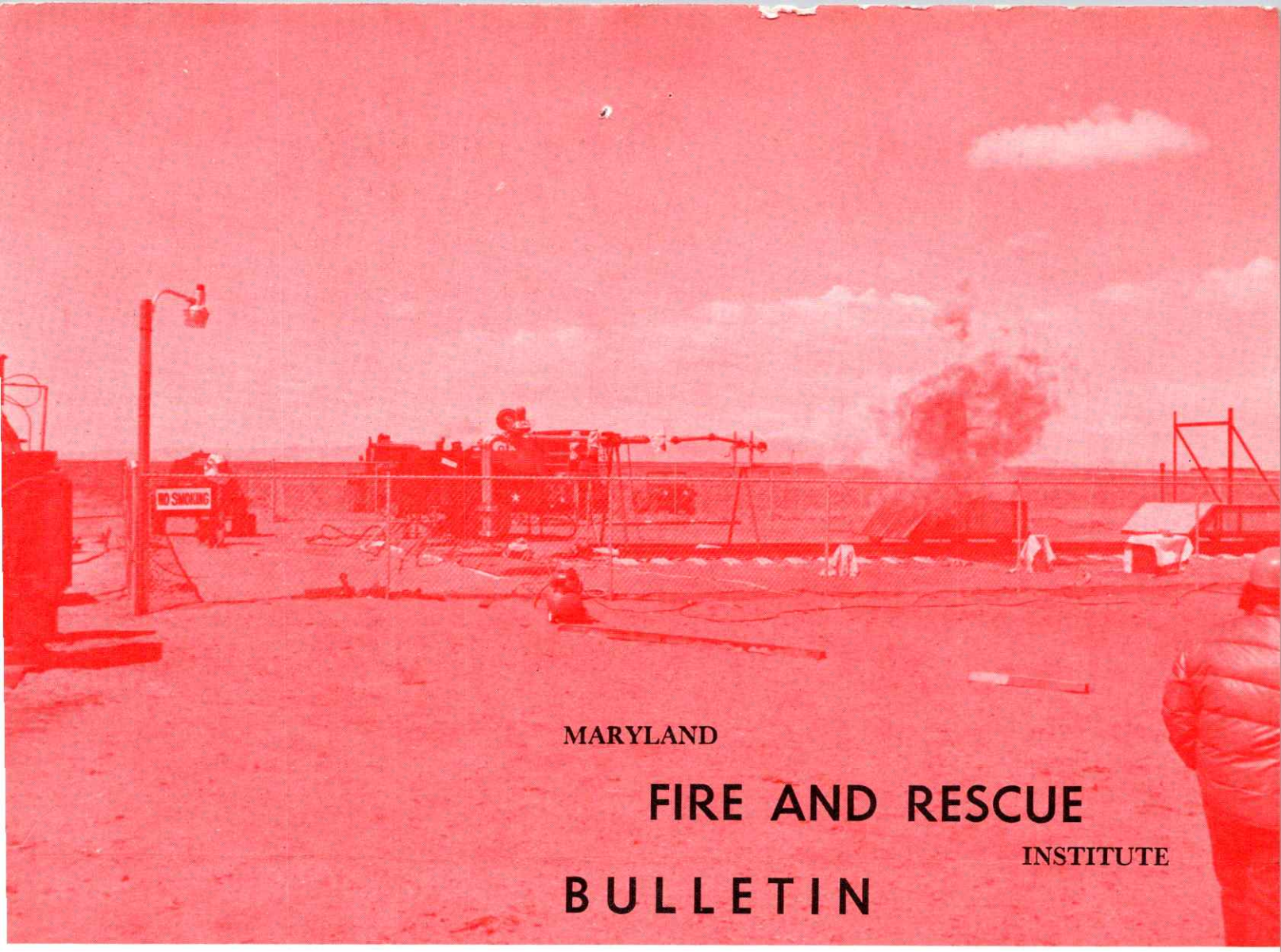

MARYLAND

FIRE AND RESCUE INSTITUTE

BULLETIN

VOLUME 5 AUGUST 1976 NUMBER 8

D. O. T. PROPOSES ANTI-BLEVE REGULATIONS

The United States Department of Transportation has proposed amendments to the regulations governing uninsulated railroad pressure tank cars, amendments D.O.T. states will improve the design and construction of these rail cars. Working together, the Federal Railroad Administration and the Materials Transportation Bureau have conducted research and proposed rule changes that would, according to a D.O.T. spokesman, drastically reduce the BLEVE (Boiling Liquid Expanding Vapor Explosion) potential of these cars when involved in a derailment or other damaging accident.

The impetus for these new regulations was supplied by a series of serious railroad accidents involving pressure tank cars transporting hazardous materials, primarily the liquified petroleum gases. From 1969 through 1975, there were 519 accidents involving the pressure tank cars (#'s 112 & 114-34,500 gallon capacity) of which 168 lost some or all of their cargo. These occurrences have caused 18 deaths, 832 injuries and 45 major evacuations involving more than 40,-000 persons. In addition, just four of these accidents caused damage totalling $100-million. Some of the names of these incidents familiar to the Fire Service include Kingman, Arizona; Houston, Texas; and, Crescent City, Illinois.

The proposed improvements in the design and construction of these rail cars cover the two major areas of thermal protection and tank head puncture protection. The new regulations only propose minimum performance standards that all 112 and 114 pressure tank cars must meet after a specified period of time. The regulations do not dictate to industry the specific design or hardware changes that must be made to meet these performance standards.

After the testing of small plate samples and full scale tank cars at the U.S. Army Ballistics Research Laboratory at White Sands, New Mexico and the

(Continued on page 5)

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Editor
Colin A. Campbell

ON THE COVER: U.S. Department of Transportation officials, in Pueblo, Colorado, testing insulated and uninsulated railroad tank car steel plates prior to proposing anti-BLEVE regulations covering large-capacity, uninsulated railroad tank cars. For more information see the story on page one. Photo courtesy of U.S. Department of Transportation.

FROM THE EDITOR

Colin A. Campbell

During a recent television documentary about a large metropolitan fire department, a firefighter, commenting on the hazards faced daily by him and his fellow firefighters, said, "Firemen die ten years younger, so it's just something you accept." That is a philosophy which is far too prevalent in the Fire Service in Maryland and across the country. It is not necessary that firefighters give in to the hazards of their profession.

During a recent newscast, there was a story, with accompanying videotape of a dramatic aerial ladder rescue from the upper stories of a burning building. The videotape showed the rescue in full, including the rescuing firefighter who wore absolutely no protective gear. About thirty seconds later that same videotape showed another firefighter clambering up another ladder. Fortunately, this firefighter was wearing protective gear and an air pack. Unfortunately, his mask was dangling at his side, his turnout coat was open and his boots were down. In essence, he was almost as unprotected as the first firefighter.

I said it earlier and it bears repeating, **firefighters need not surrender to the hazards of their profession.** Granted, the protective gear is not as sophisticated as it should or could be, granted it is bulky and uncomfortable and granted it sometimes hinders firefighters in the performance of their duties. However it does offer basic and rudimentary protection from the flames, heat, smoke and toxic gases which are the firefighters' chief hazards and repeated exposure to which, shorten a firefighter's life expectancy.

It is not necessary that firefighters, as a profession, have shorter life spans than those individuals in other professions. Wear your protective gear at all times on the fireground. Wear your air packs, even during overhaul, because the danger from toxic gases is at the maximum during overhaul.

And take heart, because for the first time in the 200 plus year history of the Fire Service, serious and substantial steps are being taken to upgrade firefighters' protective clothing.

A major program with the National Aeronautics and Space Administration (NASA) for improving a firefighter's "protective envelope" has begun and is being supported through research underway in several other studies.

Initiated by the National Fire Safety and Research Office of the National Fire Prevention and Control Administration (NFPCA), the cooperative program with NASA covers the design, development, prototype fabrication, test and evaluation of improved clothing and equipment for use by firefighters. Technology and materials developed for the Apollo and Skylab projects are being used in the development, and representatives from the firefighting community are assisting researchers in identifying priorities.

The project objectives include: improving firefighter safety by providing protection against heat, flame, smoke, toxic fumes, moisture, impact, penetration and electrical hazards; improving firefighter performance through better protection, reduced weight, increased maneuverability and reduced physiological stress; and, meeting price levels acceptable to the Fire Service and local communities. NASA recently completed a project to improve the breathing system for firefighters, and will incorporate those findings into the current study.

So, the bottom line is WEAR YOUR PROTECTIVE GEAR. It may be bulky, heavy and uncomfortable, but it does offer you a degree of protection . . . a degree that will surely be increased by the improved protective clothing which is now in the works.

THE MOVE TO POSITIVE PRESSURE

by Joseph M. McDonagh
MFRI Associate Director

M.F.R.I. Staff Photo

In recent years there has been increased discussion about changing from Demand Breathing Apparatus to Pressure Demand or Positive Pressure Breathing Apparatus.

There indeed is a move in this direction and much research has indicated the need for such a change. Most of the discussion stems from facepiece leakage on present breathing apparatus which some consider to be unacceptable and hazardous.

In the eyes of those critical of the current breathing apparatus, the inflexibility of the standard facepiece is the cause of the hazard. One size is expected to fit all different types of facial sizes and characteristics. Some feel firefighters should be fitted with their own personal facepiece and it should be considered as much a part of their personal protective gear as boots or bunker coats. This would assist in lessening the potential leakage problem, but may not insure a constant level of protection. Individually-fitted facepieces are not available to the fire service and will not be until we, the users, demand it.

It is apparent from the observation of many tests that much of the leakage comes from around the exhalation valve. This important valve is usually ignored by those of us who use it. But the fact is, it can leak very badly, badly enough to kill you.

The Federal agencies involved in the push for pressure demand are:

OSHA — Occupational Safety and Health Administration.

NIOSH — National Institute for Occupational Safety and Health.

MESA — Mine Enforcement Safety Administration.

OSHA is the health and safety regulatory agency for the Federal government, while NIOSH is the research arm of OSHA. MESA, the old Bureau of Mines, remains involved in breathing apparatus for mine use and jointly approves respirators with NIOSH.

Other national organizations involved are ANSI (American National Standards Institute) and CGA (Compressed Gas Association). ANSI and CGA standards are referenced in the OSHA regulations, making them law. The same is true with NFPA standards.

Within the State of Maryland, and under the Commissioner of Labor and Industry, there is an agency which functions in place of OSHA. This state agency is known as MOSH, Maryland Occupational Safety and Health. OSHA, the Federal agency, delegates the responsibility and authority to states which have an approved OSHA plan. Maryland, being one of those states, has the responsibility and authority within the state.

MOSH has adopted the Federal standards for General Industry promulgated by the U.S. Department of Labor. The specific standards which govern breathing apparatus (or respiratory protection) are known as 29 CFR 1910.134. This standard deals with such things as:

a. permissible practice.
b. requirements for a minimal acceptable program.
c. selection of respirators.
d. air quality.
e. use of respirators.
f. maintenance and care of respirators.

In recent years, more research has been conducted on facepiece leakage which indicates a need for new standards proposing the use of Pressure Demand Breathing Apparatus. OSHA is now publishing Proposed Exposure Standards in the **Federal Register** for many toxic materials and gases. If and when these standards are approved, as written, pressure demand will be required. In the **Federal Register** of May 8, 1975, (Volume 40, Number 90, Part II) covering Ketones, it specifically names firefighting and calls for respiratory protection of:

"Self-contained breathing apparatus with a full facepiece operated in the pressure demand (positive pressure) mode."

The Maryland Occupational Safety and Health program is in the process of drafting breathing apparatus standards for the firefighter. As this draft becomes available, the Fire Service will have an opportunity for input and comment. No time or date for this draft is yet available. If the Federal standard is approved first, Maryland will probably adopt the same standard.

(Continued on page 8)

WANTED:

INDUSTRY/FIRE DEP'T. COOPERATION

by Richard Schramm

MFRI Industrial Training Coordinator

The growing number of industrial plants and facilities being built or relocated in the rural areas of Maryland has placed an increasing burden on local fire departments to work closely with the industries' managers and safety personnel. The need for a close-knit working relationship becomes much more evident when considering the unique problems and hazards now facing the smaller volunteer fire departments. Some of those hazards include flammable liquid or hazardous chemical manufacture or storage, high-pile storage warehouses, large square footage manufacturing buildings or, in some cases, life-threatening manufacturing processes.

As all trained officers and firefighters know, it is to the fire departments' benefit to have visited a particular target hazard occupancy prior to responding to the facility for an emergency service call. Whether the response is for fire, explosion, rescue, or other emergency, the key to coping effectively with the situation is pre-planning.

A good pre-planning program should not be limited to a quick visit by the chief of a department or a designated officer, but should include a complete tour of the building, a description of the facility's operation and a detailed explanation of any hazardous or life-threatening processes. The tour visit should involve officers and as many firefighters as possible from the first and second alarm companies.

HAVE YOU.....

—pre-planned all of the industrial occupancies in your district?

—explored areas of cooperation between your department and the plant Emergency Preparedness Team?

—conducted a cooperative simulated disaster drill?

—critiqued that drill?

—updated your pre-plan on an annual basis?

In addition to the tour and fact finding mission, consideration should be given to how the plant Emergency Preparedness Team or other predesignated employees can best assist the public fire department during the time of the emergency. Predetermined assistance can be offered in many areas, but should be limited to areas of expertise and prior training shared by both the plant personnel and the local fire department.

An example of this concept would be a cooperative simulated disaster training drill at the plant facility with all departments and agencies, both public and private, which would normally respond. After the drill has been conducted and each group has followed its pre-planned assignment, a critique should be held to discuss the successes AND failures of the operation and how best the overall operation could be improved. Those individuals participating in the critique should not be limited to chief officers, but should include a good cross section of the firefighters or emergency rescue and first aid personnel who would participate in an actual disaster. This method of review and updating should be conducted at least yearly for each industrial occupancy within a rural fire district.

Utilization of this planning approach undoubtedly would focus attention on the need for cooperation between local fire departments and industry, not only in times of disaster, but in the planning process before such emergencies occur. Hopefully by developing a cooperative attitude, better communications will follow and a mutually coordinated fire prevention and suppression effort will emerge.

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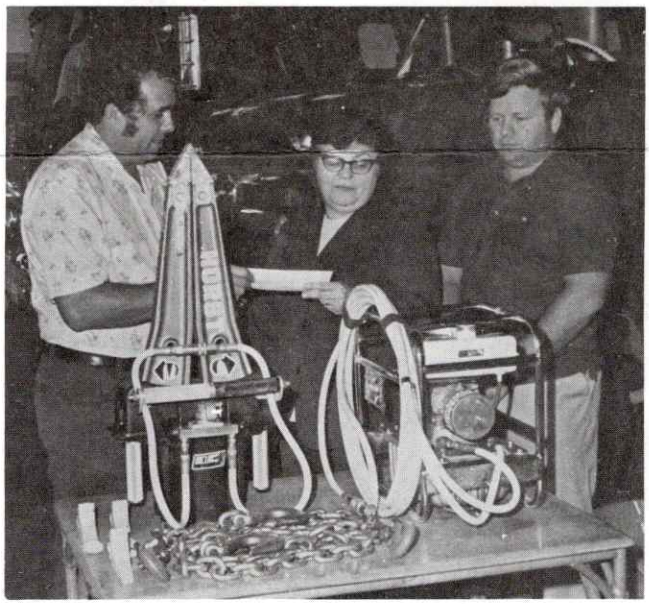


Federalsburg Volunteer Fire Dep't.

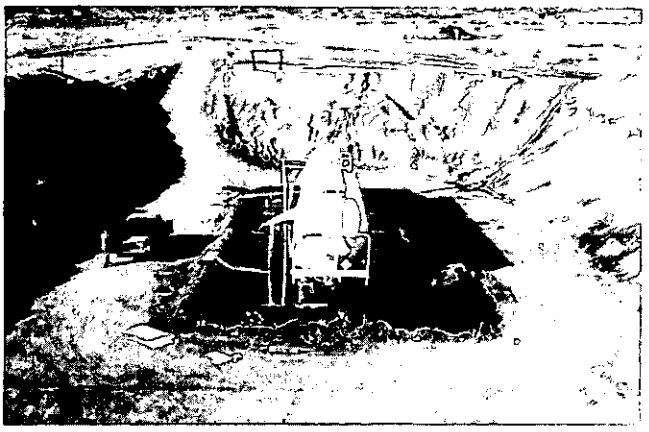
The Federalsburg Volunteer Fire Department became the first department in Caroline County to be equipped with a Hurst Tool thanks solely to the efforts of the Ladies Auxiliary. Auxiliary President Betty Anthony is shown presenting Federalsburg Fire Chief Bill Andrew a check for $5,000, while department President Alan Planner looks on. The $5,000 paid for the auto extrication tool which Federalsburg has offered to respond anywhere in the area for serious vehicle accidents. Chief Andrew said training sessions have already been held and more than half the department has signed up to learn how to use the Hurst Tool.

BLEVE PREVENTION REGULATIONS

(Continued from page 1)

Pueblo Test Center in Colorado, the Federal Railroad Administration established minimum standards for both pool and torch fires. Because tests showed all of the liquid lading in a thermally-protected tank having a capacity of 33,600 gallons will be vented when exposed to a pool fire of 100 minutes, 100 minutes has been selected as the duration for the pool fire test to qualify proposed thermal insulation systems.

During the torch fire tests, it was calculated a tank car will empty its liquid contents within 30 minutes through a hole in its shell, resulting from the penetration and withdrawal of a coupler head. For this reason, 30 minutes has been selected as the prescribed minimum duration of the torch test.



U.S. Department of Transportation

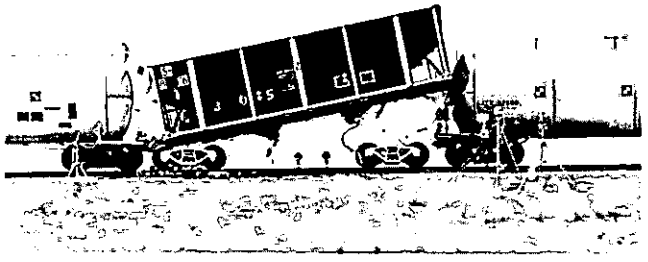
Pool fire test facility built at the U.S. Army Ballistics Research Laboratory in White Sands, New Mexico, specifically for testing insulation systems for uninsulated railroad tank cars.

In the area of tank head puncture protection, the proposed regulations establish criteria based upon analyses of accidents and impact tests in which tank cars loaded close to their rail load limit of 263,000 pounds have impacted at speeds of up to 18 miles per hour. The regulations give industry three options to afford adequate tank head puncture resistance:

1. Installation of a protective head shield system that meets the requirements of the existing regulations.
2. Installation of a specified steel jacket head having a minimum thickness of ½"; or,
3. A tank head puncture resistance system with the capability of withstanding specified impacts without loss of lading based upon a performance requirement.

The impact tests performed at the Pueblo site also demonstrated that the use of shelf couplers, in addition to the application of tank head puncture resistance systems, effectively lessened the possibility of tank punctures by limiting the vertical disengagements of couplers or causing a coupler head to break away thus preventing it from acting as a ram.

For this reason, the proposed regulations would require the installation of specifically designed shelf E couplers, F top shelf couplers, or other couplers approved by the FRA. These installations would have to be made within one year on 112 and 114 tank cars not equipped with head shields.



U.S. Department of Transportation

The Federal Railroad Administration also conducted impact studies at the Pueblo, Colorado Test Center. These tests demonstrated the effectiveness of shelf couplers as a deterrent to tank car puncture.

Finally, the tests indicated existing safety relief valves installed in uninsulated 112 and 114 tank cars may not provide sufficient relief capacity under extreme fire accident conditions. However, these tests have demonstrated that if thermal protection is applied to a tank, the existing relief valves do provide sufficient relief capacity. Accordingly, no changes have been made in the relief valve currently required for 112 and 114 tank cars.

The proposed regulations contain a requirement that within six months after the effective date of the final rule, all new 112 and 114 tank cars are to be equipped with shelf couplers, a tank head puncture resistance system, a thermal protection system and a safety relief valve of adequate capacity to protect each thermally insulated tank.

Previously built 112 and 114 tank cars will be required to be similarly equipped according to the following shedule:

1. Either shelf couplers or a tank head puncture resistance system within one year after the effective date of the rule;
2. Notwithstanding "one", shelf couplers within two years after the effective date of the rule; and
3. Thermal protection and tank head puncture resistance systems with adequate relief valve capacity within four years after the effective date of the rule.

It is important to remember that these are only **proposed** rule changes and have not yet been finalized. Interested persons are invited to give their views on the proposal. Any communications should identify the docket number (HM-144) and be submitted, by March 14, 1977, to the **Section of Dockets, Office of Hazardous Materials Operations, Department of Transportation, Washington, D.C. 20590. It is requested that five copies of all comments be submitted.**

"MIRACLE" RESCUE IN WESTERN MARYLAND

by Assoc. Professor Pamela B. doCarmo
and
EMT/A Instructor Robert Sincell

On Saturday, May 24, 1976 at 8:35 PM, the Southern Rescue Squad of Garrett County, Maryland, received a call for a child swept over the falls at Swallow Falls State Park. Thus began a tension-filled, eleven-hour battle against fantastic odds to rescue a ten-year-old boy.

The boy, Richard Bouchard, was sliding down the rocks into the water below with his father, sister and two other children. On his "one last slide" before leaving the water, mid-channel currents caught Richard sweeping him rapidly toward the falls. After a futile attempt by his father to stop him, Richard was swept over the falls which, through the years, had claimed many lives. His father dove repeatedly trying to find the boy, but to no avail. Unknown to anyone at the time, Richard surfaced in a cavity behind the roaring falls. He was to remain there virtually unharmed throughout the entire 11-hour ordeal.

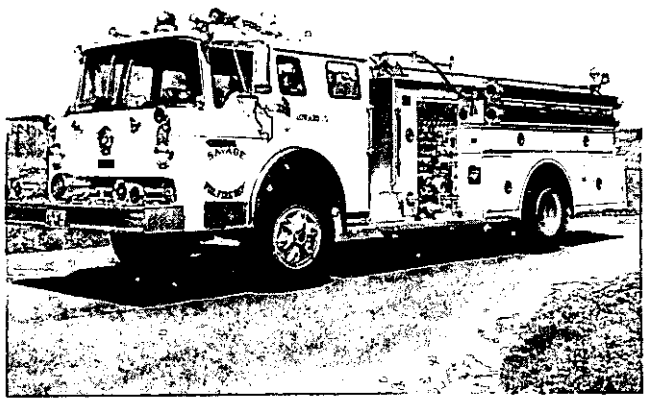
After receiving the call, Southern Rescue Squad personnel responded, along with the Park Superintendent and Sheriff's deputies. After quickly surveying the scene, assistance was sought from the Deep Creek Fire Company. The company responded with additional personnel, lights and a generator, boats and ropes.

About this time, three boys on the East side of the river reported hearing a yell from beneath the falls.

Photo by Perry Shaffer

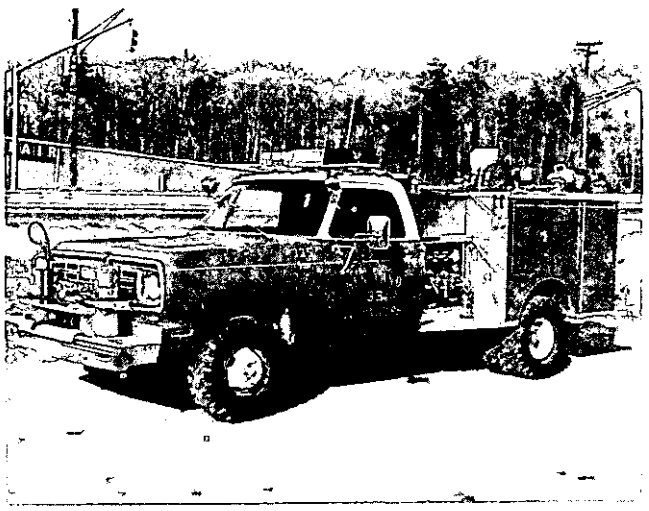
Young Richard Bouchard is shown being treated by members of the Southern Rescue Squad immediately after his rescue from behind Swallow Falls.

WHAT'S NEW ACROSS THE STATE .....



M.F.R.I. Staff Photo

In Howard County, the Savage Volunteer Fire Department recently placed in service this 1975 Ford/Oren 1250 gallon per minute pumper. The unit is powered by a diesel engine and carries a standard complement of firefighting equipment as specified in NFPA Pamphlet 19.



M.F.R.I. Staff Photo

The Kentland Volunteer Fire Department recently placed in service a Dodge/Pierce mini-pumper. The vehicle is equipped with a 500 gallon per minute pump and 250 gallons of water.

This seemed almost unbelievable, but brought to mind a similar accident two years earlier when two children surfaced after being under the falls for nearly 45 minutes. The boys' report spurred the rescue and fire personnel present. A rope was quickly secured above the falls from which a line was attached to a boat.

Several attempts were made, from the boat, to get behind the falls, but the overpowering currents prevailed. It was apparent that scuba divers would be needed to get through the falls. A call was placed to the Maryland State Police Scuba Team at Hagerstown. However, it was learned that unit would not be able to respond until 10 AM the next morning.

Because time was of the essence, a 3:00 AM call was placed to the Somerset (Pa.) Fire Department's Rescue/Diver Team. The Somerset divers responded almost immediately, arriving at Swallow Falls at 6:00 AM. While waiting for the divers to arrive, Southern Rescue and Deep Creek personnel kept watch, keeping the lights focused on the falls. After being rescued, Richard stated that he could not go to sleep because the lights were too bright. What he did not know was the lights were left on to tell him he had not been abandoned.

As the Somerset divers prepared to enter the water at 6:55 AM, a fisherman reported hearing a shout from beneath the water and pointed out to the divers the spot from which it came. The divers entered the water at this point and, at 7:13 AM, Somerset firefighter/diver Donald Shaffer emerged with Richard in his arms.

A crescendo of shouts, pats on the back, jumping up and down and, admittedly, a few tears greeted Richard and his rescuer. All the effort, muscle strains, sleeplessness and discomfort had been worth it! Richard, who was cold, tired, frightened and hungry, was quickly reunited with his family at the Garrett County Memorial Hospital, thus ending the long ordeal.

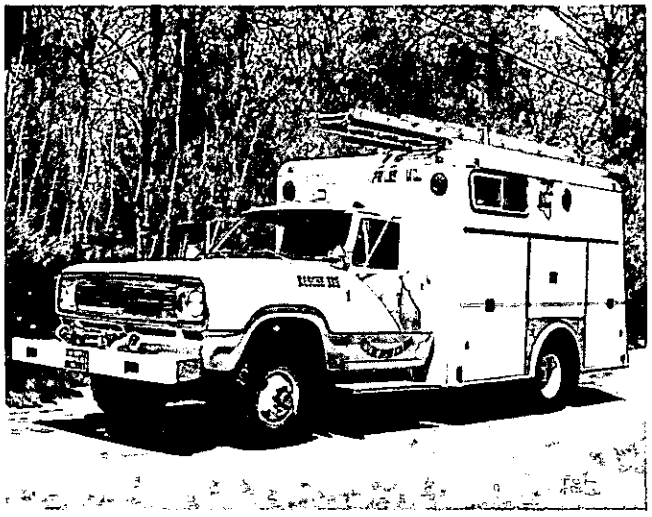
This indeed may have been a "miracle" rescue, but it should serve as an inspiration to all of us who have practiced and sacrificed just to be ready for such a rescue. All too often our efforts are not this successful. It should be kept in mind that everything we do — even the little things like keeping the lights playing on the falls — may bring a reward, even though, at the time, we have the feeling our efforts will be futile.

The personnel of the Southern Garrett County Rescue Squad, the Deep Creek Fire Company and the Somerset, Pennsylvania Fire Department are to be congratulated for a job well done.

***A future issue of the "Bulletin" will contain diver Donald Shaffer's personal account of this unbelievable rescue.*

M.F.R.I. Staff Photo

The Anne Arundel County Fire Department recently placed in service this 1975 International/Bevier Fuel Truck. The tank capacity is 600 gallons of gasoline and 400 gallons of diesel fuel. The unit responds to all extended fire operations in the county requiring refueling of apparatus.

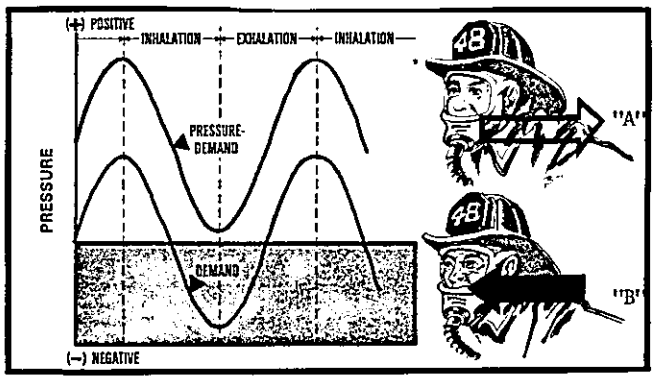


M.F.R.I. Staff Photo

Rescue Hose Company of Annapolis recently placed in service this Dodge mini-squad. The vehicle is equipped with a large complement of rescue tools and vehicular extrication equipment.

PRESSURE DEMAND
(Continued from page 3)

The three major manufacturers, MSA, Scott and Survivair all offer pressure demand, as does Globe Safety Products, Inc. This type of apparatus is not new and has been around for years. The principle used in this respirator is to maintain a higher pressure on the inside of the facepiece than the atmospheric pressure on the outside. In accomplishing this, any leakage should be flowing to the outside ("A"), rather than into the facepiece ("B"), as illustrated below.



Courtesy of "Fire Independent"

The three manufacturers mentioned above all use the same or a similar principle to provide the positive pressure. They use existing facepieces and regulators modified with springs on the atmospheric side of the diaphragm and the exhalation valve. The two springs balance the system so there will be no flow of air unless there is a leak. The spring pressing against the diaphragm opens the admission valve enough to allow an air flow which maintains the positive pressure on the inside of the facepiece. The exhalation valve has an equal spring to balance the pressure requirements of the regulator admission valve. If you did not have this spring at the exhalation valve the air would flow directly to the outside because nothing would be holding in the pressure. In its very simplest form, that's all there is to a pressure demand unit.

This is the first of a two-article series. The second and last article will feature a comparison of MSA, Scott and Survivair Pressure Demand Breathing Apparatus.

THE EMT RESPONSE

This is a monthly quick quiz prepared by the Emergency Care faculty of the Maryland Fire and Rescue Institute. The intent is to stimulate self-review of knowledge gained in EMT/A courses. The source document for all questions is **Emergency Care** by Grant and Murray, published by the Robert J. Brady Company, Washington, D.C., 1971.

1. What is the normal adult breathing cycle?
   a. Once every five seconds
   b. Once every ten seconds
   c. Once every 15 seconds
   d. Once every 30 seconds

2. Airway obstruction is most commonly caused by what factor?
   a. Flexing the head forward
   b. Unconsciousness
   c. Foreign matter in the mouth, pharynx or trachea
   d. A sharp blow to the trachea

3. What is the first step in the emergency care of airway obstruction?
   a. Clean out the mouth
   b. Tilt the patient's head back
   c. Give four quick breaths
   d. Insert an oropharyngeal airway

4. What is the most important function of an oropharyngeal airway or an S-tube?
   a. Allows suctioning of the mouth
   b. Allows the rescuer to ventilate the patient without tilting the head
   c. Causes the patient to vomit thus clearing the airway
   d. Maintains an open airway by holding the base of the tongue forward

5. If, upon insertion of an oropharyngeal airway, the patient begins to gag, what should be the EMT's next action?
   a. Insert a smaller airway
   b. Remove and re-insert the airway
   c. Remove the airway completely
   d. Pull the airway out slightly

ANSWERS: 1.a; 2.c; 3.b; 4.d; 5.c