

United States Department of the Interior, Bureau of Reclamation

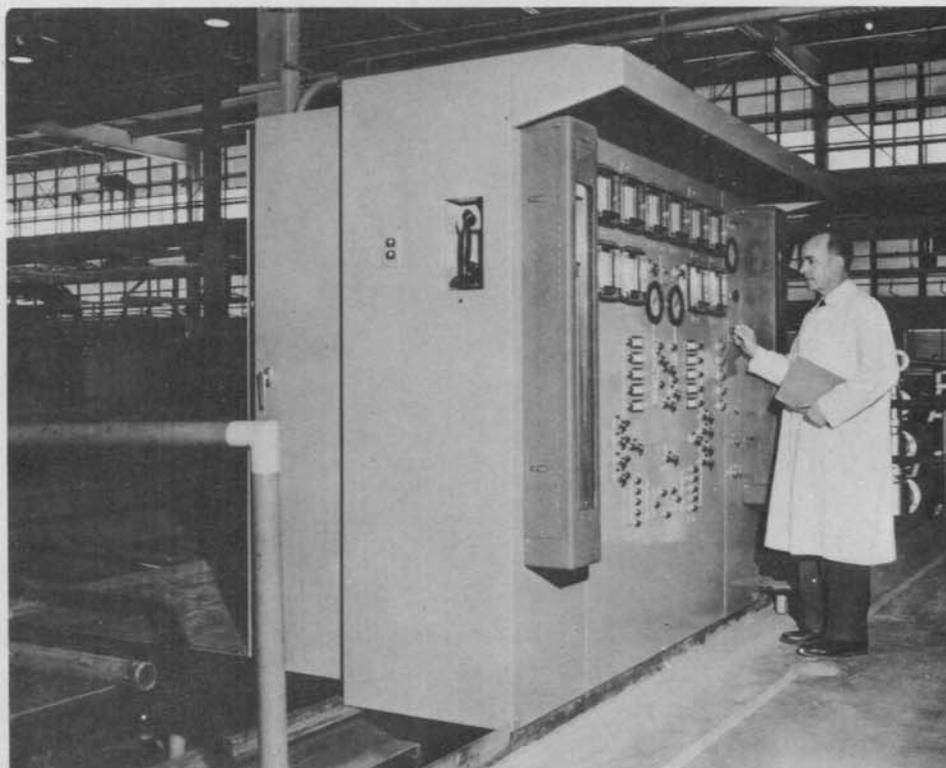
IRRIGATION OPERATION AND MAINTENANCE

BULLETIN NO. 74

October, November, December 1970

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The Irrigation Operation and Maintenance bulletin is published quarterly, for the benefit of irrigation project people. Its principal purpose is to serve as a medium of exchanging operation and maintenance information. It is hoped that the reports herein concerning labor-saving devices and less costly equipment and procedures, developed by resourceful project people, will result in improved efficiency and reduced costs of the systems for those operators adapting these ideas to their needs.

To assure proper recognition of those individuals whose suggestions are published in the bulletins, the suggestion number as well as the person's name is given. All Bureau offices are reminded to notify their Suggestions Award Committee when a suggestion is adopted.

* * * * *

Division of Water Operation
and Maintenance
Engineering and Research Center
Denver, Colorado 80225



COVER PHOTOGRAPH:

All controls on the control cabinet at the Bureau Engineering and Research Center, Denver, Colorado, are clearly marked for identification. The importance of such marking is discussed beginning on page 1, of this Bulletin. Photo PX-D-58316

UNITED STATES DEPARTMENT OF THE INTERIOR

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BUREAU OF RECLAMATION
Ellis L. Armstrong
Commissioner

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INTRODUCTION

Starting on page 1, an article entitled "Nameplates and Identification of Piping and Controls," describes a general standardization of nameplates and piping identification, including color coding being used by the Bureau of Reclamation.

Condition of electrical facilities on irrigation projects is always a point of concern and should be given periodic attention as emphasized in this short article on page 6.

A set of water safety rules prepared for the Third Regional Water Safety Conference held at Sacramento, California, can be found on page 9, and on page 10, the newly released National Safety Council Data Sheets are listed.

A guide to be used for closed (pipe) drain construction entitled "Filter Material for Pipe Drains," found on page 11, was taken from recent available specifications.

An idea for safety barrel hooks to facilitate handling loaded oil drums, can be found on page 13, they virtually eliminate the dangers of slipping, sudden overbalancing and load shifting.

Gopher and rat holes that cause breaks are a big problem for the Yuma County Water Users' Association along their 135 miles of unlined canals and laterals in Arizona. An idea to strengthen banks to reduce the possibility of breaks can be found on page 17.

Pollution control for houseboats on Bureau reservoirs is the subject of a timely article on page 21.

On page 22, attention is called to a recent publication, "Investigation of Plastic Films for Canal Linings." This may be of interest to those using or contemplating the use of this type of material for water barriers.

NAMEPLATES AND IDENTIFICATION
OF
PIPING AND CONTROLS

Wherever operating equipment is located there is a need for identification devices or markers which can readily be recognized. Standardized labeling of controls, piping, instruments, and other equipment in pumping plants, dams, gatehouses, switchyards, etc., contributes to safety, efficiency, and lower cost maintenance through a savings in time and reduction of error. Over the years criteria for the development of standardization of piping identification and equipment nameplates have been set up. The purpose of this article is to update criteria and offer suggestions with emphasis on economy and practicality.

Programs to standardize the marking at a given installation may conceivably be undertaken in stages, but obviously certain improvements should receive the highest priority. A system of identifying all controls critical to the operation of a facility should be a matter of special concern to those responsible for operation and maintenance. For example; there is a need for labeling the switches in the electrical supply lines of motors powering sump pumps, high-pressure oil pumps, ventilating fans, and similar equipment at dams, pumping plants, headworks, etc. This is especially important where the equipment might have to be operated occasionally in an emergency by less experienced personnel. Where valves in hydraulic lines are used for control, they also should be labeled. The following paragraphs offer labeling suggestions for various types of locations.

Identification Markers--General

Types in order of preference are:

Laminated phenolic resin nameplates.

Self-sticking tape - preprinted stock signs.

Self-sticking tape - stenciled.

Embossed tape.

Suggested colors for controls are:

Red background for fire protection, warning inscriptions, and emergency devices, such as penstock gate emergency closure switches.

Black background for all other marking.

All lettering to be white.

Nameplates for Panel Mounting

Background: 1/16- or 3/32-inch-thick laminated phenolic resin, black or red.

Lettering: White, not less than 3/16-inch-high, except for informational plates intended to be read at close range.

Fastening: Self-tapping screws.

Nameplates Mounted on Concrete Walls

Background: 1/16- or 3/32-inch phenolic resin, black or red.

Lettering: White, not less than 1/4-inch-high, except close-range informational.

Fastening: Epoxy cement.

Nameplates for Out-of-doors Installations

Background: Laminated phenolic, black or red, 1/16- or 3/32-inch laminate as appropriate for curved mounting.

Lettering: White, not less than 1/4-inch-high, except close-range informational.

Fastening: Epoxy cement.

Nameplates for Valves or Equipment in Well-lighted Areas

Background: Laminated phenolic, black or red, 1/16-inch laminate for mounting on flat surface; 1/8-, 3/16-, or 1/4-inch laminate for mounting on curved surfaces.

Lettering: White, not less than 1/4-inch-high, except close-range informational.

Fastening: Epoxy cement.

Stock signs may be available to meet many needs.

Complete identification of electrical controls at an installation is shown in the photograph on next page. Terminal markers provide

complete identification on the job. Matching terminal markers can be used to save time on future tracing and hookups.

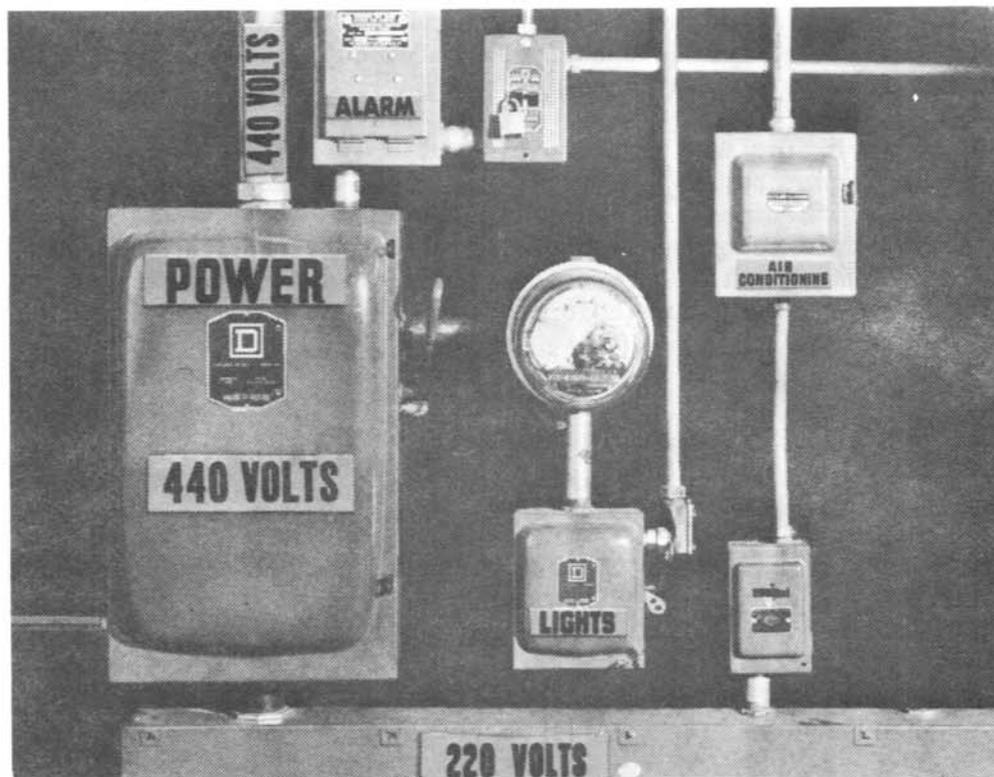


Photo PX-D-67878

A nameplate standard now in use by the Bureau of Reclamation is shown on page 7

Identification for Equipment in Dimly Lighted Locations, or Requiring Identification at Distances Greater Than 10 Feet

Background: Self-sticking vinyl cloth tape, white background, 2-1/4- or 1-1/8-inch widths.

Lettering: Black letters (stencil letters in the field), use preprinted black arrows to show direction of flow.

Color Coding of Exposed Piping

The following suggestions are latest approved standards:

1. All piping may be painted continuously in accordance with harmonizing color schemes. However:

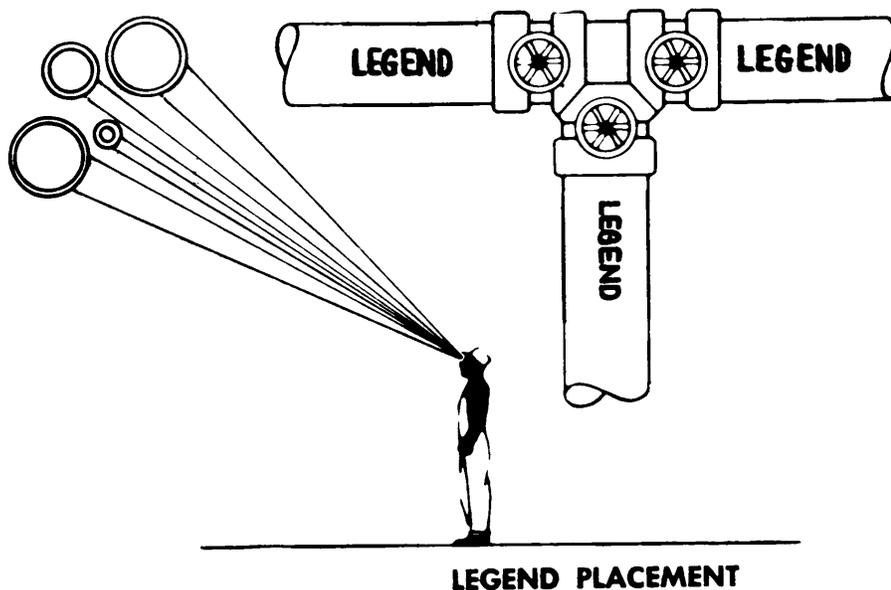
a. No piping should be painted red except fire protection piping and (CO₂) cylinders.

b. No piping should be painted yellow except piping for chlorine gas (not chlorine solution), or other materials designated dangerous.

2. All piping may be identified at approximate intervals such as each unit bay with legends stenciled or self-sticking vinyl cloth tapes (black letters on white background). In addition, a color bank should be placed to the left of each legend using 1-1/2-inch self-sticking vinyl cloth banding tape in the following colors:

- a. Green for all water pipe, except fire protection.
- b. Black for all oil pipe.
- c. Aluminum for air pipe.

Pressure-sensitive markers combine standardized colors and legends for complete pipeline identification. Background colors designate general nature of pipe contents. Legends identify exact contents. It takes only seconds to apply both color and legend at the same time for positive, quick, complete identification. A sketch showing legend placement can be found below and a photograph of the standardized pressure-sensitive markers can be found on page 5.



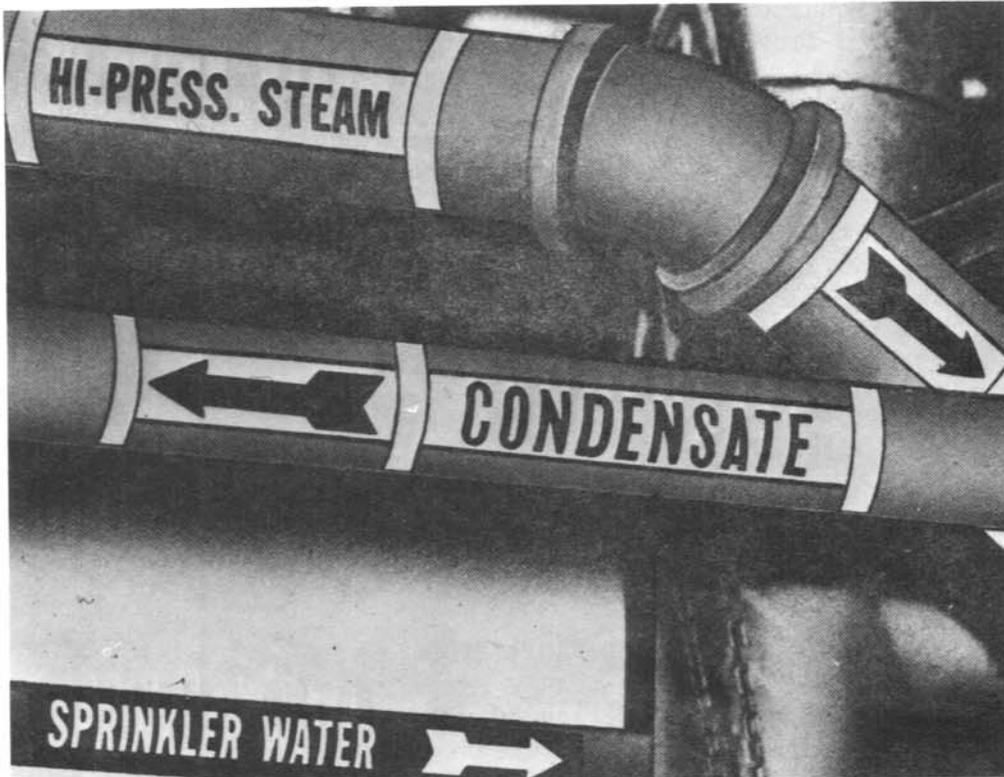


Photo PX-D-67879

Purchasing Information for Self-sticking Tapes and Stencils

Laminated resin identification markers, self-sticking tapes and other supplies may be purchased from various suppliers such as mechanical, hardware, and electrical supply houses. Catalogs are available from these same sources. Warehouse life of the adhesive is usually stated to be 2 years, so orders should be based upon turning the stock in that period of time.

It is advantageous to purchase preprinted directional arrows and labels but many times the preprinted legends are not suitable, therefore, consideration should be given to purchasing blank white markers and stenciling the legends on them in the field. Markers come in various widths but generally the use of 1-1/8-inch markers and directional arrows on pipes 3 inches and smaller, and 2-1/4-inch markers and arrows for pipes 6 inches and larger is suggested.

Machine-cut stencils for use in printing legends on blank white markers may be purchased for approximately 50 cents per line. Maximum length of a line is about 16 inches, which will permit 21 letters and spaces for 3/4-inch letters, or 15 letters and spaces for 1-inch letters. One-inch letters may be used for single-line legends on 2-1/4-inch

markers. Three-quarter-inch letters should be used for 1-1/8-inch markers, or for 2-line legends on 2-1/4-inch markers. The height of a 2-line legend of 3/4-inch machine-cut letters will be 1-7/8 inches. Stencils can be ordered in standard oil board or mylar sheet. The oil board will give sharper letters, is less expensive, and will serve satisfactorily if properly cleaned and stored flat after each using.

The stencil ink should be black and should comply with Federal Specification TT-I-558 for waterproof ink. Ink can be applied by roller, brush, or spray. For printing a few legends, a brush will probably be most convenient, but for larger quantities rollers with integral ink feeders will save time. Such rollers with ink may be purchased for about \$20.

Banding tape for safety color coding should be 1-1/2 inches wide. This tape comes in 30-yard rolls. The colors should be as specified under "Color Coding of Exposed Piping" above.

* * * * *

ELECTRICAL FACILITIES

Continued attention to the condition of all electrical facilities is very necessary for the safe and efficient operation of an irrigation project. This should include those facilities essential to the powering and lighting of project works, shops, warehouses, and residences. Because of the age of some facilities, electrical features should be reviewed periodically to determine if they are in a safe and serviceable condition and that they meet current national and state electrical codes.

Electrical deficiencies that may exist on older projects include inadequate grounding facilities; broken or inadequately supported conduit; inadequately supported overhead supply and service lines; the use of nongrounding-type receptacles and nongrounding-type plugs on extension and power supply cords; broken lighting fixtures and convenience outlets; lighting fixture and convenience outlet boxes that are not securely anchored and without covers or with loose covers; poor connections in the main disconnecting switchboxes; splices in conductors outside junction boxes; extension and power supply cords with deteriorated, broken, taped, and frayed insulation; circuit breakers and disconnecting switches without nameplates or labels; lighting and convenience outlet circuits fused with oversized fuses; and main disconnecting switchboxes without locks.

Periodic examination of electrical facilities should be encouraged. The examinations should be made by personnel who are well qualified to judge the sufficiency of the electrical installations and familiar with national and state requirements.

* * * * *

SAMPLE NAMEPLATES

STRAINER DRAIN

EXTENDED TYPE

STRAINER DRAIN

COMPACT TYPE

FIRE PROTECTION WATER SUPPLY CAUTION
2 1/2-INCH OUTLET FOR FIRE DEPARTMENT USE ONLY

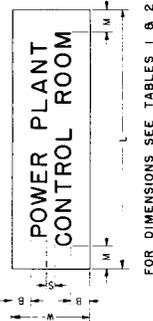
INSCRIPTION AND GLOBE RANGE INFORMATIONAL LETTERING

GOthic LETTERING CHART *

NORMAL LINE WIDTH (100%)
ABCDEF GHIJKL MN
ABCDEF GHIJKL MNOP
ABCDEF GHIJKL MNOPQR
ABCDEF GHIJKL MNOPQRSTU
ABCDEF GHIJKL MNOPQRSTU V
ABCDEF GHIJKL MNOPQRSTU VWXY Z
ABCDEF GHIJKL MNOPQRSTU VWXY Z
ABCDEF GHIJKL MNOPQRSTU VWXY Z

* Average widths listed include spacing between letters

SIZE AND LETTER SPACING OF NAMEPLATES



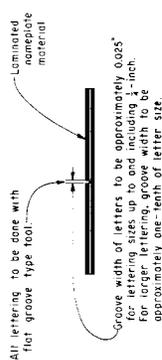
FOR DIMENSIONS SEE TABLES I & 2

TABLE I

(Dimensions in inches)

GOthic LETTER SIZE	NO. OF LINES		
	W	B	S
1/2	1.00	3/8	1.25
5/8	1.00	3/8	1.25
3/4	1.00	3/8	1.25
7/8	1.00	3/8	1.25
1	1.00	3/8	1.25
1 1/8	1.00	3/8	1.25
1 1/4	1.00	3/8	1.25
1 1/2	1.00	3/8	1.25
1 3/4	1.00	3/8	1.25
2	1.00	3/8	1.25

For other lettering sizes, more than three lines, or various size lettering on some nameplate, arrange width as follows:
 Space (S) = Average of letter sizes on each side of Border (B) = Largest lettering size on nameplate x 1.2 + 1/8
 Width (W) = Average of letter widths (M) to be used plus 1/8 inch.



DETAIL A

TABLE 2

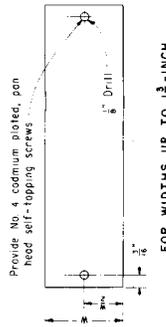
(Dimensions in inches)

NO. OF LETTERS AND SPACES	LETTERING SIZE ON LONGEST LINE		LETTERING SIZE ON LONGEST LINE	
	NORM	COND	NORM	COND
1	1/2	3/4	3/4	1
2	3/4	1	1	1 1/4
3	1	1 1/4	1 1/4	1 3/4
4	1 1/4	1 3/4	1 3/4	2
5	1 3/4	2	2	2 1/4
6	2	2 1/4	2 1/4	2 3/4
7	2 1/4	2 3/4	2 3/4	3
8	2 3/4	3	3	3 1/4
9	3	3 1/4	3 1/4	3 1/2
10	3 1/4	3 1/2	3 1/2	3 3/4
11	3 1/2	3 3/4	3 3/4	4
12	3 3/4	4	4	4 1/4
13	4	4 1/4	4 1/4	4 1/2
14	4 1/4	4 1/2	4 1/2	4 3/4
15	4 1/2	4 3/4	4 3/4	5
16	4 3/4	5	5	5 1/4
17	5	5 1/4	5 1/4	5 1/2
18	5 1/4	5 1/2	5 1/2	5 3/4
19	5 1/2	5 3/4	5 3/4	6
20	5 3/4	6	6	6 1/4
21	6	6 1/4	6 1/4	6 1/2
22	6 1/4	6 1/2	6 1/2	6 3/4
23	6 1/2	6 3/4	6 3/4	7
24	6 3/4	7	7	7 1/4
25	7	7 1/4	7 1/4	7 1/2
26	7 1/4	7 1/2	7 1/2	7 3/4

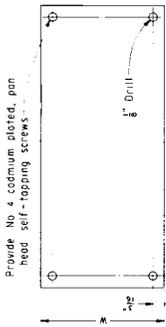
For other lettering sizes or longer nameplates, use the following formula:
 L = (N+1) * M (Nameplate length cut to nearest 1/8 inch)
 L = Length of nameplate
 N = Average letter width on longest line
 M = Number of spaces on longest line
 M = Margin = Average letter width plus 1/8 inch.

DRILLING OF NAMEPLATES

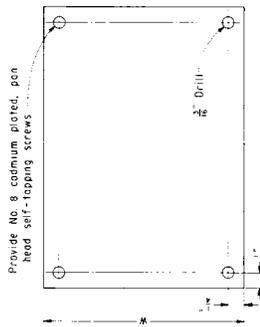
(For panel mounting only)



FOR WIDTHS UP TO 1 1/2-INCH



FOR WIDTHS OF 2- TO 3-INCHES



FOR WIDTHS OVER 3-INCHES

NAMEPLATE MATERIAL
 NOTE - All nameplate material shall be suitable for exposure to weather. Nameplate material shall be laminated phenolic resin sheets or 1/8-inch thick (as specified), opaque, black or white finish. Sheets to be cut to size with sharp edges and without burrs. Shall conform to Military Specification MIL-P-184 and Federal Specification L-P-509a.
 TYPE B - Same as Type A except Chinese red surface or equivalent.
 TYPE C - Same as Type A except 1/4-, 3/8-, or 1/2-inch thick (as specified).
 TYPE D - Same as Type A except Chinese red surface or equivalent and 1/4-, 3/8-, or 1/2-inch thick (as specified).

NAMEPLATE USES

TYPE A - For panel mounting with self-tapping screws. For concrete wall or other flat mounting to identify interior or exterior.
 TYPE B - Red nameplates are restricted to uses such as fire protection equipment, warning inscriptions, and emergency devices. Methods of mounting shall be same as Type A.
 TYPE C - For mounting on non-flat surfaces with epoxy cement.
 TYPE D - Restricted to uses such as fire protection equipment, warning inscriptions, and emergency devices. For mounting on non-flat surfaces with epoxy cement.

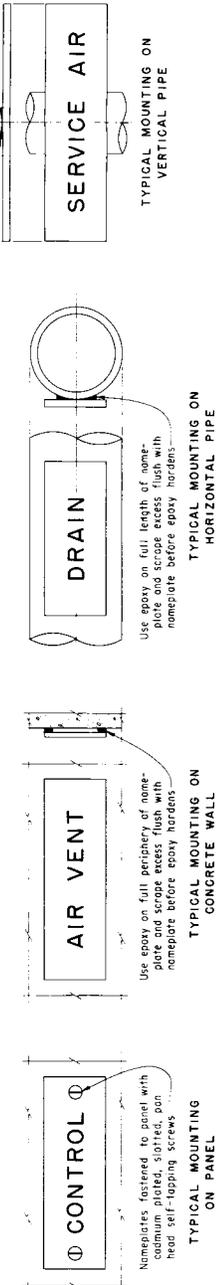
LETTERING

Use normal or condensed letter types shown on the Gothic Lettering Chart. Condensed lettering shall be not less than 1/8-inch high (1/8-inch preferred), except that 3/16-inch and smaller may be used for information and instructions that may be read at close range. Larger size lettering may be specified for out-of-doors installations or where necessary.

NOTES

This drawing supersedes Drawings No. 40-D-5173, 105-D-341, and 105-D-342.
 This drawing and Drawings No. 40-D-6124, -6130, and -6187 supersede Drawing No. 40-D-2587.

MOUNTING OF NAMEPLATES



SERVICE AIR

TYPICAL MOUNTING ON VERTICAL PIPE

DRAIN

TYPICAL MOUNTING ON HORIZONTAL PIPE

AIR VENT

TYPICAL MOUNTING ON CONCRETE WALL

CONTROL

TYPICAL MOUNTING ON PANEL



UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

STANDARD NAMEPLATES

DESIGNED BY: [Signature]
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]
 APPROVED BY: [Signature]

BUREAU OF RECLAMATION, WASHINGTON, D.C. 20250 40-D-6234

WATER SAFETY

The following water safety rules were printed in the "Proceedings of the Third Regional Water Safety Conference," April 16, 1970, sponsored by the Bureau of Reclamation, Sacramento, California.

General Safety Rules

1. Water is your friend if you relax in it. If you fight it, it becomes your enemy.
2. People should not play near the water if they cannot swim.
3. A child under 10 years of age, when near water, should always be attended by a person who has the ability to render assistance if necessary.
4. All people should know how to swim.
5. Everyone should learn some of the simple lifesaving methods so that he can assist people who might be in trouble.
6. No one should go to the aid of anyone in trouble unless he is capable of rendering assistance.
7. Everyone should learn an acceptable technique of administering artificial respiration in an emergency.
8. People should not go swimming when they have been drinking alcoholic beverages.
9. The colder the water, the more susceptible one is to shock. In extremely cold water (32-40°) even a good swimmer can survive for only a few minutes.
10. Respect water and what it might do to a person without notice. It does not take very much to cause a person to drown. A sudden wind squall can make the calmest lake a raging sea.

Personal Safety Rules for Swimming

1. A person should never swim alone, no matter how well he can swim.
2. Swim in a patrolled area.

3. When vacationing at a private cottage or lake, know where there is someone who could give assistance in emergency.
4. Private swimming pools and areas should have safety equipment available, such as ring buoys, heaving lines and poles.
5. A person should never wade or dive into water where he is unfamiliar with the depth or contour of the bottom.
6. Jumping into cold water should be avoided when one is overheated.
7. People should learn rules of safety for such sports as skindiving, water skiing and other aquatic sports before they try the activity.
8. People should never swim during an electrical storm.
9. Children should not be permitted to swim in canals.
10. Wait at least an hour after eating before swimming.

* * * * *

NATIONAL SAFETY COUNCIL DATA SHEETS

The National Safety Council has recently published new or revised technical data sheets on the subjects listed below. Copies of these data sheets (by the numbers shown in parentheses) may be obtained from the National Safety Council, 425 N. Michigan Avenue, Chicago, Illinois 60611.

Barricades and Warning Devices for Highway Construction Work (239 Revision A)

Picric Acid (351 Revision A)

Carbon Monoxide (415 Revision A)

Automatic Tire Curing Press Operations (625)

* * * * *

FILTER MATERIAL FOR PIPE DRAINS

One of the important parts of any closed (pipe) drain is the filter material used for the envelope enclosing the pipe. The following paragraphs or pertinent parts thereof were taken from the latest Bureau specifications for pipe drain construction and can be used as a guide:

"General--The handling, transporting, and placing of the graded filter material shall be subject to approval and shall be such as will result in a uniform mixture of the material being placed without separation or segregation.

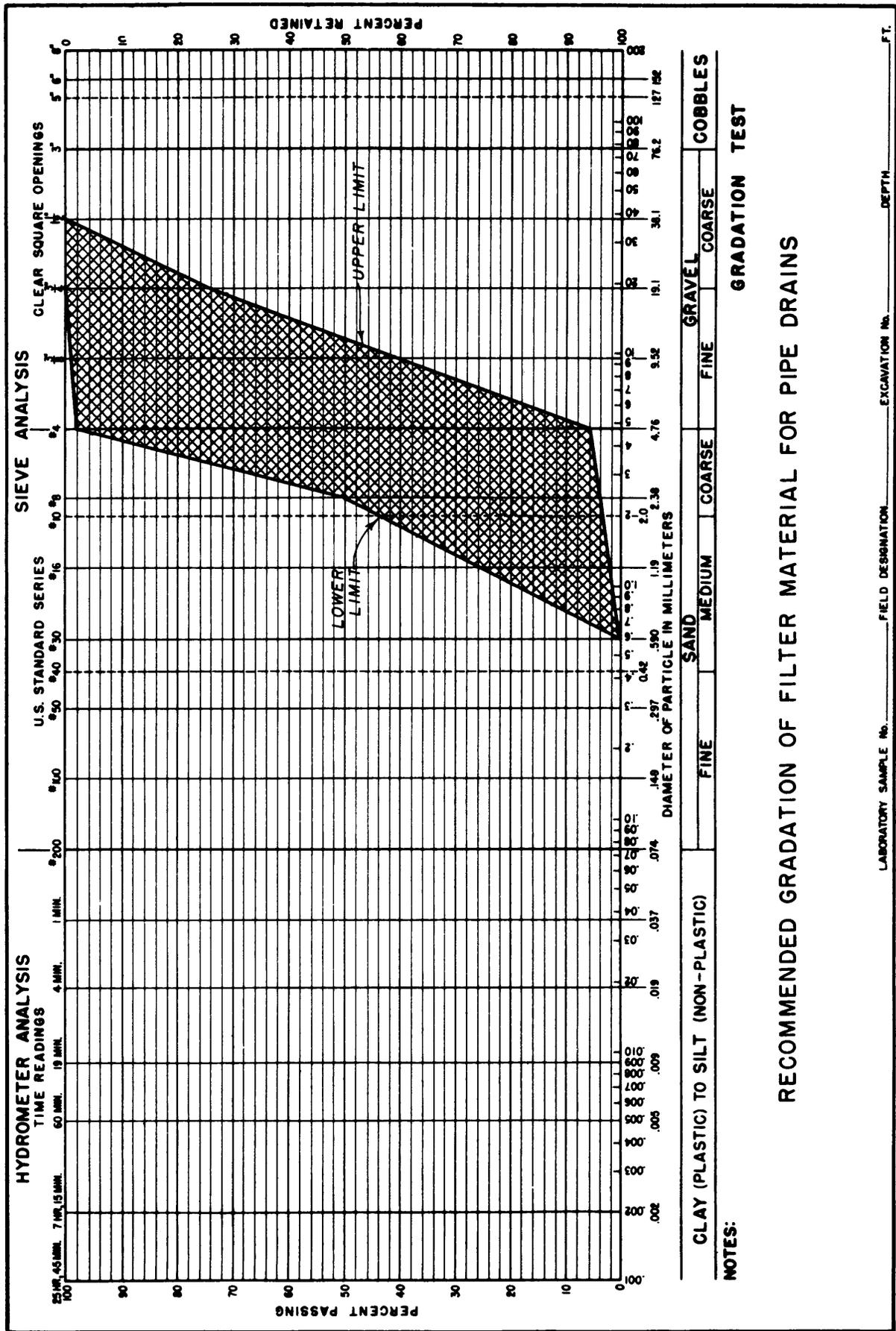
"Materials--The graded filter material for pipe drains shall be obtained from approved sources, and shall consist of a uniform mixture of sound, clean sand and gravel, free of vegetable matter, clays and other deleterious substances, and shall be selected or processed to meet the following gradation requirements:

APPROVED GRADED MATERIAL Percent Passing by Weight					
Screen size	#30	#8	#4	3/4	1-1/2
Maximum	0	50	98	100	
Minimum	0	4	6	75	100

"Placing--The graded filter material shall be placed to form an even, firm bedding under the pipe, and the remainder of the filter material shall be carefully placed so as not to disturb the pipe. No special compaction will be required, except as may be required for insuring a firm and even bedding for the pipe."

A sieve analysis chart on page 12, illustrates the limits of gradation for filter material listed above and a gradation analysis should be made. Such an analysis is simple to perform and can be made in most commercial, university, state or Government construction material physical property laboratories at little cost.

DRAWN BY _____ CHECKED BY _____ DATE 9-15-70



NOTES:

RECOMMENDED GRADATION OF FILTER MATERIAL FOR PIPE DRAINS

LABORATORY SAMPLE No. _____ FIELD DESIGNATION _____ EXCAVATION No. _____ DEPTH _____ FT.

SAFETY BARREL HOOKS
(Suggestion R7-70S-38)

The following idea for safety barrel hooks was submitted by Mr. Jack Foster, Loveland Operation and Maintenance Branch, South Platte River Projects, Loveland, Colorado. He has used some sound principles in working out a device for lifting steel oil drums and it was reported to be a big improvement over previous methods used.

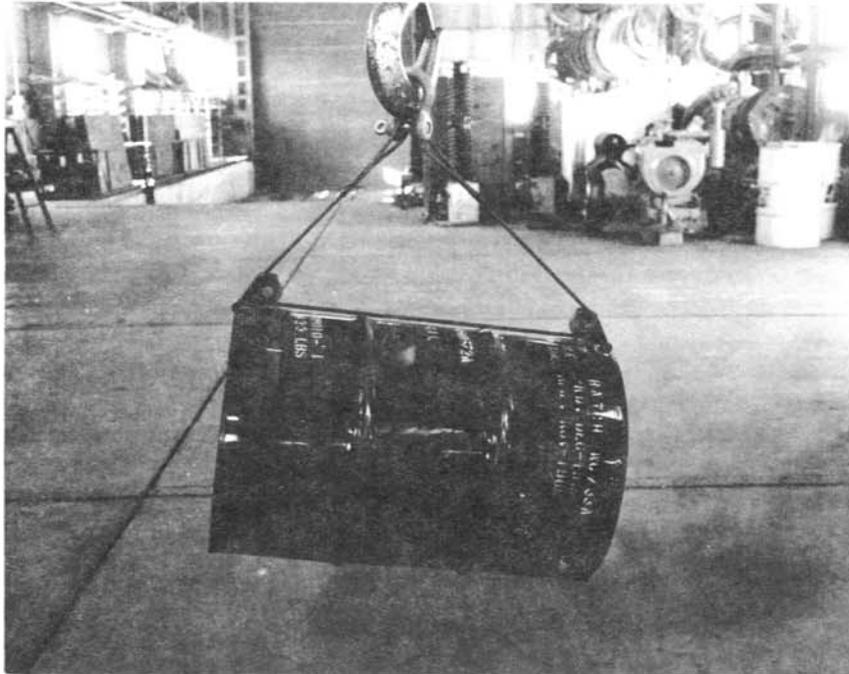
The hooks were designed to replace other methods of moving 55-gallon or smaller steel drums where a gantry hook is available, as in power-plants and warehouses, and in storage yards where mobile cranes and booms may be used. Also in gravel surfaced switchyards and substations when it is desired to move oil drums close to the oil circuit breakers, the hooks would facilitate the work where a mobile boom could be used.



Photograph 1. Photo PX-D-67880

Various methods have been used in the past such as cargo nets, barrel slides, barrel hitches and rope or steel slings around the middle of the barrel for moving oil drums. Most of the methods have not been too satisfactory. This new method has proven both safe and efficient.

It is an easy task for one person to handle a pair of these barrel hooks and they can be fastened either to the top of the drum or to the side. Photograph 1 at left, shows a view of the safety hooks and sling in place on top of the drum. Also, one or more barrels may be lifted in this manner out of the midst of a group of barrels without moving the others. Photograph 2 on the next page shows a view of the barrel hooks and sling in place, lifting a barrel horizontally.



Photograph 2. Photo PX-D-67881



Photograph 3. Photo PX-D-67882

As shown in Photographs 3 and 4, a barrel may be picked up from either position and tipped to the other position easily with this device. If it is desired to move a drum which is standing upright and place it in a horizontal position to use its contents, a drain valve can be installed in the drum. The drum is then lifted a few inches off the floor and the workman may then tip the barrel as the sling will run through the sheaves on the hooks.



Photograph 4. Photo PX-D-67883

The sheave wheels that were used in the model set of hooks were down-guy wheels which were found in the scrap pile. Although other wheels may be used, these were of ideal dimension for the purpose to which they were adapted.

With reference to the sketch on page 16, the safety barrel hooks were made with 1/4- x 1-1/2 x 6-3/4-inch mild steel. After the hook was forged some was cut off the lip to obtain the correct depth for the hook. The lip of the hook was then ground to the proper shape, and should have an 11-1/4-inch radius on the 1-1/2-inch face width, with an approximate 30° slant on the 1/4-inch face thickness. The hooks weigh about 1 pound each.

The uprights, which hold the sheaves were made of the same material as the hook and a triangular piece welded behind it on the hook end of the shank as a fillet braced the uprights. However, the uprights could be made of wider material and shaped as shown in the sketch.

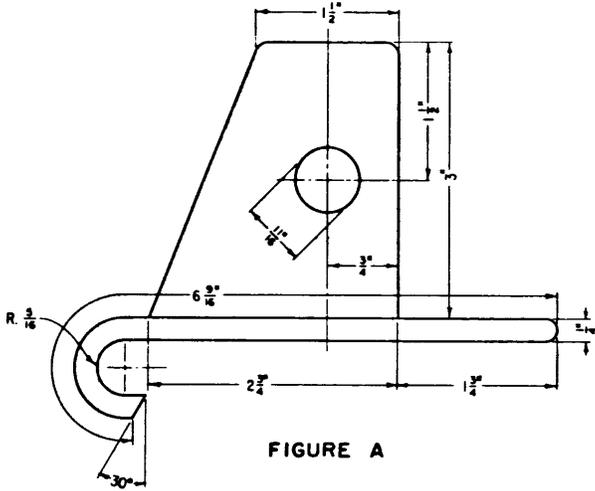
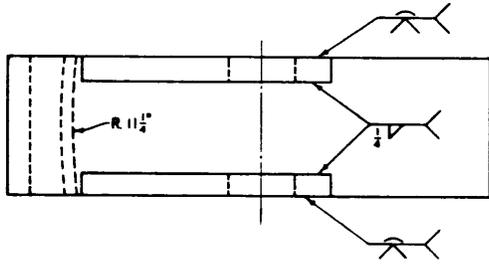


FIGURE A

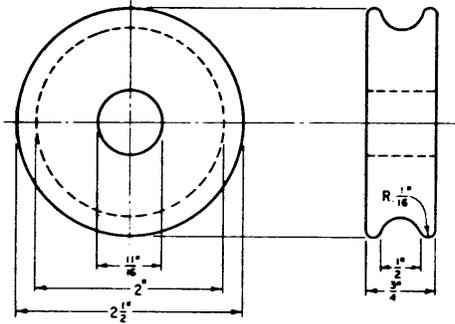
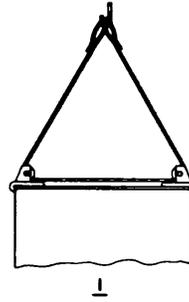
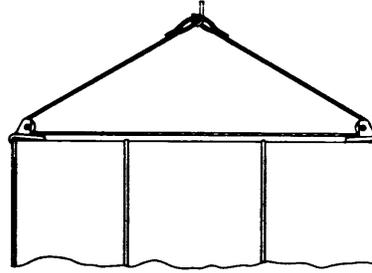


FIGURE B



1



2

FIGURE C

NOTES

Figure A is a drawing of the Safety Barrel Hook, two of which are required. They are made of $\frac{1}{4} \times 1\frac{1}{2}$ mild steel and weigh about one pound each.

Figure B is a drawing of the Sheave Wheel which fits between the uprights welded on top of the hook and held in place with a $\frac{3}{8} \times 2\frac{1}{2}$ machine bolt.

Sketches 1 and 2 depict the Safety Barrel Hook in place using a steel rope sling 70° between the ends of the layback of the eyes in the ends of the sling.

SAFETY BARREL HOOK

ELIMINATE GOPHER AND RAT HOLES 1/

The Yuma County Water Users' Association maintains approximately 135 miles of unlined main canals and laterals. Recently four major breaks on their West Main Canal occurred within a six month period due to gophers and rats burrowing through the canal banks. Manager Tommy Long and his employees decided filling the holes by conventional means was slow, tedious, and costly. They decided to try something else and they believed compaction of the inside banks of the canal might be the answer.

The use of half of an old sheeps-foot roller to compact the inside banks above the waterline was conceived by Mr. Long, but the credit for building the structural attachment and adapting it to their heavy-duty industrial wheel tractor was turned over to Shop Superintendent Mr. Nick Reese, and his welder Mr. Preston Bagby. Many other shop personnel contributed their ideas. As Manager Long says "it was a joint effort".

Photograph 1 below, and Photograph 2 on page 18, are views of the sheeps-foot roller attachment on a tractor showing the hinge points.



Photograph 1. Photo PX-D-67884

1/ The article was prepared for this publication by Mr. Tommy Long, Manager of the Yuma County Water Users' Association, Yuma, Arizona.

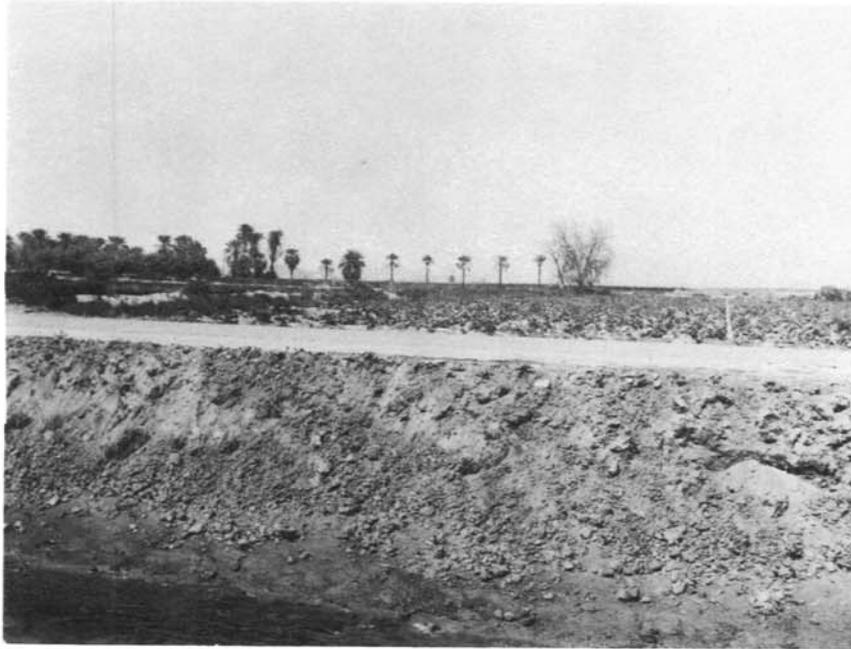


Photograph 2. Photo PX-D-67885

Photograph 3 below, shows a view of the East Main Canal bank before rolling, and Photograph 4 on page 19, shows the same bank after rolling. The rat and gopher holes have been caved in and compacted.



Photograph 3. Photo PX-D-67886



Photograph 4. Photo PX-D-67887

The working speed of the tractor is approximately 5 miles per hour; with higher speeds there was a tendency for the roller to ride over the old holes and undermined sections of the bank. Photograph 5 below is a view of the tractor roller making a first pass along the top of the canal bank. Photograph 6 on page 20, is a view of tractor and roller making a fourth pass.



Photograph 5. Photo PX-D-67888



Photograph 6. Photo PX-D-67889

The Association personnel believe that covering their system once each year will reduce the possibility of future breaks immeasurably. The next time they repeat the operation they believe that compacting the banks in two passes will do the job.

A word of caution. It is estimated the sheeps-foot roller weighs approximately 2,400 pounds. Extended on the end of the boom and when raised by the hydraulic ram to cross over structures places a terrific weight load on the right rear axle and tire of the tractor. Small tractors or tires will not carry this weight.

Many beneficial side effects have been gained by use of the sheeps-foot roller. The undercut perpendicular banks have been compacted and restored. This has reduced erosion from the water. Weeds were pulverized eliminating the need for the first spring spraying. Gopher trappers can now see the freshly worked holes and trap the gophers without danger of caving banks or falling into canals.

* * * * *

It is a healthy idea, now and then, to hang a question mark on the things you have long taken for granted.

HOUSEBOATS ON RESERVOIRS 1/

A 5-point program for control of houseboats on Bureau reservoirs was announced by the Interior Secretary. The program provides that use of houseboats not be permitted on reservoirs where on-shore sewage disposal is not available, houseboats should have sufficient power and other capabilities consistent with weather hazards, fixed mooring sites should be regulated, and litter disposal regulations should be established to prevent waste into reservoir waters.

As most of Reclamation's reservoirs in the west has been transferred to other Federal and non-Federal agencies, the cooperation of those agencies is being requested in this effort to protect the environment. However, the policies in regard to houseboats on reservoirs which are under recreational management by the Bureau of Reclamation are as follows:

1. Where facilities or provisions are not available for on-shore sewage disposal, houseboat use should be prohibited. Sewage disposal in reservoir water is unacceptable, and practices at each reservoir should be reviewed in this regard.
2. There should be regulations pertaining to power and other capabilities of houseboats to avoid damage resulting from weather hazards. Because of the unusually large exposure above the waterline, power needs for houseboats usually are larger than for other types of boats to enable them to make headway against high winds. The regulations should depend on local conditions.
3. There should be time limitations relative to the use of each houseboat for individual trips and for the season. Care is needed to prevent permanent residence by houseboat users. The usual practice of limiting single-trip use to a 14-day period is believed appropriate in most instances.
4. There should be regulations to control mooring sites for houseboats in order to eliminate undesirable interference with public use for other purposes.
5. There should be strict regulations to prevent disposal of litter from houseboats into reservoir waters, in addition to regulations pertaining to sewage disposal, since houseboats usually include living accommodations designed for continuous occupancy.

With appropriate controls and facilities, it is believed houseboat use is entirely proper on Reclamation reservoirs.

1/ This article was extracted from a Department of the Interior News Release dated Thursday, July 9, 1970.



Investigations of Plastic Films for Canal Linings

By M. E. Hickey
Chemical Engineering Branch
Division of Research
Office of Chief Engineer



UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION



The publication illustrated above is a summary of laboratory tests, field investigations and field installations made by the Bureau of Reclamation over a period of years. It can be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402, or the Engineering and Research Center, Bureau of Reclamation, Attention: Code-920, Denver Federal Center, Denver, Colorado 80225. Price 50 cents. Bureau offices can obtain copies by requisition to the E&R Center at the above address.

As stated in the introduction, buried flexible membrane linings of Polyvinyl chloride (PVC) and polyethylene plastics are being accepted increasingly for lining applications because of their performance and low cost. Many materials have been or are under test.

Either the PVC or polyethylene plastic of a minimum 10-mil thickness can be used satisfactorily as canal lining. Although the Bureau's greatest use of plastic membrane is for lining canal systems, these membranes can also be used as liners for reservoirs storing potable water, irrigation reservoirs and ponds, sewage and waste lagoons, brine storage ponds and pits, dam and levee cores, and as cutoff curtains in vertical trenches.