

## Example Baghouse Agency Operation & Maintenance Plan

The key element of the material outlined below is the facility's willingness to use no visible emissions as an action level for taking corrective measures. If this had not been the case, further monitoring techniques would have been requested. Examples of monitoring techniques which are used to evaluate baghouse performance may be found in the "Baghouse Periodic Monitoring Literature Review" following this O&M plan. The literature review is a compilation of guidance from APTI training courses and other sources on ways to monitor baghouse performance.

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The following baghouse parameters should be considered by the permit reviewer when determining what is monitored and the frequency.

### Baghouse Parameters

Baghouse type:  Pulse Jet  Reverse Air  Shaker

Material handled:

Moisture problems possible:  Yes  No

Material corrosive:  Yes  No

If yes, are acid resistant bags in use:  Yes  No

Operating temperature (°F):

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### Monitoring Guidelines

The facility makes a commitment to take timely corrective action during periods of excursion where the indicators are out of range. A corrective action may include an investigation of the reason for the excursion, evaluation of the situation and necessary follow-up action to return operation within the indicator range. An excursion is determined by the averaged discrete data point over a period of time. An excursion does not necessarily indicate a violation of an applicable requirement. If the corrective action measures fail to return the indicators to the appropriate range, the facility will report the exceedance to the department and conduct source testing within 90 days of the exceedance to demonstrate compliance with applicable requirements. If the test demonstrates compliance with emission limits then new indicator ranges must be set for monitoring and the new ranges must be incorporated in the operating permit. If the test demonstrates noncompliance with emission limits, then the facility, within 60 days, proposes a schedule to implement corrective action to bring the source into compliance and demonstrate compliance.

### General

Periodic Monitoring is not required during periods of time greater than one day in which the source does not operate.

### **Weekly**

- Visible emissions shall be observed on a weekly basis to ensure no visible emissions during the material handling operation of the unit. If visible emissions are observed this would be an exceedance not a violation and action will be taken as soon as possible, but no later than 8 hours. If weather conditions prevent the observer from conducting an opacity observation, the observer shall note such conditions on the data observation sheet. At least three attempts shall be made to retake opacity readings at approximately 2 hour intervals throughout the day. If unsuccessful that day due to weather, an observation shall be made the following day.
- Check and document the baghouse pressure drop. If the pressure drop falls out of the normal operating range, specified by the manufacturer, corrective action will be taken within 8 hours to return the pressure drop to normal.

Maintain a written record of the observation and any action resulting from the inspection.

### **Monthly**

- Check the cleaning sequence of the baghouse.
  - Pulse jet baghouse - check the air delivery system
- Check the hopper functions and performance.

If leaks or abnormal conditions are detected the appropriate measures for remediation will be implemented within eight (8) hours. Maintain a written record of the inspection and any action resulting from the inspection.

### **Quarterly**

- Thoroughly inspect bags for leaks and wear. (Look for obvious holes or tears in the bags.)

If leaks or abnormal conditions are detected the appropriate measures for remediation will be implemented within eight (8) hours. Bag replacement should be documented by identifying the date, time and location of the bag in relationship to the other bags. The location should be identified on an overhead drawing of the bag layout in the baghouse. Maintain a written record of the inspection and any action resulting from the inspection.

### **Semiannual**

- Inspect every 6 months all components that are not subject to wear or plugging, including structural components, housing, ducts and hoods.

If leaks or abnormal conditions are detected the appropriate measures for remediation will be implemented within eight (8) hours. Maintain a written record of the inspection and any action resulting from the inspection.

### **Record Keeping and Reporting**

Maintenance and inspection records will be kept for five years and available upon request.

### **Quality Control**

- The filter equipment will be operated and maintained according to the manufacturers recommendations.
- An adequate inventory of spare parts shall be kept.

Authority for Requirement: 567 IAC 22.108(3)"b"

## Baghouse Periodic Monitoring Literature Review

### **Typical baghouse monitoring and indicating devices.** APTI - SI:412A

Pilot Lights	To show motors operating, compartments on- or off-line, row of bags being pulsed
Opacity monitor	To measure continuous opacity of stack
Manometer or magnehelic gauges	To determine pressure drop a various points in the baghouse. Recorders are useful to give permanent pressure drop readings
Temperature indicators	To determine temperature at critical points in baghouse
Gas flow meters	To measure actual gas flow rate through the baghouse
Fan current, fan bearing temperature and fan vibrator indicators	To identify early warning signs indicating maintenance to the fan

### **Routine maintenance** APTI - SI:412A

#### Daily Maintenance

1. Check pressure drop.(Cite manufacturer maximum pressure drop and normal operating range.)
2. Monitor gas flow rate.
3. Observe stack outlet; visually or with a continuous monitor, during material handling.
4. Monitor cleaning cycle; pilot lights or meters on control panel.
5. Check compressed air on pulse jet baghouses.
6. Monitor discharge system; make sure dust is removed as needed.
7. Walk through baghouse to check for normal or abnormal visual and audible conditions.

#### Weekly Maintenance

1. Check all moving parts on the discharge system; screw-conveyor bearings
2. Check damper operation; bypass, isolation, etc.
3. Spot check bag tensioning; reverse air and shake bags.
4. Check compressed air lines including oilers and filters.
5. Blow out manometer lines.
6. Verify temperature-indicating equipment.
7. Check bag-cleaning sequence to see that all valves are seating properly.
8. Check drive components on fan.

### Monthly Maintenance

1. Spot check bag-seating condition.
2. Check all moving parts on shaker baghouses.
3. Check fan for corrosion and blade wear.
4. Check all hoses and clamps.
5. Spot check for bag leaks and holes.
6. Inspect baghouse housing for corrosion.

### Quarterly Maintenance

1. Thoroughly inspect bags.
2. Check duct for dust buildup.
3. Observe damper valves for proper seating.
4. Check gaskets on all doors.
5. Inspect paint on baghouse.
6. Calibrate opacity monitor.
7. Inspect baffle plate for wear.

### Annual Maintenance

1. Check all welds and bolts.
2. Check hopper for wear.
3. Replace high-wear parts on cleaning system.

## **Minnesota Pollution Control Agency O & M Guidance for Baghouses**

Inspect annually all components that are not subject to wear or plugging, including structural components, housing, ducts and hoods. Maintain a written record of the inspection and any action resulting from the inspection.

Inspect quarterly all components that are subject to wear or plugging. Maintain a written record of the inspection and any action resulting from the inspection.

Check differential pressure once per week. Verify that it is within acceptable range. Record the results.

Check visible emissions from the unit once per week. If visible emissions exist, inspect equipment for evidence of malfunction, including broken bags. Record the results of the inspection and any corrective action taken.

Calibrate mercury pressure switch annually and maintain a written record of the calibration and any action resulting from the calibration.

Maintain pressure switch alarms with both horn and light in control room if pressure loss to the bag puffer is detected.

## **Air Pollution Engineering Manual O & M Guidelines for Baghouses**

### **Why Keep Records**

1. Records permit the operator to be aware of continuing normal operation.
2. Records permit the operator to be aware of abnormal operation, such as sudden failures or slowly changing parameters (e.g., slow rise in residual pressure that, if allowed to continue, would limit the ability of the process to reach full load).
3. Records provide a historical record that is useful when troubleshooting problems.

### **What Records to Keep**

1. Pressure drop.
2. Flow rate. Pressure-drop information cannot be interpreted properly unless the flow rate is known. A record of flow rate may be useful in identifying a developing leak in the ducting or in the baghouse itself.
3. Opacity. If a continuous opacity monitor is incorporated into the system, its output should be recorded. If such opacity instrumentation is not available, visual opacity readings recorded manually should still prove useful. The cause of any change in opacity should be pursued and understood.
4. Temperature. The baghouse outlet temperature should certainly be monitored, even if other temperature records are not kept.
5. Dust removal. At least one parameter related to the quantity of dust removed from each baghouse compartment should be monitored and recorded. A change in dust quantity may be indicative of baghouse failure or of process changes.

## **Baghouse Compliance Assurance Monitoring Guidance** (AWMA 89th Annual Meeting, 1996)

When evaluating a monitoring plan one should look for specification of:

- Monitoring location and frequency,
- Analytical device,
- Description of data acquisition / measurement with reporting units and recording process,
- Basis for corrective action trigger levels,
- Separate corrective action time periods for diagnosing and remedying problems and
- Specific quality assurance / control procedures for proper monitoring operation.

Operational parameters monitored to demonstrate compliance are the following:

1. Visible emissions,
2. Pressure drop,
3. Opacity, Triboelectric effect or Light scattering effect,
4. Inlet and / or outlet gas temperature
5. Cleaning system operation,
6. Ash collection system operation and
7. Isolation damper operation.

The Secondary Lead Smelting NESHAP monitoring requirements are the following:

1. Daily monitoring of pressure drop of each compartment,
2. Daily visual inspection of stack emissions,
3. Daily visual inspection for adequate dust removal from hoppers,
4. Daily check of compressed air supply for pulse-jet baghouses,
5. Daily inspection of proper isolation damper operation,
6. Daily monitoring of bag cleaning cycle,
7. Weekly inspection of bag cleaning mechanisms,
8. Weekly check of bag tension on shake or reverse-air units,
9. Monthly internal inspection for air leaks,
10. Monthly inspection of bag condition and connections,
11. Monthly inspection of fan condition and operation, and
12. Continuous operation of a bag leak detection system based on triboelectric or light scattering effects.