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Hall B Worker Safety Training - SAF 111

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Contents

Table 1: Symbol definitions for all figures.

Abreviation	Meaning
PK	Hall B power kill button
CPK	Counting house power kill button
PA	Hall B fire pre-alarm annunciator box
FIL	Hall B fire alarm indicator light
EP	Emergency procedures manual
FE	Fire extinguisher (types: halon, dry powder, carbon dioxide)
PS	Fire alarm pull stations
ER	Escape route
PIB	PSS indicator box
PH	Telephone

1 Introduction

1.1 Hazards in Hall B - highlights

- Fire/smoke: limited/changing egresses, large fuel inventory, many ignition sources, explosions.
- Electrocution/shock: large electrical currents, high voltage, many possible sources.
- Falling: falling objects, personnel falling from elevated platforms, many trip hazards.
- Magnets: high-intensity fields, numerous magnets, changes with experiment configuration.
- Crane: small clearance areas, low visibility in hall.
- Cryogens: ODH hazards.
- Vacuum: multiple thin windows – potential for hearing loss, other damage.

1.2 Administrative Requirements

- SAF 111 required for unescorted work in hall and shift-taking.
- Buddy system is mandatory for work in Hall B:
  - No one may enter Hall B without having identified a specific partner.
  - Communication between the two people responsible for each other shall occur no less often than every five minutes until both have exited the hall.
- Access to elevated platforms (space frame, side carriages, forward carriage) is restricted to people who can use escape ladders. No loitering policy on these platforms.

1.3 Special Equipment in Hall B – Smoke Escape Masks

- Always evacuate on fire alarm as quickly as safely possible.
- Grab smoke mask as you leave.
- NOT a fire fighting device. Only for escape.
- Only open smoke mask if you encounter smoke and wish to use it.

- Does not contain an oxygen supply – is only a filter for toxic gases commonly found in fires.
- Rated for 15 minutes exposure to smoke conditions.
- To use: open case, push filter out, pull over head, pull strap tight.
- Long hair should be pushed inside mask.

1.4 Visual alarm conventions

- Magenta (purple) beacon – radiation.
- Light blue flashing light – ODH.
- Red beacon – magnetic field may be on, or may turn on or off without warning.
- Yellow beacon – activated laser, moving machinery, or monitored gate.

1.5 Audible alarm conventions

- Beam permit klaxon – sustained tone, several seconds on, several seconds off.
- Fire alarm – loud, continuous bell.
- Fire early warning system – dual 1-second beeps.
- Crane in motion – loud honking electronic horn.
- Oxygen Deficiency Hazard – loud electronic honk at 1-second interval.

2 Hall B Counting Room

2.1 Counting Room

- Typical fires in these areas are from household devices brought in.
- Elevated floor contains some flammables, as do bookshelves.
- Hall B fire alarm light and audio alarm – informational – do not evacuate.
- Emergency Procedures binder.
- Hall B Personnel Safety System status box.

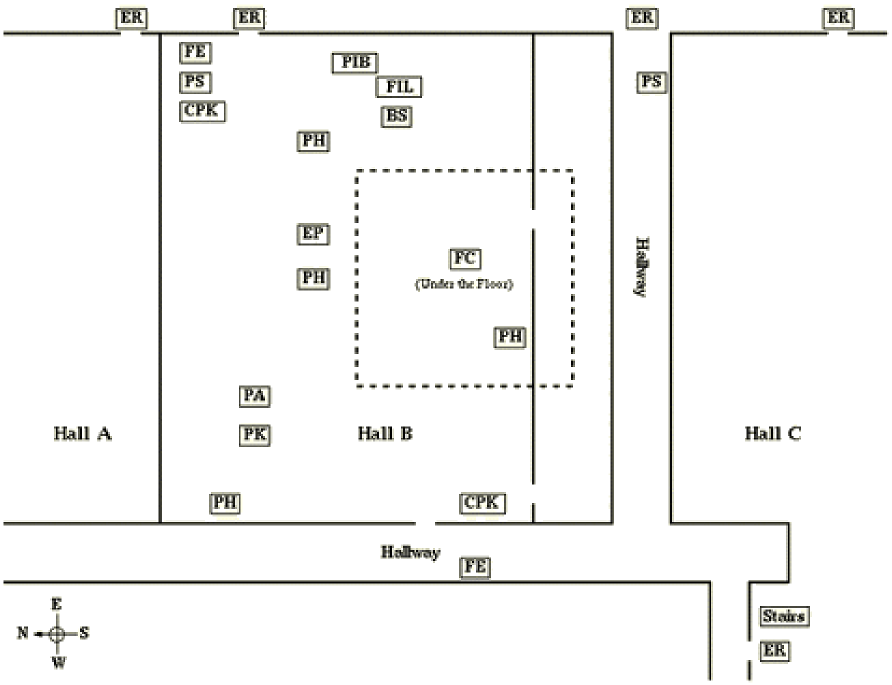

Figure 1: Counting room.

- Purpose of PSS.
- Five states of the system:

1. Restricted access.
   - training requirements only (key card reader enforced).
2. Sweep.
   - klaxon audible notification in hall.
   - arming of run-safe boxes (Safe, Operational, Unsafe) in each unoccupied area.
3. Controlled access.
   - key-controlled access; limited number can enter hall.
   - entrant's identity recorded, training and dosimeter checked.
4. Power permit.
5. Beam permit.

- Emergency beam cutoff switch.
- CCTV monitors – can be used to identify emergency conditions in hall.

- Fire Early Warning System annunciator box.
  - Brings together four related systems:
    1. VESDA – Very Early Smoke Detection Apparatus – a network of five smoke detector systems covering all structures in the hall. This system monitors its output and alarms at a much lower output level than the building fire alarm system, of which it is a part.
    2. Sniffer – a system for detecting gases given off by heated materials with ppm sensitivity.
    3. Linear heat sensors – monitor many fuels in the hall, alarms at 155 F.
    4. Crate monitoring system – monitors crates for overcurrent, overvoltage, loss of cooling, or overtemperature. Not yet implemented.
- Power kill buttons for Hall B – duplicates of those in the hall
- Power kill buttons for the counting room – by both of the two exits.
- Small fire extinguisher for the counting room – by the parking lot exit door.
- Fire pull station – by the parking lot exit door.
  - Policy requires activating these when smoke/fire is seen.
  - Automatically notifies MCC and Guard Post #2, activates fire alarm bell in local area.
  - Does not automatically call fire department.
  - No penalty for accidental false alarms

2.2 Hallway Outside the Counting Room

- Larger fire extinguisher than the one in the counting room.
  - Identify type, discuss differences between dry chemical and CO_2 .
  - Note that only people trained at JLAB may operate fire extinguishers.
  - Everyone is encouraged to attend Fire Safety I and II.
- Power failure phones.
  - All yellow phones on site are power failure phones.
  - Yellow phone's telephone number changes on power fail; power-failed number is posted on side of phone.

  - Black pay phone will also work if power fails, 911 call is free.

- Fire alarm bell on wall.
- First aid kit on wall.
- Two exits to outdoors from hallway; both have adjacent fire pull stations.
- Don't use elevators in case of fire.

2.3 Hallway in Front of Hall B Access Cage

- Nearest fire extinguisher is around the corner, near Hall A access cage.
- Fire pull station by door to stairway.
- Emergency escape from this area: up stairs if possible, otherwise through Hall B (via emergency access button) if path to stairs is blocked.
- Hall B PSS status box.
- ODH light.
- Bulletin board for safety-related summary postings.
- Whiteboard for up-to-the-minute postings.
- Hall B rapid access system (read instructions on box).
- Keys for controlled access.

2.4 Hallway between Access Cage and Door to Hall B

- Run-safe box.
- ODH detector.
- Sign-in board (to be replaced by card reader).
- Fire alarm bell.
- Safety bulletin cork-board.
- Important postings on back of door into Hall B.

2.5 Area Within Hall B Immediately Adjacent to Entrance Door

- Power kill buttons – by door and on corner of electronics racks.
- Fire pull station.
- Fire extinguishers (for hot work, or in emergency conditions).
- Cordless phone (emergency or non-emergency use).
- Yellow power failure phone in phone mini-booth.
- Fire Early Warning System annunciator box.
- Eye wash station.
- Run safe box.

3 Space Frame

3.1 Area Below Space Frame (Space Frame Level 0)

- Two Halon 1211 streaming agent fire extinguishers.
  - Need these because fuels cannot all be reached by conventional extinguishers – 30 ft range.
  - JLAB training covers these – can be dangerous if not used by trained person.
- Two ODH sensors.
- Tagger magnet vacuum box has thin window – hearing protection required.
- Fire extinguisher at foot of stairs.
- Smoke mask box at foot of stairs.
- Fire alarm pull station at foot of stairs.

3.2 High Current Power Supply Area (Space Frame Level 0)

- Four large, high-current DC power supplies.
- Mini-torus/pair spectrometer supply connected to different loads for photon beam experiments than for electron beam.
- Note route of black conductors (yellow labels) from light blue supply into floor of space frame.
- Note route of grey plastic-clad conductors from light blue supply following hall perimeter.
- Note route of black-jacketed conductors from other supplies into cable trays and into upstream alcove.
- Note route of grey-clad conductors from power supplies/switches into upstream alcove.
- Note run-safe box mounted on wall.

3.3 Space Frame Level 1 (including upstream tunnel interlocked exit)

- Fire extinguisher beneath tagger, against back wall (between Level 0 and Level 1).
- Smoke mask box at the top of the stairs.
- Two power kill buttons at the top of the stairs.
- Fire extinguisher at the top of the stairs.
- Fire alarm pull station at the top of the stairs.
- Three exits from this area:
    1. Stairs.
    2. Vertical escape ladder on southeast corner of this level.
    3. Emergency escape door at the end of the upstream tunnel. Note: this door is interlocked to the accelerator operation. The upstream tunnel is often posted at some level of radiological control and usually requires a dosimeter. The control gate in this tunnel is never locked, to permit emergency escape.

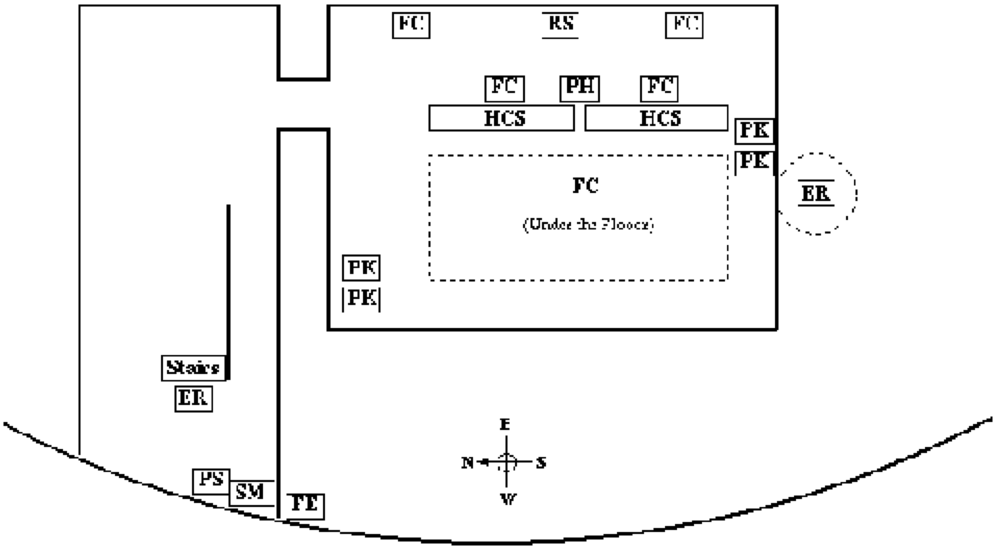

Figure 2: Space frame, level 1.

- Run-safe box at end of upstream tunnel.
- Run-safe box behind racks on south side of this level.
- Three major fuel concentrations:
  1. Full cable tray above the racks on the south side of this level.
  2. Full cable tray above the racks on the west side of this level.
  3. Cables in the interior region of the spectrometer, especially the vertical runs.
- Four hazards in the interior region of the spectrometer:
  1. Cryogenic hydrogen/deuterium liquid (explosion hazard if released).
  2. High current leads (up to 8000 A at 40 V) if minitorus magnet is in use.
  3. High magnetic fields.
     - Torus magnet (small fringe field, superconducting).
     - Mini-torus magnet, when used (small fringe field).
     - Polarized target magnet, when used (large fringe field, superconducting).

4. Thin vacuum foil and/or very thin-walled foam or carbon fiber scattering chamber.
    - Hazard to hearing if rupture occurs.
    - Potential for flying sharp debris if rupture occurs.

- Many high-current electronics crates underneath fuel.
- Two large DC high-current (8000 A) power supplies at this level.
  - Follow grey-clad conductors from supply to upstream tunnel.
  - Torus power supply (4000 A at 4 V).

4 Space Frame Level 2

- Smoke mask box at the top of the stairs.
- Power kill buttons at the top of the stairs.
- Fire extinguisher at the top of the stairs.
- Fire alarm pull station at the top of the stairs.
- Exposed fuel under subfloor.
- High current electronics crates.
- Cryogenics lines in crane operation area.
- Run-safe box on south end of this level.
- Fire extinguisher on south end of this level.
- Power kill button by fire extinguisher on south end of this level.
- Hydrogen gas line routed through this level.
- Second exit from this level via escape ladder.

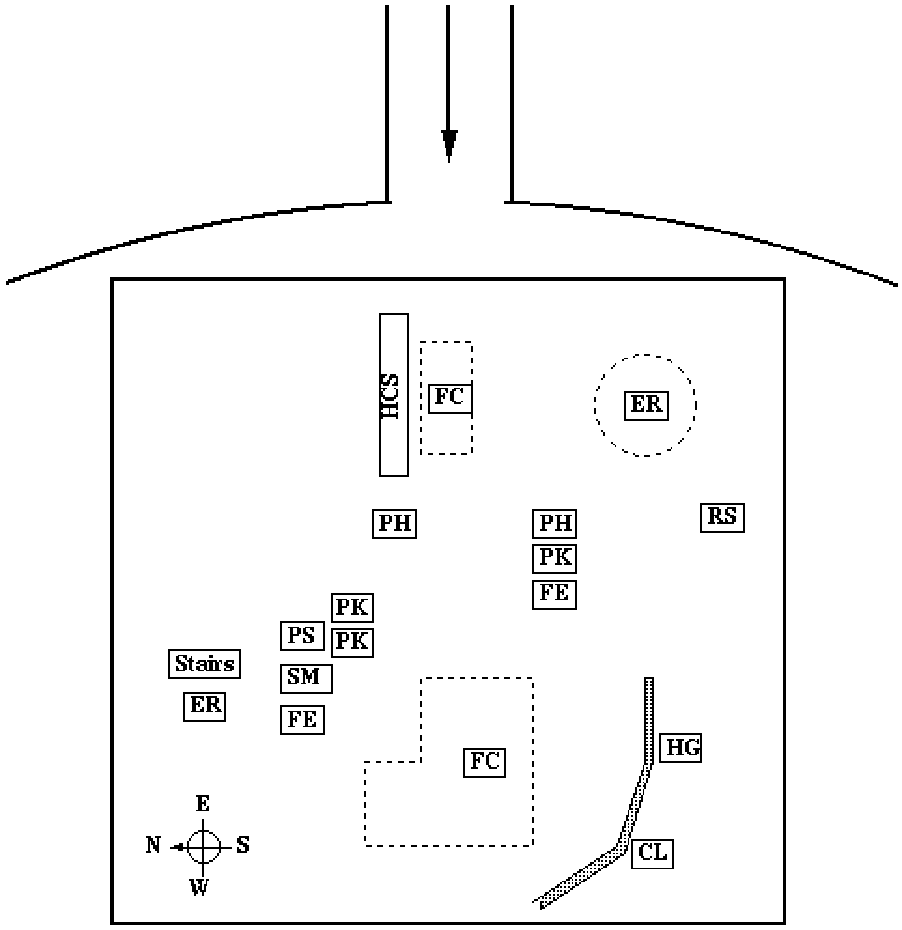

Figure 3: Space frame, level 2.

5 Space Frame Level 3

- Smoke mask box at the top of the stairs.
- Power kill button at the top of the stairs.
- Fire extinguisher at the top of the stairs.
- Fire alarm pull station at the top of the stairs.
- Exposed fuel under subfloor.
- Laser operating on this level.
- High current electronics crates.

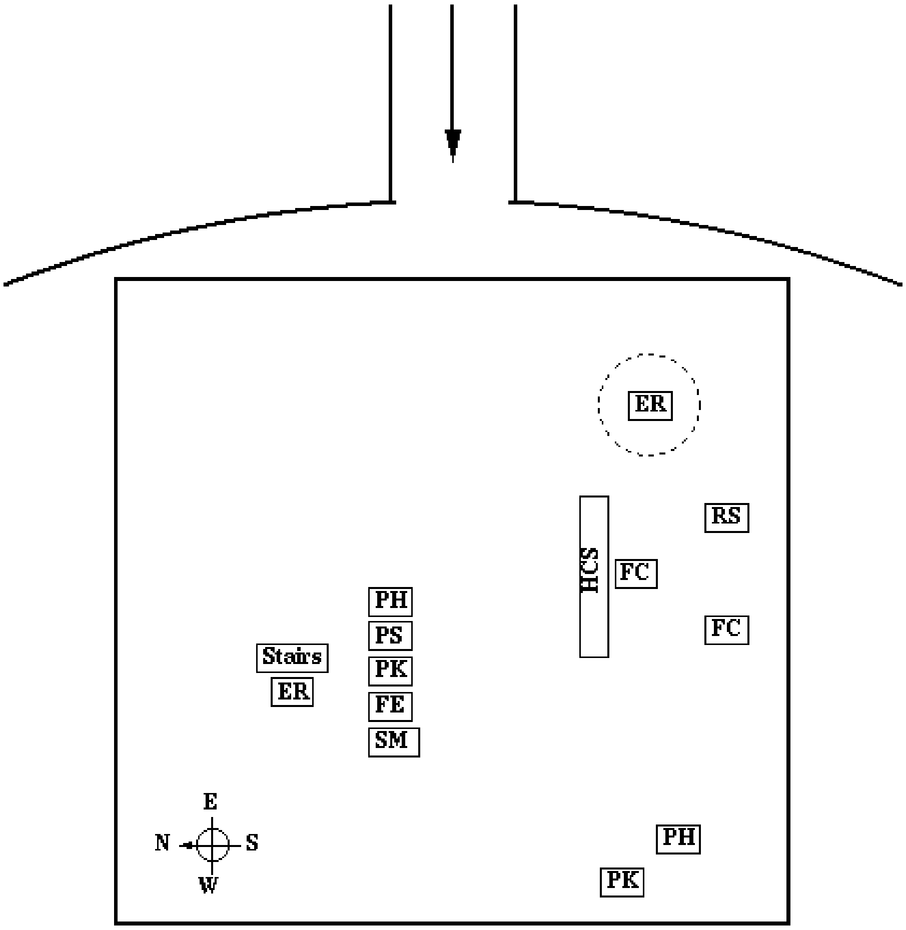

Figure 4: Space frame, level 3.

- Run-safe box on south end of this level.
- Power kill button on south end of this level.
- Second exit from this level via escape ladder.
- Severe crane hazard.
  - proximity between crane beam and roofs of sheds.
  - lock out the crane yourself before working there.
  - don't lean ladders against top of shed.
  - don't put toolboxes, etc on these roofs.
- ODH level 2 above crane level.

6 General Area, Ground Floor

6.1 IMPORTANT ISSUES FOR WORKERS IN THE HALL, ALL LOCATIONS:

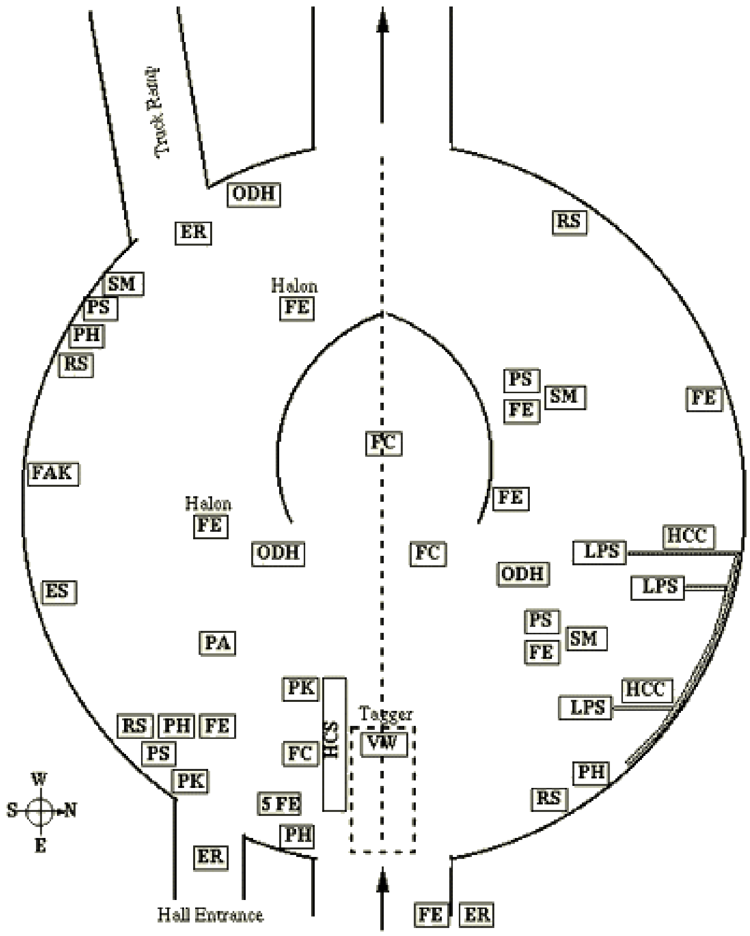

Figure 5: Hall B, ground floor.

- Transient trash – papers, plastic, tissues, cardboard, etc.:
  - Missing link between sparks and igniting more massive combustibles.
  - Remove from all areas in hall.
- Small cables:

– Missing link between brief flames from power supply apertures and igniting more massive combustibles.
– Route these away from openings in power supply boxes.

6.2 Area by Rollup Door to Truck Ramp, Floor Level

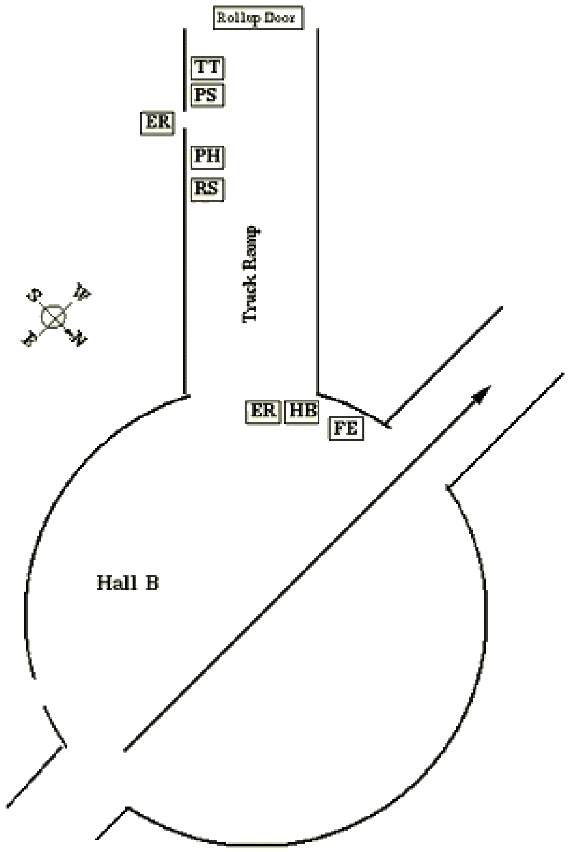

Figure 6: Rollup door, truck ramp.

- ODH monitor by North side of rollup door.
- Smoke escape mask box by access door.

- Truck tunnel not a protected escape from smoke in case of a fire; difficult to climb truck ramp in emergency situation.
- Fire pull station.
- Run safe box.
- Fire pull station and run safe box at top of truck ramp.

7 North and South Carriages

7.1 North Clamshell (North Side Carriage) Area, Floor Level

- Note grey-clad high-current conductor running along wall.
- Fire extinguisher mounted to wall.
- Potential trip hazards on floor (slip plates for carriage movement).

7.2 South Carriage Level 1

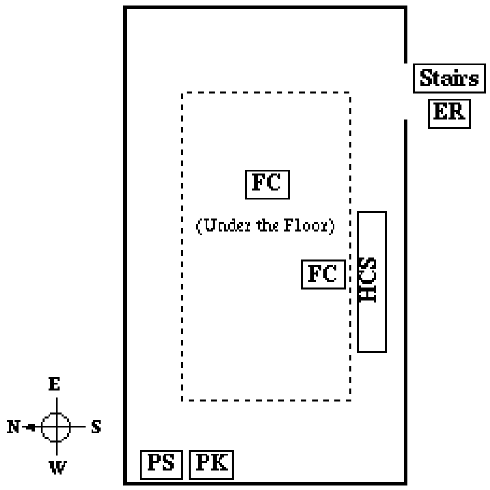

Figure 7: South Clam shell, level 1.

- Smoke mask box at the top of the stairs.
- Fire extinguisher at the top of the stairs.
- Fire alarm pull station (to be mounted) at the top of the stairs.
- Exposed fuel in subfloors.
- High current electronics crates.
- No run-safe box yet.
- Power kill button on west end of this level.
- One or two exits via portable stairs.

8 Forward Carriage, Pie Tower, North Clamshell Carriage, Downstream

8.1 Under "Pie Tower," Floor Level

- Fire extinguisher at base of stairs.
- Smoke escape mask box at base of stairs.
- Fire pull station at base of stairs.
- Run-safe box mounted on wall.

8.2 Forward Carriage Area, Floor Level

- Grey-clad, high-current conductors running up wall into downstream alcove.
- Potential trip hazards on floor (slip plates for carriage movement).
- Largest single fuel concentration in hall, in stacked coils of coaxial cable (solid polyethelene core, polyvinylchloride [PVC] jacket), bottom of forward carriage and south clamshell carriage.
- Other large fuel concentration in hall: Time of Flight counters - a few hundred exposed slabs of 2" thick polyvinyltoluene from 1' to 10' long, surrounding CLAS on all four carriages.

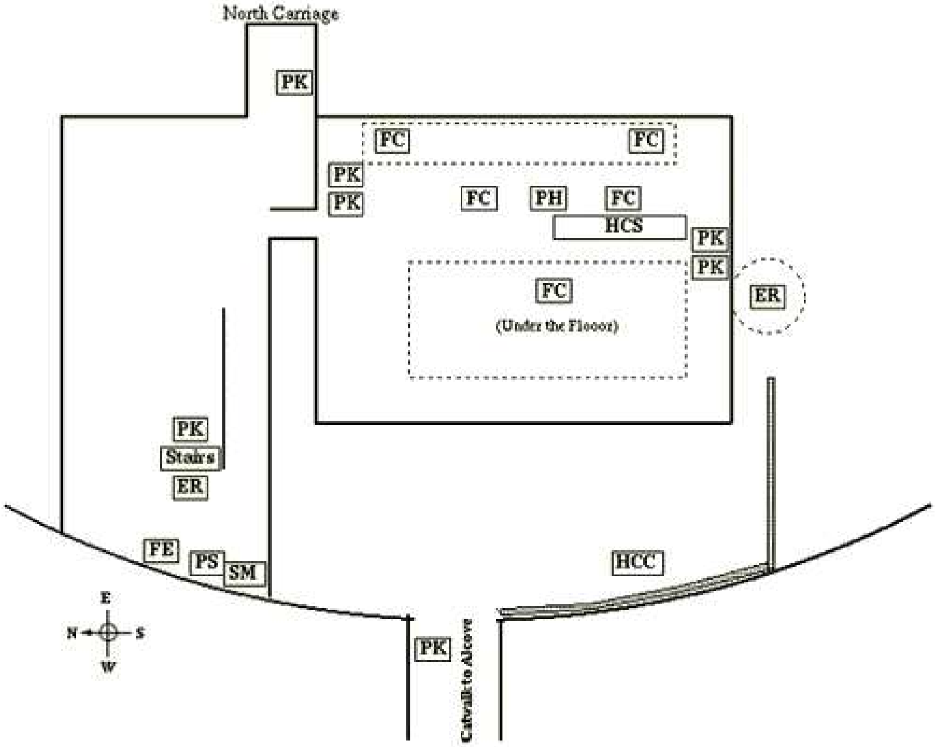

Figure 8: Forward carriage, alcove, level 2.

8.3 Alcove - Level 2

- Smoke mask box at the top of the stairs.
- Power kill button at the top of the stairs.
- Fire extinguisher at the top of the stairs.
- Fire alarm pull station at the top of the stairs.
- Exposed fuel in subfloors.
- High current electronics crates.
- Run-safe box deep inside downstream tunnel.
- Potentially radiologically posted area inside tunnel – dosimeter required.
- Power kill button in downstream alcove.

- Power kill buttons on both ends of Forward Carriage level 2.
- No second exit from Forward Carriage level 2 when carriage is retracted.
- Forward Carriage level 2 very congested, high fuel density, high ignition source density.

9 Forward Carriage Level 3

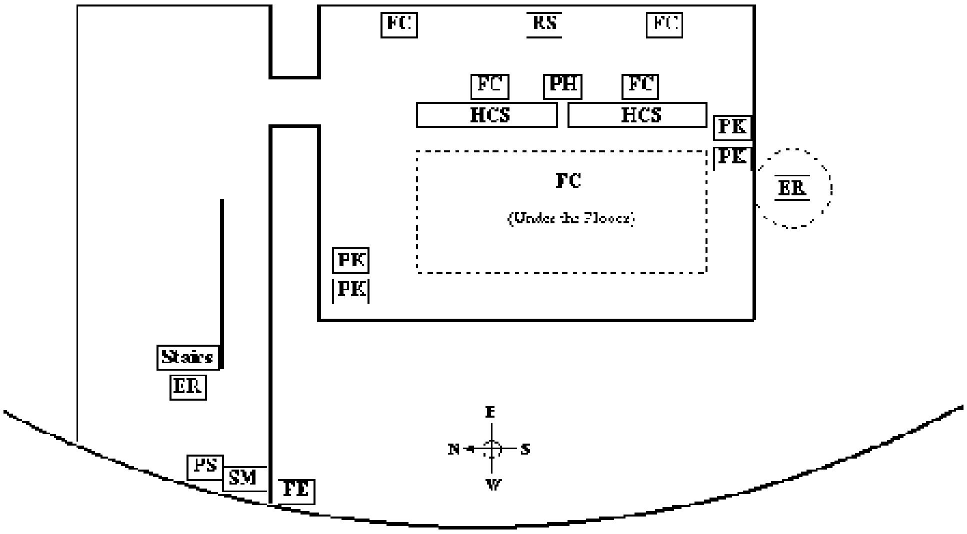

Figure 9: Forward carriage, level 3.

- Smoke mask box at the top of the stairs.
- Fire extinguisher at the top of the stairs.
- Fire alarm pull station at the top of the stairs.

- Exposed fuel in subfloors.
- High current electronics crates.
- Run-safe box at end of walkway.
- Power kill buttons on both ends of this level.
- Second exit via vertical escape ladder.

10 Forward Carriage Level 4

- Two exits via vertical escape ladders.
- Two power kill buttons on north end of this level.
- Two lasers operating on south end of this level.