Quality Assurance/ Quality Control Plan

Opacity Monitor
EU Wood Boiler
Biewer Sawmill

Company: Biewer Sawmill
Location: McBain, MI
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GLOSSARY OF TERMS AND ACRONYMS

Accuracy	The measure of the closeness of a measurement to its true value. Although the true value of gas is not known, it can be approximated by the use of an appropriate standard of reference. For example, a National Institute of Standard and Technology Standard (formerly NBS) Reference Material (NIST0-SRM) is a primary standard used to assess accuracy. Secondary standards are also used as an approximation to the "true value" although errors may be introduced using these secondary standards.
Angle of View	The angle that contains all of the radiation detected by the photo detector assembly of the analyzer at a level greater than 2.5% of the peak detector response. The total angle of view will be no greater than 4 degrees.
Angle of Projection	The angle that contains all of the radiation projected from the lamp assembly of the analyzer at a level of greater than 2.5% of the peak illuminance. The total angle of projection will be no greater than 4 degrees.
ASTM	American Society for Testing and Materials
Attenuate	To lessen the amount, force, magnitude, or value of (light).
Attenuator	An apparatus used to lessen the amount, force, magnitude, or value of (light); another name for a neutral density filter or screen
Audit	An audit is an independent assessment of the accuracy of data. Independence is achieved by having the audit performed by an operator other than the person conducting the routine measurements and by using audit standards and procedures different from those routinely used in the monitoring.
Audit Jig	A device that when attached to the opacity transceiver, or permanently installed, allows the insertion of neutral density filters in the opacity light beam. The device is used during the calibration error (CE) test of the opacity monitor.
Calibration Drift (CD)	The difference in the opacity monitor output reading from a reference value after a period of operating during which no unscheduled maintenance, repair, or adjustment took place. The reference value is supplied by a reflecting mirror and a neutral density filter or screen which can be automatically or manually inserted into the light beam path of the monitor. The CD error is calculated as the difference (in percent opacity) between the correct value and the observed value for the zero and upscale calibration value.

Calibration Error Test (CE)	A calibration error test is a performance audit of an opacity monitor in which a three point audit is conducted. Three certified neutral density filters (low, mid, and high-range) are placed in the opacity monitor light beam five nonconsecutive times and the monitor responses are recorded from the opacity monitor data recorder. From the data, a calibration error is calculated.
COM	Continuous Opacity Monitor - That portion of the instrument that senses the pollutant and generates an output that is a function of the opacity (the transceiver and the retro reflector units). A COM is also known as a transmissometer.
COMS	Continuous Opacity Monitoring System - The total equipment used to sample, analyze, and provide a permanent record of opacity monitoring data on a continuous basis. This equipment typically includes the transceiver, retro reflector, blowers, control unit, data record and processing hardware and software. A COMS may also be known as a transmissometer system.
CFR	Code of Federal Regulations. The opacity monitor is designed to help the user meet the requirements of Title 40 CFR Part 60.
chip	Integrated Circuit - a microelectronic semiconductor device.
DIP Switch	A group of subminiature switches, usually slide switches, housed in a Dual In-line Package (integrated circuit header) configuration.
Emission Outlet Path length	The path length at the location where emissions are released to the atmosphere.
EPA	Environmental Protection Agency; regulating body that oversees and controls environmental issues.
EU	Engineering Units
FET	Field Effect Transistor - an active three terminal semiconductor device.
LED	Light Emitting Diode - a solid state miniature indicator light.
Millivolt (mv)	An electrical unit of measure equal to 1×10^{-3} volt.
Monitor	Instrument that measures a flue gas characteristic such as opacity.

Monitor Malfunction	Any interruption in the collection of data as a result of the failure of any component of the opacity monitor to operate within specifications of the manufacturer or Performance Specification 1 (PS-1).
Monitor Path length	The path length at the installed location of the opacity monitor.
Nanometer (nm)	Unit measure of length equal to 1 x 10^{-9} meter. Commonly used to describe wavelengths of light.
NBS	National Bureau of Standards - an agency of the US government chartered to maintain standards of measurement.
NEMA	National Electrical Manufacturers Association - a standards-making organization. Enclosures (e.g., junction boxes, instrument racks, switch boxes, etc.) are rated by their manufacturers to meet various NEMA standards.
Neutral Density (ND) Filter	An optical filter or screen which attenuates light uniformly over the wavelength range of interest. The wavelength range of interest for an opacity monitor is the visible light spectrum of 400 to 700 nanometers (nm). ND filters are used for the assessment of calibration error and are used for the assessment of the daily calibration drift (upscale calibration check or span check). ND filters may also be referred to as screens, attenuators, or audit filters.
Opacity	The fraction of incident light that is attenuated by an optical medium. Opacity (Op) and Transmittance (Tr) are related by: Op=1-Tr.
Optical Density	A logarithmic measure of the amount of incident light attenuated.
OSHA	Occupational Safety and Health Administration.
Out-Of-Control Period	The time period which the opacity monitor may not be collecting valid data; or data which may not be used to demonstrate compliance.
Path length	The depth of effluent in the light beam between the receiver and the transmitter of a single-pass transmissometer, or the depth of effluent between the transceiver and reflector of a double-pass transmissometer.

Performance Audit	A quantitative evaluation of the opacity monitor operation. Usually the accuracy of the opacity monitor is determined by using known reference standard (ND Filters).
Pot	Potentiometer - a three terminal variable resistor. Position of sliding contact can be adjusted by rotating a shaft or screw or by sliding a control tab or knob. Miniature screw-adjusted units are commonly called trimpots; multi-turn knob-adjusted units are called helipots; linear-adjusted units are called slidepots.
QA/QC	Quality Assurance/Quality Control
Response Time	The amount of time it takes the opacity monitor to display, on a data recorder, 95% of a step change in opacity.
Routine Maintenance	An orderly program of actions designed to prevent the failure of opacity monitor parts during their use.
(Daily) Span	Refer to Upscale Calibration Value.
Span Value	For most opacity monitor, the span value is set to 100% opacity however; the span value may also be specified by regulations at a value other than 100%. Sometimes the Span Value is referred to as the range of the monitor.
Systems Audit	A qualitative evaluation of opacity operation. Emissions data, logs, QA/QC data and the operational information are reviewed by regulator officials or by a corporate environmental auditor in order to determine the operational status of the opacity monitor relative to the applicable regulations or to the company's objectives.
Transmittance	The fraction of incident light that is transmitted through an optical medium.
Upscale Calibration Value	Sometimes referred to as the span or daily span (The opacity value at which a calibration check of the opacity monitor is performed by simulating an upscale opacity condition. The upscale calibration value is simulated with a filter or screen).
Zero	A simulated or actual level where the opacity is at zero (0) percent. A simulated zero is initiated daily when a mirror in the transceiver unit moves into the light path. An actual zero may be performed when the opacity monitor is mounted on the stack and no emissions are in the stack or duct (clean stack conditions) or by removing the opacity monitor (transceiver and retro reflector) from the stack to achieve the actual zero.

Section 1. Introduction

This Quality Assurance/Quality Control (QA/QC) Plan has been prepared to support the operation of the opacity monitor at the Biewer Sawmill, McBain Facility, wood-fired Boiler installed for measurement of opacity. The opacity monitor serves the following functions:

1. Compliance with construction and operating permit requirements
2. Provide process data to assist operation and maintenance of pollution control equipment

This plan is developed according to guidelines developed by the United States Environmental Protection Agency (EPA) as specified in 40 CFR 60, Appendix A and Db, Performance Spec. 1, 40 CFR 60, Appendix F, Quality Assurance Procedures, and ASTM D6216-98 which include general requirements for the installation, certification, operation, and maintenance of opacity monitor.

A. Definitions of Quality Assurance and Quality Control

Quality Assurance and Quality Control (QA/QC) serve independent functions. QA is the series of activities performed to evaluate the overall effectiveness of the maintenance and QC efforts. QC involves those activities undertaken to determine that the product or service is effective in maintaining an accurate and reliable output of opacity monitor data.

Quality Control functions often are comprised of a series of frequent internal checks, such as monitor inspections, periodic calibrations, and routine maintenance. Quality Assurance involves less frequent external checks on product quality and is used to evaluate the total quality control process.

External quality assurance evaluations may include independent monitor audits, third party sampling and analysis, and/or comparisons to known calibration standards. This Plan encompasses both QA and QC functions and identifies which function is fulfilled by the specific activity.

B. Quality Assurance Policy

Biewer Sawmill, McBain Facility's policy is to efficiently operate and maintain its facilities in accordance with good operating practices (GOP) and applicable environmental regulations. Biewer Sawmill, McBain Facility is committed to ensuring that all environmental monitor are operating within acceptable limits and that its operations are in compliance with operating and environmental permits.

C. Objective of Quality Assurance Plan

Biewer Sawmill, McBain, MI recognizes that the reliability and acceptability of opacity monitor data depends on completion of all activities stipulated in a well-defined QA plan. The objective of this QA plan is to define the necessary activities that guarantee opacity monitor data quality is maintained at acceptable levels. The plan also provides the framework for implementing QA activities by addressing items such as documentation, training, corrective actions, and preventive maintenance measures.

D. Scope of Quality Assurance Plan

This QA plan is specific to the operation and maintenance of the opacity monitor installed at the Biewer Sawmill, McBain Facility. The QA Plan goal is to obtain and evaluate emissions data of known and acceptable quality in support of the air pollution control equipment operation. The data obtained is used to demonstrate compliance with the following EPA, state and local emission and monitoring regulations:

40 CFR 60, Appendix B, Performance Specification 1 and Subpart Db

40 CFR 60, Appendix F; Quality Assurance Procedures

ASTM D 6216-98

Michigan DEQ Administrative Code, Rule 336.1201

Biewer Sawmill, McBain Facility Operating Permit

Activities not fully discussed may include, but are not limited to, instrument maintenance manuals, operating procedures, plant quality control procedures, and plant internal procedures for procurement and inventory control. These activities may be referenced in this QA Plan and may be updated, replaced, or deleted without notice or change to this plan.

E. Document Control

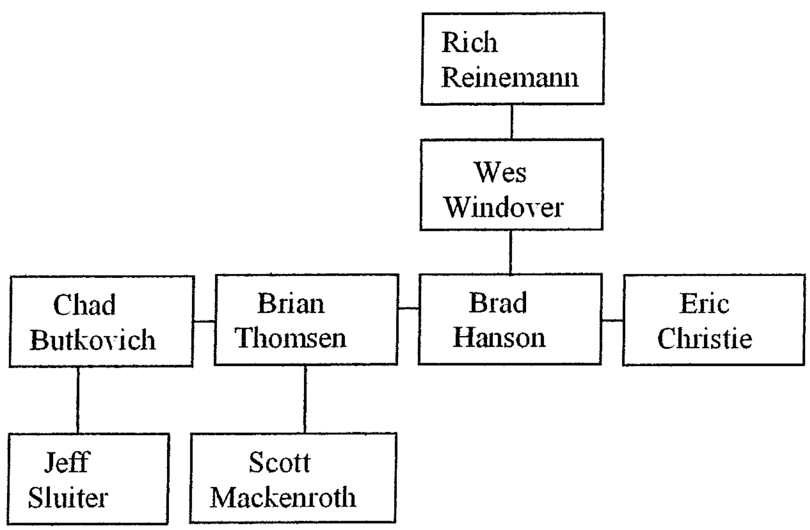
This QA Plan includes procedures that ensure changes and revisions to this plan are communicated to all appropriate individuals and should be reviewed periodically. Biewer Sawmill, McBain Facility will be responsible for ensuring that all changes and revisions are incorporated in the basic document.

Section 2.
Organization and Responsible Individuals

The following figures provide the current organizational chart for the Biewer Sawmill, McBain Facility. Facility responsibilities as they apply to the opacity monitor are shown in the chart.

Biewer Sawmill Inc.
Organizational Chart

Rich Reinemann – Plant Manager
Wes Windover – Procurement Manager
Brad Hanson – Electrical / Computer Maintenance Supervisor
Eric Christie – Mechanical Maintenance Supervisor
Brian Thomsen – A.M Boiler / Kiln Supervisor
Chad Butkovich - A.M Boiler / Kiln Supervisor
Jeff Sluiter – P.M. Boiler Operator
Scott Mackenroth - P.M. Boiler Operator



Biewer Sawmill, McBain Facility Organizational Information

Communication of Information, Data and Reports

An effective quality assurance program communicates the results of QA/QC activities to all affected parties. This QA plan makes provisions for the proper recording and communication of QA and QC information and provides the necessary mechanisms for triggering corrective actions based on the contents of QA and QC reports. Two types of communication processes used to convey emission information regarding the facility are Intra-departmental Communication and Inter-departmental Communication.

A. Intra-departmental Communication

Intra-departmental communication involves the flow of reports and data between department personnel. Its primary function is to allow for internal evaluation of data and provide determination of corrective action when needed. Information that is evaluated as intra-departmental communication include Quality Control Data and Quality Control Reports, Quality Assurance Data and Quality Assurance Reports.

a.) QC Data and Reports

Various QC checks, such as zero/span checks, visual inspections, and preventive maintenance are performed on a routine basis. Periodically, the Plant manager will:

(i) Review the measured opacity monitor data and compare them with known data to determine if a QC check is within permissible limits.

(ii) Contact the Boiler Operators to evaluate measured values for determining a probable cause when a data discrepancy occurs.

(iii) If necessary, initiate a work order request or purchase order and document a detailed description of the problem, maintenance action, and problem resolution.

b.) QA Audit Data and Reports

Quality assurance audits include quarterly Performance Audits. Audit reports contain comparisons between audit results and comparable opacity monitor data, completion of all calculations, and a determination of the pass/fail status of the audit. These quarterly audits are performed in accordance with standard procedures specified in 40 CFR 60, Appendix B, PS 1 and 40 CFR 60, Appendix F and are used to determine opacity monitor accuracy on a periodic basis. The actual performance of an audit will be conducted by a contractor who will forward all audit reports to the Plant manager.

B. Inter-departmental Communication

Inter-departmental communication involves the flow of reports and data between different departments for the purpose of the operating needs of the facility.

The Plant manager will:

1) Compile and distribute QA results and QA reports to all appropriate departments.

2) Prepare QA reports and transmit them to the EPA and other necessary local regulatory agencies.

Documentation of QA/QC data and information is an integral part of this QA Plan. Collection of opacity monitoring data is subject to various QA/QC measures to assure that data are of known and acceptable accuracy and precision.

Section 3. Description of Facility and Opacity Monitor

A. Facility Description

Biewer Sawmill Incorporated was established in 1985 at 6251 West Gerwoude Drive, McBain, MI 49657. Current plant layout includes a modern sawmill, gas/wood fired and natural gas boilers, 3 dry kilns, planer mill and shavings bagging operations.

Sawmill produces 70 million bft. of dimensional lumber and timbers. Residuals are sold into appropriate markets with surplus used to fuel a 40,000 lb/hr Wellon's wood fired boiler which produces steam for heating the facility and lumber drying operations. Lumber is dried in three Wellon's computerized multi-zone dry kilns to 19% moisture or less. Kiln capacity is 100,000bft. per kiln charge. Dried lumber is surfaced at the planer mill with a Newman 990 planer, graded, sorted by grade and dimension and packaged for shipment. Shavings from planer are bagged with a Premier Tech 600 baler and are utilized in animal bedding markets.

B. Opacity Monitor – Monitoring Solutions, Inc. Model DR-290

The Monitoring Solutions, Inc. CEMOP-290 opacity monitor consists of four major components: the transmissometer, the terminal control box, the air-purging system and the remote control unit and recording equipment. The transmissometer component consists of an optical transmitter/receiver (transceiver) unit mounted on one side of a stack or duct and a retroreflector unit mounted on the opposite side. The transceiver unit contains the light source, the photodiode detector, and the associated electronics.

The terminal control box mounted near the transceiver unit provides an on-stack analog readout of the milliamp output from the transceiver and can be used as a diagnostic tool.

The air purging system serves a threefold purpose: 1) it provides an air window to keep exposed optical surfaces clean; 2) it protects the optical surfaces from condensation of stack gas moisture; and 3) it minimizes thermal conduction from the stack to the instrument. A standard installation has one air-purging system for both the transceiver and the retroreflector units.

The remote control unit converts the nonlinear transmittance output from the transceiver (a milliamp signal) into linear opacity corrected to stack exit conditions.

The opacity monitor measures the amount of light transmitted through the effluent from the transceiver to the retroreflector and back again. The control unit uses the effluent transmittance to calculate the optical density of the effluent at the monitor location, or the "path" optical density. In order to provide stack exit opacity data, the path optical density must be corrected. The correction factor is expressed as the ratio of the stack exit inside diameter to the inside diameter of the stack at the transmissometer location. This ratio is called the "stack correction factor" (SCF) by Monitoring Solutions, Inc. The following equations illustrate the relationship between this ratio, path optical density, and stack exit opacity.

$$L_X/L_t = \text{stack correction factor}$$

where: L_X = stack exit inside diameter (ft)
L_t = the stack inside diameter (or duct width) at the monitor location (ft)

$$OP_X = 1-\left(1-\frac{opacity}{100}\right)^{stackcorre\ ctionfacto\ r}$$

where: OP_X = stack exit opacity (%)

Calibration Check

When a calibration cycle is initiated – either automatically by the Remote Signal Processor, or manually by the operator – a command signal entering the Transceiver electronics starts a series of events. An electric motor moves the zero reflector to a position that will intercept the measuring beam and return it through the transceiver window to the photo diode.

The zero reflector remains in this position during a six-minute cycle. The six-minute cycle is divided into four one-minute thirty second segments. The first one and a half minute, the internal zero (original clean window value) is established and the output is automatically adjusted to zero (4 ma). During the second one and a half minute segment, the light energy of the beam – after it has passed through the window to the zero reflector and back – is stored in the Remote Signal Processor Unit. The difference between this value and the original clean window value represents the window soiling. This value is compared with an alarm setpoint value; and if excessive, (more than 3.5 percent of the measured range) will produce a window alarm. The value now stored in memory will be used in computing the opacity with compensation for window soiling for the duration of the next measuring period.

A span check is displayed during the third one and a half minute segment by positioning a wire screen of a known attenuation value into the path of the measuring beam. The final one and a half minute segment displays the Stack Correction Factor (SCF) as an option or acts a purging period. At the end of the six-minute calibration cycle, the instrument returns to measuring the effluent in the stack or duct.

Section 4.
Data Recording and Reporting

The continuous data measured by the CEMOP-290 is recorded on a paperless strip chart recorder; Omega Model #8802MD. The instantaneous readings are recorded into a memory module. The recorder calculates a 6 minute rolling average for reporting purposes. An additional 6 minute rolling average is available directly from the opacity monitor to the recorder for future usage if necessary. The following information is documented on the memory module:

- Calibrations
- Monitor malfunction
- Opacity exceedences

In compliance with the Title V permit, the continuous opacity monitoring system (COMS) data is monitored and recorded in two categories:

1. Normal operations data, and
2. Audit data.

COMS data generated to document normal operations (including startups, shutdowns, exceedences, etc.) is recorded in the following way:

A. Daily Record Keeping

1. Strip Chart Recorder

   a. After the daily calibrations have run, the Boiler Operators will review the data recorded to verify daily operation is acceptable. He will also look at the opacity control unit to verify additional information and to record in a daily log items out of the ordinary:

      - boiler startups,
      - boiler shutdowns,
      - monitor malfunctions, and/or
      - opacity exceedences

   b. The Boiler Operators will also record the above information on the Opacity log form (Figure 1) in the Control Room.

   c. All six-minute opacity exceedences will also be recorded on the Excess Emission Report form (Figure 2) by the Boiler Operators.

d. The Boiler Operator will send the completed Excess Emission Reports (Figure 2) to the Plant Manager at the end of every month.

2. Opacity Maintenance Log

A permanent opacity monitor maintenance log is maintained by the Boiler Operators for the opacity monitor. The Mechanical Maintenance personnel enters into the opacity monitor maintenance log, detailed descriptions of any preventive and corrective actions performed on the opacity monitor components. This record also documents the use of spare parts.

The opacity monitor maintenance log shall includes at a minimum:

a. A record of any repairs, adjustments, or maintenance to each opacity monitor;
b. Operator training records;
c. Records of any period in which each opacity monitor is operative.

A periodic review of the opacity monitor maintenance log by the Plant Manager will provide a guide to possible problem trends with the opacity monitor and input as to the needs of the maintenance procedures and spare parts inventory.

Table 4-1

Site Opacity Limits
In compliance with both the federally approved Michigan DEQ and Biewer Sawmill permit to operate (item 5), excess emissions are defined as all instances of opacity values in excess limitations specified in the operating permit. Specifically, all six-minute periods in which the average opacity was greater than 20% except for (1) one six-minute period per hour of not more than 27%, (2) start-up, (3) shut down, (4) malfunctioning,

B. Data Reporting

1. Excess Emissions and Downtime Report (detail)

a. Create a new folder for the current quarter on the appropriate drive of the Plant Manager's computer. Name the folder "qtr QTR year.xls":

Where:

- *qtr* = *1st, 2nd, 3rd or 4th, as appropriate*
- *year* = *the current year (i.e., 2005, 2006)*

b. Open the previous quarters report folder and copy all the existing files into the current quarter report folder (created in step one).

c. Rename the files in the current quarter folder (created in step one) to reflect the appropriate quarter.

Where:

- *Month* = *the month of the current data (i.e. Jan, Feb, March)*
- *YY* = *the year of the current data (i.e. 05)*
- *Boiler* = *the boiler that the data represents (i.e. B002 or B003)*

d. Open the "Excess Emission and Downtime Data Month'YY – Boiler.xls" for the first month and boiler that you will be entering data for. (Figure 3)

e. Enter the appropriate "Excess Emission and Downtime (Figure 2) into the file that was opened in step 4 above. (Figure 3).

f. Add the appropriate "code" for each excursion.

g. Re-save the file.

h. Print/Make three (3) copies of the report (Figure 3).

i. Submit one copy to the Michigan DEQ.

j. File a copy of the report in the appropriate calendar quarterly report file located in the Plant Manager's office.

2. Summary Report

EXCESS EMISSIONS

1.) Retrieve either a hard copy or electronic copy of one of the monthly Excess Emission and Downtime Reports for the current quarter (i.e. Excess Emission and Downtime April'05-B002.xls).

2.) Sum the data into the into the following categories:

a. Total number of excess emission hours due to startup/shutdown
b. Total number of excess emission hours due to Control Equipment Problems.

c. Total number of excess emission hours due to Process Problems.
d. Total number of excess emission hours due to Other known Causes
e. Total number of excess emission hours due to Unknown Causes

3.) Repeat steps 1 and 2 until the data has been compiled for all three months

4.) Enter the summary data from step 2 above into the "Emission Data Summary" area of the Summary Report (Figure 4).

DOWNTIME

1.) Retrieve either a hard copy or electronic copy of one of the monthly Excess Emission and Downtime Reports for the current quarter, for one of the two gas/gas/wood fired boilers (i.e. Excess Emission and Downtime April'05-B002.xls).

2.) Review the Opacity Performance Audit and/or check with the Maintenance Department for the amount of monitor downtime for the current quarter.

3.) Sum the data into the into the following categories:

a. Total number of downtime hours due to Monitor equipment malfunctions
b. Total number of downtime hours due to Non-monitor equipment malfunctions.
c. Total number of downtime hours due to Quality Assurance Calibration.
d. Total number of downtime hours due to Other known Causes.
e. Total number of downtime hours due to Unknown Causes.

4.) Repeat steps 1 -3 until the data has been compiled for all three months of both gas/wood fired units.

5.) Enter the summary data from step 3 above into the "CMS Performance Summary" area of the Summary Report (Figure 4).

6.) Print/Make three (3) copies of the report.

7.) Submit one copy to the Michigan DEQ.

8.) Send one copy to the Manager of Environmental Affairs

9.) File a copy of the report in the appropriate calendar quarterly report file located in the Plant Manager's office.

Figure 1

Biewer Sawmill
McBain, MI

OPACITY LOG

Date: ____________

Start Time	**End Time**	**Reason**	**If there was a malfunction, how was it corrected?**

Total Steam Load ____________ ÷ 24 = Average Hourly Load ____________

Reviewed by _____________________

Figure 2

Excess Emission Report (Definition B):

Date	**Start Time**	**End Time**	**Diff. (min)**	**Avg. Opac.**	**Reason**

Figure 3

QTR **QUARTER REPORT** *YEAR* *MONTH YEAR*
Biewer Sawmill FACILITY
ID#: ____________UNIT #:_____

CODES

1	Startup temp	6	Control equipment malfunction
2	Shutdown temp	7	Other (with explanation)
3	Sootblowing	8	Unknown
4	Ash removal	9	Process problem
5	Source malfunction	10	Monitoring equipment problem

"c" indicates call made to NEDO to report

Line No.	DATE	START TIME	OPACITY %	CODE	EXPLANATION/ CORRECTIVE ACTION

Note: Since the above exceedences/downtimes are only presented in 6-minute block averages, the duration for each excursion is 6 minutes and the end times are 6 minutes later than the start times.

Figure 4

SUMMARY REPORT
(Quarterly)

OPACITY EXCESS EMISSION AND MONITORING SYSTEM PERFORMANCE

Pollutant:	Opacity
Reporting period dates:	
Company:	Biewer Sawmill
Emission Limitation:	See definition below
Address:	6251 W. Gerwoude Dr., McBain, MI 49657
Monitor Manufacturer:	Durag/Monitoring Solutions
Model No.:	CEMOP 290
Date of Latest CMS Certification or Audit:	
Process Unit Description:	Gas/Wood-fired Boiler
Total source operating time in reporting period:	

Emission Data Summary			**CMS Performance Summary**		
1.	Duration (in minutes) of excess emissions in reporting period due to:	Excess Emissions	1.	CMS downtime in reporting period (in minutes) due to:	Minutes
a.	Startup/shutdown		a.	Monitor equipment malfunctions	
b.	Control equipment problems		b.	Non-monitor equipment malfunctions	
c.	Process problems		c.	Quality assurance calibration	
d.	Other known causes		d.	Other known causes	
e.	Unknown causes		e.	Unknown causes	
2.	Total duration of excess emissions		2.	Total CMS downtime	
3.	(Total duration of excess emissions) x 100 ÷ (Total source operating time)		3.	(Total CMS downtime) x 100 ÷ (Total source operating time)	

Excess Emissions Definition:

In compliance with both the federally approved Michigan and Biewer Sawmill permit to operate (item 5), excess emissions are defined as all instances of opacity values in excess limitations as a six minute average of 20% opacity, except for one six minute average of not more than 27% opacity in any given hour.

Changes since last quarter in COMS, process or controls:

I, ____________________, certify that based on information and belief formed after reasonable inquiry, the statements and information in the second quarter of 2007 Title V report are true, accurate and complete.

Name ____________________

Signature ____________________

Title ____________________

Date ____________________

C. Audit Reports

The quarterly COMS audits for opacity monitor are performed by Monitoring Solutions, an outside contractor, in accordance with pre-approved procedures in compliance with 40 CFR 60, Appendix B, PS 1 and Appendix F. The audits and supporting documentation are documented reports prepared by the contractor and submitted to the Biewer Sawmill McBain facility for review of the draft and acceptance of the final report. These audits serve as verification of the accuracy of the opacity monitor data.

The reports and supporting records shall be retained by the Biewer Sawmill, McBain Facility for a period of at least five years from the date of the monitoring sample.

Biewer Sawmill, McBain Facility will prepare Opacity Excess Emissions and Summary Reports and will submit them along with the quarterly audit reports to the following agency on a calendar quarter basis:

AQD District Supervisor

The reports shall be submitted to the Michigan DEQ field office by January 31, April 30, July 30, and October 31 of each year. The report shall address and clearly identify all instances of deviations from permit requirements. An identification of each period during which each opacity monitor was inoperative, except for drift checks, the reasons therefore, and the nature of repairs or adjustments performed or to be performed shall be included.

All required reports must be certified by the Plant Manager.

Section 5.
Quality Assurance Activities

A. Overview

The purpose of these procedures is to ensure that the opacity monitor installed at the Biewer Sawmill, McBain Facility operate in such a manner as to provide accurate and reliable data. The opacity monitor' installation, certification and operation will be conducted under the direct supervision or persons qualified by training and experience. The McBain Facility's Maintenance Department will only perform minimal maintenance on the COMS. The McBain Facility has contracted Monitoring Solutions to provide quarterly preventive maintenance, including parts, for the opacity systems.

B. Quality Assurance Training

Training is an essential element of a successful QA/QC program. It provides the basic knowledge required to accomplish a procedure correctly. Training also provides an understanding in a given task or procedure, thereby enabling the individual involved to make effective decisions. Training is the framework about which activities are performed in a consistent manner regardless of who completes them.

1) Quality Assurance Plan

All employees involved in the opacity monitoring program must read and understand this QA/QC Plan. Individuals in the following positions will be given this manual to read and will sign an acknowledgement of receiving and understanding his/her responsibilities as defined by this manual:

- Plant manager
- Procurement Manager
- A.M. Boiler/Kiln Supervisors
- P.M. Boiler Operators
- Electrical/Computer Maintenance Supervisor
- Mechanical Maintenance Supervisor

2) General Training

General training may be viewed as providing a foundation. It is not intended as much to deliver detailed and specific knowledge, as it is to provide an understanding of the overall monitor and program goals. General training is common to all individuals directly involved in the opacity monitoring program. The following individuals have been given initial training by the COMS vendor on the system:

- Plant manager
- Procurement Manager
- A.M. Boiler/Kiln Supervisors
- P.M. Boiler Operators
- Electrical/Computer Maintenance Supervisor
- Mechanical Maintenance Supervisor

3) Periodic and Refresher Training

Special and refresher training is presented annually. Each affected employee receives appropriate training as procedures, operating parameters, or personnel changes are made. The Power and Production Superintendent, or designee, will be responsible for training as the need arises. Training records are maintained for each affected employee.

Whenever an employee neglects to correctly perform his/her duties as applicable to the COMS, he/she is retrained in that particular duty and the training is documented and filed with the affected data.

4) Standard Operating Procedures (SOP)

As with the QA Plan, all affected employees must, at a minimum, be familiar with and review appropriate SOP's as they are developed with experience.

C. Quarterly Opacity Field Audit Performance Tests

The following procedures and tests will be performed on each opacity monitor (40 CFR 60 App. B PS1) on a quarterly basis. The McBain Facility has contracted Monitoring Solutions to provide quarterly preventive maintenance, including parts, for the opacity systems. Activities performed by a Monitoring Solutions technician during a regular preventive maintenance visit typically include changing the opacity purge filters and performing the following field audit activities in accordance with pre-approved procedures in compliance with 40 CFR 60, Appendix B, PS 1 and Appendix F.

1) **Preliminary Data**

a) Obtain the stack exit inside diameter (or equivalent exit diameter) and the stack or duct inside diameter or width at the monitor location. Record these values.

Note: Effluent handling monitor dimensions may be acquired from the following sources listed in descending order of reliability: 1) physical measurements, 2) construction drawings, 3) opacity monitor installation/certification documents, and 4) source personnel recollections.

b) Calculate the stack correction factor and record the result.

c) Record the source-cited stack correction.

The stack correction factor is preset by the manufacturer using information supplied by the source. The value recorded should be the value source personnel agree should be set inside the monitor.

The path length correction error should be within $\pm$2%. This error exponentially affects the opacity readings, resulting in over or underestimation of the stack exit opacity. The most common error in computing the optical path length correction factor is the use of the flange-to-flange distance in place of the stack/duct inside diameter at the monitor location. This error will result in underestimation of the stack exit opacity and can be identified by comparing the monitor optical path length to the flange-to-flange distance; the flange-to-flange distance should be greater by approximately two to four feet.

d) Obtain the reference zero and span calibration values. Record these values.

Note: The reference zero and span calibration values may not be the same as the values recorded during instrument installation and/or certification. The zero and span values recorded should be the reference values recorded during the most recent clear-path calibration of the D-R 290.

2) **Fault Lamp Checks**

The following describes the Fault Lamp Analysis for the Monitoring Solutions, Inc. D-R 290 remote control unit. Unless otherwise noted, the audit can continue with illuminated fault lamps, provided the source has been informed of the fault conditions.

a) An illuminated BLOWER fault lamp indicates a loss of power to the purge air blowers. If a blower fault is indicated, the audit should be postponed until source personnel repair the problem. Source personnel should be told of this fault immediately. Loss of purge air may damage the on-stack components of the opacity system due to prolonged exposure to corrosive stack gases.

b) An illuminated FILTER fault lamp indicates that a reduction in purge air flow has been detected. The most likely causes of a filter fault are a clogged purge air filter or a crimped purge air hose. The audit can continue under filter block conditions; however, source personnel should be made aware of the condition so that repairs can be made at the completion of the audit.

c) An illuminated WINDOW fault lamp indicates that the opacity of the measurement window exceeds the factory preset limit of 3.5 percent. Excessive window opacity may produce a positive bias in the effluent opacity data.

d) An illuminated FAULT lamp indicates that one or more critical CEMS components have malfunctioned or are out of adjustment. An illuminated FAULT lamp should be accompanied by a fault code displayed on the front panel meter of the control unit. The nature of the fault can then be determined by consulting the instrument manual. If this lamp is illuminated, source personnel should determine the exact cause of the fault condition. The auditor should discuss the cause and magnitude of the fault condition with source personnel to determine of the audit can continue.

The parameters associated with each of the fault lamps are found in the manufacturer's manual. With the exception of alarms that warn of elevated opacity levels (alarm or warning lamps), the error codes indicate that the D-R 290 is not functioning properly.

3) **Instrument Range Check**

Check the D-R 290 measurement range by pressing the RANGE button (the LED on the button will light up). Record the instrument range.

4) **Reference Signal, Zero and Span Checks**

a) Initiate the calibration cycle by pressing the CALIBRATION button (the LED on the button will light up). The monitor will automatically cycle through the internal zero, external zero, and span modes.

b) Record the internal zero milliamp value displayed on the control panel display.

Note: The internal zero checks the instrument reference signal. Since the instrument provides a full scale output of 4 to 20 milliamps, a value of 4 milliamps displayed on the control unit display represents a zero condition. After 1-½ minutes in the internal zero mode, the monitor will automatically switch to the external zero mode.

c) Record the external zero value (in milliamps) displayed on the control unit display. Record the external zero value (in percent opacity) displayed on the opacity data recorder.

During the zero calibration check, the zero mirror is moved into the path of the measurement beam by a servomotor. The zero mechanism is designed to present the transceiver with a simulated clear-path condition. The daily zero check does not test the actual clear-path zero, nor does it provide a check of cross-stack parameters such as the optical alignment of the Transmissometer or drift in the reflectance of the retro reflector. The actual clear-path zero can only be checked during clear-stack or off-stack calibration of the D-R 290. In addition to simulating the instrument clear-path zero, the zero mechanism allows the amount of dust on the transceiver optics (primary lens and zero mirror) to be quantified. After two minutes in the external zero mode, the D-R 290 will automatically enter the span mode.

The D-R 290 internal zero should be set to indicate 0% opacity (equivalent to 3.7 - 4.3 mA). An external zero error greater than 4% opacity is usually due to excessive dust accumulation on the optical surfaces, electronic drift or an electronic/mechanical offset of the data recorder. Excessive dust on the optical surfaces sufficient to cause a significant zero error would be indicated by the difference in the internal and external zero values and/or window alarm. Instrument span error may be caused by the same problems that cause zero errors and may be identified in a similar fashion. A span error may also be caused by an inaccurately names span filter.

The external zero displayed on the control unit panel meter also indicates the level of dust accumulation on the zero retro-reflector and transceiver measurement window. The difference between the internal and external zero responses should equal the amount of dust found on the transceiver optics. To convert the zero responses to a value that represents lens dusting in percent opacity, use the following equation.

Meter response in % opacity
= 6.25 [external zero value (mA) - (internal zero value (mA)]

d) Record the span value (in milliamps) displayed on the control unit panel meter. Record the span value (in percent opacity) displayed on the data recorder. Go to the Transmissometer location.

During the span calibration check, a servomotor moves a span filter into the path of the measurement beam while the zero mirror is in place. The span mechanism is designed to provide an indication of the upscale accuracy of the D-R 290 relative to the simulated clear-path zero. The D-R 290 automatically returns to the measurement mode when the calibration cycle is complete.

If the zero and span errors are due to a data recorder offset, both errors will be in the same direction and will be of the same magnitude.

5) **Retroreflector Dust Accumulation Check**

a) Record the effluent opacity prior to cleaning the retro-reflector optics.

b) Open the transceiver housing, inspect and clean the retro-reflector optics, and close the housing.

c) Record the post-cleaning effluent opacity. Go to the transceiver location.

6) **Transceiver Dust Accumulation Check**

a) Record the pre-cleaning effluent opacity.

b) Open the transceiver, clean the optics (primary lens and zero mirror) and close the transceiver.

c) Record the post-cleaning effluent opacity.

The results of the dust accumulation check should not exceed 4%. A dust accumulation value of more than 4% opacity indicates that the airflow of the purge system and/or the cleaning frequency of the optical surfaces are inadequate. When determining the optical surface dust accumulation, the auditor should note whether the effluent opacity is relatively stable (within ±2% opacity) before and after cleaning the optical surfaces. If the effluent opacity is fluctuating by more that ±2%, the dust accumulation analysis should be omitted.

7) **Optical Alignment Assessment**

a) Determine the monitor alignment by looking through the alignment port of the side of the transceiver.

b) Observe whether the image is centered in the cross hairs.

When the transceiver and retro-reflector are misaligned, a portion of the measurement beam that should be returned to the measurement detector is misdirected, resulting in a positive bias in the data reported by the D-R 290. One of the most common causes of misalignment is vibration which may cause the on-stack components to shift slightly on the instrument mounting flanges. Another common cause of misalignment is thermal expansion and contraction of the structure on which the transmissometer is mounted. If the D-R 290 is being audited while the unit is off-line (cold stack), the results of the alignment analysis may not be representative of the alignment of the instrument when the stack or duct is at normal operating temperature.

8) **Calibration Error Check**

The calibration error check is performed using three neutral density filters: Low level 5-10%, Mid level 10-20%, High level 20-40% (per ASTM D6216-98, Paragraph 7.5). Neutral Density (ND) filters, used for calibration error assessment are required to be certified semi-annually. ND filters must be certified in accordance with the basic procedures specified in 40 CFR Part 60, Appendix B, Performance Spec. 1.

Performing the calibration error check on-stack using the filters, determines the linearity of the instrument response relative to the current clear-path zero setting. This calibration error check does not determine the accuracy of the actual instrument clear-path zero or the status of any cross-stack parameters. A true calibration check is performed by moving the on-stack components to a location with minimal ambient opacity, making sure that the proper path length and alignments are attained, and then placing the calibration filters in the measurement path.

Calibration error results in excess of ±3% are indicative of a non-linear or mis-calibrated instrument. However, the absolute calibration accuracy of the monitor can be determined only when the instrument clear-path zero value is known. If the zero and span data are out-of-specification, the calibration error data will often be biased in the direction of the zero and span errors. Even if the zero and span data indicate that the D-R 290 is calibrated properly, the monitor may still be inaccurate due to error in the clear-path zero adjustment.

The optimum calibration procedure involves using neutral density filters during clear-stack or off-stack D-R 290 calibration. This procedure would establish both the absolute calibration accuracy and linearity of the D-R 290. If this procedure is impractical, and it is reasonable to assume that the clear-path zero is set correctly, the monitor's calibration can be set using either the neutral density filters or the internal zero and span values.

a) Install the audit jig and adjust it for zero.

b) Record the audit filter serial numbers and opacity values.

c) Remove the filters from their protective covers, inspect and if necessary, clean them.

d) Record the zero value.

e) Insert the low range neutral density filter into the audit jig.

f) Wait approximately two minutes or until a clear value has been recorded and displayed on the data recorder.

Note: The data should be taken from a data recording/reporting device that presents instantaneous opacity (or opacity data with the shortest available integration period)).

g) Record the D-R 290 response to the low range neutral density filter.

h) Remove the low range filter and insert the mid range neutral density filter.

i) Wait approximately two minutes and record the D-R 290 response to the mid range neutral density filter.

j) Remove the mid range filter and insert the high range filter.

k) Wait approximately two minutes and record the D-R 290 response to the high range neutral density filter.

l) Remove the high range filter, wait approximately two minutes, and record the zero value.

m) Repeat steps e) through m) until a total of five opacity readings are obtained for each neutral density filter.

9) **Averaging Period Calculation and Recording Check**

To obtain the six-minute integrated opacity data, repeat the steps in the Calibration Error Check, changing the waiting periods to 13 minutes. (**Note:** In order to acquire valid six-minute averaged opacity data, each filter must remain in for at least two consecutive six-minute periods plus one minute; the first period will be invalid because it was in progress when the filter was inserted. A waiting period of 13 minutes is required.)

During each calendar quarter, the permittee shall be deemed in compliance with paragraph (A)(1) of rule R336.2001 of the OAC if the following conditions are met:

i. The nonexempt opacity values in excess of twenty per cent opacity are less than 1.10 per cent of the six-minute average opacity values.

ii. None of the nonexempt six-minute average opacity values exceeds sixty per cent.

iii. The total amount of time, in minutes, of exempt and nonexempt opacity values greater than 20% and less than 27%, except for one 6 minute period per hour of not more than 27% (not including start-up, shutdown, and malfunction, intermittent soot blowing, intermittent ash removal exemptions provided in paragraphs (A)(2) and (A)(3) of rule R336.2001 of the Administrative Code) does not exceed the product of 0.10 times the actual number of hours the emissions unit was in operation during the calendar quarter.

10) **Calculations**

a) When the calibration error check is complete, remove the audit jig. Close the transceiver head and the weather cover, and return to the D-R 290 control unit.

b) Return to the control unit location and reset the opacity instrument range to its original setting, if necessary.

c) Obtain a copy of the audit data from the data recorder and complete the required calculations.

Arithmetic Mean

$$\bar{d} = \frac{1}{n}\sum_{i=1}^{n} d_i$$

Where:

$\bar{d}$	=	mean of the differences,
n	=	number of data points,
d_i	=	the difference between a reference method value and the corresponding CEMS value (RM_i - CEM_i) at a given point in time, "i".

Standard Deviation

$$S_d = \sqrt{\frac{\sum_{i=1}^{n} x_i^2 - \frac{\left(\sum_{i=1}^{n} x_i\right)^2}{n}}{n-1}}$$

Where:

S_d	=	Standard deviation,
n	=	number of data points,
x_i	=	the difference between a reference method value and the corresponding monitoring system value (RM_i - CEM_i) at a given point in time, "i".

Confidence Coefficient (one-tailed)

$$CC = \frac{t_{0.975} S_d}{\sqrt{n}}$$

Where:

CC	=	Confidence coefficient
$t_{0.975}$	=	t-value

n	$t_{.975}$	n	$t_{.975}$	n	$t_{.975}$
2	12.706	7	2.447	12	2.201
3	4.303	8	2.385	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.262	15	2.145
6	2.571	11	2.228	16	2.131

The values in this table are already corrected for n-1 degrees of Freedom. Use n equal to the number of data points.

Opacity Calibration Error

Calculate the calibration error (calibration error, zero drift error, and calibration drift error) as the sum of the absolute value of the mean difference and the 95 percent confidence coefficient for each of the three test attenuators as follows:

$$Er = |\bar{x}| + |CC|$$

Where:

Er = Error.

11) **System Response Time Check**

Using a high-level calibration attenuator, alternately insert the filter five times and remove it from the external audit device. For each filter insertion and removal, measure the amount of time required for the opacity monitor to display 95 percent of the step change in opacity on the data recorder.

- For the upscale response time, measure the time from insertion of the filter for the monitor to display of 95 percent of the final, steady upscale reading.
- For the downscale response time, measure the time from removal of the filter for the monitor to display0 5 percent of the initial upscale reading.
- Calculate the mean of the five upscale response time measurements and the mean of the five downscale response time measurements.

Results of the field audit performance tests are typically recorded on forms similar to the forms on the following pages.

AUDIT DATA SHEET
MONITORING SOLUTIONS MODEL CEMOP-290 OPACITY CEMS

Corporation: Biewer Sawmill
Plant/Site: McBain, MI
Process Unit/Stack ID: Unit #
Auditor: 0
Representing: Monitoring Solutions, Inc.
Attendees: 0
Representing:
Remote serial number: 0
Transceiver serial number: 0
Flange to flange distance: 0"
Reflector serial number: 0
Date: MM/DD/YYYY

Preliminary Data

1 Stack exit inside diameter (FT) = Lx		
2 Stack (or duct) inside diameter at the transmissometer location (FT) = Lt		
3 Calculated optical path length correction factor = Lx/Lt		
4 Source-cited optical path length correction factor		
5 Source-cited zero automatic calibration value (% opacity)	0.00	%
6 Source-cited span automatic calibration value (% opacity)	0.00	%

[GO TO CONTROL UNIT / DATA RECORDER LOCATION]

[INSPECT DATA RECORDING SYSTEM AND MARK WITH "OPACITY AUDIT," AUDITOR'S NAME, AFFILIATION, DATE, SOURCE, PROCESS UNIT/STACK IDENTIFICATION, AND THE TIME OF DAY.]

Fault Lamp Checks

	ON	OFF
7 Blower [Loss of purge air blower power]		X
8 Filter [Inadequate purge air flow]		X
9 Window [Excessive dirt on transceiver window]		X
10 Fault [Additional CEMS fault has occurred. Note fault code on panel meter and consult the instrument manual.]		X

Instrument Range Check

11 Instrument range setting — 100 %
[Press the "RANGE" button and record the instrument range. Increase range if too low.]

Zero Check

[Press the "CALIBR" button of the control panel]
12 Internal zero value (milliamps) — 4.00 mA
[Wait for two minutes for automatic change to external zero mode.]
13 Panel meter zero calibration value (milliamps) — 0.00 mA
14 Opacity data recorder zero calibration value (% Op) — 0.00 %
[Wait two minutes for automatic change to external span mode.]

AUDIT DATA SHEET
MONITORING SOLUTIONS MODEL CEMOP-290 OPACITY CEMS
(Continued)

Span Check

15 Panel meter span calibration value (milliamps) 0.00 mA
16 Opacity data recorder span calibration value (% Op) 0.00 %
[Go to transmissometer location.]

Retroreflector Dust Accumulation Check

17 Pre-cleaning effluent opacity (% Op) 0.00 %
[Inspect and clean optical surface.]
18 Post-cleaning effluent opacity (% Op) 0.00 %
[Go to transceiver location.]

Transceiver Dust Accumulation Check

19 Pre-cleaning effluent opacity (% Op) 0.00 %
[Inspect and clean optical surface.]
20 Post-cleaning effluent opacity (% Op) 0.00 %

Optical Alignment Check (Optional)

[LOOK THROUGH ALIGNMENT SIGHT AND DETERMINE IF BEAM IMAGES ARE CENTERED.]

	YES	NO
21 Images Centered?	X	

[Draw Location of images in sight.]

Calibration Error Check [Jig Procedure]

[Install the audit jig on the primary lens and adjust the jig zero until a value of 4mA is read on the remote panel meter.]

[Make the final jig zero adjustments based on opacity data from the data recorder.]

[Record audit filter data.]

Filter	Serial NO.	% Opacity	SCF%
22 LOW	0	0.00	0.00
23 MED	0	0.00	0.00
24 HIGH	0	0.00	0.00

AUDIT DATA SHEET
MONITORING SOLUTIONS MODEL CEMOP-290 OPACITY CEMS
(Continued)

[Remove the audit filters from the protective covers, inspect, and clean each filter.]

[Insert a filter, wait approximately 2 minutes, and record the opacity value reported by the opacity data recorder. Repeat the process 5 times for each filter.]

[If jig zero values change by more than 1.0% opacity during any of the runs, readjust the jig zero to the original value and repeat the run.]

ZERO	LOW	MID	HIGH	ZERO
0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00

[If six-minute integrated data are also available, allow 13 minutes each for an additional run of the ZERO, LOW, MID, HIGH, and ZERO readings.]

ZERO	LOW	MID	HIGH	ZERO
0.00	0.00	0.00	0.00	0.00

[Remove the audit jig, close the transceiver head and the weather cover.]

[Return to control unit location.]

Control Unit Adjustment Reset [If necessary, reset the opacity range switch to the position indicated in blank 10.]

[Obtain a copy of the audit data from the opacity data recorder, and ensure that the data can be clearly read and interpreted.]

[Read and transcribe final calibration error data.]

	ZERO		LOW		MID		HIGH		ZERO
25	0.00	26	0.00	27	0.00	28	0.00	29	0.00
		30	0.00	31	0.00	32	0.00	33	0.00
		34	0.00	35	0.00	36	0.00	37	0.00
		38	0.00	39	0.00	40	0.00	41	0.00
		42	0.00	43	0.00	44	0.00	45	0.00

[Six-minute average data, if applicable.]

	ZERO		LOW		MID		HIGH		ZERO
46	0.00	47	0.00	48	0.00	49	0.00	50	0.00

AUDIT DATA SHEET
MONITORING SOLUTIONS MODEL CEMOP-290 OPACITY CEMS
(Continued)

Calculation of Audit Results

Stack exit correlation error (%):

51	Blank 4 (1)	------	Blank 3 (1)	*100=	0
		Blank 3 (1)			

Zero Error (% Op.):

52	Panel Meter	6.25 *	(Blank 13 (0)	---- 4.0)	--- Blank 5 (0)	===	-25.00	%
53	Opacity Data Recorder		Blank 14 (0)	------	Blank 5 (0)	===	0.00	

Span Error (% Op.):

54	Panel Meter	6.25 *	(Blank 15 (0)	---- 4.0)	--- Blank 6 (0)	===	-25.00	%
55	Opacity Data Recorder		Blank 16 (0)	------	Blank 6 (0)	===	0.00	

Optical Surface Dust Accumulation (% OP):

56	Retroreflector	Blank 17 (0)	---------	Blank 18 (0)	===	0.00	%
57	Transceiver	Blank 19 (0)	---------	Blank 20 (0)	===	0.00	%
58	Total	Blank 56 (0)	+	Blank 57 (0)	===	0.00	%

Optical Path length Correction Factor and Zero Offset Correction of Audit Filters:

59 LOW:	(1—	(1—	Blank 22)) (0) / 100))	Blank 4 (1)	*	(1-	Blank 45) (0) / 100)	*100=	0 %
60 MID:	(1---	(1—	Blank 23)) (0) / 100))	Blank 4 (1)	*	(1-	Blank 45) (0) / 100)	*100=	0 %
61 HIGH:	(1—	(1---	Blank 24)) (0) / 100))	Blank 4 (1)	*	(1-	Blank 45) (0) / 100)	*100=	0 %

MONITORING SOLUTIONS MODEL CEMOP-290 OPACITY CEMS
Performance Audit Data Summary

Auditor 0 Date MM/DD/YYYY
Source Biewer Sawmill Unit Unit #

PARAMETER		Blank No.	Audit Results		Specifications
Fault Lamps					
Blower failure		7	0	X	OFF
Filter Block		8	0	X	OFF
Window		9	0	X	OFF
Fault		10	0	X	OFF
Stack Exit Correlation Error		51	0.00		+/- 2% Op
Internal Zero Error	Panel	52	-25.00		+/- 4% Op
	Data	53	0.00		+/- 4% Op
Internal Span Error	Panel	54	-25.00		+/- 4% Op
	Data	55	0.00		+/- 4% Op
Optical Alignment Analysis		21	X	0	Centered
Optical Surface Dust Accumulation					
Retroreflector		56	0.00		<= 2% Op
Transceiver		57	0.00		<= 2% Op
Total		58	0.00		<= 4% Op
Calibration Error Analysis					
Mean Error					
	Low	62	0.00		
		71a	0.00		
	Mid	63	0.00		
		72a	0.00		
	High	64	0.00		
		73a	0.00		
Confidence Interval					
	Low	65	0.00		
	Mid	66	0.00		
	High	67	0.00		
Calibration Error					
	Low	68	0.00		<= 3% Op
	Mid	69	0.00		<= 3% Op
	High	70	0.00		<= 3% Op

Error Based On Six-Minute Averaged Data, From a Single Filter Insertion

D. Operational Test Period

If the opacity monitor is relocated or substantially refurbished, the opacity monitor must be recertified. Certification activities include all of the activities listed in the quarterly opacity field audit performance tests and completion of the operational test period. These activities may be done by either the McBain Facility or by an outside contractor.

Before conducting the operational testing, you must have successfully completed the previously discussed procedures and tests. Then, operate the opacity monitor for an initial 168-hour test period while the source is operating under normal operating conditions. If normal operations contain routine source shutdowns, include the sources down periods in the 168-hour operational test period. However, you must ensure that the following minimum source operating time is included in the operational test period: (1) For a batch operation, the operational test period must include at least one full cycle of batch operation during the 168-hour period unless the batch operation is longer than 168 hours or (2) for continuous operating processes, the unit must be operating for at least 50 percent of the 168-hour period.

Except during times of instrument zero and upscale calibration drift checks, you must analyze the effluent gas for opacity and produce a permanent record of the opacity monitor output. During this period, you may not perform unscheduled maintenance, repair, or adjustment to the opacity monitor. Automatic zero and calibration adjustments (i.e., intrinsic adjustments), made by the opacity monitor without operator intervention or initiation, are allowable at any time. At the end of the operational test period, verify and record that the opacity monitor optical alignment is still correct. If the test period is interrupted because of opacity monitor failure, record the time when the failure occurred. After the failure is corrected, you restart the 168-hour period and tests from the beginning (0-hour).

During the operational test period, perform the following test procedures:

a) Zero Calibration Drift Test.

At the outset of the 168-hour operational test period and at each 24-hour interval, the automatic calibration check system must initiate the simulated zero device to allow the zero drift to be determined. Record the opacity monitor response to the simulated zero device.

After each 24-hour period, subtract the opacity monitor zero reading from the nominal value of the simulated zero device to calculate the 24-hour zero drift (ZD).

At the end of the 168-hour period, calculate the arithmetic mean, standard deviation, and confidence coefficient of the 24-hour ZDs. Also calculate the sum of the absolute value of the mean and the absolute value of the confidence coefficient and report this value as the 24-hour ZD error.

b) Upscale Calibration Drift Test.

At each 24-hour interval after the simulated zero device value has been checked, check and record the opacity monitor response to the upscale calibration device.

After each 24-hour period, subtract the opacity monitor upscale reading from the nominal value of the upscale calibration device to calculate the 24-hour calibration drift (CD).

At the end of the 168-hour period, calculate the arithmetic mean, standard deviation, and confidence coefficient of the 24-hour CD. Also calculate the sum of the absolute value of the mean and the absolute value of the confidence coefficient and report this value as the 24-hour CD error.

Section 6.
Quality Control Activities

Quality control activities are performed to ensure that each opacity monitor's operation and maintenance are adequate and appropriate. Application of these activities ranges from installation to data handling and reporting procedures. Quality control activities rely upon a qualified and well-trained staff. Installation of each opacity monitor will be carried out in strict accordance with specifications submitted by Biewer Sawmill, McBain Facility.

A. Daily Calibration Drift Check

A two-point calibration drift (CD) check must be performed at least once per unit operating day (24 hours). Each opacity monitor's Remote Signal Processor automatically initiates a calibration check every 24 hours from a pre-set time. This starts a six minute cycle that is divided into Four one and a half minute segments. During these segments the zero, span, window soiling and stack correction factor of the monitor is checked. The monitor responses for both zero and upscale are automatically adjusted for the calibrations and recorded on a strip chart recorder.

On a daily basis, the following activities are conducted:

1) An automatic zero and span drift calibration for the opacity unit is initiated between midnight and 3:00AM.

   The Daily Zero Check and the Daily Cal Check are to be conducted in accordance with the requirements of ASTM D 6216-98.

2) At the beginning of the first shift, the Boiler Operators will record the high number value of the calibration on the strip chart near the calibration mark. Use the green pen marking for this, the red pen marks the six-minute block average and will not show the true limit.

3) If the opacity calibration high value is below 42.9% or above 48.9%, contact the Boiler Supervisor/Environmental Coordinator. The Boiler Supervisor/Environmental Coordinator will need to assign the appropriate maintenance work for the unit.

4) Record the low number value of the calibration on the strip chart near the calibration mark. Use the green pen marking for this, the red pen marks the six-minute block average and will not show the true limit.

5) If the low number value is above 3%, contact the Boiler Supervisor/Environmental Coordinator. The Boiler Supervisor/Environmental Coordinator will need to assign the appropriate maintenance work for the unit.

6) When maintenance is performed to restore the accuracy of the unit, a documented account of the work must be filed with the strip chart. The work performed must also be appropriately logged in the opacity maintenance log.

B. Out-of-Control Period

An opacity monitor shall be deemed out-of-control whenever the daily calibration drift exceeds 4% for five consecutive days, any calibration exceeds 8%, or a quarterly performance audit indicates unacceptable results. The beginning of the out-of-control period is the time corresponding to the completion of the fifth, consecutive daily CD check with a failed CD or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a failed CD. The end of the out-of-control period is the time corresponding to the completion of appropriate adjustment and subsequent successful CD check.

Any time the opacity monitor is declared "out of control" or "out of service", it cannot be used to show compliance with permit limits or data capture requirements and shall be considered downtime for reporting purposes. Based on the results of the daily calibration drift, adjustments or corrective actions may need to be implemented. At a minimum, the zero and span calibrations are automatically adjusted whenever the 24-hour drifts exceed two times the limit in PS 1,13.3(6) of 40 CFR 60, Appendix B, (as shown in Table 6-1). Corrective action does not refer to routine maintenance, but refers to the resolution of problems that occur on a non-routine basis.

Table 6-1
Criteria for Calibration Drift & Out of Control
(40 CFR 60, appendix B, PS 1, 13.3(6) & Appendix F, 4.3)

Monitor	Daily Calibration Drift	Daily Adjustment required	Out-of Control	
			Five(5) consecutive daily calibrations	Any calibration
Opacity	≤ 2.0 % Opacity	≥ 4.0 % Opacity	≥ 4.0 % Opacity	≥ 8.0% Opacity

If the drift exceeds the specified limits in Table 6-1, the failure is documented on the strip chart recorder by the Boiler Operators and the manual calibration procedure is initiated by Plant personnel to isolate the problem.

Section 7.
Monitor Maintenance

In accordance with 40 CFR 60, Appendix F, Section 3.0, the source owner or operator must "..develop procedures and operations for.. preventive maintenance of COMS" and .. a program of corrective action for malfunctioning COMS."

All maintenance of the opacity monitor can be classified into one of these three areas:

1. Routine preventive maintenance. This is a regularly scheduled set of activities designed to prevent problems before they develop.

2. Non-routine preventive maintenance. This set of activities is designed to prevent problems, which cannot be predicted. These procedures are performed on an as-needed basis. Non-routine preventive maintenance is not discussed in this plan since the procedural methods must be developed as the need dictates.

3. Corrective Actions. Those activities required to correct problems that occur due to equipment malfunction. Corrective actions are determined and performed by the maintenance technician or other qualified personnel based on the nature of the malfunction.

The following is the schedule of checks that must be followed to ensure reported data are reliable and the COMS operates dependably. The following includes information regarding when checks and audits should be performed and when a situation indicates the need for corrective actions. It is essential the personnel conducting the checks and audits completely document the audits in the opacity maintenance log. This includes the recording of any comments concerning the condition of the COMS. Corrective actions should be initiated immediately upon identifying a problem or malfunction.

A. Preventive Maintenance

The Boiler Operators will schedule routine maintenance and ensure that all routine Preventive Maintenance is completed on schedule.

The McBain Facility's Maintenance Department will only perform minimal maintenance on the COMS. The McBain Facility has contracted Monitoring Solutions to provide quarterly preventive maintenance, including parts, for the opacity systems. Activities performed by a Monitoring Solutions technician during a regular preventive maintenance visit typically include changing the opacity purge filters and performing field audit activities (as listed in Section 5 (C)).

The following table represents activities that may be performed by either the Maintenance Department and/or the Monitoring Solutions technician.

Table 7-1

No.	Preventive Maintenance	Frequency		
		Daily (1)	Monthly (2)	Quarterly
1	Check and plot automatic calibration sequence results	X		
2	Check window soiling, clean window and retroreflector before automatic correction reaches 4% limit.	X		X
3	Check purge filters, clean or replace			X
4	Check blowers for operation			X
5	Check blower hoses			X
6	Verify alignment of system			X
7	Check mounting plates for security			X
8	Inspect transmissometer components			X
9	Enter maintenance performed in log book	As required		
10	Remove all debris from inside and around shroud cavity.			X
11	Check recording devices for paper, ink, etc.	As required		
12	Zero and span data presentation equipment			X
13	40 CFR 60, Appendix F audit			X

(1) Routine daily checks do not require tools as no actual maintenance is performed. Checks are visual to assure proper readout from the system and absence of impending conditions that require immediate attention.

(2) Routine monthly maintenance will require the following tools and test equipment:

- Digital Volt Meter
- Standard technicians' tools such as soldering iron, screwdrivers, nut drivers, pliers, etc.

B. Corrective Actions

The McBain Facility has contracted Monitoring Solutions to also provide support to the McBain Facility on an as needed basis, including phone support and emergency visits, in the event of an opacity system hardware malfunction.

The following corrective actions may be performed by the Instrument/Boiler Technician, as appropriate, for the COMS malfunctions listed in Table 7-2. In the event that an opacity monitor requires further assessment or corrective action, the Instrument/Boiler Technician would contact a Monitoring Solutions technician, who would then access the situation and take appropriate action.

Table 7-2

No.	Issue/Problem	Corrective Action
1	Dusty Window/Reflective surface	1. Open either the Transceiver or Reflector windows by unbuckling four (4) clasps and swinging the unit housing to the side. 2. Clean all foreign material from the housing cavities. (Note: extreme care must be taken in cleaning the optical surfaces.) 3. After cleaning, close the Transceiver and Reflector housings securely. 4. Recalibrate the monitor.
2	Dirty Air Filters	Note: Filters are non-reusable 1. Remove the dirty filter 2. Replace with a new filter. 3. Empty the pre-filter chamber before the dust level reaches the "full" mark, if required.

The following actions will be taken in response to exceedences and/or alarms:

Table 7-3

No.	Situation	Alarm	Problem/Corrective Action
1	Opacity Exceedence	If the opacity emission limits are exceeded, an alarm will sound in the Boiler Operatorss' control room.	1. The Boiler Operators investigates the cause of the exceedence, if the boiler operation/malfunction is the cause; he takes the necessary corrective actions. If the cause is not the boiler (emission source), the Production Foreman is notified. 2. The Production Foreman will notify the Maintenance Department. 3. The Maintenance Department will implement the appropriate COMS corrective action.
	Opacity monitor Error	Error message appears on opacity display in control room	1. Record the information on the Opacity Log (Figure 1) and notify the Power House Foreman. 2. The Power House Foreman will contact the Maintenance Department. 3. The Maintenance Department will notify the Plant Manager that the monitor is down and will attempt to identify the problem based on the fault table located in the users O& M manual. 4. The Maintenance Department will implement the appropriate corrective action. 5. If the unit cannot be repaired by the Maintenance Department, the Plant Manager is contacted. 6. The Plant Manager or Maintenance Department will contact a Monitoring Solutions technician for additional instructions and/or to arrange for a service call as appropriate.

C. Spare Parts

The following is a list of the parts typically supplied by Monitoring Solutions for the opacity systems for regular quarterly preventive maintenance.

Table 7-4

Durag DR-290 Opacity Monitor Recommended Spare Parts		
Monitoring Solutions' PN	**Description of Parts**	**Quantity**
310-00432	Opacity Blower Filter	4

Section 8. References

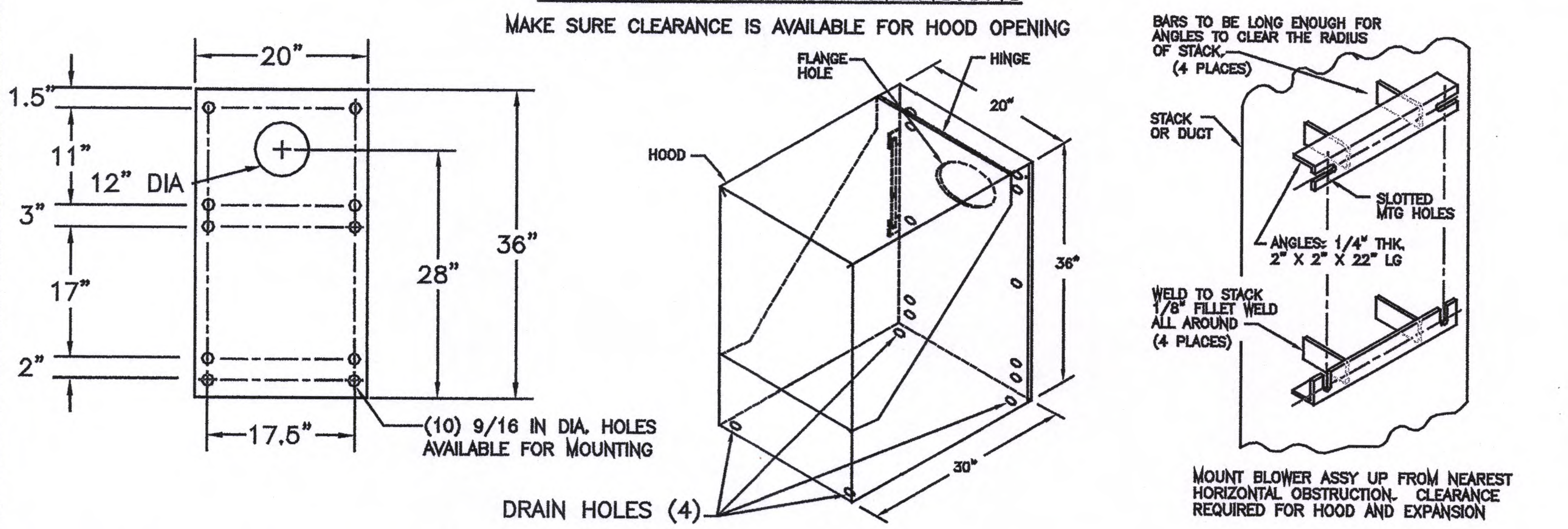
1. 40 CFR 60 Appendix B, Performance Specification 1 and Subpart Db, "Specifications and Test Procedures for Continuous Opacity Monitoring Systems in Stationary Sources"
2. 40 CFR 60 Appendix F, "Quality Assurance Procedures.
3. ASTM D6216-98, "Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications"
4. "Durag Model D-R 290 Dust and Opacity Monitor Installation and Operation Manual", Durag, Inc
5. "Durag Model D-R 290 Service Manual", Durag, Inc.
6. Michigan DEQ Administrative Code, Rule 336.1201
7. Biewer Sawmill, McBain Facility Operating Permit No. 286-05

NO. | DATE | BY | CKD | APD | REVISION
A | 11/06/06 | EJM | WAN | EJM | INITIAL RELEASE
GENERAL OVERVIEW LAYOUT
REFLECTOR ASSY
TRANSCEIVER ASSY
OUTLET
FLUE GAS FLOW
STACK WALL
STACK DISPLAY AZ
JBOX
115V 20A WIRING HOOK-UP BY CLIENT
REFLECTOR TO TRANCEIVER INTERFACE CABLE SUPPLIED AND INSTALLED BY CLIENT
TO CONTROL ROOM DISPLAY BY CLIENT
BLOWER MOTOR DATA:
MODEL: VFC309P-5T
CONNECTIONS:
TIE 115V HOT L1 TO P1
TIE T1 TO T3
TIE NEUTRAL T2 TO T4
TIE GRN TO CHASSIS
(FOR 220V, SEE MOTOR NAMEPLATE)
NOTE: IMPROPER CONNECTIONS WILL CAUS WRONG ROTATION AND COULD CAUSE DAMAGE TO THE SYSTEM.
USE SEPERATE BREAKER/DISCONNECT FOR EACH BLOWER MOTOR
REMOTE DISPLAY UNIT PHYSICAL CHARACTERISTICS
10 INCHES
10 INCHES
DURAG
D-R 290 AW
6 INCHES
5.5 INCHES
0.5 INCHES
5/32 INCH HOLE
3/16 INCH
7.0 INCH
1/8 INCH
5/8 INCH
CONTROL ROOM UNIT TERMINAL DESIGNATIONS
PLUG 2
PLUG 1
NOTE: TO ENABLE CHANGES IN SETUP, JUMPER MUST BE INSTALLED BETWEEN 2D & 2Z
NOTE: CONTACT USED TO INITIATE A REMOTE CALIBRATION ACTIVATES UPON OPENING OF CONTACT (5 SEC)
OPACITY DATA NOT VALID (NO) — MEASURING RELAY 6 (NC)
OPACITY FAULT (C) — WARNING RELAY 5 (C)
MEASURING RELAY 6 (C) — OPACITY DATA NOT VALID (C)
WARNING RELAY 5 (NO) — OPACITY FAULT (NO)
OPACITY ZERO (C) — WINDOW CHECK RELAY (C)
OPACITY SPAN (C) — UPSCALE CHECK RELAY (C)
WINDOW CHECK RELAY (NO) — OPACITY ZERO (NO)
UPSCALE CHECK RELAY (NO) — OPACITY SPAN (NO)
NEUTRAL / HOT / LIVE / GROUND — 120VAC (10A) FROM CLIENT
RS422 CONNECTION FROM STACK 1, 3
2, 4 RS422 CONNECTION FROM STACK
TEST METER POINT # 2 (+)
TEST METER POINT # 2 (-)
ANALOG OUTPUT # 2 (+)
ANALOG OUTPUT # 2 (-)
TEST METER POINT # 1 (+)
TEST METER POINT # 1 (-)
ANALOG OUTPUT # 1 (+)
ANALOG OUTPUT # 1 (-)
(SHD)
OPACITY OUTPUT #2 (+)
OPACITY OUTPUT #2 (-) 4-20MA
OPACITY OUTPUT #1 (+)
OPACITY OUTPUT #1 (-) 4-20MA
OUTPUTS ARE AN AVERAGE BASED ON THE INTEGRATION TIME IN THE SETUP FOR EACH OUTPUT
OUTPUT #1 - TYP. SETUP 5 SEC
OUTPUT #2 - TYP. SETUP 1 OR 6 MIN ROLLING
OUTPUT #2 WILL HOLD LAST VALID VALUE DURING CALIBRATION
TERMINAL LAYOUT
BACK OF CONTROL ROOM UNIT
D-R 290AW
NEUTRAL
HOT / LIVE
GROUND
CONTROL ROOM UNIT TO BE MOUNTED BY CLIENT
REFLECTOR ASSY
BLOWER SWITCH 310-00015
FILTER SWITCH 310-00014
PRESS. SW
VAC. SW
N.C.
N.O.
BLK
WHT
RED
TRANSCEIVER ASSY
BLOWER SWITCH: "OPEN" W/PRESSURE (NORMAL "CLOSED" LOSS OF POWER (FAULT)
FILTER SWITCH: "OPEN" W/NORMAL VACUUM ACROSS FILTER "CLOSED" FILTER BLOCKING>50% (FAULT)
ERROR CODES:
100: TRANSCEIVER SIDE BLOWER FAULT
200: TRANSCEIVER SIDE FILTER PLUGGED
300: REFLECTOR SIDE BLOWER FAULT
400: REFLECTOR SIDE FILTER PLUGGED
ERROR 100
ERROR 200
ERROR 300
ERROR 400
DR 290-AZ STACK DISPLAY
TO BLOWER
INPUT POWER 120VAC, 60HZ 15 AMPS BY CLIENT
CABLE SUPPLIED AND INSTALLED BY CLIENT (RECOMMEND BELDEN 8465)
BLK1 RED1 BLK2 RED2
CABLE TO BE SUPPLIED AND INSTALLED BY CLIENT
WHEN USING EXISTING CABLE(S), THERE MUST ADEQUATE SLACK FOR THE NEW SYSTEM OR AN INTERPOSING J-BOX OR TB WILL NEED TO BE SUPPLIED. CABLE MUST BE IN GOOD OPERATING CONDITION AND SUITABLE FOR SERIAL COMMUNICATION FOR THE LENGTHS IN SERVICE.
USE OF EXISTING CABLE IS AT THE CLIENT'S OWN RISK!
RECOMMENDED RS422 SIGNAL CABLE: THREE TWISTED PAIR, 22AWG W/OVERALL SHIELD
BELDEN 1420A OR EQUIVALENT RUN IN CONDUIT
BELDEN 88103 OR EQUIVALENT TRAY RATED
RECEIVED MAR 29 2007 AQD-CADILLAC
CLIENT: BIEWER SAWMILL MCBAIN, MI
WELLONS, INC.
MONITORING SOLUTIONS
MODEL 290 DUAL BLOWER OPACITY SYSTEM
ELECTRICAL INTERCONNECT
DRAWN 11/06/06 EJM
DESIGN 11/06/06 EJM
CHECKED 11/06/06 WAN
APPRD 11/06/06 EJM
SCALE NONE
MONITORING SOLUTIONS P.A. NO. 30408
CAD FILE NO. 3408531
DRAWING NO. 53
SHEET 1 OF 3
REV A
WELLONS # 3E-63681-1

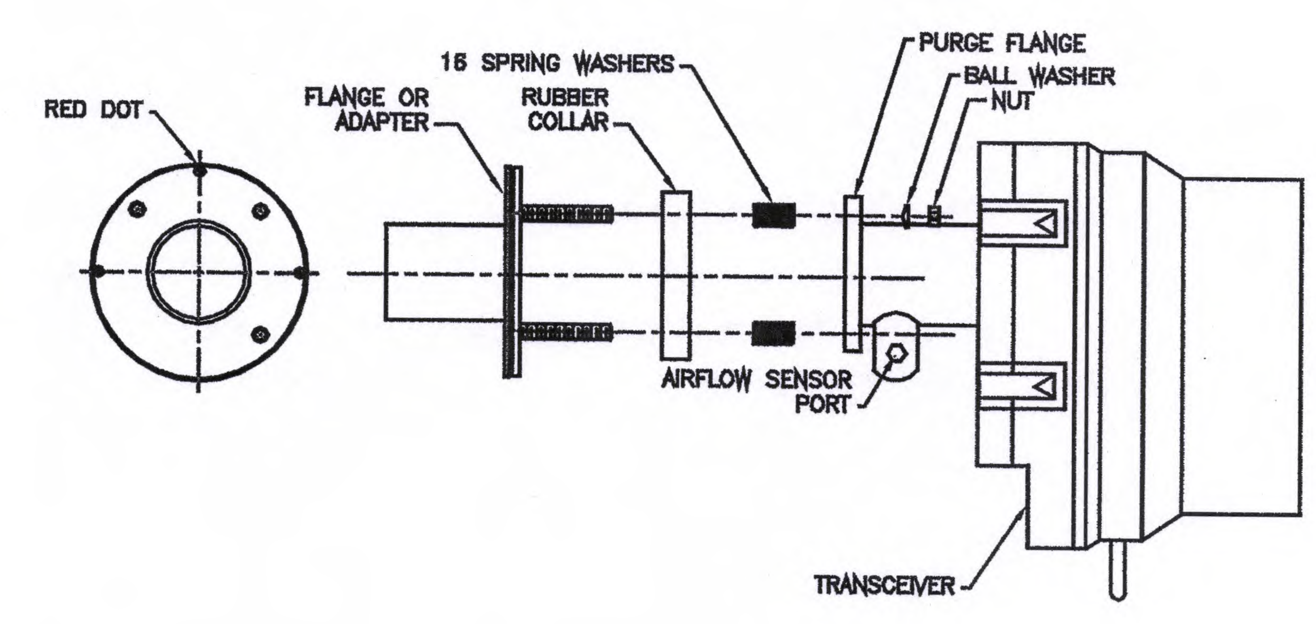
NO.	DATE	BY	CKD	APD	REVISION
A	11/06/06	EJM	WAN	EJM	INITIAL RELEASE

BLOWER MOUNTING DIMENSIONS

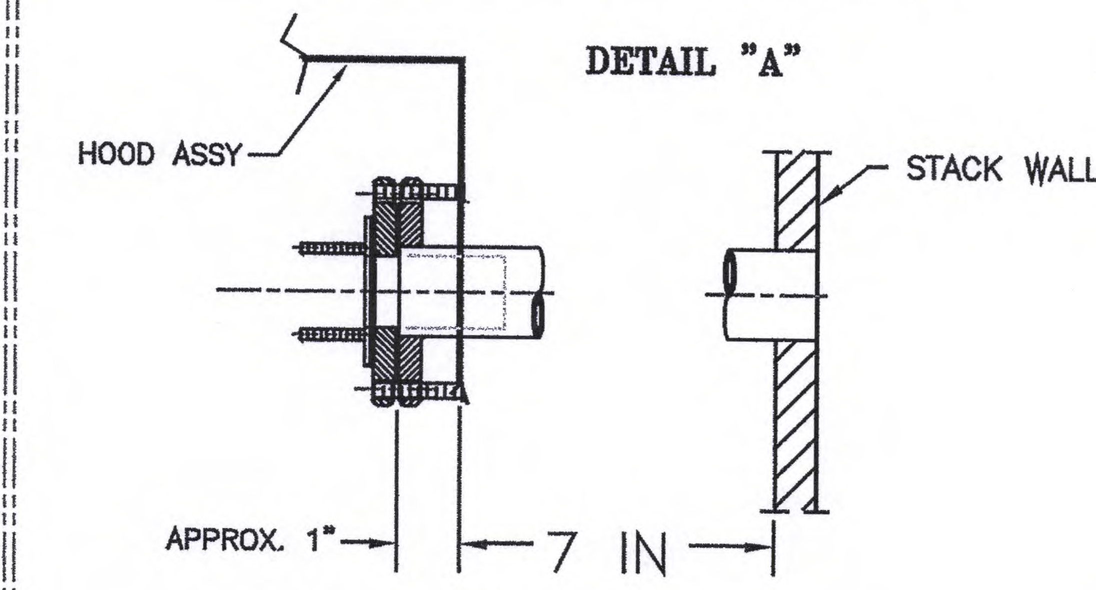
MAKE SURE CLEARANCE IS AVAILABLE FOR HOOD OPENING



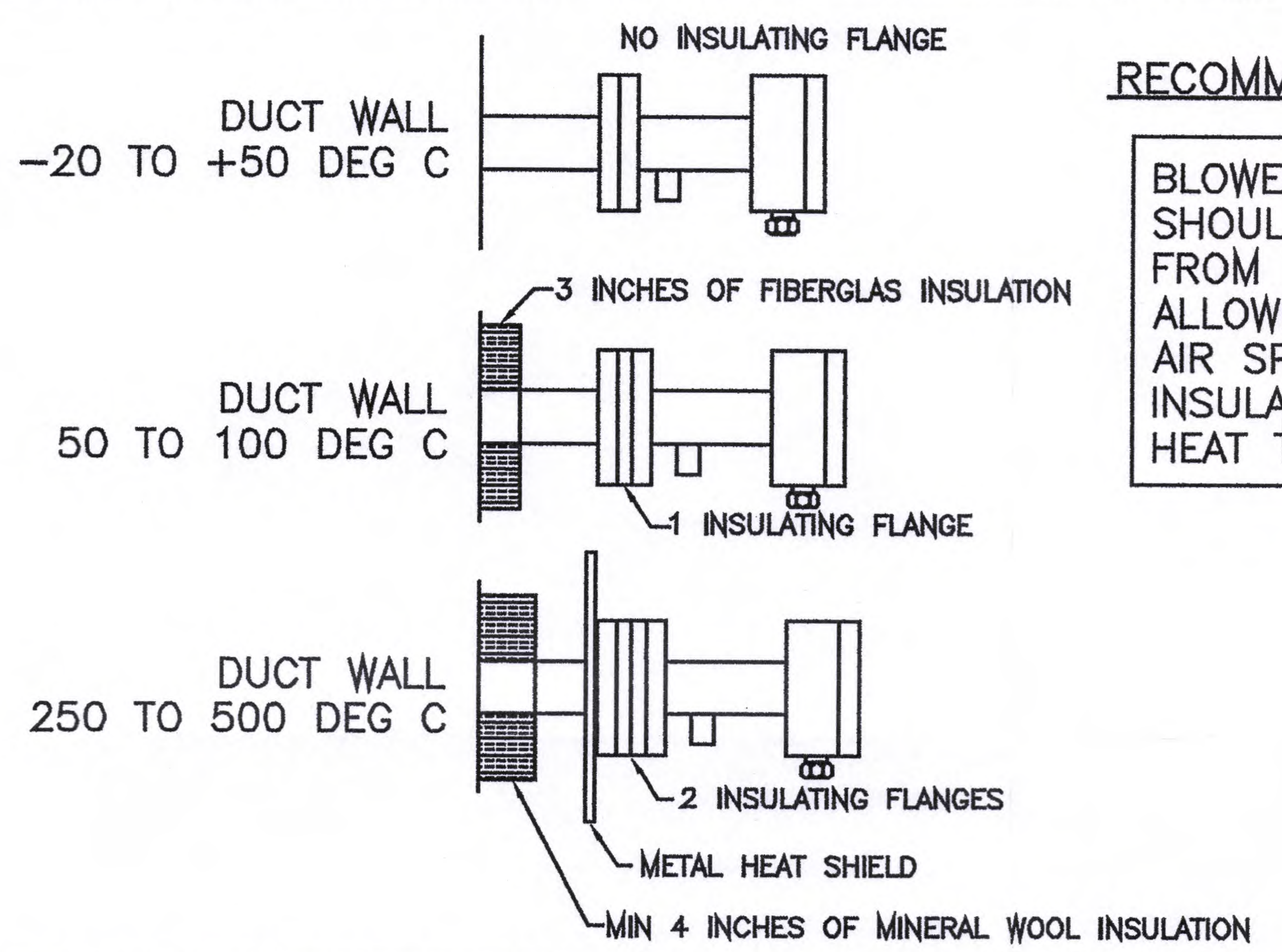
TRANSCEIVER/REFLECTOR MOUNTING INFORMATION



PORT & FLANGE INFORMATION

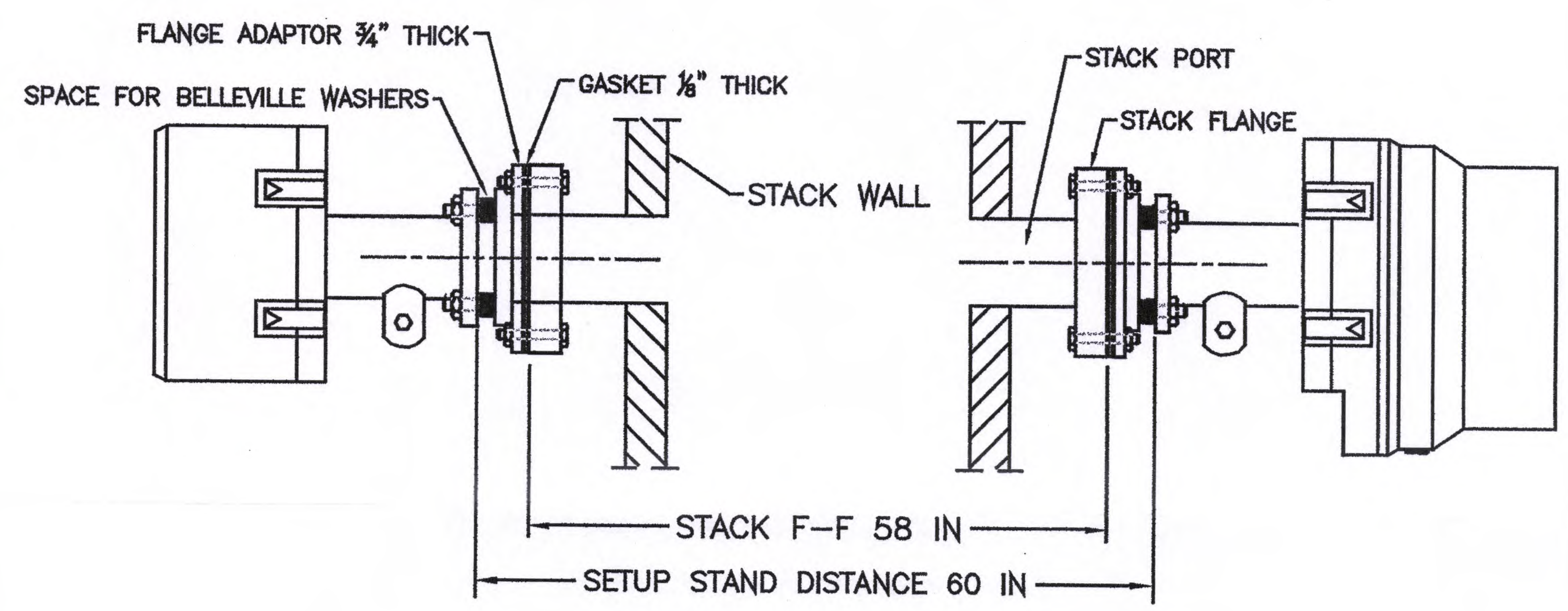


RECOMMENDED INSULATION

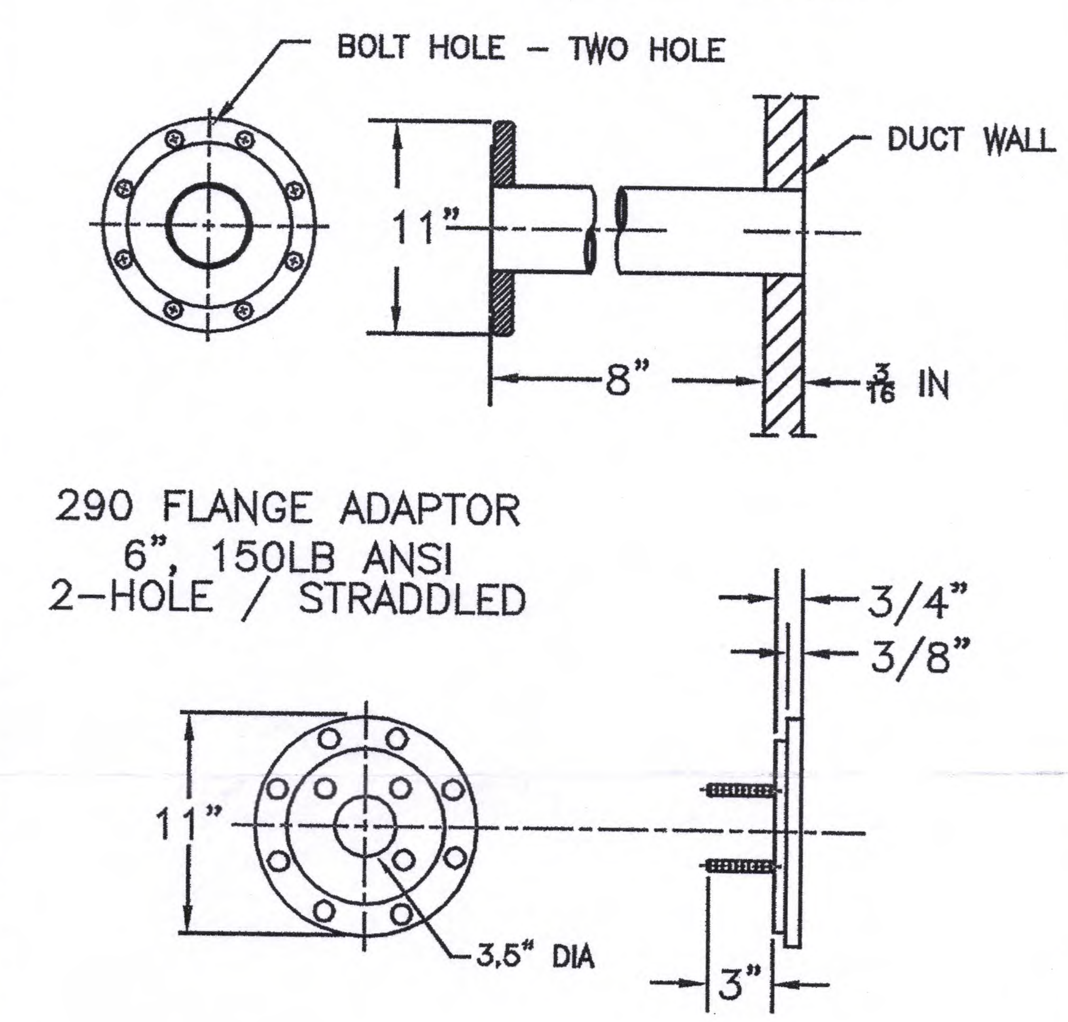


BLOWER ASSEMBLIES SHOULD BE OFFSET FROM THE STACK WALL ALLOWING ADEQUATE AIR SPACE OR INSULATION TO PREVENT HEAT TRANSFER

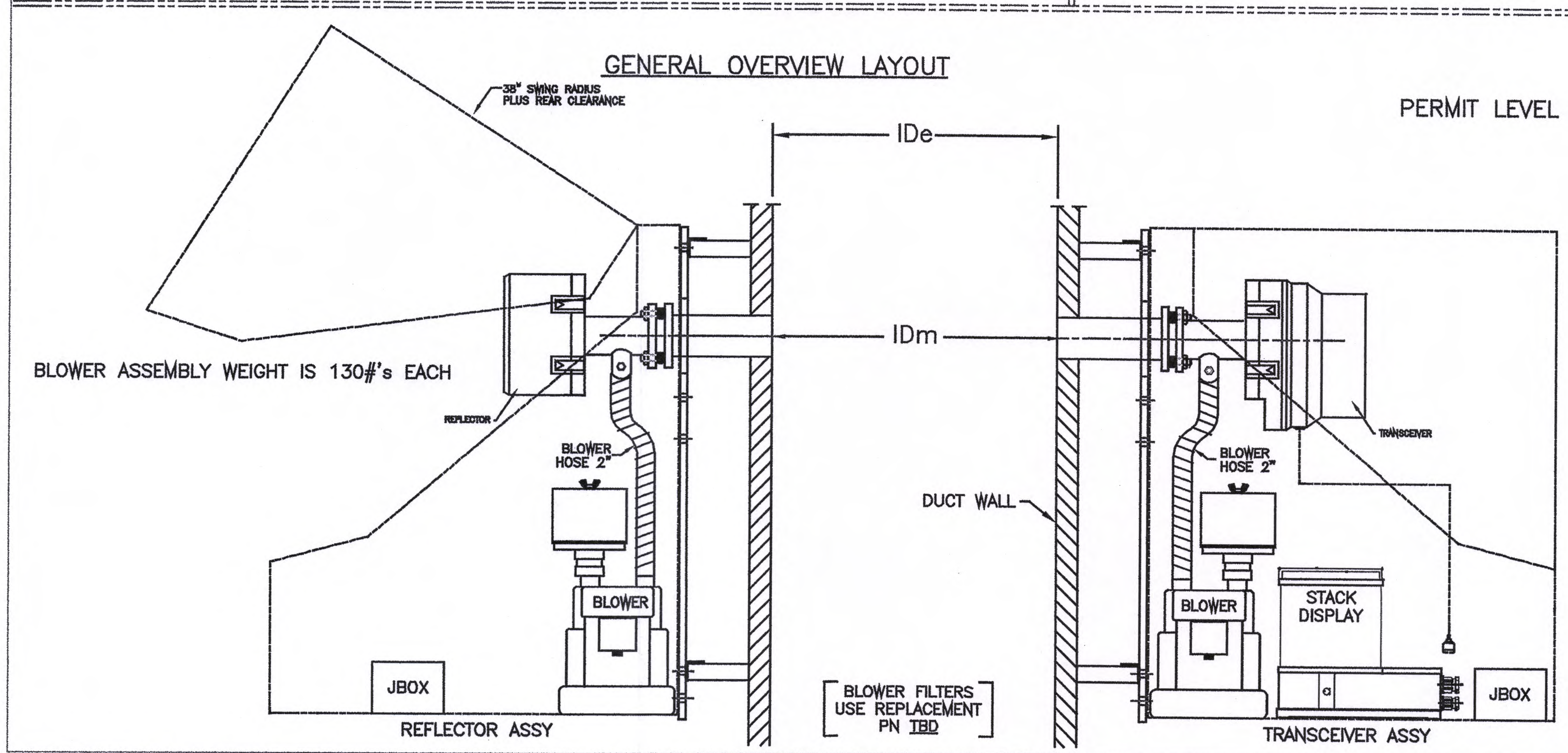
STACK FLANGE TO FLANGE



PORT & FLANGE INFORMATION



GENERAL OVERVIEW LAYOUT



BLOWER FILTERS USE REPLACEMENT PN TBD

PERMIT LEVEL FOR SELECTION OF AUDIT FILTERS 20%

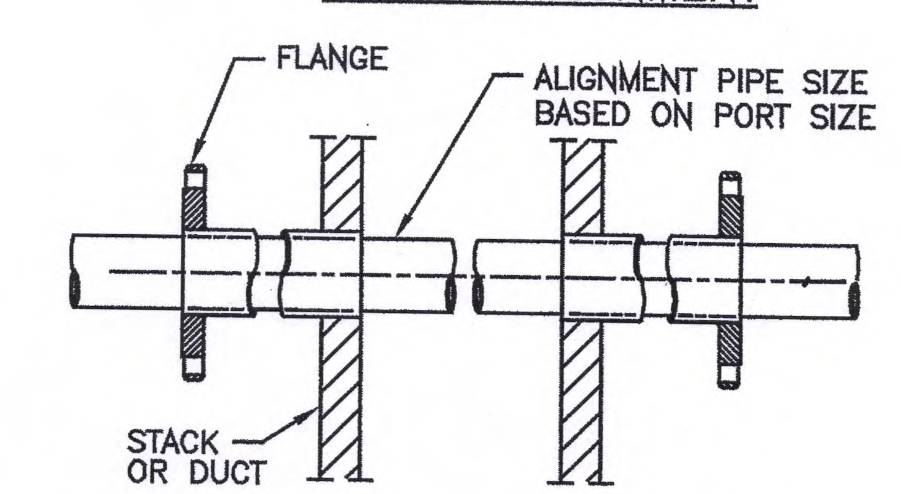
STACK CORRECTION FACTOR (SCF):

$$\frac{IDe}{IDm} \quad \frac{42"}{42"} = 1.0$$

SAMPLE POINT
PRESSURE: +/- 1 ("W.C.)
TEMPERATURE: 250-450 (°F)

1 HP BLOWER 6" PORT TO 15" W.C.

FLANGE ALIGNMENT



NOTE: FLANGE MUST BE ALIGNED WITHIN 1 DEGREE OF EACH OTHER, HORIZONTALLY AND VERTICALLY. THIS IS CRITICAL FOR PROPER OPERATION

CAUTION

TRANSCEIVER AND REFLECTOR SHOULD NOT BE MOUNTED UNTIL BLOWER MOTOR(S) HAVE BEEN POWERED AND CORRECT ROTATION FOR PURGING HAVE BEEN VERIFIED.

CLIENT: BIEWER SAWMILL MCBAIN, MI

WELLONS, INC.

MONITORING SOLUTIONS
4440 S. HIGH SCHOOL RD. * SUITE D * INDPLS, IN 46241 * 317-856-9400 * FAX: 317-856-9410
56 RT 173 * SUITE B1 * HAMPTON, NJ 08827 * 908-713-0172 * FAX: 908-713-0221

	DATE	INT.
DRAWN	11/06/06	EJM
DESIGN	11/06/06	EJM
CHECKED	11/06/06	WAN
APPRD	11/06/06	EJM
SCALE	NONE	

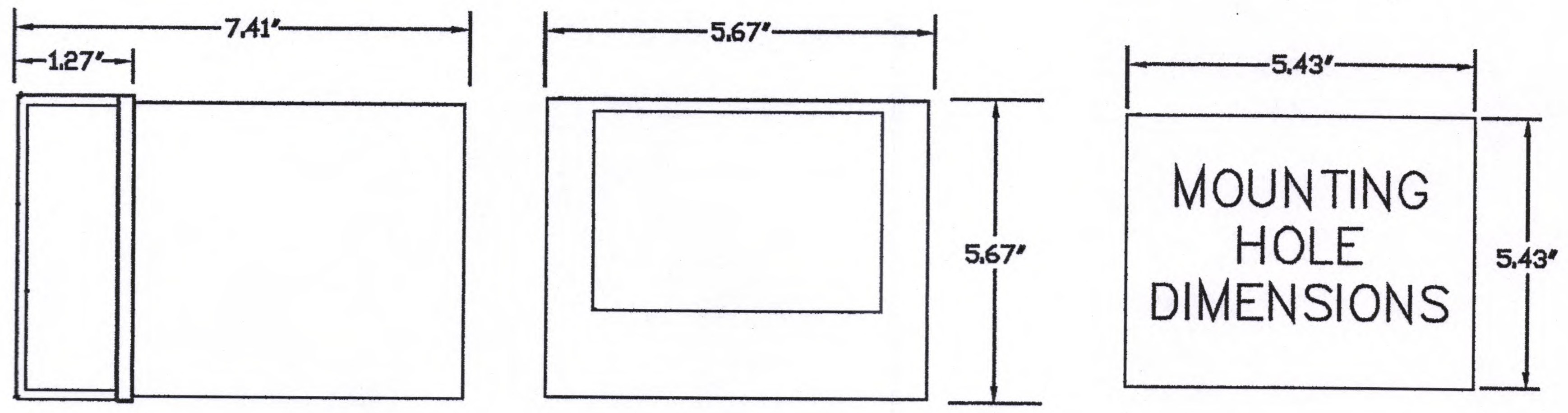
MODEL 290 DUAL BLOWER OPACITY SYSTEM
MECHANICAL DETAIL

MONITORING SOLUTIONS P.A. NO.	CAD FILE NO.	DRAWING NO.	SHEET	REV
3408	3408532	53	2 OF 3	A

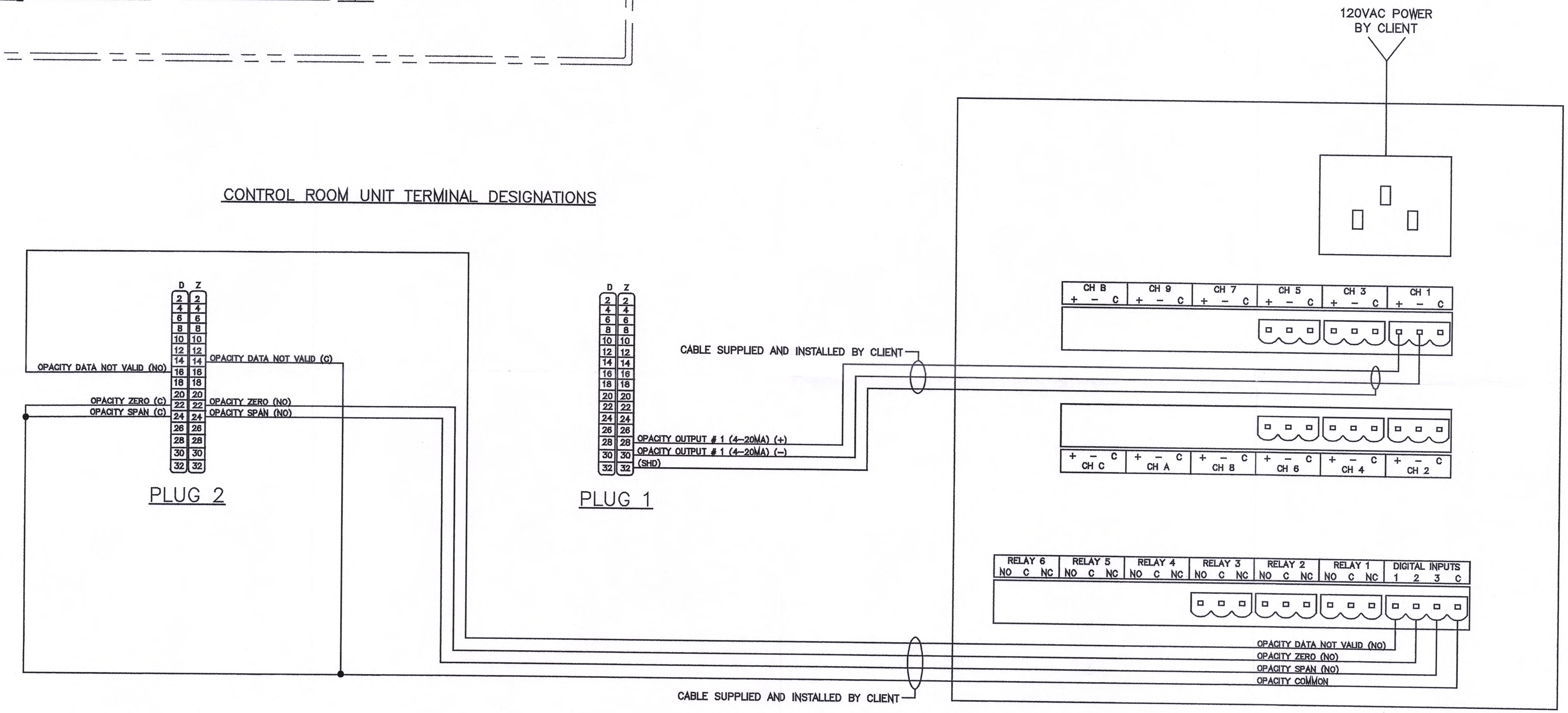
WELLONS # 3E-63681-2

NO.	DATE	BY	CKD	APD	REVISION
A	11/06/06	EJM	WAN	EJM	INITIAL RELEASE

CHART RECORDER PHYSICAL CHARACTERISTICS

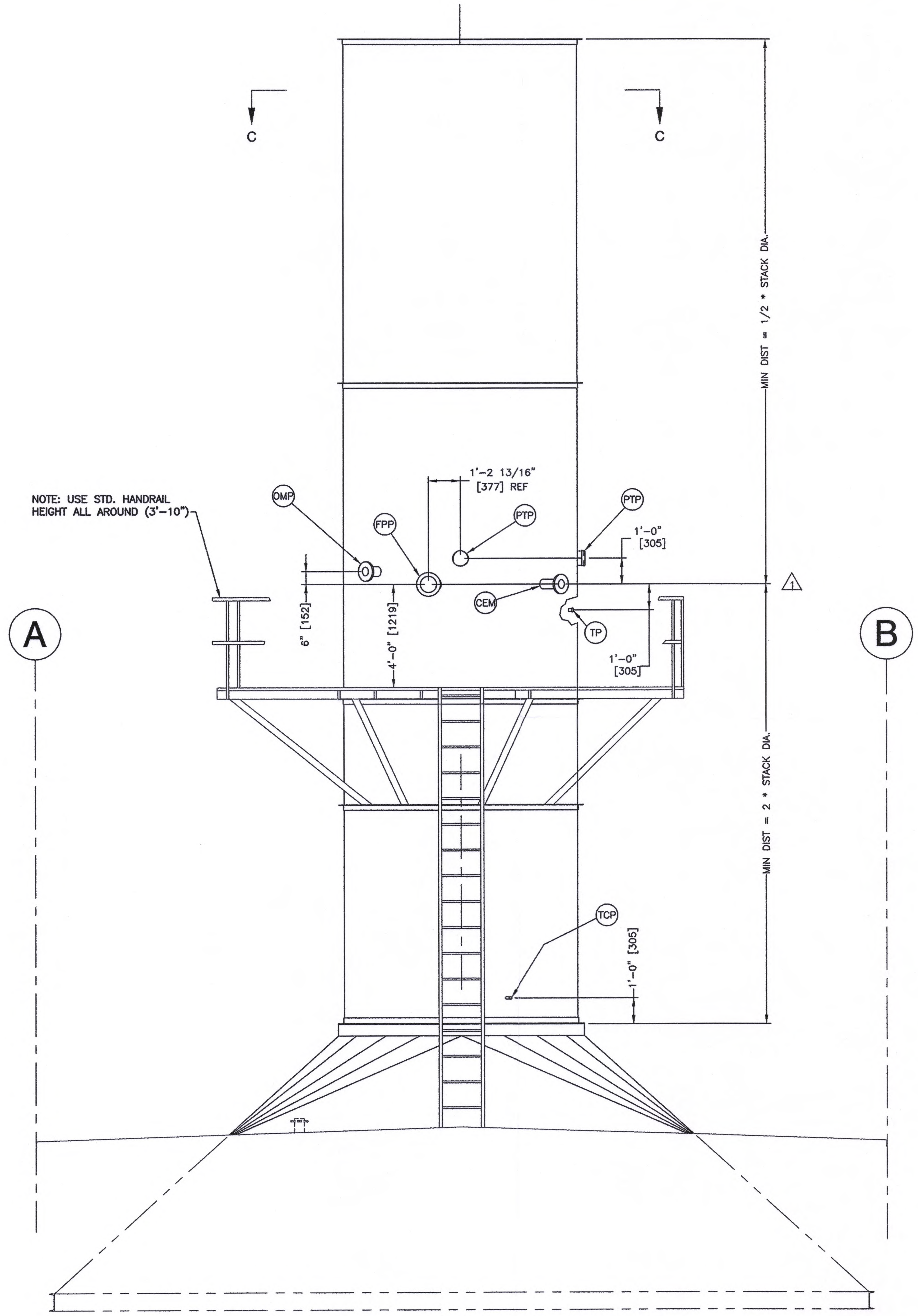


CONTROL ROOM UNIT TERMINAL DESIGNATIONS

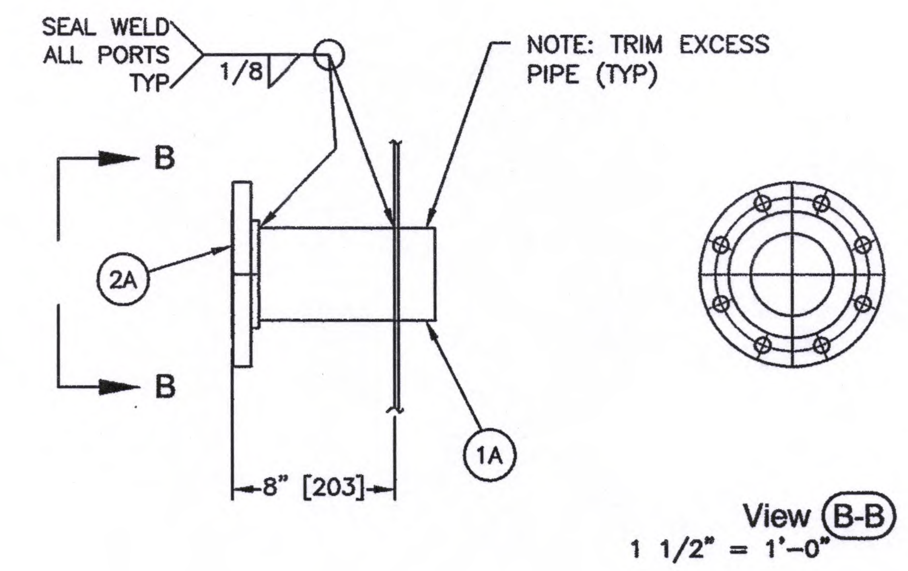


CLIENT: BIEWER SAWMILL MCBAIN, MI	MONITORING SOLUTIONS 4440 S. HIGH SCHOOL RD. * SUITE D * INDPLS, IN 46241 * 317-856-9400 * FAX: 317-856-9410 56 RT 173 * SUITE B1 * HAMPTON, NJ 08827 * 908-713-0172 * FAX: 908-713-0221			
WELLONS, INC.		DATE	INT.	MODEL RD8800 CHART RECORDER
	DRAWN	11/06/06	EJM	
	DESIGN	11/06/06	EJM	
	CHECKED	11/06/06	WAN	
	APPRD	11/06/06	EJM	
	SCALE	NONE		
MONITORING SOLUTIONS P.A. NO.	CAD FILE NO.	DRAWING NO.	SHEET	REV
30408	3408531	53	3 OF 3	A

WELLONS # 3E-63681-3

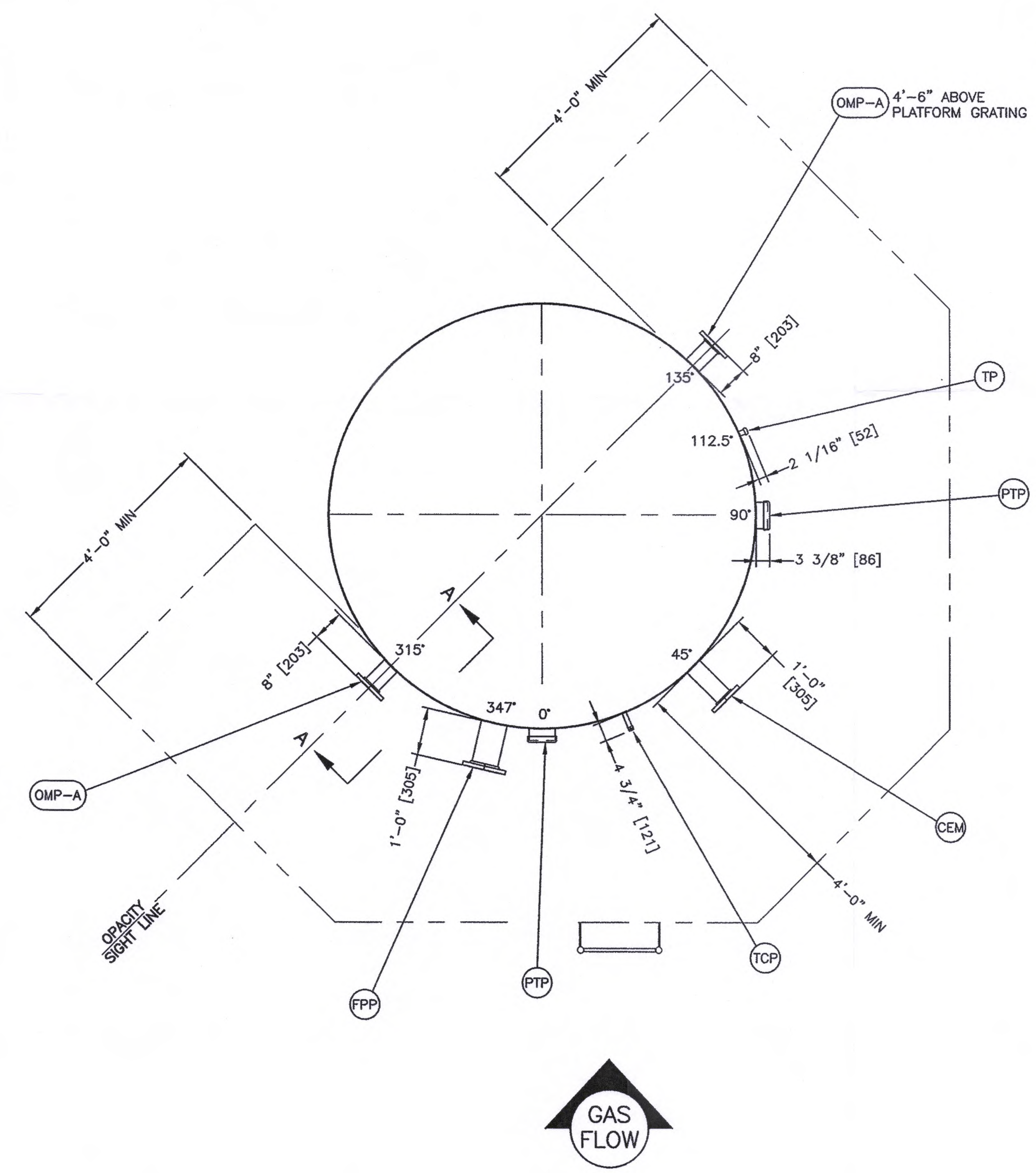


VIEW LOOKING W/ FLOW
3/8" = 1'-0"



SECTION A-A
1 1/2" = 1'-0"

OPACITY MONITOR PORT (OMP-A) ASSEMBLY (TYP)



View C-C
1/2" = 1'-0"
STACK PORTS LAYOUT

ITEM	QTY	DESCRIPTION		WT
		STANDARD ON MOST STACKS		
* OMP-A	2	OPACITY MONITOR PORT ASSEMBLY		
1A	2	PIPE, Ø4", SCH 40, A53-A x	0'-10"	
2A	2	FLANGE, Ø4", 150#, RF, SO, FS, A105, ST WT BORE		
* OMP-B	2	OPACITY MONITOR PORT ASSEMBLY		
1B	2	PIPE, Ø6", SCH 40, A53-A x	0'-10"	
2B	2	FLANGE, Ø6", 150#, RF, SO, FS, A105, ST WT BORE		
PTP	2	PERFORMANCE TEST PORT ASSEMBLY		
3	2	PIPE, Ø6", SCH 40, A53-A, T.O.E. x	0'-3"	
4	2	PIPE CAP, Ø6", 150#, THD, M.I.		
TP	1	TEST PORT		
5	1	PIPE, Ø1", SCH 40, A53-A, T.O.E. x	0'-2"	
6	1	PIPE CAP, Ø1", 150#, THD, M.I.		
TCP	1	THERMOCOUPLE PORT		
7	1	PIPE, Ø3/4", SCH 40, A53-A, T.O.E. x	0'-4 3/4"	
8	1	PIPE COUPLER, Ø3/4", THD		
9	1	PIPE PLUG, Ø3/4", THD		
		OPTIONAL COMPONENTS		
CEM	1	CONTINUOUS EMISSION MONITOR PORT ASSEMBLY		
10	1	PIPE, Ø4", SCH 40, A53-A x	1'-2"	
2A	1	FLANGE, Ø4", 150#, RF, SO, FS, A105, ST WT BORE		
FPP	1	FLOW PITOT PORT		
11	1	PIPE, Ø6", SCH 40, A53-A x	1'-2"	
12	1	FLANGE, Ø6", 150#, RF, SO, FS, A105, ST WT BORE		

* NOTE: OPACITY MONITOR PORT (OMP) WILL CONSIST OF Ø4" OR Ø6" PIPE & FLANGE DEPENDING ON CUSTOMER SPECIFICATIONS.

FEB 1 6 2007

JOB	REV	REVISION	BY	DATE	CHECKED	DATE
2429	1	Modified Port Locations	MJS	27APR06	[signature]	4/27/06

WELLONS P.O. BOX 1030 SHERWOOD, OR 97140-1030

8260

STACK STANDARD
PORT LAYOUT INSTALLATION

DO NOT SCALE THIS DRAWING
SCALE: VARIES
DRAWN: MJS DATE: 09FEB06
CHECKED: [signature] APPROVED
DRAWING NUMBER: 3E-62721 SHEET: 1 REV: 1

REF 3E-57666

JOB	REV	REVISION	BY DATE	CHECKED DATE
2517	1	Corrected Dimension Text Size	MJG 07AUG06	
		ISSUED FOR CONSTRUCTION		

WELLONS 2525 W. Firestone Ln. Vancouver, WA 98660 1-800-WELLONS

DO NOT SCALE THIS DRAWING
SCALE 1/4"=1'-0"

8120 B2517

DRAWING M.S. DATE 02FEB'06

BOILER BREECHING
I.D. & F.D. SYSTEM SECTIONS

CHECKED WJR 8AUG06 APPROVED

BIEWER SAWMILL INC.
McBAIN, MICHIGAN

DRAWING NUMBER 3H-62542-3 REV 1

REF

FEB 1 6 2007

2517	1	Corrected Dimension Text Size	MJG 07AUG06	
JOB	REV	REVISION	BY DATE	CHECKED DATE

WELLONS
2525 W. Firestone Ln.
Vancouver, WA 98660
1-800-WELLONS

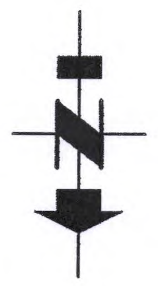
DO NOT SCALE THIS DRAWING
SCALE 1/4"=1'-0"

8120 B2517
DRAWN M.S. DATE 02FEB'06
CHECKED WJR 8AUG06
APPROVED

BOILER BREECHING
I.D. & F.D. SYSTEM ELEVATION

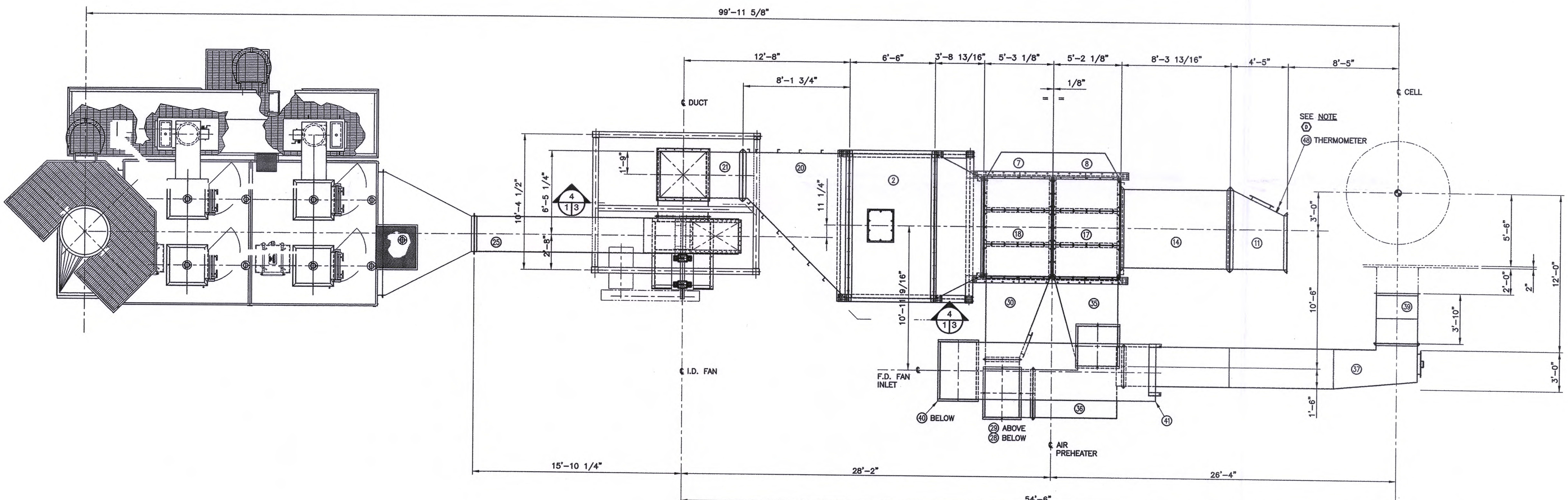
BIEWER SAWMILL INC.
McBAIN, MICHIGAN

DRAWING NUMBER 3H-62542-2 REV 1



ITEM	QTY	DESCRIPTION	PART NUMBER	REQN	WT
26	1	I.D FAN TO ESP INLET DUCT	3H–62551	1279	1400
27	1	F.D.FAN ASSY. C/W MOTOR & DRIVES	?	?	?
28	–	F.D.AIR DUCT WITH BYPASS DAMPER	3H–62543	1308	608
29	1	HEAT EXCHANGER INLET ELBOW	3H–18639	1308	452
30	1	HEAT EXCHANGER INLET TRANSITION	3H–18640	1308	1186
31	1	F.D. AIR DUCT DAMPER TRANSITION	3H–62544	1308	238
32	1	BY–PASS QUADRANT & HANDLE ASSY.	2H–14103	1313	51
33	1	BY–PASS CONNECTION ROD	1B–49194	1313	18
34	1	BY–PASS DAMPER ARM	1H–14691	1313	9
35	1	HEAT EXCHANGER OUTLET DUCT ASSY.	3H–62546	1310	1118
36	1	HEAT EXCHANGER DUCT TEE	3H–56189	1310	945
37	1	F.D. DELIVERY DUCT	3H–56208	1311	1715
38	1	F.D. DELIVERY DUCT 90° ELL	3B–56181	1311	469
39	1	F.D. DELIVERY DUCT TEE	3B–56187	1311	1157
40	1	F.D. INLET DUCT @ FAN	3H–62545	1308	2295
41	1	F.D. INLET DUCT @ BUILDING	3B–56178	1308	1625
42	–	–	–	–	–
43	–	–	–	–	–
44	–	–	–	–	–
45	–	–		–	–
46	–	–	–	–	–
47	1	THERMOMETER (200°F TO 1000°F)	–	1299	–
48	2	THERMOMETER (50°F TO 550°F)	–	1299	–
49	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–

ITEM	QTY	DESCRIPTION	PART NUMBER	REQN	WT
1	1	I.D. FAN ASSY. W/ MOTOR & DRIVES		?	–
2	1	MULTICONE BODY ASSY.	3B–7399	?	4591
3	1	MULTICONE HOPPER ASSY. (UPPER)	3B–18539–1	?	2194
4	1	MULTICONE HOPPER ASSY. (LOWER)	3B–18539–2	?	1059
5	1	ROTARY VALVE		–	–
6	2	HEAT EXCHANGER ASSY. (7'–6" x 10'–3 1/2") 676 TUBES	3H–11480–1 & 2	?	23239
7	1	HEAT EXCHANGER TURNING SECT. W/ ACCESS DOOR (R.H.)	3H–18741–1	?	–
8	1	HEAT EXCHANGER TURNING SECT. W/O ACCESS DOOR	3H–18741–2	?	–
9	1	ASH HOPPER ASSY. W/ ACCESS DOOR (FOR 676 H.E.)	3H–27267–1	?	–
10	1	ASH HOPPER ASSY. W/O ACCESS DOOR (FOR 676 H.E.)	3H–27267–2	?	–
11	1	BREECHING TRANSITION SECTION	3B–48896	1276	1182
12	–	–		–	–
13	–	–		–	–
14	1	HEAT EXCHANGER INLET DUCT	2B–56172	1276	1537
15					
16	1	I.D. FAN OUTLET FLEXIBLE JOINT	?	?	?
17	1	HEAT EXCHANGER INLET DUCT	3B–56171	1277	1148
18	1	HEAT EXCHANGER OUTLET DUCT	3BF–23298	1277	1173
19	1	HEAT EXCHANGER TO MULTICONE TRANSITION	3H–18641	1277	1059
20	1	I.D. DUCT FROM MULTIPLE CONE OUTLET	3H–62547	1278	2200
21	1	I.D. FAN TRANSITION DUCT	3H–62548	1278	3100
22	1	BREECHING I.D. FAN INLET DUCT	3H–62549	1278	1500
23	1	I.D. DAMPER ASSY.	?	1282	?
24	1	I.D. FAN OUTLET DUCT	3H–62550	1279	250
25	1	E.S.P. INLET DUCT	3H–62552	1279	3100



⊖ INSTALLATION LEGEND

A –
B –
C –
D – THERMOMETER (47) LOCATE FOR EASE OF READING
E – THERMOMETER (48) LOCATE FOR EASE OF READING
F –
J –

FEB 1 6 2007

JOB	REV	REVISION	BY	DATE	CHECKED	DATE
2517	1	Corrected Dimension Text Size	MJG	07AUG06		

WELLONS 2525 W. Firestone Ln. Vancouver, WA 98660 1-800-WELLONS

DO NOT SCALE THIS DRAWING
SCALE 1/4"=1'–0"

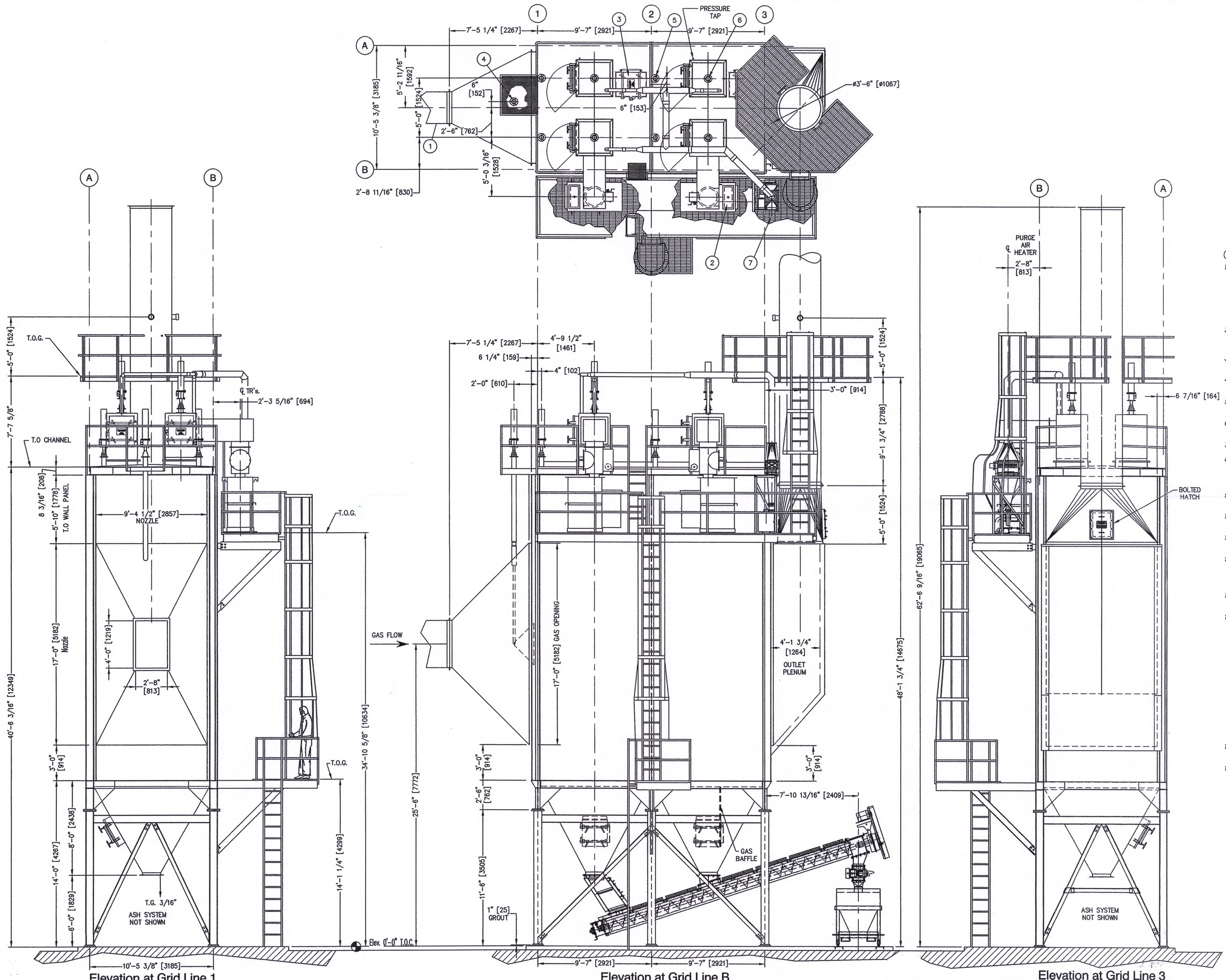
8120 B2517

DRAWING M.S. DATE 02FEB'06
CHECKED WJR 8AUG06 APPROVED

BOILER BREECHING
I.D. & F.D. SYSTEM G.A.

BIEWER SAWMILL INC.
McBAIN, MICHIGAN

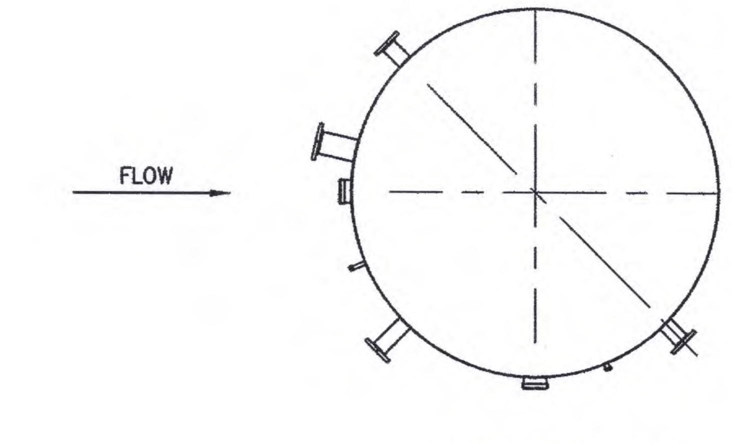
DRAWING NUMBER 3H-62542-1 REV 1



Elevation at Grid Line 1

Elevation at Grid Line B

Elevation at Grid Line 3



STACK PORTS LAYOUT
SEE DWG 3E-62721

General Notes:

1. Structural Materials To Be Used:

   Wide Flanges – ASTM – A992
   Other Shapes – ASTM – A36
   Plates – ASTM – A36
   Sheets – ASTM – A570
   Pipe – ASTM – A53B
   Tubing – ASTM – A500B

2. Precipitator Side Frames, Inlet/Outlet Top Girders, Top Intermediate Girders, Bottom Inlet/Outlet Girders And Bottom Intermediate Girders Shall Be 3/16" Plate w/ Stiffeners. All Welded Construction, Gas Tight.
3. ESP Roof Shall Be 3/16" Diamond Plate Walking Surface, Internally Stiffened, All Welded Construction, Gas Tight.
4. ESP Inlet Nozzle Shall Be 3/16" Plate With External Stiffeners, ESP Outlet Plenum Shall Be All Welded Construction, Gas Tight.
5. Inlet And Outlet Perforated Distribution Plates Shall Be 12 Gage Sheet Or Heavier, Stiffened And Internally Suspended. Inlet Plates Are Externally Rapped.
6. Outlet Rectangular Transition And Inlet Ductwork Shall Be 10 Ga. Plate Min. With External Stiffeners, All Welded Construction, Gas Tight.
7. Stack Shall Be Min. 10 GA. Sheet. All Welded Construction, Gas Tight.
8. All Seams And Joints In The Precipitator Casing, Roof, Hoppers, Inlet Nozzle & Ductwork, Outlet Plenum And Stack Shall Be Seal Welded, Gas Tight Utilizing E-60xx Electrodes In Accordance With The Latest AWS Standards. Connections That Are Highly Stressed Or Subject To Impact Shall Be Welded Using E-70xx Electrodes.
9. All Expansion Joints, Where Deemed Necessary,To Be Flexible Fabric Type And Will Be Gas Tight And Allow For Thermal Expansion Of The ESP Nozzle & Ductwork.
10. ESP Access Will Be Suspended/Supported From The ESP Casing & Supports, And Will Allow For Thermal Expansion And Growth.
11. Erection Holes Where Furnished, Shall Be a Minimum of 11/16" Diameter For 5/8" Bolts. All Erection Bolts Will Be Seal Welded To Prevent Gas Leakage.
12. All Access Doors To Have 24" Min. Passageway, Formed 10 Gage Sheet Construction With (4) Sealing Dogs. Access Doors Shall Project Beyond Casing Insulation. All Hinged Access Doors Shall Be Furnished With Key Interlocks And Danger Signs Warning of: "High Voltage".
13. All Electrical Equipment Shall Be UL Approved Or Tested By An Electrical Laboratory Judged Acceptable By The State Of Jurisdiction
14. ESP Design Criteria:

   Stack Design Per ASME STS-1-1992
   1997 Uniform Building Code
   9th Edition Of AISC
   Seismic Zone 1D
   Wind Speed 90 mph, Exposure C
   Snow Loading 79 psf
   or
   Live Loading 50 psf
   Dust Loading
   Hopper, Structural 50 pcf at 50% of Capacity.
   ESP Plates 50 pcf @ 1/2" Thk. Ea. Side
   Design Pressure ± 5" Water
   Operating Pressure + 1 1/4" Water
   Design Temperature 400°F With Possible Excursions To 500°F
   Operating Temperature 350°F

15. Values "T.G." Represent Thermal Growth to 350°F Operating Temp. Values Will Be 50% Higher During Extended Excursions to 500°F.
16. For Other Details See Proposal

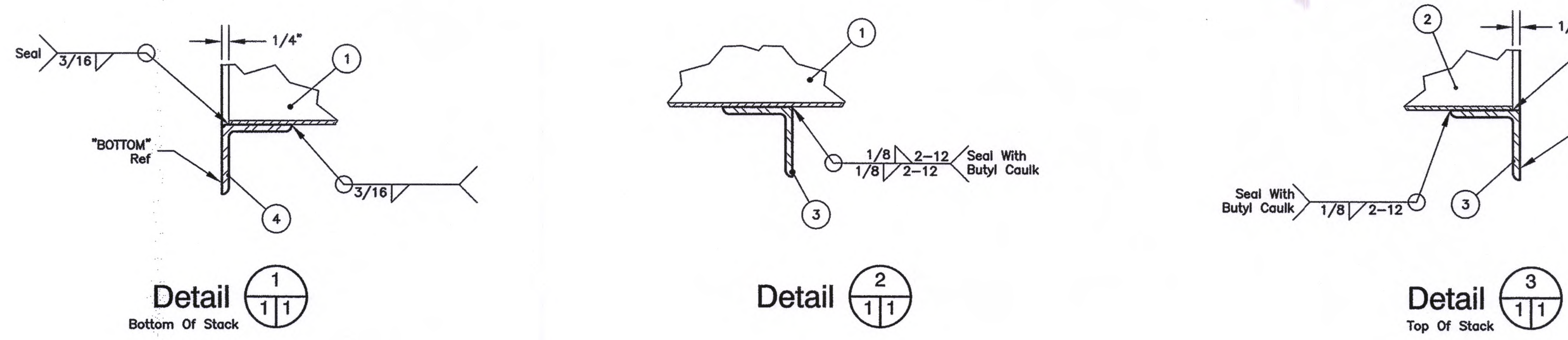
Legend

1. Process Gas Supply Duct
2. Transformer/Rectifier Assy w/High Voltage Conductor (2 Reqd)
3. Access Hatches (8 Provided)
4. EGR Rapper/Inlet Distribution Plates
5. EGR Rapper/Collector Plates (2 Rows Of 2 = 4 Total)
6. EGR Rapper/HV Electrodes (2 Sections Of 2 = 4 Total)
7. Purge Air Fan/Heater

FEB 16 2007

WELLONS 2525 W. Firestone Ln. Vancouver, WA 98660 1-800-WELLONS		DO NOT SCALE THIS DRAWING / SCALE 1/4" = 1'-0"
8260	2425	DRAWING MJS / DATE 15MAR06
Electrostatic Precipitator Size 3 General Arrangement and Elevation		CHECKED DKC 16MAR06 / APPROVED MJS 05/01/06
Biewer McBain, MI	2517	DRAWING NUMBER 3E-61142 / REV 0

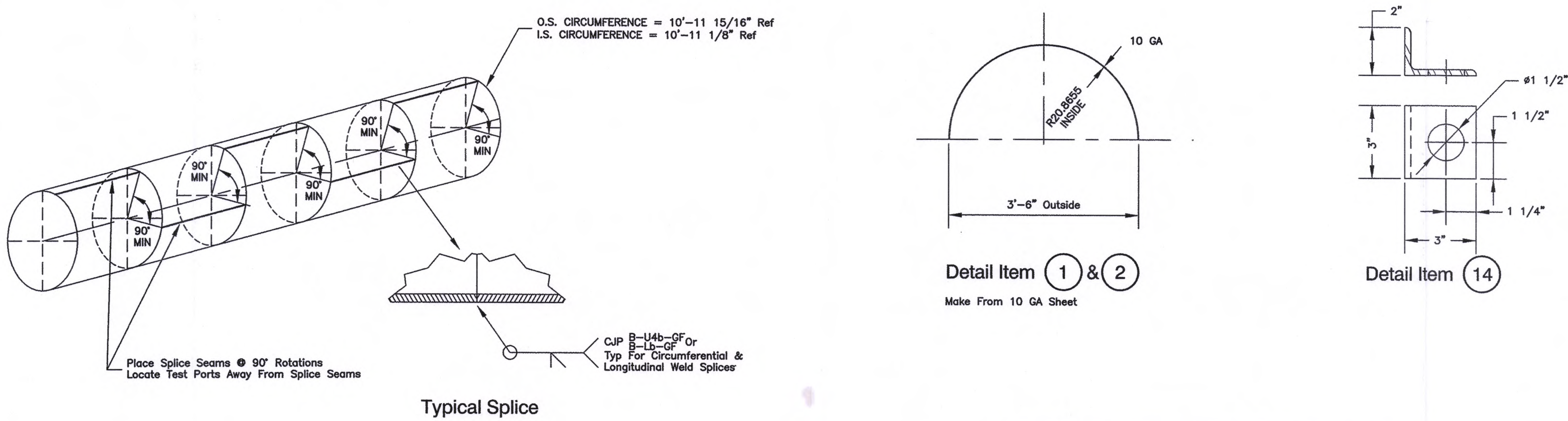
REF: 3E-61123



ITEM	QTY	DESCRIPTION	REQN	WT
1	4	Tube 42"O.D. x 10 Ga x 4'-10" Lg (131 1/2" Circum. Length) Det		1192
2	1	Tube 42"O.D. x 10 Ga x 4'-2" Lg (131 1/2" Circum. Length) Det		257
* 3	5	L 2 1/2" x 2 1/2" x 1/4" Thk x 13'-1" Lg (Roll Toe Out To 42 1/8" I.D.)		268
* 4	1	L 3" x 3" x 1/4" Thk x 13'-2" Lg (Roll Toe Out To 42 1/8" I.D.)		66
5				
6	2	Pipe Nipple, 6" x 3" Lg, T.O.E., Sch 40		5
7	2	Pipe Cap, 6", 150#, Thd, M.I.		7
8	1	Pipe Nipple, 1" x 2" Lg, T.O.E., Sch 40		
9	1	Pipe Cap, 1", 150#, Thd, M.I.		
10				
11	1	Pipe Coupling, ø1/2", Thd		
12	1	Pipe Plug, ø1/2", Thd		
13				
14	2	L 3" x 2" x 1/4" Thk x 0'-3" Lg Det		2
15				
16				
17				
18				
19				
20				

* – 18" Has Been Added To Angle Length For Rolling Allowance

Total Weight: 1797 #



RECEIVED
MAR 29 2007
AQD-CADILLAC

FEB 16 2007

Note: For Opacity Monitor Mounting see Drawing 2B-48770

WELLONS 2525 W. Firestone Ln. Vancouver, WA 98660 1-800-WELLONS

DO NOT SCALE THIS DRAWING
SCALE 1/2"=1'-0"

8260 2440

ESP ø42" x 23'-6"
Stack Assembly

DRAWING SDM DATE 6/4/99
CHECKED [signature] APPROVED

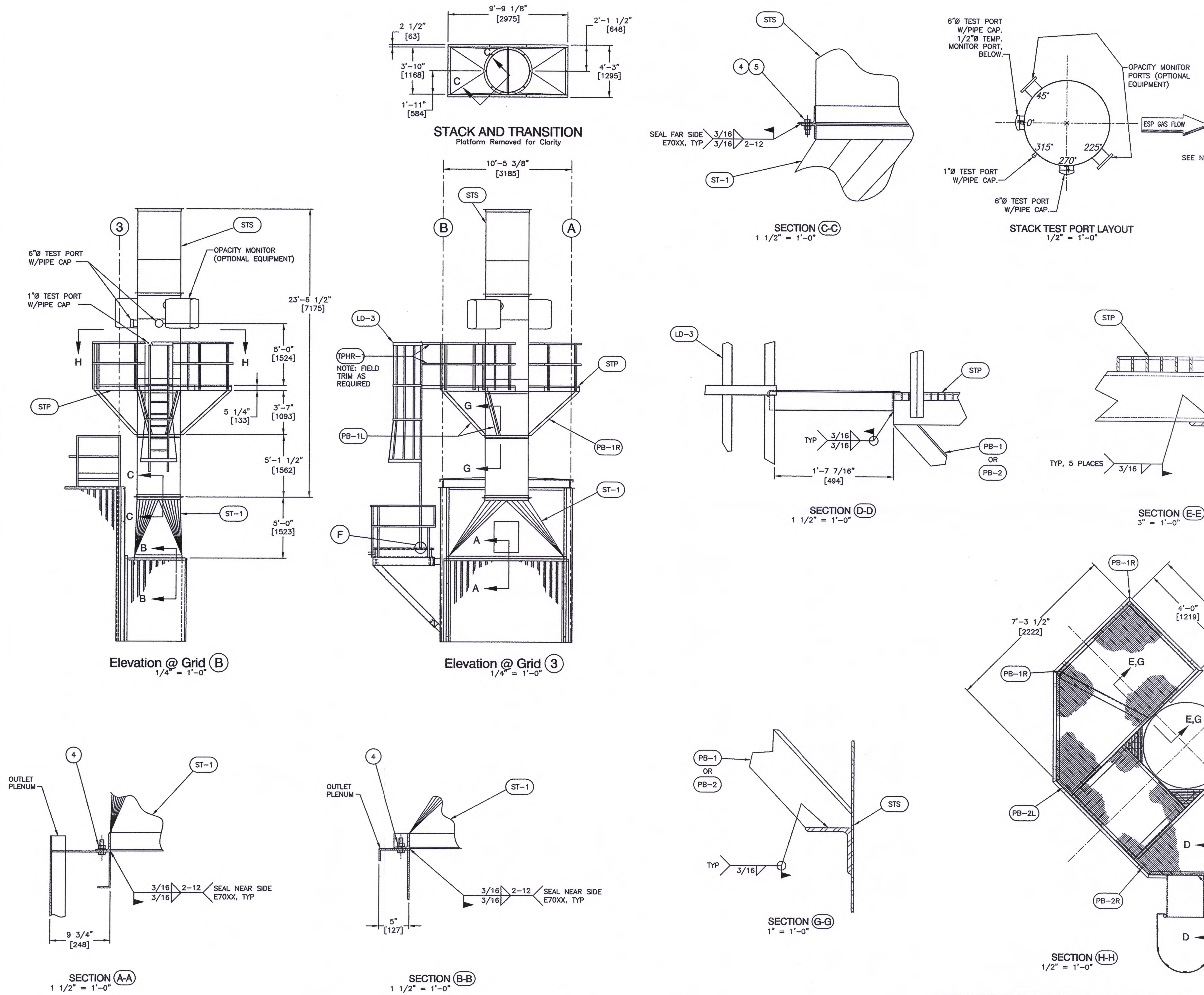
JOB	REV	REVISION	BY	DATE	CHECKED	DATE
2503	1	Added four 11/16"Ø Holes to Item 4, Updated Border	MJS	09MAR05	CAM	11MAR05

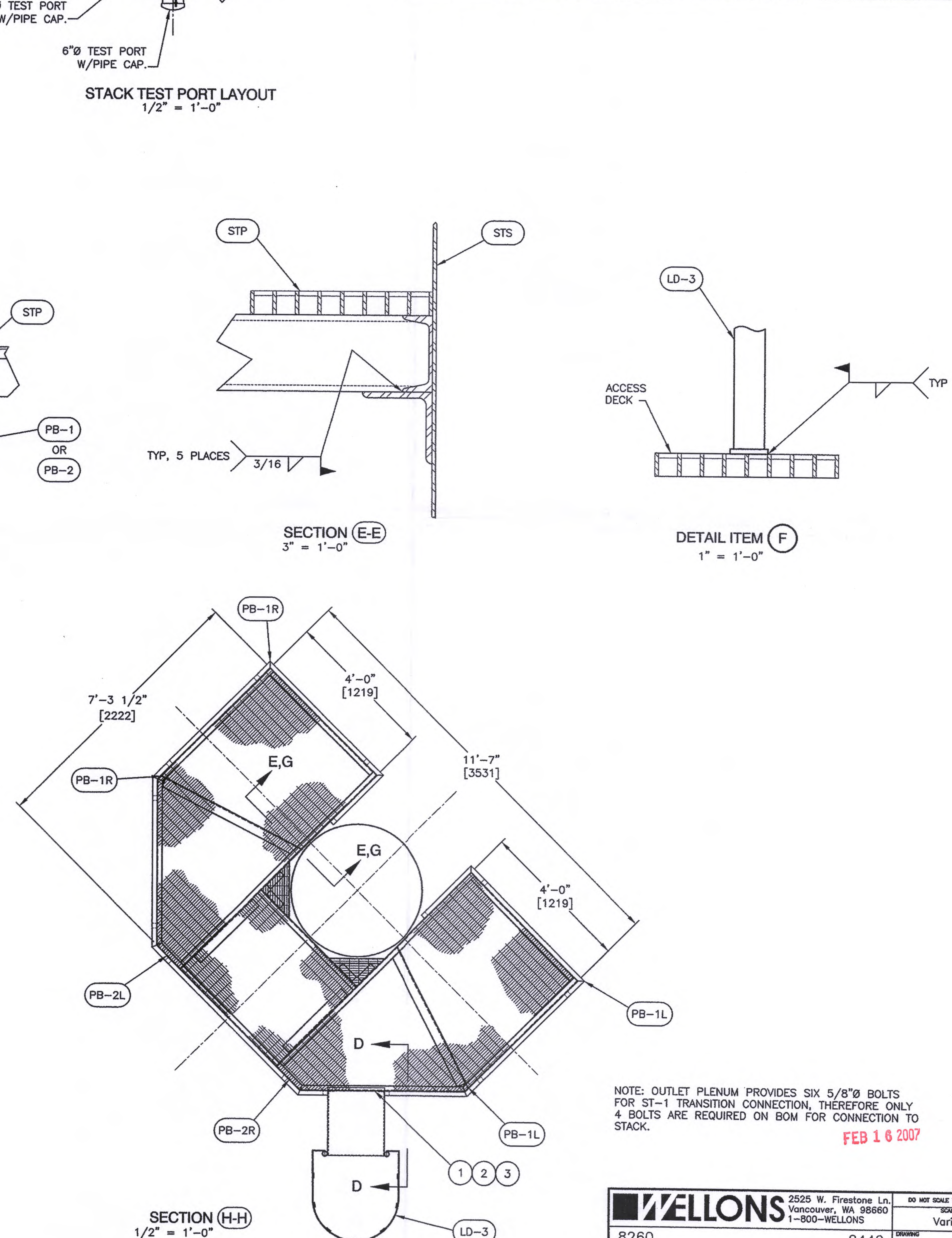
DRAWING NUMBER 3B-54960 REV 1

REF:

DATE PLOTTED: 6/7/99

ITEM	QTY	DESCRIPTION	PART NUMBER	REQN	WT
STS	1	Stack (Paint Hi-Temp Aluminum) Assembled w/Mounts for Rosemount Opacity Monitor	3E-54960	2440	1797
ST-1	1	Stack Transition (Paint Hi-Temp Aluminum)	2B-48752	2440	1080
STP	1 RH	Stack Test Platform w/Assembled Hand-Railing/KPS Right Hand Assembly	3B-53475	2440	1281
PB-1	2R,2L	Platform Knee Brace	3B-53475	2440	109
PB-2	1R,1L	Platform Knee Brace	3B-53475	2440	51
LD-3	1	Stack Ladder (Caged)	1B-54972	2440	271
TPHR-1	4	Handrail	0E-61306	2440	12
1	1	2/0 Chain X 1'-9" w/Snap Hook Each End		2440	
2	2	Eye Bolt, 3/8"Ø x 2 1/8" (3/4"Ø Eye)		2440	
3	2	3/8"Ø Hex Nut And Narrow Flat Washers		2440	
4	10	5/8"Ø Hex Nut And Narrow Flat Washers		2440	
5 (SEE NOTE)	4	5/8"Ø X 2" Hex Bolt		2440	





NOTE: OUTLET PLENUM PROVIDES SIX 5/8"Ø BOLTS FOR ST-1 TRANSITION CONNECTION, THEREFORE ONLY 4 BOLTS ARE REQUIRED ON BOM FOR CONNECTION TO STACK.

FEB 16 2007

JOB	REV	REVISION	BY	DATE	CHECKED	DATE
2517	1	Changed Item STP from L.H. to R.H. in B.O.M.	MJS	18NOV05	DKC	18Nov05

WELLONS 2525 W. Firestone Ln. Vancouver, WA 98660 1-800-WELLONS

DO NOT SCALE THIS DRAWING
SCALE: Varies

8260 2440

ESP-3 Stack, Transition, & Test Platform Installation

DRAWING: MJS DATE: 07MAR05
CHECKED / APPROVED

DRAWING NUMBER: 3E-61295 REV: 1