

PC 141

# INSPECTION OF PORTLAND CEMENT

by

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## I. INTRODUCTION

Efficient inspection of cement is essential if confidence is to be placed in the results of tests of the samples, and if certification is to be made by the inspecting agency as to the quantity and condition of the shipment.

Much has been written about the inspection and testing of Portland cement, but it appears that there is need for a paper dealing more fully with the inspection. This has been emphasized very frequently by inquiries from purchasing offices and the questions raised by inspectors. Even an inspector who is familiar with the various mill processes involved and the routine of inspection, is often called upon to make a decision which has no precedent in his experience. It is not intended that this paper shall be so far reaching as to be of assistance in all such cases, but during long experience in this work at widely scattered points, certain procedures of inspection as herein outlined have been demonstrated as being the most effective in avoiding complications and in holding the confidence and respect of all parties concerned.

It should be distinctly understood that this is not intended to convey the impression that the personnel of the mills should be held under suspicion, nor in any way to be a criticism of certain practices employed in the Portland cement industry. On the other hand, it is hoped that the information contained herein will be of assistance in conducting true inspection of cement.

## II. COOPERATION BETWEEN MILL AND INSPECTOR

The inspector must remember that he is not detailed to obtain proof of faulty material or misrepresentation on the part of the manufacturer, but that it is his duty to secure personally the information which makes it possible, without doubt or assumption, his definite and positive certification to all the points involved in his inspection. To perform this work properly, he must exercise requisite care and take all necessary precautions. When his work is well done, he will have avoided occasions for doubt in his own mind, and will not lay himself open to just criticism. The possession of the necessary information is of value as protection to the mill as well as the purchaser, and the inspector should feel no hesitancy in frankly requesting and firmly insisting upon such information.



Not all mill employes regard an inspector with equal good will. Tact and good judgment must be employed to avoid friction. Courtesy and consideration on the part of the inspector are especially in order. In addition, it is important that he learn with whom he should take up the various matters, especially any serious disputes. He should have in his mind a clearly defined idea as to the extent of his work and not exceed his rightful authority.

Both the operation of the mill and the shipping of the product require considerable planning by the manufacturers, and their interests should be well considered. Arrangements should be made to meet their convenience as far as circumstances permit, and appointments should be kept promptly.

In matters of urgent shipments, requests for special information, adjusting difficulties and even the inspector's personal welfare, the good will and cooperation of the mill employes are desirable. Therefore, with all due regard for proper and efficient inspection, the inspector should especially endeavor to avoid unnecessary friction arising from misunderstandings and disagreements.

On the other hand, especially when a mill has definitely contracted to submit certain orders for inspection, the inspector is to expect prompt fulfillment of the agreements made with the purchaser. Bins should be furnished as contracted for and in time for the specified tests to be completed before the dates set for shipments. Government specifications allow at least 10 days for completion of the 7-day tests and 31 days for the 28-day tests, reckoned from the date of the sampling. The testing laboratory should arrange with the mill for the furnishing of the proper facilities and assistance.

Many orders are handled under special arrangements for shipping, inspection and making tests at the mill laboratories, and such special details are left for proper settlement in the particular cases concerned.

The inspector should report immediately to the inspecting office any difficulty or cause for complaint in order to have such matter promptly adjusted and recorded.

Unless authorized, he should not make known to the mill any of the details of tests or investigations.

It is the best policy for the inspector not to enter into any personal agreements with the manufacturer without first giving full details to the testing laboratory.

To prevent the necessity of reconsignments, loss of tested cement, errors in reports, and misunderstandings, it is essential



that the mill give details sufficient to identify shipments if the inspector relies on the cement company for shipping information. In some cases, special arrangements provide for the transmission of shipping instructions through the inspector.

### III. DEFINITION AND SPECIFICATIONS

Definition.- It is fitting that the discussion of Portland cement inspection should contain such definition of that material as may have a bearing on the inspector's work. The following definition, which has been taken from the U.S. Government Specifications for Portland Cement<sup>1</sup>, is also used by the majority

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<sup>1</sup>Bureau of Standards Circular 33, 3rd edition.  
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of the technical societies of this country, and closely resembles the definitions of most of the foreign countries.

"Portland cement is the product obtained by finely pulverizing the clinker produced by calcining to incipient fusion an intimate and properly proportioned mixture of argillaceous and calcareous materials, with no additions subsequent to calcination excepting water and calcined or uncalcined gypsum."

The inspector's attention is called to that part of the definition referring to the process of manufacture and handling subsequent to the burning of the clinker, since it is after that operation that prohibited additions or adulterations may be made. If the inspector has any reason to believe that the cement has been adulterated he should notify the laboratory giving details and if possible take a sample of the questionable material as it is being added.

Inspection as ordinarily understood, and as herein referred to, is concerned only with the process after calcination, and any prior inspection would be done only under special arrangements.

Specifications - There should be a clear understanding as to the specifications with which the cement is to comply, in order that there may be some basis upon which to adjust any difficulties or contentions.

### IV. KILN TO FINISHED PRODUCT

Intervening Steps - The steps intervening between the kiln and the shipping of the cement may be some or all of the following: cooling, clinker storage, preliminary grinding, addition



of gypsum, finish grinding, storage and packing. No attempt will be made to describe these operations as the machinery and layouts vary widely among the different mills. However, the inspector should know something of the general types of grinding machinery and conveying systems and be able to use the proper terms in referring to them. When beginning an inspection, the inspector should make himself familiar with the layout of that part of the mill dealing with the processes between the kiln and the disposition of the cement by storage or packing.

## V. CEMENT STORAGE

Bins - Bins for the storage of cement are built of various materials and in different forms. The chief points of interest to an inspector are the facilities for sampling and sealing, and the possibility of leakage or overflow of cement from adjoining bins.

Storehouse Outline - A brief outline sketch showing the position of bins and packing machines and the paths of the conveyors between them will often be of value to the inspecting office, as when instructing new inspectors or in deciding which of a number of bins can best be emptied or released to the company.

Cleaning Bins - It is desirable that all cement be removed from a bin before it is filled for test. Any cement adhering to the bin wall or floor in a cake which is sufficiently firm to not loosen or mix with the inspected cement as it is drawn from the bin may be allowed to remain. Also there may be times when it is impossible to remove all of the loose cement because of shortage of labor and poor facilities for emptying the bin. If such is the case, the residue must be sampled as outlined in Section VI.

Sealing Bins - Before sampling all old seals should be removed and new seals be placed on the outlets. The sampling is discussed in Section VI. When the bin is full, all top inlets or chutes should be sealed and the condition of cement on the top surface of the bin should be noted.

When shipments are to be made, the seals on bin outlets should be recorded before breaking and the new seals should be placed on outlets as soon as packing is completed. The construction of some bins does not permit the sealing of the outlet. If such is the case a note should be made of the appearance of the surface of the cement. If later observations indicate that the cement in the bin is not that which was sampled, because of replacement of the cement, or overflow from an adjoining bin the bin should be rejected or resampled, as the inspection office sees fit. For proper identification



it is essential that the construction of bins be such that outlets and inlets can be sealed and that no addition can be made without breaking the seals.

Breaking Seals - It will be found advisable in practically all cases for the inspector personally to break seals, even on empty bins. In any case, unauthorized persons should never tamper with seals and the mill should be considered responsible for broken or missing seals, unless they have been removed by authorization of the inspector or the testing laboratory. This will prevent much chance for misunderstanding on the part of the mill employees who may otherwise become accustomed to removing seals which they deem no longer necessary.

Length of Storage - The length of time during which a stock will be maintained under seal will be governed by instructions from the testing laboratory.

Bin Capacity - The capacity of a bin is generally known by the mill authorities but it sometimes becomes necessary to estimate this. In either case it is well that the inspection office fix the percentage of excess which may be removed from the bin as tested cement. When this limit is reached, the bin should be considered empty.

Empty Bins - When a bin becomes empty, the inspection office should be notified and the inspector should remove all seals.

## VI. SAMPLING

General - Various methods and devices are used in securing samples. The selection of the particular method and device is controlled by the general layout of the mill, the construction of the bins, and other circumstances, and is a matter for the decision of the inspecting laboratory. However, the purpose is to obtain samples truly representative of the material under inspection, and the instructions of the inspection laboratory should specify the manner of sampling and the quantity of cement to be represented by a single sample. The various methods are briefly outlined herein with such remarks as have a bearing on their efficient performance. It is the duty of the inspector to be present and supervise sampling if the assistance of others is necessary. Under no circumstances should he allow samples to be taken in his absence.

First we will consider the sampling of cement which is to be stored at the mill awaiting the results of tests. While in some instances this material will be packed and set aside until completion of the tests, the general custom is to store such cement in bins.



Conveyer Sampling - The preferable manner of sampling is to take the samples from the material as it is flowing into the bin. The material may be coming from one or more other bins, or directly from the finishing mill. For such sampling, it is essential that the inspector obtain a definite knowledge of the general layout of the conveying system, determine from where the cement is coming if the source must be known as in resampling cement for check soundness tests, and keep watch on other conveyers to make sure that no cement except that which should be sampled is entering the bin.

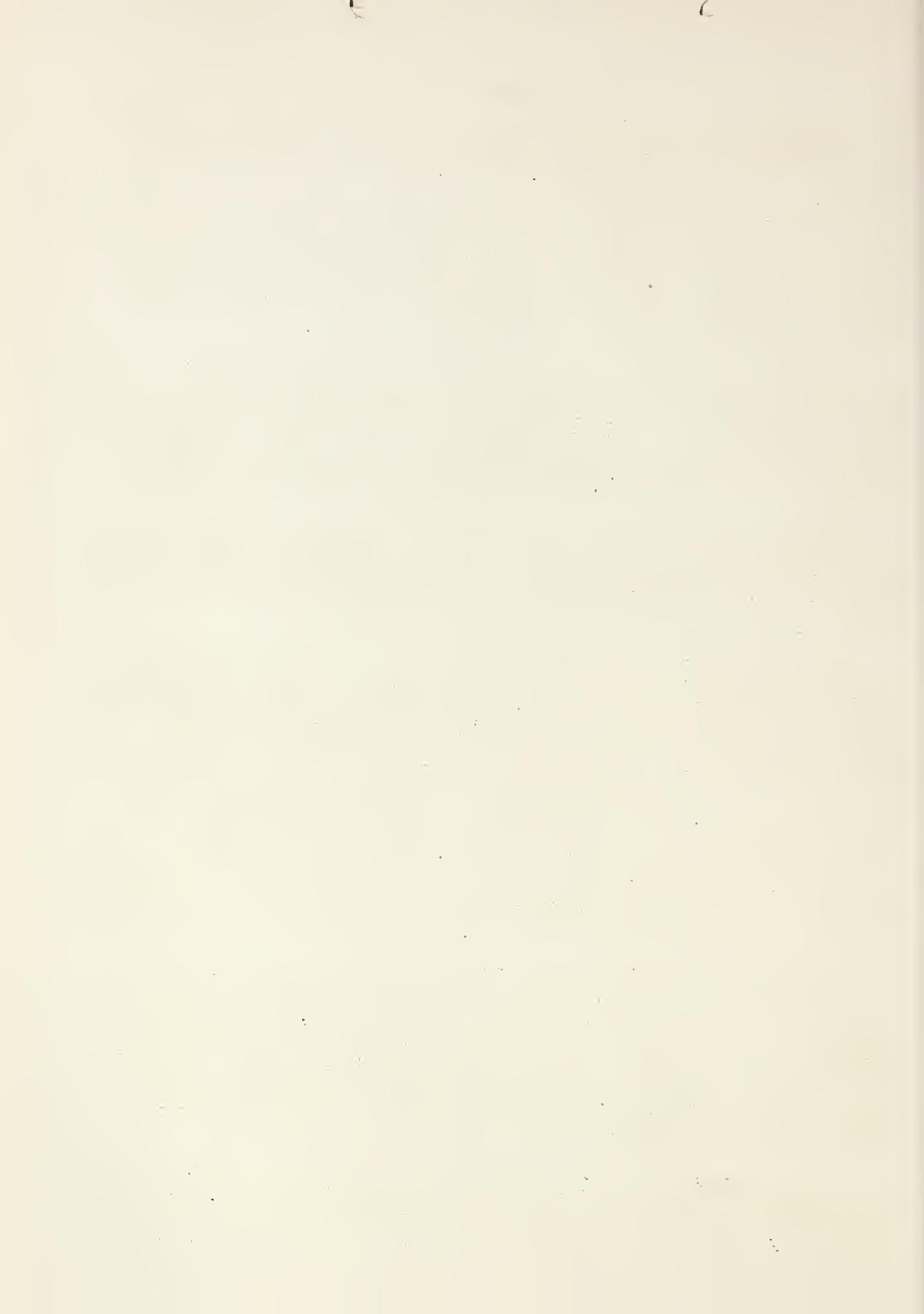
If the bin contains a residue of loose cement (See section V) samples should be taken from it before adding the new cement. In no case should a bin be accepted for test if it contains a loose residue from which it is impossible to obtain representative samples. It should be understood that the failure of samples from such residue will cause a rejection of the entire bin.

Sampling may be done either by the so-called "grab" method or by a continuous operation. The instructions of the inspecting laboratory should govern. The whole of a grab sample is taken at one time and tested as an individual sample.

The intervals at which samples are to be taken must be determined by carefully estimating the time required to convey the quantity represented by one sample. The mill officials will be in a position to impart this information and under no condition should the sampling interval be varied from the period estimated by them. If the proper number of samples are not obtained, due to insufficient information as to the rate of flow, the inspection laboratory should be advised of the circumstances. Serious shortage in the desired number of samples should be cause for the rejection of the cement. The sample preferably should be taken at the point of discharge into the bin. The construction of bins and the layout of conveyers, however, may require or permit taking samples at other points in the conveying system.

Automatic sampling devices are sometimes used. These are of various types and it is suggested that before any are used the matter be discussed with the laboratory, with details regarding the facilities for protection against being tampered with during operation. The entire amount of cement collected by the device during the desired interval should be thoroughly mixed before taking the laboratory sample. The remaining cement should be disposed of.

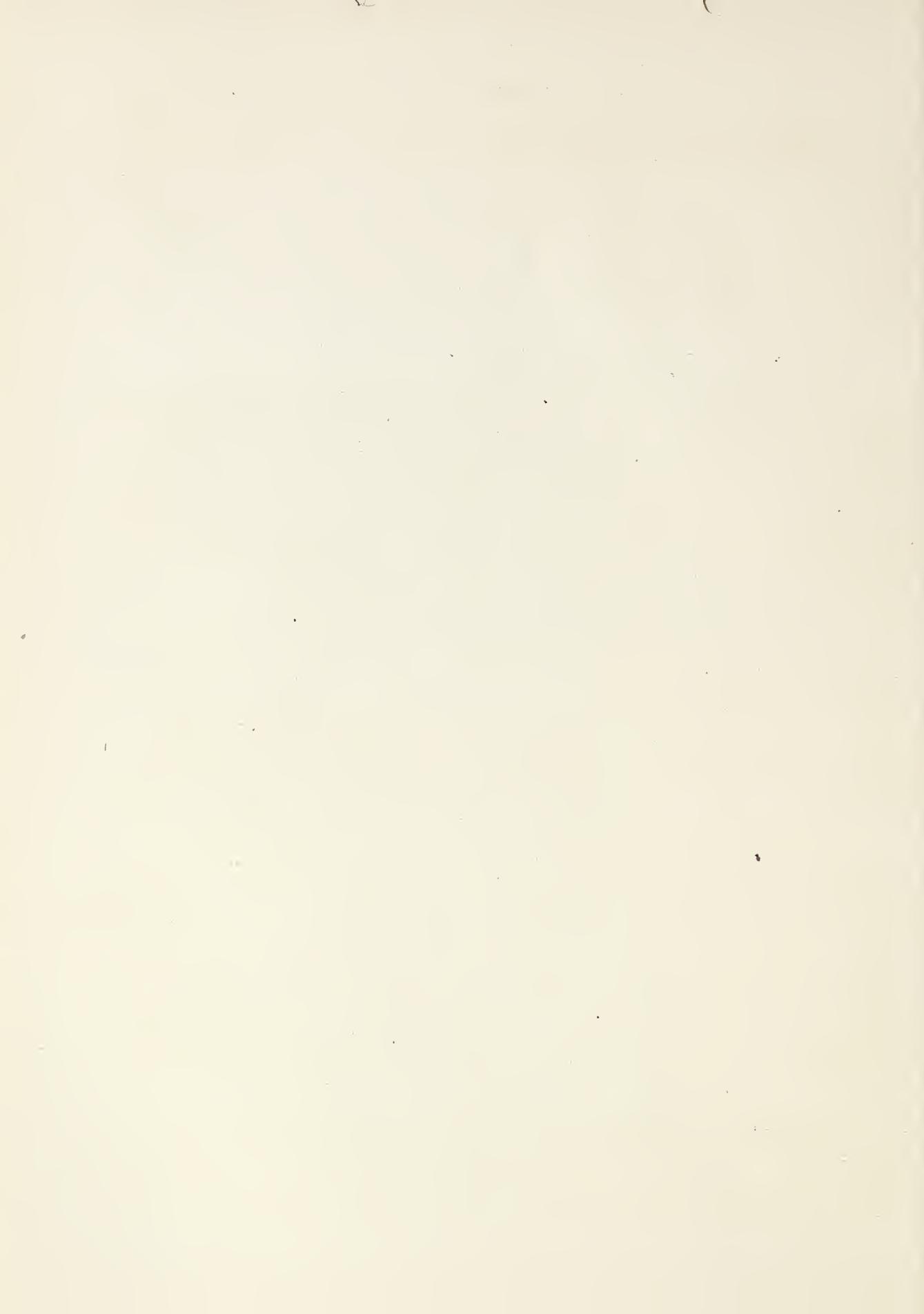
Tube Sampling - Occasionally inspectors are authorized to sample bins of cement by the use of sampling tubes. There are a number of styles of sampling tubes but none has proven to be entirely satisfactory. Samples should be taken from the sample



holes in sides of bin, and also from the top of the cement. The tube used in sampling the top of the bin should be of sufficient length to penetrate the full depth of the cement in the bin. A small sketch or note should be made of the location from which the various samples are taken. Holes in the sides of the bin for the insertion of the sampling tube should be so arranged as to furnish one sample for each quantity of cement used as the sampling unit. End or corner bins are usually preferable because of additional or better distributed sampling holes. The tube should be so manipulated as to obtain a core along the entire length.

Vertical Sampling Tubes - Use has been made in some cases of vertical tubes, with side openings, set in place before the filling of the bin. These tubes are withdrawn after filling the bin and the cement within the tube is considered to represent the various layers of cement according to their relative locations, the samples being taken from sections of the included core. When this tube is withdrawn, it is sometimes found that the top portion is not filled, indicating that all of the cement in the tube has settled or that some portion has not been well filled. Moreover, when a bin is large or filled from more than one point, there is no assurance that the samples are representative of all the cement within the bin unless a number of tubes are used.

Sampling from Discharge - It is the custom of some laboratories to release a portion of the cement from the bin and take samples at short intervals as it flows from the discharge opening. An indicator, such as a wood or cork ball, is often placed on the surface of the cement above the opening and the cement is allowed to flow until the indicator appears at the discharge. Some laboratories authorize the use of this method, either alone or in connection with tube sampling, but generally it is not commendable. It is open to the same objections as the vertical tube placed in the bin prior to filling. (See preceding paragraph). If the bin is large, or filled from more than one point, the samples may not be representative, for it must be remembered that the crater formed above an outlet is of relatively small diameter, with almost perpendicular sides, gradually forming into a cone at the top and the indicator will appear at the discharge after a relatively small portion of the cement has been distributed. Tests have shown that a hole extending the full depth of the bin is first formed, and then the material from the top surface falls into this hole, forming the cone shaped crater. It can readily be seen that this method would not obtain samples representative of the entire contents of a large bin, especially if it were filled from more than one point.



Relative Merits of Methods - Though the inspector should be governed by the instructions of his laboratory, it may be well for him to know that tests have been made of the various methods of sampling bins. A discussion of some of these tests will be found in a report of Sub-Committee VII of Committee C-1 of the American Society for Testing Materials (Data considered by Committee C-1 of the A.S.T.M. in Preparing the Standard Specifications and Tests for Portland Cement.) The report deals with sampling in particular and gives considerable data obtained by sampling a bin filled with alternate layers of sound and unsound cement.

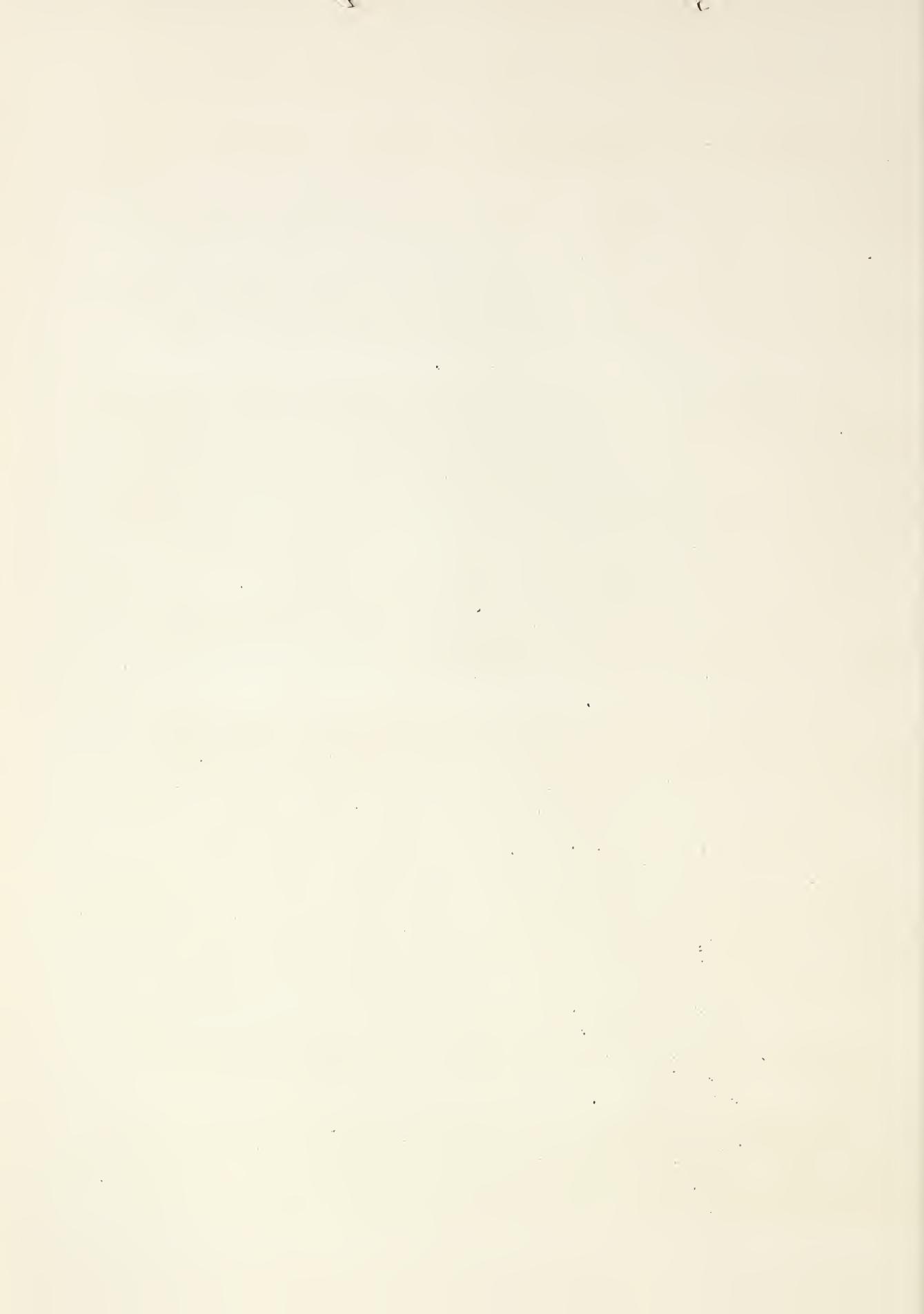
Car Sampling - If samples are to be taken at the time of shipment, they are usually secured from the bags directly after leaving the packing machines or after they have been placed in the car. Since a very valuable part of inspection consists of the checking of quantities and the loading of cars, it is desirable that the inspection be performed during the packing. At any rate, when sampling a previously packed car, attention should be paid to the general condition of the car and its contents as well as noting the number of packages.

Samples are secured by inserting a small sampling tube through the bag valve or by opening the mouth of the bag. Samples may be individual or composite according to the inspector's instructions.

Considerable cement is now being shipped in bulk and, if it is to be sampled at the time of shipment, it should be done preferably while the car is being loaded. Samples may be obtained from the loaded car with a suitable sampling tube.

Miscellaneous Sampling - If previously packed cement or cement in storage at warehouses or building sites, is to be sampled, the same general instructions hold, with the additional precaution that the arrangement of the various lots be definitely determined, their location be well described in the inspector's notes or sketch, and that the sampled bags be identified by a tag or mark to permit of their later selection if needed. Also, especially when cement has been in storage for a considerable time, its general condition and the storage facilities should be noted. It is advisable to record any available data relating to the identity of the shipments from which the stock is reported to have come.

Treatment of Samples - All samples should be properly identified by means of sample slips placed within the containers. These slips should be filled out as each sample is obtained. Bin samples should be numbered in the consecutive order in which they are taken.



It is preferable to ship samples in air-tight containers. In case heavy cloth sample bags are used, they in turn should be placed in larger sacks. Each large bag should be well secured, fastened with a seal which passes through and around the top of the bag, and be well tagged for shipment. Delay and damage to samples in transit are to be guarded against, and it is well to place two tags on a bag. Express agents often paste their way bills on tags and, if only one tag is available, desirable information may be obscured.

If a declaration of value is necessary when shipping samples, it should be remembered that samples are specially taken and prepared and are of more value to the laboratory than ordinary commercial cement.

After samples are taken, they should not be left unguarded. If it becomes necessary to interrupt the work or leave the samples or entrust them to others, it is requisite that such lots be sealed. Unless he identifies and seals these samples, the inspector is neglecting to provide that assurance of continuous identification which is necessary if inspection is to mean what its name implies.

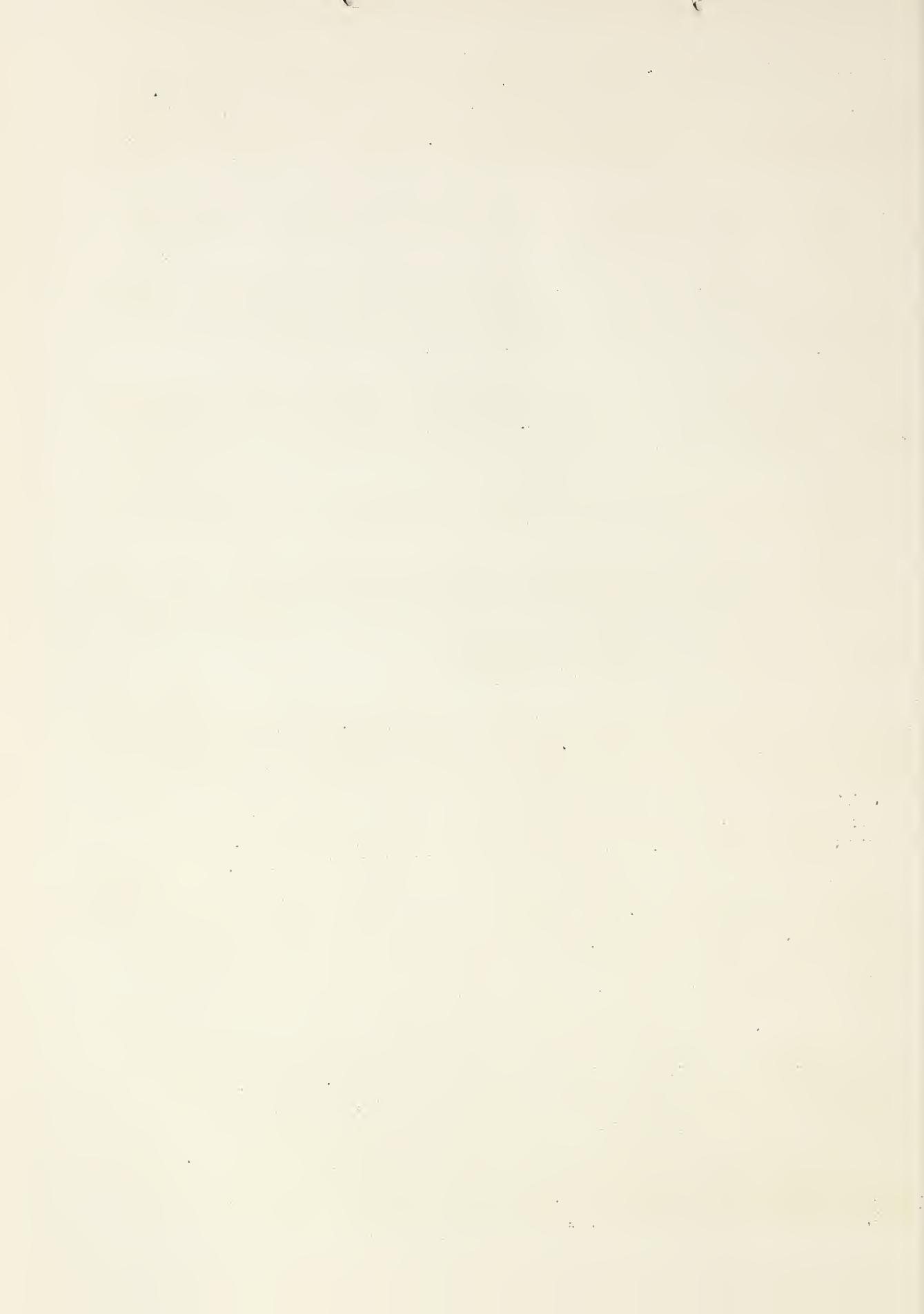
Samples should be protected from the weather and should not be stored under conditions which are likely to affect them, such as cold storage, moist air or the vicinity of steam pipes or stoves. They should be shipped promptly as the effects of aging should be avoided as much as possible.

Some mills request that a part of each sample be given them for tests in the mill laboratory. This practice should first be authorized by the laboratory. Before making such divisions, each sample should be carefully mixed by rolling on a paper. Moreover, it is desirable that it be thoroughly understood that this is done only for the information of the mill and that the mill's tests will not be considered as in any way decisive.

For full tests according to the Government specifications in effect January 1, 1921, samples should weigh approximately five pounds, thus insuring a small reserve for any necessary check tests. The inspector should make no tests in the mill laboratory unless so directed by this office.

## VII. PACKING AND SHIPPING

Conveyors - Before the seals are removed from a bin for the purpose of drawing tested cement, the conveyors should be traced to the packing machine. They should be clean of all cement and also the bin of the packing machine should be empty. While the cement is flowing from the bin, frequent trips should be made along the conveyor to see that cement is coming only from the desired source. This point cannot be too strongly emphasized. If packers are working on a piece work basis and



cement is not flowing as rapidly as they desire, it occasionally happens that sources of supply are used in addition to that of the tested stock.

Weight of packages - If the bags are tied too far down, or the machines improperly set, or if the packers, in an effort to increase output, cause the bags to become detached before the proper amount is placed therein, the purchaser may lose a considerable part of the cement he pays for. Instances have sometimes come to attention where the discrepancy was as much as ten pounds per bag on numerous bags. The weights can be checked by having random trucks of loaded bags run upon a platform scale. The U.S. Government Specifications provide that a bag shall contain 94 pounds net and a barrel 376 pounds net. They further contain the following paragraph concerning unit weights.

"Packages varying more than 5 per cent from the specified weight may be rejected; and if the average weight of packages in any shipment, as shown by weighing 50 packages taken at random is less than that specified, the entire shipment may be rejected."

If necessary the tare weight can be determined by weighing a number of the empty containers.

Including additional packages to make up for shortage in weight of other packages is open to the objection that the package is generally used as the unit in concrete mixing, with the assumption that it represents the usual standard weight, therefore, this practice should not be allowed.

Containers - Cloth bags have become a costly part of the marketing of cement. There are in use various grades of bags, each with its refund value as agreed upon in the purchase order. It is therefore essential that the bags which are specified in the purchase order be used in making the shipment, and, to prevent loss of cement and insure refund for empty bags, torn or defective bags must be rejected. Bags improperly tied should be rejected. When paper bags are used, it is customary to add approximately 2 per cent empty bags to replace any broken in transit. Packages should bear the name of the maker and the brand and all marking should agree with the contents, both as to quantity and quality. If cement is to be shipped in wooden barrels or special containers, attention must be given to the details as set forth in the order.

When an inspection stamp or other identification is desired on the packages, it should not be applied until the packages are properly filled with tested and accepted cement.



Loading and Inspecting Cars - The number of barrels of cement in a car is readily obtained by computing the number of bags in a pile, the piles in a row, and the number of rows. In case of disagreement between the inspector's tally and that of the mill, the discrepancy should be eliminated before the car is sealed.

The condition of the car should be determined, before loading if possible. Cars should be clean and dry. Roof should be examined for leaks, and sides and doors should be in condition to protect the contents. If refrigerator cars are used, all ice should be removed.

When cars are scarce and cement urgently needed, cattle and coal cars are sometimes used. Such cars should be authorized by the testing laboratory before packing. Cattle cars are usually lined with paper and coal cars covered by tarpaulins. If doors are broken or missing, protection should be obtained by boards and paper across the opening.

To prevent damage to bags and loss of cement, all projecting nails should be removed from the floors and also from the walls of the cars to a height sufficient to clear the cement bags. If the cement is packed in paper bags, the bags should be so arranged in the center of the car that jolting in transit will not throw them to the floor and break them.

To many of the large jobs and users, cement is now being shipped in bulk. The foregoing notes in regard to the general condition of the cars apply, but doors should be closed by tongue and groove boards or other means to prevent loss in transit. The quantity of cement must be determined by weight after the car is loaded. If the inspector cannot conveniently be present when the cars are weighed, he might at intervals compare the weights given him with those in the railroad records. Cars for bulk shipments should be lined with paper.

Careful check on quantities is always desirable. At times it serves the maker as well as the purchaser to have proper certification from the purchaser's inspector.

Sealing Cars - The last, but by no means the least important step is the sealing of the cars. Cars should be sealed by the inspector immediately after packing. Seals are necessary on all doors and openings. Seal numbers should be carefully noted, together with the initials and number of the car.

Some cars are provided with a lever device for opening the door. In such cases, a seal should also be applied to the lever if it is of a type permitting sealing. If the lever is unsealed, railroad men will sometimes raise it and partly open the door to see within. Should any of the bags lodge against the door preventing its being closed again the contents may thus be exposed to the weather. If the inspection seals on a loaded car have been broken responsibility should not be assumed by the inspector for quantity or quality. The matter



should be referred to the inspection laboratory before resealing the car.

Car Reports - After a car has been packed and the contents tallied and inspected, and before sealing the door, the inspector should tack in a prominent place any car inspection report or notices in use by his laboratory. These notices may save much time and misunderstanding should the detailed shipping reports of the inspector not be available to the official in charge of the receipt and unloading of the cars.

Transportation by Other than Railroad Cars - Transportation by wagon, truck or barge does not always permit sealing and identification as practiced on freight car shipments. In such special cases, arrangements should be adopted which will best serve the needs of the occasion.

General - It is well to avoid packing cars with cements of different status of test, such as "24-hour" and 7-day tested cement since failure of one lot may require the rejection of satisfactory cement which has been packed with it. This matter is best left to the decision of the inspection laboratory.

### VIII. CEMENT IN TRANSIT.

After the car leaves the mill, it is not often that it will be again seen by the inspector. However, cases have arisen where the inspector, because of his location, has been requested to assist in tracing cars, obtaining data as to delivery dates when the records of the job were incomplete or lost, investigating broken seals, expediting shipments, and locating cars in transit in order to intercept them at transfer points and obtain new samples. Such unusual matters are best left to the judgment of the inspector, assisted by such instructions as may be given him in the case. At such times he will find it of great assistance to have the cooperation of the mill and local railroad men.

### IX. RECORDS

Notes - All notes should be made directly in a permanent-leaf note book in order to provide a means of duplicating any report which may be lost or destroyed.

Seals - Seals must be numbered, otherwise, they are but a poor and uncertain identification. Moreover, even if numbered, their careless or unauthorized use may sometimes cause misunderstandings. It is advisable that they be carefully kept where the inspector alone has access to them. If circumstances should require that other seals be used, as those of a railroad, the number and initials should be fully recorded and the proper



notes made on the report. The inspector should record and report the number of each seal used by him, also record and compare with previous reports the number of each seal he breaks.

Reports - Reports should be definite and complete. This applies especially to samples. Inspection, sampling and testing will have been done to no avail if the identity of samples is not properly established. Efficiency is impaired if the records are so incomplete that desirable information cannot be secured. The time and money spent as well as the certainty of results desired, surely warrant the expenditure of time sufficient to make careful and complete record. The inspector should keep his laboratory posted as to his location and travel dates.

Forms - Most laboratories have devised the forms required for their records and reports. These must necessarily vary according to the needs of the service.

## X. DANGERS

It behooves both the experienced man and the novice to have ever in mind the motto "Safety First" while engaged in work around the cement mill. To the novice, especially, a few words of warning are fitting, for, in addition to the usual precautions against injury from cars, machinery and such other causes as may be well known to most men, attention must be paid to certain sources of danger which are more or less peculiar to the cement mills.

Foremost among the causes of accidents in plants are the screw conveyors. A look at one in motion should convince the inspector that a serious, if not fatal, accident will result if an arm or leg is caught by the screw. Experienced mill men urge precautions in this matter. Avoid taking samples from screw conveyor. When working above bins, insist that covers be on any screw conveyors which may run beside the walk way.

In such a location a screw has frequently been seen uncovered at a short height above the walk way. At night time, or in a dimly lighted part, it would be easy for a man to stumble and have an arm caught in the screw. In the alleyways and tunnels leading from the bins one might find that the conveyor covers are not always in place or a space between covers or gratings may exist. These faults are not always evident since they may be concealed by cement or an empty sack placed over the opening to prevent escape of dust. Therefore, while insisting that all covers be placed where he must work, the inspector should never walk upon the covers. The inspector should insist on the mill furnishing lights and other facilities adequate to permit the performance of his work in safety.



Do not walk among belts, gears, and chains if it can be avoided. Avoid line shafts since projections on rapidly revolving shafts are not always visible. Be on the lookout for electric wires, especially around the tops of the storage houses.

If the inspector finds it necessary to go in the vicinity of the quarry, he should consult someone in charge and avoid danger from blasting operations.

In addition to the foregoing dangers, there exist those peculiar to the cement itself. Dust soon settles on the overhead timbers of the storehouses and any climbing should be done cautiously. When filling bins, the space above them will often be sufficiently cloudy with dust to make it difficult to distinguish objects clearly.

If it becomes necessary to walk upon the surface of the cement in the bins, do so cautiously and only in company with the mill men. The cement may be very warm. The surface may be especially fluffy or lightly deposited causing difficulty in walking. Should one fall into the cement from the top of the bin, the consequence might be serious.

Often a steep bank of cement forms in the bins by the removal of part of the contents and in the large storehouses where a traveling conveyor cuts a precipitous slope in the remaining cement. Also in bins the cement will form steep slopes when being filled. Keep away from such slopes. Men have been buried beneath sudden slides of cement with fatal results.

Before starting work, inquire of the Superintendent or foreman in charge as to the existence of any unusual conditions which should be guarded against.

Report promptly in writing to the inspecting laboratory any dangerous conditions which are not remedied.

Use caution in crossing tracks and when working on or around cars, and sealing cars, especially if an engine is coupled to the train or is nearby. Do not seal cars while they are in motion. Do not sit in the doorway of a car or on the floor of a loaded car.

Serious effects seldom come from breathing Portland cement dust but the irritation, which is experienced by one unaccustomed to the dust may be avoided by breathing through a wet sponge or respirator.





B/L No. \_\_\_\_\_

Weight Entire Shipment  
\_\_\_\_\_

Number bags \_\_\_\_\_

This is tag No. \_\_\_\_\_

Seal No. \_\_\_\_\_

Shipped from \_\_\_\_\_  
\_\_\_\_\_

Mill \_\_\_\_\_

Bin \_\_\_\_\_

Date Shipped \_\_\_\_\_

Inspector \_\_\_\_\_

CEMENT INSPECTION DIVISION  
BUREAU OF STANDARDS  
-----

Sample Slip

Date \_\_\_\_\_

Mill \_\_\_\_\_

Consignee \_\_\_\_\_

Destination \_\_\_\_\_  
\_\_\_\_\_

Car )  
Bin ) \_\_\_\_\_

Barrels \_\_\_\_\_

Inspector \_\_\_\_\_

Form 392

Reverse side of shipping tag.

The forms copied above and those attached have been found convenient. These are offered only as a suggestion, as each laboratory will have to outline a system according to its needs.



CEMENT INSPECTION DIVISION  
BUREAU OF STANDARDS

CAR REPORT

..... Car No. .... contains ..... barrels  
(Initials.)

..... cement which has met the United States  
(Brand.)

Government specification requirements for .....  
(Time.)

Date ..... Packed by .....  
Bureau of Standards Inspector.

Car received by .....

Condition .....

THIS SLIP TO BE PLACED IN CAR CONTAINING SHIPMENT OF CEMENT IT DESCRIBES.

Form 335.

11-6444


Twenty-eight day tested cement has met the United States Government specifications as contained in Bureau of Standards Circular No. 33, 3d edition, in every respect.

Seven day tested cement has passed the 7 day tests, and if accepted, reports of 28 day results will not be made unless requested.

If shipment is made from untested stock, you will be notified of 7 day results, and if requested, of 28 day results.













