



PRODUCT BULLETIN

NEW OSHA REGULATION

On January 14, 1993, OSHA published a long-awaited final rule on entry into confined spaces. The new regulation requires that the employer "Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations." American industry will be critically affected by the new regulation due to the huge number of confined spaces requiring entry during plant maintenance and operations. The cost impact on industry of providing additional employees for non-productive stand-by presence will result in a substantial cost increase when confined space work is required.

THE Life•line MONITORING SYSTEM

The **Life•line** alternative to the use of an attendant at each confined space entry is now available. Knowing that computer/radio entry monitoring was near development, OSHA specifically permitted the use of such a system in its final rule as noted in 1910.146(d)(6):

Attendants may be assigned to monitor more than one permit space provided the duties described in paragraph (i) of this section can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in paragraph (i) of this section can be effectively performed for each permit space that is monitored.

CFR Part 1910.146 (i) lists the ten duties of the attendant -- duties that must be accomplished regardless of whether there is one attendant for each entry, or one attendant monitoring up to one hundred entrants with the Life•line system.

(1) *Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.*

Whether monitoring one entry from just outside the confined space, or monitoring several entries from a main monitoring center, attendants must know the hazards involved in each entry. This can be learned, in general, from the required attendant training and, specifically, from the entry permit posted at each confined space entrance. (The **Life•line** system will even print the appropriate entry permit for each confined space prior to entry.) **Life•line** will allow the attendant or other supervisory personnel to input specific information about a location into **Life•line's** software. By simply querying the system, an attendant would be informed about the hazards associated with that area and/or any special equipment or procedures that are needed for a safe entry.

(2) *Be aware of possible behavioral effects of hazard exposure in authorized entrants.*

Life•line is a continuous-monitoring system. The system is designed to prevent hazard exposure, not detect behavioral effects that indicate that a problem has already developed. The gas detection monitor and/or ventilation sensor in the confined space is polled approximately every 25 seconds, and the results are uploaded to the main monitoring center. The portable **Life•line** monitor also checks on its user at preset regular time intervals by initiating an audible and visual status query.

(3) *Continuously maintain an accurate count of authorized entrants in the permit space and ensure that the means used to identify authorized entrants...accurately identifies who is in the permit space.*

The entrant must log his/her portable **Life•line** monitor into the system before entering a permit space. The system display indicates the name of the entrant, the specific permit space entered, the time of entry, and the training level accomplished by the entrant. A potential entrant without the training necessary for that particular space will be denied entry. Additionally a log of all activity (all log-on, log-off and work location changes) is kept as a permanent and printable record within the system and is always available for immediate viewing.

(4) *Remain outside the permit space during entry operations until relieved by another attendant.*

The attendant at the main monitoring center will not enter the permit space. **Life•line's** training dictates that the attendant shall have no other duties other than monitoring the **Life•line** system. If there is some need for an individual to be in a permit space (as in an emergency rescue) that person would not be the attendant and thus could enter the permit space to attempt a rescue, if qualified, and if that was part of the employer's rescue procedure.

(5) *Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space...*

An individual standing outside a permit entry space cannot carry out this requirement with nearly the effectiveness of the **Life•line** monitoring system. The communications capability of **Life•line** are far in excess of what is required by OSHA. The attendant may either communicate with the "global alarm" feature which sends an evacuation alarm to all users of the system, or he can selectively communicate with the entrants using a voice communication option.

(6) *Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order authorized entrants to evacuate the permit space immediately...[when required.]*

The attendant at the main monitoring center is able to warn either specific entrants or all entrants to evacuate the permit space(s) immediately with either the global alarm or voice communication feature. The area outside the spaces(s) may be guarded by barriers or by a roving monitor if the area is not in view of the attendant at the main monitoring center.

(7) *Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.*

One of the most compelling features of **Life•line** is the ability of the attendant at the main monitoring center to identify an emergency and immediately summon rescue and/or other emergency services. A remote display can be located at various locations to inform groups such as fire and rescue of the entrant's location in the event of an emergency.

(8) *Takes ...[appropriate]... actions to [warn and remove unauthorized persons who may] approach or enter a permit space while entry is underway.*

The main source of warning are the signs and/or barriers outside the permit space. If the area is out of the sight of the attendant at the main monitoring center, the employer must provide a roving monitor in the vicinity. When an unauthorized entrant is identified, the attendant may alert authorized entrants by using the voice communication feature.

OSHA reports have historically shown that unauthorized entrants is not a significant problem in confined space entry activities.

(9) *Perform non-entry rescue as specified by the employer's rescue procedure.*

The attendant at the main monitor will summon appropriate staff if non-entry rescue is required. The attendant at the main monitor will not perform non-entry rescue unless the entrant needing assistance is the only entrant in a permit space at that time.

(10) *Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.*

The **Life•line** main monitoring center is equipped with both an audible and visual alarm system which will notify the attendant the moment of an emergency. The significant impact of this alarm condition will keep an attendant from doing anything else but responding to this condition. Additionally, **Life•line's** training will dictate that the attendant shall have no duties other than monitoring the **Life•line** system.

HOW DOES **Life•line** WORK?

Life•line consists of a main monitoring center, portable **Life•line** monitors and, as options, remote location satellites, environmental monitors, and ventilation control sensors. The main monitoring center integrates custom data base software with specialized communications and computer hardware which will transmit and display the status of workers monitored by the system.

The main monitoring center can be as small and mobile as a laptop computer, or integrated as part of a central fixed location monitoring center.

Each confined space entrant is required to check out a portable **Life•line** monitor which he/she will take with him/her to the work location. The main monitoring center will regularly poll each portable **Life•line** monitor for the purpose of uploading its current status. The polling process will utilize technology similar to that used by packet radio (a radio frequency modem).

The portable **Life•line** monitor checks on its user at preset regular time intervals by initiating an audible and visual status query. The audible and visual status query will continue until the acknowledge button is depressed by the entrant. Failure of the user to acknowledge the status query within a preset period of time (as determined by the facility) will trigger an alarm warning tone from within the user's portable **Life•line** monitor. This warning tone and a visual signal will last for approximately 15 seconds to give the user sufficient warning of his/her pending alarm condition. Failure of the user to respond to both of these conditions will put the portable **Life•line** monitor into an alarm state. Upon being polled (at intervals of approximately every 30 to 40 seconds) by the main monitoring center, the portable **Life•line** monitor will download its alarm status which will cause an alarm condition at the main monitoring center.

REACTING TO AN ALARM

When an alarm is initiated by a user's portable **Life•line** monitor, a computer screen at the main monitoring center will display the user's name and work location as a flashing emergency identifier. Both a system alarm horn and strobe light will alert the system attendant monitoring the system.

The system attendant will then have the option of either opening a voice channel to the user in alarm to inquire as to his/her condition, and/or immediately dispatching a rescue team to the user's location. Should the user need help, a "help-request" switch can be depressed on the portable **Life•line** monitor. In this mode of operation, an alarm request is transmitted back to the main monitoring center where the attendant can open a voice channel to the user.

If the user is incapacitated in either alarm condition, the system attendant at the main monitoring center can control the microphone of the portable **Life•line** monitor which is in alarm. In this condition, the attendant will be able to listen to the user without the need for user intervention.

Following any alarm condition where multiple users were evacuated from a common work location, the portable **Life•line** monitor will continue its user status query to ensure the safety of all workers after the evacuation, i.e., the system will take attendance.

As an additional option, the system will integrate with the facility's and/or work area ventilation system. In the event of failure of the ventilation system, the main monitoring center will transmit an evacuation alarm to users working in the affected area. The ventilation system's "off" or "stop"

buttons would also be defeated by **Life•line** until such time as all users have left the area that the ventilation system supports, and either logged off the system or changed their work location.

MULTI-GAS DETECTION SYSTEM

A modular gas detection system may be installed and/or integrated with the portable **Life•line** monitor as an option. In many facilities this interface can be accomplished with the employer's existing gas detection equipment. This system will provide real-time information of gas levels in the environment. These levels will be transmitted to a data base contained in the main monitoring center so that exposure limits of the users may be tracked over time.

The gas detection module will also interface with the portable **Life•line** monitor's alarm should the environment become contaminated or deprived of oxygen. If the gas detection system goes into alarm, an audible and visual alarm signal will be produced by the portable **Life•line** monitor. Both the alarm condition and concentration levels will be transmitted back to the main monitoring center where the concentration levels, affected user, and work location will be displayed on the system's computer screen. If there are other workers in the affected area, an evacuation alarm will be automatically initiated on all of those users' portable **Life•line** monitors.

USE OF REMOTE SATELLITE LOCATIONS

The **Life•line** system will also provide the option for users to access the system from remote satellite locations. This satellite configuration will allow a user to input his/her work location upon checking out a portable **Life•line** monitor. The user may also gain access to the system for changing his/her work location or to log out of the system at the completion of his/her duties.

The remote location satellite will have the ability to communicate with the main control center by one of two methods. The simplest method would employ permanent remote locations whereby a smart terminal will be attached to a cabinet containing chargers for the portable **Life•line** monitors. The remote terminal will communicate with the main control center by either RS422 communication protocol or a network LAN-type configuration. By utilizing a smart terminal at the remote locations, access time for communications between the remote terminal and the main control center will be minimized.

If mobile remote locations are required, the same smart terminal/charger configuration will be used with spread spectrum technology communication utilized between the main monitoring console and the remote location.

A brief discussion of "spread spectrum technology" might be helpful here. Most familiar applications of RF communications, such as cordless telephones or CB radios, operate on a specific frequency. This is referred to as narrow band technology, since the signal occupies a very small part of the RF spectrum. While narrow band can be successfully used in some wireless data collection systems, its susceptibility to interference makes it unacceptable for many applications.

Spread spectrum technology is used to overcome the limitations imposed by narrow band technology. Instead of transmitting on a signal frequency, each spread spectrum technology channel uses an approximate 3MHz band of the RF spectrum. Spread spectrum technology achieves a maximum data rate of 122Kbps, compared to 9600 for narrow band.

Life•line was designed to be a system that can be customized allowing for extensive versatility in its end configuration. Custom features such as integrating specific company or industry jargon within its displays and remote monitoring and/or displaying of specific levels or pressures of various substances are just some of the examples of **Life•line**'s capabilities.

Life•line MONITORING HAZARDOUS AND/OR REMOTE LOCATIONS

Many individuals employed by municipalities, utilities and refineries are required to work in locations where they must work alone and at some distance from assistance. If they should have an

emergency such as a fall, a heart attack, or some danger that develops in the environment, communication is often dependent upon a radio in a vehicle which may not be easily reached.

The **Life•line** system's ability to regularly poll the worker can maintain a level of safety and security by providing continuous monitoring of employees in these hazardous or remote locations.

TRAINING AND MAINTENANCE

Each **Life•line** system is available in a range of capacities from a minimum of no less than two monitored employees, to a maximum of over one hundred monitored employees. The cost of the system is a function of the number of employees to be monitored. A system lease program is available.

The **Life•line** technology is supported by a detailed program of user training in the operation and maintenance of the system and the requirements of safe confined space entry. We provide a program of monthly service and recertification, as well as on-call maintenance and on-line software diagnostics.

Life•line's ORIGIN

The **Life•line** monitoring system was developed by Safe Environment Engineering to create a means of monitoring employees in confined spaces without the need for a one-on-one standby attendant. To assure that **Life•line** met OSHA requirements it was developed with the assistance of Barry White, the former Director of the Safety Standards division of the United States Federal Occupational Safety and Health Administration (OSHA), whose office wrote the United States confined space entry standard. Mr. White also served as a member of the Marine Chemists' Qualification Board, and assisted the Navy to improve its Gas Free Engineering Program.

Mr. White will be available to assist each purchaser of the **Life•line** system to rewrite current written confined space entry procedures to encompass the use of **Life•line**, and to work with the Base's safety and health professionals to place the system in operation so that it meets all OSHA requirements.

ADDITIONAL INFORMATION

For additional information on the **Life•line** system, and to arrange for a demonstration of the system in your facility, please call Safe Environment Engineering at (661) 295-5500.

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