



March 6, 1972

GLENN J. SAMPSON  
Vice President, Power

MEMO ROUTE SLIP		For use where there is no routing slip	For use where there is a routing slip	For use where there is a routing slip
Form No. 1 (Rev. May 14, 1967) ATC M 0240		Note and return	For signature	For information
TO (Name and unit)	INITIALS	REMARKS		
J. B. Henderson, RO		SUBJECT: TOLEDO EDISON COMPANY		
R. H. Engelken, RO	DATE	DOCKET NO. 50-346		
P. A. Morris, RO				
TO (Name and unit)	INITIALS	REMARKS		
RO Files		Attached are the enclosures to applicant's		
DR Central Files	DATE	letter dated March 6, 1972, which were not sent		
PDR		to you with our letter dated March 13, 1972.		
TO (Name and unit)	INITIALS	REMARKS		
1 PDR				
NSIC	DATE			
DTIE				
FROM (Name and unit)	REMARKS			
RO:III	<i>Hilda - I'm sending an extra copy since the March letters went out with the old distribution.</i>			
PHONE NO.	DATE	<i>Glenn</i>		
	6-13-72			

USE OTHER SIDE FOR ADDITIONAL REMARKS

GPO : 1968 O-294-613

developed at 90 days is determined.

Yours very truly,

*Glenn J. Sampson*  
GJS:r

Attachments

MAR 10 1972

8001310592

*Don L.*

# Bechtel Corporation

## Inter-office Memorandum

To H. W. Wahl

Subject Concrete Investigation

Date January 21, 1972

From M. R. Stephens

Of Construction

Copies to

A. Bingham	wo/a
J. Stull	wo/a
S. Helms	w/a
J. Lenardson	w/a
J. Corder	wo/a
P. Cotter	wo/a
J. Varela	wo/a
A. Martin	wo/a

At Davis-Besse Power Station  
FMB-594

As you are aware on December 28 and 29, 1971, concrete was placed in Bentley Pour Numbers 550, 552, 551 and 555 respectively. The 7-day breaks of this concrete received on January 4 and 5, 1972, indicated low early strength gains as compared to normal 7-day cylinder strengths previously obtained. This prompted investigation into the possible cause, and it was determined that minor inadequacies existed in the first 24-hour curing period of the cylinders in question. However, additional 7-day cylinder strengths received on January 6 and 7, 1972, indicated improper curing was not the cause, and prompted further investigation as indicated in the attached chronological history of the events. Meetings were held with all parties involved, namely PTL, Medusa, Bechtel and TECo. Medusa Cement Company's expert indicated the probable cause was a chemical change in the cement composition which caused low early strength gains, but did not violate the chemical requirements of ASTM, C-150. As a matter of fact, User's Tests proved that the cement in question did, in fact, comply in all respects with the requirements of C-150, but the 7-day mortar cube strengths were much lower than the usual. Medusa further indicated that from previous experience and past history, coupled with the information presently available, the concrete in question would meet or exceed the specification requirements for strengths in 28 days.

On January 12, a stop order was issued to Nicholson Concrete Company prohibiting further concrete production until it could definitely be established that this, in fact, would be the case, because Medusa Cement Company's expert indicated that the chemical  $C_3S$  was responsible for low early strength gains and subsequent Users Tests taken as a result of this problem, proved this to be true. Additional cylinders were tested to determine whether the strength increase was in fact occurring as was indicated by Medusa's expert. These were 22-day results representing the pours in question. All strengths were adequate and indicative of satisfactory 28-day strengths. A significant number of strengths were above the design requirements. Based on this information on January 20, the stop order written on the production of

concrete was removed to allow production to commence on January 24, 1972.

The following action items were implemented immediately. Procedures will be written to cover these areas and submitted to Engineering for approval at a later date.

1. Medusa Cement Company committed to sampling and testing the cement loaded into each rail car (approximately 400 barrels) to determine the 3-day cube strength results in order to determine if the cement will produce satisfactory 7-day concrete strengths at the jobsite. The 3-day cement cube strength results will be used to determine if the rail car can be unloaded at the Bayview, Ohio Storage Facilities, and will be coordinated within Medusa. Information will be forwarded to the Bayview Storage Facility, including the rail car number, to allow unloading into the silo set aside for Davis-Besse jobsite.
2. Nicholson has been advised to review their QA Program to incorporate these requirements and include means of verifying that the unloading of rail cars at the Bayview Facility is in accordance with Medusa's commitments.
3. PTL has been advised to incorporate in their QC procedure a surveillance function to verify that Medusa Cement Company is indeed complying with their commitment at the Medusa Facility in Wampum, Pa. In addition, PTL will take cement random samples at Wampum and perform cement cube strength tests verifying Medusa's test results. The frequency of sampling has not been firmed up at this time. PTL at the jobsite will verify that Nicholson Concrete Company is maintaining surveillance of the Bayview Facility.

*M. R. Stephens*  
M. R. Stephens

MRS:DE/mm

Attachments (14)

## INVESTIGATION & ACTION

The following is a chronological history of events to determine the reason for low 7-day strength test results on the concrete placed in the attached pours.

### Woodville Lime & Chemical Company - Aggregate Supplier

Telecon with Mr. J. Urshel, questioning the possibility of contamination of the delivered aggregates proved negative. Mr. J. Urshel stated that no changes had been made in their processing or handling operations.

### Pittsburgh Testing Laboratory - On-Site Test Lab.

Investigated areas including curing tank temperatures. Visual inspection of stock-piled aggregate, batch ticket quantities, mixing water visual quality, errors in testing machine use or calibration, cylinder caps, making of cylinders. All items approved acceptable.

Advised PTL to sample and test concrete ingredients as follows:

- a) Mixing water for algae, salt, oil.
- b) Cement for full lab tests to determine compliance with ASTM C-150.
- c) Fly ash for full lab tests to determine compliance with ASTM-618.
- d) Tests in item b and c above to be made with mixing water from jobsite and standard water as required.
- e) Pozzilith 200N for verification.
- f) Daravair for verification.

Items a,b,e, & f will be forwarded when received.

### Toledo Edison Co.

Requested and obtained fly ash carbon and fineness results on tests presently in TECo lab. Results attached as Item 1.

### Nicholson Concrete & Supply Company - Batch Plant Contractor.

Discussions were held with plant operating personnel. Questioned plant operation. No abnormal events or malfunction occurred. Calibrated all weight hopper scales. Results proved no discrepancies existed.

Pittsburgh Testing Laboratory - Pittsburgh, Pa.

Telecon with lab and requested results of users test presently in their possession. Testing was not yet complete. Advised PTL to perform full chemical and physical tests on cement and fly ash and report results immediately by telephone. Results tabulated and attached as Item 2.

Pittsburgh Testing Laboratory - Cleveland, Ohio

Telecon with G. Bigham in Cleveland advising of testing requirements and requesting expeditious completion on 24 hour basis.

Medusa Cement Company - Cleveland, Ohio

Attempt to contact Mr. W. Copenhefer proved unsuccessful. Advised Mr. Gulyas of problems in concrete strength and requested Medusa support immediately.

Note: A telecon with PTL's J. Artuso indicated that the cement was suspect. Mr. Artuso stated that possibly the chemical composition has changed sufficiently to give low 7-day strength characteristics but most probably would produce satisfactory 28-day strengths. Mr. Artuso indicated experience with this problem before and would be able to confirm this after the chemical tests requested were completed.

The following concrete test batches were made in 5 yard quantities for further information at a later date. Results attached as Item 3. Eight cylinders were cast from each batch at the locations indicated.

<u>Area</u>	<u>Cyl. No.</u>	<u>Mix</u>	<u>Slump</u>	<u>Air</u>	<u>Temp.</u>	<u>Unit Weight</u>
Batch Plant	Q-1-P	C-1-3A	2-1/2	3.7	68	92.65
Lab	Q-1-L	C-1-3A	1-3/4	3.0	64	
Site	Q-1-S	C-1-3A	1-3/4	2.4	64	
Batch Plant	Q-2-P	C-1-3ANFA	2-1/4	4.8	64	91.75
Lab	Q-2-L	C-1-3ANFA	2-1/4	3.8	63	
Site	Q-2-S	C-1-3ANFA	2-1/4	3.2	62	

Two cylinders of each set were steam cured for 72 hours after the initial 20+ 4 hour curing time. Test results are enclosed as Item 3.

1/13/72

Contacted Medusa Cement, Mr. W. Copenhefer. Advised him of low strength problem and requested immediate assistance in solving the problem. Mr. Copenhefer advised his immediate departure for the jobsite and would send Mr. K. Rupp to the jobsite in the interim.

A meeting was chaired by Bechtel with Nicholson, Medusa, PTL, & TECo to discuss present condition of concrete in place, and further action to be taken.

Discussion centered on the probability that concrete strengths at 28-days would be satisfactory. However, all were agreed that sufficient evidence was not available at the time for any conclusions. The test results received from PTL, Pittsburgh via J. Artuso indicated that the cement was in question.

The 7-day test results for samples taken on December 27, 1971 and December 30, 1971

indicated low strengths were obtained as indicated below.

Sampled 12-27-71 --- Fly Ash Users Test

7-day control	2230 PSI	(Cement only)
7-day test	3520 PSI	(Cement and fly ash)

Sampled 12-30-71 --- Fly Ash Users Test

7-day control	2230 PSI	(Cement only)
7-day test	3350 PSI	(Cement and fly ash)

Normal strengths obtained previously are as follows:

Sampled 10-21-71 --- Fly Ash Users Test

7-day control	3610	(cement only)
7-day test	5000	(cement and fly ash)

Sampled 12-3-71 --- Fly Ash Users Test

7-day control	3450	(cement only)
7-day test	4970	(cement and fly ash)



Rupp agreed that this did indicate a significant change. However, Mr. Copenhefer would be more qualified to explain this situation.

All parties agreed to expedite the supply of acceptable cement. Mr. Rupp indicated he would contact Mr. Copenhefer as soon as possible and commence necessary action.

Bechtel advised all parties that the concrete in place was questionable and no further concrete placements would occur until Medusa and Nicholson could assure acceptable cement through additional testing prior to use.

Bechtel requested and Nicholson agreed to supply sufficient Huron Type II cement to commence qualification tests for an alternate supply of cement as a backup in the event Medusa Cement proved unacceptable. Nicholson was also requested to empty Bin #2 for inspection to determine if leakage was present from the fly ash Bin #1. (It was agreed later that TECo would pay this cost if the cement proved acceptable and Nicholson would pay the costs if the cement proved unacceptable.)

Bechtel and PTL agreed to establish a testing program at Medusa, Wampam, Pa. plant to insure acceptable cement was delivered to the Bayview silos for use on this job. TECo requested that Nicholson separate the fly ash from the common cement-fly ash compartmented silo to prevent possible fly ash to cement leakage. Nicholson agreed.

Nicholson Concrete & Supply Co. - On-Site Batch Plant

Nicholson removed and wasted 58,047 lbs. of cement from Bin #2. Samples were taken by the on-site PTL test lab at approx. 6300 lbs. intervals for future tests.

1/14/72

Inspection of Bin #2 at the batch plant indicated no leakage of fly ash into the cement was present.

Huron Type II cement was delivered and installed. 10 test batches were made and cylinders cast for all mix designs presently in use. Test results are attached, as Item 4.

A meeting was chaired by Bechtel with Nicholson, PTL, Medusa and TECo.

Bechtel indicated Nicholson had established a means of separating the fly ash from the common cement-fly ash compartmented silo. The plan is to erect another bin alongside the existing silo and provide a screw conveyor for feed of fly ash to the weight hopper. This could be obtained from Rex Chainbelt in Milwaukee, Wis. rapidly, and was presently under fabrication for another job. Rex had agreed to divert this unit to this job. Approximate shipping date is January 28, 1972.

Medusa indicated that the cement chemical composition has evidently changed significantly to indicate low 7-day strengths, but was actually a better Type II cement than had been supplied. Supplies previously were closer to a Type I cement in strength gains. Although the Type II specifications were met as evidenced by the users tests performed, Medusa was confident that the 28-day strengths would be adequate. Medusa expressed a desire to obtain core samples to ascertain the strength of the concrete in place, at their cost.

Bechtel agreed to obtain engineering information on January 17, 1972 to determine the locations and number of samples to be taken as Item 12.

Medusa made the following commitments and Bechtel agreed:

- a) Each rail car of cement loaded at the Wampum, Pa. plant would be tested for acceptable results based on what Bechtel was accustomed to.
- b) The rail cars would then be transported to the Bayview silos designated for the Davis-Besse job and would not be unloaded until test results taken at Wampum indicated acceptable strengths. Probably, 3-day results on cube strengths would be sufficient. The time in transportation would be approximately 6-7 days and 7-day results may be available.
- c) The Bayview personnel would be advised of what cars, by number, were acceptable for this job and only those cars would be unloaded into a silo reserved for this job. Medusa will make additional silos available as required.



Bechtel requested PTL to provide an acceptable inspection criteria at Wampum to verify this operation with spot check sampling to insure compliance with this criteria.

PTL agreed.

All was in agreement that Medusa was to coordinate core sampling with PTL. PTL would provide all necessary equipment. Bechtel would obtain the necessary information on the location of the samples to be taken.

The intent is to obtain these samples by January 18, 1972 and compare the results with cylinder strengths available from cylinders presently under normal curing conditions.

1/18/72

PTL obtained core samples for Medusa Cement Company in the areas indicated by Bechtel engineering on the enclosed drawing. The results of the core samples are indicated below.

These core samples were taken from concrete pours involved in the investigation.

CORE SAMPLES TAKEN ON 1/18/72 AND TESTED ON 1/21/72

No. 1	Top	2250	
No. 2	Top	2910	Bottom 4520
No. 3	Top	1910	
No. 4	Top	2750	
No. 5	Top	2680	
No. 6	Top	2360	
No. 7	Top	3540	Bottom 3550
No. 8	Top	2420	
No. 9	Top	2180	

Concrete represented 1 thru 6, placed on 1/4/72

Concrete represented 7 thru 9, placed on 1/7/72

1/20/72

Additional representative cylinders were tested at 22 days for pours 550, 551, 552, and 555; test results are attached as Item 5. These are containment building pours 10 and 11.

Received 3-day cube strength test results taken on 4 rail cars from Medusa Cement Company at Wampum, Pa. Results are indicated below:

<u>Car No.</u>	<u>3-Day Test</u>
255942	2360 psi
881000	2460 psi
982465	2330 psi
882168	2500 psi

All parties were agreed that the 3-day results indicated acceptable cement.

Additional Attachments

Item 6 represents cylinders which were steam cured for strength gain determination.

Item 7 represents cylinders under normal laboratory curing waiting additional testing.

Item 13 & 14 represents tabulated test results of each mix design indicated.

Conclusion:

The aforementioned events produced an acceptable end result allowing continued concrete placement. It is anticipated that the 28-day strengths will prove acceptable and no further action is deemed necessary at this time.

Swiss Hammer Readings For  
Concrete Pours 550, 551, 552 & 555

Pour #550 1/11/72 4270 PSI represented by Item 11

<p>Area 1</p> <p>16 20 18 20</p> <p>20 17 15 17</p> <p>19 19 19 18</p> <p>20 18 19 18</p>	<p>Area 2</p> <p>17 18 15 15</p> <p>17 18 17 15</p> <p>13 13 16 16</p> <p>15 18 19 15</p>
<p>Area 3</p> <p>20 16 18 18</p> <p>19 18 20 21</p> <p>17 12 18 16</p> <p>17 19 22 22</p>	<p>Area 4</p> <p>29 31 30 32</p> <p>32 36 30 30</p> <p>31 33 30 36</p> <p>36 30 35 35</p> <p>29 32 34</p>
<p>Area 5</p> <p>31 31 29 29</p> <p>26 29 28 32</p> <p>26 27 31 28</p> <p>28 26 26 25</p> <p>30 31 32</p>	<p>Area 6</p> <p>26 33 31 32</p> <p>55 34 36 24</p> <p>36 29 36 25</p> <p>30 29 28 34</p> <p>29 31 30 31</p>

Pour #551 1/11/72 4896 PSI represented by Item 8

<p>Area 1</p> <p>28 28 28 28</p> <p>30 26 28 25</p> <p>26 27 26 26</p> <p>28 26 28 28</p> <p>28 29 32 30</p> <p>28</p>	<p>Area 2</p> <p>27 28 27 29</p> <p>30 28 28 27</p> <p>27 29 33 27</p> <p>28 27 29 28</p>
<p>Area 3</p> <p>26 29 26 26</p> <p>30 28 28 30</p> <p>27 27 28 36</p> <p>27 26 28 28</p> <p>26 25 28</p>	

Pour #552 1/10/72 4850 PSI represented by Item 10

<p>Area 1</p> <p>20 25 25 24</p> <p>21 24 20 20</p> <p>20 21 22 20</p> <p>22 22 20 20</p>	<p>Area 2</p> <p>21 22 24 21</p> <p>20 23 22 25</p> <p>20 22 24 21</p> <p>20 20 20 23</p>
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Pour #555 1/10/72 6500 PSI

represented by Item 9

Area 1      39 42 21 39  
              37 42 39 26  
              41 39 36 36  
              39 40 50 46  
              38

Area 2      34 32 43 38  
              36 36 36 38  
              39 44 34 36  
              36 38 36 36  
              38 36

Area 3      31 32 33 43  
              32 40 34 30  
              38 35 34 35  
              36 32 36 34  
              48 42 33 29  
              30 33

Area 4      34 38 40 38  
              40 36 38 40  
              38 39 36 34  
              36 35 36 36  
              34 40 38 38  
              38

NOTE: Areas 1, 2 & 3 for Pour 550 and Areas 1 & 2 for Pour 552 were made with one Swiss Hammer. Readings for all other areas were taken with another Swiss Hammer. Thus, the difference in average readings.

Indicated strengths are shown by each pour number.

Pour #		Date of Pour
550	Condensate storage tank slab	12-28
551	Transfer tube slab and wall	12-29
552	Pour #10 under cont. vessel, 210 degrees-39 degrees	12-28
555	Pour #11 in cont. vessel, 0 degrees-90 degrees	12-29
556	North half MFWP foundation	1-3
557	Duct Banks between T/G pedestal and P.H.	1-3
557	Pour #11 Cont. Bldg. 254 degrees - 360 degrees	1-4
558	Condensate pump equip. pad	1-3
569	585 diesel gen. slab.	1-6
562	585 slab aux. bldg., Area 7, G line to 5 line	1-5
564	Col Cap, B-8	1-5
565	Grade beam between cols. B-3 and A-3	1-6
	Elect. M.H. 3101, foundation slab	1-5
569	585 diesel gen. slab	1-6
571	Pour #11, Cont. Bldg. 199 degrees to 254 degrees	1-7
572	Col. caps C-9, D-9, D-10; Grade beams E-9-D-9, D-9-C-9, C9-C10, C10-D10, D10-D9, D10-E10, A4-B4.	1-10
573	Elect. pit bottom slab	1-11
574	Duct bank into west wall of pumphouse	1-10
576	Grade beam A1-B1	1-11



PITTSBURGH TESTING LABORATORY  
ESTABLISHED 1881

INSPECTING ENGINEERS AND CHEMISTS

850 POPLAR STREET

PITTSBURGH, PA. 15220

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PLEASE REPLY TO:  
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CL-6800

January 21, 1972

The Toledo Edison Company and  
The Cleveland Electric Illuminating Company  
Post Office Box 929  
Toledo, Ohio 46301

Re: CL-8800  
Materials Testing  
Cement and Fly Ash Tests

Dear Sir:

Attached are following reports of Fly Ash Tests and Cements indicating the dates sampled.

Test of Cement-Laboratory No. 722353-Sampled 1/12/72  
Test of Cement-Laboratory No. 723224-Sampled 1/4/72

Test of Fly Ash-Laboratory No. 727354-Sampled 1/12/72  
Test of Fly Ash-Laboratory No. 723078-1-Sampled 12/27/71  
Test of Fly Ash-Laboratory No. 723078-2-Sampled 12/30/71

The cube strengths of the cement sampled on 1/4 and 1/12 were about 3000 P.S.I. at 7 days. This compares with about 3500 P.S.I. that was experienced previously. This is attributed primarily to the reduced  $C_3S$  content of the cement which resulted in a higher  $C_2S$ . This condition would cause ultimate strength to develop later at 28 days or 90 days. This would result in lower cylinder strengths in the field, and the strength development of the cylinders would also be retarded with the ultimate strength developed at 28 or probably 90 days.

- 1 -



The Toledo Edison Company and  
The Cleveland Electric Illuminating Company

January 21, 1972

- 2 -

Although there would be a reduction in strengths with the above cements, these would not be as appreciable as the cements that were sampled on 12/27 with the fly ash as shown in the fly ash reports 723078-1 and 2. The seven day cube strengths of the cement (Standard ASTM C-109 ASTM C-150 without Fly Ash) was 2230 P.S.I. at seven day. This is appreciably lower, and the concrete made from this cement would be significantly lower. This apparently is due to a sharp reduction in the  $C_3S$ . The ultimate strengths should be comparable however at later ages of 28 days and possibly 28 days.

It is recommended that the quality of cement be established as that used in the original mix designs or new designs made with the cement quality and then the cement quality maintained by normal testing rate specified in ASTM C-150 and the silo tested and sealed prior to use.

Very truly yours,

PITTSBURGH TESTING LABORATORY

*Joseph F. Artuso*  
Joseph F. Artuso,  
Assistant to the Vice President

JFA/mb

cc: Mr. J.D. Lenardson  
Mr. Neil Wadsworth  
Mr. F. Lohnes  
Mr. Don Eisenhart  
Bechtel Company  
PTL, Cleveland

Enclosures

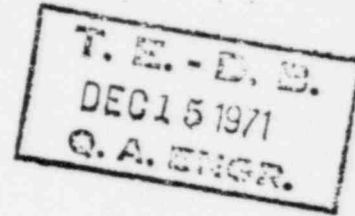
65 H  
REVIEWED & ACCEPTED  
AF 12-15-71

**ORIGINAL** THE DAVIS-BESSE PROJECT **DAVISON** COMPANY

OFFICE MEMORANDUM

**ORIGINAL**

December 14, 1971



TO: J. D. Lenardson  
FROM: G. W. Eichenauer  
SUBJECT: Observing and Auditing of Medusa Cement Company (Bay Bridge Storage Silos) Bay View, Ohio.

An inspection visit was made at Medusa Cement Company, Bay View, Ohio, on December 7, 1971, by the writer, and accompanied by George F. Bigham, District Manager, Pittsburgh Testing Laboratory.

Principal contact during the audit - Wm. Bluhm, Manager.

Items and areas covered were as follows:

1. Audited bill of lading from Wampum, Pennsylvania Plant, as to type of cement, quantity and against railroad car numbers being unloaded.
2. Observed unloading cars by blower system to various silos.
3. Checked master mill test reports for each lot delivered from Wampum, Pennsylvania, which has been tested in accordance with ASTM C-150 and certified for use on Davis-Besse Project.
4. Silos were tight and provide for free movement to discharge opening. Each silo is numbered according to type of cement stored. Type II Cement stored in #17 silo is reserved for the Davis-Besse Project.
5. Checked temperature records which revealed highest readings at 120°; average 75° to 80°.
6. Latest calibration of scales was October 31, 1971, by "Col' Industries".

COMMENT: The bill of lading appears to be indefinite in regard to from which silo or lot at Wampum Plant, cement is being delivered to the Bay Bridge storage silos. Where storage is provided for different types of cement or cementitious materials, it is essential the above be identified for traceability.

TO: J. D. Lenardson  
Page 2  
December 14, 1971

ORIGINAL

SUBJECT: Observing And Auditing of Medusa Cement Company (Bay Bridge  
Storage Silos) Bay View, Ohio. (CONTINUED)

Since Nicholson Concrete and Supply Company is responsible to their Quality Control Program covering receipt of material for the Davis-Besse Project, it is recommended a follow-up be made regarding this comment.

*George W. Eichenauer*

GEORGE W. EICHENAUER

GWE:jp

cc: N. L. Wadsworth  
A. S. Martin  
Nicholson Concrete & Supply Company

12-17-71

**ORIGINAL**

FOLLOW UP AUDIT MEDUSA

A telephone call, 12-17-71, to Howard Wahl, Project Engineer, from A.S. Martin (Bechtel), in regard to a Q.A. program by Medusa Cement Co. was not necessary as long as Nicholsons received the proper certifications. Mr. Wahl stated this was the same procedure being used on all their Nuclear Power Plants.

*George Eichenauer*  
George Eichenauer  
*OK - [Signature]*

GWE:bac

THE TOLEDO EDISON COMPANY

OFFICE MEMORANDUM ORIGINAL

February 17, 1972

TO: J.D. Lenardson
FROM: G.W. Eichenauer
SUBJECT: QA visit at Medusa Cement Company, Wampum, Pennsylvania.

An inspection visit was made at Medusa Cement Company, Wampum, Pennsylvania, on February 10 & 11, 1972 by the writer, accompanied by Mr. Mike Nicholson and Mr. Verl Smith of Nicholson Concrete and Supply Company Toledo, Ohio. The primary purpose of the QA visit was to determine the traceability of cement from Wampum's Manufacturing plant to the distribution silos at Bay View, Ohio to the Davis-Besse project; methods and frequency of sampling and adequacy of Medusa's Quality Control Program.

Principal contacts during the visit:

- Wm. Copenhefer Quality Control Medusa
R. Eberhardt Plant Manager Medusa
Charles Solbrig Chief Chemist Medusa
Geo. Bigham District Manager Pittsburg Testing Laboratories

The processing of cement was observed during a tour of the plant. Limestone and shale is obtained from nearby Company owned quarries and glacial gravel is purchased from a nearby pit for additional silica. Purchased sintered pyrites provides the required iron content. After crushing, the various raw materials are combined in the right proportions so that the cement made from them will be of the right composition and of uniform quality. Once mixed, the crushed raw materials undergo a process called fine grinding which mixes the various materials more thoroughly and reduces them further in size in preparation for the kiln. Coal fired kilns are used for clinker production. The clinkers are air quenched and transferred to a covered clinker storage area. When there is sufficient clinker available, the clinker is withdrawn from the bottom and transferred to a closed circuit finish mill, where it is interground with approximately 4% of New York State gypsum rock. Upon leaving the milling circuit the cement is pneumatically pumped to the silo banks.

Initial blending is controlled by mill chemists first analyzing the rock and other materials to determine their mineral content. Then, by means of mathematical formulas, they determine how much of each kind of material should be used to obtain the uniform final product. Formulas used at this stage help control the amounts of key chemical compounds, such as tricalcium silicate, dicalcium silicate and tricalcium aluminate, found in the finished cement.

ORIGINAL

TO: J.D. Lenardson  
Page 2  
February 17, 1972

SUBJECT: QA visit at Medusa Cement Company, Wampum, Pennsylvania.

The Quality Control of cement production is checked throughout the manufacturing process. Production samples are composited daily for analytical survey. Each three hours samples are collected from the cement receptacle of a periodic sampling device. Periodic Control tests for specification conformity of the cement are sulfur determination and fineness. Chemical and physical testing is performed daily on the cement composite to determine all other values related to ASTM specification. Fineness of the mix is monitored by temperature, pressure, and rate meter devices. Burning results are checked by periodic testing of clinker-free line content.

During the exit meeting, procedures to establish a program at Medusa, Wampum plant to insure acceptable cement delivered to Bay View silos for use at the Davis-Besse site was discussed.

It was agreed that all Type II cement transferred from Wampum silos to railroad cars for the Davis-Besse project will be documented and will indicate which silo from their bank and certification of the lot. This will provide identification for traceability on cement. (See comment on previous TECo Audit 12-7-71 at Bay View).

Each cement car loaded at the Wampum plant designated for the Davis-Besse project will be sampled and 7 day results on cube strength will be reviewed by Wampum personnel for acceptable strengths. The Bay View personnel will be advised of what cars, by number, were acceptable for the Davis-Besse project and only those cars will be unloaded into the Davis-Besse reserved silo at Bay View.

All records and test reports from Wampum plant will be forwarded to Nicholson Concrete & Supply Company each month for specification conformity of the cement.

COMMENTS: The layout chart of the silo storage bank regarding identification for different types of cement was not clearly marked. This was discussed with Medusa personnel, and a revised chart will be made for clarification.

Since Nicholson Concrete & Supply Company is responsible to their Quality Control Program covering receipt of material for the Davis-Besse Project, it is recommended that a follow-up by Nicholson be made regarding this comment.

It is also recommended that Nicholson Concrete Co. maintain close surveillance over Medusa Cement Company's QA program in order to comply to the 18 point criteria according to TECo contract 7749-4 Section 12.

*George W. Eichenauer*  
GEORGE W. EICHENAUER

GWE:bac

CC: GJS | G.B. Nicholson Concrete P/L  
NLW | W.C. Medusa Cement Co.  
ASM | LER

OK  
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REVIEWED & ACCEPTED  
*[Signature]*