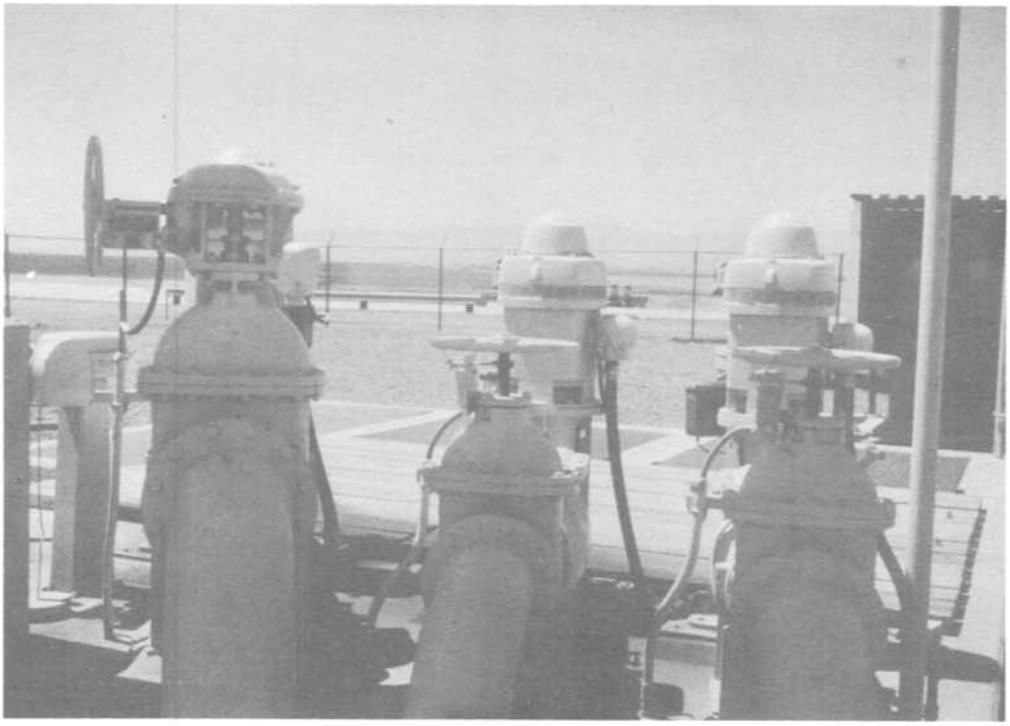
WATER OPERATION AND MAINTENANCE

BULLETIN NO. 91

MARCH 1975



IN THIS ISSUE

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

The Water Operation and Maintenance Bulletin is published quarterly, for the benefit of those operating water-supply systems. Its principal purpose is to serve as a medium of exchanging operation and maintenance information. It is hoped that the reports herein concerning laborsaving devices and less costly equipment and procedures 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.

Any information combined in this bulletin regarding commercial products may not be used for advertisement or promotional purposes and is not to be construed as an endorsement of any product by the Bureau of Reclamation.

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

COVER PHOTOGRAPH:

Three pump units at Lateral P-11 on the Central Valley Project, California. Water from these 3 units is pumped into a pipe distribution system for irrigation. Units are operated and maintained by the Westlands Water District.
Photo PX-D-75757

UNITED STATES DEPARTMENT OF THE INTERIOR
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Secretary

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WATER OPERATION AND MAINTENANCE
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INTRODUCTION

Pumping efficiency is most important to an operator on irrigated land, and in the article starting on page 1, the grower can find out what he can do to make these pumps more productive.

"Electrical Testing of Pipeline Construction," is the title of the article on page 4. It offers a very simple procedure to prevent a bimetallic connection during pipeline construction.

An article starting on page 5, shows how personnel from the Engineering and Research Center, Denver, Colorado, and the Missouri-Souris Projects, Bismarck, North Dakota, corrected an unsafe condition on a recently purchased drill rig, used for high speed horizontal drilling and drain installation operations.

Dump truck operators have been known to accidently trip the dumping lever on their trucks, which can be very dangerous. However, the device described in the article on page 8, will prevent this type of accident from ever happening.

A prophesy by the Economic Research Service on crop production for the 17 Western States by the year 2000 can be found on page 10.

The U.S. Coast Guard's Federal requirements for recreational boats are listed on page 13.

By following the five tips for tractor operators in the article on page 15, accidents can be greatly reduced or even eliminated.

A short followup article on power tool safety as it pertains to field personnel in the Bureau of Reclamation can be found on page 19.

The Director of Public Works in Des Moines, Iowa, gives his views on page 20, of (the best use for) Multi-Use Equipment.

TIPS FOR IRRIGATION PUMP EFFICIENCY[1]

If you were to guess how many irrigation pumps in Arizona were inefficient, what would you guess? 10 percent of the total? 25 percent? Well, according to a recent brochure from the Energy Management in Agriculture Committee, the correct figure would be around 50 percent. This means that around half of the pumps in Arizona are wasting energy, time and money by not being as efficient as possible.

Under ideal conditions, says the report, efficiency of electric pumping plants could be slightly above 74 percent. Efficiencies for large electric motors such as those used on irrigation wells vary only one or two percent with normal changes in load. The efficiency change for 100 to 300 HP motors associated with changing from one-half to full load is only two percent. Therefore, notes the report, low overall efficiencies are directly attributable to the pump. With energy comprising most of the variable costs of pumping, and about half the total cost, efficiency has a very important bearing on pumping cost per acre foot.

Report is True

In order to find out what the grower can do to make his pump more efficient, we spoke with Mr. Bill Hart a leading pump expert in Casa Grande, Arizona. Bill agreed with the report's findings that half the state's pumps were inefficient to the point that it is costing the grower money. But Hart stressed that declining water tables were adding increased lift to the tune of 45 feet every five years, but the grower could compensate this factor by carefully maintaining his pumps.

"It's important for us all to remember," said Hart, "that low pumping efficiency means not only wasted money, but it can potentially damage a crop if the water cannot get to a crop when it needs it the most. If your pump is only putting out 500 gallons per minute when it should be putting out 1200, your crop is going to suffer during times of peak water need.

"The biggest percentage of problems with a pump are with electrical equipment," added Hart. "As an example, the high summer heat in Arizona can, and often does, stop a pump by heating up the bimetallic overload relay. If this happens, and no one catches it for a couple of days, your pump will be damaged and again, your crop will be damaged.

"During thunderstorms, lighting can also pose a problem to the electrical apparatus of your pump."

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[1] Reprinted by special permission of the Editor from the August 1974, issue of Arizona Farmer-Ranchman.

Bearing Problems

Mr. Hart also states that problems with mechanical features on most motors are smaller in number than with electrical, but are just as important and money wasting. Motor bearings burning out are the biggest factor in this case, and Hart stated that it was often a case of neglect by the grower. "The line shaft bearings use vegetable oil for lubrication," said Hart. "If the grower doesn't check the 55-gallon dripper barrels daily, he may have quite a problem with his bearings.

Vandals

"Vandal damage," added Hart, "occurs to such an extent near rural areas, that growers are forced to fence their pumps to guard against senseless destruction." This is just one more suggestion by Mr. Hart to keep your pumps in good condition. See figure 1 below.

Figure 1 PX-D-75758

What To Do

Ten tips on keeping your pumps in good condition have been singled out by Hart in his work with Arizona growers and their pumping equipment.

"The first tip, is really the best one," said Bill. "It has to do with watching your equipment continuously or as often as you can.

"This will prevent most of the major problems confronting growers and will lessen damage on problems which occur at unobserved times.

"Another tip that can save you time and money is to be selective about your pumping equipment. When a grower ties up around 60 to 70,000 dollars, he must make sure that he is getting the best pump for his money. So, talk to your neighbors and ask them about their equipment--is it reliable? Is it worth the money? Then, read the brochures that come with the different systems. Above all, know what you're getting."

Watch your Water

In addition to checking your pump's equipment every day, Hart stated that it's a good idea to keep a close watch on the water that is pumped to the surface. Things to watch for include a noisy pump, foamy water, bubbles in the water, mixtures of water and air, and

variations in the pumping load. "When this happens," Hart said, "it's a good indication that the water table has dropped to a point below the bowls of the pump. The solution to this is to extend the pump deeper into the shaft.

"When going through your daily inspection routine," said Hart, "here are some further things to watch for and do:

"On the top of the pump housing, make sure that the casing is air-tight, and not permitting dust and dirt to enter.

"Then, look to see if you have a full pipe of water.

"Then, check your motor leads. This will indicate your amperage and voltage--in other words, the work your pump is doing.

"After that, look inside the housing for dirt and birds which might have gotten in. This is a continuous problem. Also, make sure your mechanical switches are in good working order. This means to make sure they are clean and tight.

"If you can discern damage to your pump from high water salinity, you might wish to investigate the potential of material changes to help with the problem. Salt is very hard on pumps, and of course, the deeper the water table drops, the saltier the water is going to become.

"It might be a good idea to make sure that your irrigator also knows what to look for when making his rounds. Quite often, there is a language barrier, so it is a must that all who work around the pumps be on the guard for problems."

In the near future, Bill thinks new designs and modifications will alleviate some of the problems plaguing the grower. "It has to come," said Hart. "With the dropping water table, sometimes an additional 20-ton load can be put on your pump. You can get friction loss when this happens as well as shaft stretch. But in the meantime, the grower should make sure that his pumps are cared for in the best possible manner, and this means maintaining them in the off season."

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ELECTRICAL TESTING OF PIPELINE CONSTRUCTION

(Reprinted by permission from the May/June 1974 issue of GRIST, a publication of the National Conference of State Parks, Washington, D.C.)

Converting the old "ounce of prevention" saying into modern electrical terms is saving money for the government and has earned Millard W. Wilcox, a civil engineer then at the Park Services's Western Service Center in San Francisco, a piece of award money. Here's how.

When pipe lines are built which consist of dissimilar metals--aluminum pipe and steel valves, for example--insulating materials such as gaskets, bolt washers and bolt sleeves must be utilized to prevent electrolysis and consequent corrosion between the two different metals. All of this is obvious, accepted, and standard practice in specifying and constructing such lines. But, contractors and workmen being human and like all of us, susceptible to lapsing into carelessness at times, can make mistakes. Through poor workmanship, or omission of insulation altogether, an open circuit (that is, metalic, electrical contact) may result between aluminum pipe and steel valve.

When this happens, and gets covered up by paint and subsequent backfilling of the line, there may be, indeed, almost surely is, trouble later....corrosion, and leaking or failure. And by then it's too late to come back on the contractor. There's nothing to do but tear it up and re-do the work right.

Obviously, having a government inspector peering over the shoulder of the workmen during each step of installation might prevent such problems, but, equally obvious, is the fact that this would not be practical from a budget nor a manpower standpoint. So what's the answer?

The "ounce of prevention" solution proposed by Mr. Wilcox is uncomplicated. Put the contractor on notice that each section of the installation is to be tested electrically, by a government inspector, for contact or open circuit between dissimilar metals before any painting is applied or backfill made. (The testing is relatively simple, being accomplished with volt meter and/or ampere meter.)

With the contractor knowing that his work is to be tested electrically, a strong psychological influence seems to operate. Through closer supervision and insistence on better workmanship, much of the trouble disappears in advance, leaving to be detected only unavoidable, honest mistakes. Thus the ultimate goal of the California engineer's suggestion is to assure superior construction in the first place and elimination of subsequent pipe line deterioration or failure. Done away with is the always unsatisfactory situation of trying to get the contractor to make good or having the repairs done by others at additional expense to the government.

* * * * *

ANALYZE - DEVISE - REVISE[1]

Analysis

The Engineering and Research Center, Denver, Colorado, recently purchased for field use, a special drill rig for high speed horizontal drilling and drain installation operations. After thorough specifications review, it was ordered with a rollover protective structure, emergency shutoff switches, and other required safety devices, see figure 2 below.

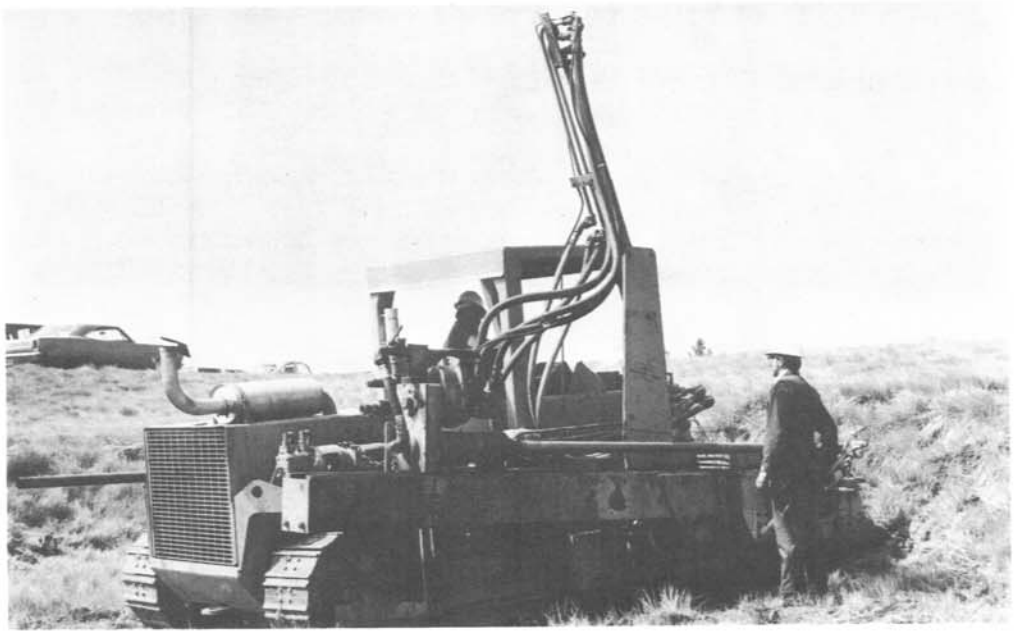

Figure 2 PX-D-74783

Operators from the Engineering and Research Center and the Missouri-Souris Projects, Bismark, N.D., were adequately trained in the new machine operation, but initial operation observation and analysis by upper Missouri Region drilling and safety personnel and Robert Hatcher of the E&R Center, disclosed the existence of a severe hand hazard when drill rod sections were added or removed. The method developed by the manufacturer required grasping the rod lenths with two large pipe wrenches while the machine was operated to break pipe joints and spin pipe sections on and off. This operation can be seen in figure 3 at top of the next page.

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[1] Reprinted by special permission, from the Reclamation Safety News, Second Quarter 1974.

Figure 3 PX-D-74781

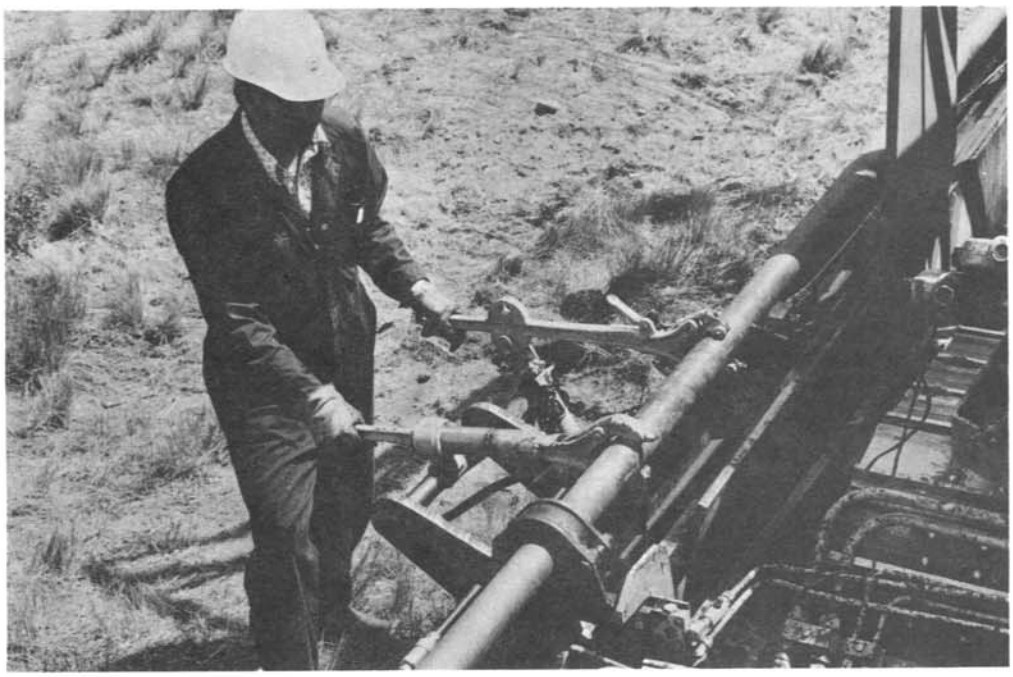


Figure 4 PX-D-74782

Devise

The extreme hand hazards present in the aforementioned method made it mandatory to develop or devise a new method of torquing or breaking rods. The Missouri-Souris Projects Office requested the E&R Center to investigate all sources to eliminate the apparent hazard. After much discussion with machine manufacturers and other private companies, a firm was located to design and develop a substitute method.

Revise

Immediately upon receipt of the supplementary equipment, consisting of one sliding tubing tong and one hydraulic actuated tubing tong attached to brackets welded to the machine frame, see figures 3 and 4 on page 6, the units were installed on the machine and tested throughout a 2-week drilling contract to determine adequacy. Observation of the new equipment indicates remarkable improvement in safety and a perceptible increase in efficiency.

The problems encountered with this machine serve as a lesson to all supervisors: "Never place a new machine into full operation until it has been given a shakedown run, operators are adequately trained, operations have been analyzed for unsafe conditions, and uncovered hazards corrected or eliminated."

Congratulations to the Upper Missouri Region and the Engineering and Research Center personnel for following a standard safety axiom as old as time itself: ANALYZE - DEVISE - REVISE.

* * * * *

DUMP TRUCK DEVICE TO PREVENT ACCIDENTAL DUMPINGS

(Reprinted from the July/August 1974 issue of GRIST, a publication by the National Conference on State Parks, Washington, D.C.)

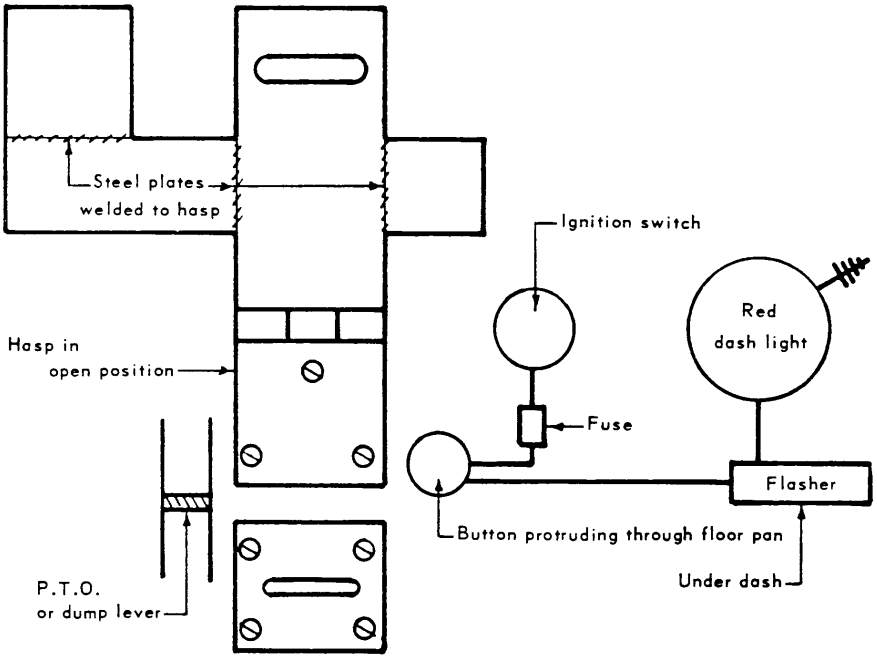
The danger, mess, and possible monetary loss which can accompany the accidental dumping of a truck are bad news anywhere. So Mr. John Reed, a mechanic at Colonial National Historical Park in Virginia has come up with an idea that virtually assures that it won't happen there, anyway. (The idea's neat, easy to do, and costs little--so it just might be the sort of safety device others would like to copy.)

Mr. Reed reasoned that if the power lever in the cab which actuates the truck's dump body can't be moved, then it can't be dumped, either, accidentally, or otherwise! So, he designed and built a locking device which makes it impossible to inadvertently move the dumping lever. The device consists essentially of a hasp to which has been welded an L-shaped arm. When the hasp, which is hinged to the floor board, is in a closed position over its locking staple, the power lever is prevented from moving because it is confined within a notch formed by the hasp and the L-shaped arm. (See sketch on the next page.)

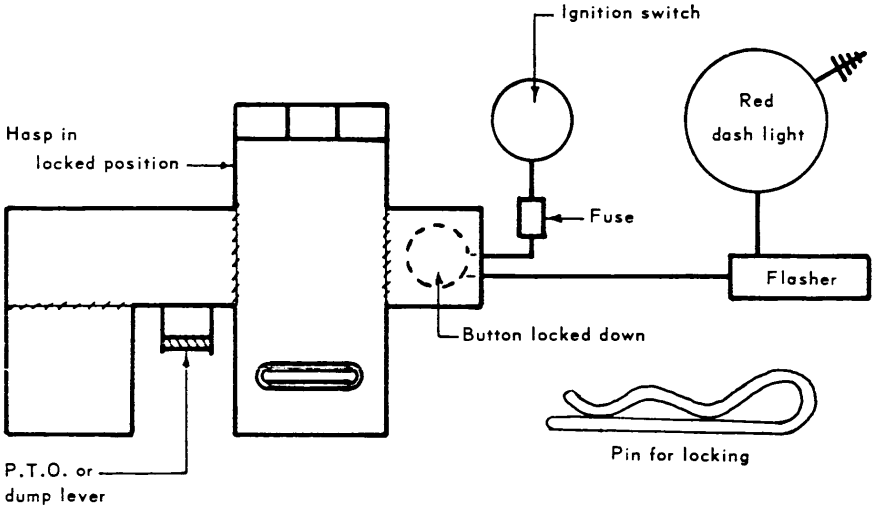
So much for preventing dumping of any kind! The truck can't be dumped when the hasp is closed. But, when the operator is ready to dump, he simply flips the hinged hasp back out of the way, and the power lever can now be moved. But--something else happens, when the hasp is opened--a red light on the dash flashes and keeps flashing out its warning that now the dump lever can be operated so be alert! Because Mr. Reed added another arm to his hasp, this arm engages a switch mounted under the floor board (and protruding through). The switch operates exactly as does the dome light switch in the door of a car: pressed down, no current flows; but, released, the circuit is closed, and current flows from a hot wire tapped at the ignition switch to a flasher unit which blinks on and off a red warning light on the dash. (See same sketch on the next page.)

Material for the anti-dumping device cost less than $4.00--for hasp, switch, flasher, fuse and holder, and dash light, the later being a small truck clearance light. A short length of wire and less than two hours of labor completed the installation.

They liked John Reed's idea at Colonial National Park. In fact it has been applied to all of the park's dump trucks. It is providing an added dimension of safety to a potentially difficult problem, which apparently had never been tackled before. And it's expected to save money, too, through preventing loss of material through accidental dumping. Mr. John Reed was awarded a cash prize for his innovative thinking--and action!



OPEN, WARNING LIGHT FLASHING



CLOSED, WARNING LIGHT OUT

Sketch

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THE WEST
--A Production Prophesy

In looking at American agriculture's capacity to produce, the Economic Research Service projects some figures for thought regarding the West. These projections should be of special interest to suppliers of equipment and services used in the Western States.

By the turn of this century, the West is expected to be playing a larger role in agricultural production in the United States....a fact attributable primarily to a projected increase in irrigated cropland.

In particular, the 17 Western States are projected to produce a substantially larger share of the Nation's rye, peanuts, Irish potatoes, cotton, and eggs by the year 2000. (See chart below.)

They're projected to produce a substantially smaller share of only three major commodities--barley, dry beans and peas, and turkeys.

Of all major commodities, barley is the one projected to show the most change in the West. Nearly 85 percent of the Nation's barley was produced there in 1970-72 but only about 63 percent is projected for the West by the year 2000.

Of the 20 major commodities in the ERS projection, the West is shown to step up production of 14 commodities by the year 2000. Peanut production is projected to double, grain sorghum is projected to go up by two-thirds, and production of cattle and calves, chickens, and eggs, by half.

THE UNITED STATES' AND 17 WESTERN STATES' AGRICULTURAL PRODUCTION, 1970-72 AND 2000

	1970-72 Average			2000 Projections				
	U.S.	Western States	West's Share of U.S. Production	U.S.	Western States	West's Share of U.S. Production	U.S. 2000 As Percent Of U.S. 1970-72	West 2000 As Percent Of West 1970-72
	Millions		*Percent*	*Millions*			*Percent*	
Corn	5,122 bu.	815.8 bu.	15.9	6,761 bu.	909.9 bu.	13.5	132.0	111.5
Oats	830.1 bu.	317.8 bu.	38.3	750.7 bu.	292.9 bu.	39.0	90.4	92.2
Barley	434.4 bu.	367.8 bu.	84.7	551.3 bu.	345.3 bu.	62.6	126.9	93.9
Sorghum	789.5 bu.	718.6 bu.	91.0	1,296 bu.	1,203 bu.	92.8	164.2	167.4
Wheat	1,505 bu.	1,209 bu.	80.3	1,671 bu.	1,336 bu.	80.0	111.0	110.5
Rye	38.4 bu.	26.9 bu.	70.0	28.0 bu.	21.0 bu.	75.0	72.9	78.1
Rice	85.0 cwt.	40.7 cwt.	47.9	108.7 cwt.	50.3 cwt.	46.3	127.9	123.6
Peanuts	3,086 lbs.	622.0 lbs.	20.2	4,691 lbs.	1,220 lbs.	26.0	152.0	196.1
Sugarbeets	27.3 tons	23.1 tons	84.6	28.7 tons	23.2 tons	80.8	105.1	100.4
Dry beans and peas	20.3 cwt.	13.0 cwt.	64.0	28.7 cwt.	16.4 cwt.	57.1	141.4	126.2
Irish potatoes	313.7 lbs.	191.0 lbs.	60.9	372.6 lbs.	248.1 lbs.	66.6	118.8	129.9
Sweet potatoes	12.5 lbs.	1.6 lbs.	12.8	11.8 lbs.	1.4 lbs.	11.9	94.4	87.5
Cotton	11.5 bales	5.7 bales	49.6	11.7 bales	6.5 bales	55.6	101.7	114.0
Cattle, calves	40,020 lbs.	22,785 lbs.	56.9	57,701 lbs.	33,561 lbs.	58.2	144.2	147.3
Hogs	22,173 lbs.	4,118 lbs.	18.6	28,495 lbs.	4,760 lbs.	16.7	128.5	115.6
Sheep, lambs	1,052 lbs.	812.9 lbs.	77.3	952.6 lbs.	741.9 lbs.	77.9	90.6	91.3
Chickens	12,211 lbs.	1,433 lbs.	11.7	19,236 lbs.	2,157 lbs.	11.2	157.5	150.6
Turkeys	2,297 lbs.	782.5 lbs.	34.1	3,826 lbs.	1,081 lbs.	28.3	166.6	138.2
Eggs	69,389	15,219	21.9	83,778	22,638	27.0	120.7	148.7
Milk	118,591 lbs.	28,200 lbs.	23.8	118,800 lbs.	26,269 lbs.	22.1	100.2	93.2

The only major commodities for which production in the West is expected to decrease in the next 25 years are oats, barley, rye, sweet potatoes, sheep and lambs, and milk.

Use Fewer Acres

To meet production demands, the 17 Western States are projected to use fewer acres than they did in 1969, due principally to increases in crop yields and irrigated crop acreage.

In a second projection--to the year 2020--ERS shows both the U.S. and the Western States experiencing significant crop yield increases relative to 1970-72.

For the U.S. as a whole, the smallest yield increase is for sugarbeets--16 percent over the 20 tons per acre of 1970-72. The largest increase would be for rice--72 percent over the 4,679 pounds per acre of 1970-72.

The West is projected to experience even further increases than the U.S., except for sugarbeets, due to higher irrigated yields and further increases in irrigated crops in the West.

The smallest yield increase projected for the West in 2020 is in sugarbeets--9 percent more than 1970-72's yield of 22 tons per acre. The largest gain is an 88-percent rise in oat yields from the 1970-72 average of 47 bushels per acre.

While these Western States had 127 million acres of harvested cropland in 1969, they are projected to harvest 125 million in the year 2000.

Overall, the Western States supplied slightly less than half of the 459 million acres comprising the Nation's total cropland in 1969--a proportion that's not likely to change much by 2000.

Tops In Irrigation

However, the West supplied nearly 90 percent of the Nation's 37 million acres of irrigated cropland, and by 2000, total irrigated cropland is projected to increase by 4 million acres, with three-quarters of this increase being in the West.

For irrigated harvested cropland only, total acreage is projected to go from 33 million to 37 million acres, of which 33 million--and most of the increase--would be in the West.

About 1 million acres of this additional irrigated land in the West is expected to come from public development. Private irrigation development is projected at only 2-1/2 million acres--a result of a likely decrease of 1-1/2 million acres in Texas caused by depleted ground water supplies.

The 17 Western States are estimated to have a 5-million acre decrease in nonirrigated harvested cropland between 1969 and 2000.

Water In The West

In projecting how much more water the West will be using for irrigation by the turn of the century, ERS puts the figure at 10 percent. This is water consumed--meaning it does not return to surface or ground water--and would thus total 63,580,000 acre-feet (volume of water that would cover 1 acre to a depth of 1 foot) by the year 2000.

By regions in the West, however, this estimate varies considerably. In the Southern Plains--Oklahoma and Texas--water consumed is projected to go down by about 1.7 million acre-feet. While water consumed is expected to go up in the other regions, the Pacific States of Washington, Oregon, and California would see the greatest increase--nearly 3 million acre-feet.

Water consumed in the Mountain States--Montana, Idaho, Wyoming, Colorado, Utah, Nevada, Arizona, and New Mexico--is projected to go up by about 2.7 million acre-feet, and in the Northern Plains, by 1.9 million acre-feet.

ERS also made a set of projections based on a much higher export demand by the year 2000. Such demand would require a continued movement toward freer trade and a comparative advantage for the U.S. in agricultural trade.

Under these projections, another 1.5 million acres of irrigated cropland would be added, along with 47 million acres of nonirrigated cropland, of which 14 million would be in the West.

The reason the high export level does not affect the West more is that a movement toward freer world trade is projected to involve mainly feed grains and soybeans--which are predominatly Corn Belt crops.

(Based on manuscript entitled Agricultural Production and Irrigation Requirements in the West in the Year 2000, by Marlin Hanson, Natural Resource Economics Division, and Allen Smith, National Economic Analysis Division, also, "Agricultural Production and Irrigation Requirements in the West Over the Next 50 Years," paper presented at the American Society of Civil Engineers meeting on Water Resources Engineering, Los Angeles, California, January 23, 1974, by Leroy Quance, National Economic Analysis Division, Marlin Hanson, and Allen Smith.)

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SAFE BOATING TIPS

(Extracted from the Department of Transportation, U.S. Coast Guard, NEW Federal Requirements for Recreational Boats. February 74, CG-290)

1. Gasoline vapors are explosive. All doors, hatches, and ports should be closed while fueling, galley fires and pilot lights extinguished, smoking strictly prohibited, and the filling nozzel kept in contact with the fill pipe to prevent spark. Do not use gasoline stoves, heaters, or lights on board. Portable tanks should be fueled out of the boat at all times.

2. Do not operate electronic gear (i.e. radios) while fueling.

3. Know your fuel tank capacity.

4. After fueling, ventilate all compartments and check the machinery and fuel tank spaces for fumes before starting the motor. Remember, the electrical ignition system could provide the spark to an accumulation of gasoline vapors. Keep fuel lines tight and bilges clean.

5. Do not permit persons to ride on parts of the boat not designed for such use. Bow, seatback, or gunwale riding can be especially dangerous.

6. Keep an alert lookout. Serious accidents have resulted from failure to use your eyes.

7. Be especially careful when operating in any area where swimmers or divers may be. Divers are easily recognized by the red flag with a white diagonal slash which marks the approximate center of their activities.

8. Watch your wake.

9. Keep firefighting and lifesaving equipment in good condition and readily available at all times.

10. Obey the Rules of the Road.

11. Always have children and nonswimmers wear Personal Flotation Devices.

12. If you capsize, remember that if the boat continues to float, stay with it.

13. Good housekeeping is even more important afloat than ashore. Cleanliness diminishes the probability of fire and tripping hazards.

14. Have an anchor and sufficient line to assure a good hold in a heavy blow.

15. Know the various distress signals. It is recommended that you carry a mirror, flashlight, flares, smoke, etc., to insure you can be seen if trouble develops.

16. Learn the weather warning signals.

17. Water ski only when you are well clear of all other persons. There should always be two people in the tow boat; one to watch, the other to operate the boat.

18. Be extremely careful of your footing. Falls are one of the chief causes of accidents.

19. Always instruct one other person on board in handling your boat in case you become disabled or fall overboard.

20. Before departing on any boat trip, always leave a "Float Plan" with someone ashore. This "Float Plan" should indicate a description of your boat, number of passengers, destination, proposed route, and other information which you feel would aid in finding you should an emergency develop. Always advise the person you left your "Float Plan" with on your arrival or return.

* * * * *

UNITED STATES FARM POPULATION[1] NOW STABILIZING

The U.S. farm population declined only 0.8 percent a year from 1970 to 1973, contrasting sharply with 4.8 percent average annual declines in the 1960's according to a U.S. Department of Agricultural report recently issued.

Economic Research Service (ERS) figures now show about 9.5 million people living on farms. Losses of farm population continue in the South and Northeast regions of the country while the West shows an increase. The north Central area showed little change in farm population.

The ERS estimates also reveal that during 1970-73, the net loss to the farm population through people migrating from farms or reclassification of their residence from farm to non-farm averaged 113,000 annually. Although the absolute average loss has been steadily declining as the number of potential migrants diminished, this was a 40-year low.

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[1] As reported in a recent issue of the Western Farm Equipment publication.

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FIVE TIPS FOR YOUR TRACTOR OPERATORS[1]

"There are a lot of things workmen, and even owners of operating field equipment, do that are far from safe," says Mr. John Wetzel, who farms near Woodland, California. "Actually, when you think about such accidents, a lot of them result from carelessness--but a lot also come from just being plain foolish."

As he talked, he illustrated what he meant. He wanted to talk to his tractor driver who was pulling an incorporator tool behind an International hydrostatic tractor. So he waved the man to stop, then stepped in between the rear and front wheels to talk to the operator.

"There," he said, "see what I mean. I stood in a most dangerous position. The driver was in the seat and the engine was still running. A wrong movement on his part could have started that tractor fast. I would have been knocked down and probably run over. This is a common practice by most every farmer." See figure 5 below, so please never stand in front or back of a wheel to talk to a driver whose machine is still running. You could be seriously injured if the tractor should suddenly roll or lurch. Instead, stand clear of its path, and have the operator shut off the engine.

Figure 5 PX-D-75759

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[1] Reprinted by special permission of the Managing Editor, M.A. Johnson, from the May 1974 edition of Western Farm Equipment.

The photographs to follow show various dangerous situations and were posed by operators who know better than to duplicate these hazards in actual field conditions. Make sure you do, too! Use protective equipment, proper maintenance, competent drivers and some common sense.

For Safety's sake, always use the steps made for mounting the tractor. Never climb up the lugs of the tire, or up other extensions of the machine, see figure 6 below. It is easy to slip off the rubber lugs, especially if the tire is wet and slippery.

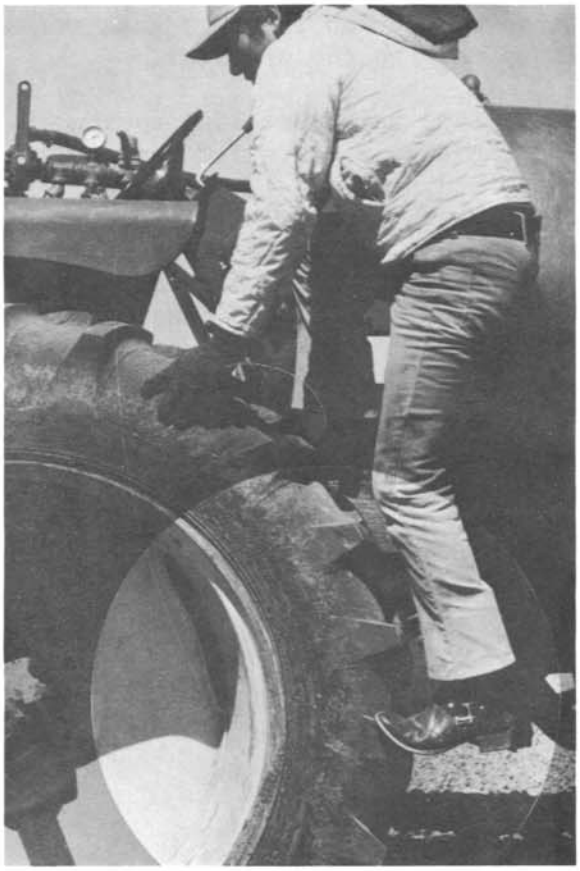

Figure 6 PX-D-75760

Never operate the hydrostatic drive from an off-the-seat position....not even to move the tractor backward or forward for a hitchup as shown in figure 7 on the next page. A little too much pressure on the lever could cause the machine to lurch and run over the careless operator.

In figure 8 on the following page these workers are dumping a pesticide for control of nematodes into a tank behind the tractor. Two safety laws are being broken. Neither one of these men is wearing safety goggles, and the man on the right does not have protective rubber gloves.

Don't get under a tractor to check or work on it while the engine is running. Figure 9 on page 18 shows this very clearly. When changing a tire or wheel, block other wheels so the machine will not move unexpectedly and pin you underneath.

Figure 7 PX-D-75761

Figure 8 PX-D-75762

Figure 9 PX-D-75763

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Did You Know....that automobiles are primary water polluters. An EPA study conducted by Biospherics Inc., of Rockville, Maryland, said cars spread roads with a layer of pollutants such as asbestos from break linings, rubber from tires, zinc from oil and tires, lead from gasoline and other heavy metals and nitrogen and phosphorus compounds. For hours after a rainstorm, the road runoff is almost as strong as municipal sewage in terms of pollution to streams and rivers. Biospherics based its findings on a year of research, which involved the Washington, D.C. Capital Beltway, to analyze debris.

HANDTOOL SAFETY

This article is a followup to one in our December 1974 Bulletin pertaining to Power Tool Safety on page 7, and was taken in part from a Safety Handbook prepared by the Bureau of Reclamation entitled "Power System Safety Standards." The safety standards and safe work pratices contained in the manual apply to Bureau-operated facilities and to all operations and activities performed by operation and maintenance personnel. (Section 7, Powerplants and Substations)

Only the following type electrical systems are permissible when working or inspecting scrollcases, draft tubes, and other similar wet or damp locations where there is danger of electrical shock:

a. Portable drop cords and hand-held lighting equipment energized at nor more than 32 volts.

b. Electrical circuits not exceeding 30 amperes and 120 volts protected by a UL-listed ground-fault interrupter. Such systems shall be installed in strict conformance with the manufacturers' specifications and recommendations and periodically tested for reliability.

c. Stationary portable electrically powered equipment, such as pumps, heaters, blowers, etc., used in these locations, shall be connected to a circuit protected as described in (b.) above, or shall be grounded with a visible flexible copper ground wire.

Preferably air-powered tools or handtools should be used for work in these locations. If portable electric tools are required, they shall be of the double-insulated type utilizing a 115-volt circuit protected by a ground-fault interrupter as described in (b.) above. Under no circumstances shall an employee use an electric-powered tool while standing in water.

Employees shall not enter scrollcases or draft tubes prior to notifying and receiving permission of the supervisor in charge.

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MULTI-USE EQUIPMENT FOR SNOW & ICE CONTROL[1]

by Leo L. Johnson
Director of Public Works
Des Moines, Iowa

Spring is the time for public works people to put their snow removal equipment in mothballs and ready the summertime equipment for the tasks ahead--patching streets, cleaning intakes, seal coating, asphalt surfacing, mowing and pavement repairs--to mention a few.

Unfortunately, most of us cannot afford this luxury. What we actually must do is repair and prepare the equipment we have been using all winter in the shortest time possible so that it can be used for summertime programs and maintenance activities.

Manufacturers of equipment have been quick to realize the more versatile a machine, the more marketable it becomes, especially in the public works field. For example, an increasing number of government agencies are purchasing dual purpose truck bodies that can be used as a self-unloading box or quickly modified to use as a chemical or sand spreader by simply adding an easily attached spinner machanism. On the other hand, snow melters have not received widespread acceptance primarily because of the high costs and limited specialized use.

There probably is not a public works director or street superintendent who, during one winter or another, or some extreme storm, has not had need for more equipment than he was able to muster. On the other hand, that same public works man, on occasions of other winters or storms, has had more than an adequate amount to do a satisfactory job. How does he decide on how much snow removal equipment he should have? Some factors of the determination are apparent. Certainly you need not have more than his work force can operate. If he should need more than he can operate, he probably will have to depend on private contractors who will most likely be using dual purpose equipment since contractors specializing in snow removal are generally not available when needed.

Unless he is new at the job, he should by now know the standards of service demanded by his community and how much and what kind of equipment this service will require. In most public works planned programs this information would probably be adequate to size the fleet. But in snow removal he is confronted with another problem--he really doesn't know the size of the program until it is there.

In figure 10 on the next page this rubber tired end loader, usually used for miscellaneous loading operations with standard bucket, can

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[1] Reprinted by special permission of the Editor from the APWA Reporter dated October 1974. This is a monthly publication of the American Public Works Association, Chicago, Illinois. Article is based on a paper presented at the 1974 North American Snow Conference.

be fitted with blade attachment and used for snowplowing, especially turning lanes on main arterials, parking lots, and intersection corners. It can also be used for sand and salt loading, and in figure 11 below it shows a bulldozer generally used for earth moving and building demolition that can also be used for heavy snowplowing.

Figure 10 PX-D-75700

It would be my opinion that even in the coldest areas, it would be a misuse of the taxpayers' money to have enough specialized snow removal equipment to combat the worst storm or even the most severe winter. At these times, every piece of equipment that can be pressed into service should be used if possible regardless of its original purpose, even at the risk of marginal efficiency. Equipment purchased or modified with dual purpose in mind may well make the difference between success or failure.

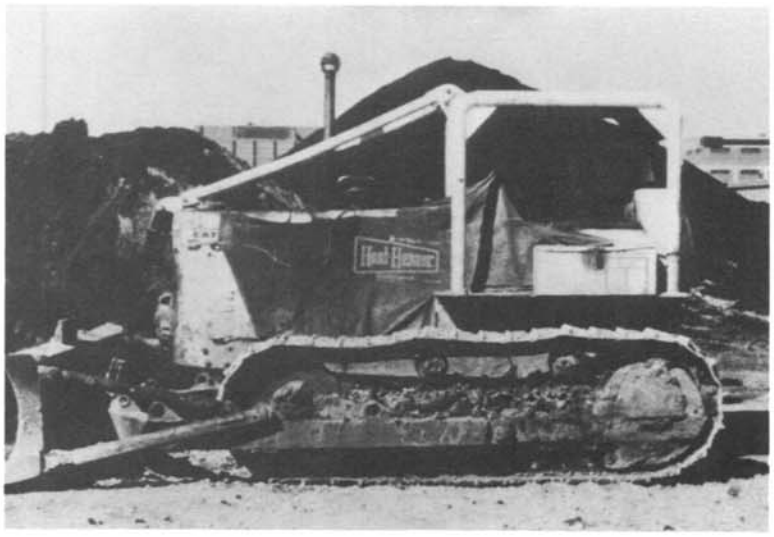

Figure 11 PX-D-75699

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GPO 858-438

The purpose of this Bulletin is to serve as a medium of exchanging operation and maintenance information. Its success depends upon your help in obtaining and submitting new and useful O&M ideas.

Advertise your district's or project's resourcefulness by having an article published in the bulletin! So let us hear from you soon.

Prospective material should be submitted through your Bureau of Reclamation Regional office.