4 - PS4
5	45	Proton S.B. #5 - PS5
5	46	Tag Photon #1 - TP1
5	47	Tag Photon #2 - TP2
5	48	Proton Assembly Building - PAB
5	49	Proton S.B. #6 - PS6
5	50	Wide Band - WB
5	52	Site Security - Site 52
5	60	Proton S.B. #2 - PS2
5	61	Proton Pole Building
5	71	Village #1
5	72	Village #2
5	73	Village #3
5	74	Village #4

Trunk #	Mini Node#	Location
6	12	Neutrino S.B. #1 -NS1
6	13	Neutrino Target S.B. - TSB
6	14	Master Substation
6	15	Fire Station
6	16	Fess Site - 38
6	17	Roads & Grounds
6	18	Warehouse #2
6	19	Neutrino S.B. #2 -NS2
6	20	Neutrino S.B. #4 -NS4
6	22	Training Center - EAO
6	24	Neutrino S.B. #7 -NS7
6	25	K-Tev
6	26	Neutrion Lab F
6	27	Neutrion Lab E
6	28	Neutrino S.B. #NSE -NSE
6	29	Neutrino Lab A
6	30	Muon Lab
6	31	K.C. Pond
6	32	Neutrino S.B. #NWA -NWA
6	40	FESS Site - 39
6	41	Radiation Physics Calibration

Trunk #	Mini Node#	Location
7	1	Meson S.B. #1 -MS1
7	2	Meson S.B. #2 -MS2
7	3	Meson S.B. #3 -MS3
7	4	Meson Equipment Room
7	5	Meson Detector Lab
7	6	Meson Cryo Central
7	7	Meson S.B. #6 -MS6
7	8	Meson MW Lab Building
7	9	Meson MP Lab Building
7	10	Meson Assembly Building
7	11	Low Level Radiation - LLRP
7	50	Main Injector 60 - MI60
7	51	Main Injector 8 - MI8
7	52	Main Injector 10 - MI10
7	53	Main Injector 20 - MI20
7	54	Main Injector 30 - MI30
7	55	Main Injector 40 - MI40
7	56	Main Injector 52 - MI52
7	57	Main Injector 50 - MI50
7	58	Main Injector 62 - MI62
7	59	Kautz Road Sub Station
7	60	Main Injector 12 - MI12
7	61	Main Injector 65 - MI65
7	62	Main Injector 31 - MI31

Appendix H
FIRUS Hardware Repairs/Status

DATE	Location	Problem	Time taken to Fix

At the end of the month, this log is to be electronically forwarded to the
Sr Fire Protection Engineer and FIRUS Manager

APPENDIX I
FIRUS PERMISSIONS

Firus Permissions

Bit Pattern Key
f - 1111 - Add/Delete, Limits, Modify, Bypass
6 - 0110 - Limits, Modify
5 – 0101 - Limits, Bypass
4 – 0100 - Limits
1 – 0001 - Bypass

	Fire	Emer	Utility		Trouble		System Software
Charlie Briegel	f	f	f	f	6		
Al Legan	f	f	f	f	6		
Rich Neswold		f	f	f	f	6	
Joe Flores	0	f	f	f	6		
Bob Plummer		0	0	f	f	0	
Mark Thomas		0	0	f	f	0	
Bill James	f	f	f	f	4		
Kent Collins	0	0	f	0	0		
Chuck Morrison	0	f	0	0	0		
Bob Thomas	0	f	0	0	0		
Mark Kujawa		f	f	0	f	0	
Brian Petersohn		f	f	0	f	0	
Richard Berquist	0	0	f	f	0		
Greg Gilbert	0	0	1	0	0		
Tom Kraus	0	0	f	0	0		
David Iverson		5	5	5	0	0	
Duane Plant	0	0	f	f	0		
Operation Crew	**0**	**1**	**1**	**1**	**1**		