



**CENTERS FOR DISEASE[™]
CONTROL AND PREVENTION**

Summary of U.S. Mines with Refuge Chambers

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Office of Mine Health and Safety



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Disclaimer:

The findings and conclusions in this report have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy.

Introduction

The National Technology Transfer Center (NTTC) was asked by the National Institute for Occupational Safety and Health (NIOSH) to identify the mines within the United States of America that contain refuge chambers. Specifically, NIOSH requested that the following information be included in this report:

1. Compile a listing of all underground mines in the United States that currently have refuge chambers. The listing will include mine name, mine location, type of mine and type of chamber.
2. Provide all relevant information on the design characteristics of the refuge chambers. This would include size, construction information and any and all information related to the chamber itself including communication systems, sanitation facilities, storage of food and water supplies, etc.
3. Where possible collect design specifications including engineering drawings, location within the mine complex and pictures.

The attached report summarizes the information that the NTTC was able to compile using primary and secondary resources. A short summary outlines the research and information about compiling methods as well as the limitations to the information provided. The remaining portions of the report are summary tables containing the available information about the mines, refuge chambers, and persons contacted during the research of this report. The report provides as complete a set of information as possible given the constraints of time and manpower.

Definition of Refuge Chamber

In the United States, there are different terms used to describe what is termed in this report as a refuge chamber. The reason for using different terms is to avoid MSHA Metal/Nonmetal mining refuge chamber requirements. MSHA requires refuge chambers for mines that do not have secondary escape routes (Gary Gomez, MSHA South Central District). If a refuge chamber is required, it needs to be connected to mine water lines, compressed air lines, and have two forms of communication. A designated refuge chamber also is inspected by MSHA. For this reason, mines that are not required to have refuge chambers will designate a safe area that can be sealed from the rest of the mine and use a different term such as 'designated place of safety.' By doing this, the mine can avoid the MSHA requirements for refuge chambers.

For the purposes of this report, a refuge chamber is an area, place, haven or shelter within an underground mine that can be sealed off from the rest of the mine in order to protect miners who are unable to get out of the mine in an emergency. The shelter contains equipment (such as food, air, water, first aid, communications, and sanitation facilities) that allow the miners to survive until they can be retrieved or escape. Common words and phrases used to describe these places include mine refuge, refuge chamber, mine safe haven, and designated places of safety (DPOS).

Methodology

The initial phase of the research portion of this effort involved identifying mines and mining companies that use refuge chambers. A preliminary list of mines containing refuge chambers was identified by searching internet sources (mine company web sites, mine association web sites, Mine Safety and Health Administration (MSHA) web sites, and state mine-safety related websites) and contacting agencies and persons with expertise in or knowledge of refuge chambers. Once identified, the agencies and people were contacted by email and/or telephone. The NTTC identified the names of 54 mines that contain refuge chambers. NTTC also obtained specific information on some of these mine's refuge chambers from State mine inspectors, Federal (MSHA) inspectors and industry contacts.

MSHA Headquarters also was contacted to determine if they had any mine refuge information. MSHA indicated that a similar list of United States mines containing refuge chambers was being compiled by the Applied Engineering Division (AED) of MSHA's Approval and Certification Center. NTTC and AED met to discuss and compare findings. AED obtained their information from the MSHA District Offices (6 Metal/Non Metal and 11 Coal offices). The information they compiled identified 28 mines that contained refuge chambers. They also knew that there were approximately 50 mines in the US that had refuge chambers. This information supported the information compiled by NTTC.

In order to avoid duplication of effort, the NTTC and AED began working together to compile a list of contacts that could provide detailed information on mine refuges for the mines identified. Initially, NTTC and AED attempted to obtain the contact information for company mine personnel involved in refuge chamber oversight (safety personnel, engineers, and executives). The AED provided contact information for 28 mines and agreed to attempt to identify email addresses for 6 of those mines. The NTTC attempted to identify the remaining 26 mine contacts.

Specific information on the mine's refuge chambers was primarily through direct contact company personnel. The AED was restricted by federal law to contacting 9 mines. The NTTC was tasked to obtain the information about the 45 remaining companies. At the time of this report submittal, mine refuge chamber information has been obtained for 40 of the 54 mines identified and is included in Table 1. A listing of the states that do not have mines with refuge chambers is included in Table 2. A total of 155 people were contacted by email and/or telephone to obtain the information summarized in this report. This list is provided in Table 3.

Summary of Results

A total of 54 United States mines with refuges were identified. Of those mines, two no longer contain a chamber, one may not have a chamber, and 19 mines are reported to have chambers but this information is not confirmed. The NTTC was able to obtain more detailed information on the remaining 32 two mines identified. There also was conflicting information on the types and number of chambers located within some mines. The attached Table 1 provides a complete summary of the refuge information obtained for each mine identified.

The total number of mines with refuge chambers is not certain because: 1. the mines identified may be an incomplete list since all US mines were not contacted as part of this study; and 2. the total number of refuge containing mines are subject to change. Current MSHA metal/non-metal regulations require a mine or mine section to have a refuge chamber if there is only one egress route. As mines develop new areas, it may be necessary to use refuge chambers as these areas may not have an emergency escape route until development is complete. Additionally, mine companies have begun to proactively require refuge chambers in their mines. For example, Newmont Mining Company issued a corporate mandate requiring the installation of refuge chambers in their mines by the end of 2006 (Matt Burwell, DEA Inc.).

Of the 54 mines identified, only 3 coal mines were identified as having refuge chambers. The remaining mines were metal/non-metal. Mines that formerly contained chambers and mines that indicated that they plan on installing chambers were included in the total number. The following provides a complete breakdown of the mine types:

| <u>Mine Type</u> | <u>Number with Refuge</u> |
|------------------|---------------------------|
| Coal | 3 |
| Gold | 15 |
| Copper | 1 |
| Lead/zinc | 10 (possibly 12) |
| Limestone | 3 |
| Molybdenum | 1 |
| Oil Shale | 1 |
| Platinum | 2 |
| Potash | 3 |
| Radioactive | |
| Storage | 1 (unconfirmed) |
| Salt | 4 |
| Silver | 4 |
| Trona | 4 |
| Uranium | 2 |
| <u>Total</u> | <u>54</u> |

The following provides a breakdown of what types of refuges were found in the mines:

| <u>Chamber Type</u> | <u>Number of Mines</u> |
|-----------------------|------------------------|
| Built-in | 11 |
| Portable | 20 |
| Built-in and Portable | 4 |
| <u>Unknown</u> | <u>19</u> |
| <u>Total</u> | <u>54</u> |

The construction specifications for, and locations of, the built-in refuge chambers varied. Generally, these chambers are constructed in drifts or excavated areas along a main escape route or near an escape shaft. Typically, they have steel end-walls that have sealable steel doors sealing the ends. Water, electricity, and compressed air are hard connected to the shelter and supplied through the mines' system. Many chambers have backup lighting, water, and air. Other construction methods include building a wooden structure and covering it with a coating of shotcrete. All chambers had communication capabilities such as leaky feeder systems, mine pager telephones, or radios. Summaries of the specifications for built-in chambers are included in Table 1.

Attachment A contains a presentation with pictures and general specifications for refuge chambers in the Balmat Mine No. 4. Pictures of the refuge chamber in the National King Coal mine are provided in Attachment B.

The construction specifications for and locations of the portable chambers varied. They are typically located within a short walking distance of the work area. Portable chambers are either made by the mining company, a local fabrication shop, or are ordered from refuge chamber manufacturers. Their construction varied. The structures are typically of steel construction and are welded onto pallets for ease of transport. They contain supplies including water and first aid. The simpler units have sealing compound to seal doors and no stand alone supply of compressed air, and limited supplies. The manufactured chambers have more supplies, are self sealing, and can contain compressed air, monitoring equipment, toilets, and air scrubbing equipment. All chambers had communication capabilities such as leaky feeder systems, mine pager telephones, or radios. Summaries of the specifications for built-in chambers are included in Table 1.

Attachment C is a drawing and pictures of the DEA Round Chamber design and Attachment D contains a drawing and pictures of the DEA 16-man chamber. A presentation providing general specifications and photographs of the MineArc refuge chambers is found in Attachment E.

Limitations

When reviewing the data and results presented in this report, certain limitations need to be considered.

- Not everyone contacted responded to the inquiry.
- Information was obtained over a 2 month period. Additional time would provide more robust information and allow the 19 companies that have not provide information due to time constraints. Additional mines also might be identified given additional time.
- Two companies expressed concern over sharing information with NTTC. That number may increase as the remaining 19 companies are contacted.
- MSHA is limited in the assistance they can offer NTTC. They are not permitted to contact more than 9 companies without receiving special permission as Federal law prevents them from performing a survey of more than 9 companies.

Summary and Recommendations

The research outlined in this report provides the most comprehensive information on the use of mine refuge stations in the United States. The number of mines utilizing some sort of refuge was greater than initially anticipated and across a wide range of mining sectors. Due to the short time requirements of this study, there is a probability that not all refuges have been identified and that a large amount of information about known refuges can still be collected.

The information in the report includes responses from mine operators and MSHA received by January 31, 2007. It is anticipated that additional responses to the NTTC inquiries will be received after this date and some mechanism should be developed to ensure incorporation of this additional data. Therefore, the NTTC recommends that a follow-up project be established that allows for the collection and documentation of this information. This project would be a low level effort over a longer period of time to allow NTTC personnel to continue to interact with the mine operators and MSHA technical personnel on issues related to mine refuge chamber developments and report back to NIOSH.

TABLE 1

**UNITED STATES UNDERGROUND MINES KNOWN TO
CONTAIN REFUGE CHAMBERS**

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|----------|---|--|---|---|-----------------|--|
| Alaska | Teck Cominco American | Dave Godlewski VP, E&PA Teck Cominco American | Pogo Mine Fairbanks, AK 2 dia | Mine currently does not have any underground refuge chambers. Miners can exit any area of the mine in less than the required MSHA time through multiple exits. During the mine development they used two, 6 person portable refuge chambers. They do have plans to construct two refuge chambers in 2007 as follows: Location: They are to be constructed in 15'W x 15'H x 15'L drifts previously used for diamond drilling along the main mine ramp. Also developing new ore body, L2, and will construct a refuge off that access ramp. Construction Specifications: Drift will be covered with shotcrete and the chamber will have a capacity of 10-15 miners. Supplies and Features: Information not included in description provided. | Gold | Dave Godlewski VP, E&PA Teck Cominco American |
| Arizona | Cementation USA Inc. (also listed as Resolution Copper Mining LLC) | 1. Bill White, Safety Superintendent 2. Mike J. Wegleitner, Manager of H&S 520-689-9374 Ex. 39 | Resolution Mine Superior, AZ 1 part. | Contains 1 round model DEA, Inc. refuge chamber. See Attachment C for diagram and pictures of this chamber. 1/11/07 - Emailed Bill White (Safety Engineer for Resolution) and asked him for specifications on his refuge chambers. 1/30/07 - Left telephone message with Mike Wegleitner. MSHA Website indicates this mine is non-producing. | Copper | 1. MSHA District 2. Bill White Safety Superintendent Resolution Mine 3. Mike J. Wegleitner, Manager of H&S Resolution Mine |
| Colorado | Twentymile Coal Company | Dianna Ponikvar-Scott Safety Supervisor Twentymile Coal Company | Foidel Creek Mine Oak Creek, CO 1 dia | Mine has a single, built-in chamber. They are looking at the option of getting portable refuge chambers for each working section but have not made a decision whether to obtain and install any at this time. Location: The chamber is located next to a main air shaft in the central portion of the mine. This location is accessible to all working areas of the mine and has access to the surface through the adjacent air shaft. Construction Specifications: The chamber is built into the seam with coal ribs for walls and has cement block stoppings with sealable steel doors at the end. Supplies and Features: The chamber is supplied by water and compressed air lines. It contains meals ready-to-eat (MRE), a portable toilet, water, a shower, and supplemental roof support. Air is monitored using a CO and CH4 monitor. They do not have any bottled air as a supplemental air supply. | Bituminous Coal | 1. Bill York-Fern State of Colorado |

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|-------------------|---|---|--|--|--|--|
| Colorado (cont'd) | National King Coal, LLC | Dan Redetzke Mine Engineer National King Coal | King Coal Mine Hesperus, CO | Mine contains one built-in chamber. Pictures of chamber are included in Attachment B. Location: Approximately 6,500' in by the portal and approximately 8,000' out by the projected point of furthest penetration, at entry #5, between cross-cuts 39 and 40 in 2-south mains. Construction Specifications: Two concrete block walls at each end with 5' x 5' steel doors in each wall to form an airtight at ends of chamber. Sidewalls are coal ribs. Size is approximately 1,500 sq. ft and the chamber can accommodate 15 persons for 48 hours. Has a 6-inch borehole connecting chamber to the surface. Supplies and Features: Contains enough food, water, and lightsticks for 15 persons for 48 hours. Has blankets and sleeping pads for half of occupants to rest at a time and a PETT toilet system. There is one ton of bagged rock dust, 48 draeger tube air samplers (1 per hour), a dedicated air oxygen line and a telephone line supplied through the 6-inch borehole to the surface. A 16/4 electrical cable telephone line connects from the surface to Ferco mine telephones located inside and directly outside of chamber for communications with rescue personnel. | Lignite Coal | William Reitze District 9 MSHA |
| | Phelps Dodge Corporation and Climax Molybdenum Company Cortier Corporation | Chris Rose Health and Safety Manager | Henderson Mine Empire, CO 4-5 | MSHA (Andy Yanik) is in process of obtaining information from Mr. Rose. In an initial contact, Mr. Rose indicated they had 4 chambers and they are in the process of installing another. 2/1/07 - Mr. Rose is in the process of compiling specifics on the refuge chambers. | Molybdenum | 1. MSHA District 2. Bill York-Fern State of Colorado |
| | Mount Royal Ventures LLC | | C-JD-9 Nucda, CO C-JD-8 Gulnare, CO Cash Mine Idaho Springs, CO | MSHA to contact company, obtain information, and provide to NTTC. MSHA to contact company, obtain information, and provide to NTTC. MSHA to contact company, obtain information, and provide to NTTC. | Uranium- Vanadium Uranium- Vanadium Gold | MSHA District MSHA District MSHA District |
| Idaho | New Jersey Mining Co. | Grant Brackebusch, P.E. New Jersey Mining Co. | Golden Chest Mine | Mine has one built-in refuge chamber. Many of the specifications were not included in the description provided. Additional information has been requested. Location: Not included in description provided. Construction Specifications: Not included in description provided. Supplies and Features: supplied with hand tools, drinking water, stopping material, a compressed air line and a water line. At the New Jersey mine we are just starting an exploration crosscut so we do not have a refuge chamber. | Gold | Grant Brackebusch, P.E. New Jersey Mining Co. |
| | U.S. Silver - Idaho, Inc. | Dave Gray Safety Director Galena Mine | Galena Wallace, ID | Called Mr. Gray on 1/29/07. He indicated that he was in training did not have a chance to discuss refuge chambers today. He provided his email address and an email was forwarded to him requesting specifics of their mines refuges on 1/29/07. | Silver | MSHA District |
| | Placer Mining Corporation | Robert Hopper President | Bunker Hill Mine Kellogg, ID | Spoke with Mr. Hopper and he indicated that he would like his MSHA Boise contact Ron Jacobsen to email him indicating that he is aware of my efforts. This was done and contact was attempted on 1/30/07. | Lead/Zinc | MSHA District |

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|----------------|-----------------------------|---|--|--|----------------|--|
| Idaho (cont'd) | Hecla Mining Company | Jim Angle Safety Coordinator and Jon Jordan Chief Engineer Lucky Friday Mine | Lucky Friday Mullan, ID AA Report 2 | <p>Mine contains an unknown number of permanent refuge chambers. Information on the chambers varied. The descriptions of the chambers varied by the three people who provided information on the mine (Jim Angle, Jon Jordan, and Robin McCulloch). Jim Angle indicated that he would provide additional information on the refuge chamber in a follow-up email.</p> <p>Location: According to Jon Jordan, the chambers are located on each operating level and they are made from mined openings. They are typically dual purpose locations (shifters office, shop area, or mined out area that is also a refuge chamber).</p> <p>Construction Specifications: Jim Angle indicated that the refuge chambers are fabricated by constructing a chamber out of wood and covering it with a layer of shotcrete. A steel door is welded onto the side for an entry. The most recently constructed chamber was built as follows: 4x6 wood frame covered with wood, wired, and then coated with shotcrete. Robin McCulloch indicated that the mine has a chamber that is a 10' x 20' container vessel stocked with supplies.</p> <p>Supplies and Features: Jon Jordan indicated that he was uncertain of the specific contents of the chambers but knows that they are supplied by compressed air and water lines and contain first aid and water. Communications are by pager telephone and dial telephone systems.</p> | Silver | 1. MSHA District 2. Robin McCulloch MT State Bureau of Mines |
| | Sterling Mining Corporation | Daniel Groves Safety Supervisor | Sunshine Mine Kellogg, ID 3 per 1 per | <p>They are in the process of reopening their mine that has been shut down since 2001. Mine currently has only one egress point so they are constructing three permanent refuge chambers and have one portable chamber. The portable chamber is in the Sterling Tunnel being dug to connect the Sunshine mine to the adjacent Con-Sil Mine (aka. Silver Summit Mine). When the tunnel is completed, the refuge chambers will not be needed since there will be a secondary escapeway through the tunnel to an escape shaft being reconditioned within the Con-Sil mine. This escape shaft is currently in disrepair and its base is flooded. Once the tunnel dig and shaft refurbishment is complete, the chambers will not be needed but will remain in place.</p> <p>Portable chamber – Location: Contained in the tunnel being constructed and located near working face. It is moved by bucket loader as the excavation advances. Construction Specifications: Constructed of 1/8-inch steel by a local fabricator to the following dimensions: 7.5' long x 8' tall x 6' wide.</p> <p>Supplies and Features: Contains piped-in air and water lines (with compressed air and water bottle backup), first aid supplies, dry toilet with lime, and a pager telephone for communication. No air purifying or monitoring equipment is present.</p> <p>Permanent Chambers – Location: Chambers are being constructed adjacent to main shaft (Jewell Shaft) at the mines 3 levels (2,500, 2,700, and 3,100 feet). The 2,500 level chamber is currently under construction and will serve as a staging area, lunch room, and refuge chamber. The 2,700 and 3,100 level chambers will be dedicated refuge chambers only. Construction Specifications: The shell and door are constructed of wood (4x6 frame covered with sheet goods). The exterior is painted with fireproof paint and the interior is lined with plastic burlap to provide a seal so that the chamber has positive pressure. Plastic Burlap also is used to seal the door.</p> | Silver | MSHA District |

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|----------------|--------------------------------------|--|---|---|----------------|---|
| Idaho (cont'd) | Sterling Mining Corporation (cont'd) | Daniel Groves Safety Supervisor (cont'd) | Sunshine Mine Kellogg, ID (cont'd) | <p>Supplies and Features: Each chamber contains piped-in air and water lines (with compressed air and water bottle backup), first aid supplies, dry toilet with lime, and a pager telephone for communication. They plan to have food and alternative lighting but are uncertain of the type of each. The size of the chambers is unknown until they determine number of potential occupants. No air purifying or monitoring equipment is present.</p> <p>Location: One permanent chamber located adjacent to the escape shaft within mine. It is in place while the escape shaft is being refurbished.</p> <p>Construction Specifications: The shell and door are constructed of wood (4x6 frame covered with sheet goods). The exterior is painted with fireproof paint and the interior is lined with plastic burlap to provide a seal so that the chamber has positive pressure. Plastic Burlap also is used to seal the door.</p> <p>Supplies and Features: Each chamber contains piped-in air and water lines (with compressed air and water bottle backup), first aid supplies, dry toilet with lime, and a pager telephone for communication. They plan to have food and alternative lighting but are uncertain of the type of each. The size of the chambers is unknown until they determine number of potential occupants. No air purifying or monitoring equipment is present.</p> | Silver | |
| | | | Con-Sil Mine Silver Summit Mine Kellogg, ID | | Silver | |
| Kansas | Lyons Salt Company | Steve Kadel President and General Manager Lyons Salt Company | Lyons Salt Company Lyons, KS | <p>Mine contains one built in refuge chamber.</p> <p>Location: The chamber is built in a drift adjacent to the escape shaft and is an integral part of the escape shaft. It has been used only for access to the escape shaft because the main hoist was down, not because we had a mine disaster.</p> <p>Construction Specifications: Dimensions are 12' x 30' and can accommodate 30 people. It contains cinder blocks, brattice, 2x4's, nails, tools. Connected to the surface by an air shaft.</p> <p>Supplies and Features: It has pipe supplied water and air, blankets, sleeping bags, a first aid kit, and a land line telephone for communication. Additional supplies can be towed to the chamber by the air shaft. No air monitoring or sanitation is contained in the chamber.</p> | Salt | MSHA District |
| | Independence Salt Company | | Independence Salt Company Kanopolis, KS | MSHA to contact company, obtain information, and provide to NTTC. | Salt | MSHA District |
| | Hutchinson Salt Company | | Hutchinson Salt Company Hutchinson, KS | MSHA to get email address and NTTC will contact. | Salt | MSHA District |
| Kentucky | Rogers Group | Ed Elliot Safety Supervisor | Jefferson County Stone | MSHA Table indicated that there was a chamber within the mine. Ed Elliot (mine Safety Supervisor) indicated that they do not have any refuge chambers and they have not had them in the past. They feel that using SCSRs is adequate for escape purposes in a hardrock mine. However, they are currently looking into the possibility of using refuge chambers. | Limestone | MSHA District |

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|-------------------|------------------------|---|---------------------------------|--|----------------|---|
| Kentucky (cont'd) | Vulcan Materials | Bill Huffman Safety Supervisor | Richmond Road <i>had 1</i> | No longer have any refuge chambers in use. They used one temporarily when one of their escapeways was down so they could continue to work in that area. It was a portable refuge chamber that was located next to the out-of-service escapeway so that it would have access to water and telephone. He was unable to provide additional information at the time of the telephone call and indicated that he would call me back. | Limestone | MSHA District |
| Missouri | Doe Run Mines | Dennis Murphy Manager, Safety & Environmental Doe Run Mines | Buck Mine <i>1</i> | Mine contains one portable 'designated point of safety' (DPOS). These are portable refuge chambers but are not identified as such to avoid the MSHA metal/non-metal requirements for chambers (the requirement to be connected to piped air, potable water, and two forms of communication). Location: Located in either dead-end headings or in drifts away from escape shafts. Construction Specifications: Constructed of steel and vary in size from 10' x 20' to 15' x 25'. Designed to accommodate 10 to 15 personnel. Supplies and Features: Contains 3 pressurized air tanks set to discharge 2 liters per minute per person (enough air supply for 10 people for 1 day). Supplies include drinking water, first aid kits, blankets, mine maps, caulk gun with caulking, copy of escape/evacuation plan, a fire extinguisher, an air tank wrench, a no smoking sign, and a toilet consisting of a bucket and plastic bags. Communication system is supplied by a page telephone. No monitoring equipment or air purifying equipment is supplied. | Lead/zinc | Gary Gomez, Safety Specialist, South Central District, MSHA |
| | | | Sweetwater Mine <i>1</i> | Mine contains one portable 'designated point of safety' (DPOS). These are portable refuge chambers but are not identified as such to avoid the MSHA metal/non-metal requirements for chambers (the requirement to be connected to piped air, potable water, and two forms of communication). Location: Located in either dead-end headings or in drifts away from escape shafts. Construction Specifications: Constructed of steel and vary in size from 10' x 20' to 15' x 25'. Designed to accommodate 10 to 15 personnel. Supplies and Features: Contains 3 pressurized air tanks set to discharge 2 liters per minute per person (enough air supply for 10 people for 1 day). Supplies include drinking water, first aid kits, blankets, mine maps, caulk gun with caulking, copy of escape/evacuation plan, a fire extinguisher, an air tank wrench, a no smoking sign, and a toilet consisting of a bucket and plastic bags. Communication system is supplied by a page telephone. No monitoring equipment or air purifying equipment is supplied. | Lead/zinc | Gary Gomez, Safety Specialist, South Central District, MSHA |

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|-------------------|------------------------|---|----------------------------------|--|----------------|---|
| Missouri (cont'd) | Doe Run Mines (cont'd) | Dennis Murphy Manager, Safety & Environmental Doe Run Mines (cont'd) | Viburnum Mine Number 29 3 | Mine contains three portable 'designated point of safety' (DPOS). These are portable refuge chambers but are not identified as such to avoid the MSHA metal/non-metal requirements for chambers (the requirement to be connected to piped air, potable water, and two forms of communication). Location: Located in either dead-end headings or in drifts away from escape shafts. Construction Specifications: Constructed of steel and vary in size from 10' x 20' to 15' x 25'. Designed to accommodate 10 to 15 personnel. Supplies and Features: Contains 3 pressurized air tanks set to discharge 2 liters per minute per person (enough air supply for 10 people for 1 day). Supplies include drinking water, first aid kits, blankets, mine maps, caulk gun with caulking, copy of escape/evacuation plan, a fire extinguisher, an air tank wrench, a no smoking sign, and a toilet consisting of a bucket and plastic bags. Communication system is supplied by a page telephone. No monitoring equipment or air purifying equipment is supplied. | Lead/zinc | Gary Gomez, Safety Specialist, South Central District, MSHA |
| | | | Castel Mine, Number 35 3 | Mine contains three portable 'designated point of safety' (DPOS). These are portable refuge chambers but are not identified as such to avoid the MSHA metal/non-metal requirements for chambers (the requirement to be connected to piped air, potable water, and two forms of communication). Location: Located in either dead-end headings or in drifts away from escape shafts. Construction Specifications: Constructed of steel and vary in size from 10' x 20' to 15' x 25'. Designed to accommodate 10 to 15 personnel. Supplies and Features: Contains 3 pressurized air tanks set to discharge 2 liters per minute per person (enough air supply for 10 people for 1 day). Supplies include drinking water, first aid kits, blankets, mine maps, caulk gun with caulking, copy of escape/evacuation plan, a fire extinguisher, an air tank wrench, a no smoking sign, and a toilet consisting of a bucket and plastic bags. Communication system is supplied by a page telephone. No monitoring equipment or air purifying equipment is supplied. | Lead/zinc | Gary Gomez, Safety Specialist, South Central District, MSHA |
| | | | Brushy Creek 5 | Mine contains five portable 'designated point of safety' (DPOS). These are portable refuge chambers but are not identified as such to avoid the MSHA metal/non-metal requirements for chambers (the requirement to be connected to piped air, potable water, and two forms of communication). Location: Located in either dead-end headings or in drifts away from escape shafts. Construction Specifications: Constructed of steel and vary in size from 10' x 20' to 15' x 25'. Designed to accommodate 10 to 15 personnel. Supplies and Features: Contains 3 pressurized air tanks set to discharge 2 liters per minute per person (enough air supply for 10 people for 1 day). Supplies include drinking water, first aid kits, blankets, mine maps, caulk gun with caulking, copy of escape/evacuation plan, a fire extinguisher, an air tank wrench, a no smoking sign, and a toilet consisting of a bucket and plastic bags. Communication system is supplied by a page telephone. No monitoring equipment or air purifying equipment is supplied. | Lead/zinc | Gary Gomez, Safety Specialist, South Central District, MSHA |

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| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|-------------------|--|--|---|--|---------------------------------|--|
| Missouri (cont'd) | Doe Run Mines (cont'd) | Dennis Murphy Manager, Safety & Environmental Doe Run Mines (cont'd) | Fletcher Mine 1 | Mine contains one portable designated point of safety (DPOS). These are portable refuge chambers but are not identified as such to avoid the MSHA metal/non-metal requirements for chambers (the requirement to be connected to piped air, potable water, and two forms of communication). Location: Located in either dead-end headings or in drifts away from escape shafts. Construction Specifications: Constructed of steel and vary in size from 10' x 20' to 15' x 25'. Designed to accommodate 10 to 15 personnel. Supplies and Features: Contains 3 pressurized air tanks set to discharge 2 liters per minute per person (enough air supply for 10 people for 1 day). Supplies include drinking water, first aid kits, blankets, mine maps, caulk gun with caulking, copy of escape/evacuation plan, a fire extinguisher, an air tank wrench, a no smoking sign, and a toilet consisting of a bucket and plastic bags. Communication system is supplied by a page telephone. No monitoring equipment or air purifying equipment is supplied. Has one portable DPOS unit. 1/11/07 - Emailed David Hawley asking for specifics on DPOS. | Lead/Zinc | Gary Gomez, Safety Specialist, South Central District, MSHA |
| Montana | Martin Marietta Stillwater Mining Company | David Hawley David.Hawley@martinmarieita.com Dee Bray Safety Manager East Boulder Mine | Parkville Mine 1 East Boulder Mine Big Timber, MT 1 | 1/26/07. Dee Bray indicated that he would meet with the other mine safety people at Stillwater Mining Company (James Phips and John Leak) and put together summary information for their mine refuge chambers within the Stillwater and East Boulder Mines. Two sources provided the information included below. 1. The following information was obtained from Robin McCulloch, Montana Bureau of Mines: Mine contains 1 refuge chamber. Location: Main level of mine. Construction Specifications: The chamber is the shell of a tunnel boring machine that had its internal mechanics removed. The boring machine was drilled into a non-producing area where it was grounded and gutted. An entrance was welded onto the empty tunnel boring vessel to create the chamber. Supplies and Features: Mr. McCulloch is unsure of the supplies contained inside. 2. The following information was obtained from Matt Bunwell of DEA Inc: The mine contains from 1 to 6 'round model' DEA, Inc. refuge chambers. A drawing and pictures of this type of chamber is included in Attachment C. | Limestone Platinum Group Ore | Gary Gomez, Safety Specialist, South Central District, MSHA 1. Robin McCulloch, Montana State Bureau of Mines. 2. Matt Bunwell, General Manager, DEA, Inc. 3. MSHA District |

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|------------------|---|--|---|---|--------------------|---|
| Montana (cont'd) | Stillwater Mining Company (cont'd) | James Phips Safety Manager Stillwater Mine | Stillwater Mine Nye, MT 1+ | 1/26/07. Dee Bray indicated that he would meet with the other mine safety people at Stillwater Mining Company (James Phips and John Leak) and put together summary information for their mine refuge chambers within the Stillwater and East Boulder Mines. Two sources provided the information included below. 1. The following information was obtained from Robin McCulloch, Montana Bureau of Mines: Mine contains multiple refuge chambers that also serve as lunchroom and gathering spaces. Location: Refuges are located on the active working levels off of the footwall lateral near the bottom of a ramp. Construction Specifications: Constructed out of a short drift. No further information was discussed. Supplies and Features: Contains water, electric, a microwave oven, first aid, and other supplies. Communication is by telephone. It contains water, electric, communication, and other supplies. | Platinum Group Ore | 1. Robin McCulloch, Montana State Bureau of Mines. 2. Matt Burwell, General Manager, DEA, Inc. 3. MSHA District |
| Nevada | Bonanza Exploration, Inc. Newmont Mining Corporation | William Howell Newmont Mining Corporation | Copperstone Mine Reno, NV Deep Post Mine 8 | 2. The following information was obtained from Matt Burwell of DEA Inc: The mine contains from 1 to 6 round model DEA, Inc. refuge chambers. A drawing and pictures of this type of chamber is included in Attachment C. Not listed on MSHA web site as a mine. MSHA to contact company, obtain information, and provide to NTTC. Contains eight of DEA Inc.'s 16-man portable refuge chambers. Chambers have not been used for emergencies and the company is issuing a refuge chamber policy on 2/1/07. See Attachment D for schematic and pictures. Location: Not specified in description provided. Construction Specifications: Steel with stand-alone battery back power for 36+ hours and are connected to mine compressed air and water lines. Supplies and Features: Connected to mine air and water lines. Contain 35 gallons of bottled water, first aid, stokes baskets, blankets, 6 breathable compressed air and 4 medical oxygen bottles, chemical toilets, and split stream air conditioning. Air purification systems include 15 ExtendAir LIOH "curtains" and monitoring equipment for CO, CO ₂ , O ₂ , temperature and air pressure. The communication system includes a telephone, leaky feeder radio, and a fiber optic line (to be installed). | Gold Gold | MSHA District Matt Burwell, General Manager, DEA, Inc. |
| | | | Deep Star Mine 3 | Contains three of DEA Inc.'s 16-man portable refuge chambers. See Attachment D for schematic and pictures. Location: Not specified in description provided. Construction Specifications: Steel with stand-alone battery back power for 36+ hours and are connected to mine compressed air and water lines. Supplies and Features: Connected to mine air and water lines. Contain 35 gallons of bottled water, first aid, stokes baskets, blankets, 6 breathable compressed air and 4 medical oxygen bottles, chemical toilets, and split stream air conditioning. Air purification systems include 15 ExtendAir LIOH "curtains" and monitoring equipment for CO, CO ₂ , O ₂ , temperature and air pressure. The communication system includes a telephone, leaky feeder radio, and a fiber optic line (to be installed). | Gold | Matt Burwell, General Manager, DEA, Inc. |

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State (cont'd) | Mine Operator/ Company (cont'd) | Mine Contact (cont'd) | Mine (cont'd) | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|--------------------|---|---|------------------------|--|----------------|---|
| Nevada (cont'd) | Newmont Mining Corporation (cont'd) | William Howell Newmont Mining Corporation (cont'd) | Chukar Mine 3 | Contains three of DEA Inc.'s 16-man portable refuge chambers. See Attachment D for schematic and pictures. Location: Not specified in description provided. Construction Specifications: Steel with stand-alone battery back power for 36+ hours and are connected to mine compressed air and water lines. Supplies and Features: Connected to mine air and water lines. Contain 35 gallons of bottled water, first aid, stokes baskets, blankets, 6 breathable compressed air and 4 medical oxygen bottles, chemical toilets, and split stream air conditioning. Air purification systems include 15 ExtendAir LIOH "curtains" and monitoring equipment for CO, CO2, O2, temperature and air pressure. The communication system includes a telephone, leaky feeder radio, and a fiber optic line (to be installed). | Gold | Matt Burwell, General Manager, DEA, Inc. |
| | | | Midas Mine 7 | Contains 7 of DEA Inc.'s 16-man portable refuge chambers. See Attachment D for schematic and pictures. Location: Not specified in description provided. Construction Specifications: Steel with stand-alone battery back power for 36+ hours and are connected to mine compressed air and water lines. Supplies and Features: Connected to mine air and water lines. Contain 35 gallons of bottled water, first aid, stokes baskets, blankets, 6 breathable compressed air and 4 medical oxygen bottles, chemical toilets, and split stream air conditioning. Air purification systems include 15 ExtendAir LIOH "curtains" and monitoring equipment for CO, CO2, O2, temperature and air pressure. The communication system includes a telephone, leaky feeder radio, and a fiber optic line (to be installed). | Gold | Matt Burwell, General Manager, DEA, Inc. |
| | | | Leeville Mine 8 | Contains six of MineArc's 15-man and 1 of MineArc's 12-man portable refuge chambers. See Attachment E for presentation containing specification and pictures. Location: Not specified in description provided. Construction Specifications: Steel with stand-alone battery back power for 36+ hours and are connected to mine compressed air and water lines. Supplies and Features: Connected to mine air and water lines. Contain 35 gallons of bottled water, first aid, stokes baskets, blankets, 3 breathable compressed air and 3 medical oxygen bottles, an oxygen candle, chemical toilets, and split stream air conditioning. Air purification systems is forced circulation through a chemical bed that performs CO/CO2 scrubbing, and moisture removal. Chamber has monitoring equipment for CO, CO2, O2, temperature and air pressure. The communication system includes a telephone, leaky feeder radio, and a fiber optic line (to be installed). | Gold | Matt Burwell, General Manager, DEA, Inc. |

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|-----------------|-------------------------------------|---|------------------------------|--|----------------|---|
| Nevada (cont'd) | Newmont Mining Corporation (cont'd) | William Howell Newmont Mining Corporation (cont'd) | Carlin East Mine 7 | Contains seven of MineArc's 12-man portable refuge chambers. See Attachment E for presentation containing specifications and pictures. Location: Not specified in description provided. Construction Specifications: Steel with stand-alone battery back power for 36+ hours and are connected to mine compressed air and water lines. Supplies and Features: Connected to mine air and water lines. Contain 35 gallons of bottled water, first aid, Stokes baskets, blankets, 3 breathable compressed air and 3 medical oxygen bottles, an oxygen candle, chemical toilets, and split stream air conditioning. Air purification systems is forced circulation through a chemical bed that performs CO/CO2 scrubbing, and moisture removal. Chamber has monitoring equipment for CO, CO2, O2, temperature and air pressure. The communication system includes a telephone, leaky feeder radio, and a fiber optic line (to be installed). | Gold | Matt Burwell, General Manager, DEA, Inc. |
| | Barrick Gold Corporation | Gregory Lang President Barrick, North America | Possible Multiple Mines | Article in Nevada Observer titled Mine Safety Scrutinized Following Coal Mine Disasters in the East indicated that all underground mines in Nevada have refuge chambers. Uncertain as to the validity of this statement. MSHA website lists 17 underground mines in Nevada. 1/30/07 - email sent to Gregory Lang, President of Barrick, North America asking about refuge chambers. | Gold | 1. Article from Nevada Observer, 1 March 2006 |
| | Queenstake Resources USA, Inc. | Brent L. Chamberlain Human Resource Manager Jerritt Canyon Mine | Jerritt Canyon Mine 2 | They have a total of 2 DEA Inc. fabricated portable round refuge chambers. A schematic and pictures are included in Attachment C. Location: Chambers are located in areas under initial development where a secondary escape is not yet available. These areas typically have no more than a few people so the chambers (6-8 person capacity) are large enough to accommodate the work crew. They do not use any chambers in areas where they have more than one path of egress. Their placement is determined by the nature of the development but they typically try and locate them within 100 to 200 feet of the working area. Construction Specifications: The chambers are cylindrical steel structures with a steel entry door at one end. They have a capacity of 6 to 8 people and are designed as a short duration refuge. | Gold | Matt Burwell, General Manager, DEA, Inc. |
| | | | | Supplies and Features: The chambers have power (not always), piped air supply, and a telephone (in the form of a Simco telephone or a leaky feeder radio or both). They contain water, first aid, and sealant materials (plastic molding material and silicone-like caulk) to seal the door. They do not expect them to be inside very long so the supplies are limited to those mentioned above. They do not have a beacon or a radio location device on the refuge. | | |

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|------------|-------------------------------------|---|---------------------------------------|--|---|--|
| New Mexico | BHP Billiton | Rebecca Boam | San Juan Coal Mine, Farmington | Has refuge chamber. Rebecca Boam (former New Mexico Mine Inspector) and Chris Hefner (New Mexico Mine Inspector) indicated that the mine contained a chamber. MSHA to contact company, obtain information, and provide to NTTC. | Coal | 1. Rebecca Boam, NM Mine Inspector (former) 2. Chris Hefner, NM Interim Mine Inspector (from 01/07) |
| | US Government, Department of Energy | Chris Hefner New Mexico Mine Inspector, State of New Mexico | Waste Isolation Pilot Plant, Carlsbad | Rebecca Boam (former New Mexico Mine Inspector) indicated that it has a refuge chamber. However, Chris Hefner (current New Mexico Mine Inspector) indicated that the mine does not have a refuge chamber. Miners use SCSR's to escape mine. It is a small mine with no longer than 1200 feet to an egress point so SCSR's are adequate. | Underground radioactive waste repository located in a stable salt dome. | 1. Rebecca Boam, NM Mine Inspector (former) 2. Chris Hefner, NM Interim Mine Inspector (from 01/07) |
| | Mosaic Potlash, Carlsbad, Inc. | Chris Hefner New Mexico Mine Inspector, State of New Mexico | Mosaic, Carlsbad | The Mosaic Mine is extensive in size and contains multiple built-in chambers. Location: Primary chambers are located within 10 minutes of a working face. Secondary escape chambers are located every 30 minutes along escape route. These secondary chambers are stocked with enough SCSRs to get the miners to the next chamber. Construction Specifications: Chambers are constructed from an excavated area approximately 40' wide x 100' long x 9' high. Entrances are double sealed. Mr. Hefner indicated that he would send me drawings for the chambers and would attempt to locate their emergency response plan. Supplies and Features: Primary chambers contain skids that are loaded with all supplies and support facilities. The skids are kept in the chamber closest to working face. A list of the skids contents was not supplied. Chemical toilets are located in each chamber and communication is available by leaky feeder radio, radio, and mine telephones. Secondary chambers are stocked with chemical toilets and enough SCSRs to get miner to the next chamber. | Potlash | 1. Gary Gomez, Safety Specialist, South Central District, MSHA 2. Rebecca Boam, NM Mine Inspector (former) 3. Chris Hefner, NM Interim Mine Inspector (from 01/07) |

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|---------------------|----------------------------------|--|---------------|--|----------------|--|
| New Mexico (cont'd) | Intrepid Potash NM LLC, Carlsbad | Johnny Rodriguez, Safety Manager, Intrepid Potash NM LLC Has not responded to inquiry. | Intrepid East | <p>Intrepid East Potash mine is extensive in size. There are two varying accounts about the mine refuges: 1. First account from Gary Gomez, indicates that there are multiple refuges within the mine; and 2. Second account from Chris Heifer indicates that there is only one large refuge chamber. The Intrepid Safety Manager (Johnny Rodriguez) has not responded to our inquiry. The descriptions below are separated by account.</p> <p>Location:</p> <ol style="list-style-type: none"> 1. Gary Gomez indicated that the refuges are located at the bottom of the intake air shaft and where the main entry exit points (with man cages) are located at the exhaust shaft. 2. Intrepid East has one large refuge chamber to accommodate everyone in the connected Intrepid East and Intrepid West mines. It is located at the bottom of one of the lifts. <p>Construction Specifications:</p> <ol style="list-style-type: none"> 1. The refuges are approximately 100' x 50' and have doors that are sealed with available mortar located adjacent to door in chamber. 2. Chamber is large enough to accommodate everyone in both the Intrepid East and West mines and is sealed with a double sealed door. Actual dimensions were not disclosed. <p>Supplies and Features:</p> <ol style="list-style-type: none"> 1. The multiple chambers contains piped in water and air, first aid, and maps with escape routes. Communication is provided by both a phone line and a battery powered phone. There is not no beacon or means to notify the surface when the chamber is occupied. Miners are required to be trained on the use of the chamber every year. 2. The single chamber is large enough to accommodate everyone in both Intrepid East and West mines. Everyone in both mines is assigned transportation (man trip) and all vehicles have enough air packs to allow everyone assigned to that vehicle to get to the refuge chamber. The chamber contains crackers, water, and 2 latrines. Air supply, communication, and water is provided by permanent connection through the air shaft to the chamber. Communication is provided by a leaky feeder system, radios, and mine phones. | Potash | <ol style="list-style-type: none"> 1. Gary Gomez, Safety Specialist, South Central District, MSHA 2. Rebecca Boam, NM Mine Inspector (former) 3. Chris Heifer, NM Interim Mine Inspector (from 01/07) |
| | Intrepid Potash NM LLC, Carlsbad | Johnny Rodriguez, Safety Manager, Intrepid Potash NM LLC Has not responded to inquiry. | Intrepid West | <p>Intrepid West Potash mine is extensive in size. There are two varying accounts about the mine refuges: 1. First account from Gary Gomez, indicates that there are multiple refuges within the mine; and 2. Second account from Chris Heifer indicates that there is no refuge chamber in Intrepid West but there is a refuge in the connected Intrepid East mine that is designed to accommodate miners from both mines. The Intrepid Safety Manager (Johnny Rodriguez) has not responded to our inquiry. The descriptions below are separated by account.</p> <p>Location:</p> <ol style="list-style-type: none"> 1. Gary Gomez indicated that the refuges are located at the bottom of the intake air shaft and where the main entry exit points (with man cages) are located at the exhaust shaft. 2. Intrepid East has one large refuge chamber to accommodate everyone in the connected Intrepid East and Intrepid West mines. It is located at the bottom of one of the lifts. <p>Construction Specifications:</p> <ol style="list-style-type: none"> 1. The refuges are approximately 100' x 50' and have doors that are sealed with available mortar located adjacent to door in chamber. | Potash | <ol style="list-style-type: none"> 1. Gary Gomez, Safety Specialist, South Central District, MSHA 2. Rebecca Boam, NM Mine Inspector (former) 3. Chris Heifer, NM Interim Mine Inspector (from 01/07) |

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|---------------------|---|--|--|---|---------------------------|---|
| New Mexico (cont'd) | Intrepid Potash NM LLC, Carlsbad (cont'd) | Johnny Rodriguez, Safety Manager, Intrepid Potash NM LLC Has not responded to inquiry. (cont'd) | Intrepid West (cont'd) | 2. Chamber in connected Intrepid East mine is large enough to accommodate everyone in both the Intrepid East and West mines and is sealed with a double sealed door. Actual dimensions were not disclosed. Supplies and Features: 1. The multiple chambers contains piped in water and air, first aid, and maps with escape routes. Communication is provided by both a phone line and a battery powered phone. There is no beacon or means to notify the surface when the chamber is occupied. Miners are required to be trained on the use of the chamber every year. 2. The single chamber in adjacent and connected Intrepid East mine is large enough to accommodate everyone in both Intrepid East and West mines. Everyone in both mines is assigned transportation (man trip) and all vehicles have enough air packs to allow everyone assigned to that vehicle to get to the refuge chamber. The chamber contains crackers, water, and 2 latrines. Air supply, communication, and water is provided by permanent connection through the air shaft to the chamber. Communication is provided by a leaky feeder system, radios, and mine phones. | | |
| New York | St. Lawrence Zinc Company, LLC | No mine contact identified. Information supplied by: Bill Wilson Team Leader Division of Safety Metal/NonMetal Northeast District MSHA | Balmat Mine No. 4 & Mill Gouverneur, NY 7 5-2 | Mine has 5 permanent (built-in) and two portable (currugated steel cylinders on skids) refuge chambers. Photographs of chambers are included in a presentation found in Attachment A. Location: Chambers are located within 700 to 1,000 feet of the working areas. Construction Specifications: Actual construction specification were not disclosed. Photographs of chambers are included in Attachment A. Supplies and Features: Each chamber is connected to potable water and compressed air lines and contains additional bottled water, first aid supplies, toilet facilities, additional tools and materials for sealing purposes. Communication is provided to each chamber by wired pager telephones. | Lead/zinc | 1. MSHA Table 2. Bill Wilson Team Leader Division of Safety Metal/NonMetal Northeast District MSHA |
| Texas | United Salt | Ben Straka Mine Manager Hockley Mine | Hockley Mine 1 | Information provided by Mr. Gary Gomez of MSHA. Mr. Ben Straka of Hockley Mine was contacted and indicated that he would prefer if I obtained information from MSHA. Mine has one built-in refuge chamber to service a mine that has 13 miners underground. Chamber was installed because there is only one main entry/text shaft. Secondary small escape shaft and refuge chamber were installed to meet requirements. Location: Refuge chamber is located next to a small escape shaft containing a bullet man-cage (in crosscut 300 south and 170 east). Construction Specifications: Supplies and Features: The chamber has a three way intercom. Mr. Gomez assumed that it has air and water but was uncertain. MSHA Southeastern District (Larry Nichols) indicated that these three new zinc mines are not producing but have purchased 12 portable refuge chambers to be installed in these mines. 1/31/07 - asked MSHA for contact information for this company. | Salt | Gary Gomez, Safety Specialist, South Central District, MSHA |
| Tennessee | East Tennessee Zinc Company | | Young, Coy and Immel Mines 12 | MSHA to get email address and NTTC will contact. | Zinc Non-producing | Larry Nichols and Doniece Schlick Southeastern District MSHA |
| Utah | Calcite Explorations LLC | | Calcite Explorations LLC Lehi, UT | | Crushed, Broken Limestone | MSHA District |

TABLE 1
United States Underground Mines Known to Contain Refuge Chambers

| State | Mine Operator/ Company | Mine Contact | Mine | Comments | Material Mined | Original Source(s) to Identify Mine as Having Chamber |
|------------|-------------------------------|---|---|---|----------------|--|
| Washington | Teck Cominco American | Dave Godlewski VP, E&PA Teck Cominco American | Pend Oreille Mine Metaline Falls, Washington 2 bin 2 part | Mine contains one large built-in chamber and 2 portable chambers manufactured by Mid Canada Fiberglass LTD. of Ontario Canada (a fiberglass canoe and specialty company). Location: Information not disclosed. Construction Specifications: Portable chambers are 4' wide x 10' long x 6' tall. The built-in chamber is constructed from a 15' wide x 80' long mined out drift with 2 air lock doors. It is large enough to accommodate everyone in mine at any time. Supplies and Features: The portable and built-in units are connected to the mine's compressor air-lines and are CO monitored to shut the system down if 25 parts per million CO is detected. The portable units have 2- 4500 psig Grade " D " breathing air cylinders as backup and the permanent chamber has 8 large breathing air cylinders. The following supplies are contained in the portable and built-in units: 8 tubes meta caulk, a caulking gun, five 1-gallon jugs of drinking water, a plastic bucket for mixing sealing compound, seven 1-gallon bags of bentonite clay, regulators installed on breathing air cylinders, a portable toilet, a list of emergency telephone numbers, a small first aid kit, three garbage bags, a stretcher kit, a set of emergency procedures, a set of personnel check off sheets, and a box of spare light bulbs. Communication is provided by a page telephone and a dial telephone. | Lead-Zinc | Dave Godlewski VP, E&PA Teck Cominco American |
| Wyoming | Greybull Petroleum, LLC | Jim Wieser Greybull Petroleum | Greybull Field Project 1 + | 1/24/07 - Mr. Wieser indicated that they have portable refuge chambers manufactured by DEA Inc of Nevada. Mr. Wieser will forward the specifications for these shelters to Andy Yanik of MSHA. He will provide that information to me. | Oil Shale | 1. Donald G. Stauffenberg State Mine Inspector Department of Employment State of Wyoming 2. MSHA Table |
| | OCI Wyoming LP | | Big Island Mine & Refinery Green River, WY | MSHA to get email address and NITC will contact. | Trona | MSHA District |
| | General Chemicals Soda Ash | | General Chemicals Mine Green River, WY | MSHA to get email address and NITC will contact. | Trona | MSHA District |
| | FMC Corporation | | FMC @ Granger Green River, WY | MSHA to get email address and NITC will contact. | Trona | MSHA District |
| | Solvay Chemicals Inc. | | Solvay Chemicals Inc Green River, WY | MSHA to get email address and NITC will contact. | Trona | MSHA District |

TABLE 2

**US STATES WITH MINES NOT KNOWN TO CONTAIN
REFUGE CHAMBERS**

TABLE 2
US States with Mines Not Known to Contain Refuge Chambers

| State | Information Source | Comments |
|----------------|--|---|
| Alabama | Doniece Schlick Southeastern District MSHA | With the exception of Tennessee, she is aware of no metal/nonmetal mines with refuge chambers in this district. Unknown if there are any coal mines with chambers. |
| Arkansas | 1. Michael VanDorn, MSHA in AR. 2. Gary Gomez Safety Specialist South Central District of MSHA. | 1. The State of Arkansas has only one underground mine and it has no underground shelter. - Michael VanDorn 2. No underground mines in Arkansas. - Gary Gomez |
| California | Steve Hart, Department of Industrial Relations | California has 5 underground mines. None of them have refuge chambers. |
| Connecticut | MSHA Website | No underground mines listed on website. |
| Delaware | MSHA Website | No underground mines listed on website. |
| Florida | Ben Hart | No underground mines in Florida. |
| Georgia | Doniece Schlick Southeastern District MSHA | With the exception of Tennessee, she is aware of no metal/nonmetal mines with refuge chambers in this district. There are no reported underground coal mines in Georgia (MSHA Website). |
| Hawaii | MSHA Website | No underground mines listed on website. |
| Louisiana | Willard Graham, MSHA in LA | No refuge chambers in LA mines. |
| Maine | Steven Greeley Supervisor, Occupational Safety & Health Program, ME. Department of Labor | We have no active underground mines in Maine. All we have is surface mining. |
| Maryland | William Wilson Northeast District MSHA | No underground metal/nonmetal mines with chambers. |
| Massachusetts | MSHA Website | No underground mines listed on website. |
| Minnesota | MSHA Website | No underground mines listed on website. |
| Mississippi | MSHA Website | No underground mines listed on website. |
| New Hampshire | MSHA Website | No underground mines listed on website. |
| New Jersey | MSHA Website | No underground mines listed on website. |
| North Carolina | William Geringer Chief, Mine & Quarry Bureau North Carolina Department of Labor | We have no active underground mining here in North Carolina thus no mine refuge chambers. All mining conducted in N.C. is surface metal/non-metal. |
| North Dakota | MSHA Website | No underground mine listed on website. |
| Ohio | John Zants and Harold Plumly (Ohio DNR Mine Inspectors) | John Zants and Harold Plumly responded indicating that there are no refuge chambers in Ohio mines at this time. |
| Oklahoma | 1. Brian Goepfert 2. Gary Gomez Safety Specialist South Central District MSHA | The only metal/nonmetal mine in Oklahoma does not have refuge chambers. - Brian Goepfert One mine in OK and it has no refuge chamber. - Gary Gomez |

TABLE 2
US States with Mines Not Known to Contain Refuge Chambers

| State | Information Source | Comments |
|----------------|--|--|
| Oregon | Gary Lynch, Oregon Department of Geology and Mineral Industries | Currently, no underground mining in the state. |
| Pennsylvania | Joe Sbaffoni, Bureau of Deep Mine Safety. | Called him on 1/4/07 and left message. Spoke with him on 1/5/07. He indicated that he was unaware of any chambers in PA mines. PA has both limestone (10 – 12) and coal mines (around 40 underground in western PA). Indicated that I may want to ask larger coal companies (Consol, Massey, etc.). Also, ask Penn Coal Association. |
| Rhode Island | MSHA Website | No underground mines listed on website. |
| South Carolina | MSHA Website | No underground mines listed on website. |
| South Dakota | Mike Cepak, Natural Resources Engineering Director, Minerals and Mining Program, Department of Environment and Natural Resources | No underground mines in operation. |
| Vermont | MSHA Website | One underground quarry listed. Dandy Quarry run by Vermont Quarries Corp. |
| Virginia | Carroll Green, Supervisor, Division of Mines, VA Dept. of Mines, Minerals & Energy | To my knowledge-we don't have ANY mines with "refuge chambers". |
| West Virginia | William Wilson Northeast District MSHA | No underground metal/nonmetal mines with chambers. |

TABLE 3

LIST OF PEOPLE CONTACTED AS PART OF REPORT

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|-----------------------------|---------|---|---------------------------------|--|
| Federal Government Agencies | MSHA HQ | Rodney Brown Public Information MSHA | Telephone | Provided MSHA Approval and Certification Center (A&CC) contact, Joe Judeikis. |
| | | George Fesak Policies and Procedures MSHA | Telephone | Provided Rodney Brown as contact. |
| | | Joe Judeikis Chief Applied Engineering Division Approval and Certification Center MSHA | Email Telephone In Person | Provided the information that his group (Applied Engineering Division) had collected and worked with NTTC to collect additional information from MSHA District Offices and mining companies. |
| | | Melinda Pon | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | | Walter Slomski General Engineer MSHA | Email Telephone In Person | Worked with NTTC by sharing the information MSHA had collected to date and assisted in collection of additional mine refuge information from MSHA and mining companies. |
| | | Andrew Yanik General Engineer MSHA | Email Telephone In Person | Worked with NTTC by sharing the information MSHA had collected to date and assisted in collection of additional mine refuge information from MSHA and mining companies. |
| | | Alice Beacco | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | | Ted Farmer Supervisor Utah Field Office | Forwarded Email Fax | Faxed me a response indicating that there are no underground coal mines in Utah that have refuge chambers. |
| | | Richard Laufenberg Assistant District Manager | Email | 1/31/07 - No response to date. |
| | | MSHA Rocky Mountain District Office | | |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|----------|--|--|--------------------|---|
| | MSHA North Central District Office | Steven Richetta District Manager | Email | No mines in North Central District contain chambers. |
| | MSHA Northeastern District Office | Michael Franklin Division of Safety | Email | Responded indicating that this District Office had responded to my inquiry. |
| | | Roger McClintock Supervisory Special Investigator | | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | | James Petrie District Manager | Email | Forwarded my request to Bill Wilson. |
| | | Bill Wilson Team Leader Division of Safety | Email | Provided information on the one mine in district that has a chamber. |
| | MSHA South Central District Office | Gary Gomez Safety Specialist | Email Telephone | Provided a summary of mines with refuge chambers in this district. |
| | | Edward Lopez Supervisor | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | | Frederick Moore Missouri Field Office | Email | Provided information on Missouri mines with chambers. |
| | | Ralph Rodriguez Field Office | Email | Referred me to another contact within MSHA. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|----------|--|---|----------------|---|
| | MSHA South Central District Office (cont'd) | Michael VanDorn Little Rock Field Office | Email | Replied to my email on 1/3/07 and indicated that there is only 1 underground mine in AR and it has no refuge. |
| | MSHA Southeastern District Office | Michael Davis District Manager | Email | Forwarded my request to others in district. |
| | | Arthur Ellis Assistant District Manager | Email | Forwarded my request to others in district. |
| | | Larry Nichols Title Unknown | Email | Provided contact information for East Tennessee Zinc Company. |
| | | Doniece Schlick Safety Specialist | Email | Provided summary of mines in district with refuge chambers. |
| | MSHA Western District Office | Ronald Goldade District Manager | Email | He is no longer in District. He forwarded my email to District Office. |
| | MSHA Coal District 1 | John Kuzar District Manager | Email | No mines in District contain chambers. |
| | MSHA Coal District 2 | Thomas Light Assistant District Manager | Email | No mines in District 2 contain chambers. |
| | | William Ponceroff District Manager | Email | Forwarded NTTC inquiry email to Thomas Light. |
| | MSHA Coal District 3 | Carlos Mosley District Manager | Email | No mines in District 3 contain chambers. |
| | MSHA Coal District 4 | Robert Hardman District Manager | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|----------|---|---|-------------------|---|
| | MSHA Coal District 5 | Jim Kiser | Email | No mines in district 5 contain chambers. |
| | | Ray McKinney District Manager | Email | Forwarded to Jim Kiser. |
| | | Robert Cornett Assistant District Manager | Email | Forwarded my request to others in district. |
| | MSHA Coal District 9 | Ted Farmer | Fax | Indicated that he had no knowledge of any coal mines in Utah with refuge chambers. |
| | | Utah Field Office Supervisor | | |
| | State Government Agencies | | | |
| Alabama | Dept. of Industrial Relations, Mining and Reclamation | Michael Skates Dept. of Industrial Relations, Mining and Reclamation | | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| Alaska | Dept. of Natural Resources | Tom Crafford Dept. of Natural Resources | Email | Replied to my email indicating that there are 3 underground mines in AK. He forwarded my request to contacts at each mine and provided me with the contact names. |
| Arkansas | Geological Commission Dept. of Labor | John McFarland Chief Geologist | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | | Bonita Stocks Contact Person | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | | Mine Safety Training Tim Evans | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| Arizona | State of Arizona | Deputy Mine Inspector Pat Fitch | Email | Forwarded my email inquiry to John Stanford. |
| | State of Arizona | Deputy Mine Inspector Douglas Martin | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | State of Arizona | State Mine Inspector John Stanford | Email | Emailled me to indicate that Resolution Copper is the only mine in AZ with a chamber. |
| | State of Arizona | Deputy Mine Inspector Kerry Ugalde | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | State of Arizona | Assistant to the Mine Inspector | Email | |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|------------|---|---|--------------------|--|
| Colorado | State of Colorado | Bill York-Fern Mine Inspector | Email | Provided summary of mines with refuge chambers in Colorado. |
| California | Cal/OSHA | Stephen Hart Principal Engineer Cal/OSHA Mining and Tunneling Unit | Email | Emailed me to indicate that there are no refuge chambers in the 5 operating underground mines in CA. |
| Delaware | Penn State University | Christopher Bise Chairman (Retired) Mining Engineering and Industrial Health and Safety Programs | Email Telephone | Provided contact information for the current Chairman of the Delaware Health and Safety Program. |
| Florida | Dept. of Environmental Protection | Ben Hart Manager Mine Safety Training Program | Email | Emailed to indicate that there are no underground mines in state. |
| Illinois | Dept. of Natural Resources | General Email Inquiry Address Mines and Minerals Unit | Email | 1/31/07 - No response to date. |
| | Dept. of Natural Resources | Don McBride Mine Safety Training Division | Email | 1/31/07 - No response to date. |
| | Dept. of Natural Resources | Michael Woods Manager Mine Safety Training Division | Email | 1/31/07 - No response to date. |
| Idaho | Idaho | Mine Safety Training Division Web Page for Idaho Geological Survey | Email | Provided information on the operating underground mines in Idaho. |
| Kansas | State of Kansas | Lee Graham Coordinator Small Mine Safety Program | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | | Harold Stone Mine Inspector | Email | He did not have any information on what mines contain refuge chambers. |
| Louisiana | Office of Conservation | General Email Inquiry Address Injection and Mining Division | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|-------------------------------|---|---|--------------------|---|
| Louisiana (cont'd) | Dept. of Natural Resources MSHA | Dale Bergquist Office of Conservation | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | | Willard Graham MSHA | Email | Indicated that there are no mines with refuge chambers in state. |
| Maine | Dept. of Labor | Steven Greeley Supervisor Occupational Health and Safety Program | Email | Emailed indicating they have no underground mines in Maine. |
| Maryland | Dept. of Environment | Al Hooker Mining Permitting Section | Telephone | Was not aware of any refuge chambers in their mines. He referred me to Maryland's MSHA Field Office. |
| Minnesota | Dept. of Natural Resources | Peter Clevensstine Manager of Engineering Division of Land and Minerals | Email | 1/31/07 - No response to date. |
| | Dept. of Natural Resources | Jeanne Mittelstadt Supervisor Division of Land and Minerals Web Page Information | Email | 1/31/07 - No response to date. |
| Mississippi | | | | |
| Missouri | Dept. of Labor and Industrial Relations | Steve Dunn Assistant Director Division of Labor Standards Mine and Cave Safety | Email | There are no underground mines in state. No information on refuge chambers. Provided MSHA Field Office contacts. |
| | | Chris Cattlett Chief Bureau of Safety Division of Employment Relations | Email | Provided Ron Unscheid as an appropriate contact. |
| Montana | Department of Labor | Robin McColloch Bureau of Mines | Email Telephone | Provided information on the three mines that contain chambers. |
| | Bureau of Mines | Ron Unscheid State of Montana | Telephone | Indicated that the state does not inspect underground mines. |
| | State of Montana | Rod Jobman Mine Safety and Health Program Nebraska Safety Center | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| Nebraska | Univ. of Nebraska, Kearney | | | |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|-----------------------|------------------------------------|---|-----------------------------------|--|
| Nevada | Nevada Bureau of Mines and Geology | General Email Inquiry Address | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Commission of Mineral Resources | General Email Inquiry Address Division of Minerals | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Nevada Bureau of Mines and Geology | David Davis Geologic Information Specialist | Email | Provided links and contacts for information related to refuge chambers. |
| New Mexico | State of Nevada | Doug Dreisner State of Nevada | Email | The main companies operating underground mines would be Newmont Mining Corp., Barrick Gold, and Queenstake. Contact them for additional information. Also contact John Brown of NV Mining Assoc. |
| | New Mexico Tech | Rebecca Boam State Mine Inspector (former) | Email Telephone (attempted) | Provided a summary of the 4 mines in New Mexico that have chambers. |
| | New Mexico Tech | Chris Hefner State Mine Inspector | Telephone | Provided detailed information on mines with refugees in New Mexico. |
| New York | Department of Labor | Program Manager Division of Safety and Health | Email | No knowledge of underground mine refuge chambers in NY. |
| | Dept. of Labor | William Gerringer Chief, Mine & Quarry Bureau | Email | Indicated that there are no underground mines in state. |
| North Carolina | Division of Land Resources | Floyd Williams State Mining Specialist | Email | Indicated that there are no underground mines in state. |
| | State Land Dept. | Rick Larson Minerals Management | Email | Uncertain if there were any underground mines in state. Provided contact information. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|----------|--|--|-------------------|--|
| Oregon | Oregon Dept. of Geology and Mineral Industries | Gary Lynch Assistant Director of Regulation Mineral Land Regulation and Reclamation Program | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Oregon Dept. of Geology and Mineral Industries | Lina Ma Geologist | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Oregon Dept. of Geology and Mineral Industries | Vicki McConnell State Geologist | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| Ohio | Dept. Of Natural Resources | Robert Broecker Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Mel Byers Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | James Edgar Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Charlie Hutton Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Fred Kidd Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Jerry Luyster Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Steve McKee Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Mike Pannepucci Mine Inspector | Email | Referred me to his supervisors. |
| | Dept. Of Natural Resources | Harold Plance Mine Inspector | Email | Referred me to his supervisors. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|------------------|-----------------------------------|---|--------------------|--|
| Ohio (cont'd) | Dept. Of Natural Resources | Greg Plumly Mine Inspector | Email | Referred me to his supervisors. |
| | Dept. Of Natural Resources | Alan Solitis Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Rudy Romshak Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Mike Reese Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | Timothy Renneker Mine Inspector | Email | Referred me to his supervisors. |
| | Dept. Of Natural Resources | Jerry Stewart Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. Of Natural Resources | John Ziants Mine Inspector | Email | Indicated that he was unaware of any refuge chambers in the underground mines of Ohio (both coal and metal/non metal). |
| | Dept. Of Natural Resources | Brian Goepfert OK Field Office | Email | One underground ine in state and it has no refuge chambers. |
| | Dept. Of Natural Resources | Matthew Bertovich Division Chief Program Dev. & Tech. Services | Email | No refuge chamber in PA mines. |
| | Dept. Of Natural Resources | Christopher Bise Chairman (Retired) Mining Engineering and Industrial Health and Safety Programs | Email Telephone | Provided contact information for PA mine inspectors. |
| Oklahoma | Bureau of Deep Mine Safety | Paul Hummel Bureau of Deep Mine Safety | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. of Environmental Protection | Joel Pontorero Mining Manager Greensburg District | Email | No knowledge of underground mine refuge chambers in PA. Referred me to another contact. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|--------------------------|--|--|--------------------|---|
| Pennsylvania (cont'd) | Bureau of Deep Mine Safety | Joe Sbaiffoni Bureau of Deep Mine Safety | Email Telephone | No knowledge of underground mine refuge chambers in PA. |
| | Dept. of Environmental Protection | Michael Smith Mine Manager Moshannon District Dept. of Environmental Protection | Email | No knowledge of underground mine refuge chambers in PA. Referred me to another contact. |
| South Dakota | Dept. of Environment and Natural Resources | Mike Cepak Natural Resources Engineering Director Minerals and Mining Program | Email | No longer any underground mines in state. |
| | Dept. of Environment and Natural Resources | Robert Townsend Natural Resources Minerals and Mining Program | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| Tennessee | Dept. of Labor and Workforce Development | Cade Sexton Director Division of Mines | Email | No coal mines in state contain mine refuge chambers. |
| Utah | Dept. of Natural Resources | Peter Hess Mining Engineer Coal Regulatory Program Division of Oil, Gas and Mining | Email | Referred me to Jim Springer, Public Information Officer. |
| | Dept. of Natural Resources | Mark Mesch Program Administrator Abandoned Mine Reclamation Division of Oil, Gas and Mining | Email | Provided me with link to Utah Geology and Mining web page. |
| | Dept. of Natural Resources | Jim Springer Public Information Officer | Email | Not involved in mine safety. Provided contact information for mine safety personnel. |

TABLE 3
People Contacted As Part of Report

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|----------------------------|--|--|----------------------------------|--|
| Virginia | Division of Mines, VA Dept. of Mines, Minerals & Energy | General Email Inquiry Address Division of Mines | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. |
| | Dept. of Mines, Minerals & Energy | Carroll Green Supervisor Division of Mines | Email | No refuge chamber in VA mines. |
| Washington | Dept. of Natural Resources Dept. of Natural Resources | General Email Inquiry Address Dave Norman Mine Inspector | Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. Indicated that the Pend Oreille Mine (Pb-Zn) is the only underground mine in WA and is operated by Teck Cominco. Provided contact person (Dave Godlewski). |
| Wyoming | State Inspector of Mines | Don Stauffenberg State Inspector of Mines | Email | Indicated that Gerybull petroleum has refuge chamber and provided company contact. |
| Mining Associations | | | | |
| Colorado | Colorado Mining Association | Company web page general information email contact. | Email | Asked if they would provide information about underground mines and refuge chambers within Colorado. No reply received. |
| Nevada | Nevada Mining Association | John Brown | Email Telephone | Indicated that he would send an email to association members asking for them to respond to my request for information. |
| Utah | Utah Mining Association Utah Mining Association Utah Mining Association | General email inquiry address Utah Mining Association David Litvin President Ralph Sanich Title Unknown | Email Email Email Email | 1/31/07 - Not responded to date. Unknown if request was forwarded. Forwarded email request to Ralph Sanich. Indicated that he was unaware of any refuge chambers in Utah. |
| Industry Contacts | | | | |
| Alaska | Kennecott Greens Creek Mining Company | Caroline Cave Health and Safety Superintendent Greens Creek Mining Company | Email | Emailed on 1/30/07. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|----------------------------|--|---|----------------|---|
| Alaska (cont'd) | Mystery Creek Resources, Inc. Nixon Fork Mine | William Burnett Mine Manager | Email | We here at Nixon Fork Mine do not have a refuge chamber. |
| | Saint Andrew Goldfields Nixon Fork Mine | Paul Jones | Email | 1/31/07 - Not responded to date. |
| | Tech Cominco American | Dave Godlewski VP, E&PA Teck Cominco American | Email | Emailed description on 1/16/07. |
| | Teck-Pogo, Inc | Karl Hanneman Pogo Gold Mine | Email | 1/31/07 - Not responded to date. |
| Arizona | Resolution Copper Mining LLC | Mike J. Wegleitner, Manager of H&S Cementation USA Inc. | Telephone | Called on 1/30/07. Left Message. |
| | Resolution Copper Ming LLC | Bill White Safety Superintendent | Email | Emailed on 1/11/07. No response as of 2/1/07. |
| Colorado | National King Coal, LLC | Trent Peterson King Coal Mine Hesperus, CO | Email | Forwarded my request to appropriate people in company to answer inquiry. |
| | National King Coal, LLC | Dan Redetzke Mine Engineer King Coal Mine Hesperus, CO | Email | Provided information on refuge chambers. |
| | Phelps Dodge Corporation and Climax Molybdenum Company | Chris Rose Henderson Mine Empire, CO | Email | MSHA has been in contact with Mr. Rose. Indicated that they have 4 chambers. Is in the process of compiling specific information. |
| | Twenty Mile Coal Company | Dianna Ponikvar-Scott Safety Manager Foistel Creek Mine | Telephone | 1/30/07 - Provided information about their chamber. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|----------|-----------------------|--|--------------------|---|
| Kentucky | Rogers Group | Ed Elliot Safety Supervisor Jefferson County Stone | Telephone | We do not have any refuge chambers at this time. They have not had them in the past. They feel that using SCSRs is adequate for escape purposes in a hardrock mine. However, they have been looking into the possibility of using refuge chambers. |
| | Vulcan Materials | Bill Huffman Safety Supervisor Richmond Road | Telephone | Indicated that they no longer use a refuge chamber as it was only temporary while an escapeway was out of service. Provided information on the chamber that was used. |
| Idaho | Hecla Mining Company | Company web page general information email contact. | Email | Emailed information request to company on 12/18/06. they have two underground mines in US: 1. Lucky Friday Mine, Coeur D'alene, ID 2. Greens Creek, Admiralty Island, AK |
| | Hecla Mining Company | Jim Angle Safety Coordinator Lucky Friday Mine | Email Telephone | Provided information on mine refuge chambers. |
| | Hecla Mining Company | John Jordan Chief Engineer Lucky Friday Mine | Telephone | Provided some information on Hecla Mining chambers. Also indicated that I should speak with Jim Phips (Stillwater Mine) and Dee Bray (East Boulder Mine), and Jim Angle (Hecla Mining). |
| | New Jersey Mining | Company web page general information email contact. | Email | Asked if they had operating underground mines with refuge chambers. Email sent On 12/18/06. |
| | New Jersey Mining Co. | Grant Brackebusch, P.E. | Email | Provided information on their refuge chamber. |
| | Golden Chest Mine | Robert Hopper President Bunker Hill Mine | Telephone | Spoke with Mr. Hopper and he indicated that he would like his MSHA Boise contact Ron Jacobsen to email him indicating that he is aware of my efforts. Andy Yanick spoke with Mr. Jacobsen and Mr. Jacobsen indicated that he would contact Mr. Hopper to explain. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|---------------------------|--------------------------------|--|--------------------|---|
| Idaho (cont'd) | U.S. Silver - Idaho, Inc. | Dave Gray Safety Director Galena Mine | Email Telephone | Spoke with him on 1/29/07. He indicated that he would prefer I send him an email containing my refuge chamber inquiry and he would respond. Email sent. |
| | US Silver - Idaho Inc. | Mark Hartman President/Operations Manager Galena Mine | Telephone | Provided me with David Gray (Safety Supervisor) as the appropriate contact. |
| | Sterling Mining Company | Daniel Groves Safety Supervisor Sunshine Mine | Telephone | Provided information on their refuge chambers. |
| Kansas | Lyons Salt Company | Steve Kadel President and General Manager Lyons Salt Company | Email | Provided information on their refuge chamber. |
| Missouri | Doe Run Mines Buick Mine | Dennis Murphy Manager, Safety & Environmental Doe Run Mines | Email | Provided information on the refuge chambers in their 6 mines. |
| Montana | Martin Marietta Parkville Mine | David Hawley David.Hawley@martinmarietta.com | Email | Indicated that they have one DPOS. Emailed him asking for specifics. |
| | Montana Tech | General Inquiry | Email | Provided contact information. |
| | Stillwater Mining Company | Dee Bray Safety Manager | Email Telephone | Mr. Bray indicated that he would meet with the other Stillwater safety personnel and put a summary email together and forward to the NTTC. 1/31/07 Have not received information. |
| Nevada | Stillwater Mining Company | John Leak Safety Coordinator and Emergency Response Coordinator, Stillwater Mining Company | Email Telephone | I was forwarded to him by either Dee Brae or James Phips. He is to provide me with information on Stillwaters refuge chambers. |
| | Barrick Gold Corporation | Gregory Lang President Barrick, North America | Email | 1/31/07 - Not responded to date. |

**TABLE 3
People Contacted As Part of Report**

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|--------------------|--|---|--------------------|--|
| Nevada (cont'd) | Bonanza Exp. Inc. Cooper Stone DEA, Inc | Joe Kircher | Email | 1/31/07 - Not responded to date. |
| | | Matt Burwell General Manager DEA, Inc. | Email Telephone | Provided information on the portable refuge chambers they manufacture and companies that have purchased them. |
| | Newmont Mining Corporation | Bill Howell Refuge Chamber Oversight Newmont Mining Corporation | Email Telephone | Provided total number of portable refuge chamber they have and indicated that he would email NTTC specifics. |
| | Queenstake Resources USA, Inc | Brent Chamberlain Human Resources Manager Jerritt Canyon Mine | Email Telephone | Provided description of their refuge chambers and usage. |
| New Mexico | Intrepid Potash NM LLC, Carlsbad Intrepid East | Johnny Rodriguez, Safety Manager, Intrepid Potash NM LLC Johnny.Rodriguez@intrepidpotach.com | Email | Sent email on 1/11/07. No response as of 1/30/06. |
| Texas | United Salt Company | Ben Straka General Manager Hockley Mine | Email Telephone | Indicated that he would prefer that we obtain information on their chambers from Gary Gomez, Safety Officer, MSHA District Office. |
| Utah | Utah Southeast Applied Technology Campus | Dale Evans Chairman Southeast Applied Technology College | Email | No knowledge of a mine with chamber. Provided Utah Mining Association contact information. |
| | Utah Southeast Applied Technology Campus | Miles Nelson Campus President Southeast Applied Technology College | Email | No knowledge of a mine with chamber. Provided Utah Mining Association contact information. |
| | Western Energy Training Center | Steven Burge Chairman | Email | 1/31/07 - Not responded to date. |

TABLE 3
People Contacted As Part of Report

| Location | Company | Contact Name/ Title | Contact Method | Comments |
|-------------------|---|---|---------------------------|--|
| Vermont | Vermont Quarry Corporation Danby Quarry | Web Page General Inquiry email address | Email | 1/31/07 - Not responded to date. |
| Washington | Teck Cominco American's Pend Oreille Mine | Dave Godlewski Vice President, E&PA Tech Cominco American | Email | 1/16/07 - Indicated that he is collecting information on mine refuges and will forward that to me upon completion. |
| Wyoming | Greybull Petroleum, LLC Greybull Field Project | Jim Wieser Greybull Petroleum | Email | Indicated that they have portable refuge chambers. Will forward the specifications for these shelters to MSHA who will provide to NTTC. |

Attachment A

St. Lawrence Zinc, Balmat Mine No.4
Refuge Chamber Presentation

REFUGE CHAMBERS
ST.LAWRENCE ZINC CO., LLC
BALMAT MINE NO. 4 & MILL
MINE ID NO. 30-01185
NEW YORK

CHARACTERISTICS

There are seven refuge chambers in place, five permanent and two portable located at:

2 @ 2500 feet level – 1 permanent,
1 portable

2 @ 3100 feet level – permanent

1 @ 3500 feet level – permanent

1 @ 3700 feet level – permanent

1 @ 3900 feet level – portable

A refuge chamber is under construction at the 4000 feet level

Two vertical shafts provide access for the mine.

The #2 shaft has a landing at the 2100 level and the #4 shaft has a landing at the 3100 level. There are drivable entries from the 4000 level to each shaft landing.

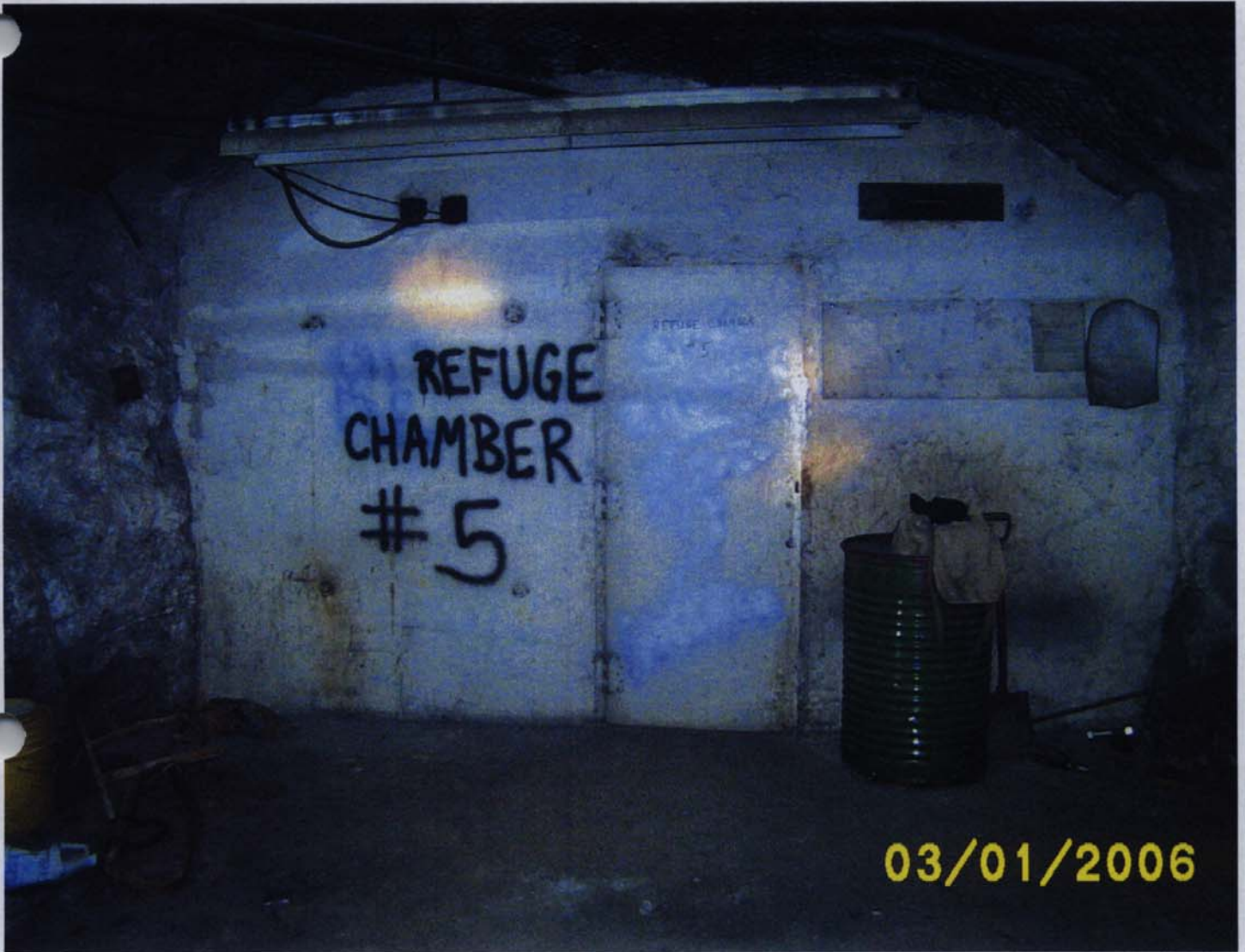
The distance from the work areas to the refuge areas varies from 700 to 1000 feet.

Each refuge chamber is provided with potable water lines and air lines. Additional bottled water is stored in each chamber.

Communications are provided to each chamber by wired pager phones.

Each chamber is provided with toilet facilities and first aid supplies.

Additional tools and materials are stored for sealing purposes



Permanent refuge chamber
at the 2500 level.



Additional emergency supplies stored
in permanent refuge chambers



Portable refuge chamber



Inside view of portable
refuge chamber

Attachment B

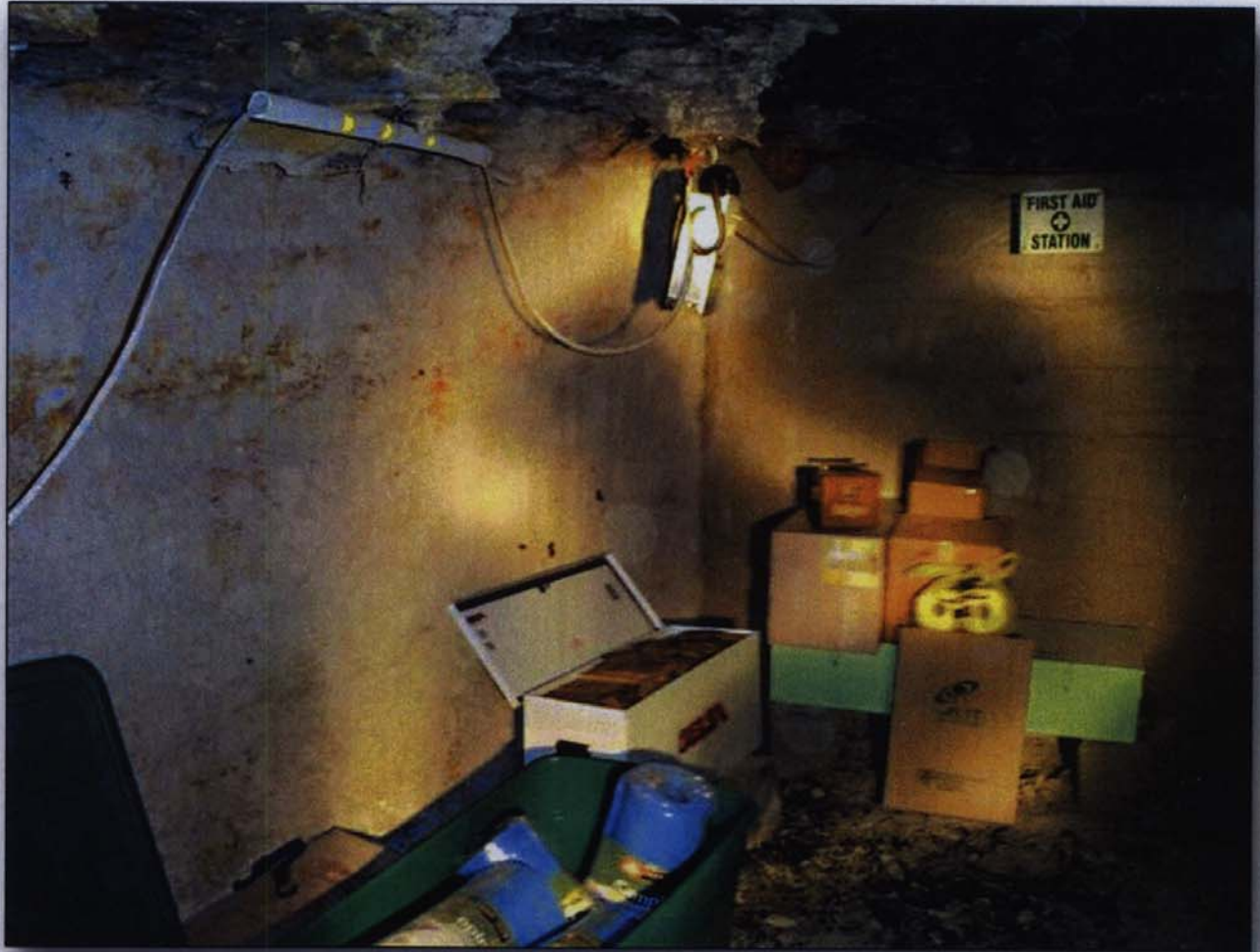
National King Coal Mine
Refuge Chamber Pictures











Attachment C

DEA Inc. Round Portable Refuge
Chamber
Drawing and Pictures

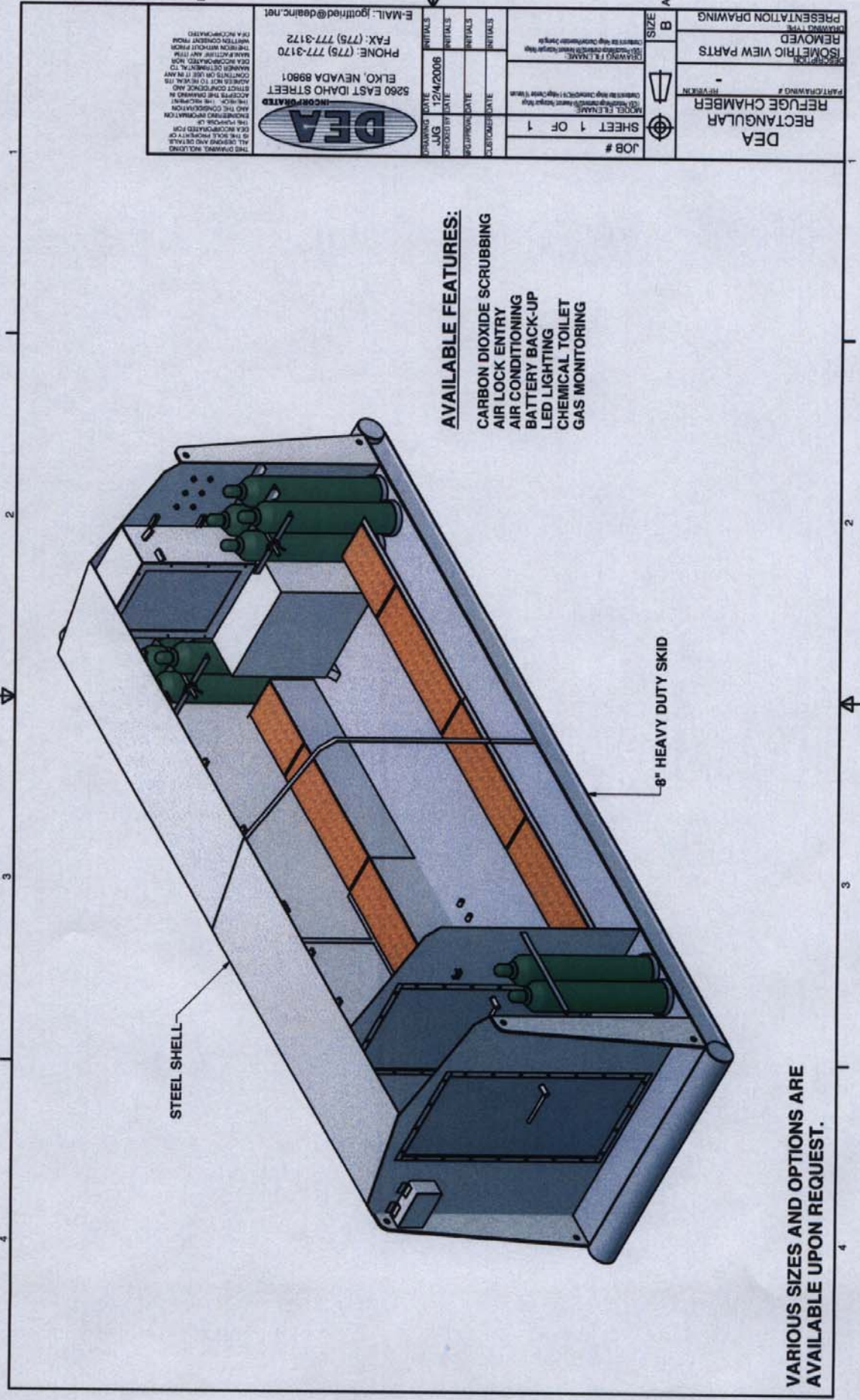






Attachment D

DEA Inc. 16-Man Portable Refuge
Chamber
Drawing and Pictures



- AVAILABLE FEATURES:**
- CARBON DIOXIDE SCRUBBING
 - AIR LOCK ENTRY
 - AIR CONDITIONING
 - BATTERY BACK-UP
 - LED LIGHTING
 - CHEMICAL TOILET
 - GAS MONITORING

VARIOUS SIZES AND OPTIONS ARE AVAILABLE UPON REQUEST.

| | | | | | | | |
|------------------------------|--|------------------------|--|---------------------|--|---|--|
| JOB # | | SHEET 1 OF 1 | | MODEL FILE NAME | | DRAWING FILE NAME | |
| DATE | | DATE | | DATE | | DATE | |
| INITIALS | | INITIALS | | INITIALS | | INITIALS | |
| DRAWING DATE | | CHECKED BY DATE | | DATE | | DATE | |
| 12/4/2008 | | | | | | | |
| E-MAIL: jgottfred@deainc.net | | PHONE: (775) 777-3170 | | FAX: (775) 777-3172 | | THIS DRAWING, INCLUDING ALL DIMENSIONS AND DETAILS, IS THE SOLE PROPERTY OF DEAINC. NO PARTS OR INFORMATION FROM THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN CONSENT OF DEAINC. | |
| | | 5260 EAST IDAHO STREET | | ELKO, NEVADA 89801 | | | |

DEA
100 YEAR BIRTH YEAR
1914-1915
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1918-1919
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1922-1923
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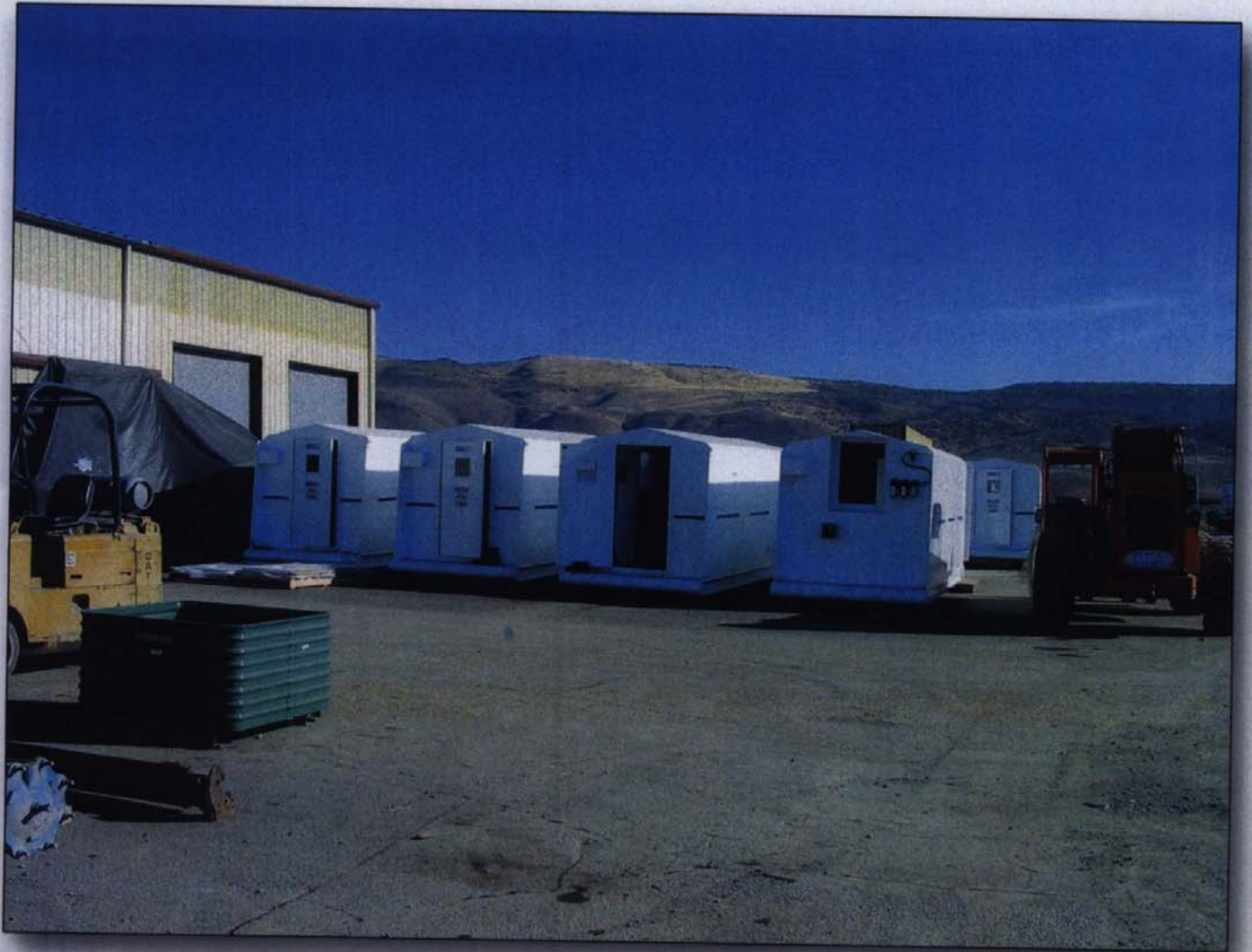
003

**NO SMOKING
OXYGEN
IN USE**

EMERGENCY
REFUGE
CHAMBER







Attachment E

MineArc Portable Refuge Chamber
Summary Presentation



Underground Refuge Chambers



Company Overview

- MineARC Systems is involved in providing solutions to underground safety requirements specialising in the mining and tunnelling industry
- They are the world's leading developer and manufacturer of underground Refuge Chambers and have pioneered the carbon monoxide scrubbing system for underground use.



Features & Benefits



- Three Separate Systems of Air Supply
- Carbon Monoxide and Carbon Dioxide Scrubbing
- Air Conditioning System
- Full Battery Backup on all Systems
- Totally Stand Alone for 36 Hours



Applications

- Underground Mining
- Tunnelling
- Nuclear Waste Facilities
- Offshore Oil Platforms

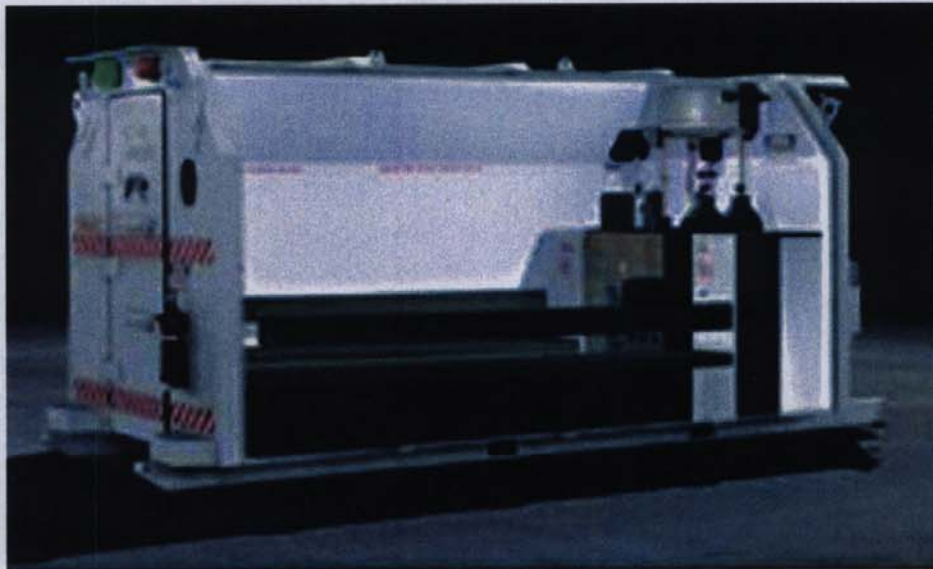


MineARC Systems Refuge Chambers are installed in Underground Metalliferous Mines throughout Australia as well as Mines and Tunnels in Ireland, Indonesia, New Zealand and Turkey.



The Chamber

The chamber is a purpose built Steel Chamber designed to minimise the flow of air either into or out of the chamber once the door and air valves are sealed.



The Chamber

- Constructed of 5mm steel plate fitted with a skid base and towing and lifting points.
- Painted internally with non toxic inorganic paint and externally in industrial grade enamel.
- Escape Hatch
- Viewing Portal
- Internal & External Fire Extinguishers



Air Conditioning System

Refuge chambers must be cooled because the occupants themselves produce heat and as the heat accumulates it becomes a serious problem.

Heat build up also occurs during the scrubbing of the air.

An Air Conditioning Unit is therefore a life preserving necessity in a Refuge Chamber.



Air Conditioning System

- Air conditioning of the chamber is supplied by a split system air conditioning unit operated by Mines Power under normal conditions.
- Once the mine power fails a battery back up system will automatically run the unit.



Scrubbing System

- The CO₂ and CO Scrubbing system is in a self-contained unit designed to clean air in confined spaces where human life needs to be supported over a period of time, such as in Mine Refuge Chambers.
- The purpose is to remove the Carbon Dioxide (CO₂) and Carbon Monoxide (CO) from the air in the Chamber, reducing the risk of Carbon Dioxide and Monoxide poisoning, which can result in loss of life



Air Systems

The chamber is fitted with three separate breathing air supply system:

- Filtered and silenced Compressed Mine Air
- Medical Oxygen Cylinders
- Oxygen Candle



Gas Detection System

A Gas Sampling Pump Kit is provided with the chamber to test the Oxygen (O₂), Carbon Dioxide (CO₂) and Carbon Monoxide (CO) levels inside the Chamber. Testing the air is only required when using the Oxygen Candle or the Medical Grade Oxygen Bottles.



Electrical Systems

- The MineARC chamber is connected to an external 240-volt ac supply.
- The electrical system incorporates battery backup so that the chamber continues to operate normally even when Mine Power is interrupted.



Contact Us

For more information please see our website at
www.minearc.com.au

Or for a copy of our animated CD email us
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