Proposal No. 143036

Pulp Dryer, No. 3 Paper Machine Vents, No. 2 and 3 Smelt Dissolving Tank Vents, and No. 1 and 2 Combination Boilers
Test Plan
New Indy Catawba, LLC
Catawba, South Carolina

Prepared For

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18 June 2021

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SECTION 1
INTRODUCTION

Weston Solutions, Inc. (WESTON®) has been contracted by New Indy Catawba, LLC (NIC) to conduct emission testing on the Pulp Dryer, No. 3 Paper Machine Vents, No. 2 and 3 Smelt Dissolving Tank Vent, and No. 1 and 2 Combination Boilers at the NIC mill in Catawba, South Carolina. The purpose of the testing is to document the emissions from sources identified in Condition No. 5 (Order to Correct Undesirable Level of Air Contaminants) issued by the South Carolina Department of Health and Environmental Control (SC DHEC).

1.1 TESTING PROGRAM ORGANIZATION

The test program coordinator for NIC is:

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The test program will be performed by Weston Solutions, Inc. (WESTON®). The Project Manager for WESTON is:

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1.2 SUMMARY OF TEST PROGRAM

Table 1-1 summarizes the testing program.

TABLE 1-1
SUMMARY OF EMISSIONS TESTING PROGRAM

Emission Source/ Sample Location	Parameter Measured	Test Method/Data Source	Operating Scenarios/ Additional Information
No. 3 Paper Machine[1] (6 total exhaust fans – All 6 vents will be tested)	Stack Gas TRS (Hydrogen Sulfide - H_2S) (Methyl Mercaptan - MMC) (Dimethyl Sulfide - DMS) (Dimethyl Disulfide - DMDS)	EPA Method 16	Three runs of 16 injections or more per run
	Stack Gas Moisture and Temperature	EPA Method 4	
	Stack Gas Volumetric Flow	EPA Method 2	
	H_2S, MMC, DMS, DMDS Liquid Concentration in the White Water	ALS Sulfur Liquid Method	White Water samples from the wire pit, or closest location to the headbox of the machine, corresponding to TRS stack test runs for the Paper Machine Stacks.
	Total Sulfides in the White Water	HACH 6000	
	Methanol Liquid Concentration in the White Water	NCASI MeOH-94.03	
Pulp Dryer[2] Single Vent	Stack Gas TRS (H_2S, MMC, DMS, DMDS)	EPA Method 16	Three runs of 16 injections or more per run
	Stack Gas Moisture and Temperature	EPA Method 4	
	Stack Gas Volumetric Flow	EPA Method 2	
	H_2S, MMC, DMS, DMDS Liquid Concentration in the White Water	ALS Sulfur Liquid Method	White Water samples from the wire pit, or closest location to the headbox of the machine, corresponding to TRS stack test runs for the Pulp Dryer Stack.
	Total Sulfides in the White Water	HACH 6000	
	Methanol Liquid Concentration in the White Water	NCASI MeOH-94.03	
No. 2 and No. 3 Smelt Dissolving Tank[3] (ID Nos. 2510 and 5110, both venting through Emission Point ID No. 2511S)	Stack Gas TRS (H_2S, MMC, DMS, DMDS)	EPA Method 16	Three runs of 16 injections or more per run
	Stack Gas Moisture and Temperature	EPA Method 4	
	Stack Gas Volumetric Flow	EPA Method 2	

TABLE 1-1
SUMMARY OF EMISSIONS TESTING PROGRAM
(CONTINUED)

Emission Source/ Sample Location	Parameter Measured	Test Method/Data Source	Operating Scenarios/ Additional Information
No. 1 Combination Boiler[4] (ID No. 2605) NCG and SOG gases	Stack Gas Oxygen/Carbon Dioxide	EPA Method 3A	NCG and SOG gases routed to the No. 1 CB Normal operating rate
	Stack Gas Total Reduced Sulfur (H_2S, MMC, DMS, DMDS)	EPA Method 16	
	Stack Gas Sulfur Dioxide (SO_2)	EPA Method 6C	
	Stack Gas Moisture and Temperature	EPA Method 4	
	Stack Gas Volumetric Flow	EPA Method 2	
No. 1 Combination Boiler[4] (ID No. 2605) NCG gases only	Stack Gas Oxygen/Carbon Dioxide	EPA Method 3A	NCG gases only routed to the No. 1 CB Normal operating rate
	Stack Gas Total Reduced Sulfur (H_2S, MMC, DMS, DMDS)	EPA Method 16	
	Stack Gas Sulfur Dioxide (SO_2)	EPA Method 6C	
	Stack Gas Moisture and Temperature	EPA Method 4	
	Stack Gas Volumetric Flow	EPA Method 2	
No. 2 Combination Boiler[4] (ID No. 3705) NCG and SOG gases	Stack Gas Oxygen/Carbon Dioxide	EPA Method 3A	NCG and SOG gases routed to the No. 2 CB Normal operating rate
	Stack Gas Total Reduced Sulfur (H_2S, MMC, DMS, DMDS)	EPA Method 16	
	Stack Gas Sulfur Dioxide (SO_2)	EPA Method 6C	
	Stack Gas Moisture and Temperature	EPA Method 4	
	Stack Gas Volumetric Flow	EPA Method 2	

TABLE 1-1
SUMMARY OF EMISSIONS TESTING PROGRAM
(CONTINUED)

Emission Source/ Sample Location	Parameter Measured	Test Method/Data Source	Operating Scenarios/ Additional Information
No. 2 Combination Boiler[4] (ID No. 3705) NCG gases	Stack Gas Oxygen/Carbon Dioxide	EPA Method 3A	NCG gases only routed to No. 2 CB Normal operating rate
	Stack Gas Total Reduced Sulfur (H_2S, MMC, DMS, DMDS)	EPA Method 16	
	Stack Gas Sulfur Dioxide (SO_2)	EPA Method 6C	
	Stack Gas Moisture and Temperature	EPA Method 4	
	Stack Gas Volumetric Flow	EPA Method 2	
Steam Stripper (ID No. 9801) Collected during each CB Testing Scenario	H_2S, MMC, DMS, DMDS Liquid Concentration Inlet to Steam Stripper	ALS Sulfur Liquid Method	Take samples corresponding to 1-hr SO_2 runs on No.1 and No. 2 CBs
	H_2S, MMC, DMS, DMDS Liquid Concentration Outlet of Steam Stripper	ALS Sulfur Liquid Method	
	Methanol Liquid Concentration Inlet to Steam Stripper	NCASI MeOH-94.03	
	Methanol Liquid Concentration Outlet of Steam Stripper	NCASI MeOH-94.03	

[1] There are no known emissions of SO_2 from the No. 3 Paper Machine since there is no fuel combustion.

[2] There are no known emissions of SO_2 from the Pulp Dryer since there is no fuel combustion.

[3] New-Indy has added the Smelt Dissolving Tank Scrubber (common stack) to the test program for TRS compounds.

[4] The kraft NCG system does not have test ports and is unsafe to test. The test plan is designed to estimate the controlled emissions from the kraft NCG system without unnecessary risk to personnel performing the testing. Due to highly pressurized and explosive atmosphere inside the NCG system, the mill would be required to shut down for an extended period to allow port installation.

[5] Does not meet EPA Method 1-4 criteria.

1.3 TEST SCHEDULE

Table 1-2 presents the testing schedule.

TABLE 1-2
TESTING SCHEDULE

Date	Task
11 June 2021	Revised Test Plan Submittal
21-30 June 2021	Conduct testing on all sources listed in Table 1-1
30 July 2021	Submit Test Results to New Indy

1.4 APPLICABLE TEST PARAMETERS

This test program is designed to capture all sources and test parameters listed in Condition 5.

The total reduced sulfur (TRS) and sulfur dioxide (SO_2) testing will consist of three one-hour test runs.

TABLE 1-3
TEST PARAMETERS

Source	Test Parameters						
	TRS[a]	SO_2	O_2/CO_2	Moisture	Temp.	VFR	Liquid[b] Sample Collection
No. 3 Paper Machine Vent 1	X			X	X	X	X
No. 3 Paper Machine Vent 2	X			X	X	X	X
No. 3 Paper Machine Vent 3	X			X	X	X	X
No. 3 Paper Machine Vent 4	X			X	X	X	X
No. 3 Paper Machine Vent 5	X			X	X	X	X
No. 3 Paper Machine Vent 6	X			X	X	X	X
Pulp Dryer Vent – Single Vent	X			X	X	X	X
No. 2 & 3 Smelt Dissolving Tank Vents (Combined)	X			X	X	X	
No. 1 Combination Boiler – 2 Conditions	X	X	X	X	X	X	
No. 2 Combination Boiler – 2 Conditions	X	X	X	X	X	X	
Steam Stripper[c]							X

a) Speciated – TRS, MeSH, DMS, DMDS

b) MeOH, TRS, and total sulfide analysis. Column included for reference only.

c) Sample collection in conjunction with No. 1 and No. 2 CB testing.

1.5 TECHNICAL APPROACH

WESTON will provide professional services, equipment, instrumentation, laboratory services, supplies, and expenses to perform the scope of work outlined in Paragraph 1.2. The emission-testing program shall be conducted in accordance with the most current revision of the following EPA Reference Methods and Performance Specifications.

Parameter	Abbreviation	Test Method[a]	Notes/Remarks
Volumetric Flow Rate	VFR	1,2,4	
Gas Composition	O_2/CO_2	3A	Instrumental Analysis
Sulfur Dioxide	SO_2	6C	Instrumental Analysis
Total Reduced Sulfur	TRS	16	Kraft Pulping

a) Methods are EPA Reference Methods unless otherwise noted.

Section 2 describes the equipment to be tested. Section 3 describes the sampling location. Sections 4 and 5 describe the sampling and analytical methods and internal quality assurance/quality control activities. Section 6 includes example data sheets, and Section 7 includes a representative test report outline.

SECTION 2
SOURCE DESCRIPTION

This section contains a brief description of the processes, typical process air flow schematics, and the process conditions and controls to be in force during the emissions testing.

2.1 NO. 3 PAPER MACHINE VENTS – 6 TOTAL

The No. 3 Paper Machine has a series of roof vents designed to remove water vapor and control temperatures during the drying process. Figures 3-1, 3-2, and 3-3 provide a layout of the vents located on the No. 3 Paper Machine roof. The vents are approximately 48 inches in diameter and are equipped with a fan. The exhaust gases are vented directly to the atmosphere. Cyclonic flow measurements have been conducted, and all 6 vents were determined to be noncyclonic (<20º). Stack extensions will be added to any vents with less than 0.5 duct diameters upstream. Figure 2-1 presents a schematic of the No. 3 Paper Machine.

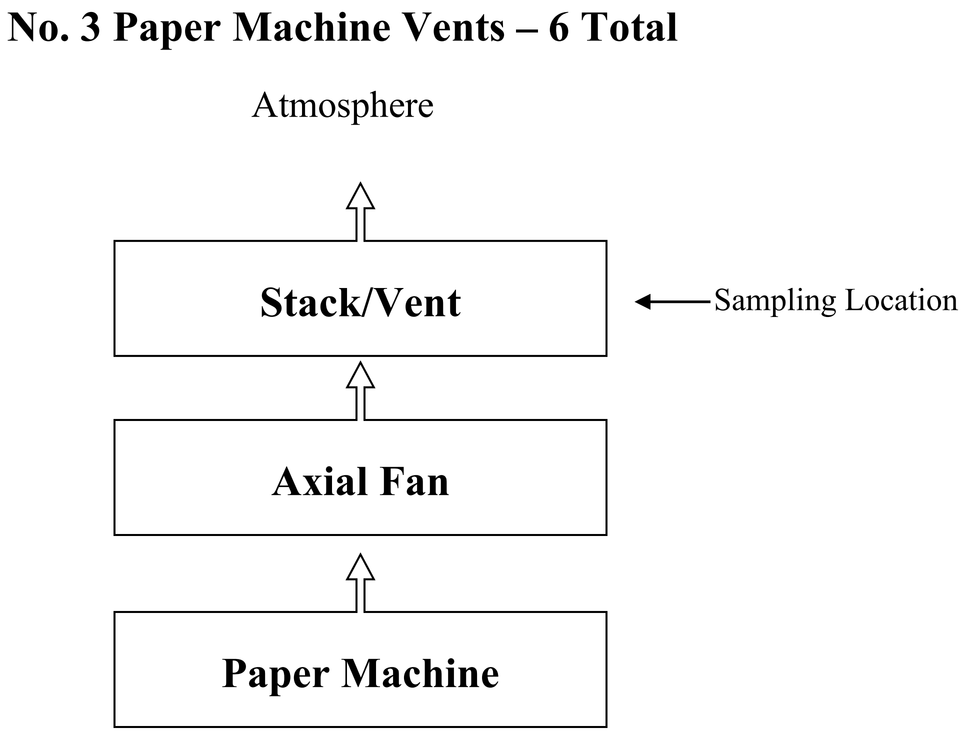


FIGURE 2-1 PROCESS SCHEMATIC –
NO. 3 PAPER MACHINE

2.2 PULP DRYER

The pulp dryer is equipped with a single vent designed to aid in the dewatering of pulp prior to the paper machine process. The dryer section consists of a wire section and a series of steam coils to heat the air around the pulp and drive off moisture. The roof vent is approximately 48 inches in diameter and equipped with a fan. The exhaust gases are vented directly to the atmosphere. The stack exit is currently covered by a rain cap that will be removed prior to testing. A stack extension will be added to meet Method 1 criteria. Figure 2-2 presents a schematic of the Pulp Dryer.

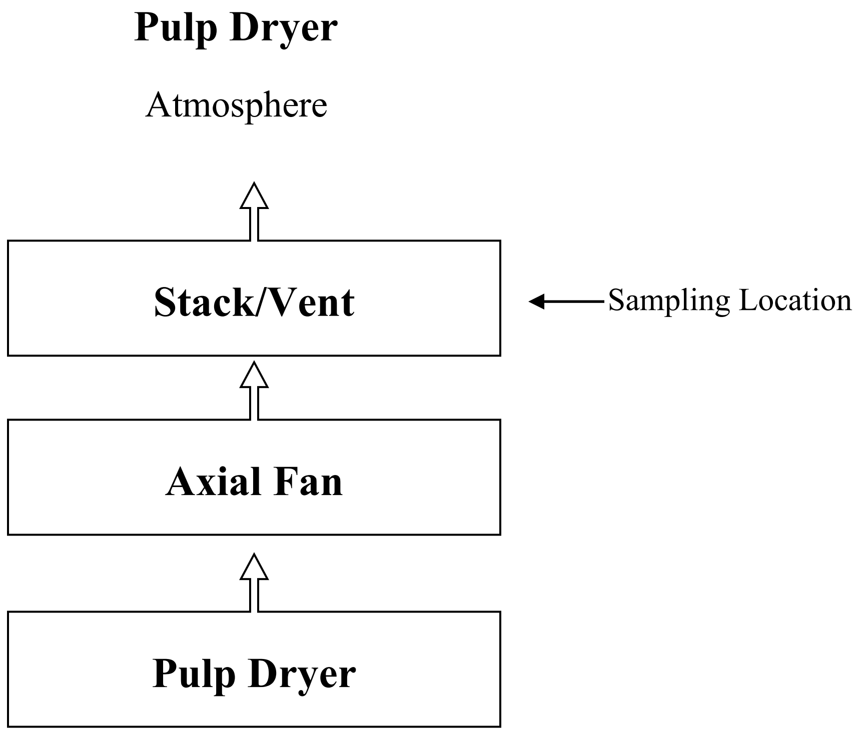


FIGURE 2-2 PROCESS SCHEMATIC – PULP DRYER

2.3 NO. 2 AND 3 SMELT DISSOLVING TANK (COMBINED)

The No. 2 and No. 3 Smelt Dissolving Tanks (SDTs) are where the inorganic chemicals are solubilized to form green liquor that is used in the causticizing and pulping processes.

The SDTs have one common wet impingement scrubber system that utilizes control equipment to monitor and record the scrubbing liquid pH, pressure, and scrubbant flow rate. Figure 2-3 presents a schematic of the No. 2 and 3 Smelt Dissolving Tank (Combined).

No. 2 and 3 Smelt Dissolving Tank (Combined)

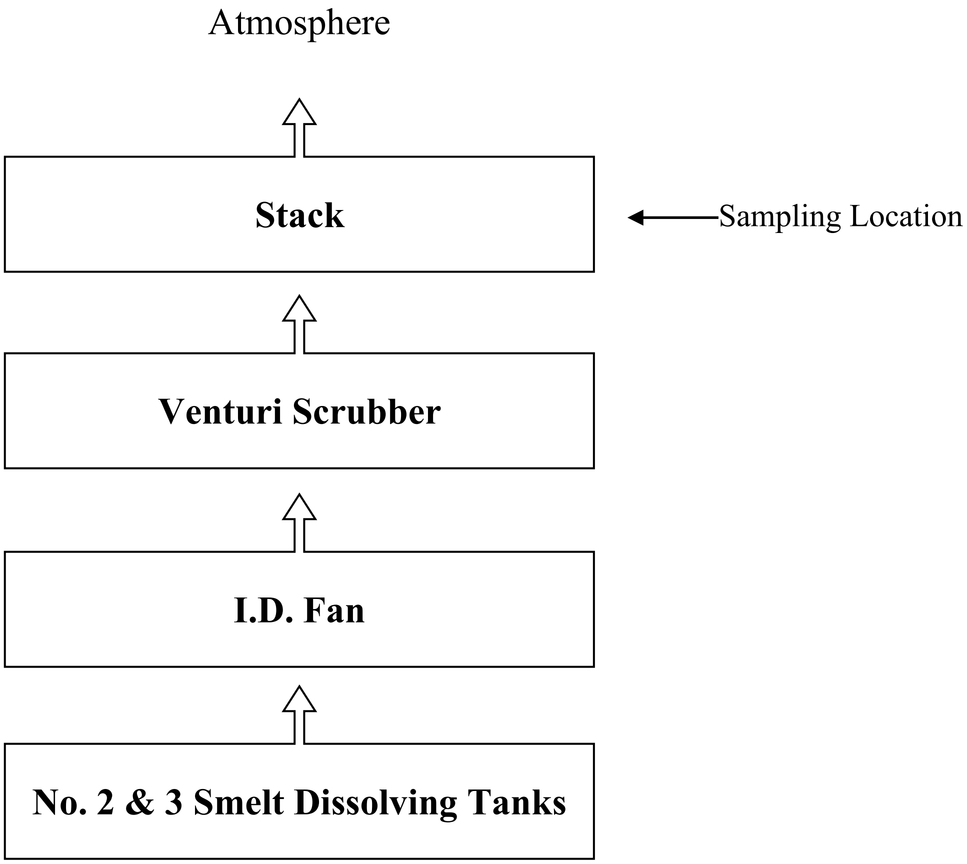


FIGURE 2-3 PROCESS SCHEMATIC –
NO. 2 AND 3 SMELT DISSOLVING TANKS

2.4 NO. 1 COMBINATION BOILER

The No. 1 Combination Boiler is a multi-fuel boiler with a steam generation capacity of *275,000* pounds/hour. The steam is used to operate processes in the integrated pulp and paper mill as well as turbine generators, which supply approximately 100% of the electrical energy needed for the mill. The primary fuel is wood (biomass). The boiler is equipped with a wet venturi scrubber system with instrumentation to monitor and record the gas phase pressure drop across the scrubber, and the scrubbant flow rate. Emissions from the process are influenced by the fuel type and quality, the fuel input rate, the gas phase pressure drop across the scrubber, and the scrubbant flow rate. Figure 2-4 presents a schematic of the No. 1 Combination Boiler.

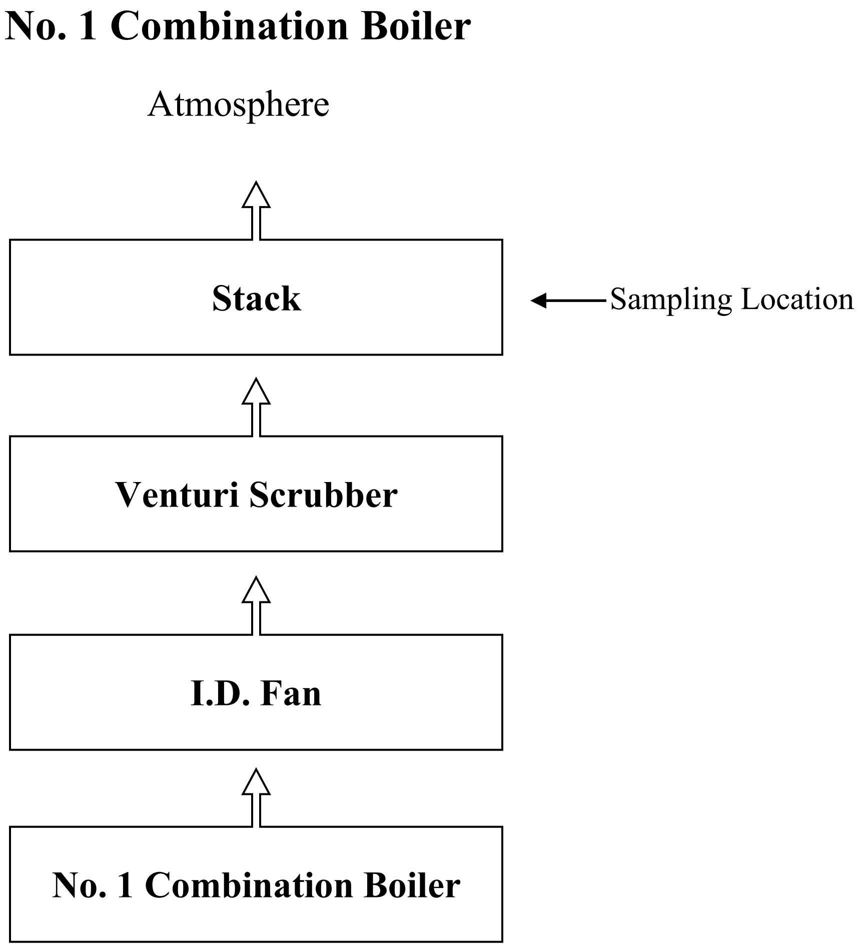


FIGURE 2-4 PROCESS SCHEMATIC –
NO. 1 COMBINATION BOILER

2.5 NO. 2 COMBINATION BOILER

The No. 2 Combination Boiler is a multi-fuel boiler with a steam generation capacity of *275,000* pounds/hour. The steam is used to operate processes in the integrated pulp and paper mill as well as turbine generators, which supply approximately 100% of the electrical energy needed for the mill. The primary fuel is wood (biomass). The boiler is equipped with a wet venturi scrubber system with instrumentation to monitor and record the gas phase pressure drop across the scrubber, and the scrubbant flow rate. Emissions from the process are influenced by the fuel type and quality, the fuel input rate, the gas phase pressure drop across the scrubber, and the scrubbant flow rate. Figure 2-5 presents a schematic of the No. 2 Combination Boiler.

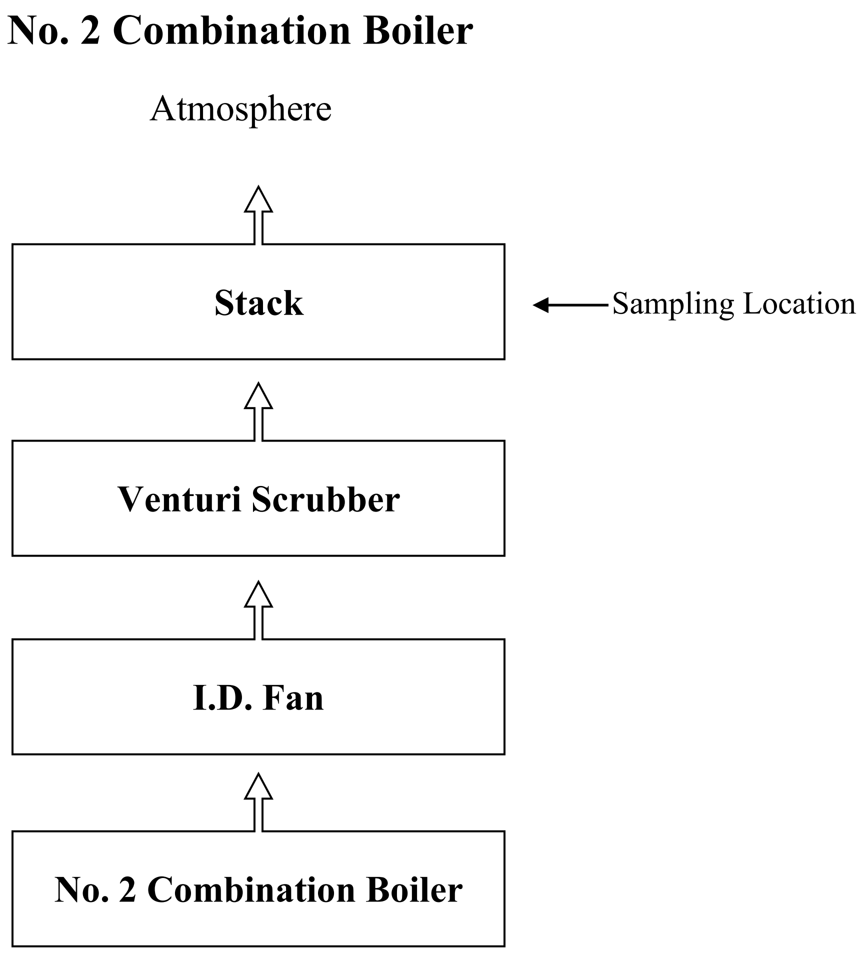


**FIGURE 2-5 PROCESS SCHEMATIC –
NO. 2 COMBINATION BOILER**

SECTION 3
SAMPLING LOCATION

3.1 PULP DRYER AND NO. 3 PAPER MACHINE ROOF TOP

Figures 3-1 through 3-3 present drawings and a diagram of the Pulp Dryer and No. 3 Paper Machine Roof Top.

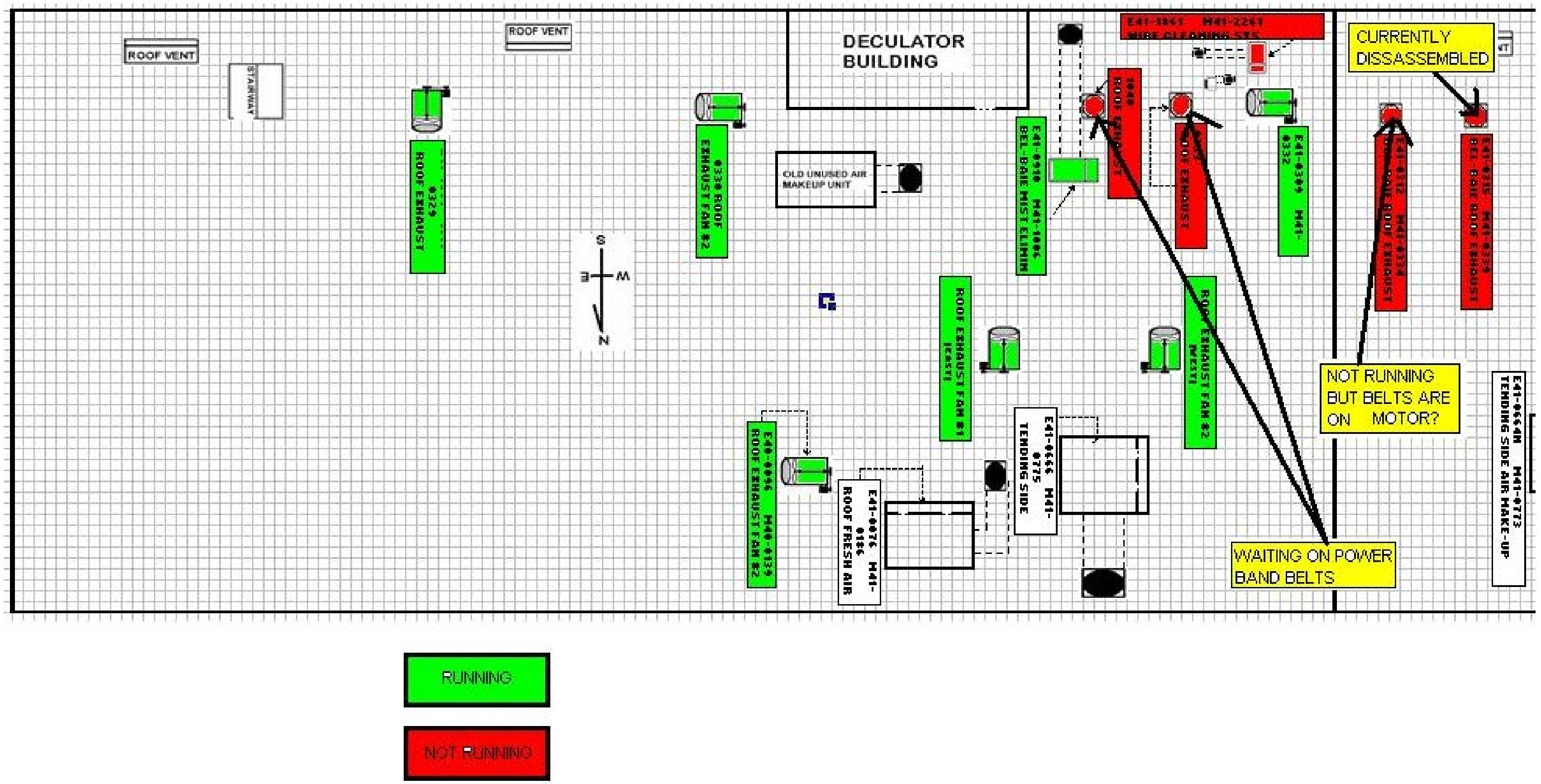


FIGURE 3-1 NO. 3 PAPER MACHINE ROOF TOP DRAWING

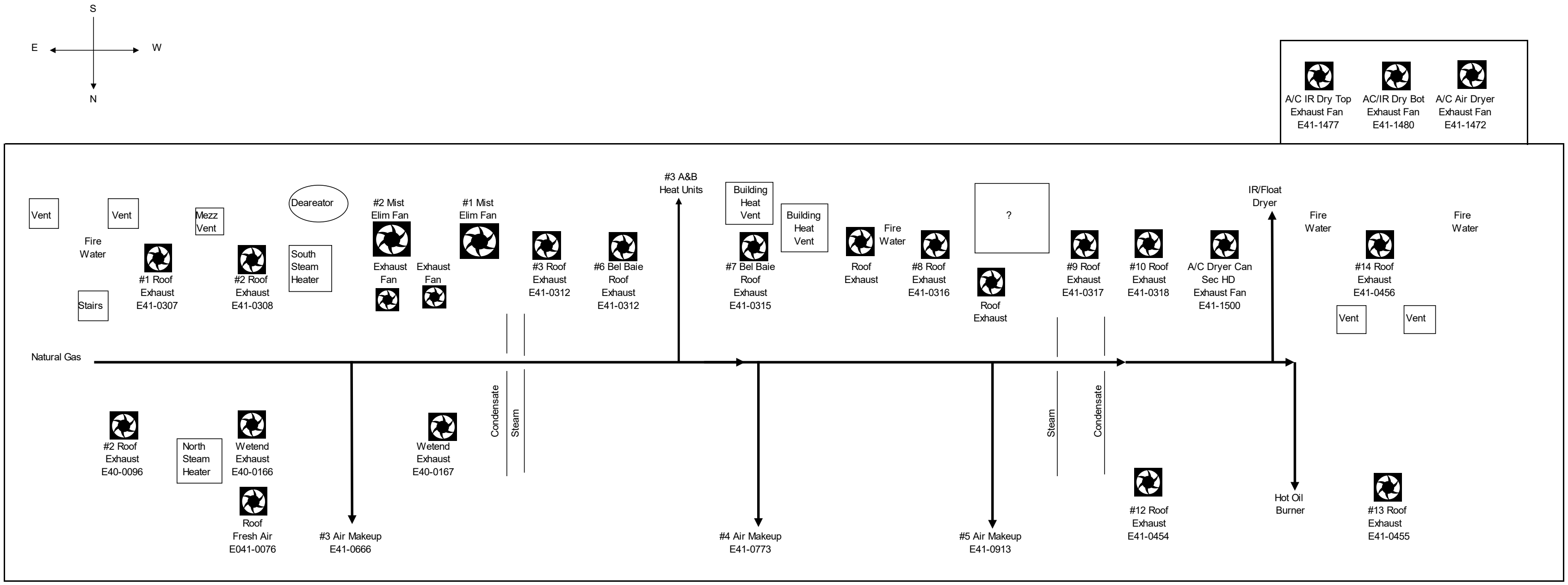


FIGURE 3-2 NO. 3 PAPER MACHINE ROOF DIAGRAM

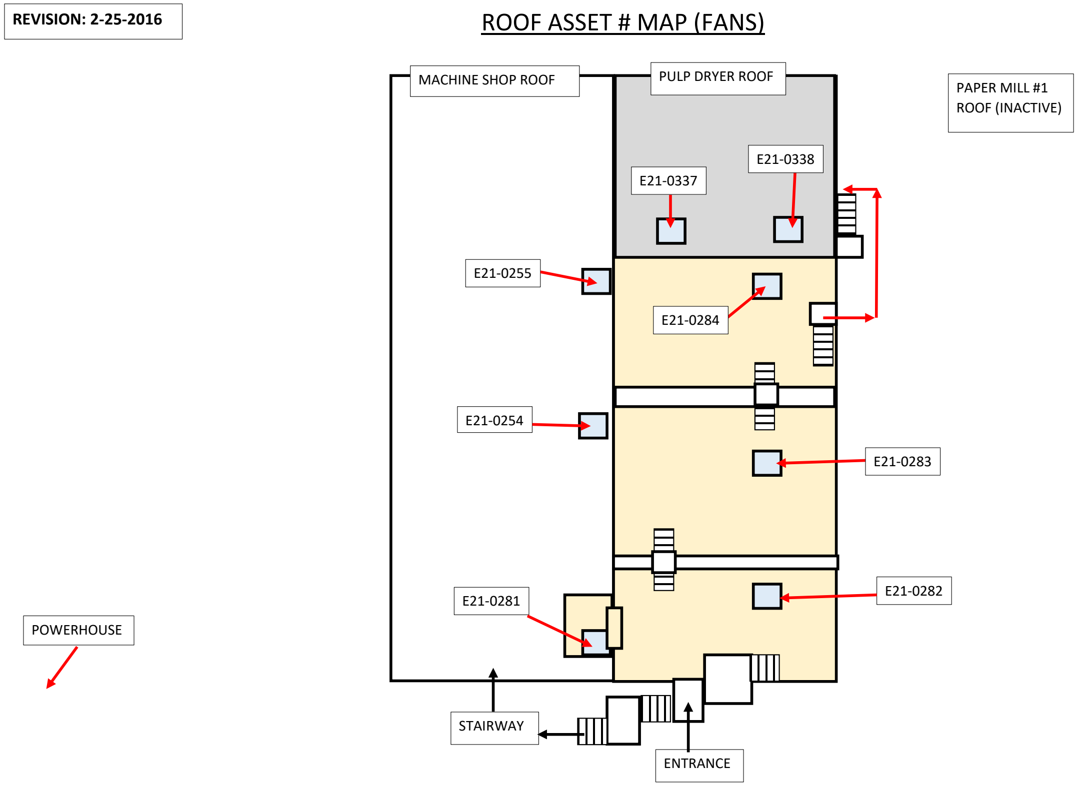


FIGURE 3-3 PULP DRYER ROOF MAP

3.2 NO. 2 AND 3 SMELT DISSOLVING TANK

Figure 3-4 is a diagram of the No. 2 and 3 Smelt Dissolving Tank Stack. There are two, 4-inch test ports oriented at 90˚ to each other. The stack has a circular cross-section with an inside diameter of approximately 71 inches. The test ports are 6.4 diameters downstream and 1.7 diameters upstream of the nearest flow disturbances. A total of 16 traverse points will be sampled, eight through each test port.

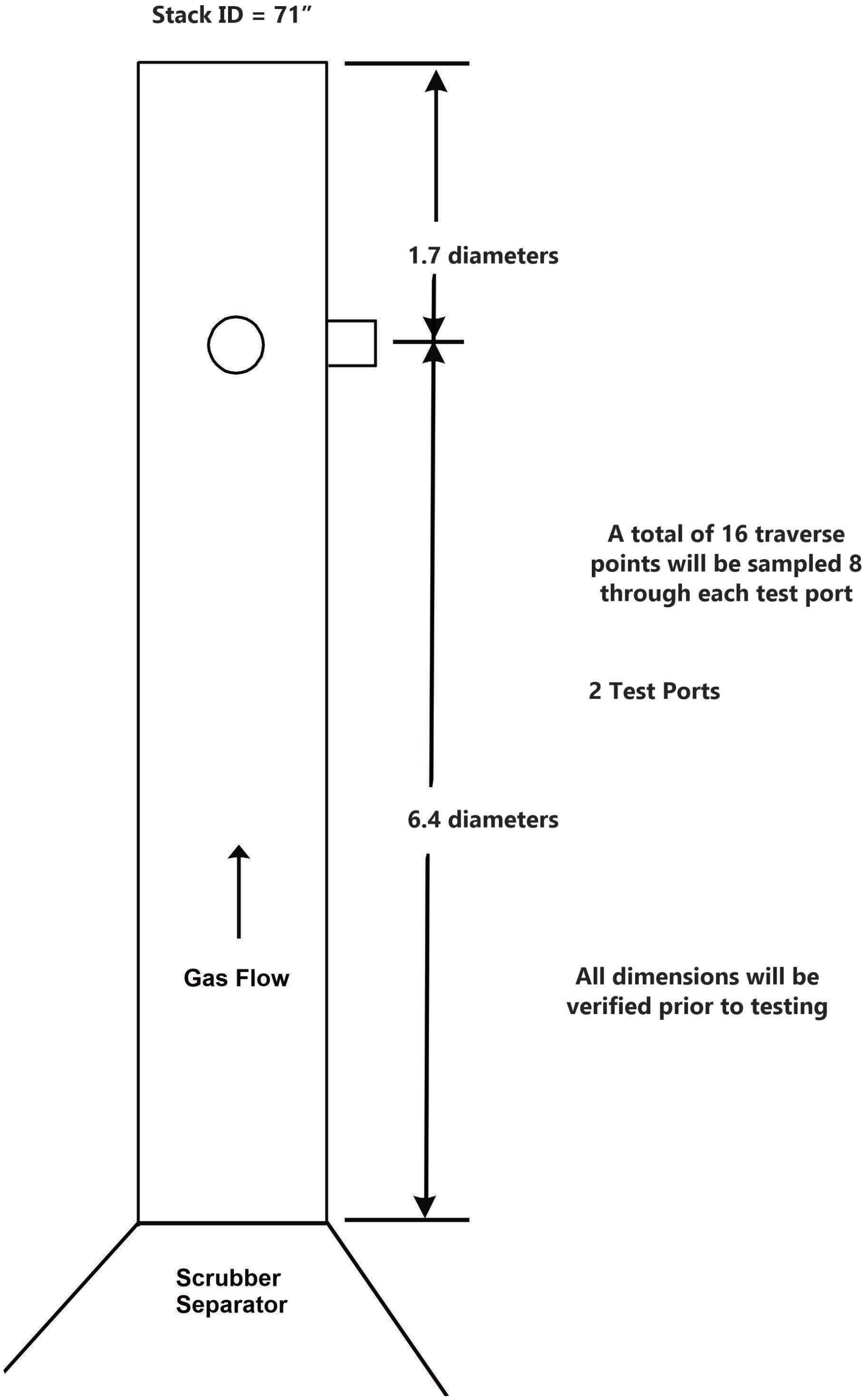


FIGURE 3-4 NO. 2 AND 3 SMELT DISSOLVING TANK STACK

3.3 NO. 1 COMBINATION BOILER

Figure 3-5 is a diagram of the No. 1 Combination Boiler Stack. There are four, 4-inch test ports oriented at 90˚ to each other. The stack has a circular cross-section with an inside diameter of approximately 120 inches. The test ports are 3.2 diameters downstream and 4.5 diameters upstream of the nearest flow disturbances. A total of 16 traverse points will be sampled, four through each test port.

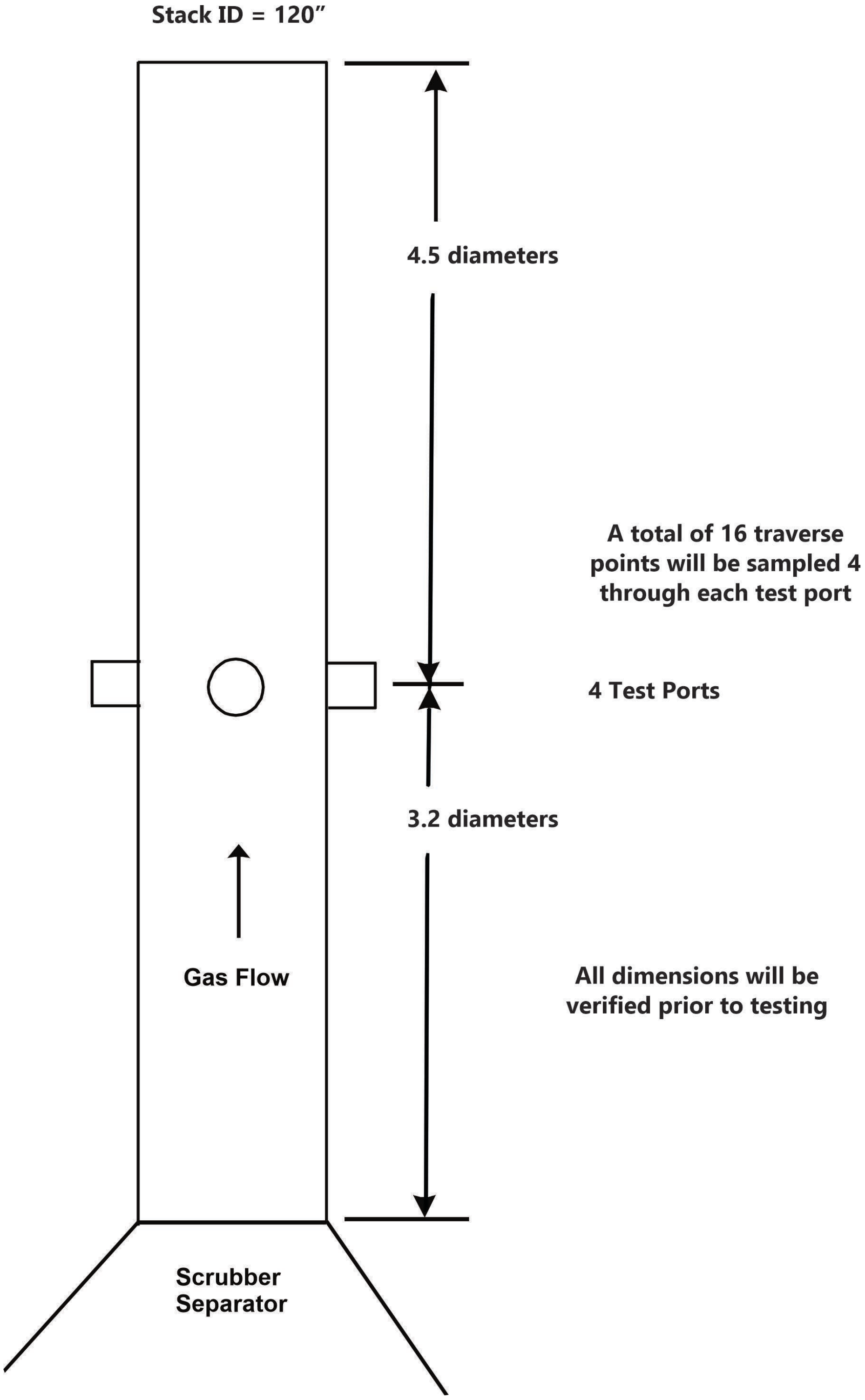


FIGURE 3-5 NO. 1 COMBINATION BOILER STACK

3.4 NO. 2 COMBINATION BOILER

Figure 3-6 is a diagram of the No. 2 Combination Boiler Stack. There are four, 4-inch test ports oriented at 90° to each other. The stack has a circular cross-section with an inside diameter of approximately 120 inches. The test ports are 3.2 diameters downstream and 4.5 diameters upstream of the nearest flow disturbances. A total of 16 traverse points will be sampled, four through each test port.

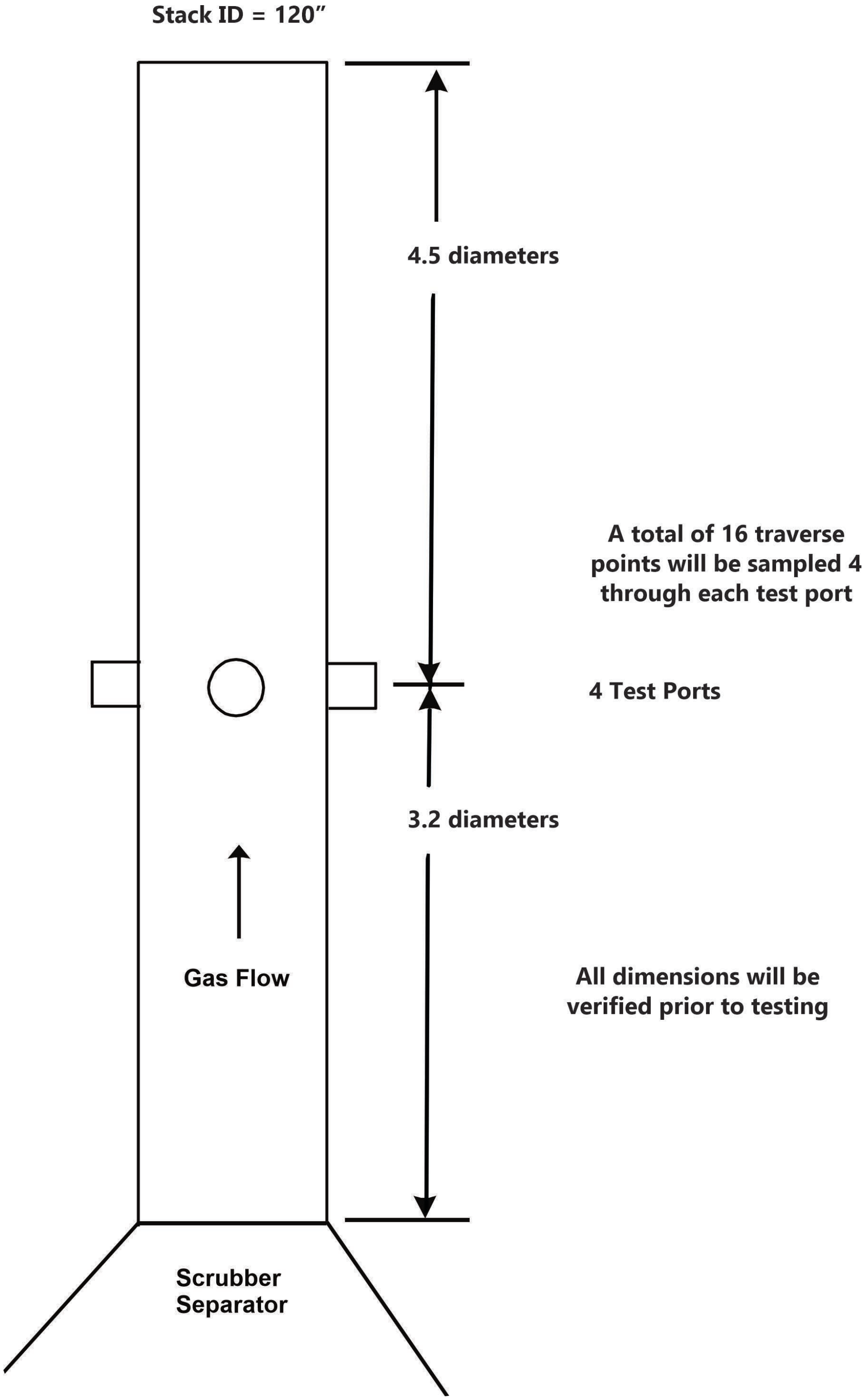


FIGURE 3-6 NO. 2 COMBINATION BOILER STACK

SECTION 4
SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

4.1.1 Volumetric Flow Rate

Mass emission rates are calculated by multiplying measured target analyte concentrations by calculated volumetric flow rates. Volumetric flow rates are determined using measurement data obtained by EPA Reference Methods 1-4.

The ductwork is measured at the sample location to the nearest 0.25 inch using a steel tape measure. Traverse points are selected in accordance with EPA Reference Method 1 on the basis of ductwork dimensions, geometry, and upstream and downstream disturbances. When a sample location does not meet EPA Reference Method 1 criteria, the maximum recommended number of traverse points is used.

Gas Velocity

The velocity of the gas stream is measured in accordance with EPA Reference Method 2 by reading the instantaneous velocity pressure with an inclined manometer at each traverse point using either an “S” type pitot tube and a leveled, inclined manometer with a scale of 0 to 10 inches of water. In rare cases of highly negative pressure sources, a Magnahelic gauge with scales of 0 to 5 or 0 to 25 inches of water may be used in place of an inclined manometer. The stack pressure is calculated from the measured static pressure of the stack and the ambient barometric pressure. The static pressure is calculated from using the static side of the pitot tube, and the barometric pressure is measured using a calibrated aneroid barometer. Manometer selection is determined by the velocity pressure of the gas stream. A manometer with a 0 to 0.25 inch scale may be used when the velocity pressure of the gas stream is less than 0.25 inches of water. By convention, any measured velocity pressures of less than 0.005 inches of water are recorded and reported as less than 0.005 inches of water. The stack temperature is measured with a calibrated thermocouple and pyrometer.

Gas Composition and Moisture Content

The composition of the gas stream will be measured in accordance with EPA Reference Method 3A using Paramagnetic O_2 and Infrared CO_2 analyzers using Protcol-1 gases.

The moisture content of the gas stream is determined according to EPA Reference Method 4, by collecting an integrated sample of source gas from a single point on the gas stream. At the conclusion of each run the volume of condensed moisture collected in the impingers of the sampling train is measured and used to evaluate the moisture content of the gas stream.

When sources are saturated or contain entrained water droplets, moisture content is also determined using the temperature measured at each traverse point and psychometric chart values corrected for stack pressure or by use of saturation vapor pressure tables. In these conditions, the lower moisture of the measured and saturation-based values is used for volumetric flow rate calculations.

The molecular weight of the gas stream is calculated using the determined moisture, oxygen, and carbon dioxide concentrations. The balance of the gas stream is assumed to be nitrogen. The volumetric flow is then calculated at stack and standard conditions using the calculated molecular weight, the measured stack temperature, and measured velocity, stack and barometric pressures. Standard conditions are 68 °F and 29.92 inches of mercury and 0% moisture.

Data Acquisition and Reporting

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed (where possible) with preprogrammed calculators or spreadsheet software.

Quality Control

Quality control procedures for volumetric flow measurements involve leak checks of pitot tubes, pitot tube lines and manometers, periodic analysis of ambient air and duplicate analysis of source gas samples, and periodic calibration checks of thermocouples and pyrometers. Magnahelics are verified against inclined manometers prior to each use.

Data transfers are minimized. Data sheets are checked for completeness and accuracy. Calculations are verified by a second person.

4.1.2 Gas Composition (Instrumental)

Oxygen (O_2) and carbon dioxide (CO_2) testing is conducted in accordance with EPA Reference Method 3A.

Sampling Equipment and Procedures

Figure 4-1 illustrates the sampling system. The sample is withdrawn continuously from the source through a heated probe, filter, and sample line to a sample conditioner which removes moisture from the gas stream. The sample is then transported to a Paramagnetic O_2 analyzer and an Infrared CO_2 analyzer.

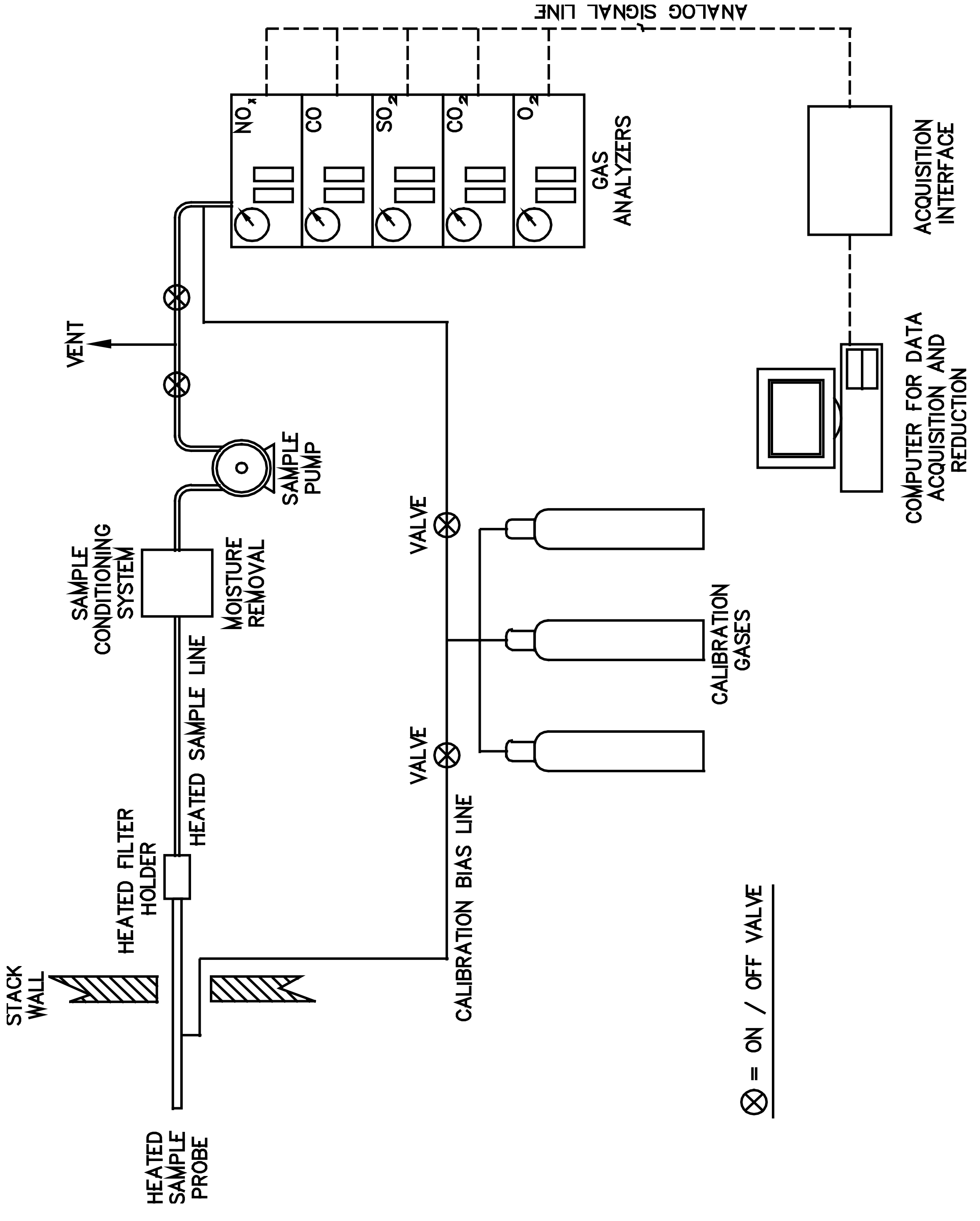


FIGURE 4-1 CONTINUOUS EMISSION MONITORING SYSTEM

Sample Analysis

The O_2 analyzer uses a paramagnetic detector, and the CO_2 analyzer uses a non-dispersive infra-red (NDIR) detector to produce an electrical signal which is linearly proportional to the O_2 and CO_2 concentration, respectively.

Data Acquisition and Reduction

Data are acquired electronically using a computer with software designed by WESTON for EPA Reference Method 3A analysis. This system generates a calibration curve, converts electronic signals into concentrations, and provides one-minute averages during the sample run and an average concentration over the duration of the sample run.

Quality Control

At the time of analysis, O_2 and CO_2 in nitrogen calibration gases certified according to EPA Protocol-1, are used to calibrate the analyzer and to determine a bias correction factor for the entire system bias in accordance with EPA Reference Method 3A. The calibration gases are introduced directly to the analyzer to generate the calibration curve. A zero gas and an upscale calibration gas are introduced at the probe and recovered through the sampling and analytical system. A bias correction factor is calculated using the ratio of the concentration measured from the sampling system and concentration measured directly at the analyzer. Sample run averages are corrected for system bias results.

4.1.3 Total Reduced Sulfur

Total reduced sulfur testing is performed using the procedures described in EPA Reference Method 16. When TRS data must be oxygen corrected, EPA Reference Method 3A using a calibrated O_2 analyzer, is performed on an integrated bag sample to measure oxygen concentration.

Sampling Equipment and Procedures

Figure 4-2 illustrates the sampling system. A Teflon®-lined, stainless steel probe of sufficient length to monitor the gas stream (without wall effects) is used to extract a gas sample from the emission source. The probe tip is directed away from stack gas flow to minimize particulate and moisture entrainment. The probe is connected directly to the recovery gas line and sample conditioning system.

The sample conditioning system consists of a Teflon® impinger containing 1.5M citrate buffer, adjusted to a pH of 5.4 to 5.6, maintained in an ice bath. Moisture is condensed in the impingers, yielding a dry sample and thus eliminating the need for heated sample lines. Even though the impinger set traps entrained particulate matter, very fine particulate matter is removed by a Balston® AQ Microfiber filter installed at the impinger outlet.

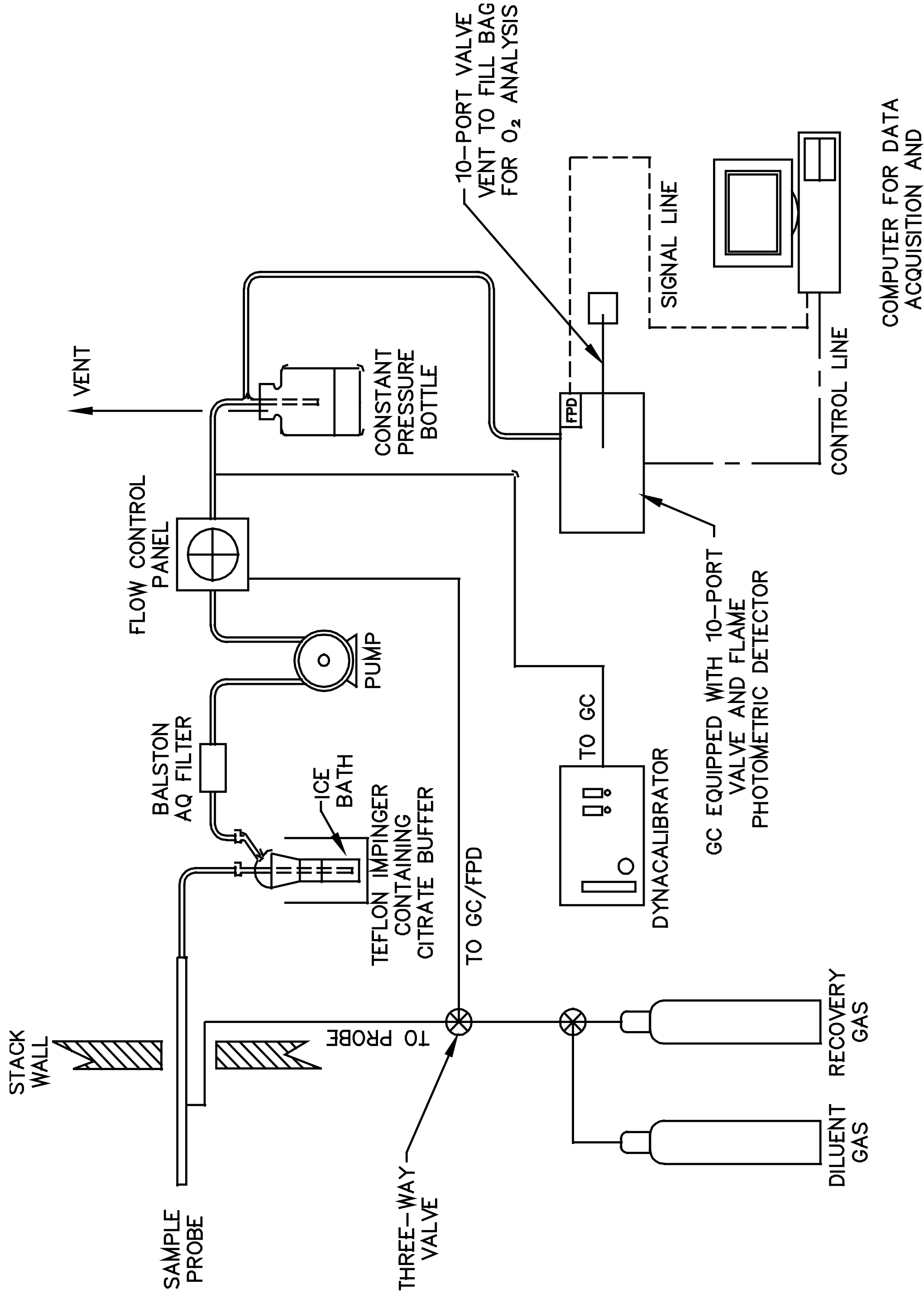


FIGURE 4-2 EPA REFERENCE METHOD 16
SAMPLING AND ANALYTICAL TRAIN

An unheated nylon line is connected from the filter to the sample pump inlet. Sample line length and connections are minimized to reduce surface adsorption of TRS and the possibility of leaks.

The pump outlet is connected directly to a constant pressure bottle. At this point, a major portion of the sample is vented to the atmosphere, and the remainder is used to charge the gas chromatograph (GC) sample loop. The GC sample loop outlet is connected to a Tedlar® gas collection bag gas sample collection and subsequent analysis using a calibrated O_2 analyzer.

Sample Analysis

Separation of hydrogen sulfide (H_2S), methyl mercaptan (MeSH), dimethyl sulfide (DMS), and dimethyl disulfide (DMDS) is accomplished by gas chromatography using a column suitable for separating these compounds. After resolution of H_2S, MeSH, and DMS, the column is backflushed to achieve resolution of DMDS within 2-3 minutes from sample injection. The gas chromatograph is operated on periodic cycle to produce a minimum of 20 injections per hour.

Detection of reduced sulfur compounds is accomplished with a flame photometric detector (FPD). The FPD response is calibrated before and after testing using gas phase standards prepared from gravimetrically certified permeation devices.

Data Acquisition and Reduction

The FPD responses are recorded by a computer equipped with software designed by WESTON for reduced sulfur compound analysis. The software controls the timing of the gas-chromatographic cycle, integrates and records peaks, performs calculations, and prints the results. Calibration curves are generated by the software using log-log linear least squares best fit of the data.

Quality Control

Permeation devices certified by the vendor are used to calibrate the FPD response. They are kept in a permeation chamber that is maintained at a constant temperature of 50° ± 1°C, the temperature at which the vendor certified the permeation rates. This assures that the actual permeation rates are the same as the certified rates. This temperature is verified at the time of sampling using a National Institute of Standards and Technology (NIST) traceable mercury-in-glass thermometer.

VICI-Metronics, Santa Clara, California, supplied the permeation devices for the testing. The devices are gravimetrically analyzed to measure the emission rate before shipment.

Various concentrations of the permeants are generated by varying the flow of the diluent gas stream over the devices. A calibration curve is constructed of at least three concentrations of each permeant; three successive injections at each concentration yield peak areas that differ from the mean peak area value by less than 5%.

Sampling system integrity is evaluated after every three hours of sampling by injecting a known concentration of H_2S at the probe tip and recovering the sample through the sample conditioning and sample transport subsystems. The same gas stream is then introduced directly to the GC sample loop. The ratio of concentrations corresponds to the system correction factor. This factor is then used to adjust measured reduced sulfur compound concentrations.

A system audit gas (of appropriate H_2S concentration) is used to evaluate the analytical system integrity each test day.

4.1.4 Sulfur Dioxide (Instrumental)

Sulfur dioxide (SO_2) testing is conducted in accordance with EPA Reference Method 6C.

Sampling Equipment and Procedures

Figure 4-1 illustrates the sampling system. The sample is withdrawn from the source through a heated probe, heated filter, and heated sample line to a sample conditioner which removes moisture from the gas stream. The sample is then transported to the analyzer through a Teflon® line.

Sample Analysis

The analyzer measures, at two discrete wavelengths, the absorption of ultraviolet radiation by the gas sample. The concentration of the components absorbing the light are then determined from relationships developed through application of the ideal gas law in concert with the laws of Bouguer, Beer, and Lambert.

Data Acquisition and Reduction

Data are acquired electronically using a computer with software designed by WESTON for EPA Reference Method 6C analysis. This system generates a calibration curve, converts electronic signals into concentrations, and provides bias-corrected averages.

Quality Control

At the time of analysis, SO_2 in nitrogen calibration gases (certified according to EPA Protocol-1) are used to calibrate the analyzer and to determine a bias correction factor for the entire system in accordance with EPA Reference Method 6C.

Calibration gases are introduced directly to the analyzer to generate the calibration curve. Zero level and upscale calibration gases are introduced at the probe and recovered through the sampling and analytical system. A bias correction factor is then calculated using the ratio of the measured concentration of the bias gas introduced through the sampling system and the measured concentration of the bias gas introduced directly to the analyzer. Run averages are adjusted for this bias correction factor.

SECTION 5
QA/QC ACTIVITIES

5.1 QA/QC PROCEDURES

The performance tests will incorporate the appropriate QA/QC procedures specified in EPA Methods 1, 2, 3A, 4, 6C, and 16. The integrity of the sample collection will be verified through procedures as specified in the EPA test methods. Sample custody procedures will be followed as described in Section 6.5.

Throughout the entire project, a high level of quality control will be maintained. The WESTON test personnel are experienced in the use of the instrumentation, the procedures, and the quality control requirements. The following paragraphs briefly summarize the quality control measures associated with the project.

Quality assurance objectives for precision and accuracy are presented in Table 5-1.

TABLE 5-1
QA OBJECTIVE FOR PRECISION AND ACCURACY

Critical Measurement	Method	Detection Limit
Volumetric Flow Rate	EPA 1, 2	100 acfm
Oxygen/Carbon Dioxide	EPA 3A	0.1%
Moisture	EPA 4	0.1%
Total Reduced Sulfur	EPA 16	<1 ppm
Sulfur Dioxide	EPA 6C	<2% of span

5.2 DATA QUALITY OBJECTIVES

Quality assurance procedures are designed to assess and document data accuracy, precision, and completeness. Accuracy is a measure of agreement between a measurement and a reference or standard value. Precision is a measure of mutual agreement of replicate measurements. Completeness is a measure of the amount of valid data collected compared to the amount that was expected under correct operating conditions. The pre-evaluation quality objectives are: completeness of 100%; accuracy and precision are described in Section 5.3 and Section 5.4.

Precision will be measured using the variation among replicate sample runs and analyses. Accuracy will be measured relative to the standard and permit requirements, control standards or audit samples, if available.

5.3 INTERNAL QA PROGRAM

QA Procedures for sampling and analysis will be conducted as required by method procedures. Test data precision will be measured using replicate sample runs and analysis. Three 1-hour test runs will be conducted for each pollutant.

Equipment will be calibrated prior to use at the site, and calibration will be checked again upon return to the Weston facility in Auburn, Alabama. The meter box calibration and calibration check data will be included in the test report.

The Type S pitot tubes used with the velocity probe at the stack locations will be calibrated prior to use in the emission testing program according to the procedures of EPA Method 2.

Leak checks of each sampling system and the pitot tube lines will be performed before and after each test run. Leak check results will be included in the test report.

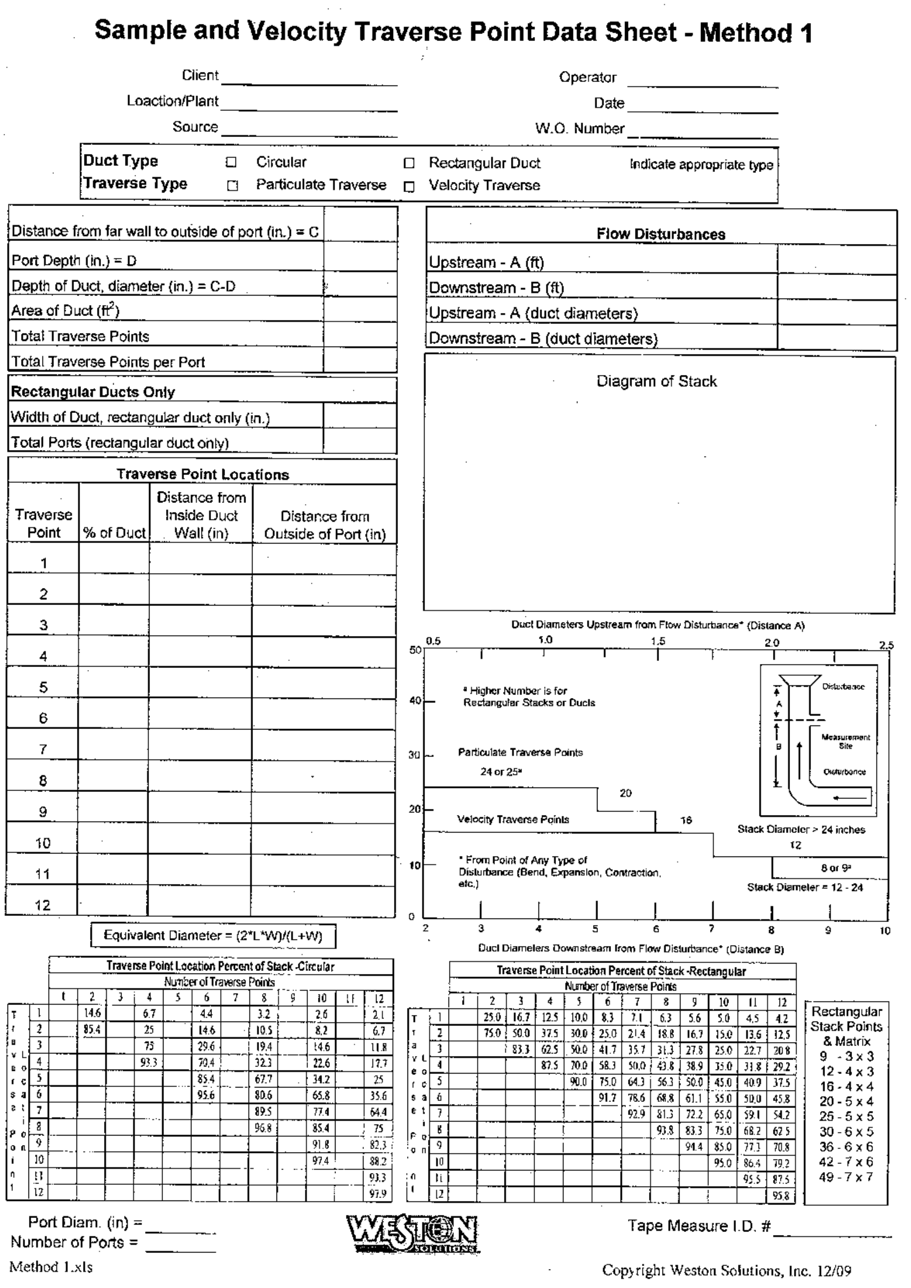
All sampling system components that contact the samples and all equipment used in sampling and recovery operations will be cleaned according to the procedures described in EPA Methods. All sampling equipment, media, and reagents will be packaged and handled to prevent contamination during transit to the test sites and preparation for emission tests.

Following sample collection, all samples will be given a unique alphanumeric sample identification number. All samples will be recorded by number in the project sample log. Sample labels will be completed and affixed to the sample container.

5.4 SAMPLE IDENTIFICATION AND CHAIN OF CUSTODY

The technician managing the test is responsible to ensure that all samples are accounted for and that proper chain-of-custody procedures are followed. After collecting and recovering the samples, the stack testing lead contact will apply sample labels, maintain inventory records of all the samples taken, and ensure that chain of custody forms are completed if sample possession is changed.

SECTION 6
DATA SHEETS



Sample and Velocity Traverse Point Data Sheet - Method 1

Client ____________________
Loaction/Plant ____________________
Source ____________________
Operator ________________
Date ________________
W.O. Number ________________

Duct Type ☐ Circular ☐ Rectangular Duct Indicate appropriate type
Traverse Type ☐ Particulate Traverse ☐ Velocity Traverse

Distance from far wall to outside of port (in.) = C	
Port Depth (in.) = D	
Depth of Duct, diameter (in.) = C-D	
Area of Duct (ft^2)	
Total Traverse Points	
Total Traverse Points per Port	
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	
Total Ports (rectangular duct only)	

Flow Disturbances	
Upstream - A (ft)	
Downstream - B (ft)	
Upstream - A (duct diameters)	
Downstream - B (duct diameters)	

Diagram of Stack

Traverse Point Locations

Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Equivalent Diameter = (2*L*W)/(L+W)

Traverse Point Location Percent of Stack -Circular

Traverse Point Location	Number of Traverse Points: 1	2	3	4	5	6	7	8	9	10	11	12
1		14.6		6.7		4.4		3.2		2.6		2.1
2		85.4		25		14.6		10.5		8.2		6.7
3				75		29.6		19.4		14.6		11.8
4				93.3		70.4		32.3		22.6		17.7
5						85.4		67.7		34.2		25
6						95.6		80.6		65.8		35.6
7								89.5		77.4		64.4
8								96.8		85.4		75
9										91.8		82.3
10										97.4		88.2
11												93.3
12												97.9

Traverse Point Location Percent of Stack -Rectangular

Traverse Point Location	Number of Traverse Points: 1	2	3	4	5	6	7	8	9	10	11	12
1		25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2		75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3			83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4				87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5					90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6						91.7	78.6	68.8	61.1	55.0	50.0	45.8
7							92.9	81.3	72.2	65.0	59.1	54.2
8								93.8	83.3	75.0	68.2	62.5
9									94.4	85.0	77.3	70.8
10										95.0	86.4	79.2
11											95.5	87.5
12												95.8

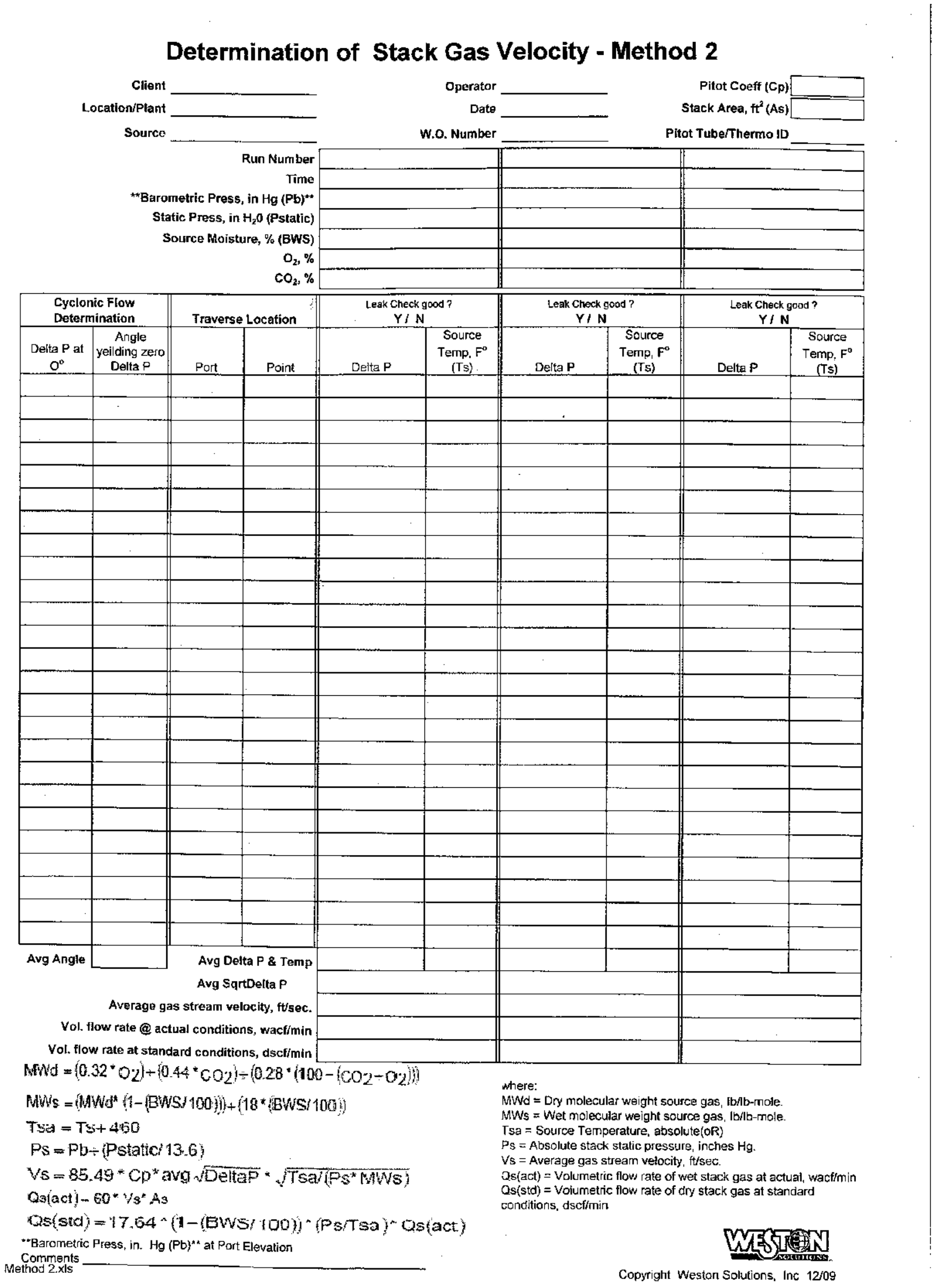
Rectangular Stack Points & Matrix
9 - 3 x 3
12 - 4 x 3
16 - 4 x 4
20 - 5 x 4
25 - 5 x 5
30 - 6 x 5
36 - 6 x 6
42 - 7 x 6
49 - 7 x 7

Port Diam. (in) = ________
Number of Ports = ________

Tape Measure I.D. # ____________

Method 1.xls

FIGURE 6-1 METHOD 1



Determination of Stack Gas Velocity - Method 2

Client ____________________ Operator ________________ Pitot Coeff (Cp) ☐

Location/Plant ____________________ Date ________________ Stack Area, ft^2 (As) ☐

Source ____________________ W.O. Number ________________ Pitot Tube/Thermo ID ____________

Run Number			
Time			
Barometric Press, in Hg (Pb)			
Static Press, in H_2O (Pstatic)			
Source Moisture, % (BWS)			
O_2, %			
CO_2, %			

Cyclonic Flow Determination		Traverse Location		Leak Check good ? Y / N		Leak Check good ? Y / N		Leak Check good ? Y / N	
Delta P at O°	Angle yeilding zero Delta P	Port	Point	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)
Avg Angle		Avg Delta P & Temp							

Avg SqrtDelta P			
Average gas stream velocity, ft/sec.			
Vol. flow rate @ actual conditions, wacf/min			
Vol. flow rate at standard conditions, dscf/min			

$MWd = (0.32 * O_2) + (0.44 * CO_2) + (0.28 * (100 - (CO_2 + O_2)))$

$MWs = (MWd * (1 - (BWS/100))) + (18 * (BWS/100))$

$Tsa = Ts + 460$

$Ps = Pb + (Pstatic/13.6)$

$Vs = 85.49 * Cp * avg\sqrt{DeltaP} * \sqrt{Tsa/(Ps * MWs)}$

$Qs(act) = 60 * Vs * As$

$Qs(std) = 17.64 * (1 - (BWS/100)) * (Ps/Tsa) * Qs(act)$

where:

MWd = Dry molecular weight source gas, lb/lb-mole.

MWs = Wet molecular weight source gas, lb/lb-mole.

Tsa = Source Temperature, absolute(oR)

Ps = Absolute stack static pressure, inches Hg.

Vs = Average gas stream velocity, ft/sec.

Qs(act) = Volumetric flow rate of wet stack gas at actual, wacf/min

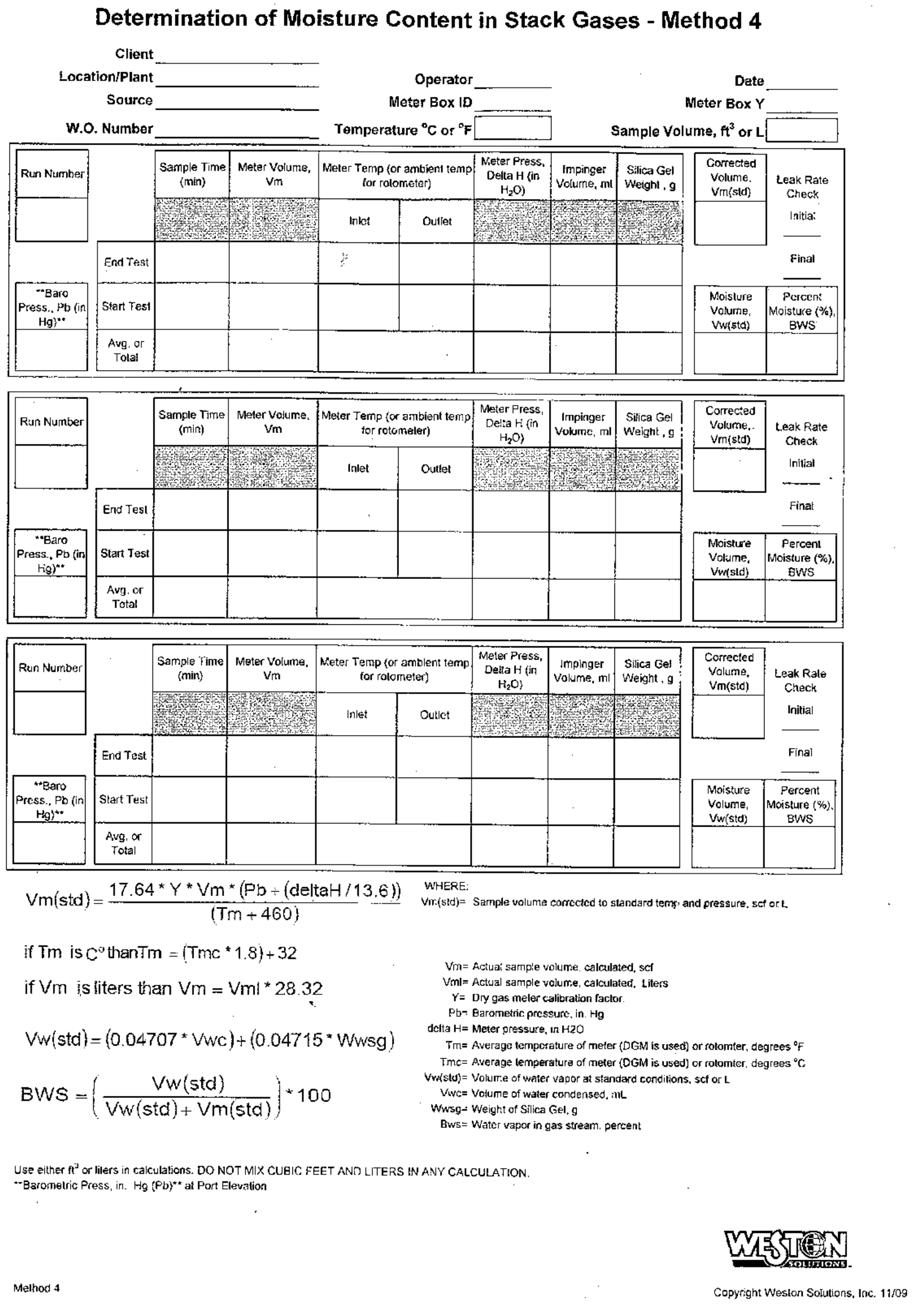
Qs(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min

Barometric Press, in. Hg (Pb) at Port Elevation

Comments ____

Method 2.xls

FIGURE 6-2 METHOD 2



Determination of Moisture Content in Stack Gases - Method 4

Client ____________________

Location/Plant ____________________ Operator __________ Date __________

Source ____________________ Meter Box ID __________ Meter Box Y __________

W.O. Number ____________________ Temperature °C or °F ☐ Sample Volume, ft^3 or L ☐

Run Number		Sample Time (min)	Meter Volume, Vm	Meter Temp (or ambient temp for rotometer)		Meter Press, Delta H (in H_2O)	Impinger Volume, ml	Silica Gel Weight , g	Corrected Volume, Vm(std)	Leak Rate Check
				Inlet	Outlet					Initial
	End Test									Final
Baro Press., Pb (in Hg)	Start Test								Moisture Volume, Vw(std)	Percent Moisture (%), BWS
	Avg. or Total									

Run Number		Sample Time (min)	Meter Volume, Vm	Meter Temp (or ambient temp for rotometer)		Meter Press, Delta H (in H_2O)	Impinger Volume, ml	Silica Gel Weight , g	Corrected Volume, Vm(std)	Leak Rate Check
				Inlet	Outlet					Initial
	End Test									Final
Baro Press., Pb (in Hg)	Start Test								Moisture Volume, Vw(std)	Percent Moisture (%), BWS
	Avg. or Total									

Run Number		Sample Time (min)	Meter Volume, Vm	Meter Temp (or ambient temp for rotometer)		Meter Press, Delta H (in H_2O)	Impinger Volume, ml	Silica Gel Weight , g	Corrected Volume, Vm(std)	Leak Rate Check
				Inlet	Outlet					Initial
	End Test									Final
Baro Press., Pb (in Hg)	Start Test								Moisture Volume, Vw(std)	Percent Moisture (%), BWS
	Avg. or Total									

$$Vm(std) = \frac{17.64 * Y * Vm * (Pb \div (deltaH / 13.6))}{(Tm + 460)}$$

if Tm is C° than $Tm = (Tmc * 1.8) + 32$

if Vm is liters than $Vm = Vml * 28.32$

$$Vw(std) = (0.04707 * Vwc) + (0.04715 * Wwsg)$$

$$BWS = \left(\frac{Vw(std)}{Vw(std) + Vm(std)} \right) * 100$$

WHERE:

Vm(std)= Sample volume corrected to standard temp and pressure, scf or L

Vm= Actual sample volume, calculated, scf

Vml= Actual sample volume, calculated, Liters

Y= Dry gas meter calibration factor.

Pb= Barometric pressure, in. Hg

delta H= Meter pressure, in H2O

Tm= Average temperature of meter (DGM is used) or rotomter, degrees °F

Tmc= Average temperature of meter (DGM is used) or rotomter, degrees °C

Vw(std)= Volume of water vapor at standard conditions, scf or L

Vwc= Volume of water condensed, mL

Wwsg= Weight of Silica Gel, g

Bws= Water vapor in gas stream, percent

Use either ft^3 or liters in calculations. DO NOT MIX CUBIC FEET AND LITERS IN ANY CALCULATION.

Barometric Press, in. Hg (Pb) at Port Elevation

Method 4

FIGURE 6-3 METHOD 4 DATA SHEET

SECTION 7
TEST REPORT OUTLINE

TABLE 7-1
TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

Healthy People. Healthy Communities.

June 18, 2021

Mr. Dan Mallett
New-Indy Catawba, LLC
5300 Cureton Ferry Road
PO Box 7
Catawba, SC 29704

RE: <u>Pulp Dryer, No. 3 Paper Machine, No. 2 and 3 Smelt Dissolving Tanks, No. 1 and No. 2 Combination Boilers, and Steam Stripper Test Plan Submitted June 18, 2021</u>

Dear Mr. Mallett:

The referenced site-specific test plan is approved by the Department contingent upon the following:

1) New-Indy shall meet all testing requirements outlined in the State Order to Correct Undesirable Level of Air Contaminants and the EPA's 114 letter, issued on June 2, 2021.
2) New-Indy shall follow and perform all requirements listed within the applicable permits, regulations, test methods, and correspondence.
3) All stacks related to the dryer section of the paper machine must be tested.
4) All stacks to be tested must meet Method 1 - 4 criteria.
5) New-Indy shall collect, record, and report all data needed to report emissions, as mass emission rates.
6) Combustion sources must be tested for SO_2.

New-Indy shall record and report all process and operating parameters identified within the site-specific test plan and within the applicable permit. These parameters must be recorded at least every 15 minutes during the testing. Recording these parameters is the responsibility of the facility, not the contractor conducting the test, and failure to record these parameters may also be cause for rejecting the test results.

New-Indy shall operate the processes to be tested at representative operating conditions. Tests conducted at lower operating conditions may have reduced operating and/or emission limits imposed. The level of restriction will be determined by the margin of compliance, operating rate, and other appropriate parameters.

Any deviations from the plan, without prior approval from the Department, may be cause for rejecting the test results. The supporting information and follow up emails are integral parts of the plan and must also be followed.

Approval of this site-specific test plan does not constitute approval of any alternative test methods, monitoring parameters, or procedures.

If I can be of any further assistance, please do not hesitate to call me at (803) 898-2231 or contact me via e-mail at justicje@dhec.sc.gov.

Sincerely,

James E. Justice
Environmental Health Manager
Source Evaluation Section
SCDHEC Bureau of Air Quality

Cc: Compliance File 2440-0005
Ec: Rhonda Thompson, BAQ
Michael Shroup, BAQ
Michael Verzwyvelt, BAQ
Todd Russo, U.S. EPA Region 4
Dan Mallett, New-Indy Catawba, LLC
Alexis Dabney, Midlands Region – Lancaster BEHS

dhec
Healthy People. Healthy Communities.

June 18, 2021

Mr. Dan Mallett
New-Indy Catawba, LLC
5300 Cureton Ferry Road
PO Box 7
Catawba, SC 29704

RE: <u>Steam Stripper, Aerated Stabilization Basin, and Post-Aeration Tank – Test Plan Submitted June 15, 2021</u>

Dear Mr. Mallett:

The referenced site-specific test plan is approved by the Department contingent upon the following:

1) New-Indy shall meet the requirements outlined in the State Order to Correct Undesirable Level of Air Contaminants and the EPA's 114 letter issued on June 2, 2021.
2) New-Indy must follow and perform all requirements listed within the applicable permits, regulations, test methods, and correspondence.
3) New-Indy shall collect, record, and report all data needed to report emissions, as mass emission rates.

All process and operating parameters and pollution control operating parameters identified within the regulations, the site-specific test plan, operating permit, and correspondence must be recorded at least every 15 minutes during the test and must be included within the final report. Recording these parameters is the responsibility of the facility, not the contractor conducting the test, and failure to record these parameters may also be cause for rejecting the test results.

New-Indy shall operate processes to be tested at representative operating conditions according to §63.457(o). Tests conducted at lower operating conditions may have reduced operating and/or emission limits imposed. The level of restriction will be determined by the margin of compliance, operating rate, and other appropriate parameters.

Any deviations from the plan without prior approval from the Department, may be cause for rejecting the test results. The supporting information and follow up emails are integral parts of the plan and must also be followed.

Approval of this site-specific test plan does not constitute approval of any alternative test methods, monitoring parameters, or procedures.

40 CFR 63, Subpart S requires the collected condensate to be treated according to one of the listed options. Any alternative compliance standard or monitoring procedure will require approval by the Administrator.

If I can be of further assistance, please contact me at (803) 898-3856 or email me at monroedn@dhec.sc.gov.

Sincerely,

David N. Monroe
Environmental Health Manager
Source Evaluation Section
SCDHEC Bureau of Air Quality

Cc: Compliance File 2440-0005

Ec: Michael Verzwyvelt, BAQ
Rhonda Thompson, BAQ
Michael Shroup, BAQ
Allie Dabney, Midlands Region – Lancaster BEHS
Todd Russo, U.S. EPA Region 4
Dan Mallett, New-Indy Catawba, LLC

S.C. Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201 (803) 898-3432 www.scdhec.gov