

LEAD

*Published by
Lead Industries
Association*

VOLUME THIRTEEN

MARCH, 1943

NUMBER TWO



One of the uses to which lead foil packaging has been put is the moistureproofing and verminproofing of army field rations

Lead Industries Association New York, N. Y.

Lead-Clad Plywood Provides Ease of Installation for X-Ray Shielding

A NEW development to simplify the application of lead shielding to X-ray photography and fluoroscopy rooms is lead-clad plywood which is now available from stock in the standard plywood sizes.

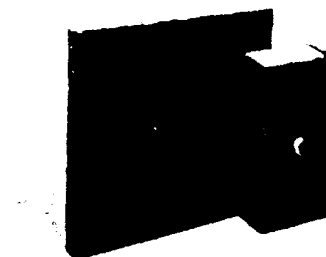
The sheets of lead-clad plywood can be cut to size with an ordinary carpenter's saw and secured to new or existing walls or ceilings with nails or screws at the edges of the sheets. The joints are then covered with lead-clad battens which in turn are held by lead-headed nails. Any intermediate fastening is also done with lead-headed nails and thus a continuous barrier of high density material is provided.

The lead is firmly bonded to the plywood which makes possible its application in relatively large units. The finish is smooth and permits a trim and workmanlike finish which can then be painted so that the room may be as pleasant and presentable as any other working space.

The preferred method of bonding

the lead to the plywood is by the use of a newly developed latex cement which makes a permanent elastic bond. However, the use of this cement is restricted to materials which are destined for use by the armed services or in vital war plants which are entitled to high priority ratings so the producers have also developed a casein cement process which produces similar results. In the casein cement type a fabric insert is used to provide elasticity and improve the bond between lead and plywood.

Sheet lead, generally 1/16-in. thick, is rolled onto the cement coated plywood and then subjected to pressure until the adhesive is thoroughly set. The 1/16-in. thickness of lead is slightly greater than 1.5 mm. which is indicated as being minimum thickness of lead which will give adequate protection against X-rays generated by voltages not in excess of 100 KV. according to the table published in LEAD, July, 1942, and taken from the booklet "X-ray Protection" pub-



X-Ray shielding material of lead-clad plywood and battens

lished by the National Bureau of Standards, U. S. Department of Commerce.

The description of the lead-clad plywood called "Andelco" is furnished by the manufacturer of the product, Andel & Company, Inc. of Chicago. The same company also manufactures and carries in stock standardized X-ray operators observation windows of kalamein construction, complete, glazed with approved lead glass for use with all types of lead linings.

Housing Project Planners Directed to Use Most Available Materials

CLARIFICATION of policy in the selection of plumbing materials to be used on proposed Federal Public Housing Authority projects is provided by Technical Bulletin No. 2, Standards for Temporary War Housing, Part V, Plumbing, issued in January, 1943, as follows:

"2. Where standard specifications indicate the alternate use of two or more materials, the choice of material shall be made by the contractor on the basis of availability; however, where one of two or more alternate materials listed in the Emergency Plumbing Standards is customarily used in a locality, such material should be specified in order to utilize available labor to the best advantage and to minimize the possibility of jurisdictional disputes. For example, the local code of Buffalo, New York,

requires that frames and water closet connections shall be of lead. These requirements should be followed for projects in this area.

"3. Where a municipality has adopted the Emergency Plumbing Standards as the local code during the war emergency, inspection of the work installed in that locality by the local municipal inspector is desirable as a matter of policy whenever possible, provided such inspection is performed without cost to the project. Many municipalities have offered their services for this purpose without obligation to the Government."

While these instructions allow some latitude in the final choice when alternate materials are specified, they indicate that lead should be used wherever it is at all possible since lead is the most available material at the

present time. It is also indicated that it is the responsibility of the architect to inform himself as to local practices and code requirements and to write his specifications accordingly in order that local labor may be utilized to the greatest advantage and that there will be the greatest possible cooperation with local building authorities.

It will also be an advantage to the materials supply situation in general to specify lead wherever it is adaptable, since lead is more plentiful and more easily obtainable than any of the other metals. The use of lead pipe in a single project where steel might otherwise have been used may result in the release of several tons of steel which may become armor plate or gun barrels instead of pipe and fittings. No opportunity to save critical metals should be overlooked.

Lead Foil in Packaging Saves Weight and Space While Releasing Other Metals for Armament Use

ONE of the most interesting of the changes in processes which have been brought about by wartime necessity and one which promises to remain with us when the war is over is the result of the development of lead foil materials for packaging. Although the prime reasons for research into this field were for the purpose of conserving steel, aluminum, tin and other metals, savings in weight, shipping space and cost have been great enough to indicate that many types of lead foil packages will continue to be used even when rigid containers are again available.

Many of the uses of foil with which most of us are familiar are of comparatively recent origin but heavy lead foils have long been used for packaging perishable materials which required protection from atmospheric

or moisture deterioration. Historical references to the Boston Tea Party mention the lead-lined chests which were torn open by the "indians" who boarded the ships in Boston Harbor. Fine imported teas can probably still be obtained sealed in heavy leadfoil packages.

However, such closures are expensive and easily damaged. The newly developed lead foil packages are substantial and economical while retaining the advantages of waterproofness and airtightness. They are being used as shipping and storage containers for rifles, machine parts, optical instruments, radio parts, cartridges, powder and detonators as well as foods, drugs, bandages and chemicals. The lead foil type package is especially adapted to use for emergency rations and medicines because



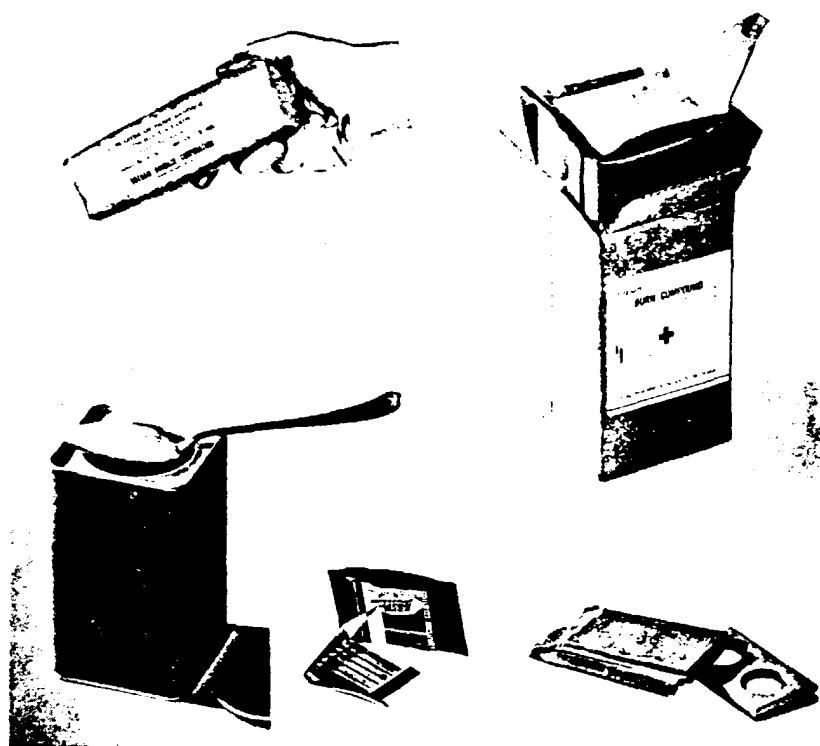
Moisture and verminproofed with lead foil, this package holds 20 lbs. of macaroni

of its light weight and ease of opening. Even cigarettes and matches are kept in lead foil coated envelopes by soldiers for protection against water and perspiration.

The most commonly used modern lead foil protected package is essentially a bag made of foil-coated kraft paper. The basic materials are lead foil, an asphalt adhesive and kraft paper. Over the lead foil may be cellophane, bond paper, an additional layer of kraft paper or other material as required, suitable to the requirements of the material to be packaged. Usually the cellophane is covered with a special thermoplastic coating which will seal the package upon the application of heat. Although the lead is quite thin, it is sufficiently ductile to withstand folding without breaking and it forms a vaporproof, waterproof closure which will also exclude vermin and bacteria.

Other types of containers such as cannisters made of fibre laminated with lead foil are available. Some dehydrated foods for civilian consumption have appeared wrapped in lead foil type packages and are on dealers shelves today. The possibilities of lead foil packages are limited only by the resourcefulness of the designers and we may expect to see many more applications during the war emergency and after.

Widely varied types of lead foil packages. Upper left, plaster bandage. Upper right, burn ointment. Lower left, cannister for epsom salts. Lower right, envelope for sulfadiazine tablets. Lower center, waterproof matchholder



Importance of Lead Pigment Paints Stressed in Farm Machinery Conservation Program

THERE is today probably no more serious problem being faced by a single group of producers than the growing scarcity of farm machinery which is troubling the farmers. Although farm produce must be increased this year new machinery available for purchase will be only 20 percent of that offered for sale in 1940, or perhaps less. In the face of these conditions coupled with the growing shortage of manpower and the insistent demand for scrap, every piece of farm machinery in the country must be sought out, checked over and put into working condition.

All over the country farmers are recognizing this necessity and many of them have accomplished remarkable results. The shops of many vocational agriculture schools have been made available to owners of machinery. Regular school classes have undertaken projects of rehabilitation of damaged and discarded machinery and adult classes in machinery maintenance and repair have been well attended by farmers. Machines which have been abandoned in the fence corners for years are being hauled out and repaired, repainted and returned to service. There are known cases of machines of estimated age of

30 years which are going back into use.

Many of the breakdowns which have caused the abandonment of potentially serviceable farm machinery can be traced to the results of rust and decay. In those cases where such damage has already happened there is nothing to be done but make repairs at whatever expense is necessary. However, further damage of this sort can be guarded against, and machines still intact can be protected from rust simply and inexpensively by means of paint. In fact, the effectiveness of paint in preventing destruction of iron and steel can be utilized to extend the life of countless articles in daily use which have come to be practically irreplaceable.

The Conservation Division of the WPB strongly recommends that full advantage of paint coatings should be taken to protect all iron and steel

equipment as a conservation measure.

The lead pigment paints, red lead and blue lead, are unsurpassed for the protection of exposed iron and steel. Red lead particularly has the property of being "rust inhibitive," that is, in addition to forming a protective coating over the metal, it can actually retard or inhibit the chemical reaction between the iron and oxygen.

The mixing and application of these paints are easy and the cost is small. The timely application of a coat of metal protective lead paint might be the means of extending the useful life of iron or steel articles for a time measured in years.

The Lead Industries Association, 420 Lexington Avenue, New York, N. Y., has available a leaflet entitled "Stop Demon Rust" which gives full but concise simple instructions for the preparation of red lead paints in small quantities suitable for use on farm machinery and equipment. This leaflet will be sent free on request to anyone interested in so protecting his equipment.

Corrosive Flue Gases Have Little Effect on Lead

IT is well known that the gases produced by the combustion of most fuels used by industry have a corrosive effect on metals. Some metals are known to be more resistant to corrosion than others and many tests have been conducted for determining both qualitative and quantitative differences. A recently conducted series of tests on various metals and alloys has produced important data of value to engineers who find it necessary to specify materials for use in locations where high concentrations of flue gases occur.

An account of these tests, which were conducted by Louis Schnidman and Jesse S. Yeaw of the Rochester Gas and Electric Corporation of Rochester, New York, is carried in the December, 1942, issue of "Industrial and Engineering Chemistry."

Tests were conducted in condensing chambers in which the air was kept saturated with vapor condensed from flue gases produced by the controlled

combustion of fuel gas. Four different fuel gases were used ranging from non-odorized natural to foul manufactured.

Two series of tests were run, the first series on a variety of metals and alloys and the second series on a group of alloyed steels containing chromium and nickel, commonly referred to as stainless steels.

A summary of the tests indicates that, while most metals showed evidences of a relatively uniform rate of corrosion beginning almost immediately upon exposure, the so-called 18-8 stainless steels resisted attack for a considerable period of time but, with the exception of one containing molybdenum, they failed rather quickly once corrosion started.

A tabulation of life expectancy estimated from the test data, of the various metals shows that, with the exception of the molybdenum stainless steel, lead is by far the most resistant to corrosion by flue gases.

Application of lead pigment paint by adult class in farm machinery repair



The termination of the tests precluded the investigation of the behavior of the molybdenum stainless steel subsequent to the beginning of attack but the life expectancy of lead is shown to be from 1.8 to 15 times as great as that of other common metals in the same thickness. Actually the superiority of lead is even greater. Because of its physical characteristics and comparatively low cost, lead is generally used in greater thicknesses than the other metals. This has the effect of multiplying the years of service which can be counted upon from lead. Thus the commonly used 4-lb. per square foot sheet lead, which is nearly twice as thick as the 20 gage test samples, could be expected to last twice as long. This would, in effect, entitle lead to a 30 year life expectancy in comparison with the other metals listed in the table since

ESTIMATED MAXIMUM LIFE OF 20-GAGE METAL IN FLUE GASES

Metal or Alloy	Approx. Compn.	Life, Years
Iron	Commercial Steel	1 ^a
Copper	And a few of its alloys	7
Zinc	Commercial	8
Aluminum	And some of its alloys	8
Lead	Commercial	15
Steels:		
Chrome	17	3
Chrome	27	3-4
Stainless	18-8	4-8
Stainless	18-8-Ti	2-5 ^a
Stainless	18-8-Cb	2-5 ^a
Stainless	18-8-Mo	— ^b
Stainless	25-12	5-9
Stainless	25-20	2-3 ^a

^a Strips were penetrated during exposure tests.

^b Corrosion very light, no calculation possible with available data.

Reprinted from *Industrial and Engineering Chemistry*

lead is seldom used in sheets as thin as 20 gage.

Condensed flue gases are merely an intensified form of the destructive elements in the atmosphere of any urban community either industrial or residential. The results of tests by exposure to flue gases can be applied

directly to atmospheric exposure. They prove by laboratory methods, what has been learned by many years of experience, that roofing, flashings and other similar items of lead will have unsurpassed durability even under the most severe conditions of atmospheric exposure.



Architectural attractiveness of Middleboro Court House is emphasized by clean white lead paint

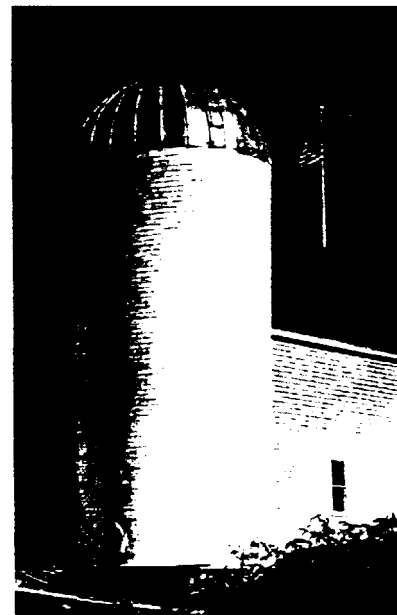
Trim Town Buildings of Middleboro, Mass., Show Results of White Lead Maintenance Program

MIDDLEBORO, Mass., is one of the small thriving industrial towns so characteristic of New England. It has a solid background of diversified industry which has located there partly because of ample hydraulically generated power. Agriculture also contributes to the commercial life of the community which is in the cranberry growing area of southeastern Massachusetts.

Middleboro is one of the oldest

towns in the United States. The original settlement founded in 1660 was once burned by the Indians who were originally friendly but later turned hostile. The town was incorporated in 1669. It now has a town manager form of government which maintains well kept streets and municipal properties including a spacious and comfortable town farm.

In recent repainting of the town buildings, pure white lead and lin-



White lead painted silo on Middleboro Town Farm

seed oil paint was used throughout, carrying on a long standing practice of efficient economical maintenance.

Because of the durability and uniform wearing qualities of white lead paint, the beauty of the newly painted buildings will be preserved and when repainting becomes necessary, no expensive preparation will be required.



No. 18

Andover, Mass., City of Historic Houses

ANDOVER, Mass., in the Merrimac Valley is a town of many interests. It is an old town, having been settled about 1643 and incorporated in 1646. It was named for Andover in Hampshire, England, which had been the home of some of the early settlers.

Andover is the home of manufacturers of twine, woolens, rubber goods and other commercial products and nearby is the site of "Shawshen," a model community created by the American Woolen Co.

However, Andover is probably best known for its leadership in educational facilities. Abbot Academy, the oldest incorporated school for girls in New England was founded there in 1829. Phillips Academy for boys, founded there in 1778, is still one of the best known preparatory schools in the United States. A theological seminary, for over one hundred years connected with Phillips Academy, was moved to Harvard University in 1909.

Many architecturally interesting and historically important houses have become the property of Phillips Academy through the years. They are all beautifully set in park-like grounds and in spite of age and the rigors of New England winters are all sound and well kept in good condition. The maintenance practice of the Academy is to use pure white lead paint exclusively on both old and new work. The soundness of this policy is well demonstrated by the condition of the buildings.

Samaritan House, Phillips Academy, Andover, Mass. Erected in 1824 on the site of the present chapel it was removed to its present site in 1929. Pure white lead paint has played its part in keeping this building sound and beautiful through unusually difficult circumstances.



The America House, Phillips Academy. Like so many other buildings which are associated with significant American historical events, this house in which Samuel Smittle wrote the words to the song "America" is protected with white lead paint.



The Newman House, Phillips Academy. Built in 1811 it was once the residence of young Master Oliver Wendell Holmes. Its beautiful condition attests the excellence of the protection from weather provided by the white lead paint with which it has been protected for so many years.

DAYTON SNYDER





Good Paint Available With White Lead Despite Possible Shortages of Other Materials

WARTIME painting can be done with good paint. White lead pigment, which is the basic ingredient of top quality paint, is freely available in quantities sufficient to supply both military and civilian needs. Metallic lead, from which white lead is made, is the only common metal of which ample stocks exist for both civilian and military uses and white lead is being produced in sufficient quantities to take care of all needs. There being no threat of shortage of white lead, it is not necessary to use a pigment of doubtful durability on any new or presently built structures, either temporary or permanent. This is extremely important at the present time. It means that white lead can be used extensively to make the best use of the supplies of linseed and other drying oils which are somewhat limited and which must be used with consideration.

Oil Conservation Measures Suggested

Measures for the conservation of linseed oil have been taken by the War Production Board. Manufacturers of ready-mixed paints which contain large proportions of linseed oil are now required to use smaller quantities of oil in their products. It is entirely possible to do this without destroying the quality of their product by using some thickened or bodied oil and increasing the amount of thinner and at the same time increasing the white lead proportion slightly. This is exactly what has been required by the Government in changing the Emergency Alternate Specifications for ready-mixed exterior paints. The latest Emergency Speci-

fication E-TT-P-156, White, is now a 100 percent white lead paint, differing from the regular specification TT-P-156 only in the composition of the vehicle.

It is also possible for users of job-mixed white lead paints to reduce their consumption of linseed oil without sacrificing the quality of the paint. High quality paint can be made of pure white lead and linseed oil through a considerable range of proportions. Slight changes in mixing formulas, reducing the quantity of oil, increasing the white lead proportion slightly and adding a little more thinner, can be the means of saving appreciable quantities of oil.

Formula Changes Studied

The National Bureau of Standards of the Department of Commerce has studied the revisions of paint formulas and in letter circular LC-717 has

published tables of suggested formulas containing reduced quantities of linseed oil. The table printed here is adjusted to soft paste white lead from the recommendations applying to heavy paste contained in LC-717. Paints made from the suggested formulas will contain less oil and more thinner. They will also contain a larger proportion of white lead. They will have slightly greater hiding power and the finish coats will have less tendency to collect dirt on exposure to the weather. Quoting again from LC-717, "The Bureau believes that the paints will have a satisfactory durability. Since there is no shortage of white lead but a very definite shortage of oil, it seems desirable to suggest the formulas given in the table. If they are generally used, a saving of oil will result."

The high regard in which pure white lead paint is held is indicated by the statement that even two slightly thinned coats of the paint recommended for third coat in Table I (a) would be better than three coats of an inferior quality paint.

PROPOSED OIL CONSERVING FORMULAS FOR THINNING SOFT PASTE WHITE LEAD *

TABLE I

	(a) Painting New Wood Three Coats				
	Primer	Body Coat	Finish Coat		
Soft Paste					
White Lead	100 lb.	100 lb.	100 lb.		
Raw Linseed Oil	2½ gal.	1 gal.	2 gal.		
Turpentine	2¼ gal.	1¾ gal.	¾ gal.		
Drier	1 pint	1 pint	1 pint		
Gals. Paint	8½	6½	6		
(b) Painting New Wood Two Coats					
	Primer and Body Coat	Finish Coat			
Soft Paste					
White Lead	100 lb.	100 lb.			
Raw Linseed Oil	1 gal.	2 gal.			
Turpentine	½ gal.	¾ gal.			
Spar Varnish	¾ gal.	—			
Drier	1 pint	1 pint			
Gals. Paint	5½	6			
(c) Repainting Wood Two Coats					
	Body Coat	Finish Coat			
Soft Paste					
White Lead	100 lb.	100 lb.			
Raw Linseed Oil	1¼ gal.	2 gal.			
Turpentine	2 gal.	¾ gal.			
Spar Varnish	—	—			
Drier	1 pint	1 pint			
Gals. Paint	6½	6			

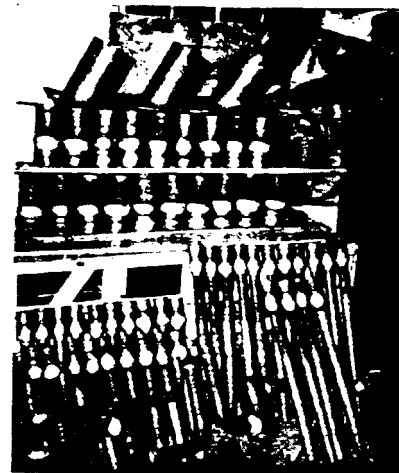
* For heavy paste white lead use one quart more of turpentine.

Progressive Rock Island, Ill., Takes Step to Conserve Plumbing Materials

AN excellent example of the way in which a city can cooperate with the conservation measures of the War Production Board to reduce consumption of critical war materials while still retaining safe plumbing practice requirements is afforded by Rock Island, Ill. Rock Island has adopted the Emergency Plumbing Standards for the duration of the war and is enforcing them through the

city building and inspection departments.

The standards are being applied in conjunction with the existing code insofar as the two sets of requirements may be applied together. This procedure allows the continuance of the requirement of the use of lead wastes, vents, traps and closet connections which has long been the standard practice in this city. Thus



Lead pipe and fittings ready for installation in Berkshire Subdivision in accordance with Emergency Plumbing Standards



The following articles and reprints contain information, drawings and specifications on the use of lead products helpful to architects, engineers and others in the construction industry. They are available, free of charge, upon request to the Lead Industries Association, 420 Lexington Avenue, New York City.

SOME PAINTING PROBLEMS AND THE ANSWERS

By Dr. F. L. Browne, Senior Chemist, Forests Products Laboratory, Madison, Wisc.

Reprinted from the National Real Estate Journal, Sept., 1939.

STAMFORD'S DOUBLE LIFETIME HOME

A complete analysis of hard lead flashing, white lead paint, lead plumbing, plywood and red cedar Certigrade shingle details and installation methods. Reprinted from the American Builder, July, 1939.

BRUSH UP ON YOUR PAINTING

A practical article on the selection and application of paint reprinted from House Beautiful, June, 1941.

DON'T GAMBLE WITH PAINT

An instructive article on the selection of paint for farm use reprinted from the March 1942 issue of Country Gentleman.

WHITE LEAD PAINT FOR DEFENSE HOUSING

Reprint from Bulletin of the Producers' Council including specifications and graphic mixing instructions for exterior and interior White Lead Paint.

STOP DEMON RUST

Leaflet giving concise, simple instructions in the use of the rust preventing qualities of Red Lead Paint in protecting farm machinery.

HOW LUMBER AND PAINT KEEP YOUR HOME ALWAYS IN STYLE

A brief digest of the advantages of painted lumber homes with color-styling suggestions and other interesting information.

LASTING LEADWORK IN MODERN PLUMBING

By T. N. Thompson, Technical Editor, Plumbing and Heating Journal.

Reprinted from Plumbing and Heating Journal, Feb., 1939.

COMMERCIAL STANDARDS:

Calking Lead, CS94-41
Lead Pipe, CS95-41
Lead Traps and Bends, CS96-41

Official publications by the Government Printing Office of the above Commercial Standards as promulgated by the U. S. Department of Commerce through the National Bureau of Standards, effective June 25, 1941.

NEW SIMPLIFIED STANDARD FOR LEAD TRAPS AND BENDS

File size leaflet with new standards for lead traps and bends as well as existing standards for lead pipe and calking lead, and other informative data.

LEAD PLUMBING FOR DEFENSE HOUSING

Reprint from Bulletin of the Producers' Council including information on the Emergency Plumbing Standards and the Defense Housing Critical List.

the private housing projects now being erected in Rock Island will not be required to substitute steel or less durable material for the long lasting lead that Rock Islanders have been accustomed to depend upon.

In addition, the progress of housing construction will not be threatened by delays in obtaining materials. Lead is easily and quickly obtainable and two private projects now under way in Rock Island will soon be completed. The Berkshire Subdivision and the Suncrest Addition will provide a total of 94 badly needed low-cost homes for war workers.

It is the intention of the Federal Public Housing Authority that wherever possible materials for plumbing installations shall be selected to conform to the existing code in force at the site of the project. The city of Rock Island is cooperating to the letter by adopting the Emergency Plumbing Standards while retaining the requirements for lead which are embodied in its local city code.

**DON'T STOP
Buying
War Bonds and Stamps**

UPON REQUEST, THE LEAD INDUSTRIES ASSOCIATION WILL BE GLAD TO MAIL "LEAD" REGULARLY, FREE OF CHARGE, TO THOSE INTERESTED, AND WILL COOPERATE WITHOUT OBLIGATION IN THE SOLUTION OF YOUR LEAD PROBLEMS