Fermilab

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DRAFT US Department of Energy Underground Fire Protection Guide

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DGS-SEE Seminar on Fire Protection for Physics Research Facilities

7 & 8 October 2015

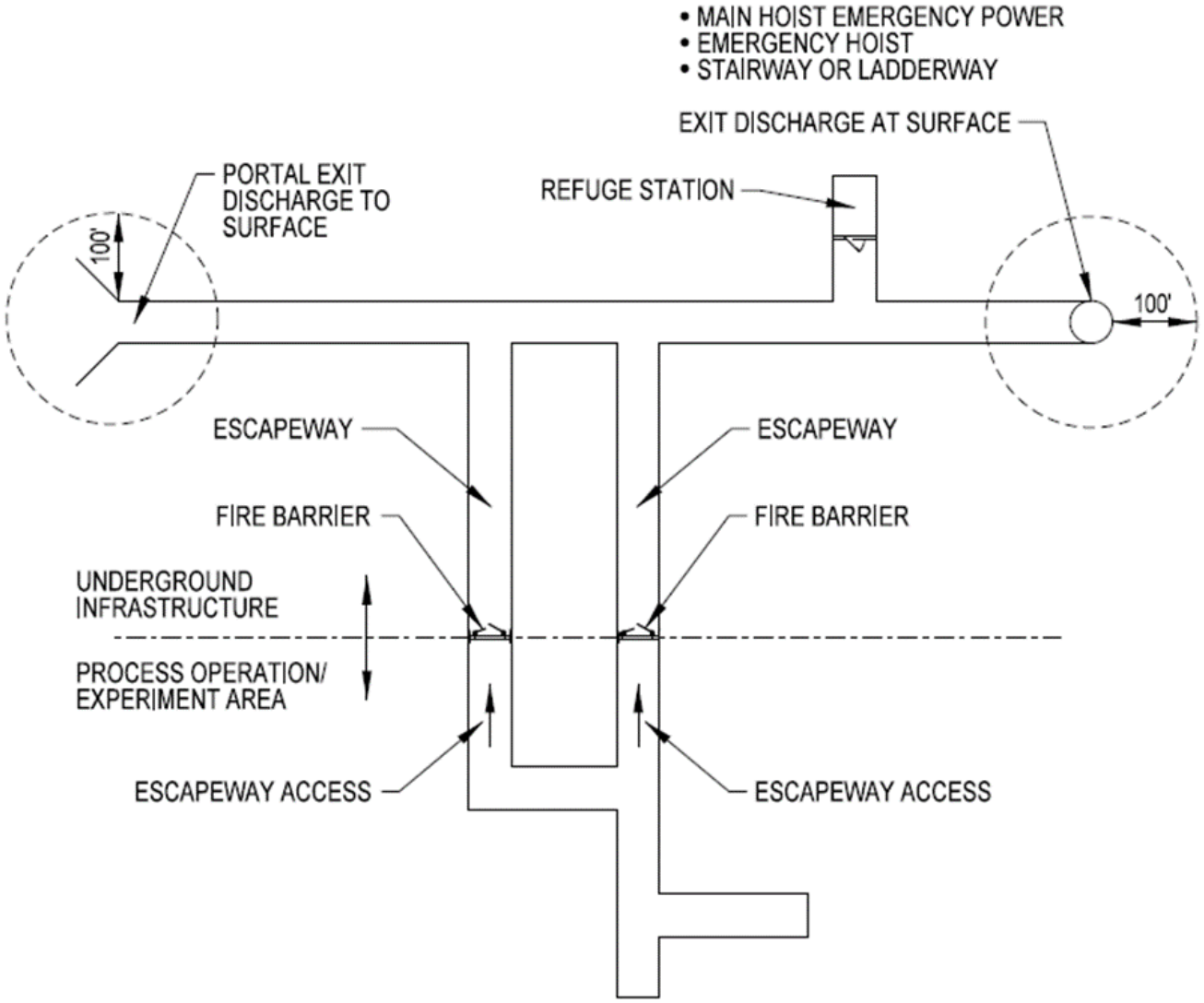
Disclaimer

- No US national safety organization wanted to develop a new standard or guide
- This guide is still being vetted by the US Department of Energy community

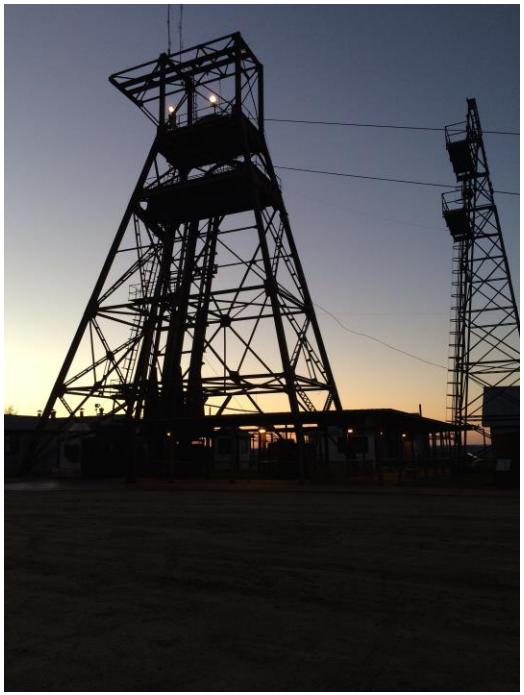
Organization

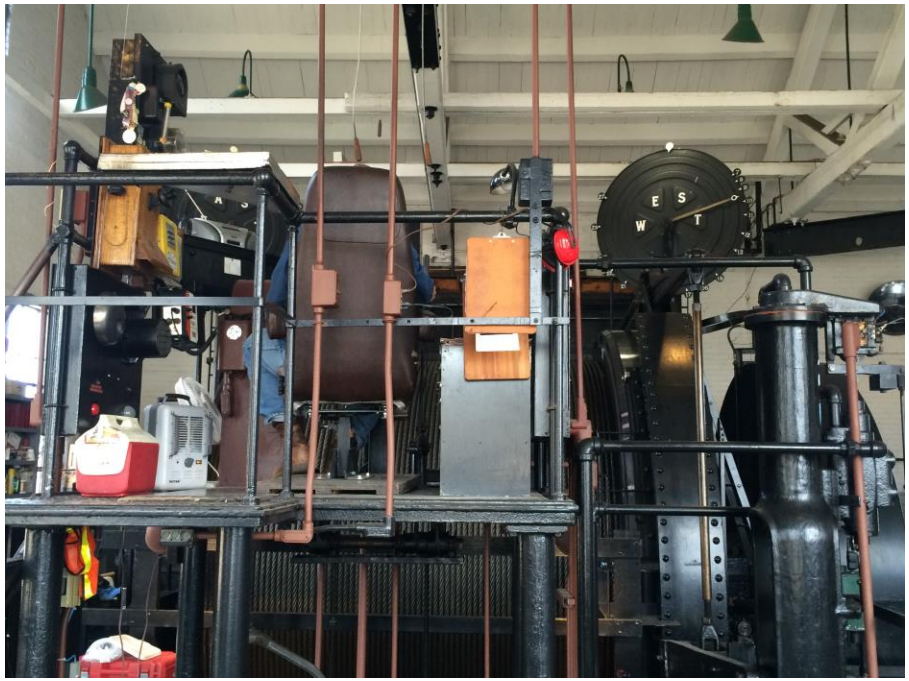
- Purpose
- Applicability and Scope
- Definitions
- Fire Prevention
- Fire Protection
- Means of Egress
- Fire Department Response
- Underground Facility Rescue
- Underground Facilities Services

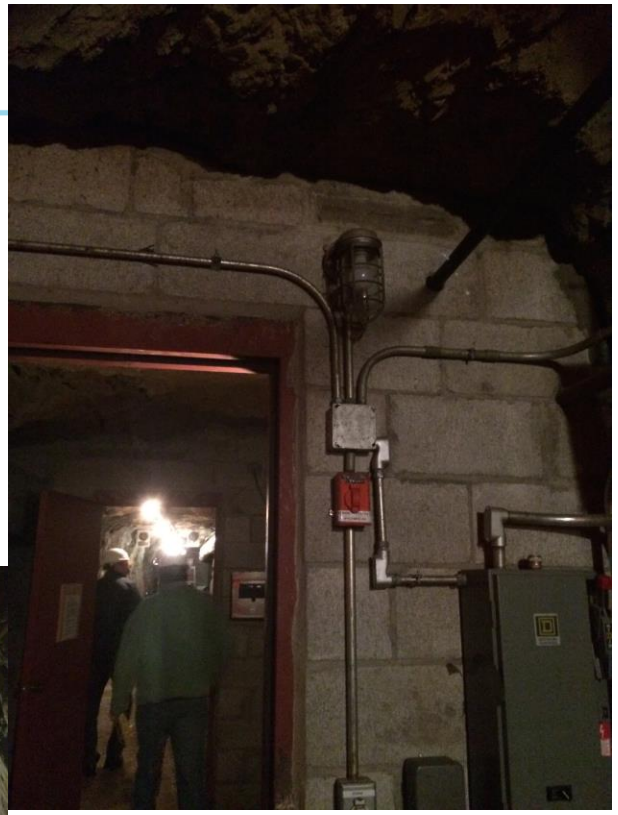
DOE Sample Facility

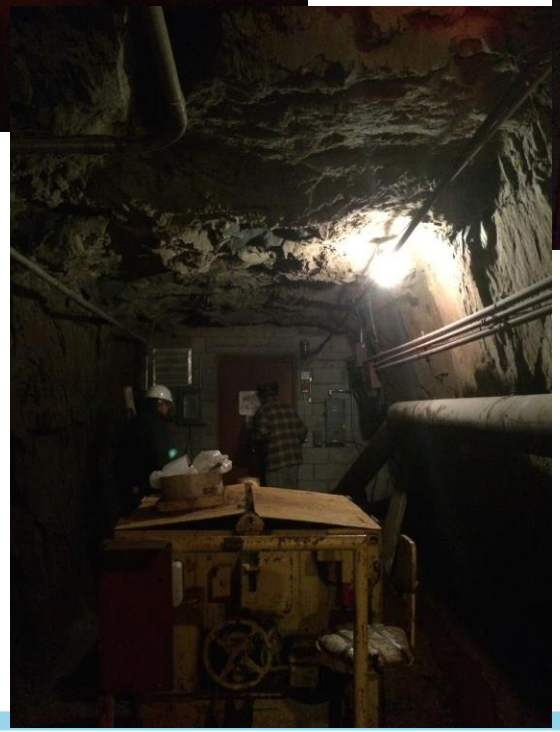


Soudan Mine









Soudan Mine Fire


DANGER
Keep
Shaft
Gates
Closed
DANGER
Keep
Shaft
Gates
Closed


Barber-Colman
NETWORK 8000™
Global Control Module


BREITUNG
B-1
FIRE
TOWER FIRE
ALTENBURG
Silv-ex

Facility	Location	Date	Hazard	Depth	Exits	Self Exiting Y/N	Limits on Number of People	Fire Suppression System	MSHA 57.1 or NFPA 520
Waste Isolation Pilot Plant (WIPP)	Chihuahuan Desert, outside Carlsbad, N.M.	March 26, 1999	transuranic (TRU) waste	2150 ft	3: Salt Handling Shaft, Air intake Shaft, & Waste Shaft	No	145	Protect vehicles with dry chemicals, Alarms, fire brigades, shafts.	MSHA:
Yucca Mountain nuclear waste repository	Nye County, Nevada	Not yet	spent nuclear reactor fuel and other high level radioactive waste	1,000 feet beneath the surface and 1,000 feet above the water table	4 The North Portal, designated ventilation intake shafts, South Portal, North Construction Portal.	N/A	N/A	Automatic (sprinkler), refuge stations, Rescue, isolation, ventilation Firewater, Fire suppression, Fire detection, Fire alarm, Fire notification, Explosion protection, Fire barriers	MSHA: NFPA 520: No
SLAC Linac tunnel	Menlo Park, CA	1967 (date of first linac beam)	Prompt radiation High intensity electron beam line for research purposes.	25 feet	Ladders every 333 feet (total of 15). Three stairwells to surface. Exit to grade at west end.	Yes	During long downs, no more than 100 people in linac tunnels.	Air sampling smoke detection, wall mounted C02 portable fire extinguishers. Fire hydrants at surface. Two cross-tunnel fire barriers.	MSHA-no. NFPA 520-no.
SLAC Beam Switch Yard (BSY)	Menlo Park, CA	1967	Prompt radiation from high intensity electron beam for research purposes	0 - 30 feet	One grade level exit, two ladders to surface, 5 exits through other tunnel spaces.	Yes	50 employees maximum during long downs.	Combination of spot-type smoke detection and air sampling detection. Wheeled and portable CO2 fire extinguishers.	MSHA – No. NFPA 520—under review.
SLAC LCLS	Menlo Park, CA	2007 (first beam)	Prompt radiation from electron and x-ray beam pulses used for research.	0 – 70 feet	One grade exit, two stairwells, one ramp up to grade	Yes	Varies, but no more than 60 employees in any one fire area	Sprinklers, wall-mounted CO2 fire extinguishers, spot type/beam type/VESDA smoke detection (varies by area)	MSHA—no. NFPA 520-no.
Fermilab- NuMI	outside Batavia, Illinois, near Chicago	November 21, 1967 (as National Accelerator Laboratory	neutrino beam generated MI-65 Target Hall and MINOS Detector Hall)	150 ft to 350 ft	2-hour fire rated, 44-in width pressurized passageway, stair, & egress elevator	Yes	50 Occupants	Emergency voice fire alarm system, heat & smoke detection, sprinklers	MSHA 57.1: n/a NFPA 520: Yes

Fermilab- ILC	**outside Batavia, Illinois, near Chicago**	**Future**	**International Linear Collider – Conceptual Design Phase only. Currently this project is unfunded**	**350 ft**	**2 & refuge areas with 2 hour fire barriers, stairs > 44 in. Wide, and doors > 36 in. wide.**	**Yes**	**<50 Occupants**	**fire alarm system, heat & smoke detection, sprinklers**	**MSHA 57.1: n/a NFPA 520: Yes**
Fermilab - LBNE	outside Batavia, Illinois, near Chicago	November 21, 1967 (as National Accelerator Laboratory	Long baseline neutrino experiment – Conceptual Design Phase	320 ft	2-hour fire rated, 44-in width pressurized passageway, stair, & egress elevator	Yes	50 Occupants	Emergency voice fire alarm system, heat & smoke detection, sprinklers	
University of Minnesota – Soudan Underground Laboratory	Near Ely Minnesota	1900-est. mine 1980- est. lab	Several Experiments (MINOS long baseline neutrino experiment receives a beam of neutrinos from Fermilab).	2,340 ft	Fire Rated Single Shaft Elevator		average -11; maximum- 36	fire alarm system, heat & smoke detection, Automated suppressant system- sprinklers, Extinguishers, and 1 escape chamber (shafts), ventilation	
Sanford Underground Research Facility - SURF (Deep Underground Science and Engineering Laboratory, DUSEL)	Homestake, SD	2002	Experiments LUX- the most sensitive detector yet to search for dark matter cryogens and other hazardous materials	4850 ft below ground	2: Primary and secondary	Yes		**two means of access/egress will be provided Notification of an emergency "stench gas" system	MSHA 57.1: Yes NFPA 520: Yes
Nevada National Security Site	Nye County, NV	1950s	8 active & 14 inactive facilities; hazards vary by facility but may include explosives, radioactive materials, wood, paper, oils, etc.	Varies from hundreds to thousands of ft	Shafts and portals depending upon the facility	Yes and no, varies by facility. One facility has 3 shafts and the others have portals	Varies by facility and by activity	Varies by facility: Portable fire extinguishers, fire alarm systems, squawk boxes, miners cap lamps & emergency lighting, refuge stations, no automatic suppression.	No & No**
Ultra Low Background Counting Laboratory 3425 Building PNNL	Richland, WA	2010	R&D Lab with some hazardous materials, cryogens	40 ft	2 exits – one at each end of the building	Yes	30 – typically less than 10		N/A This is a building built per IBC and NFPA 101

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