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Subject: S.O.P. FLY ASH			Distribution A, B, C, D, E
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PURPOSE: To Establish Uniform Procedures For The Sampling, Testing, Reporting Of Tests And Evaluation Of Fly Ash For Use In Projects Administered By State Aid.

1. GENERAL:

Acceptance of fly ash for use in work under the supervision of State Aid will be based on source approval, certification by the fly ash supplier that the fly ash complies in all respects with the applicable specifications, and check samples obtained after delivery to the concrete plant or project site and submitted to and tested by the MDOT Central Laboratory or approved private laboratory.

It shall be the Contractor's responsibility to ascertain that the fly ash supplier from whom he purchases fly ash complies with the provisions of this S.O.P.

2. RESPONSIBILITIES OF FLY ASH SUPPLIERS:

2.1. Source Approval: Source approval is based upon fly ash produced by a specific plant utilizing specific equipment, materials, and processes. Any change in equipment, materials, and processes; shipment of non specification fly ash; or violation of any provision of this standard operating procedure will void any source approval and require that a new approval be obtained prior to further shipments. Each fly ash supplier proposing to furnish fly ash for highway work shall provide the following:

2.1.1. Formal request for source approval in writing to the MDOT Materials Engineer containing the following information.

2.1.1.1. Name and address of fly ash supplier.

2.1.1.2. Class of fly ash.

2.1.1.3. Name and location of ash source.

2.1.1.4. Name and location of coal source.

2.1.1.5. Number of boilers at plant and tons of fly ash produced per hour by each boiler.

2.1.1.6. Detailed quality control program. The quality control programs must meet the minimum requirements of Section 3 below.

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2.1.1.7. A statement certifying agreement with, and acceptance of, all provisions of this standard operating procedure; certifying that all information and data furnished with this request for source approval is accurate and any change in the information will be reported immediately; and further certifying that upon any change in equipment, materials, and/or processes used in the production of fly ash, shipment of fly ash to highway work will cease until reapproval of the source is obtained.

2.1.2. Submit test data verifying compliance with the specifications and compliance with the minimum quality control sampling and testing. This test data shall represent the material produced in the last one year period.

2.1.3. Submit a sample of fly ash along with the complete analysis of the tests required by the specifications to the MDOT Materials Engineer for verification testing. The sample must have been split and analyzed by the laboratory which is performing the quality control testing.

2.1.4. The fly ash source will be placed on the Mississippi Department Of Transportation's approved list of fly ash suppliers provided the data submitted with the request and test results verifies that a uniform quality product conforming to the specifications is being produced, and that the fly ash suppliers quality control program provides reasonable assurance that only fly ash meeting the requirements of the specifications will be shipped. There are two approved lists of fly ash sources for use in concrete mixtures: one for use only in "Nonsulfate Areas", and one for use in "Sulfate Areas". The requirements for being placed on either list are as follows:

2.1.4.1. Fly ash for use in "Sulfate Areas" shall result in an expansion of 0.10% or less in six months and 0.50% or less in one year when tested in accordance with ASTM Designation: C 1012. Test specimen shall be prepared using a Type I Portland cement having a C₃A content of 8.0% or less, or a Type II Portland cement. The proposed fly ash shall be incorporated at the rate of 25% cement replacement.

Fly ash sources conforming to these maximum expansion limits and to all other requirements of this S.O.P. will be placed on the approved list for use in "Sulfate Areas". Such sources are also approved for use in nonsulfate areas.

2.1.4.2. Fly ash sources conforming to all requirements of this S.O.P., except for the maximum expansion limits set out in Subsection 2.1.4.1 above shall be placed on the approved list for use in "Nonsulfate Areas".

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3. MINIMUM QUALITY CONTROL PROGRAM:

- 3.1. The fly ash supplier shall provide a quality control program meeting at least the minimum sampling and testing frequencies established in ASTM C 311. The tonnage units expressed in this standard are interpreted to refer to as-marketed material.
- 3.2. Each sample representing 400 tons, or the sample representing the quantity sampled when this is less than 400 tons shall be tested for the following:

Fineness (No. 325 sieve analysis)
Moisture Content
Specific Gravity
Loss on Ignition

All other physical and chemical tests required by the specifications shall be made on composite samples representing each 2000 tons, the composite sample for this purpose being prepared by combining equal parts of five consecutive samples, each representing 400 tons.

- 3.3. The sampling, tests, and testing frequencies required may increase from the minimum depending on the particular production problems of the plant. In all cases the quality control program shall be submitted to the MDOT Materials Engineer for approval. The quality control program submitted for approval must be detailed and include at least the following:
- 3.3.1. Name and location of company or firm performing the quality control sampling.
- 3.3.2. Name and location of company or firm performing the quality control testing.
- 3.3.3. Name and title of the individual directly responsible for the quality control program at the source.
- 3.3.4. Sampling points, sampling frequency, and tests to be performed.
- 3.3.5. Procedures and equipment for handling, storage and shipment of fly ash.
- 3.3.6. Number of storage silos and capacity of each.
- 3.3.7. Action to be taken when quality control testing indicates borderline and non specification fly ash has been produced.

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3.4. Each testing laboratory performing any portion or all of the required tests under this procedure must be approved before a fly ash source can be placed on the approved list. Such approval will be contingent upon the following:

3.4.1. Each testing laboratory must be regularly inspected by the Cement Concrete Reference Laboratory (CCRL). The testing laboratory shall authorize the Cement Concrete Reference Laboratory to send a copy of each inspection report directly to the State Materials Engineer of the Mississippi Department of Transportation. Frequency of these inspections shall be approximately once each 18 months according to CCRL scheduling.

3.4.1.1. Failure to participate in the CCRL inspection program on a regular basis will result in disapproval of the laboratory and removal of the fly ash source from the approved list.

3.4.1.2. Failure to authorize CCRL to send a copy of the inspection report to MDOT will result in disapproval. If a copy of the latest inspection report is not received by the MDOT within any 24-month period, the laboratory will be disapproved and the fly ash source removed from the approved list.

3.4.1.3. The laboratory will be expected to correct all deficiencies found during the CCRL inspection. Documentation by the laboratory certifying to the correction of each deficiency on the inspection report must be furnished the MDOT Materials Engineer. Failure to correct deficiencies found by the CCRL inspection will result in disapproval of the laboratory and removal of the fly ash source from the approved list.

3.4.2. Comparison tests will be performed at least once a year and more frequently if deemed necessary by the MDOT Materials Engineer. Continued approval of the laboratory will depend on the comparison of its test results with the Central Laboratory. If major differences are found, an attempt to resolve them will be made as quickly as possible. Continued unresolved differences in test results will result in disapproval of the laboratory and removal of the fly ash source from the approved list.

3.4.3. The fly ash supplier is totally responsible and will be accountable for the utilization of a qualified laboratory in the performance of the quality control program.

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- 3.5. All test reports shall be on letterhead paper identifying the laboratory performing the tests and shall contain the following information.
- 3.5.1. Date of Report
 - 3.5.2. Fly Ash Report
 - 3.5.3. Class of Fly Ash
 - 3.5.4. Silo Number
 - 3.5.5. Boiler Unit Number (If plant is equipped with more than one boiler)
 - 3.5.6. Sample Control Number
 - 3.5.7. Test Report Number
 - 3.5.8. Date Sampled
 - 3.5.9. Test Results
 - 3.5.10. Statement certifying that the fly ash represented by the test results meets the requirements of State Aid and the Mississippi Department Of Transportation specifications (NOTE: If the test results do not meet specifications, in lieu of the certified statement, documentation of the disposition of the fly ash represented by the test report shall be submitted with the test report).
 - 3.5.11. Signature and title of responsible official
- 3.6. Sample test records shall be available for inspection by MDOT personnel for at least three years after the fly ash has been tested.

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4. CERTIFICATION AND REPORTING BY THE FLY ASH SUPPLIER:

4.1. Distribution of Test Reports.

4.1.1. After source approval a copy of all test reports shall be submitted to the MDOT Central Laboratory.

4.1.2. When fly ash is delivered to a commercial ready mix concrete plant which produces concrete for State Aid work, a copy of the test reports covering the material shipped shall be furnished to the ready mix plant.

4.2. Certification of Shipments. For each shipment of fly ash, a certificate shall be furnished with the following data:

Fly Ash Source	Date Shipped
Class of Fly Ash	Project, or Work Order, Number
Silo Number	Name of Purchaser
Number of Tons Shipped	Destination

The certificate shall also contain the following or similar wording:

"The undersigned certifies that the fly ash in this shipment was loaded from the pretested silo indicated above and that it complies with MDOT specifications for (Class Designation). The fly ash was tested under laboratory numbers _____, and no fly ash not covered by a certified test report has been added to the silo".

Distribution of the certificate shall be made as follows:

4.2.1. When fly ash is delivered directly to a project site, the certificate shall accompany each transport and shall be delivered to the appropriate State Aid representative, except that the copies for the MDOT Materials Engineer and the MDOT District Materials Engineer shall be mailed.

4.2.2. When fly ash is delivered directly to a commercial ready mix concrete plant which produces concrete for MDOT and State Aid work the certificate (except the project number or work order number) is to be furnished the ready mix concrete plant with each transport and copy sent to the MDOT Materials Engineer.

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A copy of the certificate shall be furnished by the ready mix concrete plant to the County/LSBP Engineer or his personnel supervising projects or work orders being furnished concrete.

5. RESPONSIBILITIES OF COUNTY ENGINEER SUPERVISORY PERSONNEL:

- 5.1. Fly ash delivered to the project site may be used provided a certification has been received with each shipment. Concrete produced by an approved commercial ready mix concrete plant may be accepted, insofar as the fly ash is concerned, provided the concrete plant has furnished the required data as outlined in Section 4 above.

In case a shipment is received without the proper certificate, the fly ash shall not be used until the required certificate has been furnished or until tests indicating compliance have been completed on samples submitted from the shipment.

- 5.2. Fly ash delivered for use in State Aid work will be sampled by a representative of the County/LSBP Engineer at the approximate frequencies outlined below. The frequencies shown apply to each source of fly ash and are minimum; additional samples will be obtained if there is a question concerning the quality of the fly ash.

Each sample will consist of approximately eight (8) pounds (approximately one gallon) and will be obtained in such a manner, and at such points, that the sample will: (1) be representative, (2) not be contaminated, and (3) represent only one source and class of fly ash.

The samples will be placed in triple-seal metal cans or other moisture proof containers that will insure the samples against contamination. The samples will be delivered, or will be mailed or shipped, prepaid to the MDOT Central Laboratory as soon as possible.

- 5.2.1. Fly ash used by approved commercial ready mix plants in production of concrete for State Aid work will be sampled at the rate of one (1) sample for each 100 tons, or fraction thereof, used. Insofar as possible, at least one sample shall be obtained for each project except that a sample will not be required if the project contains less than 30 c.y. of concrete.

- 5.2.2. When fly ash is delivered to a project site, or to a central concrete plant set up for a specific project, to be used in concrete paving, structural concrete, or soil stabilization, sampling shall be at the rate of one (1) sample for each 200 tons for concrete paving and structural concrete and 4000 tons for soil stabilization, or fraction thereof, received. On concrete paving and structural concrete projects containing less than 100 tons or soil stabilization projects containing less than 2000 tons of fly ash, a sample will not be required.

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6. RESPONSIBILITY OF MDOT CENTRAL LABORATORY:

- 6.1. Except for the initial sample required under Subsection 5.2.2 above, the MDOT Central Laboratory may composite as many as four consecutive samples from each project, forming test samples to be tested by the MDOT Central Laboratory. In no case will samples from more than one project, different sources, or different class fly ash be composited. The individual samples from which the composite test sample is obtained will be retained until satisfactory test results on the test samples are obtained.

If a composite test sample fails to comply with specifications requirements, each individual sample represented by the composite test sample will be tested for the failing requirement(s). Upon receipt of test results on individual samples, the MDOT Materials Engineer will evaluate the test to determine action to be taken under Section 7 below.

MDOT Central Laboratory tests results will be distributed to all concerned parties.

- 6.2. The MDOT Central Laboratory will maintain the list of approved fly ash suppliers, and monitor the suppliers quality control program.

7. NON-COMPLYING FLY ASH SAMPLES:

When a sample of fly ash fails to comply with the specification requirements, the MDOT Materials Engineer will evaluate the failure and the probable effect of the failing requirement on the quality of the product produced with the fly ash. If the MDOT Materials Engineer deems the failure of sufficient seriousness to warrant such action, he may at his discretion order that the fly ash thus represented not be used in highway work and require the fly ash supplier to suspend all shipments for highway work until such time as the cause(s) of the failure have been corrected to his satisfaction. The shipment of non-specification fly ash will be cause for removal of the source from the approved list of suppliers.

In order to eliminate any possible delay in production because of non-conforming fly ash, it shall be the Contractor's responsibility to provide ample moisture-proof storage and shipments of fly ash to permit identification, sampling and testing, and appropriate actions as indicated above for failing samples.