Department of the Interior, Bureau of Reclamation

IRRIGATION OPERATION AND MAINTENANCE

BULLETIN NO. 56

April, May, June 1966

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In This Issue:

Linseed-Oil Protection for New York State Thruway Bridges
Discipline: When an Employee Breaks the Rules
Water Measurement Procedures
Truck Bed Lift Kit
Safety Warning Signs for Survey Crews
How to Give an Order
Eliminating Chromium Glare for Safety

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 on the systems of 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.

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Division of Irrigation Operations
Office of Chief Engineer
Denver, Colorado

A view of a crew hand spraying the structural concrete of a thruway bridge using a mixture of raw linseed oil and mineral spirits. This relatively inexpensive treatment appears to halt deterioration.

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INTRODUCTION

The concrete in the exposed surfaces of walls, piers, posts, handrails, parapets, curbs, soils, etc., that are in contact with water or spray during freezing weather can deteriorate rapidly. The durability of the concrete can be considerably improved and its serviceability greatly prolonged by preventive maintenance in the form of a weatherproofing treatment. The Bureau of Reclamation has recommended use of linseed oil, turpentine, and white lead and oil paint after proper preparation of concrete surfaces. The method proposed is outlined in the Bureau's "Concrete Manual"1/ and is an adoption of a treatment used by the Oregon State Highway Department2/. An article describing materials and methods tried and now being utilized by the New York State Thruway Authority to improve concrete durability is presented herein beginning on page 1.

When an employee breaks the rules, what should a good supervisor do? An article beginning on page 8 and reproduced with the permission of the editor of Supervisory Management offers some suggestions. Also from Supervisory Management is an article starting on page 16, on How to Give an Order.

Good water measurement on irrigation projects is becoming more important with time. Much has been written on the subject and in a recent Bureau of Reclamation report a summary has been made of some of the material available. The report and its contents are further discussed on pages 12 and 13.

A truck bed lift kit is described on pages 13 and 14 and the suggested safety warning sign for survey crews on pages 14, 15 and 16 could be easily adapted to warn of other hazards.

A suggestion for eliminating chromium glare of the windshield wiper for safety reasons begins on page 20.

1/"Concrete Manual," (Seventh Edition), USDI, Bureau of Reclamation, Denver, Colorado, 1963.
2/Paxsom, G. S., "Maintenance and Repair of Concrete Bridges on the Oregon Highway System," American Concrete Institute Proceedings, Volume 42, 1946, Pages 105-114.

LINSEED-OIL PROTECTION FOR NEW YORK STATE THRUWAY BRIDGES1/

The problem of protecting the structural concrete on our toll roads, expressways and interstate routes has attained major proportions since the use of de-icing chlorides has become the maintenance way of life.

The heavy use of chloride has taken its toll in spalled and deteriorated concrete. Bridges, with their susceptibility to temperature fluctuations and freeze-thaw cycles, are most vulnerable to this type of damage and, from an economic standpoint, are the most costly to maintain. Some years ago the New York State Thruway Authority recognized this problem and embarked on a search for methods and materials to minimize the adverse effects of such chemicals.

Wearing Surfaces Sealed

During the years 1958 through 1961 the portland cement concrete wearing courses on bridges carrying the Thruway were sealed with a slurry of coal tar pitch emulsion overlaid with 1-1/2 in. of asphaltic concrete. The surface was then sealed with an additional coat of the slurry. This in effect roofed over the structural slab and has proved generally effective in protecting the structural integrity of these bridges.

But rapid deterioration of exposed walks, malls, faciae, curbs and pylons continued to present a costly and time-consuming maintenance problem. It was obvious that some method would have to be devised to arrest the rate of deterioration if it were not to outstrip the rate of replacement.

To alleviate this problem the Authority began testing various sealants in 1962. Test installations of epoxies, modified chlorinated rubber paints, tung-oil derivatives, petroleum distillates and a mixture of linseed oil and kerosene were placed on structures in the Buffalo and Albany Divisions of the Thruway.

In the fall of 1962, a field weathering installation was set up at the Albany Division where concrete test slabs, incorporating conventional stone aggregates and slag aggregates, fortified by varying degrees of air entrainment and integral waterproofing admixtures, could be tested for resistance to salt damage. In conjunction with the test, it was decided to include slabs for the purpose of evaluating the relative merits of surface sealants.

1/Reproduced by permission of the editor from an article appearing in Civil Engineering, July 1965, by the author, who is the Assistant Superintendent of Maintenance, New York State Thruway Authority, Albany, New York.

Rigorous Tests for Slabs

Every morning, if a freeze occurred, a mixture of 50 percent sodium chloride and 50 percent calcium chloride was applied to induce a thaw. This cycle was followed for five days, after which the slabs were flushed clean and refilled with clear water. The slabs were then left in a frozen state for 48 hours, subject only to temperature-induced thaws. At the end of this period, the de-icing salts were again applied for five cycles. Thus during every five-day period the slabs were either going through freeze-thaw cycles or were covered with the brine solution.

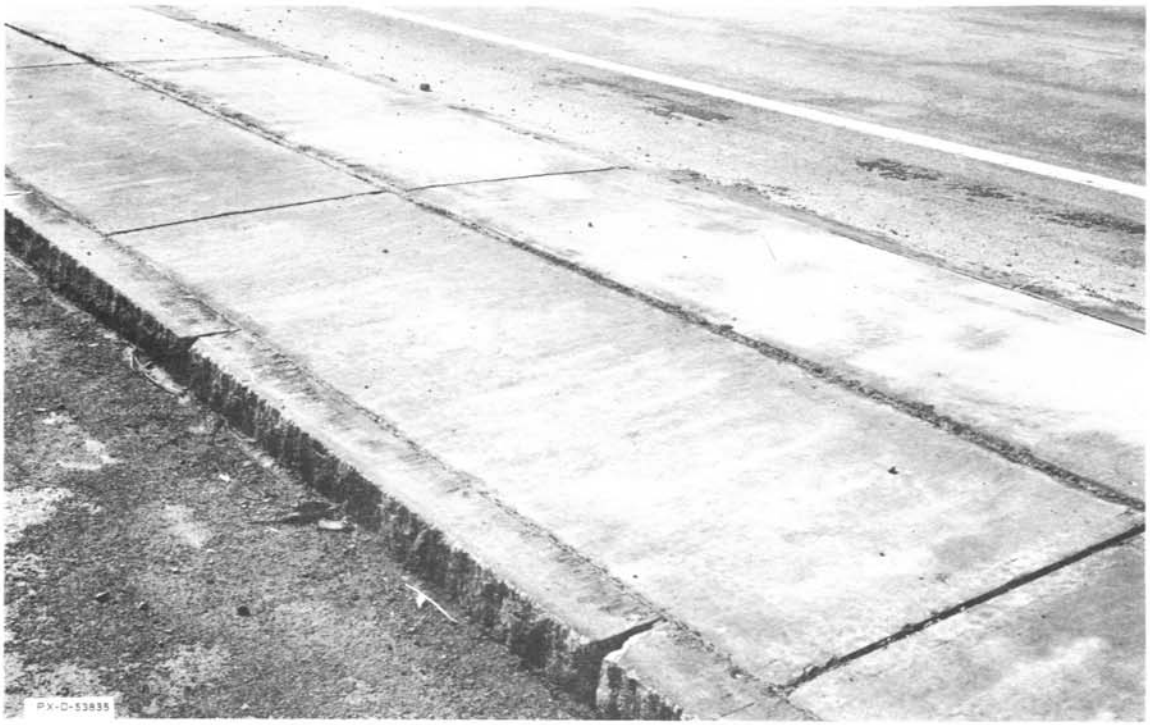
The first phase of the test ran for 77 days. During this period the slabs were subjected to 68 freeze-thaw cycles induced by 40 applications of de-icing salts and by natural temperature variations. Of the sealants used, a mixture of 50 percent boiled linseed oil and 50 percent mineral spirits was the most effective.

In the Buffalo Division the bridge at Milepost 422.80 had the entire walk and mall replaced in 1962. Utilizing the areas formed by the construction joints, the surface was sealed with the following materials: three epoxy coatings, each of a different manufacture, two covered with broacast sand and one applied in two brush coats without abrasives; a colorless petroleum distillate compound, Item M41W New York State, Department of Public Works, Specifications 1957; a modified chlorinated rubber paint filled with a fine sand; and a solution of half raw linseed oil and half kerosene. Several areas were left untreated to afford a control. It was obvious after even one year of exposure that the mixture of linseed oil and kerosene afforded good protection.

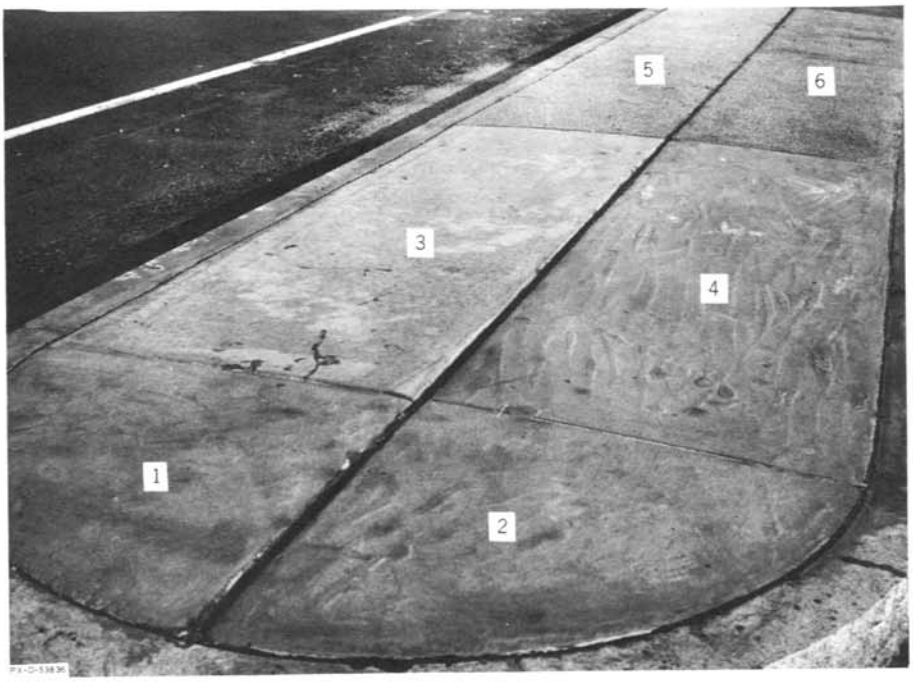
Photographs 1 through 3 on the following pages are views of the test blocks. Photograph 1 shows panels that received a treatment using a compound consisting of raw linseed oil and kerosene, with blocks 19 and 20 in the foreground of the left side of the photograph having received a proprietary surface coating material. The view of the bottom photograph shows blocks treated with the linseed oil compound after two years' exposure.

Photograph No. 2 is a view of several panels treated with experimental application of epoxies. Panels 1, 2, and 4 were treated with an experimental application of one type of epoxy and Panels 5 and 6 received another type and also were covered with an abrasive. The view of the panels in the lower photograph is the same area two years later.

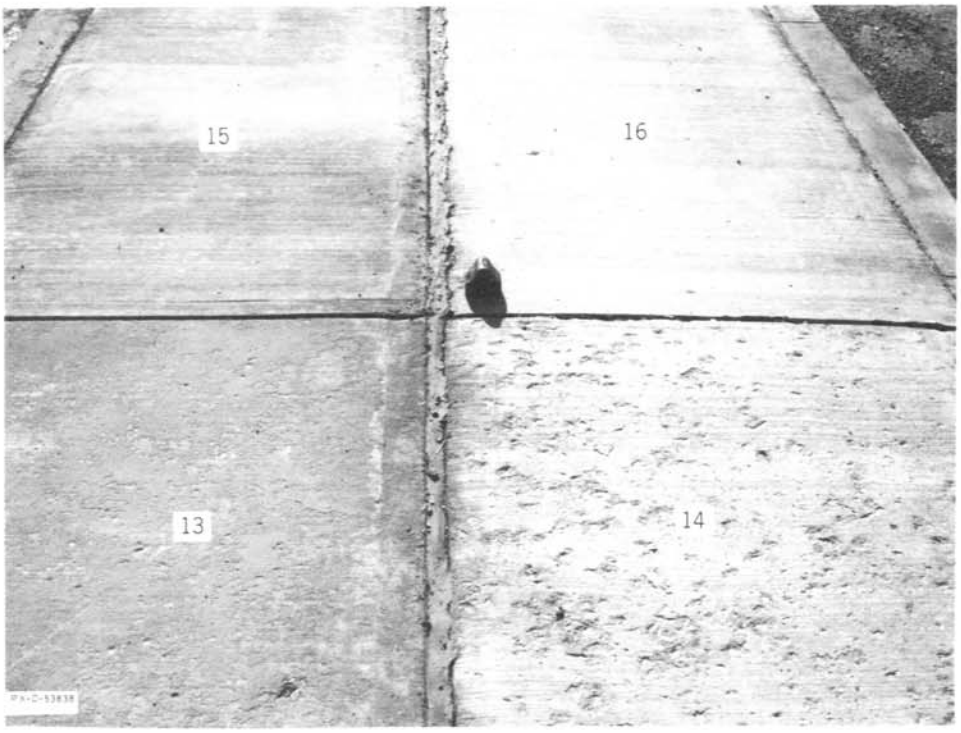
Photograph No. 3 is a view of panels treated with a modified chlorinated rubber enamel. After an exposure of two years those at the top were given two coats of the same proprietary surface coating material used in blocks 19 and 20. There is no explanation as to why Panel 14 was severely attacked while Panel 13 is in relative good condition.



Photograph No. 1



Photograph No. 2



Photograph No. 3

In 1962 the new South Grand Island Bridge was opened to traffic. In the construction contract, two coats of linseed oil and kerosene were called for on the sidewalks of the structure. In addition the walks and curbs in the toll plaza were treated by maintenance forces, half with linseed oil and kerosene and half with commercial waterproofing compound.

In the spring of 1963, an evaluation study was made of the test installations. The protection afforded at the South Grand Island Bridge was found to be truly remarkable. After a severe winter, there was not a single pop-out or pit mark on the entire 3,439 feet of sidewalk. In the toll-plaza area the results were similar; both the linseed oil and kerosene mixture and the waterproofing compound primer had given 100 percent protection. A recent visual inspection showed that the treatment is still fully effective. Photograph No. 4 is a view of the sidewalk of the new South Grand Island Bridge. After two years of exposure, it was treated with linseed oil and kerosene immediately after the bridge was open to traffic in 1962. The structural concrete supporting the rail was not treated.

From the evaluation, it was determined that only the linseed oil and waterproofing compounds afforded the desired protection. At this point it became a matter of simple economics. The cost per gallon of the linseed oil compound was approximately one-third that of waterproofing product.

Photograph No. 4

Linseed-oil Compound Decided On

The decision was reached in the summer of 1963 to institute a program of coating with the linseed-oil compound all exposed concrete on curbs, walks, fasciae and pylons of 729 Thruway bridges before the onset of another winter. The traffic islands and sidewalks at toll areas were included in the program.

The photograph, shown on cover, is a view of a crew hand-spraying the structural concrete of a Thruway bridge using a mixture of raw linseed-oil and mineral spirits. This relatively inexpensive treatment appears to halt deterioration.

At the outset of the program other solvents including Xylene, Toluol, Methyl-Ethyl-Ketone and petroleum mineral spirits were tested as a replacement for the kerosene, which tended to excessively discolor and streak the concrete and required an abnormally long time to dry and bleach out. It was determined that the mineral spirit best suited the purpose since this liquid was not only an ideal solvent with good drying characteristics, but was also the most economical.

To implement the program, each Division bridge crew set up a three-man crew equipped with standard 3-gallon weed sprayers and a pickup truck for the transportation of men and materials. Initially the compound specification called for a mixture of 50 percent linseed oil and 50 percent mineral spirits. Following several trial applications on a carefully measured area, it was determined that 60 percent mineral spirits and 40 percent linseed oil was the best ratio for use in hand-spraying equipment.

The rate of application of the first coat varied with the porosity of the concrete but in general was 0.025 gal per sq yd (40 sq yd per gal). Subsequent coats were applied at the rate of 0.015 gal per sq yd (67 sq yd per gal). By the fall of 1963 all the scheduled bridges and toll areas had received at least one coat, and 80 percent of the total had received a second coat.

Not for Grass and Shrubs

Two problems were encountered in the program. In the toll area it was noted that the overspray raised havoc with lawns and plantings. The second problem was one of discoloration of the concrete. On some finishes the dried film had a dark and streaked appearance. This was especially true on the fasciae. Although most discoloration bleached out within a matter of weeks, there were instances where the bleaching required the entire winter.

An interesting fact observed in 1964 was that where the mixture was applied to concrete areas that were already showing signs of distress, deterioration was arrested.

The beneficial results of the 1963 application were sufficient to justify the continuance of the program in 1964. Consequently a program was set up to insure that all bridges and toll areas would receive a total of three applications. Protection of lawns and plantings was accomplished by the use of plastic sheeting and posed no problem in 1964.

The use of a mixture of linseed oil and mineral spirits has now become a matter of routine maintenance on the New York Thruway bridges. Since this material has only been in general use on the Thruway since 1963, there is no firm evidence as to the efficiency for long-term protection. Visual inspection tends to indicate that a three-coat system is satisfactory. However, the Authority has arbitrarily set up a maintenance schedule that calls for two coats the first year, an additional coat during the second and third years, followed by a one-coat renewal every five years thereafter.

The First Winter is the Worst

It is generally accepted that concrete is most susceptible to spalling and pitting during the first winter and that this susceptibility decreases with each succeeding year. Therefore it has become the practice of the Thruway maintenance forces to seal all new concrete 28 days after placement. From experience it has been found that the sealing can be accomplished any time after 14 days. However, if sealing is carried out before the expiration of a 14-day curing period, there is the possibility that the finish will be marred. This marring takes the form of a stippled appearance. While durability does not seem to be affected, the condition may be unsightly.

The question may arise as to why the Authority chose to treat all the bridges even though many had survived the ravages of winter and deicing chemicals for ten or more years. The answer is the insurance afforded by this low-cost extra protection.

The age of an unblemished structure is indicative of its durability but it is not a rock-fast guarantee that deterioration of the structural concrete will not occur even after 10 or 12 years of satisfactory service.

When the high cost of concrete restoration is weighed against the approximate over-all cost of 10-1/2 cents per sq yd for a four-coat protective system it would be economic folly to risk the deterioration of even one bridge.

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DISCIPLINE: WHEN AN EMPLOYEE BREAKS THE RULES1/

By
Walter E. Baer

A good supervisor tries to create a climate in which his subordinates willingly abide by company rules. But even the best supervisor cannot expect perfection; rules will still be broken. What he does about these violations will not only influence the future behavior of the employee involved--it can have serious effects on the morale in his department and even on future contract negotiations with a union, if there is one. Every supervisor, therefore, should periodically review his disciplinary methods to make sure they are producing the most constructive results. Here are some guidelines that should help:

1/Reproduced by permission of the editor from an article appearing in Supervisory Management, February 1966, by the author who is Manager, Employee Community Relations, Brunswick Corporation.

1. Know the rules and make sure your subordinates know them. You can't maintain discipline unless you know what is allowable and what is not. Be sure of your shop rules and see that they are conveyed to all employees in your department.

2. Don't ignore violations. A supervisor doesn't have to issue a formal reprimand or disciplinary suspension every time a rule is broken. What he does will depend upon the nature and the circumstances of the violation and the employee's past record. The important point is that he must do something. Overlooking the offense and saying nothing is equivalent to condoning the violation, and in time could make that particular rule unenforceable. As one arbitrator has said, "There is a point at which the silence of a supervisor in the face of open and persistent violations of rules becomes in effect a condonation of the violations."

3. Get all the facts. Most arbitrated disputes are over the facts of a discipline case. As soon as a supervisor believes there has been a violation, he should establish exactly what happened. He can talk to other supervisors, interview employee witnesses, refer to records, and examine any physical evidence.

When disciplinary action is challenged, the burden is upon management to show that there was just cause. Disciplinary action based on suspicion alone cannot be justified--not only is it unfair, but it won't stand up in arbitration. The more information that the supervisor can gather in his initial investigation, the less chance that new facts will come to light later that might show the discipline was unjust.

As his first step in the investigation, the supervisor should give the employee an opportunity to explain his actions. Don't assume that if the employee has an explanation, he will volunteer it--take the initiative and ask for one. Otherwise the employee may say later, "He didn't ask me."

The employee may offer no explanation even when asked--this fact will weaken any explanation presented later by the union. If the employee does give an explanation, check it out carefully--even if it doesn't sound convincing. Don't dismiss an explanation because it doesn't excuse his actions completely. It may at least be sufficient to justify a lesser penalty.

Just as important as getting the facts is recording them. If a disciplinary action is challenged, the supervisor is usually the main source of information for management. He may be called upon months after the incident to recall it in detail. If he relies on his memory, his case will be weak.

On the other hand, if he puts the facts down on paper while they are still fresh in his mind, his testimony will be far more effective. No detail should be overlooked that might prove important later. The record should answer such questions as: Who was involved? What took place? When did it happen? Where did it happen? Who else was there? What did the employee say? What did you say?

4. Choose the most appropriate disciplinary action. Perhaps nothing puts a supervisor's judgment to the test more sharply than determining what discipline to give an employee who has violated a rule. He must draw the fine line between punishment that is too severe to be just and punishment that is too mild to be corrective.

A supervisor contemplating discipline for a broken rule must always keep in mind what he hopes to achieve through that discipline. In almost all cases, his goal will be to change the employee's behavior. Labor-management arbitrators base their decisions on the concept of "corrective discipline." Briefly, this concept is that the purpose of discipline should be to obtain compliance with the established rules, not simply to punish the employee. Discharge, of course, is not a corrective disciplinary action--therefore, it should be resorted to only where all other efforts to correct the employee have failed. (However, certain major offenses are so serious that arbitrators have held that immediate discharge is justified--example are theft, sabotage, assault on a supervisor.)

A supervisor should not depend on a rigid mechanical formula or a fixed pattern of penalties when he administers discipline. Each case must be judged individually, in terms of four main questions:

a. How serious was the offense and what were the circumstances?

b. What is the employee's past conduct record, and how long has he been employed?

c. When was his last rule violation?

d. What is the plant practice in similar cases?

5. Administer the discipline properly. Telling an employee he is being penalized for breaking a rule isn't any more pleasant for the supervisor than for the employee. This is the critical time for the supervisor to remember that the purpose of the discipline is corrective, not punitive. If he doesn't, he may end up with a sour employee, rather than a chastened one. He must keep a good control on his emotions, and avoid sarcasm, threats, and temper blowups. Although the employee should be made to feel that plant discipline is a serious matter and that better conduct will be expected, this should not be conveyed through a violent bawling-out.

Similarly, don't just hand an employee a penalty without explaining it. Devote some time to telling him what he did wrong, why he is being given this penalty, and what is expected of him in the future. He may still be resentful--but not to the extent that he would be if there were no explanations.

What does effective discipline require of the supervisor? In the words of one arbitrator, "The application of corrective discipline requires both firmness and patience. Firmness, in order that persistent shop rule violations shall not be allowed to pass without efforts at correction; patience, in order that the discharge penalty may be withheld until such efforts at correction have proven ineffective."

Check List for Discipline

1. Do I have the necessary facts?

   a. Did the employee have an opportunity to tell his side of the story?

   b. Did I check with the employee's immediate supervisor?

   c. Did I hold my interviews privately to avoid embarrassing the employee?

   d. Did I investigate all other sources of information?

   e. Did I exert every possible effort to verify the information?

   f. Have I shown any discrimination toward an individual or group?

   g. Have I let personalities affect my decision?

2. Have I administered the corrective measure in the proper manner?

   a. Did I consider whether it should be done individually or collectively?

   b. Am I prepared to explain to the employee why the action is necessary? For instance--
   --Because of the effect of the violation on the employer, fellow employees and himself.
   --to help him improve his efficiency and that of the department.

   c. Am I prepared to tell him how he can prevent a similar offense in the future?

d. Am I prepared to deal with any resentment he might show?

e. Have I filled out a memo for his personnel folder or a letter describing the incident, to be signed by the employee? A copy of this memo or letter should be given to the employee, and he should be told that he may respond in writing--for the record.

f. In determining the specific penalty, have I considered the seriousness of the employee's conduct in relation to his particular job and his employment record?

g. Have I decided on the disciplinary action as a corrective measure --not a reprisal for an offense?

3. Have I done the necessary follow-up?

a. Has the measure had the desired effect on the employee?

b. Have I done everything possible to overcome any resentment?

c. Have I complimented him on his good work?

d. Has the action had the desired effect on other employees in the department?

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WATER MEASUREMENT PROCEDURES

Water measurement is a subject that has been treated in numerous publications and many of these are available for reference in local public libraries. In the Irrigation Operators' Workshop for 1965, held in the Office of Chief Engineer, U.S. Bureau of Reclamation, Denver Federal Center, Denver, Colorado; Engineer A. J. Peterka of the Hydraulics Branch of the Division of Research conducted the sessions on water measurement procedures. His notes were included in the bound lecture notes of the 1965 Workshop. Because of the demand for copies of Mr. Peterka's notes, they have been republished as Report No. Hyd-552, "Water Measurement Procedures," under date of November 15, 1965.

As stated in the foreword to Report No. Hyd-552, Mr. Peterka's notes contain the essential parts of four previous workshop lectures presented in 1961, 1962, 1963, and 1964. A new section on propeller meters has been added; other new developments have been included; and some of the original material has been edited to provide a clearer understanding of water measuring procedures and practices.

Standard and nonstandard devices are defined and their implications in regard to water measurement are discussed.

Water measuring devices and methods are classified under three categories: (1) the velocity device, (2) the head device, and (3) miscellaneous devices including chemical and dye dilution methods, total count radioisotope methods, magnetic methods and sonic methods.

Under "Some Basic Hydraulics," the concepts of the discharge equation and velocity head are developed; these two concepts are used to derive the basic equations for both orifice and weir discharge using the simplest methods possible. Several of the general aspects of water measurement accuracy are also discussed.

Flumes and weirs, probably the most commonly used devices, are used to furnish examples of good and poor water measurement practices. This is done because the majority of irrigation operators are more familiar with these devices and not because it is desired to condemn or praise these structures as measuring devices. Furthermore, the effects of good and bad measurement practices are often visible on weirs or flumes and are not visible in some of the more sophisticated measuring devices.

After a general explanation of the simpler devices has been made, more complicated devices and techniques such as the submerged orifice meter, Venturi meter, metergate, and constant-head orifice turnout measuring device, and propeller meters are described.

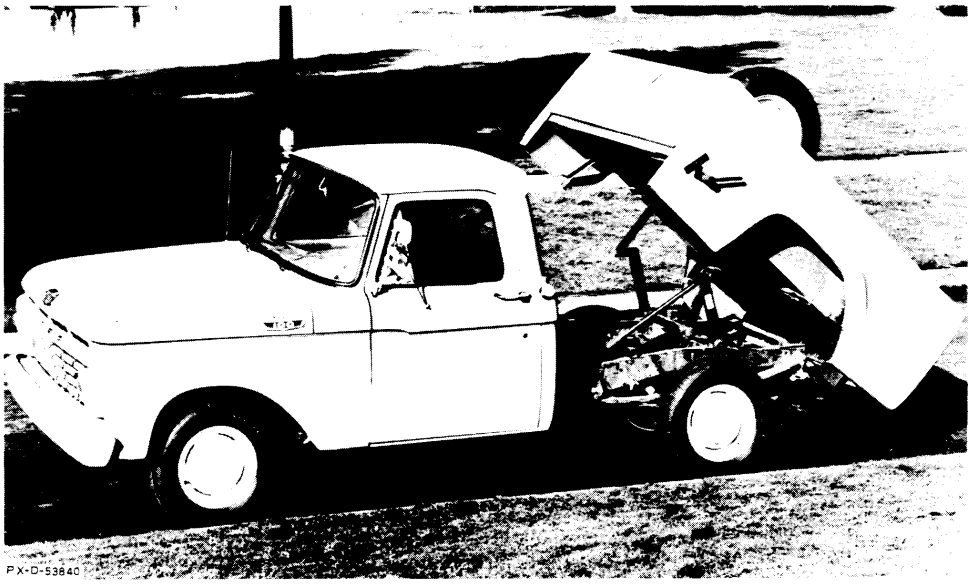
Hints are given for troubleshooting metering devices suspected of being inaccurate and instructions are given for selecting the proper size and obtaining proper installation of metergates and constant-head orifice meters.

Progress in water measuring techniques including the chemical dilution and radioisotope methods is reported, and an evaluation of commercially available open channel deflection meter is given. Progress in the development of magnetic and acoustic meters is reported. A list of reference material and a chart showing the head required to operate certain measuring devices are presented.

* * * * *

TRUCK BED LIFT KIT

A kit for the conversion of any 1/2-, 3/4- or 1-ton box or flat bed pickup to any all purpose dump truck is now available. Everything needed is included in the kit, according to the manufacturer, and it is claimed that anyone with average mechanical skill can install the complete unit. A view of one installed unit on a standard pickup truck is shown in the photograph on the following page.



Photograph No. 1

The unit is completely self-contained. There is no thrust on the pickup frame regardless of load. A rear hinge arrangement permits mounting any type bumper and trailer hitch, an adjustable locking device holds the body securely to the frame, and a quick release tailgate hinge furnished with each kit permits instant removal of the tailgate. The kit does not change the appearance of the pickup, and it may be taken off when the truck is replaced and installed on another pickup of the same make.

The kit can be furnished with a 6- or 12-volt electrohydraulic power unit or a power take-off unit. The electric hydraulic unit has a positive-action electric control mounted in the cab on the driver's side. A retractable 20-foot extension enables the operator to stand at the side or rear of the truck during unloading.

If additional information is desired, write Chief Engineer, U.S. Bureau of Reclamation, Denver Federal Center, Denver, Colorado 80225, Attention: Code 410.

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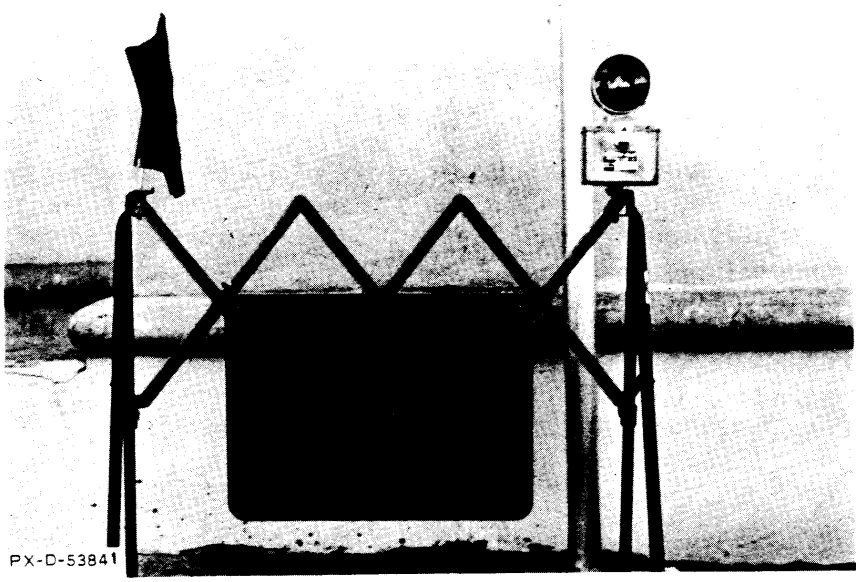
SAFETY WARNING SIGNS FOR SURVEY CREWS
(Suggestion R3-63-25)

The idea of using safety warning signs for survey crews working on or near roadways is not new. However, Lloyd R. Porter of the Boulder City Development Office suggests a new type of sign and points out

considerable advantages in using it over signs presently in use. A photograph of the sign is shown below.



Photograph No. 1

Some particular advantages in using the sign are:

1. It is lightweight, compact (folds to convenient, easy-to-carry size) yet is durable and strong. This makes it easier and more convenient to carry in a vehicle and easier to lift in and out and to set up.

2. The yellow-orange backing on the sign with black letters is readily visible from great distances.

3. The flasher-light is easily seen at dusk and night or in poor light.

The folding barricade and blinker light was purchased at a cost of approximately $37.00 and is described as follows:

> "Four-foot standard guard gate barricade, safety, folding 3 ft high with 2 red warning flags and bracket for one flasher. Glass-beaded reflectorized traffic yellow cross bars for maximum night time visibility.--Flasher, blinking light, weatherproof, two-directional head, 4 inch amber lens, enamel case, complete with two 6-volt lantern batteries."

The sign itself signifying "Survey Crew," was made from sheet aluminum with yellow-orange reflective adhesive backing and black lettering applied

by heat and pressure. The cost of the sign was approximately $5.00. The total cost for each unit is therefore approximately $42.00, yet this cost is negligible if only one accident is prevented.

The number of units needed for each crew or part of crew on the highway will depend of course on the extent of the work, number of lanes on roadway, etc.

One other aspect to consider is the possibility of interchanging the "Survew Crew" sign with some other sign for nonsurveying functions such as "Danger Blasting," "Men Working," "Detour," etc.

In line with the Bureau of Reclamation's Safety program and the growing traffic problem, the Safety Engineer feels the need for such warning devices cannot be overemphasized. If further information is desired, write Chief Engineer, U.S. Bureau of Reclamation, Denver Federal Center, Denver, Colorado 80225, Attention: Code 410.

* * * * *

HOW TO GIVE AN ORDER

By
Eugene E. Whitworth1/

Giving orders is one of the severest tests of supervisory ability. Into that seemingly simple process of telling somebody to do something are rolled all the varied aspects of supervision: Communication, planning, human relations, delegation, motivation. What stops many supervisors from trying to improve this all-important managerial technique is that they mistakenly feel that good order-givers are born not made.

But it is possible to learn to give orders to employees and to give them in such a way that they are motivated to do the job and are given the information they need to do it.

The first step is to pin down the reasons that orders fail to achieve the results the supervisor wants. Here are some common failings in order-giving:

1. Using ambiguous or vague words in framing the order, such as, "I want these letters typed soon," instead of "I want these letters typed by 12 o'clock."

1/Reprinted by permission of the editor from an article appearing in Supervisory Management, January 1966 issue.

2. Assuming that the order is understood the way you intended it, without getting confirmation that you have made yourself clear.

3. Failing to motivate the subordinate by telling him why he is being asked to perform this assignment.

4. Giving too many details to the experienced subordinate or too few to the inexperienced one. The first will be bored and resentful, the second will flounder.

5. Failing to tailor the manner of your order to the employee and the situation. In some cases a direct order is desirable, in others a request.

6. Mistiming the order. There are some times when an order will not register strongly with a subordinate, such as quitting time.

7. Depending entirely on positional authority for getting an order carried out, rather than trying to develop inner authority which will motivate the subordinate to cooperate willingly.

8. Giving too many orders at once. By trying to cover too much ground, a supervisor will end up with none of his orders carried out correctly.

9. Mumbling or talking too fast. A supervisor who doesn't like order-giving may just blurt out an order and take off, leaving a confused employee behind him.

Some of these order-giving faults are easier to remedy than others, of course. But once they are pinpointed, a supervisor can make a conscious effort to eliminate them. Here are some steps he can take.

Establishing a "Team" Approach to Order-Giving

A supervisor is a leader, but he isn't a dictator. If he depends entirely on his positional authority, he may get obedience--but an unthinking obedience that actually will weaken his department's performance. Obedience based on willingness and understanding is the kind that produces top results in productivity and efficiency. By always stressing the cooperative "team" approach, the supervisor can make his orders more effective.

One way to do this is to fill in the employee on the background and the significance of the order. Obviously when you request an employee to wipe up some oil that's been spilled in an aisle, extensive explanations are unnecessary. But most orders are more complex than that, and it pays to explain the importance of what you want the subordinate to do. If possible, point out how the assignment will benefit the whole operation, and tell the subordinate why he was selected to do this job.

Use the Right Type of Order

You can give an order in a variety of ways, and you'll find it effective to use different approaches to fit a particular employee or situation. Most frequently you will find a request works admirably if you have established a sound climate in your department. Thus you would say, "Bill, will you please see that all outgoing invoices are typed in triplicate from now on?" Or, "Joe, when you have a chance, would you check our inventory of machine lubricants?"

Although a request carries almost the same weight as a direct command, it makes the receiver feel that his cooperation is being asked for rather than demanded--and he is more likely to give it. Requests are most effective with experienced workers and with sensitive employees who may be antagonized by direct orders.

Another type of order which is even more dependent on the initiative and cooperation of subordinates is the suggestion. For example, you might say, "I wonder if we can improve our housekeeping so that we'll pass all safety inspections?" This order is only implied, but it will bring a positive response from conscientious workers.

The direct order should be used infrequently. It may be necessary in times of emergency to stress the urgency of the situation, or in dealing with employees who don't respond to any other type of order.

Time the Order Correctly

Unless it's urgent, an order should not be given to an employee who is harassed, rushed or preoccupied. For example, to give an employee an order just before he has an important appointment would be unwise, since he would be unable to concentrate. Similarly, orders normally should not be given just before the lunch break or quitting time--they'll probably be forgotten quickly.

Make the Order Clear and Complete

Keep your order as simple as possible, but make sure you include all the facts the subordinate needs to carry it out quickly and efficiently. You're less likely to overlook any important information if you think in terms of six elements: Why, who, what, where, when and how. The who is particularly important when giving an order to a group--it should be made clear who is responsible for doing what.

Unless you have no definite time limit on the assignment, specify the time you want the job completed, and make sure the subordinate understands perfectly what the conditions of completion are.

To find out if he understands, you must get some feedback. Don't assume that if an employee keeps nodding his head he must understand the instructions. Even if you ask him if he understands and he says yes, you need more solid evidence. He may even be able to repeat the order to you verbatim without actually understanding it the way you wanted him to. It's better to get him to express your instructions in his own words. Ask him how he intends to handle the most complex phase of his assignment. For example, "When you get the valve in, how will you adjust the spring tension?" You'll find out from his answer if he has understood your instructions.

Pretest All Orders Before You Give Them

The supervisor who decides he wants an employee to do something and rushes off to tell him often will have cause to regret later that he didn't think the order through first. After giving the order, he may realize that he gave it to the wrong subordinate, left out important details or pulled some other boner. Before giving any order, he should check it against the following questions:

1. Does the subordinate really have the background, training and skill needed to carry out the order?

2. Is giving this order the right way to accomplish the objective--or is there another way that might be better?

3. Am I prepared to explain to the employee the reasons for the order?

4. Are all the details of the order complete in my mind so that I will be able to tell the subordinate what he needs to know to carry out the job?

5. Have I thought through the best way to give this order so that the employee will be fully motivated to carry it out?

6. Have I picked the best time to give the order?

*Don't Just Tell Them--Show Them

As we become involved with words that mean something that cannot be pointed at, we come to the stage where a word has one meaning to the speaker but all too often quite a different meaning to the listener.

*This article, by William Exton, Jr., Senior Consultant, William Exton, Jr., and Associates, accompanied the preceding article by Eugene E. Whitworth, in Supervisory Management, and also is reproduced by permission of the editor.

For example: A supervisor in a chemical plant is instructing a new employee in a simple operation: tapping the bottom of an overturned mixer with a hammer to knock loose the last few grains of the contents being poured out. Handing the man a hammer, he says, "Give it a good, hard tap." A moment later he is horrified to see the bottom of the mixer stove in by the eager new worker. After all, what does "hard" mean? The supervisor is a light, slender, delicate man who is accustomed to mixing accurate batches, using a chemist's scales with care. Any hammer is a crude tool to him; a "hard tap" is about what would be required to drive a small tack. That is the evaluation of "hard tap" which the supervisor has learned from his experience. The worker is a burly 220-pounder who used to be a railroad section hand and has driven many an eight-inch spike into an oak tie with a 12-pound sledge. He doesn't think you can hit a "hard" tap with a hammer.

If the supervisor had given the mixer a tap of appropriate force and said, "Tap it as hard as this," the word "hard" would have had its value clearly shown; there would have been no misunderstanding.

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ELIMINATING CHROMIUM GLARE FOR SAFETY

(Reprinted by permission of GRIST, January/February, 1966 issue, a publication by the National Conference on State Parks, Washington, D.C.)

As Park Ranger Lester L. Womack of Grand Canyon National Park points out, a safety hazard unnoticed by many on the modern automobile is the chromium-plated arm of the windshield wiper. Reflection of the sun from this unit can cause anything from a minor annoyance to a fatal mishap--yet the hazard can be eliminated in a few minutes with a spray can of metal primer or grayish paint. This will give the arm a dull gray finish that does not reflect light.

It is a simple matter to mask the front of the car, windshield and wiper blades with newspapers and masking tape, then to finish the dulling job with a few squirts from the spray can. The few minutes required to do the work could save a life.

Photographs of the preparations and accomplished job are shown on the following page.

Material for preparation

Painting finished: no glare

Photograph No. 1