HW → 1995.05.10 LGF Feed Rate Revised Protocol

Norlite Corporation

Norlite

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May 10 , 1995

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REGION IV HEADQUARTERS
SCHENECTADY, N.Y. 12306

Mr. William J. Clarke
Regional Permit Administrator
New York State Department of
Environmental Conservation
Region 4
1150 N. Westcott Road
Schenectady, New York 12306-2014

SUBJECT: Test Protocol to Validate Higher LGF Halogen Feed Rate Limit

Dear Mr. Clarke:

Norlite hereby submits Revision 2 of the subject Test Protocol for your review and approval. This revision responds to NYS DEC comments contained in your letters of April 28 and May 3, 1995, as well as incorporates some minor changes to clarify some test elements. Revisions to the previous edition of the test have been italicized to highlighted changes.

Your letter of May 3, 1995 requests an explanation for the apparent discrepancy between the proposed scrubber pH operating range (7.9 to 8.5 in Rev. 1 of the test plan) and a pH of 10.2 which was identified by wastewater treatment tests as the optimum pH for removal of metals. Metals absorption from the scrubber gas stream is not highly pH sensitive; whereas, metals precipitation from aqueous solutions, such as in the WWT System, is controlled by pH. The 7.9 to 8.5 scrubber pH range originally specified was in error. Our minimum permitted scrubber pH is >8.0 for the purpose of acid gas removal; therefore, the scrubber water pH operating range for the test has been revised to the range of 8.0 to 9.0. Since this is the current normal operating range of the scrubbers, the interim wastewater treatment system performance would not be expected to change. The permanent wastewater system has pH adjustment capability to take advantage of enhanced metals removal performance at elevated pH; therefore, superior metals removal capability is expected from this system.

Norlite is proposing to conduct this test in two stages. The first stage includes, 1) a two day baseline test to confirm performance of both kilns at normal blowdown flow rates (10 - 12 gpm) and the current maximum permitted chlorine feed rate (115 lbs./hr.), 2) a four day, two kiln elevated chlorine feed test (200 - 440 lbs./hr.) at normal blowdown flow rates, and 3) a 14 day, single kiln (Unit #1) test at elevated chlorine feed rates and increased blowdown flow rates. Stage

One of the test will start on May 30, 1995 and will continue through June 18, 1995. The second stage will consist of a 14 day, single kiln (Unit #2) test at elevated chlorine feed rates and increased blowdown flow rates. Stage Two will commence on July 10, 1995 and will continue through July 23, 1995. The elevated chlorine feed test (>115 lbs./hr.) schedule has been expanded from 30 days to 32 days to allow the duration of individual test conditions to be in 8, 12, and 16 hour blocks. This will allow sufficient time for the scrubber system to establish equilibrium conditions after changes in chlorine feed rates, blowdown rates, and scrubber recirculation rates, and will simplify management of the test.

If you have any questions on the attached Test Protocol, please feel free to call me. Thank you for your continued assistance in this matter.

Sincerely,

William J. Klein
Director of Compliance

Enclosure: Halogen Test Protocol, Rev. 2

cc: Sanjay Saraiya, NYS DEC, Region 4
Robert Warland, NYS DEC, Region 4
Carol Lamb-LaFay, NYS DEC, Region 4

Norlite

TEST PROTOCOL FOR DEMONSTRATING COMPLIANT STACK PLUME CHARACTERISTICS WHILE FIRING WASTES CONTAINING CHLORINATED ORGANICS IN EXCESS OF CURRENT PERMIT FEED LIMITS

MAY 1995

REVISION #2

TABLE OF CONTENTS

TEST PROTOCOL FOR DEMONSTRATING COMPLIANT STACK PLUME CHARACTERISTICS WHILE FIRING WASTES CONTAINING CHLORINATED ORGANICS IN EXCESS OF CURRENT PERMIT LIMITS

1.0 INTRODUCTION

Norlite Corporation, located in Cohoes, New York, operates two lightweight aggregate kilns that incinerate both liquid and solid hazardous wastes/low grade fuels (LGF) for destruction and energy recovery. Emissions from these processes are controlled by independent air pollution control systems, each consisting principally of a baghouse and wet scrubber.

During September/October 1992, Norlite conducted a Trial Burn on Kiln #1. This Trial Burn successfully demonstrated that Kiln #1's air pollution control system is capable of removing hydrogen chloride from flue gases to within regulated State and Federal emissions limits while the kiln is fired with hazardous waste fuels containing up to 440 lbs./hr. of organic chlorine. Since Kiln #2's air pollution control system is identical to that of Kiln #1, the Trial Burn also demonstrated Kiln #2's capability to satisfy emissions limits for hydrogen chloride under similar conditions. Results of the Trial Burn were incorporated into a comprehensive Trial Burn Report which was submitted to the New York State Department of Environmental Conservation (DEC) during December 1992. While DEC was reviewing Trial Burn results pursuant to issuing revised permit conditions, Norlite requested DEC to authorize testing of a zero (wastewater) discharge system which, if successful, would entirely eliminate wastewater discharges from the facility. For a variety of reasons, zero discharge proved to be unfeasible. These reasons were mainly attributed to build-up of solids in the APC system. During the zero discharge test, DEC received an odor complaint from a local resident. This complaint, in conjunction with the presence of a trailing plume during the zero discharge test period, prompted DEC to propose, as a minor modification, authorization of a 30 day test. During the test period, Norlite would demonstrate that there are no adverse changes to stack plume characteristics associated with firing chlorinated organics at levels significantly in excess of the current 115 lbs./hr. permit limit. This test period will confirm that the odor complaint and trailing plume was solely the result of the zero discharge process, and not expected from routine operation at levels of chlorine feed of 440 lbs/hr.

The objective of this protocol is to define the manner in which such a test will be conducted. By testing both kilns at elevated organic chlorine feed rates for a *32 day period*, Norlite expects to demonstrate compliant and acceptable stack plume characteristics under worst case circumstances for a wide range of meteorological conditions. The test will demonstrate the ability of Norlite's air pollution systems to properly control hydrogen chloride emissions at organic chlorine feed rates significantly in excess of currently permitted values, and will support a revised permit condition for burning wastes with elevated chlorine levels. Prior stack tests in 1992 have demonstrated the ability of the kiln process to meet New York Part 373 and EPA Part 266 standards when feeding chlorine at average rates of 440 lbs/hr.

The test will also evaluate the impact of various scrubber water blowdown *and recirculation flow* rates on the stack plume characteristics. It is believed that the adverse plume characteristics observed during the zero discharge test period were due to low blowdown rates for the scrubber water. The objective of zero discharge process operations was to minimize blowdown rate so as to minimize the amount of water injected into the kiln. These blowdown rates were as low as 5 gpm. It is believed that the higher the blowdown rate, the better the scrubbing efficiency and the better the quality of plume characteristics. *While scrubber recirculation flow rate was not an independent test variable during zero discharge testing, since this variable does influence scrubbing efficiency, Norlite will also evaluate the effect that scrubber recirculation flow rate has on stack plume characteristics.*

Additionally, the test will be utilized to help establish limits for some dependent process variables; specifically, Ducon and Venturi differential pressures. These parameters will be continuously measured during the complete range of test conditions to help establish an appropriate operating range for these variables.

Data and observations collected during this test will be evaluated and summarized in a report to be submitted to DEC within *60 days* following completion of testing. Refer to Section 5.0 for a description of the report format and content.

2.0 PROJECT ORGANIZATION

Mr. William J. Klein, Director of Compliance, will be responsible for management of the test program and compilation of all test data and conclusions into a comprehensive test report. Waste fuel activities and routine plant operations will be under the direction of Mr. Charles Vannoy, Director of Operations. Finally, stack plume observations, chlorine emissions monitoring, and stack flow rate measurements will be managed by Mr. Edward Burgher, Director of Permitting.

3.0 <u>TEST IMPLEMENTATION</u>

3.1 Overview

Norlite proposes to conduct the subject elevated chlorine feed test on both kilns for a *32 day period*. Appropriate waste feeds will be prepared by enriching the organic chlorine content of routine waste feeds by blending with chlorinated POHCs or by using as-received waste and blending to a higher percentage chlorine, *up to an organic chlorine concentration of approximately 9%*. Each kiln will be operated separately at *normal to near* maximum permitted feed conditions and air pollution control systems will be operated in accordance with current permit limits to achieve the appropriate levels of chlorine removal. Stack plume characteristics for both units, specifically the presence of trail-off/opacity and, where possible, odor at the point the plumes touch the ground will be observed and recorded at specified intervals for the duration of the test. In addition, a chlorine emissions monitor will be installed to monitor chlorine emissions from each kiln during each separate test *condition*. Samples of the scrubber blowdown water will be collected for analysis for *total dissolved solids (TDS), total suspended solids (TSS), chloride concentration*, and ammonia nitrogen. *Finally, wastewater treatment system influent and effluent samples will be analyzed for the aforementioned parameters, plus all characteristics required by Consent Orders R4-1680-94-05 and R4-1734-94-08, to determine if there is a potential to affect the treatability of the scrubber water/wastewater and impact final effluent quality.*

3.2 Theory

During the 1992 Trial Burn, the cause of the trailing plume affect was demonstrated to be ammonium chloride. Ammonium chloride forms sub-micron particulate with crystals of high refractive index, creating an apparent elevated opacity. Despite this effect, the emissions of HCl were in compliance with Part 373 Limits during the Trial Burn.

The Zero Discharge Testing performed in 1993 involved the use of the scrubber blowdown as a temperature control agent in the kiln. All of the scrubber blowdown was injected into the kiln. For this reason, the main objective of the zero discharge process was to minimize the volumetric rate of blowdown, to the range of 5 to 10 gpm. When this was done, it was observed that the apparent opacity of the plume increased, and the removal efficiency for HCl declined. Odors of acid gas were experienced at the point at which the plume impacted ground level during a one day test during which halogen feed rates of 440 lbs/hr were made to Kiln 2.

The Trial Burn in 1992 operated at high halogen feed rates for 6 days *with good plume characteristics and with no exceedence of Part 373 Limits for HCl*. The reason is believed to be attributed to the high scrubber blowdown rates, with minimum rates averaging 28 to 30 gpm. These higher blowdown rates result in higher fresh make-up water rates, and lower dissolved solids in the scrubber water. This in turn improves scrubber efficiency for HCl, and removal efficiency for submicron particulate matter like ammonium chloride.

3.3 Test Execution

Prior to the start of the test period, Norlite will conduct background evaluations of the plume characteristics under current conditions of blowdown rates of 10 to 12 gpm, and halogen feed rates of 115 lbs/hour. Two days of data will be collected for each kiln to establish background. Samples of the scrubber blowdown will be analyzed for *total dissolved solids (TDS), total suspended solids (TSS), chloride concentration and* ammonia nitrogen. *Additionally, as discussed in Section 3.2, wastewater treatment system samples will be analyzed to evaluate the impact on the wastewater treatment system.*

Each kiln is scheduled for a two week shutdown, with Kiln #2 going down for two weeks (*June 5th to June 18th*) and Kiln #1 going down for two weeks in *July* (*July 10th to July 23rd*). During the time that one kiln is down, the hydraulic capacity of the temporary wastewater treatment plant is such that a blowdown rate of 30 gpm can be sustained for the one operating kiln. This will enable Norlite to complete testing *in July, so that the halogen major permit modification can be evaluated near the time of completion for the permanent wastewater treatment plant, in September.*

Norlite proposes to evaluate plume characteristics under varying halogen feed rates, scrubber blowdown characteristics, *and scrubber recirculation flow rates*. This will enable evaluation of the relationship between *dependent test variables* such as HCl emission rate, opacity, and *scrubber operating conditions, e.g., Ducon and Venturi differential pressures*, scrubber water *TDS, TSS, chloride concentrations, and* ammonia nitrogen contents versus scrubber water blowdown rate, *scrubber water recirculation flow rate*, and halogen feed rate. Halogen feed rates of (115), 200, 250, 300 and 440 lbs/hour will be evaluated, against scrubber blowdown rates of 10, 20 and 28 gpm and *scrubber water recirculation flow rates of 175, 185, and 195 gpm*. These parameter may vary by 10% from these proposed values. These various *scrubber recirculation and* blowdown rates, and halogen feed rates will provide sufficient data to allow the establishment of permit conditions that maximize halogen feed rate while maintaining compliant emissions.

3.4 Test Schedule

The background measurements will be taken for two days on each kiln at existing blowdown rates and halogen feed rates of 115 lbs/hour. This will be conducted *on May 30th and May 31st, followed by the first 18 days of the 32 day test period of higher halogen feed rates.*

The following table provides the schedule for conducting the *elevated halogen feed* test on each kiln. This schedule allows all critical combinations of scrubber blowdown rate, *scrubber water recirculation flow rate*, and halogen feed rate to be evaluated *for* each kiln.

TEST SCHEDULE

KILN	DAY	DATE	TIME	HALOGEN FEED RATE (lb./hr.)	BLOWDOWN RATE (gpm)	RECIRC. RATE (gpm)
1&2	1	6/1	00:00-08:00	200	10-12	175
1&2	1	6/1	08:00-16:00	200	10-12	185
1&2	1	6/1	16:00-24:00	200	10-12	195
1&2	2	6/2	00:00-08:00	250	10-12	175
1&2	2	6/2	08:00-16:00	250	10-12	185
1&2	2	6/2	16:00-24:00	250	10-12	195
1&2	3	6/3	00:00-08:00	300	10-12	175
1&2	3	6/3	08:00-16:00	300	10-12	185
1&2	3	6/3	16:00-24:00	300	10-12	195
1&2	4	6/4	00:00-08:00	440	10-12	175
1&2	4	6/4	08:00-16:00	440	10-12	185
1&2	4	6/4	16:00-24:00	440	10-12	195
1	5	6/5	00:00-12:00	200	20	175
1	5	6/5	12:00-24:00	200	20	185
1	6	6/6	00:00-12:00	200	20	195
1	6	6/6	12:00-24:00	200	28	175
1	7	6/7	00:00-12:00	200	28	185
1	7	6/7	12:00-24:00	200	28	195
1	8	6/8	00:00-12:00	250	20	175
1	8	6/8	12:00-24:00	250	20	185
1	9	6/9	00:00-12:00	250	20	195
1	9	6/9	12:00-24:00	250	28	175
1	10	6/10	00:00-12:00	250	28	185
1	10	6/10	12:00-24:00	250	28	195
1	11	6/11	00:00-16:00	300	20	175
1	11	6/11	16:00-24:00	300	20	185
1	12	6/12	00:00-08:00	300	20	185
1	12	6/12	08:00-24:00	300	20	195
1	13	6/13	00:00-16:00	300	28	175
1	13	6/13	16:00-24:00	300	28	185
1	14	6/14	00:00-08:00	300	28	185
1	14	6/14	08:00-24:00	300	28	195
1	15	6/15	00:00-16:00	440	20	175
1	15	6/15	16:00-24:00	440	20	185
1	16	6/16	00:00-08:00	440	20	185
1	16	6/16	08:00-24:00	440	20	195
1	17	6/17	00:00-16:00	440	28	175
1	17	6/17	16:00-24:00	440	28	185
1	18	6/18	00:00-08:00	440	28	185
1	18	6/18	08:00-24:00	440	28	195
2	19	7/10	00:00-12:00	200	20	175
2	19	7/10	12:00-24:00	200	20	185
2	20	7/11	00:00-12:00	200	20	195
2	20	7/11	12:00-24:00	200	28	175

KILN	*DAY*	*DATE*	*TIME*	*HALOGEN FEED RATE* (lb./hr.)	*BLOWDOWN RATE* (gpm)	*RECIRC. RATE* (gpm)
2	21	7/12	00:00-12:00	200	28	185
2	21	7/12	12:00-24:00	200	28	195
2	22	7/13	00:00-12:00	250	20	175
2	22	7/13	12:00-24:00	250	20	185
2	23	7/14	00:00-12:00	250	20	195
2	23	7/14	12:00-24:00	250	28	175
2	24	7/15	00:00-12:00	250	28	185
2	24	7/15	12:00-24:00	250	28	195
2	25	7/16	00:00-16:00	300	20	175
2	25	7/16	16:00-24:00	300	20	185
2	26	7/17	00:00-08:00	300	20	185
2	26	7/17	08:00-24:00	300	20	195
2	27	7/18	00:00-16:00	300	28	175
2	27	7/18	16:00-24:00	300	28	185
2	28	7/19	00:00-08:00	300	28	185
2	28	7/19	08:00-24:00	300	28	195
2	29	7/20	00:00-16:00	440	20	175
2	29	7/20	16:00-24:00	440	20	185
2	30	7/21	00:00-08:00	440	20	185
2	30	7/21	08:00-24:00	440	20	195
2	31	7/22	00:00-16:00	440	28	175
2	31	7/22	16:00-24:00	440	28	185
2	32	7/23	00:00-08:00	440	28	185
2	32	7/23	08:00-24:00	440	28	195

In the table above, the four days of higher halogen feed at the low blowdown rates will be performed at the start of the test. Since the blowdown required for each of these four days is achievable with the temporary wastewater treatment plant, these four days can be completed prior to the shutdown schedule. The higher blowdown rates will then be evaluated on each kiln during each 14 day maintenance outage.

In the event that some unexpected process limit is prematurely reached, Norlite will evaluate the cause and, at its option, elect to correct the problem and then proceed with the test program or continue the test at some reduced chlorine feed limit.

3.5 Process Configuration

The kilns and their associated air pollution control systems are configured in accordance with the description contained in Section 3.2 of the Trial Burn Report. The only substantial difference between the configuration of the current kiln systems and those at the time of the Trial Burn, concerns the treatment and disposition of wastewater (scrubber blowdown). During the Trial Burn for Kiln #1, scrubber blowdown was discharged to the Salt Kill consistent with interim control measures which were established as part of an engineering report approved by DEC. Norlite has since installed a temporary wastewater treatment system capable of treating up to 15 gpm of blowdown per kiln. The permanent wastewater system will be capable of managing 30 gpm of blowdown per kiln.

3.6 Waste Preparation

During the 30 day test, routine sources of LGF will be enriched in organic chlorine content by blending with POHCs in the waste storage/feed system or by using received wastes. The POHC source will be a non-hazardous mixture of tri and tetrachlorobenzenes which have a nominal chlorine concentration of 60%. All other aspects of waste acceptance and feed preparation/planning will be in accordance with current approved permit conditions and practices. Further details on the POHC spike are presented in Appendix B.

Non-hazardous POHC blends will be received in tank car or drum quantities. Tank cars will be off-loaded in a manner similar to hazardous waste receipts, except that only that quantity of POHC necessary to prepare a waste blend will be withdrawn from the tanker at a given time. In this manner, tankers will be partially off-loaded and used for interim storage of non-hazardous POHCs. This arrangement is necessary since test related feed planning, blending, sampling, and LGF feed operations for two kilns, at maximum feed rates for sustained periods, will tax Norlite's storage/feed systems and analytical resources. Full and partially filled tankers of POHCs will be parked in the truck staging area which has secondary containment capability in the unlikely event of a leak.

3.7 Process Operations

During the 32 day test, the kilns and their air pollution control systems will be operated in accordance with the process limits defined in Norlite's Part 373 permit. Norlite expects DEC will grant written approval, via a minor modification, to allow an organic chlorine feed limit of 440 lbs./hr./kiln for the duration of the test. *Additionally, the permitted scrubber water recirculation flow rate WFCO setpoint of 175 gpm must be relaxed to allow scrubber recirculation flow rate to be tested at the proposed test condition of 175 gpm. Norlite proposes that an interim WFCO limit of 165 gpm be established for this parameter for the duration of the test.*

The success of this test is dependent on the ability of Norlite's air pollution control systems to remove hydrogen chloride from flue gases and comply with established emissions limits while each *system is taxed by operating at elevated organic halogen feed rates.* Feed conditions for each kiln will be as follows:

- *LGF feed rate will be within Norlite's normal operating range (7.5 to 9.5 gpm) with approximately three days of operation for each kiln approaching Norlite's permit limit of 10.1 gal./min. The organic chlorine concentration will correspond to a feed rate of up to 440 lbs./hr./kiln,* and

- Raw shale feed rate will be within Norlite's normal operating range of 14 to 18 tons/hr.

To ensure optimum performance, i.e., maximum chlorine removal, the air pollution control systems will be operated as follows:

- Scrubber recirculation tank pH will be controlled in the range of 8.0 to 9.0 for each unit,

- Scrubber water blowdown will be varied from 10 to *28* gpm for each unit *and scrubber water recirculation flow rate will be varied between 175 and 195 gpm for each unit* to establish the relationship between blowdown rate *and recirculation flow rate* and stack plume characteristics, and

- A lime feed rate of 2.7 to 3.5 lbs./hr. will be maintained to each baghouse for each corresponding lb./hr. of organic chlorine contained in the waste feed.

All other process control parameters will be maintained within current permit limits or interim permit limits established by the minor modification authorizing this test.

3.8 Data Collection / Stack Plume Characterization

During the 32 day test period, all routine LGF, kiln, and air pollution control system operating parameters will be recorded for both units in accordance with permit requirements and current practices. Ducon and Venturi scrubber differential pressures will be recorded continuously. Grab samples of scrubber blowdown water will be collected for analysis of TDS, TSS, chloride concentration, and ammonia nitrogen. One grab sample will be collected for each change in scrubber recirculation flow rate. This will ensure that three grab samples will be collected for each set of halogen feed rate and blowdown conditions. Grab samples will not be collected until at least one hour following a change in scrubber recirculation flow rate. This will ensure that the scrubber liquids have achieved equilibrium conditions. In addition, stack plume characteristics, specifically the presence of-trail-off and opacity and, where possible, the absence/presence of acid gas-like odor at the point the plumes touch the ground, will be observed and recorded during daylight hours. Where possible this observation will be made to coincide with withdrawal of the scrubber blowdown grab sample to ensure that there is a correspondence between scrubber conditions and plume characteristics. Meteorological conditions from site observations and local weather service broadcasts corresponding to the time of each plume characterization will also be logged. Whenever possible, stack plume observations will be made during periods of adverse meteorology.

In addition to the foregoing, Norlite will collect daily wastewater influent and effluent samples. The influent sample will be grab sample taken from the floc tank or floc tank overflow. The effluent sample will be Norlite's daily SPDES sample. The samples will be analyzed for TDS, chlorides, and ammonia nitrogen, as well as all effluent parameters identified in all active consent orders covering *wastewater discharge.*

Ammonia nitrogen will be determined in accordance with EPA Method 350.2 in "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020. *All other blowdown water analyses will be conducted in accordance with the methods recognized by Norlite's SPDES permit. All analyses will be performed by a New York certified laboratory.*

If results indicate significantly elevated ammonia nitrogen in scrubber water *or watewater treatment system influent* under the high halogen feed rate conditions, additional treatability studies will be performed to determine impact *on wastewater treatment system operations or effluent quality*. A separate test program will be prepared for these treatability studies at *that* time.

In addition to the foregoing, continuous HCl emissions monitoring will be conducted in accordance with Section 4.0 and Appendix A.

4.0 EMISSIONS TESTING

4.1 Continuous HCl Emissions Monitoring

A continuous HCl emissions monitor will be used to measure HCl emissions from one kiln. Since both kilns will be operated with the same waste feed materials in (as close as possible to) identical fashions, HCl emissions from the second unit will be essentially identical.

Stack gases will be withdrawn from a stack test port with a sampling system consisting of a heated probe/filter enclosure, a heated sample line, a chloride analyzer, and a sample pump. Continuous gas stream analysis will be performed by the chloride analyzer, a TESS-COM Model 745 TGA, *or equivalent*, Ambient Low Level Gaseous Chloride Analyzer. The theory of operation for this device is as follows:

> The gas sample is drawn through a glass scrubber by the sample pump. Sample flow is maintained at a constant rate by an orifice at the entrance to the scrubber. A positive displacement pump introduces a constant flow of a specially prepared scrub solution into the scrubber. The scrub solution (distilled water, nitric acid, and potassium nitrate) is buffered to maintain a constant ionic strength. As the gas stream is bubbled through the scrub solution, chloride ions are formed as HCl is removed from the gas stream. A second metering (positive displacement) pump extracts a liquid sample, at a constant rate, from the scrubber and delivers it through a debubbler to a chloride ion-selective (measuring) electrode which, along with a reference electrode, is contained in a temperature controlled (18 degrees Celsius) flow cell. The difference in potential between the two electrodes corresponds to the chloride ion concentration. Potential differential is then electronically amplified and converted to an output range of 4-20 mA. This output is measured and calibrated to a range of 0-100 ppm chlorine in the stack gas.

Further details on the HCl CEM system is provided in Appendix A. This measurement will provide a numerical value for chloride concentrations in stack gases. Since the stack gas sample contains no condensed moisture from its point of withdrawal (from the stack) up to the point it is introduced to the instrument's scrubber, HCl monitoring performed in this manner will be immune to the documented ammonium chloride interference which was encountered in Method 0050 testing during the 1992 Trial Burn.

To convert the aforementioned gas chloride concentration to an equivalent emission rate, a stack flow rate measurement will be taken in accordance with EPA Method 2 for each change in waste composition or waste feed rate which produces a 5% change in mass gas velocity as measured by induced draft fan current draw at a constant damper position. All changes in damper position will prompt taking a new stack flow rate measurement.

The HCl CEM system will not be operated 24 hours per day for the entire test period. The reason is the difficulty in maintaining this newly developed CEM operational for more than a 1 hour period.

HCl CEMS are relatively new technology and have not been perfected to the extent of other CEM systems, such as C0 analyzers. The CEM requires frequent maintenance and change out of the buffer solutions.

The HCl CEM system will collect data for each change in scrubber water recirculation rate. The system will be operated for a one hour test period, the start of which will coincide with withdrawal of each scrubber blowdown grab sample. This will ensure that data from three HCl sampling periods will be collected for each set of halogen feed rate and blowdown conditions and will coincide with stack plume observations and scrubber conditions.

4.2 Opacity

The opacity of the exhaust plume will be determined in accordance with EPA Method 9 during each test run performed. The observer will be positioned in accordance with the method taking into consideration plant operations and traffic patterns. Opacity shall be measured as an average of 24 consecutive observations recorded at 15 second intervals.

5.0 <u>ANALYSIS OF DATA AND REPORT FORMAT</u>

Data and observations collected during this test will be evaluated and summarized in a report to be submitted to DEC within 60 days following completion of testing. The report will contain a full discussion of results as outlined below:

1. A summary containing a concise description of the test program including, A) reasons for/objectives of the test, B) the manner in which tests were conducted, and C) pertinent conclusions including a tabular summary comparing measured results with compliance limits,

2) A description of POHC/waste blends,

3) A description of process operating conditions including, waste/chlorine feed rates, kiln conditions, and air pollution control system operating parameters *(variables, both dependent and independent)*,

4) A description of monitoring locations and techniques,

5) Test results including, hydrogen chloride emission rates and observations of plume characteristics, i.e., opacity and, where possible, odor where the plume(s) contacted the ground, and corresponding meteorological conditions,

6) Test data; both raw and calculated data including, where appropriate, QA/QC data,

7) A discussion correlating test results to test conditions, including the identification of any difficulties or departures from intended test conditions and an explanation of their impact, if any. An attempt will be made to compare trail-off/opacity observations made during the test period, with records of historical observations to see if opacity can be statistically correlated with high chlorine feed rates.

8) Tables and graphs presenting the relationship between HCl emission rates and opacity, versus scrubber water blowdown rate, *scrubber recirculation flow rate*, and halogen feed rate. An optimum halogen feed rate and scrubber water blowdown rate will be proposed for the Part 373 Permit.

9) Results of analysis of *TDS, chloride concentration*, and ammonia nitrogen in scrubber water samples, and an evaluation of the impact on scrubber water treatability *and wastewater treatment system operations and/or effluent quality*. Depending on the results, additional treatability studies may be proposed.

10) Appendices containing information on instrumentation, detailed process data, etc.

6.0 SCHEDULE

This testing will be initiated in late May, 1995 and concluded by July 23th. The report will be submitted during the week of September 18, 1995, shortly after the scheduled completion of construction of the permanent wastewater treatment plant. This plant is expected to be completed by the September 10, 1995 consent order deadline.

APPENDIX A

HCl CEM PROTOCOL

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Procedure: Continuous Emissions Monitoring for Hydrogen Chloride

Prepared By: Edward C. Burgher, Environmental QA/QC Manager, Norlite Corporation

1.0 Introduction

The following procedure describes the monitoring methodology including the sampling system, continuous analyzer and system calibration methods.

2.0 Sampling System

The sampling system is comprised of three major components, a sample probe / sample filter enclosure, a heated sample line and a sample pump. The general configuration of the sampling system is shown in Figure 1.

The insulated, heated probe / filter enclosure, fabricated by Norlite, is located at the 85 foot level (i.e., at the lower stack platform). The probe assembly is composed of 1/4" Teflon tubing, a Teflon filter holder and media (5 micron pore size), and a 3-way 316 stainless steel valve were contained in the enclosure. The probe protrudes approximately 1 foot into the stack.

The three-way valve is located immediately upstream of the sample filter assembly to permit calibration gas delivery to the probe assembly.

The probe enclosure is heated (Whatlow Model 375 Strip Heater) to maintain a minimum temperature of 250•Fto prevent HCl loss through condensation.

The sample line (Technical Heaters / Clean Air Engineering) is also heated and controlled to maintain a minimum sample temperature of 250•F.The sample line is approximately 200 feet in length.

The sample pump (ADI Model 19310) is located immediately downstream of the analyzer. The sample pump is capable of developing a vacuum capacity of 22 in. Hg which is sufficient to maintain sample system residence time of less than 90 seconds from the probe to the analyzer scrubber.

Figure 2 depicts the heated sample enclosure.

Norlite

3.0 Sample Analysis

Continuous gas stream analysis is performed using a TESS-COM Model 745 TGA, SN 1115HCL, Ambient Low Level Gaseous Chloride Analyzer. The theory of operation is as follows:

The gas sample is passed into a glass scrubber by the sample pump. The sample flowrate is maintained at a constant by the entrance orifice to the scrubber. A positive displacement pump introduces a constant flow of ionic strength adjusted scrub solution into the scrubber. The scrub solution (distilled water, nitric acid and potassium nitrate) is buffered to maintain a constant ionic strength. As the gas stream is bubbled through the scrub solution, chloride ions are formed from HCl in the gas stream. A second metering pump extracts a liquid sample, at a constant rate, from the scrubber and delivers it through a debubbler into the temperature controlled (18 °C) flow cell housing the reference and measuring Cl^- ion-selective electrodes. The difference in potential between the two electrodes corresponds to the activity of the chloride ion concentration.

Measurement data are then electronically amplified and buffered to an output range of 4 - 20 mA. During the trial burn the analyzer was calibrated over a range of 0 - 100 ppm.

3.0 System Calibration

The TESS-COM HCl analyzer is first calibrated using an internal calibration system using two buffers containing known concentrations of chloride (Cl^-) ions. Prior to introducing the buffers to the analyzer, gas sample flowrate is verified using a Gilmont Instruments Model Size 3 Flowmeter, SN 31501 - 31600. Liquid sample flowrate is verified using a stopwatch and graduated cylinder following the instrument manufacturer's procedure. To calibrate the analyzer for a range of 0 - 100 ppm, a buffer containing 1 ppm Cl^- is used to standardize the meter and electronics. A second buffer containing 100 ppm Cl^- is then used to set the instrument's slope.

After the instrument's internal calibration has been set, calibration gas (HCl in N_2, balance) is input at the probe (see Figure 2) to check the analyzer response while sampling through the entire system. Calibration gas (Scott Specialty, Inc., SN 1AO21342, cert. 6/3/92, 48 ppm) is exhausted into a clean 20 liter Tedlar bag after the bag has been purged at least three time with the calibration gas. The Tedlar bag is then transported to the heated sample box location and attached to the calibration gas port.

If the results are not within tolerances (± 10%) the scrub solution replacement rate and/or the sample uptake from the scrubber were increased or decreased, accordingly, until calibration results are acceptable.

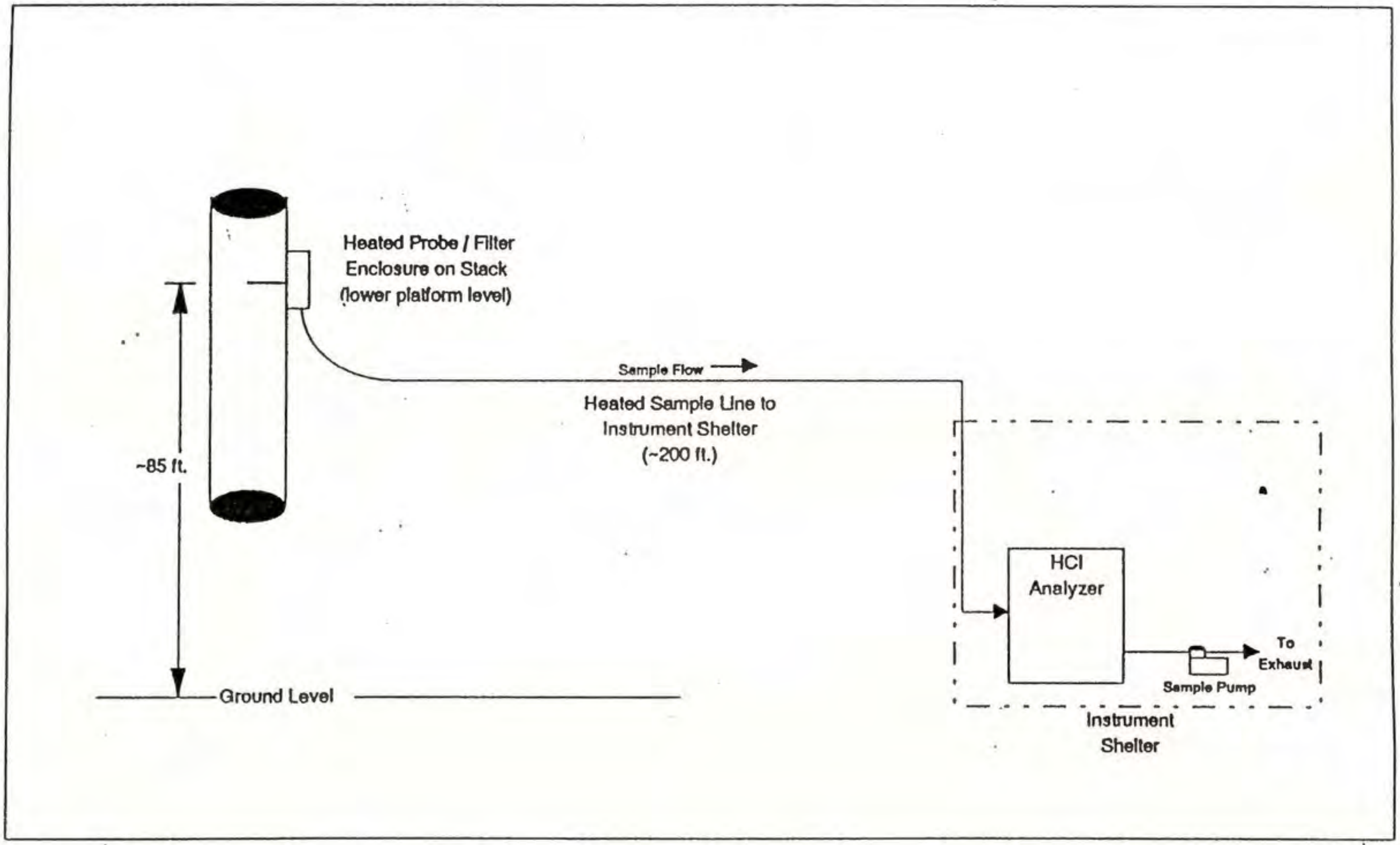

Figure 1
CEMS Sampling System

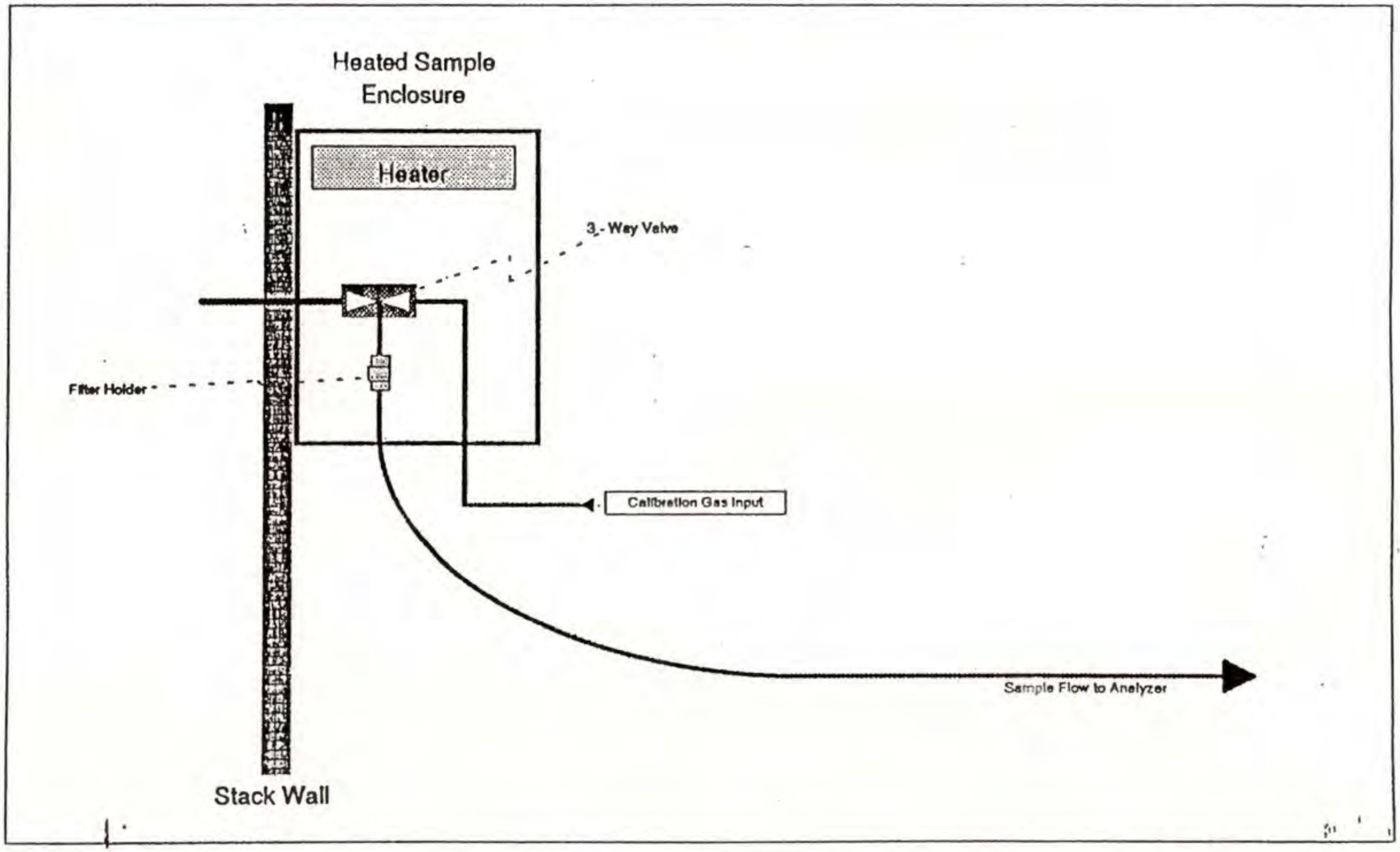

Figure 2
Sample Probe Enclosure

APPENDIX B

DESCRIPTION OF POHC SPIKES

Upstream of the micro motion flow meter, a spike POHC blend will be precisely injected into and mixed with the LGF feed. The POHC will be fed by a precise metering system at a rate which will ensure total halogen feed *per the Test Schedule*. Spiking POHC compounds of known assay will be purchased in their "pure" state and metered into the LGF line at a point upstream of the micro motion meter and burner. The feed rate of the spike compounds will be precisely measured using a weigh scale.

During the test, the drums of POHC will be pumped into a 250 gallon POHC feed tank. The POHC will be precisely metered and injected into the LGF line by the POHC feed system depicted in Figure 3. A variable metering pump will be used to control the POHC injection feed rate. A precise electric scale will be used and the weight of POHC recorded. The POHC will be mixed thoroughly with the LGF by an inline static mixer. The uniformly blended LGF/POHC mixture will flow through the micro motion meter and fired through the kiln burner assembly.

The chlorine content of the blended POHC mix will be calculated based on the purity of the technical grade POHC spiking compound used. The POHC feed rate will be calculated based on the weight of POHC spike feed into the LGF. There is no solvent carrier for the POHC spiking mixture. The concentrations of chlorine in the LGF will therefore be calculated based on the total LGF blend feed. "LGF" Blend" will consist of:

LGF Feed + POHC Spike

As an alternative to the above metering system, POHCs may be added directly to the LGF storage tanks, blending to a level that will yield feed rates in accordance with the Test Schedule.

Potential List of POHCs for Chlorine Spike to LGF Feed

POHC	SUPPLIER	UN
1,1,1-trichloroethane	Vulcan, PPG or Dow Chemical	2831
perchloroethylene	Dow Chemical	1897
trichlorobenzene	Unison	2321
tetrachlorobenzene	Unison	2321

All POHCs will be either industrial or technical grade.

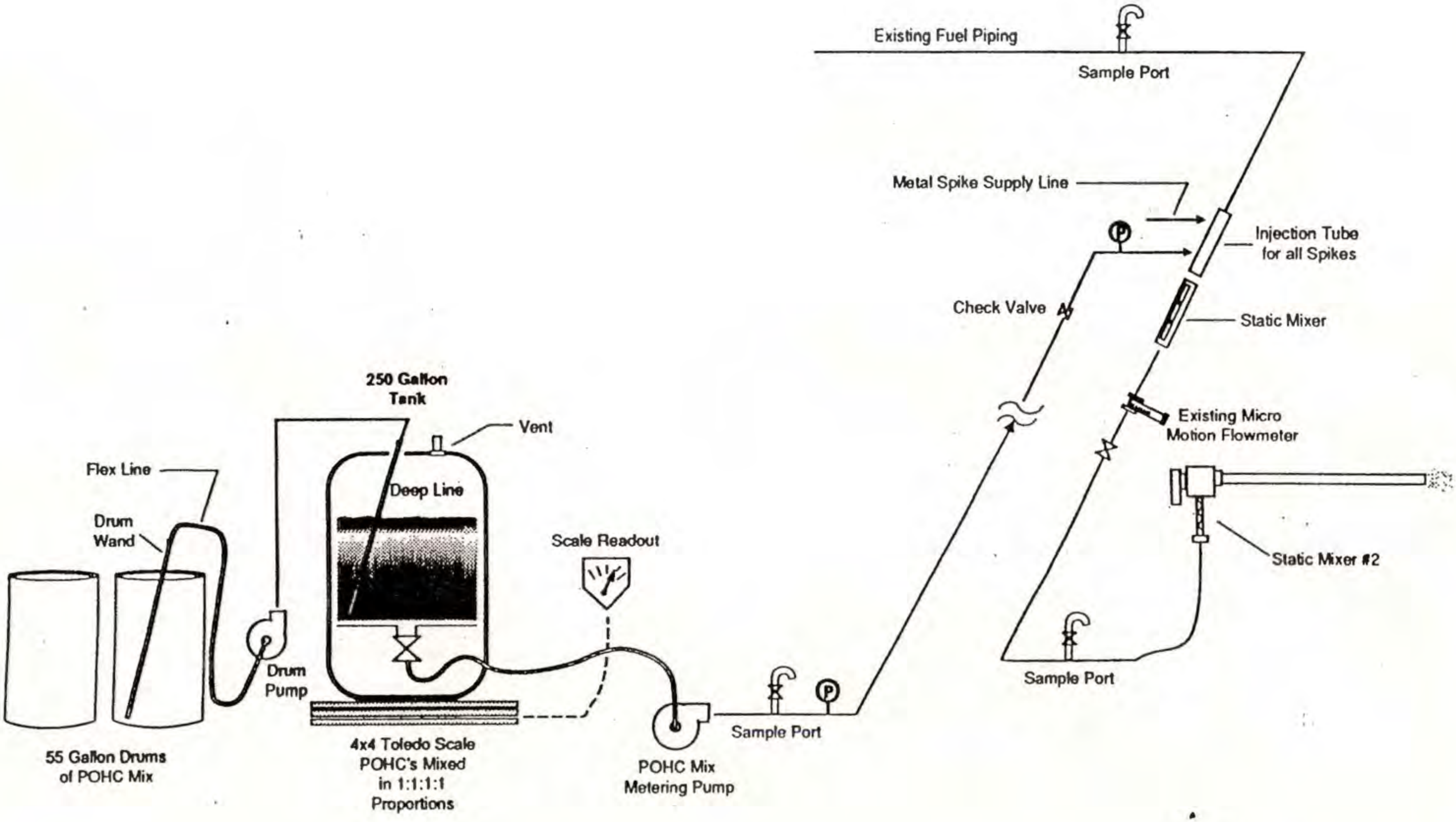

Figure 3

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Schematic Diagram of POHC Metering System