OPERATION AND MAINTENANCE MANUAL

Asphalt Concrete Drum Mix Plant No. 3

MITCHELL BROTHERS, INC.
1330 Capital Circle NE
Tallahassee, Leon County, Florida

Facility ID. 0730034

Plan Date: February 2009
Revised: February 2014

319-14-01

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES
4014 NW 13th STREET
GAINESVILLE, FL 32609-1923
352/377-5822 ▪ FAX/377-7158

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1.0 INTRODUCTION

Mitchell Brothers, Inc. owns and operates a drum mix asphalt plant, which currently holds a Florida Department of Environmental Protection (DEP) Permit under Facility ID. 0730034. The plant is located at 1330 Capital Circle Northeast, Tallahassee, Leon County, Florida.

This Operation and Maintenance Plan (O&M) has been prepared to assist the company's personnel in recognizing malfunctions at the plant and taking corrective action. The plan also provides for routine repairs and maintenance.

2.0 PRINCIPLES OF OPERATION

2.1 DRUM MIX ASPHALT PLANT*

Asphaltic concrete (asphaltic hot mix) is a paving material which consists of a combination of graded aggregate that is dried, heated, and evenly coated with hot asphalt cement.

Asphalt hot mix is produced by mixing hot, dry aggregate with hot liquid asphalt cement, in batch or continuous processes. Since different applications require different aggregate size distributions, the aggregate is segregated by size and is proportioned into the mix as required. The dryer drum process is a method of hot mix asphalt production in which wet aggregate is dried and mixed with hot liquid asphalt cement simultaneously in a dryer. This method is the most popular method of asphalt production, and the new plants are primarily modular and portable.

The drying drum process simplifies the conventional process by using proportioning feed controls in place of hot aggregate storage bins, vibrating screens, and the mixer.

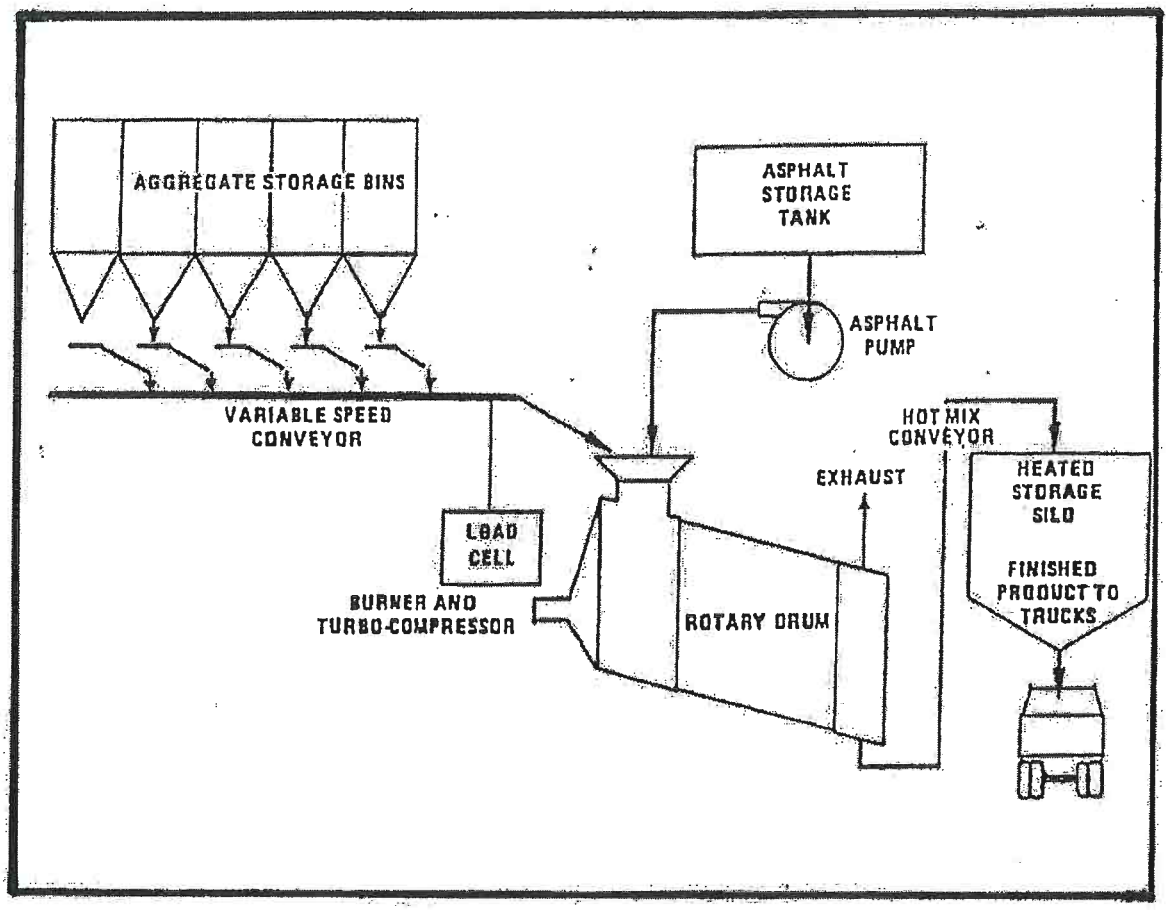
Figure 1 is a diagram of the dryer drum process. Both aggregate and asphalt are introduced near the flame end of the revolving drum. A variable flow asphalt pump is linked electronically to the aggregate belt scales to control mix specifications.

Dryer drum plants generally use parallel flow design for hot burner gases and aggregate flow. Parallel flow has the advantage of giving the mixture a longer time to coat and to collect dust in the mix, thereby reducing particulate emissions to the atmosphere. The amount of particulates generated within the dryer in this process is lower than that generated within conventional dryers; but because asphalt is heated to high temperatures for a long period of time, organic emissions are greater.

The mix is discharged from the revolving dryer drum into surge bins or storage silos.

*Extracted from AP-42

Figure 1 Shearer Type Dryer-Drum Hot Asphalt Plant



Air pollution emission points for drum dryer hot mix asphalt plants numbered below refer to Figure 1.

Emissions from the various sources in an asphaltic concrete plant are vented either through the dryer vent or the scavenger vent. The dryer exhaust stream goes to the primary collector, then to the stack for release to the atmosphere. In the dryer drum process, the screens, weigh hopper, and mixer are not in a separate tower. Dryer emissions contain mineral fines and fuel combustion products.

Potential fugitive particulate emission sources from asphaltic concrete plants include unloading of aggregate to storage bins, conveying aggregate by elevators and aggregate screening operations. Open trucks can also be a source of fugitive VOC emissions, as can the asphalt storage tanks, which may also emit small amounts of polycyclics.

Air pollution emissions from the drum dryer hot mix asphalt plant derive entirely from the rotating drum. These emissions contain mineral fines and fuel combustion products. Prior to discharge to the atmosphere, the flue gases containing this material are usually treated by some air pollution control device.

2.2 VARIABLE THROAT VENTURI SCRUBBER

The venturi scrubber is one of a variety of pollution control devices sometimes classified as wet collection devices. Wet collection devices use a variety of methods to wet the contaminant particles in order to remove them from the gas stream. There is also a wide range in their cost, their collection efficiency, and the amount of power they expend.

Wet collectors have the following advantages: They have a constant pressure drop (at constant volume); they present no secondary dust problem in disposing of the collected dust; and they can handle high-temperature or moisture-laden gases. They can also handle corrosive gases or aerosols, but corrosion-resistant construction may add materially to their cost. Space requirements are reasonably small. Disposal of the wastewater or its clarification for reuse may, however, be difficult or expensive.

Their collection efficiency varies widely with different designs. Most collectors decline rapidly in efficiency for particles between 1 and 10 microns. Many investigators believe that collection efficiency is directly related to the total power expended in forcing the gases through the collector and in generating the water spray.

In the venturi scrubber, the gases are passed through a venturi tube to which low-pressure water is added at the throat. Gas velocities at the throat are from 15,000 to 20,000 fpm, and pressure drops are from 10 to 30 inches water gage. Recirculation of water is feasible. The predominating cleaning mechanism is believed to be impaction. In spite of the relatively short contact time, the extreme turbulence in the venturi promotes very intimate contact. The wetted particles and droplets are collected in a cyclone spray separator. Water rates are about 3 gpm per 1,000 cfm gas. Very high collection efficiencies have been reported for very fine dusts. Provision for variation of the scrubber throat dimension provides the operator a change to achieve a close to optimum compromise between operating costs and degree of gas cleaning required.

2.3 MITCHELL BROTHERS, INC. - SUMMARY OF OPERATIONS

This facility consists of an ACECO asphalt concrete drum mix plant with a capacity of 275 tons per hour and associated equipment and operations. Particulate emissions are controlled by a venturi wet scrubber manufactured by ACECO. Aggregate stored in bins is weighed and conveyed to a rotary drum and mixed with liquid asphalt pumped from an electrically heated storage tank. Recycled asphalt concrete is introduced into the drum mixer at a ratio of not more than 40 percent of the total mix produced. The mixture is heated by a dual-fuel burner in the rotary drum and thence conveyed to a heated storage silo and to trucks for delivery to customers.

3.0 MAINTENANCE SCHEDULE AND TROUBLESHOOTING GUIDE

The proper operation of the asphalt plant as well as its associated air pollution control devices is dependent on regular and detailed maintenance. The following schedule of maintenance is to be complied with.

PREVENTIVE MAINTENANCE SCHEDULE		
	DATE	INITIAL
DRUM MIXER - DAILY		
1. Check the inlet and discharge gates.		
2. Check the burner linkage		
3. Visually check the stack plume.		
WET SCRUBBER - WEEKLY		
1. Inspect and clean spray nozzles and check for clogs and for proper alignment.		
2. Wash down the inside of the scrubber and remove debris.		
3. Inspect nozzles in upper ducts.		
WATER PUMP - DAILY		
1. Check strainer at inlet to pump foot valve.		
FAN - DAILY		
1. Inspect interior of fan and fan wheel.		
2. Inspect fan housing drain plug.		
SETTLING POND - MONTHLY		
1. Clean out settling pond and add fresh make-up water.		
2. Check pH pond water		

4.0 SCHEDULED INSPECTIONS

As a supplement to the maintenance schedule described in Section 3.0, Mitchell Brothers is instituting a weekly inspection and written report which will be kept on file for DEP inspection.

This inspection report is reproduced in Figure 2 of this manual.

The plant operating variables, which are most indicative of pollution control efficiency, are the venturi pressure drop and spray water pressure. These two should always have nominal values as follows:

Throat Pressure Drop	-	5 to 8 inches water
Water Pressure	-	25 to 35 psi

Figure 2 Drum Mix Asphalt Plant – Weekly Inspection Report

Date of Inspection_____ Visual Appearance of Stack_____

Visual Appearance of Duct Work and Blower (leaks, etc...) _____

_____

Visual Appearance of Drainage System and Settling Ponds_____

Venturi Pressure Differential_____ inches H2O (5-8)

Water Pump Pressure_____ psi (25-35)

Venturi Damper Position (open)

Expected values in parentheses

Exhaust Gas Temperature _____ F; Material Exit Temperature _____ F

Motor Loads: Percentage of full load amperage.

a) Drag Conveyor _____%

b) Drum Mix _____%

c) Burner Blower _____%

d) Exhaust Fan _____%

e) Water Pump _____%

Corrective Action(s) Taken: _____

_____

_____

_____

_____

_____

_____

_____

Signature of Inspector

APPENDIX 'A'

TABLE OF CONTENTS

1.0 INTRODUCTION

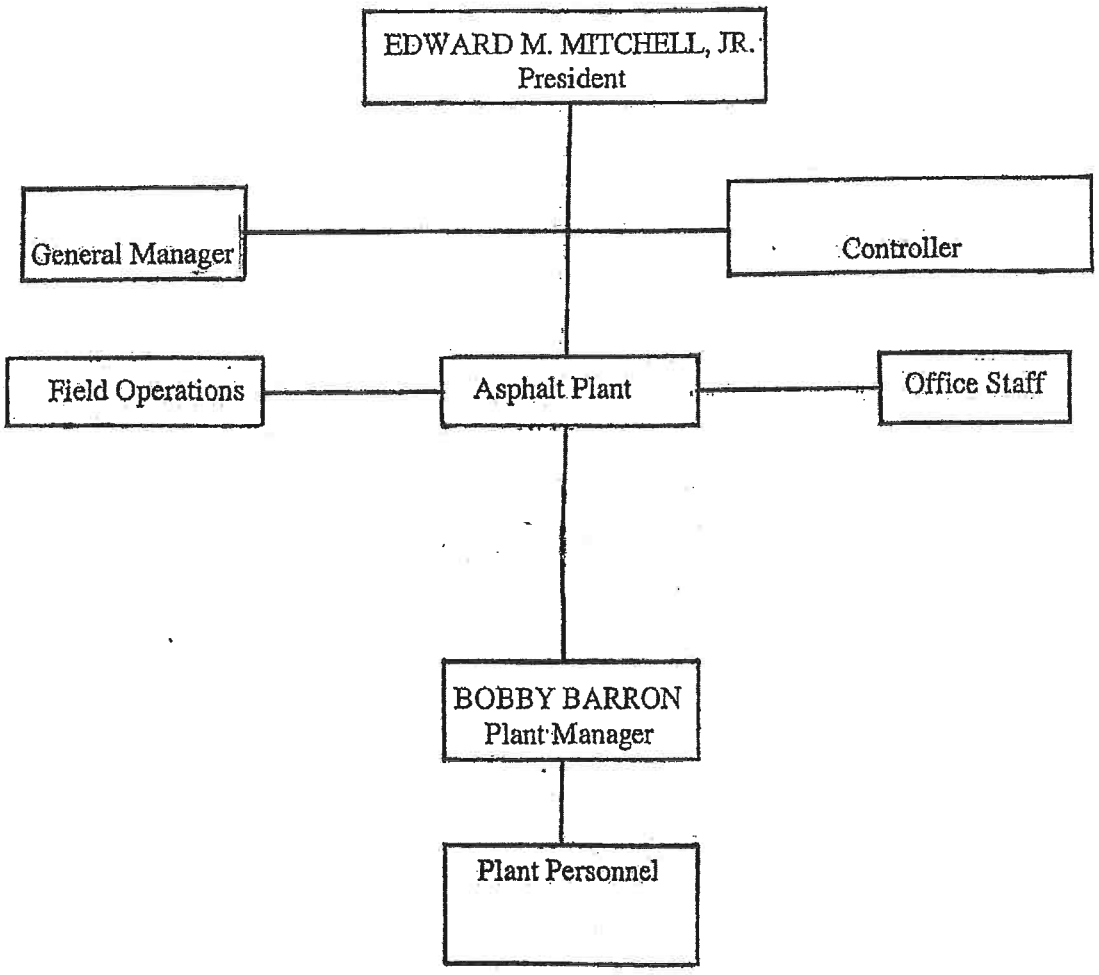
It is the purpose of this Organizational and Communications Plan to describe in specific detail the methods and procedures for ongoing communications between Mitchell Brothers, Inc.; specifically, the personnel involved with the operation and maintenance of the Drum Mix Asphalt Plant and representative(s) of the State of Florida, Department of Environmental Protection. Further, it shall be the purpose of this plan to provide the Department of Environmental Protection with specific information regarding the internal structure of Mitchell Brothers, Inc., facilitating ease of communication when it is necessary for Department personnel to contact the individuals responsible for the day-to-day operations of the plant.

The plan shall provide specific guidelines for communications during times of normal operation and for times when there are emissions above what are considered to be "normal" and "acceptable" levels. This plan shall address both normal (regular business) hours of operation and operation during times when the normal channels of communication with the Department would not be available.

It is the ultimate purpose of this plan to provide for operation of the plant in full compliance with the applicable rules and permit conditions. In the event of malfunctions, this plan is to provide channels of communication to the Department and corrective actions to be taken.

2.0 INTERNAL STRUCTURE

Mitchell Brothers, Inc. is a privately held corporation and is a licensed General Contractor. Organized in 1972, it is primarily engaged in heavy road construction and asphalt paving operations. Mitchell Brothers, Inc. has for many years been the permitted operator of a Batch-type asphalt plant. As with any company with multiple and diverse job tasks, there are also divisions of responsibility and authority. This is a discussion of that division as it occurs at Mitchell Brothers, Inc.



As illustrated by the preceding chart, plant personnel and/or the Plant Manager report to Edward M. Mitchell, Jr., President.

The office staff would be involved in the communications Plan in that they are responsible for placing and receiving telephone calls and handling other communications. They would not
originate such communication.

One of the following authorized personnel will be on site during operation of this drum mix plant:

a. Edward Mitchell, Jr., President
b. John O'Reilly, Controller
c. Bobby Barron, Plant Manager

3.0 POLICY DECLARATION

3.1 POLICY DECLARATION FOR OPERATION AND MAINTENANCE

Mitchell Brothers, Inc. hereby declares a policy that the operation and maintenance plan accompanying this organization and communication plan will be followed and the required record-keeping program maintained. The operation and maintenance plan calls for a weekly inspection and operation report as well as outlining preventative maintenance procedures. The weekly operation and maintenance report will be maintained on file at the plant site. It is not intended that preventive maintenance documentation be maintained.

In making routine inspections, whether weekly or during daily operations, the following events are declared to be typical of conditions which would require shutdown and corrective action on the earliest possible schedule.

1. Water pressure outside of the bounds of 25 to 35* psi which should be taken as evidence of:
    a. Spray nozzle malfunction.
    b. Pump malfunction.
    c. Pump suction malfunction.
    d. Low line stoppage.
    e. Major leak.
2. Any partial blockage of water drain lines.
3. Pressure drop across venturi scrubber outside of the bounds of 5-8 inches* water which should be taken as evidence of:
    a. Partial blockage of air flow ducts or scrubber.
    b. Sign of increased or decreased water flow.
    c. Blower deterioration.

*Please amend this due to our previous existing CMI Plant was pumping a psi pressure at 100 psi, due to our recent upgrades our water pressure has been dropped and established

at target of 30 psi +/- 5 psi. Our current measured pressure dropped across the venturi scrubber has been reduced from 10-12 inches to 5-8 inches. The above pressures are due to modifications from existing CMI Plant to our present operating procedures. Under these new procedures, all stack tests have been below the required EPA limits. All required records, as specified in our QCM Plan, are available for review at the plant site as well as copies will be forwarded to our main office located at 1300 Aenon Church Road, Tallahassee, Florida.

3.2 POLICY DECLARATION FOR COMMUNICATION

Mitchell Brothers, Inc. hereby establishes a company policy that communication with the Department of Environmental Protection will be carried out in accordance with Florida Administrative Code Rule 62-210.700. A copy of this rule is appended hereto.

The State of Florida Chapter 62-210.700 dealing with excess emissions states that these types of emissions are allowed when they result from start-up, shut-down, or malfunction of the sources provided; 1) best operational practice to minimize emissions is adhered to, and; 2) the duration of excess emissions is minimized but in no case exceeds 2 hours in any 24-hour period. The regulation further stipulates that the Department may in special cases authorize excess emissions over and above the 2 hours in any 24-hour period.

The regulation further stipulates by referenced to Chapter 62-4.130 that excess emissions be reported to the Department or appropriate local program in writing.

Mitchell Brothers, Inc. is hereby establishing its policy that excess emissions which occur for a period in excess of 1 hour during any 24-hour period will be immediately reported to the Tallahassee office of the Florida Department of Environmental Protection followed by a written notification of that event including an explanation as to the cause of excess emission and what steps were taken to correct the problem and what steps are being taken to prevent its recurrence.

It should be understood that this plant cannot operate without the air flow generated through the scrubber or air pollution control system. A failure to maintain air flow for any reason, including failure of the blower or blower motor, would require immediate

cessation of operation for reasons in addition to excess pollution emissions. Additional situations potentially indicative of excess emissions which shall constitute reason to cease operation are:

A. Any visible emissions detected. While the staff of Mitchell are not certified VE observers, it is felt that they can adequately make this evaluation.

B. Failure of spray water delivery system (water pressure less than 20 psi or drainage failure).

C. Pressure drop across the scrubber of less than 5 inches of water.

In those situations where Department notification is required, said notice shall be by telephone to the Tallahassee subdistrict office as soon as plant and personnel safety conditions allow. If this event occurs during hours when no contact can be made with the Department, the call will then be made on the next Department working day. Written notice of each event will be furnished to this office as specified earlier.

4.0 RESPONSIBILITY FOR OBSERVATION AND COMMUNICATION

1. Responsible persons shall be those indicated on the company organization chart previously shown. At all times that the Drum Mix Plant is operating, one of those group will be on site to deal with contacts coming from the Department.

2. All personnel are responsible for observation of the operational efficiency of the plant and specifically the pollution control equipment.

   a. Operational personnel shall report any observation of problem(s) to his on-site supervisor.

   b. The above referenced responsible persons shall be charged with initiation of communication to the Department in accordance with the guidelines set forth in this plan.

3. Responsible persons shall ensure that the air permit renewal application is submitted to the Department in a timely manner, at least 60 days prior to the expiration date of the permit.

5.0 TRAINING ACTIVITIES

The persons involved in the operation and maintenance of the drum mix asphalt plant at Mitchell Brothers, Inc. have, for the most part, received on-the-job training in the operation of this equipment. Two of the persons mentioned below, Mister Mitchell and Mister Barron, have received extensive training (6 days) from the manufacturer's representative, Mr. Tom McFadden. Any new employees receive on-the-job training from one or more of these persons. If deemed necessary, a factory representative will be called for further operational training.

A. Mr. Edward M. Mitchell, Jr. is a college graduate, having been in the asphalt contracting business for over 35 years. Mr. Mitchell has attended seminars given in this industry dealing with pollution control and other subjects. He is a certified general contractor in the state of Florida. During May of 1984, Mr. Mitchell participated in on-the-job training provided by Mr. Tom McFadden of CMI Industries using CMI equipment installed at Mitchell Brothers.

B. Mr. Bobby Barron is a high school graduate and has received all of his training on the job, part of which was the specific training given by Mr. Tom McFadden of CMI Industries. This training consisted of at least 6 days of interaction between Mr. McFadden and Mr. Barron. Mr. Barron has been in the asphalt manufacturing business for approximately 20 years

6.0 DIAGNOSIS OF SEVERITY OF AN OCCURRENCE

Mitchell Brothers, Inc. does not employ persons who could be classified as "expert" in the field of air pollution or emission standards. Nevertheless, through years of association with this type of operation, Mitchell Brothers, Inc.'s personnel have a good working knowledge of visible emissions and emission standards. Mitchell Brothers, Inc.'s personnel will exercise all diligence in observations and objectively report their findings.

APPENDIX 'B'

WET SCRUBBER

CHECK: Remove both doors on the washer body as well as the door to the venturi spray bar, if your unit has one. Some units were designed with an easy pull out spray bar.

The spray nozzle should be inspected and cleared of any pebbles, sticks, or grass which may have become embedded in them. If worn, they should be replaced.

REASON: Clogged nozzles reduce the water flow rate as well as the spray pattern, and has a drastic affect on the scrubbing efficiency.

CHECK: Wash down the inside of the scrubber from the venturi inlet, including the duct to the fan inlet.

REASON: You do not want the unit to plug or have chunks of rust scale or dirt particles breaking loose, possibly going up the stack.

CHECK: Replace the venturi spray bar and check the water pressure. You want to set this at approximately 30 psi.

REASON: The majority of the scrubbing action takes place in the venturi; therefore, we want adequate water pressure and volume flow available.

CHECK: Inspect the nozzles in the upper ducting and clean, if necessary. Set the water pressure on the upper spray bars to approximately 30 psi.

REASON: These nozzles precondition the gas stream temperature, creating a more uniform gas density, as well as doing some of the initial scrubbing.

CHECK: Using a stem-type thermometer, check the temperature of the air entering the fan when the plant is producing asphalt. It is desirable to maintain a temperature between 135 F to 160 F.

REASON: Temperatures above 160 F will not do as good of a job of scrubbing out particulates.

If you cannot maintain this temperature range, then you may have to increase the flow of water into the system. This is accomplished in two ways; either by changing to larger nozzles in the spray bars, or by installing a larger water pump. Under normal conditions the pump supplied by CMI should be more than adequate.

DRUM MIXER

CHECK: It is important that you check out the position of your asphalt injection pipe.

REASON: To insure that you are getting a good coating action on the aggregate and not causing a blue smoke condition because the pipe is too far forward in the drum.

CHECK: Make sure the injection pipe is not too far towards the rear of the drum.

REASON: Allows potential of uncoated aggregates to discharge with your mix, up your drag slat conveyor and contaminate the mix stored in the silo. This could create an additional problem by allowing small uncoated particles to pass into the dust collector causing it to have to work harder to remove particulates from the air stream. If you can not eliminate this, then you will probably have to supply additional water if a scrubber system is being used.

CHECK: Make sure that the inlet and discharge flap gates are in position and working properly.

REASON: An improperly positioned flap gate can create an air short circuit with the combustion air flow causing a puffing action at the burner end of the drum. This condition cannot be allowed during a stack test. Also, this condition can cause a reduction in the plant production rate.

CHECK: Examine the burner linkage assuring that the set screws are locked in tight.

REASON: Slippage is either the fuel valve or any linkage can create burner combustion problems.

CHECK: Visually check the stack plume to see if it appears good and white, or has a slight gray to black appearance.

REASON: If darker, then it is possible a final adjustment in the linkage may be necessary, or even a slight change in the fuel pressure.

WATER PUMP

CHECK: It is extremely important that the water pump and settling ponds are located as close as possible to the drum mixer.

REASON: This will help eliminate any large friction flow losses or large pressure heads the pump might otherwise have to attempt to overcome. This can have a great affect on pump capacity, which in turn can cause a loss in scrubbing efficiency.

CHECK: Care should be taken when sizing and installing the suction and pressure lines to the water pump. Check for possible air leaks on the suction side of the pump.

REASON: Pump cavitation can result from an air leak on the suction side as can to a small line.

CHECK: Special care is necessary when selecting a foot valve for the suction line. A foot valve with an opening area equal to the line open area should be installed.

REASON: A restriction here will cause a reduction in pump output capacity and could lower final nozzle pressures at the washer.

CHECK: A basket strainer of some style should cover the foot valve. Be sure the holes in the basket do not restrict the flow.

REASON: The strainer will help prevent stones, grass, paper, sticks, and other items from getting into the suction line.

CHECK: Position of the foot valve in the pond is very important. Experience has shown that probably the best method is to float the foot valve over a barrel with the valve extending below the surface approximately 18 inches.

REASON: This eliminates the possibility of sucking up anything lying on the bottom and either plugging the spray nozzles, creating pump cavitation, or breaking the pump impeller. It also allows the floating valve to seek the level of the pond as the depth changes slightly.

FAN

CHECK: Pull the fan breaker switch, then remove the access door from the fan scroll and inspect the interior for any dust build-up in the housing and on the wheel.

REASON: Again, you do not want rust or dust particles breaking loose. A dust build-up on the wheel can cause balance problems with the wheel, maybe damaging the fan shaft bearings.

CHECK: The fan housing should have a drain plug opening in the bottom. If the plug has not already been removed, then remove it and do not replace it. If your fan does not have a drain, then you will have to provide one.

REASON: Water carry-over from the washer may collect in the bottom of the fan and needs to be able to drain out. Wash out the fan interior until the draining water is fairly clear.

The condition of the fan interior and wheel should be checked periodically for wear and possible corrosion.

STACK

CHECK: The internal surfaces of the stack should be washed down with a nozzled water hose to remove any rust or dirt which has developed due to normal operations.

REASON: Rust and dirt deposits will eventually deteriorate flow conditions and contribute to pollution emissions.

SETTLING PONDS

The size, arrangement, depth, and condition of the settling ponds at the plant site are of great importance. Even though all of your equipment may be functioning properly, many asphalt plants have failed to meet the Federal EPA requirements because of the condition of the water from their settling ponds.

CHECK: Depth of the ponds, size, and arrangement increases the retention time.

REASON: Retention time directly affects how well the collected particulates settle out before recycling the water. Shallow ponds allow the recycled water to recirculate too quickly and the rise of the pond temperature affects how well you can or cannot control the stack temperature.

CHECK: The ponds will require cleaning out if, because of the depth, they can settle the suspended solids out or the ponds cloud up too rapidly.

REASON: Although the scrubber is efficient, it is virtually impossible to clean the air with dirty water.

Dirty water causes unnecessary abrasion which creates wear and tear on the scrubber and the water pump.

CHECK: The contractor should periodically check the pond "pH" to insure the water stays "neutral".

REASON: Ponds which are lower than a "pH" of 7 are leaning towards acidity. This condition can cause severe corrosion damage to the exhaust and scrubbing system on the plant.

CHECK: We suggest the use of "pH" tape for determining whether the pond is acid or base.

REASON: Swimming pool test kits can be unreliable because of the products of combustion and other elements collected in the water may cause problems obtaining an accurate "pH" indication.