Virginia Chapter

Review of Air Discharges, Federal/State Air Regulation and Selected Air Pollution Issues at the Stone Container Corporation Hopewell Mill

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Forward

The Sierra Club is a national conservation and citizens volunteer organization and is the most prominent leader of the grassroots environmental movement. The purpose of the Sierra Club is to explore, enjoy and protect the wild places of the Earth; to practice and promote the responsible use of the Earth's ecosystems and resources; to educate and enlist humanity to protect and restore the quality of the natural and human environment; and to use all lawful means to carry out these objectives.

Here in Virginia, the Sierra Club Virginia Chapter has actively campaigned to control ozone and smog, to defend the Federal Clean Air Act from assaults that would weaken health and environmental protections. We've been particularly concerned about weak and/or ineffective air pollution and environmental regulation by the Virginia Department of Environmental Quality and how such policies affect the health and environment of Virginia's citizens.

The Sierra Club Virginia Chapter has embarked on a long term project to examine the operations and conduct of Hopewell area industrial facilities discharging air pollutants that contribute to ambient smog/ozone formation, toxic and hazardous emissions and pollution/odors that degrade the quality of life in surrounding residential areas. The Club is particularly interested in how the Virginia Department of Environmental Quality regulates such emissions from Hopewell area air dischargers.

In this document, the Sierra Club Virginia Chapter examines these issues in detail at the Stone Container Hopewell Kraft Mill.

We welcome any questions and comments concerning this report from members of the public or others. Copies of this report are available on the World Wide Web through a link found at http://www.sierraclub.org/va/

The Sierra Club Virginia Chapter appreciates the interest of Hopewell area citizens in air pollution issues in general and matters raised by this report in particular.

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Executive Summary

This report examines air pollution, emission control, air toxics and enforcement matters in regard to the Stone Container Hopewell Mill, a manufacturing facility for heavy unbleached brown paper used to make cardboard.

Stone Container is responsible for filing a number of emissions reports for both common and toxic air pollutants. A detailed review of many of these air discharge reports and the tracking of emissions by both the Virginia Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency shows extensive conflicting information and uncertain characterization of emissions discharged by the Stone Container Hopewell Mill. The uncertainty about actual emissions from this facility arises from all of the conflicting reports and the failure of Virginia DEQ to require that all significant emission sources at the plant be stack tested.

There is strong evidence that Stone Container has had a long history of understating its emissions of volatile organic compounds in its annual emission reports to Virginia DEQ. Similarly, there is evidence of significantly understatement of past airborne toxics releases in reports to U.S. EPA's Toxic Release Inventory.

Stone Container appears to have reported annual emission inventories for volatile organic compounds in a form represented as carbon, which significantly understates total emissions of volatile compounds containing oxygen, nitrogen and chlorine (such as Stone's large methanol emissions).

Stone Container's year 2000 reported total reduced sulfur (TRS) emissions appear to be reduced by a factor of about 5 over the reported 1990 TRS emissions. However, review indicates that this claimed TRS emission reduction came from "paper" changes caused by using a different emission factor with different units based on production starting in 1995 for calculating TRS emissions. Such a claimed emission reduction that did not result from any actual program to install emission control equipment is known as a "paper reduction." This paper reduction of TRS illustrates the fundamental problem of relying on emission factors rather than stack testing to determine actual emission rates at the Mill.

Even the more recent reports of total reduced sulfur compounds from Stone Container are understated because the company has failed to consider that more dimethyl sulfide and dimethyl disulfide are emitted by the facility's uncontrolled brownstock washer emissions based on paper industry average estimates. In addition, part of the basis for the facility's severe understatement of volatile organic compound emissions is the failure to consider large amounts of terpene emissions from the uncontrolled brownstock washers and associated seal tank process units.

A considerable portion of the common pollutant annual emission inventory and all of the toxic pollutant reporting done by Stone Container on the Hopewell Mill is based on

estimation techniques and emission factors subject to considerable uncertainty since they are not supported by stack tests on the Stone Container Hopewell Mill.

Since 1995, Stone Container frequently failed to disclose emissions associated with gas venting or significantly understated gas venting emissions when they reported the amounts of pollution emitted during such gas venting to the Virginia DEQ. Virginia DEQ did not initiate any enforcement on this significant understatement of episodic emissions.

Both Virginia DEQ and U.S. EPA have made critical decisions allowing Stone Container to continue to operate uncontrolled emission sources of volatile organic compounds and odorous reduced sulfur compounds. These DEQ and EPA decisions have been predicated on significantly underestimated emissions, inflated emission control cost estimates, failure to perform proper control technology and process change assessments and other faulty information. The net effect of the DEQ and EPA decisions was to indefinitely delay imposition of emission controls on several uncontrolled emission sources at the Hopewell Mill and to continue adverse emissions contributing to smog formation and degradation of Hopewell's air quality.

Prior to April of 2001, the record shows that design defects at the Hopewell Mill and failure to incorporate good air pollution control practice in mill operations caused frequent and needless gas venting incidents. The facility had only a single means of incinerating very strong sulfurous vent gases and when this combustion device was unavailable for any reason, the facility vented very strong sulfurous emissions and high concentrations of smog-forming pollutants. Proper design of this facility, which was finally completed in early 2001, incorporates backup waste gas incineration capability.

Virginia DEQ took no action to address serious non-complying venting problems. In fact, Virginia DEQ explicitly [and improperly] embraced such uncontrolled venting practices as somehow constituting reasonably available control technology as considered by the Federal Clean Air Act. EPA enforcement efforts to address the problem of episodic uncontrolled releases have dragged on for years and are yet to be concluded. Uncontrolled venting of highly polluted gas flows from the Hopewell Mill cause strong and obnoxious off-site odors, high emissions of smog-forming pollutants and subsequent degradation of the quality of life for the plant's neighbors.

Review of Stone Container's quarterly excess emission monitoring reports shows that the company has a history of frequently allowing continuous emission monitor downtime to exceed 5% of plant operating time. Competent and diligent management of continuous emission monitoring program duties should allow any facility to achieve less than 5% downtime on emission monitoring as a proportion of plant operating time. Virginia DEQ failed to initiate any formal enforcement action against Stone Container even when downtime exceeded 10% on some of the facility's continuous emission monitors.

Despite a number of notices of violation over the years from DEQ or EPA for serious air violations, only a single penalty of $7382 has been imposed on the Stone

Container Hopewell Mill. U.S. EPA has alleged that Stone Container violated requirements to obtain new source review permits for changes the company made to its recovery boiler at the Hopewell Mill.

The record indicates that U.S. EPA is far more likely to find air violations than Virginia DEQ when the respective agencies conduct inspections activity at the Hopewell Mill. Virginia DEQ does not conduct unannounced, unscheduled inspections of the Hopewell Mill. Virginia DEQ's reliance on voluntary approaches to pollution cleanup has allowed Stone Container to continue a long history of operating poorly controlled or uncontrolled volatile organic compound and reduced sulfur compound emission sources.

Virginia DEQ's current rules exempt older, grandfathered, uncontrolled emissions of reduced sulfur compounds from rules designed to protect communities from strong, obnoxious odors. Other rules and provisions of DEQ permits issued to Stone Container actually prohibit any DEQ enforcement for violating emission limitations or otherwise hamstring the agency from enforcement on all but the most egregious patterns of violative conduct. The Virginia rules go beyond allowances for excusing non-complying behavior found in federal rules for this source category. These are examples of "sweetheart" permits and rules designed to strongly favor this facility and the kraft mill industry in general.

The DEQ Piedmont Office was unable to provide any documents discussing any measured poly-chlorinated biphenyl contents of waste oil burned in the lime kiln at the Stone Container Hopewell Mill, despite concerns expressed by EPA Region III on this matter.

Virginia DEQ's charges for document duplication are excessive and strongly discourage detailed citizen inquiry into the adequacy of their air pollution regulatory efforts. Citizens must search records at both DEQ regional offices and the state DEQ office in order to get comprehensive records. Despite over a month's notice before a September 2000 file inspection, the DEQ Piedmont Regional Office did not produce many of the requested documents for file review on the day of our appointment for review. All of these conditions act to discourage citizen watchfulness over the administration of federal clean air programs in Virginia which have mandatory public participation elements.

Based on the air pollution review of the Stone Container facility contained in this report, the Sierra Club Virginia Chapter makes the following recommendations:

– Virginia DEQ should insist that Stone Container and other emission sources report total annual emissions of volatile organic compounds as the sum of the weights of each specific chemical compound rather than "as carbon."

– Virginia DEQ inspection should be improved in intensity and scope to discover all observable violations at sites. Currently, EPA inspections appear to be far more capable of uncovering violations, based on review of the Stone Container file.

- Virginia DEQ must ensure that all valid incidents of air quality rule and permit violations receive at least some level of civil or criminal penalties for maximum deterrence effect.

- Virginia DEQ permit writers, enforcers and emission data evaluators must adopt a greater level of questioning on submittals from Stone Container, rather than merely accepting company assurances of the accuracy of information.

- Virginia DEQ must insist that emission reports for annual emission inventories, episodic emissions during malfunctions/upsets and emission characterization for planning and control technology decisions must be accurately stated; any source that understates its emissions should be considered in violation.

- Virginia DEQ should repeal rules exempting older pulp mill equipment from prohibitions against cause odor nuisance to communities and stop writing permits intended to hamstring agency enforcement efforts.

- Virginia DEQ should revise its rules to require 95% valid data recovery for the operation of continuous emission monitoring systems.

- Virginia DEQ should revise its document duplication charges to reduce unreasonable charges for document duplication.

Glossary

Brown stock	The name given to wood pulp that is produced by the pulping process
Carcinogen	An element or chemical compound capable of inducing cancer in test animals and/or humans.
CEM	A continuous emission analyzer used to monitor emissions from air pollution discharge stacks
CO	Carbon monoxide
Combination boiler	A combustion device capable of burning wood waste, coal and other fuels
Condensate	A type of wastewater that results from a process operation to cool hot gases containing water vapor and pollutants with a heat exchange or with direct contact with cool water.
Consent order	A consent order is a contract between a government agency and a regulated party which responds to a government allegation of a rule and/or law violation by providing enforceable measures to bring the regulated party back into compliance and to require regulated parties to pay penalties for violations.
Digester	A pressurized tank heated with steam used to contain a high temperature, high pressure cooking process for wood chips using pulping liquors in order to make wood pulp
DEQ	The Virginia Department of Environmental Quality
Emission	A discharge of gaseous or particle air pollution into the atmosphere.
Emission unit	An individual process among many at an industrial plant that releases pollution.
Emission inventory	A database maintained by a federal or state air pollution control agency that tracks the amount of annual emission that a process at a pollution source releases.
FOIA	Freedom of Information Act

Fugitive	A type of emission that is not discharged from a readily identifiable stack; fugitive emissions are released from vents, buildings, ditches, ponds, conveyors and other non-stack structures.
HAP	A hazardous air pollutant designated on a list of 189 pollutants in the Federal Clean Air Act
Kraft	The name of a specific process for pulping wood using sodium hydroxide and sodium sulfide as pulping chemicals
lb/hr	Pounds of a pollutant released per hour
Lignin	A natural “glue” which binds wood fibers together in the matrix of wood.
Lime kiln	A specialize rotary, tubular furnace for converting calcium carbonate to calcium oxide.
Liquor	In the pulp making industry, the chemical solutions associated with pulping; white liquor is virgin liquor used to pulp wood, black liquor is the pulping solution after it has been used to make pulp and green liquor is a type of liquor that is an intermediate product in the recycling of black liquor to convert it back to white liquor.
MACT	Maximum achievable control technology; a federal emission standard published by the U.S. EPA pursuant to the Federal Clean Air Act that controls hazardous air pollutants
NCG	Non-condensible gas (NCG) is the pollutant that remains in gaseous form after a raw gas stream from a pulp digesters and other sources is subjected to cooling treatment to remove water and other pollutants that can be converted from gaseous form to liquid form at the temperature at which the cooling process (condensation) operates.
NOV	Notice of violation; a document usually issued by a federal or state environmental agency that is used to notify a regulated industrial party or business that the government agency believes that the regulated party has broken a rule.
NSR	New source review; a process for permitting new and/or modified air pollution sources under federal and state law and regulation.
NOX	Nitrogen oxides, including nitrogen oxide and nitrogen dioxide

PM-10	Inhalable particulate (solid) matter less than 10 microns in diameter; very small particle air pollution
Process	A discreet, identifiable portion of an industrial plant that represents one specific operation in an overall industrial plant.
RACT	Reasonably available control technology; a level of air pollution control that is common and reasonably available at a relatively low cost per ton of emission controlled.
Recovery boiler	A combustion device used to burn strong black liquor to recovery and recycle spent pulping liquors.
Stack	A structure for discharging air pollution into the atmosphere at an elevated height
Strong black liquor	Spent pulping solutions that have been subjected to a water evaporation process in order to increase the amount of suspended wood solids contained in the solution.
SO2	Sulfur dioxide
t/y	Tons of a pollutant released per year
TRI	U.S. EPA's Toxic Release Inventory
TRS	Total reduced sulfur; chemical compounds like hydrogen sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide; all TRS pollutants have an unpleasant odor
Venting	The practice of uncontrolled release of pollutants into the atmosphere.
VOC	Volatile organic compound; a chemical compound containing carbon and hydrogen at a minimum that tends to release vapors that cause formation of smog and ozone.
Weak black liquor	Spent pulping liquor that has not been processed to remove water and which has suspended wood solids in solution at a relatively low concentration in the liquid.

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1 Introduction

This report was commissioned by the Sierra Club Virginia Chapter as part of its Hopewell Environmental Project. The purpose of the Project is to examine in detail some of the issues associated with industrial air discharges from facilities in and around the Hopewell, VA area.

This report examines in detail selected air pollution issues raised by operations of the Stone Container Corporation Hopewell (VA) Kraft Mill and air regulation of this facility by the Virginia Department of Environmental Quality and the U.S. Environmental Protection Agency.

2 Methods and Difficulties

The Sierra Club utilized a number of Virginia Freedom of Information requests in attempts to review all relevant information held by the Virginia Department of Environmental Quality (DEQ). The Club's environmental consultant conducted onsite review of records at the DEQ Piedmont District Office in September, 2000. Subsequently, additional Virginia FOIA requests for specific documents were sent to the Piedmont District office.

The Sierra Club originally requested access in writing to DEQ Piedmont District Office staff for Stone Container air regulatory records on August 5, 2000. Notwithstanding a time interval until September, 12, 2000 when the onsite Sierra Club file review began, the DEQ Piedmont staff did not produce many of the records relevant to the Sierra Club's request. For example, not all process control technology reports, compliance stacks tests, quarterly compliance reporting and excess emission reports were produced for disclosure by DEQ at the time of the September, 2000 file review. Such failures to disclose may have been caused by insufficient organization of files in the DEQ Piedmont District office. Subsequent detailed review of records has shown that other documents were not disclosed during the original onsite file review.

In addition to delays in disclosure, which increase costs and difficulty in conducting reviews of regulatory agency records, the actual cost of providing disclosure of records is also an issue at DEQ. The agency charges $0.20 per page of duplication plus a minimum of $13.31/hour to find and produce documents. In the experience of the author, this is the highest cost for records disclosure ever encountered in his career at an environmental regulatory agency.[1] Building a significant file for further technical

[1] The Virginia DEQ cost for duplicating documents is higher in the author's experience than document charges imposed by state environmental regulatory agencies in TX, MI, ME, PA, OH, MS, NY, DC and EPA Regions III, IX, V, and IV

review is a very significant expense for any citizen attempting such an activity at the Virginia DEQ.

3 Summary Description of Kraft Pulping Technology and Industrial Processes at the Stone Container Hopewell Mill

The Stone Container Hopewell Mill produces heavy brown paper used to make cardboard[2] from wood pulp produced onsite and from recycled pulp derived from waste cardboard and brown paper brought to the site.

3.1 Wood Pulping Technology at the Hopewell Mill

In the virgin wood pulping process used at the Hopewell Mill, wood chips are charged to a series of 12 tanks known as "batch digesters," each with a volume of 3000 cubic feet. The operators add pulping chemicals dissolved in water[3] (known as "white liquor") designed to break apart the natural lignin compounds contained in wood that are the natural "glue" that bind the wood fibers together.

Once a digester has been charged with wood chips and pulping chemicals, it is then closed, heated and pressurized[4] using steam produced by one of the boilers on the site. After a sufficient "cooking" time period has elapsed, the digester is emptied or "blown down" to one of two "blow tanks" where some cooling takes place and where large quantities of hot process gases are allowed to offgas out of the hot pulp that had been held under high temperature and pressure in the digester tanks.

After wood chips are digested the resulting wood pulp is known as "brown stock," which is processed through a series of screens to remove undigested wood and tree knots, which are recycled back to the digesters. Then the pulp is run through a series of "brown stock washers" to remove spent pulping chemicals from the material. The pulp is then stored for use on-site in the facility's paper-making machines.

The technical name for the wood pulping process used by Stone Container at the Hopewell Mill is the unbleached "kraft" process. At the Hopewell Mill, waste kraft paper is also received, re-pulped and combined in the feedstock to paper-making machines.

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[2] The technical term for the product is "linerboard" or "container board," which is, for example, the heavy inner or outer paper facing in a product such as corrugated cardboard.

[3] The "white liquor" used contains a solution of sodium hydroxide (commonly known as lye), sodium sulfide and sodium carbonate.

[4] Process temperatures of about 340 deg F under about 100 lbs/in^2 pressure.

The process of pressure cooking wood chips with pulping liquor releases numerous naturally occurring chemical compounds found in wood as well as other chemical compounds formed by the reaction between the wood, its lignin and the chemical contents of the pulping chemicals (see a subsequent section for a list of typical pulping process chemicals that are released). These chemical compounds are released as hot gases from pressure relief valves to control pressure in the digesters and from the digester blow-down operation when the digesting tanks are emptied. Large amounts of liquid process wastes are also generated. Dealing with all of the gaseous and liquid wastes is a substantial environmental management challenge to keep these materials from generating large amounts of air and water pollution.

3.2 Gaseous Waste Flows from Wood Pulping at the Hopewell Mill

Waste pulping plant gases are generated from pressure relief discharges from the main digester and from the "blow heat accumulator," a tank receiving gases generated after the hot pulp is removed from the digester in an operation called "blow-down." These waste gases contain volatile organic compounds (such as natural wood volatiles and lignin breakdown products), hazardous air pollutants and reduced sulfur compounds. The waste gases are routed through a condensation/cooling process to remove as much water vapor as possible in a process that can then generate another liquid waste stream. The liquid condensation products contain turpentine which is recovered as a product for sale in a liquid separation and decanting operation and shipped in railroad cars from the site.

Digester and blow heat accumulator gases (and gases from liquid evaporation processes) that do not condense from this cooling operation are collected in the "non-condensible gas" (NCG) system. The majority of the time NCG gases are directed to a combustion device where they are destroyed by burning. **When NCG gases cannot be burned in a combustion device and are otherwise released uncontrolled, these gases will cause very serious local air pollution and odor problems because of the large emissions of odorous reduced sulfur compounds and volatile organic compounds**.[5]

3.3 Liquid Waste Flows from Wood Pulping at the Hopewell Mill

The two primary liquid waste flows generated from wood pulping at the Hopewell Mill are the spent pulping liquor flow and the contaminated condensates flow.

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[5] Prior to 2001, Stone Container did not have a backup method of burning NCG gases if their lime kiln was unavailable. As a result, an operational failure in the lime kiln would always result in uncontrolled atmospheric releases.

3.3.1 Recycle of Pulping Chemicals from Spent Pulping Liquids

After a wood chips are converted to wood pulp in the digesters, the brownstock washers are used to wash the spent pulping liquor out of the newly produced pulp. This "weak black liquor" removed from the pulp must be stored and processed to avoid having it cause air and water pollution and to achieve economic operation of the mill through recovery and renewal of pulping chemicals.

A series of evaporators use steam with heat exchangers to evaporate both water and volatile chemicals from the weak black liquor. The gas flow from the evaporators is sent to condensation treatment to separate pollutants from the water vapor. The result of the evaporation process is the production of "strong black liquor," a liquid that contains about 67% solids that are left over from the pulping process..

The strong black liquor can actually be burned in a combustion device on site known as the "recovery boiler." In addition to generating process steam used throughout the mill, the recovery boiler combustion process reduces the inorganic chemical content of the strong black liquor to molten salts[6] at the bottom of the recovery boiler.

The molten salts are transferred to a tank where they are mixed with water to form "green liquor," which is the starting material in making new pulping solution. The green liquor is mixed with lime (calcium oxide) in order to restore the caustic content of the pulping solution, which is known as "white liquor." White liquor is thus the recycled pulping solution used to digest the wood chips.

When mixing the lime with the green liquor, "lime mud" is formed[7]. This lime mud is separated from the liquids by settling, is washed to remove sulfides and then sent to the lime kiln, which is a long inclined tube lined with heat insulating bricks with a flame at one end. The lime mud enters the kiln at the cooler upper end and the high temperatures in the kiln convert the mud to lime (calcium oxide). The primary fuel used to generate the high temperatures in the lime kiln is waste oil.

3.3.2 Contaminated Condensate Flows at the Hopewell Mill

Condensation/cooling treatment of gases from wood pulping and the evaporation of spent pulping liquor produces large amounts of contaminated condensates. These condensates are liquids that contain water plus significant amounts of reduced sulfur compounds and volatile organic compounds, such as terpenes, methanol, sulfur

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[6] These molten salts are sodium sulfide and sodium carbonate.

[7] Lime mud will consist primarily of calcium carbonate.

compounds and others. Stone Container has a long history of using contaminated condensates as process water throughout their mill in ways that previously caused very significant air pollution release at the site of utilization. More recently, large amounts of methanol-containing condensates are sent for processing by the Hopewell Regional Wastewater Treatment facility. The wastewater treatment plant using oxygen to treat these condensates to stimulate bacterial destruction of the methanol.

3.4 The Combination Boiler

Bark and other wood wastes cannot be introduced into the wood pulping process. As a result, large amounts of bark removed from logs received by the facility must be managed as a fuel-waste. The onsite combination boiler can burn coal, bark and other fuels to get rid of the wood waste and generate process steam for use throughout the mill.

3.5 Wood Pulping Releases Large Numbers of Chemical Compounds in the Wood Chip Digestion Process

Several chemical compounds produced by wood pulping plants like the Hopewell mill have been identified in detail process-related chemical analysis studies. Some of the chemicals and classes of chemicals release by such mills are shown in the table below:[8]:

Many of these compounds may be emitted from a variety of mill process emission sources and discharge stacks. Most of these chemical compounds are not specifically regulated by state or federal agencies as specifically identified chemical substances. There will be little information on the toxicity of many of these potential pollutants and, as a result, little basis for predicting potential health effects of humans exposed to such emissions. In the case of the Stone Container mill, little if any analysis has ever been done by any federal or state regulatory agency on the environmental and public health acceptability of such chemical emissions.

Concerns have been raised in recent years about the effects of pulping-related chemical effluents in water systems causing unexplained changes in the secondary sex characteristics of fish exposed to such effluents. As a result, there is some concern about the poorly characterized potential of pulp plant chemical byproducts to participate in endocrine disrupting effects in biological systems.

From an air pollution standpoint, most of the chemical compounds in the table would be considered as “volatile organic compounds” and control technology decisions

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[8] Review of Kraft Foul Condensates, Sources, Quantities, Chemical Composition and Environmental Effects, TAPPI Journal, Balckwell, MacKay, Murray and Oldham, October 1979, V 62, No. 10, Page 33, Table 1

imposed on such emissions would not consider issues of individual chemical toxicity – only the ability of the emission to contribute to smog formation.

Alcohols	**Sulfur-bearing compounds**	**Terpenes**
Methanol	Hydrogen Sulfide	a-pinene
Ethanol	Methyl mercaptan	b-pinene
1-propanol	Dimethyl Sulfide	Camphene
2-propanol	Dimethyl disulfide	Mycrene
Butanol	Dimethyl trisulfide	delta-3-carene
2-methyl-1-propanol	Thiophene	p-cymene
4-(p-toll)-1-pentanol	Other unknowns	a-phellandrene
		a-terpinene
Ketones	**Phenolics**	Limonene
Acetone	Guaiacol	b-phellandrene
3-methyl-2-butanone (MEK)	Syringol	gamma-terpinene
2-butanone	Phenol	Terpinolene
3-pentanone	o-cresol	Fenchone
4-methyl-2-pentanone (MIBK)	m-cresol	Linalool
	p-cresol	Fenchyl Alcohol
Acids	Vanillin	Terinene-4-ol
Resin acids	Acetovanillone	a-terineol
Fatty acid	Dihydroxy acetophenone	Cineole
Formic acid	4-dihydroxy-5-methoxy acetophenone	Dipentene
Acetic acid		Other Unknowns
Lactic acid	**Others**	
	2-methyl furan	
	Toluene	
	C10H24 to C16H34	

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4 Problems with the Characterization of Air Emissions from the Stone Container Hopewell Mill

From an air pollution management and control perspective it is essential to both qualitatively and quantitatively characterize emissions from a facility like the Stone Container Hopewell Kraft Mill. Some emissions will be released from major pollution stack release points and other emissions will be "fugitive" in which releases occur from buildings, vents, minor stacks and other non-major points. As we will show subsequently, the Stone Conainer Hopewell Mill releases thousands of tons of common air pollutants.

This report reviews air discharge information for the Stone Container Hopewell Mill obtained from 5 different sources.

The first category of emission information considered is electronic data from the Virginia Department of Environmental Quality emission inventory tracking system. This emission tracking system contains detailed emission information on each of the specific processes and related discharge points at the Mill. This data is particularly useful

because it exists as electronic database information and this form allows easy and quick electronic analysis techniques using advanced electronic database methods.

The second category of emission information considered is a collection of recent individual annual paper emission inventory reports made by Stone Container to Virginia DEQ and EPA. Although the first category of electronic information is supposed to reflect these annual paper reports submitted by Stone Container, we'll show in a subsequent section that there are important and large discrepancies between these two emission inventory information sources.

The third category of emissions information considered for this report is electronic information in the U.S. EPA's Toxic Release Inventory (TRI) system on specific toxic chemical air discharge releases from the Stone Container mill. The basis of such EPA TRI data are annual reports submitted by Stone Container since 1987. This data only shows total toxic releases for the entire plant and does not breakdown these releases by specific industrial processes at the mill.

The fourth category of emissions information considered for this report is a listing of emissions information contained in the updated Stone Container application for a Federal Operating Permit under Title V of the Federal Clean Air Act.

The fifth category of emissions information considered (primarily in the next major section of the report) was a listing of uncontrolled volatile organic compound (VOC) emissions found in Stone Container's submittal Virginia DEQ to demonstrate whether they have installed "reasonably available control technology" to abate emissions of VOCs from the plant.

Review of all of these sources of emission information at the Stone Container Mill shows that many of these reports contain emissions numbers that conflict significantly from one information source to the next, raising significant doubt as to whether any of the sources of information can be deemed correct and representative of actual emissions. It appears that Stone Container has, at times, significantly understated their actual emission impacts. Such understatement of emissions has affected decisions of Virginia DEQ by leading to more lenient emission control requirements. Moreover, such understated emissions has meant that the Mill's neighbors have been subjected to uncontrolled odorous emissions that degrade the quality of life in neighborhoods near the facility.

A few of the largest stack emission sources at the Mill have continuous emission monitoring devices for certain common pollutants. These are detailed later in this report. However, a review of Virginia DEQ files shows that specific toxic discharge studies from

stacks have never been tested with available stack testing methodologies at the Stone Container Mill. Many of the stack emission points have never had stack tests for total reduced sulfur compounds and volatile organic compounds which pose some of the most important pollution problems from this Mill

In the case of toxic air releases from all Mill sources as well as emissions of common pollutants from many of the emission sources at the mill, both Stone Container and Virginia DEQ have relied on emission calculations using "emission factors" that related expected emissions to annual production or process "throughput." The emission factors are developed from median averages of stack testing done at other plants which may have different emission controls and important process differences compared to the Stone Container Hopewell Mill. Both U.S. EPA and paper industry sources publish such emission factors.

The predominate reliance of Virginia DEQ on the emission factor method of assessing emissions at the Hopewell Mill, together with the presence of multiple reports from Stone Container that have significant discrepancies, means that the public can have little if any confidence about the emission impacts of the Mill, that the Mill is being adequately regulated and that the quality of information used in decisionmaking is supportable.

4.1 Virginia DEQ's Emission Inventories for Common "Criteria" Pollutants and Total Reduced Sulfur at the Stone Container Hopewell Mill, 1990-2000

Virginia DEQ has established an air discharge emission inventory database system for all major industrial sources in the Commonwealth of Virginia, including the Stone Contain Hopewell Mill. The emission inventory system is used to bill annual permit fees to industrial air dischargers and to assist in air quality planning and management, including programs to control regional smog and ozone. The information contained in the emission inventory is supposed to be based on annual reports submitted by air dischargers like the Stone Container Hopewell Mill.

The authors obtained official Virginia electronic databases emission inventory data for Stone Container for the years 1990-2000.[9] The DEQ emission inventory shows the following for total plant emissions at the Stone Container Hopewell Mill for 1990-2000.

[9] August 30, 2001 electronic mail transmission of data from Kirit O. Chaudhari, Director, Office of Air Data Analysis, Virginia DEQ. The data in CSV format was converted to a Microsoft Visual FoxPro v.6 DBF format and Quattro Pro spreadsheets for further analysis.

Stone Container Hopewell Mill, Emissions Data from 1990-2000, Virginia DEQ Emission Inventory (Tons/Year)								
Year	**Maximum Annual Operating Hours[10]**	**CO**	**NOX**	**PM-10**	**Total PM**	**SO2**	**VOC**	**TRS**
1990	8760	2802	2264	444	446	1873	446	146
1991	8760	2604	2055	415	417	1677	410	135
1992	8760	2784	2025	539	444	2433	581	144
1993	8760	2680	2013	233	720	2403	493	144
1994	8360	2886	2121	204	588	2470	555	147
1995	7937	4061	1929	353	636	2170	509	83
1996	7937	4052	2112	367	625	2622	482	57
1997	7937	3865	1976	470	985	1921	480	34
1998	7937	3658	1953	382	838	1987	471	34
1999	7937	4102	2225	369	838	1996	505	32
2000	7937	2797	2971	354	800	3118	441	29

Carbon monoxide and nitrogen oxide emissions appear to be highly variable over the period 1990-2000. The data appears to show the plant as discharging more nitrogen oxides and sulfur dioxide in year 2000 than in all other preceding individual years in the 1990-2000 time interval.

On first impression, year 2000 total reduced sulfur (TRS) emissions appear to be reduced by a factor of about 5 over the 1990 TRS emissions. However, further review indicates that this claimed TRS emission reduction came from "paper" changes caused by using a different emission factor starting in 1995 for calculating TRS emissions. Such a claimed emission reduction that did not result from any actual program to install emission control equipment is known as a "paper reduction."[11] This paper reduction of TRS

[10] The operating hours are provided to show perspective on the emission numbers since emissions from most sources are based on a calculation that relies on the actual number of annual operating hours; the operating hours information listed shows such hours for operation of the recovery boiler at the site.

[11] The TRS emission listing from the lime kiln was calculated in 1993 on the basis of lbs of TRS per ton of air dried pulp and changed by 1998 to a factor based on lbs of TRS per ton of lime production. As a result, the reported lime kiln emissions were changed from 65.7 tons of TRS per year in 1993 to 5.6 tons of TRS per year in 1998. Similarly, reported TRS emissions for the smelt dissolving tank vent went from a reported 65.7 tons per year in 1994 (based on an emission factor) to 3.23 tons per year (based on a subsequent stack test result).

illustrates the fundamental problem of relying on emission factors rather than stack testing to determine actual emission rates at the Mill.

A considerable portion of the common pollutant annual emission inventory and all of the toxic pollutant reporting done by Stone Container on the Hopewell Mill is based on estimation techniques and emission factors subject to considerable uncertainty. Such emission factors and estimation techniques come from median emission factors and data published by the U.S. Environmental Protection Agency and the National Council on Air & Stream Improvement (a paper industry think tank), as well as engineering estimates.

4.2 Detailed Source-Pollutant Relationships for Year 2000 Emission Inventory Data

The following tables show detailed information from the Virginia DEQ emission inventory data indicating which specific sources at the Stone Container Hopewell Mill discharge specific pollutants in the specified amounts. As such, this data reflects the Virginia DEQ's understanding of emissions each process unit from the subject facility. Review of emission estimates of individual process units at the mill is essential for identifying the level of effort made in reducing emissions and emission units that have uncontrolled or poorly controlled emissions.

Year 2000 PM-10 Emissions DEQ Emission Inventory Data	
Emission Unit Descriptor	**PM-10 Emissions tons/year**
1 LIME KILN-TONS DRY PULP	137.0
2 SLAKER MIX TANKS	56.1
PM10-UNPVD RDS(NOT WDYD)	46.0
1B COMBO BLR-50% REIN BK	37.7
PM10 FROM WOODYARD OP'S	31.0
2 BLACK LIQUOR REC/TDRYP	21.4
1A COMBO BOILER - COAL	18.0
PM10-PAVED RDS(NOT WDYD)	3.0
RECAU. AREA FUG EMISSIONS	1.9
PM10, SALTCAKE UNLOAD	1.0
3 SMELT DISS-TONS DRYPULP	0.3
COAL STORAGE & HANDLING	0.1
COOLING TOWER #1	0.0
TOTAL PM-10 EMISSIONS	**353.5**

Year 2000 TRS Emissions DEQ Emission Inventory Data	
Emission Unit Descriptor	**TRS Emission tons/year**
3EA BROWN STOCK WASHERS	18.7
1 LIME KILN-TONS DRY PULP	6.3
NCG BATCH DIGESTERS TURP	1.4
CRUDE TALL OIL MANFACTRNG	1.3
3 SMELT DISS-TONS DRYPULP	1.1
2 BLACK LIQUOR REC/TDRYP	0.5
RECAU. AREA FUG EMISSIONS	0.1
NCG MEEV	0.0
TOTAL TRS EMISSIONS	**29.4**

Year 2000 Carbon Monoxide Emissions DEQ Emission Inventory System	
Emission Unit Descriptor	**Carbon Monoxide tons/year**
1B COMBO BLR-50% REIN BK	2007.1
2 BLACK LIQUOR REC/TDRYP	748.6
1A COMBO BOILER - COAL	22.6
1 LIME KILN-TONS DRY PULP	18.7
RECAU. AREA FUG EMISSIONS	0.2
TOTAL CO EMISSIONS	**2797.2**

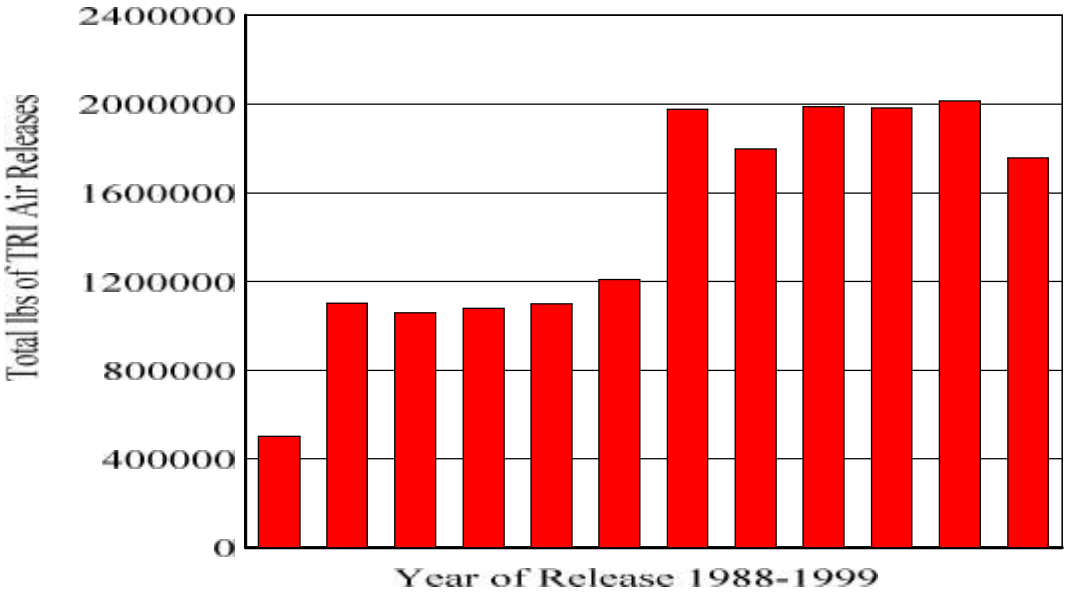
Year 2000 Sulfur Dioxide Emissions DEQ Emission Inventory Data	
Emission Unit Descriptor	**Sulfur Dioxide tons/year**
1B COMBO BLR-50% REIN BK	1400.0
1A COMBO BOILER - COAL	1374.3
2 BLACK LIQUOR REC/TDRYP	286.3
1 LIME KILN-TONS DRY PULP	56.1
3 SMELT DISS-TONS DRYPULP	1.4
RECAU. AREA FUG EMISSIONS	0.1
TOTAL SO2 EMISSIONS	**3118.2**

Year 2000 Nitrogen Oxide Emissions, DEQ Emission Inventory System	
Emission Unit Designator	**NOX Emissions tons/year**
1B COMBO BLR-50% REIN BK	1320.0
1A COMBO BOILER - COAL	981.0
1 LIME KILN-TONS DRY PULP	525.3
2 BLACK LIQUOR REC/TDRYP	136.2
RECAU. AREA FUG EMISSIONS	5.3
3 SMELT DISS-TONS DRYPULP	2.9
TOTAL NOX EMISSIONS	**2970.7**

Year 2000 Volatile Organic Compound Emissions, Stone Container Hopewell Mill, DEQ Emission Inventory System			
Emission Unit Designator	**VOC Emission, tons/year**	**Emission Unit Designator**	**VOC Emission, tons/year**
1B COMBO BLR-50% REIN BK	206.6	VACUUM SEPARATOR UHLE BOX	2.9
PAPER MACHINE DRYER HOODS	46.3	LIME MUD WASHERS	2.5
3EA BROWN STOCK WASHERS	28.5	DREGS FIL HOOD VAC PUMP	2.0
2 BLACK LIQUOR REC/TDRYP	21.1	GREEN LIQUOR CLARIFIER	2.0
PAPER MACHINE PRESS VENTS	21.1	LIME MUD FILTER	1.6
12 WEAK BLACK LQR TANKS	17.5	CRUDE TALL OIL MANFACTRNG	0.6
SOLVENT EMS-BATCH CLNING	15.9	2 SLAKER MIX TANKS	0.3
PAD CLARIFIER	15.6	BLACK LIQUOR SOAP SKMRS	0.3
2EA BSW FOAM/FILTRATE TNK	12.7	HIGH DEN STORAGE CHESTS	0.3
PAPER MACHINE VAC PUMPS	12.1	2 HVY BLACK LIQUOR TANKS	0.3
1 LIME KILN-TONS DRY PULP	9.2	PARTS CLEANING	0.2
3 SMELT DISS-TONS DRYPULP	6.3	NCG MEEV	0.2
NCG BATCH DIGESTERS TURP	5.9	RECAU. AREA FUG EMISSIONS	0.1
FOURDRINIER PAPER MACHINE	5.3	GASOLINE STORAGE&HNDLING	0.1
1A COMBO BOILER - COAL	3.2	**TOTAL VOC EMISSIONS**	**440.7**

The year 2000 Virginia DEQ emission inventory tables above indicate that the Combination Boiler stacks are the largest sources at the site of carbon monoxide, nitrogen oxides, sulfur dioxide and volatile organic compounds at the Hopewell mill. The emission inventory shows that the Lime Kiln is the largest source of PM-10 and the Brown Stock Washer vents are the largest source of total reduced sulfur. However, subsequent analysis will change a portion of this emission inventory picture as described later in this report.

4.3 Stone Container's Reports to EPA's Toxic Air Release Inventory for the Hopewell Mill



Industrial facilities must report annually to U.S. EPA on toxic releases and transfers of over 600 chemical substances on EPA's toxic release list. Total air release reports for Stone Container for the last few years are shown in the graph above and the table on the next page.

Reported Toxic Air Releases, Stone Container Hopewell Mill, 1988-2000
Data Source: U.S. EPA Toxic Release Inventory

	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988
Acetaldehyde	83006	85006	89006	61000	59000	54000	61000	NR	NR	NR	NR	NR	NR
Acetone*	NR	NR	NR	NR	NR	NR	NR	25700	90000	60000	24000	24000	0
Ammonia	140000	150000	110000	61000	58000	56000	72000	0	0	0	0	0	0
Barium Compounds	1300	1500	1100	30	NR	NR	NR	NR	NR	NR	NR	NR	NR
Catechol	0	0	0	0	0	0	0	0	0	0	0	250	0
Chlorine	5	5	5	5	1	5	5	5	5	5	5	250	250
Chromium	NR	NR	NR	NR	NR	NR	15400	NR	NR	NR	NR	NR	NR
Formaldehyde	33031	31033	32032	19000	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hydrochloric Acid	140000	190000	390000	760000	780000	680000	750000	760000	490000	460000	510000	550000	429504
Manganese Compounds	3800	4301	3701	270	NR	NR	NR	NR	NR	NR	NR	NR	NR
Methanol	770100	1200110	1300110	1000000	990000	930000	1000000	341000	440000	486000	444000	444000	22201
Methyl Ethyl Ketone	10001	13001	NR	NR	NR	NR	NR	7400	8700	11200	11000	11000	10000
Phenol	810	830	810	680	700	660	NR	NR	NR	NR	NR	NR	NR
Sulfuric Acid	77000	79000	86000	81000	100000	78000	78000	76000	70000	62000	69000	71000	40759
Zinc Compounds	NR	2800	1900	330	NR	NR	NR	NR	NR	NR	NR	NR	NR
TOTAL TOXIC AIR RELEASES	1259060	1757586	2014664	1983315	1987701	1798665	1976405	1210105	1098705	1079205	1058005	1100500	502739

* Acetone is no longer a reportable chemical; NR — Not Reported

The graph and the data show that the reported total toxic air releases significantly increased for the time interval 1994-1999 as compared to 1988-1993. The primary factors causing the jump between 1993 and 1994 was a 659,000 pound per year increase in methanol air emissions, new reporting of 72,000 pounds per year of ammonia and 61,000 pounds per year of acetaldehyde. However review of annual production rates at the mill did not show a commensurate or proportional increase in magnitude. As a result, it appears that the increase was probably an artifact of previous under-reporting rather than an actual physical increase in emissions.

Stone Container significantly under-reported methanol air emissions and did not report both ammonia and acetaldehyde from their facility prior to 1994 in their TRI reports to EPA. The total of methanol and acetaldehyde air releases increased by 720,000 pounds (360 tons) for TRI toxic air releases reported to EPA between 1993 and 1994.

Stone Container's volatile organic compound (VOC) emission inventory reported to Virginia DEQ only shows a 62 ton increase in VOCs for the same annual increase interval. The increase in Stone Container's reported TRI air releases of chemicals from 1993 to 1994 that are volatile organic compounds seriously conflicts with their reported VOC emission inventory increase provided to Virginia DEQ when the 1993 to 1994 increases are compared from the two different emission reporting systems.[12]

Only a single year of reporting for chromium emissions is shown in the reporting data for 1994. However, if hexavalent chromium was in use at the site in any cooling towers for slime control and if such use exceeded the throughput requirements under the toxic reporting regulations, more emissions of this carcinogenic pollutant should have been reported in other earlier years. Use of this material for slime control in cooling towers was banned in the mid-1990's.

It also appears that Stone Container failed to report any emissions of the carcinogen formaldehyde prior to 1997. Reporting of emissions of methyl ethyl ketone at the Stone container has been inconsistent with reporting from 1988 through 1993 and then no reports on this compound again until 1999.

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[12] If the 720,000 pound per year increase in reported total of methanol and acetaldehye was an actual physical increase in emissions and this increase resulted from a physical change or change in the method of operation at the plant, then Stone Container would be subject to New Source Review requirements, including a control technology evaluation on the emission units that had the physical change, unless the situation met one of the exceptions in NSR rules.

4.4 Comparison Review of Selected Stone Container Emission Inventory and Toxic Release Data

The following table shows selected annual data totals with all emissions converted to tons per year for the different reporting systems. Data from Stone Container's emission statements (Stone ES), Virginia DEQ emission inventory system (DEQ EI) and totals of all EPA TRI emissions that are volatile organic compounds (TRI VOCs) are shown in the table for available information.

Data is in bold in cases for which there are significant discrepancies and conflicts between data elements from the three different reports.

Year	Data Source	CO	NOX	SO2	PM-10	TRS	VOC
2000	Stone ES	**3931**	**2197**	**2178**	361	32	**486**
	DEQ EI	**2797**	**2971**	**3118**	354	29	**441**
	TRI VOCs						**448**
1999	Stone ES	4101	2221	1994	374	32	**504**
	DEQ EI	4102	2225	1996	369	32	**505**
	TRI VOCs						**665**
1998	Stone ES	**3931**	**2004**	**2034**	384	**13**	**478**
	DEQ EI	**3658**	**1953**	**1987**	382	**34**	**471**
	TRI VOCs						**711**
1997	DEQ EI						**480**
	TRI VOCs						**540**
1996	Stone ES	4052	2112	2622	365	57	**482**
	DEQ EI	4052	2112	2622	367	57	**482**
	TRI VOCs						**525**
1995	Stone ES	4061	**1736**	2170	**172**	83	**509**
	DEQ EI	4061	**1929**	2170	**353**	83	**509**
	TRI VOCs						**492**
1994	DEQ EI						**555**
	TRI VOCs						**531**
1993	DEQ EI						**493**
	TRI VOCs						**188**
1992	DEQ EI						**581**
	TRI VOCs						**269**
1991	DEQ EI						**410**
	TRI VOCs						**279**
1990	DEQ EI						**446**
	TRI VOCs						**240**

Stone ES = Stone Container Annual Emission Statement
DEQ EI = DEQ Electronic Emission Inventory Data
TRI VOCs = Stone Reporting to U.S. EPA of Air Toxics that are VOCs

The table shows there are significant discrepancies between certain data in Stone Container's submittals, DEQ's emission inventory data and certain volatile organic compound toxic release reports submitted by Stone Container to U.S. EPA.

All of the DEQ Emission Inventory data is supposed to be validated and quality assured. DEQ emission inventory information should reflect accurately submitted emission statement reports by Stone Container, except where there were disagreements and subsequent resolution of disputed emission numbers. However, the data clearly show unresolved conflicts between these two emission reporting data sets. No documents shedding any light on such significant conflicts and discrepancies between Stone Container's annual emission statements and Virginia DEQ emission inventory was provided to the authors in the Virginia DEQ file search.

The TRI VOC totals are the sum totals of specific chemical compounds that are VOCs and which are reported by Stone Container in EPA's Toxic Release Inventory. Stone Container's reports of VOC emissions in their annual criterial pollutant VOC emission inventory cannot be reconciled with reports they make on the same facility for toxic releases in the toxic release inventory.

As noted in the prior section, Stone Container's TRI reports for 1988-1993 appear to have understated methanol emissions and the company did not report any acetaldehyde and formaldehyde emissions. Such failures could account for the discrepancies between reported VOC emissions and reported TRI VOC compounds.

Given the amount of TRI VOC compounds reported for 1996 and thereafter, Stone Container's annual emission statement reports of VOC emissions appear to be understated and unreliable.

4.5 Other Areas of Uncertainty and Conflict in Stone Container Reporting and Emission Information Submittals

In July, 2001, Stone Container submitted the "second edition" of its Federal Operating Permit Application to Virginia DEQ. The source-specific emissions information contained in the submittal raises significant questions about past emission statements submitted by Stone Container. The table below shows comparisons between what Stone Container reported in their annual emission statement in year 2000 and what the company said its emissions were for selected units in the July, 2001 permit application document.

Comparison Between Emissions Data from Stone Container's Year 2000 Emission Statement & its Federal Operating Permit Application for Selected Pollutants & Emission Units

Emission Unit	Pollutant	Year 2000 Emission Report (tons/year)	Fed. Op. Permit Application, 2nd Ed. (tons/year)
Brownstock Washers 1-3	Total VOC	28.5	770
Washer Filtrate/Foam Tanks	Total VOC	12.7	116
Lime Kiln	VOC	9.2	68.6
Lime Kiln	TRS	6.3	55
Lime Kiln	PM 10	131	56.5
Recovery Boiler	VOC	53.1	80.8
Recovery Boiler	NOX	343	436
Recovery Boiler	TRS	1.4	16
Smelt Dissolving Tank Vent	VOC	15.9	56.7
12 Weak Black Liquor Tanks	Total VOC	15.8	25.8
Vacuum Separator Flume	VOC	12.1	105
Press Section	VOC	21	189
Dryer Hood	VOC	46.3	209
Wet End Exhaust	VOC	5.27	36.7

As can be seen from the table there are major conflicts in how the company characterizes its emissions between the company's year 2000 annual emission statement report and its amended application for a federal operating permit. For volatile organic compound emissions from just the emission units listed in the table, the operating permit application shows a net increase in emissions over that reported in the year 2000 emission inventory of 1429 tons per year of volatile organic compounds, a very significant understatement of the facility's volatile organic compound emissions.

The company's permit application emission disclosure on its brownstock washers shows that the revised emissions information for this single source is far larger than the VOC emissions reported for the entire facility in year 2000.

In reporting based on speciated VOCs the mass of individual organic chemical compound identities and amounts are determined and total volatile organic compounds are determined by adding the total mass emissions of each VOC chemical compound in summation. This method of reporting is encouraged by U.S. EPA in areas subject to regional smog/ozone control programs, such as in East Central Virginia. As noted in EPA guidance:

> "A VOC emissions source should calculate emissions in terms of the actual species present if adequate data are available to do so because this yields the most accurate mass. For example, if a source measures VOC emission with a CEM

> and the fraction of each compound in the emission stream is known, the total VOC emissions should be expressed in terms of the sum of the actual compounds, not "as propane." This approach should be applied whenever reliable speciation data are available, where based on a monitoring system that actually separates and measure the components of the emissions stream or on process data that indicate what compounds are present and in what proportions. However, if speciation data are unavailable expressing VOC emissions "as propane" is acceptable."[13]

Virginia DEQ has initiated an a attempt to understand why there are such highly varying emission estimates for volatile organic compound emissions from the Stone Container Hopewell Mill. However, there have been no enforcement actions started against Stone Container as a result of the contradictory data and understated emission statements. A Virginia DEQ memorandum acknowledges that Stone Container may be a far large VOC emission source than was previously believed:

> "NCASI's summary of emission test results do not appear to include terpenes when counting total hydrocarbons, although the text description indicates otherwise. This is very significant since the measured terpene emissions are about 1.6 times as large as the next highest compound (methanol). ..... **If the [terpenes] are accounted for, the sum of all VOCs from the paper machines's vacuum flume (just one vent) equates to about 105 tons/yr, whereas Stone reported 12.5 tons per year of VOCs from the paper machine's vacuum flume.** Using NCASI's Table V.B.3 and adjusted for inclusion of the terpenes as VOCs, **I estimate total VOCs from Stone's paper machine at about 575 tons per year.**
>
> **In summary, for emission characterization of Stone's paper machine, much scrutiny is needed on Stone's values as well as the NCASI study itself....**.."[14] (emphasis added)

If Mr. LaFratta is correct, Stone Container's paper machine alone emitted about 90 tons per year more VOC than Stone Container reported for the entire mill in year 2000.

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[13] EPA guidance "Open Market Trading Emission Quantification, Stationary Source Technical Guidance," April 2001, p. 5-5

[14] Electronic mail from James B. LaFratta, Virginia DEQ to Doris A. McLeod, Virginia DEQ Piedmont Office. NCASI stands for National Council for Air and Stream Improvement for the Paper Industry.

4.6 Stone Container's Emission Calculations Do Not Report Reduced Sulfur Compounds other than Hydrogen Sulfide from Uncontrolled Brownstock Washers

With Stone Container's amended Federal Operating Permit Application, the company submitted an October, 1995 extensive compilation of median emission factors from the National Council of the Paper Industry for Air and Stream Improvement for air toxics emissions from various kraft pulping emission units.[15] Of particular interest to reviewers are emissions factors for reduced sulfur compounds and naturally occurring wood volatiles from uncontrolled brownstock washer emissions and the potential for highly odorous emissions with negative impact on the community.

Stone Container's Year 2000 Emission Statement reports 18.7 tons per year of hydrogen sulfide from the Hopewell Mill brownstock washers as the highest total reduced sulfur emission source at the site. However, the emission factors provided by paper industry officials[16] indicate that dimethyl sulfide and dimethyl disulfide (also considered to be total reduced sulfur compounds) are far more prevalent in uncontrolled brownstock washer emissions than Stone ever considered. Similar emission factors from this industry source suggest that Stone Container has grossly understated its VOC emissions from its uncontrolled brownstock washers because of failure to consider the high potential for emissions of terpenes which are naturally occurring wood volatiles that will act as a volatile organic compound for purposes of smog/ozone formation.

Stone Container is a member of NCASI and would have had access to the October, 1995 report when it was published. However, Stone Container has continued to submit understated annual emission statements since the industry report's publication.

It is likely that the uncontrolled brownstock washer emissions account for a major portion of objectionable kraft mill odors from the Hopewell mill as well as being a very significant source of volatile organic compounds which lead to smog/ozone formation.

The calculations in the table below assume annual unbleached pulp production of 374,286 air dry tons (Year 2000 production) and an hourly pulp production rate of about 47.5 air dry tons of pulp per hour. Two sets of emission estimates are provided. The first emission estimates are based on median pulp plant emission factors from the NCASI report and the second emission estimate is based on the highest emission factor encountered in the NCASI survey as a potential absolute "worst case" estimate of what uncontrolled brownstock washers at the Stone Container Hopewell Mill could emit.

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[15] National Council of the Paper Industry for Air and Stream Improvement, Technical Bulletin No. 701, October 1995, "Compilation of Air Toxic and Total Hydrocarbon Emissions Data for sources at Chemical Wood Pulp Mills, Volume 1"

[16] Ibid, NCASI, October 1995 report

Emission Estimates for Odorous Compounds from Stone Container's Uncontrolled Brownstock Washers				
Pollutant	**Median Emission Estimate Using Industry Median Factors**		**Worst Case Emission Estimate**	
	lb/hour	**ton/year**	**lb/hour**	**ton/year**
Dimethyl Disulfide	3.3	12.9	22.3	88.0
Dimethyl Sulfide	6.6	26.2	109.2	430.4
Hydrogen Sulfide	0.0	0.2	1.8	7.1
Methyl Mercaptan	0.4	1.6	4.7	22.5
Total Reduced Sulfur	10.3	40.9	138	547.6
VOCs from Terpenes Emissions	9.0	35.6	284.8	1122.9

The table shows that uncontrolled brownstock washers at the Stone Container Hopewell Mill will likely emit more than twice as much total reduced sulfur compounds than what the company reported in their year 2000 emission statement. The table also shows that an uncontrolled brownstock washer could have enormous reduced sulfur emissions under a "worst case" emission calculation. Dimethyl disulfide and dimethyl sulfide cause the strong and unpleasant "rotten cabbage" odors around the Hopewell Mill.

In the case of terpenes, the latest emission estimates of VOC and terpenes from the Mill in the revised Federal Operating Permit application uses a terpene emission factor of 4.12 lbs terpenes per ton of air dried unbleached pulp. This is considerably closer to the "worst unit" emission factor than to the industry median factor.

Many of the uncontrolled chemical emissions from the brownstock washers will contribute to strong downwind odor impacts if they are released during kraft mill operations. The author did not make multiple day observations of kraft mill odor near the Stone Container facility. However, strong kraft mill odors from Stone Container were readily apparent in the area during a visit to Hopewell area on July 24, 2000. No venting of non-condensible gases was reported that day by Stone Container so ambient odor conditions that day must have been caused by usual and ordinary emissions released by the Mill.

5 Review of the 1996 Determination of Reasonably Available Control Technology (RACT) for Volatile Organic Compound Emissions from Stone Container Hopewell Mill

5.1 Introduction

Under the Federal Clean Air Act, states like Virginia with smog/ozone problems must develop a State Implementation Plan to submittal to U.S. EPA describing how the state intends to attain and maintain National Ambient Air Quality Standards. One necessary element of such plans is that existing sources of volatile organic compounds that are precursors to smog/ozone formation must install "Reasonably Available Control Technology" to limit emissions of volatile organic compounds and nitrogen oxides[17].

Reasonably Available Control Technology (RACT) is a level of emission control which is common in an industry or is otherwise available using common emission control techniques which can be reasonably applied.

In January 1996 Stone Container submitted a "VOC RACT Determination" for the Hopewell Mill. In this document, it was Stone Container's contention RACT was uncontrolled VOC emissions for all of their uncontrolled emission streams at the time of the report issuance, except for the Mill's weak black liquor filter and its Tall Oil Batch Reactor. The company agreed to change the black liquor filter to a type with no emissions and install a scrubber on the Tall Oil Batch Reactor.

Virginia DEQ and U.S. EPA Region III subsequently approved Stone Container's conclusions about RACT allowing the company to continue to maintain several uncontrolled volatile organic compound atmospheric discharge emission points. The remainder of this section outlines criticisms of the Stone Container VOC RACT Determination and the decision by Virginia DEQ to allowing such continued uncontrolled emission sources.

The Stone Container RACT Determination[18] identified the following uncontrolled atmospheric emission discharge sources at the Hopewell Mill with no volatile organic compound stack emission controls, as shown in the table below.

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[17] See 42 USC Sec. 7502(c)(1) of the Clean Air Act

[18] Stone Container Corporation VOC RACT Determination, January 18, 1996, Table 3.1

1996 RACT Study Emission Estimates on Uncontrolled Atmospheric Discharges			
Process	**tons/yr**	**Process**	**tons/yr**
Brownstock Washers	41.8	Slakers/Causticizer	0.6
Seal Tanks/Foam Tanks	18.6	White Liquor Clarifiers	0.6
Weak Black Liquor Filter	18.8	Lime Mud Washers	5.1
Paper Machine, Fourdrinier	7.1	Lime Mud Filter	1.9
Wire Cleaning	16.4	Pad Clarifier	5.1
Press Vents	28.3	Lime Kiln	11.0
Dryer Hoods	62.2	Tall Oil Batch Reactor	36.0
Vacuum Pumps	20.1	Brine Neutralization	0.0
Soap Skimmers	0.4	Tall Oil Settling Tank	0.0
Recovery Boiler	69.8	Combination Boiler, Coal	4.3
Smelt Dissolving Tank	20.9	Comb. Boiler, Wood Residue	337.3
Green Liquor Clarifier	3.7	Comb. Boiler, Combined	341.5
Dregs Filter	3.7	Pumping Station	0.2
Non-Condensible Gas System (including Blow Heat Accumulator, Multiple Effect Evaporators/Concentrators, Turpentine Condensors) (Emissions during Venting Incidents)			337.5

5.2 Stone Container's VOC RACT Submittal Didn't Identify All Uncontrolled VOC Emission Points

The first objection to Stone Container's VOC RACT submittal is that the document failed to identify all uncontrolled VOC emission points at the Hopewell Mill. As such, certain uncontrolled emission points were never subjected to the required control technology review.

The RACT submittal failed to identify uncontrolled emissions from 3 storage tanks[19] associated with the brownstock washer system. Another 9 storage tanks[20] associated with the recovery boiler were also left out. Control of the limited discharge volumes from tanks such as these should have made VOC emission control simple and inexpensive. Stone Container's failure to include these stack emission points is inexcusable. Such tanks can also be expected to discharge some total reduced sulfur which would also be controlled with many types of VOC emission controls.

[19] Emission process source HW-PSG5-V034, weak black liquor storage tank vents; 5.25 tons per year of VOC emissions.

[20] Emission process source HBPSG4-V999, weak black liquor storage tank vents; 15.8 tons of VOC emissions.

Another uncontrolled emission point that the Stone RACT submittal failed to identify and analyze was uncontrolled vapor emissions from the loading of terpentine onto railroad cars. This loading only incorporates a submerged fill to the bottom of the tank; vapors in the tank that are emitted as the tank is filled and vapors released as a result of temperature changes (known as "breathing losses") are not controlled at this source. Stone Container does not appear to acknowledge these emissions in its annual emission statements.

5.3 Underestimation of VOC Emissions from the Identified Uncontrolled Discharges Improperly Escalated Predicted Cost Per Ton of Emission Controlled Calculations

When it submitted its RACT demonstration, Stone Container failed to consider the most recent, comprehensive and up-to-date reference report then available on air toxics and volatile organic compound emissions in the materials considered to develop its estimates of the uncontrolled emission points at the Hopewell Mill.

The National Council of the Paper Industry for Air and Stream Improvement published its October 1995 Technical Bulletin No. 701 before Stone Container submitted its RACT report. This document has served as the basis for revised VOC and hazardous air pollutant emission estimates incorporated into the company's Federal Operating Permit Application.

In addition it appears likely that Stone Container understated its uncontrolled VOC emissions by providing emission estimates reported as carbon instead of summed totals of fully speciated VOC emission streams.

Both of these failures led to severe underestimation of uncontrolled emissions which led to unrealistically inflated costs per tons of emission reductions in the supplied economic analysis.

The table below shows selected uncontrolled processes at the Stone Container site along with revised emission numbers for each of these processes; the focus in the table is on VOC emission control with a thermal oxidizer:

Selected Uncontrolled VOC Process Emissions, Review for Thermal Incineration							
Process	**RACT Study Annual Emission Estimate (t/y)**	**% control assumed**	**RACT Study Emission Reduction**	**RACT Study Cost per Ton of Reduction**	**Latest Emission Estimate**	**Emission Reduction at Same Control**	**Cost per Ton of Emission Reduction**
Brownstock Washers	41.8	94	39.45	$95,432	770	724	$5,201
Seal Tanks/Washer, Foam Tanks	18.6	94	17.55	$9,029	116	109	$1,453
Paper Machine, Fourdrinier	7.1	94	6.68	$502,024	35.7	34	$99,932
Wire Cleaning	16.4	94	16.03	$15,272	16.4	15	$15,880
Press Vents	28.3	94	26.67	$46,208	189	178	$6,937
Dryer Hoods	62.2	94	58.62	$291,704	209	196	$87,039
Vacuum Pumps	20.1	94	18.95	$130,512	114	107	$23,080

Information from the table indicates that using revised and correct emission estimates with the modeled economic costs for emission control lead to thermal incineration of the seal tank/foam tank emissions becoming economically achievable. Control of the brownstock washers and press vents comes considerably closer to the agency's target of $3000/ton of emission reduction claimed as the criteria for economically feasible RACT control in the report.

While the table focuses on adding a thermal incinerator, use of an existing combustion device, such as the combination boiler at the site, would be even cheaper. In addition, use of either a thermal incinerator or an existing combustion device would provide control efficiencies closer to 98-99% control, thus lowering the cost per ton of VOC emission control numbers achieved to an even greater degree.

5.4 Portions of Stone Container's RACT Demonstration Failed to Refer to Practices at Other Mills, Failed to Consider Additional Available Process-Related Emission Controls Not Yet Implemented and Dismissed Available VOC Emission Control Techniques and Methods Without Adequate Consideration

Part of a Reasonably Available Control Technology analysis should include review on the types of RACT controls employed at other facilities in the industry. Stone Container's RACT submittal contains very little discussion of the types of controls employed elsewhere in the kraft pulping industry.[21]

[21] For example, one mill in Michigan collects all the emissions from its brownstock washers, black liquor tanks, precipitator mix tanks, chip bin eductor condensor and a number of

One of the approaches to RACT control must include process changes that reduce emissions in addition to installation of stack emission controls. The Hopewell mill generates large amounts of wastewater containing methanol, terpenes and other volatile organic compounds from gas condensation processes. Stone Container does not operate a steam stripper to clean up such contaminated wastewaters so that this waste flow can be re-used in the mill without causing more air pollution. Steam stripping systems are employed in many United States paper mills.

Steam strippers allow the removal of volatile organic compounds and reduced sulfur compounds from wastewater released by gas condensation processes. The chemical compounds stripped from wastewater are then burned in a combustion device. Stone Container's RACT submittal never considered that it could reduce air pollution by installing steam stripping technology.

Although Stone Container's RACT submittal lists a few processes where it claims that clean river water is used for makeup water rather than contaminated wastewater, there is no clear, unambiguous and comprehensive declaration in the RACT document that provides a detailed list of processes in which such contaminated wastewater is used for process purposes. To the extent that the 1996 RACT submittal failed to outline such uses of contaminated wastewater from gas condensation processes, the RACT submittal thus failed to consider process changes or wastewater cleanup processes to control and/or eliminate uncontrolled volatile organic compound emissions.

The RACT submittal in many places appears to place roadblocks against control options that should otherwise be available with a more diligent and persistent approach towards resolving potential technical problems. Several examples of these excuses for continuing to allow uncontrolled emission sources at the site are provided below.

Stone Container first disallows use of its lime kiln for incinerating any vent gases beyond what it was burning at the time, saying that the current flow of non-condensible vent gases constituted 85% of the total primary air flow to the lime kiln in its then-present operating configuration.[22] However, Stone Container was then operating a low concentration high volume venting system for combusting the non-condensible gases. Stone could have freed up vent gas combustion capacity as a RACT control by converting their low concentration high volume non-condensible gas system to a high concentration low volume system. Stone actually implemented this technology in 2001, but the company failed to consider this technique in the RACT study and potentially evaded control requirements that should have been in place 5 years earlier.

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other sources in a combined "dilute vent gas" system and incinerates these as combustion air in a wood fired boiler with incineration in its recovery boiler as a backup

[22] RACT submittal at Section 5.0, Technical Feasibility Assessment

Stone Container's submittal sought to disallow use of the recovery boiler as a burning device for vent streams, claiming that introduction of moisture into the recovery boiler risked steam explosions. However, this is not a legitimate reason to disallow vent gases to the recovery boiler since in-line vent gas conditioning, treatment and filtering systems could render any such negative event as highly unlikely or impossible with available technology.

Stone Container's submittal raised objections to burning non-condensible gases in the combination boiler as a backup to the lime kiln by claiming that such combustion could cause excursions over short term sulfur dioxide emission standards. However, the company never revealed in its document whether such sulfur dioxide emissions were in addition to sulfur dioxide derived from coal burning and whether a switch to 100% wood residue burning during periods of NCG combustion would not allow this practice to go on with no such problems. Stone Container continued to operate the plant without backup incineration capacity for non-condensible gases until 2001 when it finally altered its configuration to allow such combustion.

The Stone Container RACT submittal did not consider such available technologies as regenerative thermal oxidizers with concentrators and desorption units, flameless thermal matrix oxidation and process alterations to avoid using untreated contaminated and/or foul condensates.

According to Stone Container incineration of brownstock washer emissions in an existing combustion unit was technically infeasible because....

> "Use of this source as combustion air is not technically feasible because of the presence of fibrous particulate matter which would require frequent shutdown for cleaning and maintenance and result in increased wear on air path components, affecting combustion unit effectiveness."[23]

What Stone Container did not mention in its submittal is that other mills do practice such vent gas incineration from brownstock washer vents. They do it by having parallel backup trains of vent gas filtering and conditioning and by considering alternate locations in combustion devices for injecting vent gas for boiler combustion air.

The RACT submittal claimed that introducing vent gas from the press vents would cause additional formation of sulfur dioxide and sulfuric acid when sulfur contents of such gases would only be elevated if the facility were using contaminated condensates in the process that would offgas total reduced sulfur compounds..

In summary, Stone Container's RACT document offers little more than a series of poorly justified excuses for continuing to allow high uncontrolled volatile organic

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[23] Ibid, RACT submittal, Technical Feasibility Analysis at p. 9

compound emissions from a facility making maximum use of grandfather provisions of the Clean Air Act and regulations rather than offering excellence in emission control to lessen the facility's impacts on its neighbors and the environment.

5.5 VOC Emissions from Stone Container's Wood-Waste Burning Combo Boiler Cannot Be Considered as Complying with a Level of Emission Control Considered as Reasonably Available Control Technology

The largest reported source of volatile organic compound emissions in Stone Container's annual emission statement for the Hopewell mill comes from the Combination Boiler. The emission factor in Stone Container's annual emission reports show an emission factor of 1.4 lbs of VOC per ton of woodwaste burned and this factor is alleged to be considered compliant as a RACT emission factor.

Volatile organic compound emissions of 206 tons per year from the combination boiler would generally be considered as high. To the extent that the public can detect "burnt wood" odors in the neighborhood of this facility, the cause may indeed be poor combustion and the release of products of incomplete combustion from the combo boiler during wood waste combustion.

Burning of wet wood waste generally increases carbon monoxide emissions and products of incomplete combustion. There is no continuous emission monitor or stack testing for VOC emissions available on the combo boiler to verify the accuracy of the reported emissions estimate.

The so-called "RACT" emission factor of 1.4 lbs VOC per ton of waste burned is completely out of line from recent changes in suggested emission factors in the July, 2001 publication of U.S. EPA's AP-42 factors for wood residue combustion boilers. EPA's AP-42 factor for these boilers is 0.038 lbs VOC per million BTU[24]. This factor is equivalent to 0.342 lbs VOC per ton of wood waste, as opposed to the Stone Container's "RACT" factor of 1.4 lbs VOC per ton of wood waste burned.

In reviewing data from 32 stack tests considered by EPA in the development of its AP-42 factor, Stone Container's rate of VOC emission from the wood waste boiler would be the second most polluting source in the United States on a pound of VOC emissions per ton of waste burned basis. Accordingly, Stone Container's assumed VOC emissions from its wood burning Combo Boiler cannot be considered as a RACT emission limitation.

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[24] U.S. EPA AP-42 factors, Section 1.6, Wood Residue Combustion in Boilers, July, 2001; available at http://www.epa.gov/ttn/chief

In 1988, Stone Container filed an emission questionnaire answer indicating only 60.3 tons per year of annual VOC emissions from the combination boiler while burning bark. The Virginia DEQ file contains no explanation of how the emissions could have increased to 206 tons per year.

Virginia DEQ and Stone Container adopted a RACT Consent Agreement in May of 1996. One of the findings of that consent agreement was:

> "The Power Generation area of the Hopewell Mill consists of the Combination Boiler which incinerates a combination of Coal and Wood Residue. The Combination Boiler is currently permitted and is **estimated to emit 341.7 tons per year of VOC's.**.....The VOC's which are emitted from this boiler are products of combustion of coal and wood waste from the process. The main sources of VOC's from this boiler is the combustion of wood waste.....RACT for the Combination Boiler is deemed to be no additional controls."[25]

The findings of this consent order as to the VOC emissions of 341.7 tons per year as representing RACT from the wood burning combination boiler cannot be reconciled with the 1996 reported emission of VOC from this process unit of 200.4 tons per year, particularly since Stone Container reports its emission factor for VOC from wood burning to represent a RACT factor. No explanation exists in information disclosed to the authors as to the basis of this discrepancy.

6 Review of Stone Container's Quarterly Continuous Emission Monitoring Reports

6.1 Exposition of Continuous Emission Monitoring Data

Under federal and state rules and permit requirements Stone Container must install, maintain and operate continuous emission monitoring devices on certain emission sources and submit quarterly reports on the results of this monitoring program. Such quarterly reports typically detail the number of hours and the proportion of operating time that such emission sources fail to comply with emission limitation requirements. The quarterly reports also detail the number of hours and the proportion of operating time that continuous emission devices are offline or are otherwise unable to gain valid data.

The quarterly reports must show the causes of excess emission incidents and continuous emission monitor downtime. The reports indicate equipment startup/shutdown, emission control and monitor device malfunctions and other causes of excess emissions and continuous monitor downtime.

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[25] Consent Agreement with Stone Container Corporation, Registration No. 50370, Provision D, Finding 13, Page 7, May 1986

In general, operation of an emission source in violation of emission limitations at 5.0% or more of the source operating time will generally draw escalated regulatory agency enforcement action for many federal EPA regions and state air pollution agencies.. Similarly, monitor downtime in the range of 5-10% of the time will draw some federal or state regulatory attention. Sources should be able to operate their continuous emission monitors so that monitor downtime does not exceed about 5% of operating time.

Stone container operates the following continuous emission monitoring devices as shown in the table below:

Process	**Stack**	**Pollutants Continuously Monitored**
Combination Boiler	Main Combustion Stack	Sulfur Dioxide, Nitrogen Oxides & Opacity
Recovery Boiler	West Stack	Total Reduced Sulfur & Opacity
	East Stack	Total Reduced Sulfur & Opacity
Lime Kiln	Main Kiln Stack	Total Reduced Sulfur

The following three tables analyze the percentage of operating time that emission standards were violated and that continuous emission monitors were down or otherwise unable to gather valid data at the facility's lime kiln, combination boiler and recovery boiler for all continuously monitored parameters.

Stone Container Lime Kiln – Total Reduced Sulfur Monitoring
Review of Continuous Emission Monitoring Reports
All Reported Units in % of Total Operating Time

Quarter	**Excess Emission**	**Monitor Down**	**Quarter**	**Excess Emission**	**Monitor Down**	**Quarter**	**Excess Emission**	**Monitor Down**
			4th, 1999	0.0%	**5.0%**	**4TH, 1997**	0.0%	3.1%
3rd, 2001	0.0%	**11.5%**	**3rd, 1999**	0.0%	3.3%	**3RD, 1997**	0.0%	4.4%
2nd, 2001	0.0%	**5.1%**	**2nd, 1999**	1.4%	2.3%	**2ND, 1997**	0.0%	0.3%
1st, 2001	0.0%	1.9%	**1st, 1999**	1.2%	**7.5%**	**1ST, 1997**	0.0%	4.6%
4th, 2000	0.0%	**7.5%**	**4th, 1998**	0.0%	1.3%	**4TH, 1996**	0.0%	**7.2%**
3rd, 2000	0.0%	0.9%	**3rd, 1998**	0.0%	4.0%	**3RD, 1996**	0.0%	**5.0%**
2nd, 2000	0.0%	3.7%	**2nd, 1998**	1.0%	1.9%	**2ND, 1996**	0.0%	3.9%
1st, 2000	0.0%	2.7%	**1st, 1998**	N/A	N/A	**1ST, 1996**	0.0%	0.6%
						4TH, 1995	0.0%	0.9%

Stone Container Combination Boiler – SO2, NOX and Opacity Monitoring
Review of Continuous Emission Monitoring Reports
All Reported Units in % of Total Operating Time

Calendar Quarter	Sulfur Dioxide Monitoring		Nitrogen Oxide Monitoring		Opacity (visible emissions) Monitoring	
	Excessive Emissions	Monitor Down	Excessive Emissions	Monitor Down	Excessive Emissions	Monitor Down
3rd, 2001	0.0%	2.3%	0.3%	2.3%	3.5%	1.0%
2nd, 2001	2.1%	1.4%	1.7%	1.5%	2.4%	1.0%
1st, 2001	0.0%	4.0%	1.1%	2.7%	2.4%	0.9%
4th, 2000	0.0%	**9.5%**	1.1%	2.7%	1.0%	1.2%
3rd, 2000	0.0%	**8.8%**	1.5%	**6.4%**	1.3%	1.1%
2nd, 2000	3.1%	4.3%	1.1%	4.3%	2.2%	1.0%
1st, 2000	0.5%	3.1%	0.3%	4.3%	0.6%	1.6%
4th, 1999	0.5%	1.4%	0.6%	2.5%	0.9%	1.9%
3rd, 1999	1.5%	4.2%	0.5%	3.5%	1.3%	2.8%
2nd, 1999	2.6%	**6.6%**	2.0%	**6.6%**	2.2%	0.9%
1st, 1999	0.2%	2.5%	2.2%	2.5%	4.5%	0.9%
4th, 1998	0.0%	2.9%	0.5%	2.9%	2.1%	0.9%
3rd, 1998	0.0%	3.8%	0.0%	3.8%	0.7%	1.0%
2nd, 1998	0.0%	**8.8%**	0.7%	**8.8%**	0.3%	3.2%
1st, 1998	3.3%	**5.0%**	**12.7%**	**5.0%**	**6.5%**	1.6%
4TH, 1997	0.6%	**10.9%**	1.2%	**10.9%**	2.5%	1.4%
3RD, 1997	0.0%	0.2%	0.2%	0.2%	0.5%	1.1%
2ND, 1997	0.7%	**6.8%**	0.0%	**7.2%**	0.9%	3.6%
1ST, 1997	0.0%	2.3%	2.7%	2.3%	1.7%	**11.5%**
4TH, 1996	0.0%	**8.8%**	0.0%`	**8.8%**	1.2%	1.2%
3RD, 1996	0.2%	**15.7%**	1.2%	2.7%	0.6%	1.6%
2ND, 1996	0.0%	**12.8%**	0.4%	**14.2%**	0.7%	5.8%
1ST, 1996	1.0%	2.9%	3.2%	5.5%	2.0%	0.7%
4TH, 1995	0.1%	**6.6%**	2.8%	**11.8%**	1.2%	4.8%

Stone Container Recovery Boiler – Total Reduced Sulfur &Visible Emissions
Review of Continuous Emission Monitoring Reports
All Reported Units in % of Total Operating Time

Calendar Quarter	Total Reduced Sulfur Monitoring				Opacity (visible emissions) Monitoring			
	West Stack		East Stack		West Stack		East Stack	
	Excessive Emissions	Monitor Down	Excessive Emissions	Monitor Down	Excessive Emissions	Monitor Down	Excessive Emissions	Monitor Down
3rd, 2001	0.0%	1.2%	0.0%	1.0%	0.1%	0.9%	0.0%	1.0%
2nd, 2001	0.0%	3.3%	0.0%	4.0%	0.1%	1.0%	0.1%	1.0%
1st, 2001	0.0%	**5.6%**	0.0%	3.6%	0.1%	1.0%	0.0%	0.9%
4th, 2000	0.0%	**12.7%**	0.0%	**7.7%**	0.0%	1.0%	0.1%	0.9%
3rd, 2000	0.0%	2.6%	0.0%	4.3%	0.1%	0.9%	0.0%	0.9%`
2nd, 2000	0.0%	0.0%	0.0%	0.3%	0.3%	1.0%	0.0%	1.0%
1st, 2000	0.0%	1.0%	0.0%	1.1%	0.0%	0.9%	0.0%	0.9%
4th, 1999	0.6%	3.6%	0.0%	1.3%	0.3%	1.3%	0.1%	1.4%
3rd, 1999	0.0%	4.2%	0.0%	3.0%	0.2%	0.8%	0.0%	0.9%
2nd, 1999	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1st, 1999	0.0%	2.9%	0.0%	4.8%	0.0%	0.9%	0.0%	0.9%
4th, 1998	0.0%	**7.0%**	0.0%	**6.2%**	0.1%	1.6%	0.0%	1.0%
3rd, 1998	0.0%	2.0%	0.0%	3.9%	0.2%	1.3%	0.0%	1.0%
2nd, 1998	0.0%	0.5%	0.0%	1.0%	0.0%	0.9%	0.4%	0.9%
1st, 1998	0.0%	0.7%	0.0%	2.0%	0.1%	0.8%	0.1%	0.8%
4TH, 1997	0.0%	0.9%	0.0%	2.3%	0.5%	2.4%	0.1%	2.4%
3RD, 1997	0.0%	1.0%	0.0%	1.7%	0.1%	1.4%	0.0%	1.0%
2ND, 1997	0.0%	1.3%	0.0%	1.6%	0.1%	**5.3%**	0.1%	4.8%
1ST, 1997	0.0%	1.8%	0.0%	5.9%	0.1%	2.8%	0.0%	1.1%
4TH, 1996	0.0%	1.5%	0.0%	2.2%	0.2%	0.4%	0.1%	0.4%
3RD, 1996	0.0%	1.0%	0.0%	1.4%	0.2%	1.0%	0.0%	1.2%
2ND, 1996	0.0%	**5.8%**	0.0%	3.1%	0.1%	**7.5%**	0.3%	**6.1%**
1ST, 1996	0.0%	**17.1%**	0.0%	**14.3%**	0.1%	3.1%	0.1%	1.4%
4TH, 1995	0.7%	**17.8%**	0.0%	**13.2%**	0.2%	3.4%	0.1%	4.1%

6.2 Discussion of Stone Container's Multi-Year Record of Quarterly Continuous Emission Monitoring Reports

6.2.1 Continuous Monitoring Results on the Stone Container Lime Kiln

Review of Stone Container's Lime Kiln total reduced sulfur monitor downtime shows that out of 23 quarters of reported data, seven quarters show monitor downtime equal to or exceeding 5.0%. The worst quarter of monitor downtime was the 3rd quarter of 2001, the most recent report available to the authors. During this quarter, this monitor had 141 hours of equipment malfunctions, 18 hours of calibration/quality assurance problems, 94 hours of "other known causes" for 253 hrs of non-availability.

Stone Container is apparently taking the position that its Lime Kiln is exempt from the Federal New Source Performance Standard for kraft pulp mills that require an emission limitation of 8 ppm corrected to 10% oxygen. Stone Container's Lime kiln is subject to a Virginia rule requiring an emission limitation of 20 ppm. As a result, excursions that cause such high emissions will rarely be expected.

6.2.2 Continuous Monitoring Results on the Stone Container Combination Boiler

Review of the quarterly continuous emission monitoring results of the Stone Container Combination Boiler shows that the company does not achieve 95% continuous emission monitor uptime and valid data recovery for nearly half of the quarters from the 4th quarter of 1995 through the third quarter of 2001. A consistent, diligent and concentrated effort by CEM operators should be able to achieve such a level of performance.

Stone Container's continuous emission monitoring efforts for sulfur dioxide and nitrogen oxides on its combination boilers is not an exemplary record considering the last 6 years of reported quarters. Although their performance has improved to some extent in 1999-2001, the data still shows that 25% of the quarters reported in this time interval show combination boiler monitoring with greater than 5.0% monitor downtime. Stone Container was issued a Notice of Violation by EPA for excessive continuous monitor uptime during 1995-1997 at their combination boiler.

A multi-year review of the percentage of operating time that the Combination Boiler exceeds emission limitations shows that the facility's excess emissions generally do not approach 5.0% percent of operating time. The exceptions occurred with nitrogen oxide (NOX) and opacity (visible emissions) in the 1st quarter of 1998, when excess emissions of NOX occurred 12.7 % of operating time and excessive visible emissions occurred 6.5% of operating time.

6.2.3 Continuous Monitoring Results on the Stone Container Recovery Boiler

Stone Container's record for continuous emission monitor uptime and valid data retrieval is better at its Recovery Boiler operations as compared to its Combination Boiler. However, significant problems are still noted. Recovery Boiler monitoring performance for total reduced sulfur drew an enforcement action from EPA for the 4th quarter of 1995 and the 1st quarter of 1996.

As recently as the 4th quarter of 2000 and the 1st quarter of 2001, Stone Container's Recovery Boiler continuous emission monitoring for total reduced sulfur was showing 12.7% and 5.6% monitor downtime on the west stack and 7.7% downtime on the east stack for the last quarter of 2000.

Stone Container shows no quarters with excessive TRS or visible emissions exceeding 5% of operating time for the multi-year review period. For TRS, the Stone Container Recovery Boiler is intended to be a low odor unit that does not have direct contact evaporators and will generally operate with TRS emissions considerably less than the 5 PPM emission limitation. Such boilers will generally only have excessive emissions during partial loss of combustion of black liquor or excessive buildup of sulfidity in such boilers.

Particulate emissions from the Stone Container Recovery Boiler are subject to a 35% opacity (visible emissions) limitation which explains why visible emission violations rarely exceed 0.1% of operating time. The facility should never have been permitted at such a high level of opacity since 35% visible emission limitation would not reflect emission control achievable with best available control technology that is required by federal regulations.

7 Review of Federal and State Air Enforcement Activities Against the Stone Container Hopewell Facility

7.1 Enforcement Overview

Review of a June 1, 2000 enforcement report from EPA's AFS system on Stone Container shows the state and federal on-site inspection history for the Facility provides some enforcement statistics.

From January 1, 1990 to June 1, 2000, Virginia DEQ conducted a total of 16 on-site inspections (not including observed stack tests). DEQ found the facility to be in compliance during 14 of the state on-site inspections. DEQ found the facility in violation once as a result of an onsite inspection and one additional on-site inspection report was pending at the time that the AFS report was generated. Virginia DEQ did issue Notices

of Violation against the facility in this time period that were based on review of compliance reports and stack tests, as opposed to on-site inspection reports.

During the same time period, U.S. EPA Region III conducted a total of 6 on-site inspection visits. During 5 of these on-site inspections, EPA determined the facility to be in violation.

Notwithstanding both state and federal Notices of Violation, the Stone Container Hopewell Mill was assessed only a single penalty of $7382 on July 11, 1997 by Virginia DEQ for the period December 23, 1982 until June 1, 2000. A note in the enforcement report indicated that the $7382 penalty had not been paid as of January 14, 1998. Records provided to the author during a September, 2000 search of the records of the Virginia DEQ Piedmont Office did not show whether the $7382 penalty was paid or not.

In the same 1982-2000 time period, the enforcement report shows EPA Region III levied no penalties against the facility despite a number of enforcement actions.

In general Virginia DEQ's EPA Region III's policies allowing industrial facilities to escape penalties when violations are discovered fail to ensure that industrial sources like Stone Container have a strong economic incentive to maintain continuous compliance with all air pollution control requirements and may allow significant environmental impacts on the facility's neighbors and the environment.

Effective air enforcement should involve issuance of a notice of violation for all significant non-compliance found and entry of an administrative or judicial consent order that imposes a penalty for the violation and stipulated penalties for all future violations of the same nature. This level of effective air enforcement by both Virginia DEQ and U.S. EPA Region III has been achieved in air enforcement and compliance activities involving the Stone Container Hopewell Mill.

7.2 Recent Federal Air Enforcement

A Federal Freedom of Information Act request of the Air Protection Division of the Region III office of the U.S. Environmental Protection Agency showed a number of historic enforcement activities.

In March, 1995, EPA Region III issued a Notice of Violation to Stone Container because the company violated sulfur dioxide emission limitations[26] on its Combination Boiler during 44 three hour periods in the second quarter of 1994. Such emission excursions violated Stone Container's 1984 permit and applicable federal regulations

[26] Stone Container is subject to a requirement to limit sulfur dioxide emission limitations to 1.2 lbs of sulfur dioxide permit million BTU of heat input.

under EPA's New Source Performance Standards. EPA Region III did enter a consent order with Stone Container in response to the violation and the company paid no penalty.

In December, 1996, Stone Container conducted tests of particulate and total reduced sulfur emissions from its smelt dissolving tank vent. The results indicated that the company was violating enforceable limits on mass emissions per hour and mass emissions per ton of black liquod solids burned for both particulate matter and total reduced sulfur. The violation is summarized in the table below:

	Enforceable Limit	**December 1996 Test**
Particulate Matter	12.5 lbs/hr	25.3 lbs/hr
Particulate Matter	0.2 lbs/ton of dry black liquor solids	0.35 lbs/ton of dry black liquor solids
Total Reduced Sulfur	1.1 lbs/hr	1.54 lbs/hr
Total Reduced Sulfur	0.0168 lbs/ton of dry black liquor solids	0.023 lbs/ton of dry black liquor solids

The company tried to show compliance in subsequent stack tests in March and May of 1997. But the March, 1997 particulate stack test was not a valid compliance tests because the company only made 2 compliance runs instead of the required 3 runs. Subsequent tests in May, 1997 still did not show 100% consistent compliance with certain particulate and total reduced sulfur limits.

Based on the stack test results, the results of a June 12, 1997 order to disclose information and earlier EPA inspections, EPA Region III entered into a September 4, 1997 consent order with Stone Container. The "Conclusions of Law" in the consent order allege the following violations by Stone Container at the Hopewell Mill as shown in the table below:

Description of EPA's Conclusions	**Authorities Violated**
Failed to operate the facility with good air pollution control practice by failing to have a backup waste gas incineration system for non-condensible gases from the facility's digesters and evaporator systems and allowing uncontrolled atmospheric emissions of non-condensible gases	40 CFR §60.11(d)
Failure to comply with the applicable total reduced sulfur emission standard from each affected digester and concentrator system during periods of lime kiln bypass; failure to install a continuous emission monitoring system on the lime kiln bypass stack for non0-condensible gases	40 CFR §60.283(a) 40 CFR §60.13(g) 40 CFR §60.284(a)
Failed to properly maintain continuous emission monitoring systems for opacity (visible emissions), sulfur dioxide and nitrogen oxides at the facility's Combination Boiler; failure to maintain and operate a total reduced sulfur continuous emission monitoring system on the facility's Recovery Boiler	40 CFR §60.45(a) 40 CFR §60.284(a)
Failure to notify EPA of the date of commencement of construction or reconstruction of, and anticipated startup date and actual startup date for coal handling facilities at the facility's Combination Boiler, 3 digesters and a black liquor concentrator; failure to conduct required opacity performance tests at the coal handling facilities	40 CFR §60.7 40 CFR §60.8(a) 40 CFR §60.11(b) 40 CFR §60.11(e)
Failure to comply with the applicable particulate matter emission standard for emissions from the smelt dissolving tank vent from December 12, 1996 through May 21, 1997	40 CFR §60.282(a)
Because of the afformentioned violation EPA found Stone Container in violation of Section 111 of the Clean Air Act and 40 CFR Part 60, subparets A, D, Y and BB of EPA's federal regulations.	

Notwithstanding entry of the compliance order, available records obtained by the authors do not indicate that EPA Region III ever imposed a penalty for the violations identified in the compliance order.

On November 12, 1998, U.S. EPA Region III issued a mandatory response request for information under Section 114 of the Clean Air Act to Stone Container seeking extensive information about capital projects at the mill and certain modifications to the facility's recovery boiler. This Section 114 letter was part of the EPA's directed enforcement activity aimed at potential violations of requirements for new source review and physical modifications made without a new source review permit.

Based on the 1998 section 114 inquiry at the plant and additional plant inspections made in March, 1997 and July, 1998, U.S. EPA Region III issued a Notice of Violation to Stone Container on April 19, 1999. This NOV found:

> "During a period from 1987 through 1995, Stone made both physical changes to, and changes in the method of operation of, the recovery boiler at the Facility including, but not limted to, replacement of the recovery boiler bottom and air system. These changes allowed the increased loading of black liquor solids (BLS) through the recovery boiler (the Recovery Boiler Expansion Project)."
>
> "The activities involved in the Recovery Boiler Expansion Project were physical changes and changes in the method of operation of a major stationary source that allowed increased BLS loading of the recovery boiler and resulted in a significant net wmissions increase of pollutants regulated under the Act, including, but not necessarily limited to, nitrogen oxides. **Therefore, the Recovery Boiler Expansion Project constituted a major modification of the Facility**." (Emphasis added)

The EPA Region III NOV went on to find that Stone Container was in violation of the Virginia State Implementation Plan and federal regulatory requirements for new source review by failing to apply for a Prevention of Significant Deterioration Permit, failing to conduct a control technology review, failing to install Best Available Control Technology, failing to conduct a source impact and ambient air quality analysis or, in the alternative, failing to obtain a minor source permit.

At this writing, the last Notice of Violation and some of the earlier enforcement issues remain unresolved. EPA presently considers Stone Container to be in violation of one or more Clean Air Act regulatory requirements. No other enforcement orders have entered and no other penalties have been levied or paid.

7.3 State Air Enforcement, from 1995 to Present

On March 28, 1996, Virginia DEQ issued an "Official Letter of Admonition" to Stone Container because the facility's Third Quarter 1995 Excess Emission report indicated excessive sulfur dioxide emissions and because Stone Container didn't properly notify Virginia DEQ of the problem. Stone Container's coal was off-specification with excessive amounts of sulfur. The matter was resolved with submittal of a corrective action plan with no penalty for non-compliance.

In May of 1996, Virginia DEQ and Stone Container adopted a consent agreement requiring the facility to install all "reasonably available control technology." However, the Clean Air Act required Virginia DEQ to impose this requirement in the applicable state implementation plan several years earlier. The Virginia DEQ accepted the Stone

Container technology demonstration with little questioning and only very minimal additional control measures were imposed. See an earlier section of this document for a discussion of the Stone Container RACT issues.

On February 5, 1997, Virginia DEQ issued a Notice of Violation of particle emission limits[27] based on source emission testing conducted in December, 1996 of the lime kiln and smelt dissolving tank vents at the Stone Container mill. This NOV resulted in a subsequent entry of an order and the sole penalty ever imposed on the facility of $7382. The June 26, 1997 order imposing the penalty was not disclosed to the author during the Sierra Club file review in September 2000.

On May 24, 1999 after an extended delay, Virginia DEQ issued a Notice of Violation to Stone Container based on joint inspections conducted by DEQ Piedmont Office and EPA Region III in March, 1997 and July, 1998. This NOV tracked enforcement activity discussed in the Federal Air Enforcement section above concerning violations of new source review rules on Stone Container's modification of thier black liquor-fired recovery boiler. However, U.S. EPA Region III and not Virginia DEQ is the enforcement lead in this matter.

Virginia DEQ never issued any notices of violation for any of the serious incidents of toxic and odorous non-condensible gas venting discussed in detail in the next section.

7.4 Issues Raised from Review of Virginia DEQ Inspection Reports and Other DEQ Staff Reports

During file review by the author, Virginia DEQ inspection reports were obtained from 1990 to the present. The Virginia DEQ inspection reports indicated that the DEQ staff inspections conducted on the Hopewell Mill were always scheduled and announced. No documentations of unannounced inspections were found in the file. As a result, Stone Container environmental officials have always known when Virginia DEQ inspectors will be visiting the facility.

Several references appear in inspection reports and other materials indicating extensive use of waste oil for combustion at the Hopewell Mill lime kiln. For example, a September 15, 1997 inspection report indicates that Stone Container is using a blend of 70% waste oil for lime kiln combustion fuel. There is no information in the air regulatory files at the Piedmont office on the polychlorinated biphenyl content of waste oil burned at the site. An old EPA document, noting the use of waste oil at the lime kiln, called for such testing and surveillance. Nothing in Stone Container Title V application or in existing air permits for the facility appear to limit use of PCB-contaminated waste oil at the lime kiln. No laboratory analysis reports were found during the Virginia DEQ

[27] Particle emission limitations found at 9 VAC 5-40-1680.

Piedmont office file review showing analytical work on waste oil brought to the site for PCBs, other than for total halogenated hydrocarbons and toxic metals.

Virginia DEQ inspection reports confirm that the Stone Container Hopewell Mill is a significant odor emission source:

> "The entire facility smells strongly of sulfur."
> "Definite strong odor of H2S/TRS"
> "TRS smells strongly everywhere" September 7-8, 1993 inspection.

> "Doris, I was at Stone one time w/Rick. Attached Insp. Report has commentary about compliance issues. I remember two important observations and one olfactory sensation..... Olfactory....Worst smell all over plant...even in the office bldg ....TRS?" Note to Doris McLeod, 6/21/2000.

Although, these observations were made on-site at the plant, there is no documented odor observations in the file made in the Hopewell community concerning odors downwind of the Mill.

7.5 Compliance with EPA's Maximum Available Control Technology Standards to Control Hazardous Air Pollutants from Kraft Pulp Mills

Stone Container's Hopewell Mill is subject to federal Maximum Available Control Technology (MACT) emission standards that became effective in April of 2001 that covered hazardous air pollutant emissions from pulping operations. The standards focus on the collection and incineration of process gases containing hazardous air pollutants and the management of contaminated wastewater containing hazardous air pollutants. The author was unable to identify any non-compliance with these newly effective emission standards from file review materials provided by Virginia DEQ.

That Stone Container did not install certain emission controls, such as backup incineration of non-condensible gases, until it was forced to do so by the MACT standard. This fact illustrates that relying on voluntary approaches to air pollution cleanup can means that facilities will continue to operate poorly controlled and uncontrolled emission sources that adversely affect neighboring communities for years rather than confronting such emission problems.

8 Stone Container's Venting of Non-Condensible Gases at the Hopewell Facility

8.1 The Problem of Gas Venting at Kraft Pulp Mills

Some of the most significant air pollution and odorous impacts that can occur around a pulping facility like the Stone Container's Hopewell Mill result from uncontrolled atmospheric venting of non-condensible (NCG) gas streams.

Non-condensible gases typically contain high concentrations of reduced sulfur compounds, hazardous air pollutants and volatile organic compounds. In addition, the NCG flow will also contain a variety of naturally occurring wood volatiles with high odor potential that were not removed by gas-cleanup systems.

When released to the atmosphere, NCG gases typically cause elevated ambient concentrations of the distinctive and objectionable kraft pulp mill odors in downwind communities. The strongest odor incidents will be typically caused by uncontrolled venting of NCG flows when these gases are not otherwise combusted in a unit such as the Hopewell Mill's Lime Kiln.

Until early 2001, the Stone Container Hopewell Mill operated with a design defect that caused serious problems of uncontrolled venting of these odorous non-condensible gases. The facility was designed with only a single means of incinerating the non-condensible gases produced by wood pulping activities. With this design defect, these gases could only be incinerated in the facility's lime kiln. When the lime kiln was unavailable for any of a variety of reasons, the facility discharged its entire non-condensible gas flow uncontrolled.

Virginia DEQ never cited Stone Container for this design defect or the uncontrolled venting caused by it. In fact, Virginia DEQ explicitly embraced continued emissions from venting as constituting "reasonably available control technology" in a 1996 submittal by Stone Container and subsequent acceptance of that demonstration in a formal RACT consent order. In addition to being strongly odorous, non-condensible gas venting also releases smog/ozone precursors in an area with significant regional concern for smog formation.

U.S. EPA Region III cited this venting problem as an example of poor air pollution control practices, but there was never any fine paid or legally enforceable consent order provided to formally abate this problem.

Ultimately, national effectiveness of new rules to control hazardous air pollutants from kraft pulp mills forced Stone Container to install a backup means of non-codensible gas incineration since the company could not comply with the new mandatory national standards without such a design change. This chain of events illustrates why volunteer

approaches, as opposed to strong mandatory regulatory action, fail to protect the public from unreasonable air pollution insults.

8.2 Detailed Analysis of Stone Container's Historical Non-condensible Gas Venting Incidents, 1994-2000

A database was created to store information on all reported incidents of venting from the non-condensible gas system from August, 1994 through December, 2000. The data came from reports made available by the Virginia DEQ Piedmont District Office. There were 214 discreet incidents of venting in that time period. A total of 211 of the incidents were sufficiently documented to determine the beginning and ending time of such venting incidents. The reader is cautioned that only venting incidents of 1 hour or more are required to be reported; from 1995 through 2000, there were and average of 34 venting incidents per year a the Mill.

The following table shows venting incidents by year. The table shows all venting incidents whether they were caused by startup, shutdown, upsets, malfunctions, planned maintenance and other causes. A compilation of 1993 venting incidents found in the DEQ filea whose authorship could not be determined indicates a total of 557.05 hours of venting for that year.

Year	Number of Venting Incidents	Total Hours of Venting
1994*	14	99.4
1995	74	700.4
1996	64	467.4
1997	14	142.2
1998	20	107.1
1999	17	214.3
2000	15	127.2
* Analysis begins with August 14, 1994 incident		

The reader is cautioned against drawing conclusions about trends on venting occurrences from the table because it is possible there are gaps in the records of the VDEQ Piedmont office on venting incidents. Notwithstanding the author's multiple requests for information, large time interval gaps exists in the date exposition of reports evaluated in this analysis. For example there are only a few incident reports available from mid-July, 1999 until June, 2000. Based on past patterns of venting incidents, more venting occurrences would be expected during this time interval.

All of the venting incidents were reviewed to determine what lime kiln-related system were involved in the particular venting incidents. The following chart shows the results of this analysis:

System Causes of Venting, 8/1994-12/2000, Stone Container Hopewell Mill					
System Venting Cause Descriptor	**System Descriptions**	**Number, Venting Incidents**	**Total Hours of Venting**	**Estimated* Average Venting Emissions, VOC (lbs) per Incident**	**Estimated** Venting Emissions, TRS (lbs) per Incident**
MILL	Mill-wide startup/shutdown, power failures or other mill-wide problems	24	967.3	3712	102
MUD	Lime mud feed system, filters, conveyors or low mud feed availability	29	289.2	918	84
SCRUBBER	Maintenance and/or outages on lime kiln scrubber	30	155.9	479	82
MAINT	Other problems and system maintenance	7	77.3	1017	350
PLC	Failure of programable logic controller	19	76.2	369	129
OIL	Oil burners, strainers, oil line problems, other oil problems	26	57.5	204	94
BRICK	Failure of lime kiln refractory brick	1	52.8	4863	2450
CRUSHER	Failure of of lime kiln crusher, for reasons other than chain entanglement	19	39.6	192	129
CHAIN	Failure of lime kiln chain section with chain clogging crusher	22	34.4	144	111
CONVEYOR	Problems with conveyors in lime kiln system	7	29.8	392	350
NCG SYSTEM	NCG system problems, rupture disk problem, water in NCG system, explosion limit problem, gas temperature problem, flame arrestor	9	29.4	301	272
RING	Lime kiln outage to remove ring or ball	10	14.4	133	245
FAN	Lime kiln induced draft fan problem	5	13.8	254	490
FLAME	Flame safety system trip	2	10.6	488	1225
KILN TEMP	Adverse lime kiln temperature problem	5	8.2	151	490
UNKNOWN	Unknown problem	1	1.6	147	2450

* Based on Stone Containers' factor of 92.1 lbs/hr VOC during venting
** Based on Stone Container's factor of 26.6 lbs/hr TRS during venting; factor are subject to question

If the Mill had a proper design reflecting good air pollution control practice with backup incineration capability prior to year 2001, nearly all of the venting incidents in the table could have been avoided. Even the venting incidents involving mill-wide startup and shut down could have been avoided since the facility has the capability to generate electricity and put it on the grid during times of low kraft process steam demand.

In many cases, the table shows repeated venting incidents from the same cause. For example, there were 22 incidents of lime kiln outages from lime kiln chain pieces falling out of the kiln. Such incidents are a mark of inadequate preventative maintenance and operating a process with unreliable or marginal equipment.

In order to get to the bottom of all excess emission incidents, facilities should be required to submit "root cause analysis" which identifies the ultimate primary failure that leads to an excess emission incident. However, most of Stone Container's prompt excess emission reports sent to Virginia DEQ Container fail to provide root cause analysis.

8.3 Stone Container's History of Non-statement and/or Understatement of its Excess Emissions from Non-condensible Venting Incidents

Virginia rule 9 VAC 5-20-180 requires facilities having excess emissions due to malfunctions lasting 1 hour or more to issue a report to Virginia DEQ containing all pertinent facts about such excess emissions incidents. One pertinent fact is the amount of excess emissions released during such incidents.

Prior to November 1997, Stone Container never reported the pertinent facts of what its excess emissions actually were in the prompt reports of excess emission incidents submitted to Virginia DEQ. The company only reported the duration of such events and not the amount of emissions released. In general, there was no mention of any reasonably available measures taken to reduce emissions during such venting incidents.

Starting in November, 1997, the company began to quantify its emissions of total reduced sulfur (TRS) and volatile organic compounds (VOC) during venting incidents. However, Stone Container underestimated its emissions of these compounds. Stone used a TRS emission rate of 0.2430 lbs per hour and a VOC emission rate of 77.22 lb/hr (as propane) in the uncontrolled non-condensible gas flows.

A rate of TRS flow in non-condensible gas flow of 0.2420 lbs per hour must be considered a gross and erroneous underestimate of expected emissions. The file contains a reference to a test of the NCG flow done sometime in the mid-1990s (possibly in 1996) and this test[28] was the basis of later estimates showing TRS emissions of 26.6 lbs per hour

[28] Virginia DEQ did not provide a copy of this test report during the author's file review in September 2000.

in TRS flow. The same test information indicates an uncontrolled VOC emission rate of 92 lbs per hour of VOCs, reported as carbon.

A test done in 2001 indicated total reduced sulfur in NCG vening flows of 37.5 lb/hr (measured as sulfur dioxide) or 18.8 lbs per hour as hydrogen sulfide. However, this later test was done at a fraction of the Mill's capacity to generate NCG flow. The same test indicates a rate of NCG VOC flow of 106 lbs per hour – again at rate of production significantly less than 100% capacity.

Stone Container's total reduced sulfur venting reports continued to be severely understated until July, 2000 when it began to use the factor of 26.6 lbs/hr as the uncontrolled rate of TRS emissions during venting – a rate over 100 times higher than what was previously reported in such TRS venting incidents.

9 Virginia DEQ "Sweetheart" Permit Provisions and Rules Undermine Enforcement for the Stone Container Hopewell Mill

9.1 Enforceability Issues with Stone Container's Permit and Virginia DEQ Rules

In June of 2000, Virginia DEQ issued an air discharge permit to the Stone Container Hopewell Mill containing the following three provisions:

> "29. Excess Emissions – Regardless of the requirements in conditions 30 and 31, the DEQ shall not consider periods of excess emissions from the recovery furnace to be indicative of a violation provided that the total number of possible contiguous periods of excess emissions in a quarter (excluding periods of startup, shutdown, or malfunction and periods when he facility is not operating) during which the excess emissions occur does not exceed one percent for TRS emissions or six percent for average opacity. (9 VAC 5-50-400)"
>
> "30. Excess Emissions – Regardless of the requirements in Conditions 29 and 31, the DEQ shall not consider periods of excess emissions from the non-condensible gas collection and control system to be a violation provided that the time of excess emissions (excluding periods of startup, shutdown, or malfunction) divided by the total process operating time in a semi-annual reporting period does not exceed 1%. (9 VAC 5-60-90)."
>
> "31. Excess Emissions – Regardless of the requirements listed in Conditions 29 and 30, no violation of applicable emission standards or monitoring requirements shall be judged to have taken place if the excess emissions or cessation of monitoring activities is due to a malfunction, provided that the owner has taken expedient and reasonable measures to minimize emissions during the breakdown period; the owner has taken expedient and reasonable measures to correct the malfunction and return the facility to a normal operation; and the source is in

> compliance at least 90% of the operating time over the most recent 12 month period. (9 VAC 5-20-180 G, 9 VAC 5-40-300)."

All three of these conditions in the permit are intended to regulate and restrain DEQ's enforcement conduct rather than regulating the subject facility. Conditions 29 and 30 actually arise from weak provisions contained in federal regulations covering all mills like the Stone Container Hopewell Mill. Under conditions like these, all excess emissions associated with startup, shutdown and source malfunctions must first be excluded. Only then can air pollution control officers begin counting emissions in excess of limitations that occurred over the last quarter or semi-annual period. Only after such excess emissions exceed 1% of operating time can enforcement take place.

Although Condition 29 arises from current federal regulations, the Virginia DEQ permit language omits an additional provision of the federal rule requiring that any such attempt to exempt a source from emission limitation Enforceability is also subject to the following requirement:

> "The Administrator determines that the affected facility, including air pollution control equipment, is maintained and operated in a manner which is consistent with good air pollution control practice for minimizing emissions during periods of excess emissions." 40 CFR Sec. 60.284(e)(2).

Although the Virginia DEQ rules have a similar provision on good air pollution control practice in its Facility and Control Equipment Maintenance or Malfunction rules (9 VAC 5-20-180(A)), the rule has a number of loopholes not provided in the federal rules making the Virginia rules weaker than the federal rules.

Condition 31 contains provisions which are not found in Federal rules but arise from Virginia's Facility and Control Equipment Maintenance or Malfunction rules at 9 VAC 5-20-180(G). The permit language and this rule covering all of the emission units at the plant make it extremely difficult for Virginia DEQ to allege any violation until a source is found to be emitting in excess of an emission limitation for at least 10% of the plant operating time over the most recent 12 month period. Such a provision is very debilitating to any Virginia enforcement effort.

Condition 31 and Virginia rule 9 VAC 5-20-180(G) may very well conflict with EPA's rules on Title V operating permits under the Clean Air Act. Inclusion of such a permit condition in any proposed permit for the Stone Container Hopewell Mill should be subject to significant challenge by citizen groups and U.S. EPA.

9.2 Grandfathering Older Existing Pulp and Paper Mill Emission Units from Community Nuisance Odor Control Regulations

Virginia DEQ has an entire section of rules[29] dealing with old pulp mill emission units which are not otherwise subject to certain federal standards for new sources or more recent federal standards to control hazardous air pollutants. Certain provisions of these rules are quite notable for their unusual regulatory laxity.

Virginia DEQ rules require that "No owner or other person shall cause or permit to be discharged into the atmosphere from any affected facility any emissions which cause an odor objectionable to individuals of ordinary sensibility."[30] However, Virginia DEQ's rules for existing pulp and paper mill emission units (including several at the Stone Container Hopewell Mill) excuse such facilities from compliance with the odor rule for any emissions of total reduced sulfur (TRS) compounds. TRS is, of course, the pollutant from pulp mill plants with the highest potential for causing plant neighbors unreasonable odor nuisance.

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[29] 9 VAC 5-40-1660 through 9 VAC 5-40-1810

[30] 9 VAC 5-40-140. Accidental and/or infrequent odors are excluded from this prohibition. 9 VAC 5-40-130(C). The rules go on to say that if a source is found to be emitting odors in violation of the rule, a source must install emission controls that are economically and technically feasible to control such odors. 9 VAC 5-40-150(B)