

further the occupants from heat and gamma radiation. It is also recommended that, like a wartime bunker, the shelter be sunk well into the earth.

The basement exit shelter costs about \$1,000, if built for you, and "is actually a low tunnel, three feet wide, with an entrance at one wall near the corner of the basement, and extending 10 feet to steps or a ramp to the surface."

FCDA states that considerable work is involved in constructing this type shelter and the householder who attempts it should find help.

Because of what has been learned of the lethal fallout, it is suggested that surface doors and air intakes be added to all shelters.

The two outdoor shelters "will provide protection against blast hazards," in the three rings of destruction, surrounding the immediate blast area at ground zero.

For those living in areas not directly affected by the blast, heat and radiation, but in danger from radioactive fallout, cheaper types of cover will provide protection. These can be vegetable cellars or cyclone cellars with a three-foot earth cover.

Fox-holes or open trenching with an overcoat thrown across the top, can also save lives, although they give less substantial protection. They are particularly useful if caught on the open highway during an attack.

Anyone who has experienced disaster knows the value of having emergency stores of food and water. With little expense and effort, home-made rations can and should be set aside now.

### Water Contamination

Drinking water can be made unsafe during an attack by radioactive contamination, being poisoned with chemicals, through leaking sewage or by becoming diseased during a bacteriological attack.

Enough drinking water should be stored in a shelter or carried in a car to provide one gallon for each person. Where there are children under three years of age in the household, FCDA recommends an extra gallon for each, for a three-day supply. Milk, soft drinks, fruit juices and water or liquids from canned fruits and vegetables may be substituted.

Storing home-made B-rations (Bomb rations) can be achieved by providing a balanced three-day supply including canned fruits and juices, vegetables, soups, milk, tea bags and instantaneous drinks, canned meat and fish, baby foods, raisins and chocolate, packaged cereals and dried foods.

For babies, disposable diapers, powdered mixture for the formula, and canned or powdered milk and easily digestible foods, must be stored too.

A great number of the population is experienced in building shelters without realizing it; so, too, a number of the population is well versed in preparation for disaster and in evacuation techniques.

To cite a few examples, when civil defense officials are queried as to what cities

are best prepared today, they include in the list, Worcester, Mass., and add that civil defense-mindedness in that city came about after Worcester had suffered through a tornado in 1952.

Officials also point out that residents of coastal towns and cities in hurricane areas are evacuation-sensitive. By the same token, persons living in constant danger of floods have been sent packing and moving at a moment's notice years before the coming of atomic weapons.

Unfortunately, escape from death and disaster and knowledge of those life-saving measures necessary to survival in the past does not necessarily mean escape from death and disaster in the future. Organization and an active part in civil defense has become a must for the veteran as well as the uninitiated.

Organized civil defense has been called both a shield and a sword and as stated by those responsible for its functioning, "there will always be much more of America undamaged, and many more millions of our people eager to fight back and win, than there will be death and destruction," if an H-bomb attack is made on the United States.

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### ASTRONOMY

## Galaxy's Arms Spiral In

➤ FIRST DIRECT evidence that the Milky Way galaxy, a giant celestial pinwheel in which the sun is one of billions of stars, has arms spiraling toward the center was reported to the American Astronomical Society meeting in Princeton, N. J.

Dr. Edward F. McClain of the Naval Research Laboratory, Washington, told how he had used radio waves to look deep into the heart of our galaxy. The radio messages received from the center and beyond it indicate the inward spiral winding.

The NRL observations at 1420 megacycles confirm three different mathematical attempts, also reported at the meeting, to show that the Milky Way has the same spiral structure as other "island universes."

Dr. Frank K. Edmondson of Indiana University assumed that movements of hydrogen in the galactic arms, detected by radio radiation, are not at right angles to the radius, but at a slight angle. His calculations then show the spiral motion and eliminate a "kink" previously seen in the spiral arm just beyond that in which the sun is located.

Dr. Harold Weaver of the University of California attacked the problem of galactic motion starting with basic equations. He found that there is a change in the rotational velocity with greater distance from the galactic center, and that this change is smooth rather than reaching a peak in the spiral arm next closest to the center from the sun.

Mrs. Vera Rubin of Georgetown College Observatory, Washington, also calculated

### CHEMISTRY

## Plastic Chemicals Improve Soil for Roads

➤ SOIL UNDER road surfaces and behind walls can be made stronger and less waterlogged, the American Chemical Society meeting in Cincinnati was told.

Chemicals can alter soil properties. To the familiar types of cement and asphalt paving materials, chemists have added new kinds of plastic materials to improve soils from the engineer's point of view.

Acrylic polymers and their calcium compounds were discussed by Dr. Vincent C. Meunier of Rohm and Haas Chemical Company and Dr. James H. Reynolds Jr., formerly with the U. S. Corps of Engineers. Both noted limitations in these materials as used at the present time but recommended further study of these materials for improved rapid soil solidification.

Improved methods are available for mixing chemicals with soil. Dr. Alan S. Michaels and Dr. T. William Lambe of the Massachusetts Institute of Technology pointed out the difficulty of getting civil engineers to use the new soil treatments.

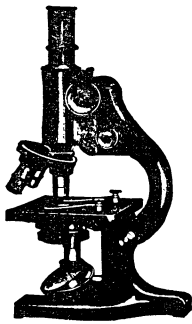
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the form of the galactic arms. She modifies by a variable angle the original circular motion proposed by the Dutch astronomers, Drs. Jan H. Oort, H. C. van de Hulst and C. A. Muller of Leiden Observatory, the Netherlands.

Dr. McClain found that there is a relative velocity of approach between the hydrogen sending out radio waves on the far side of the galaxy and the sun, and that "a departure from circular motion is present in the galaxy."

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