APPENDIX 5
PARTICULATE EMISSIONS STANDARDS

TOTAL SUSPENDED PARTICULATE

All of the particulate emissions standards, except some new source performance standards, are in terms of total suspended particulate.

Total suspended particulate (TSP) has an aerodynamic diameter of 100 µm or less. Particles with an aerodynamic diameter greater than 100 µm will not remain suspended in air for any significant length of time and, therefore, need not be regulated. That is, such particulate matter is not considered TSP.

With this definition, that part of a facility's gas stream that contains particulate matter with an aerodynamic diameter greater than 100 µm should not be considered a regulated pollutant. This means that, if the facility can demonstrate that this is the case, a facility's before control potential emissions (of regulated pollutants) would be less than that derived from a material balance or by other means.

Determination of Aerodynamic Diameter

The following equation, adapted from Cooper and Alley's discussion of the terminal velocity of a particle, may be used to calculate a particle's aerodynamic diameter,

$$d_{p,a} \quad d_{p,eff.} \sqrt{S_p}$$

Where: $d_{p,a}$ = aerodynamic diameter (µm)

$d_{p,eff.}$ = effective diameter (µm) (diameter of sphere of equal volume)
S_p = specific gravity of the particle (dimensionless)

For example, cherry wood (S_p = 0.43) with an effective diameter greater than 153 µm would not be considered TSP.*

TRANSFER CYCLONES

A cyclone has two possible configurations irrespective of use: discharging and closed-loop. The employment of a closed-loop cyclone, i.e., one in which the air discharge opening is routed back to the fan without discharging to the atmosphere, is not an air quality issue. The discharging-type cyclone is an emission source, by definition, and should be considered for permitting.

Many facilities discharge solid particulates as a product or by-product of their manufacturing processes. For a variety of reasons, these facilities employ cyclones to capture this matter. In certain cases, the particles do not present an air pollution problem and, thus, the device used to capture them cannot be considered an air pollution control device. The definition of TSP can be used to identify these cases. If the particulate matter being conveyed is TSP and a discharge cyclone is used to disengage the air stream from the particulate matter, the cyclone is an air cleaning device and is permitted as such.

INDIRECT HEAT EXCHANGERS: 15A NCAC 2D .0503 AND .0504

Applicability with Reference to Types of Fuels

Rule **15A NCAC 2D .0504**, Particulates from Wood Burning Indirect Heat Exchangers, applies to the combustion of wood. Rule **15A NCAC 2D .0503** applies to the combustion of coal, coke, lignite, peat, natural gas, fuel oils, and all other types of fuels except wood and refuse not burned as a fuel. Rule **15A NCAC 2D .0503** applies to refuse, products, and by-

*Laura S. Butler to Regional Air Quality Supervisors, *et al.*, "Definition of Total Suspended Particulate (TSP)," 1 July 1994 (memorandum).

products of a manufacturing process that are burned as a fuel rather than refuse.*

Averaging Time and Recordkeeping for Heat Input

Under **15A NCAC 2D .0503** and **.0504** the current policy on averaging time and recordkeeping for heat input is as follows:

1. A one-hour averaging time shall be used for determining the total Btu heat input and shall begin on the hour (for example, 7:00 to 8:00). However, a company may specifically request a different one-hour period. The subsequent permit issued would specify this one-hour period.
2. For the one-hour period designated, each company shall keep firing records for the State's inspection to ensure that the maximum permitted rate is not exceeded.

Where a one-hour averaging time is not feasible, then a different averaging time may be allowed. The permit should specify the averaging time.†

Aggregation of Fuel Burning Equipment at Military Installations, Educational Institutions, Etc.

For apartment complexes, military installations, and educational institutions whose primary fuel burning capacity is for comfort heat, only heat inputs of fuel burning units that are located in the same power plant or building, or are physically interconnected by common flues, steam lines, power distribution lines, etc. are to be combined to determine the allowable emission rate. For example, a single fuel burning unit serving dormitories or barracks and not connected with any other fuel burning equipment has an emission limit based on its size only.‡

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*Thomas Allen to Laura Herbert, "Applicability of 15A NCAC 2D .0503 or .0504 to Laminate Combustion," 4 June 1997 (memorandum).

†Fin Johnson to Regional Supervisors, *et al.*, "Averaging Policy for Fuel Burning Regulations 15 NCAC 2D .0503 & .0504," May 1983,11 (memorandum). N. O. Gerald to Roy Walters, Jr., "Overfire Averaging Time, Henredon Furniture Industries, Mitchell County, North Carolina," 14 June 1983 (letter).

‡Marshall Rackley to Regional Supervisors, "Aggregation of fuel burning equipment at a plant or premises—NCAC 2D .0503 & .0504," 4 March 1981 (memorandum).

Plant Site and Aggregation of Fuel Burning Equipment at Industrial Sites

Under Rules **15A NCAC 2D .0503** and **.0504**, the heat input of all fuel burning indirect heat exchangers at the *plant site* that are in operation, under construction, or permitted, are summed to obtain the heat input to determine the allowable particulate rate. Common sense should be used to determine exactly what constitutes the "plant site." Several factors should be considered in determining what constitutes a "plant site":

1. Are the fuel burning units physically interconnected by common flue, common steam lines, or common air pollution controls? (A "yes" answer means that they are at one plant site.)
2. How have the units been historically permitted? Does the facility have separate permits for different divisions located on contiguous or adjacent property? (Historically these plant sites have been permitted separately and the allowable particulate rate has been based on the total heat input for all boilers on a permit.)
3. Where are the units located in relation to one another? Are they in separate and distinct buildings?
4. Is the applicant attempting to circumvent control intended by claiming the several boilers are not part of the same operation?

At this time, the definition of "plant site" under **15A NCAC 2D .0503** and **.0504** is not equivalent to the definition of "facility" as defined for Title V, PSD, or state air toxic purposes.*

Allowable Particulate Limits Remain Fixed

Once the allowable particulate emission rate has been determined for an indirect heat exchanger, it remains fixed. The addition or removal of other indirect heat exchangers does not change the allowable emission rate of the remaining or existing indirect heat exchangers.

Burning of Waste Derived Fuels and Materials Including Oils, Solvents, and Chemicals

As a minimum the following information is needed to permit burning of waste derived materials including oils, solvents, and chemicals:

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*Laura Butler to Regional Air Quality Supervisor, " Determination of Allowable for 2D .0503 and .0504," 12 Oct. 1995 (memorandum).

1. type of waste
2. density (pounds/gallon)
3. Btu content (Btu/gallon)
4. ash content (% by weight)
5. sulfur content (% by weight)
6. lead content (% by weight)
7. mercury content

(For uncontaminated lubricating oils, the lead and mercury information is not needed if 100 gallons or less is burned per 24 hours.) If the equipment is subject to the air toxic rules, air toxic emissions also need to be addressed.

Except for waste oil, the owner or operator of the source must obtain a ruling from the Division of Waste Management, Hazardous Waste Branch on whether or not RCRA regulations apply. A copy of this ruling needs to be submitted with the application for the air permit.*

Uncontaminated or Unadulterated Fuel

Unadulterated fossil fuel means fuel oils, coal, natural gas, liquefied petroleum gas, and wood to which no toxic substances have been added. The term toxic substance refers to substances or contaminants that could result in the emissions of toxic air pollutants regulated under the North Carolina air toxic rules or hazardous air pollutants regulated under the federal hazardous air pollutant rules.

Used oil is considered equivalent to unadulterated fuel oil if the toxics are shown to be at a level of no greater concern than those of unadulterated oil. For fuel oil the following parameters should be met:

*N. O. Gerald to Regional Supervisors, *et al.*, "Burning of Waste Derived Fuels and Materials Including Oils, Solvents, and Chemicals," 28 May 1987 (memorandum). N. O. Gerald to Regional Supervisors, *et al.*, "Burning of Waste Derived Fuels and Materials Including Oils, Solvents, and Chemicals," 6 Feb. 1987 (memorandum).

CONSTITUENT/PROPERTY	ALLOWABLE LEVEL
Arsenic	1 ppm maximum
Cadmium	2 ppm maximum
Chromium	5 ppm maximum
Lead	100 ppm maximum
Total Halogens	1000 ppm maximum
Flash Point	100°F minimum
Sulfur	1.0% maximum
Ash	1.0% maximum

Laminate Combustion

Rule **15A NCAC 2D .0503**, Particulates from Fuel Burning Indirect Heat Exchangers, applies to the combustion of laminate composed of layers of kraft paper and resins. This material is paper and resin waste from the manufacturing process. It is not wood waste. Therefore, Rule 15A NCAC 2D .0503 applies.*

Paper is not wood. The pulping process changes the property of wood such that it can no longer be considered wood. Wood consists of cells cemented together by intercellular material; lignin is a primary constituent of this intercellular material. The pulping process separates intercellular material from the cells. Much of the lignin found naturally in wood is removed during the pulping process. Wood is reacted with various chemicals that change its physical properties. The wood is chemically changed into pulp. Paper is made from this pulp.†

*Thomas Allen to Laura Herbert, "Applicability of 15A NCAC 2D .0503 or .0504 to Laminate Combustion," 4 June 1997 (memorandum).

†*Ibid.*

PARTICULATES FROM HOT MIX ASPHALT PLANT:

15A NCAC 2D .0506

The maximum allowable emission rate for a hot mix asphalt plant is calculated using the maximum process rate. For permitting purposes, the maximum allowable emission rate is calculated using the maximum permitted process rate. For compliance testing purposes, the maximum allowable emission rate is calculated using the maximum process rate during the test. At any given time, the allowable emission rate is determined by the formula given **15A NCAC 2D .0506(a)**, which is

$$E = 4.9445(P)^{0.4376}$$

Thus, the allowable emission rate is a floating rate like that in **15A NCAC 2D .0515**, Particulates from Miscellaneous Industrial Processes, and not a fixed rate like that in **15A NCAC 2D .0503**, Particulates from Fuel Burning Indirect Heat Exchangers.*

The particulate emission limit in **15A NCAC 2D .0506** does not pertain solely to the dryer stack emissions. Particulate emissions from other stacks and vents, such as fugitive control systems for the mixing tower (or pug mill) not tied into the main dryer stack, are also included when determining compliance.†

When determining compliance with the particulate emission standard in **15A NCAC 2D .0506** both Method 5, which measures noncondensible particulates, and Method 202, which measures condensible particulates, should be used.‡

In **15A NCAC 2D .0506(b)**, "this equipment" refers to the fugitive process dust control system and to drying, conveying, classifying, and mixing equipment. This paragraph refers to non-stack emissions, i.e., fugitive emissions. As emissions from dryers and mixing equipment come from stacks, this paragraph would apply only to leaky dryers and mixing equipment, which is probably a good indication that something is in need

*Brock Nicholson, "15A NCAC 2D .0506: Maximum Limit," 16 Dec. 1998 (memorandum).

†Michael Y. Aldridge to Section Chiefs and Regional Supervisors, "Particulate Emissions from Hot Mix Asphalt (HMA) Plants," 4 May 2001 (memorandum).

‡*Ibid.*

of repair. The emissions that are not covered under **15A NCAC 2D .0524** are covered under **15A NCAC 2D .0521**.*

PARTICULATES FROM MICA OR FELDSPAR PROCESSING PLANTS: 15A NCAC 2D .0509

Crushing at mica or feldspar processing plants is subject to the same ambient dispersion modeling requirements as quarries.†

SAND, GRAVEL, CRUSHED STONE: 15A NCAC 2D .0510

Ambient Dispersion Modeling Requirements

Ambient dispersion modeling is required for crushed stone operations if:

1. The crushed stone facility has a crushing capacity of 400 tons per hour in a county where the PSD baseline date has been triggered, or
2. The crushed stone facility has a crushing capacity of 1000 tons per hour in any county.‡

These criteria are guidelines and may be deviated from in a particular situation for good reason.

Recycled Asphalt Product Crushers

Recycled asphalt product (RAP) crushers manufactured, reconstructed, or modified after August 31, 1983, are subject to 40 CFR Part 60, Subpart OOO (**15A NCAC 2D .0524**). If the RAP crusher is not covered under the new source performance standard, it is covered under

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*Thom Allen to William Willits, "RE: Asphalt Plant Opacity," 15 Nov. 1999 (e-mail).

†Lee A. Daniel to Fred R. Allen, "Revision to Dispersion Modeling Requirements for Crushing Operations," 23 Mar. 1990 (letter).

‡Lee A. Daniel to Fred R. Allen, "Revision to Dispersion Modeling Requirements for Crushing Operations," 23 Mar. 1990 (letter).

15A NCAC 2D .0510. Under **15A NCAC 2D .0510**, RAP crushers are not considered stone crushing operations and, therefore, are not required to employ water spray.*

Wet Suppression at Crushers

15A NCAC 2D .0510(c) requires the use of wet suppression at the crusher. According to the hearing record, the phrase "crushers with wet suppression" is synonymous with "use wet suppression at the crusher." If the material being crushed is not naturally wet, spray bars should be employed to wet the material. If the material being crushed is naturally wet, no spray bars are required. (A material is naturally wet if it is noticeably saturated with water as mined.) In any event, the material should be sufficiently wet such that the visible emissions standard is not violated at the crusher or at any conveyor, screen, or transfer point. This same interpretation applies to crushers covered under **15A NCAC 2D .0509**, Particulates from Mica or Feldspar Processing Plants, and **.0511**, Particulates from Lightweight Aggregate Processes.†

For the purposes of Title V applicability, potential emissions from rock quarries have been calculated assuming water spray at the crusher. Inspectors should ask the facility to explain the procedures for activating its water suppression system. If the facility does not turn on the water spray until visible emissions are present, its operation is dry, and its potential emissions need to be recalculated accordingly. Any facility that does not run wet material at all times should have its potential emissions calculated on a dry basis. If any quarry insists on operating its crusher without water spray, then its potential emissions need to be recalculated to account for the lack of water spray. The exception would be crushing material that is naturally wet. Wet suppression needs to be used at all times for potential emissions to be calculated on a wet basis.‡

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*Alan Klimek to Regional Supervisors, *et al.*, "Requirements for RAP crushers under 2D .0510," 21 Nov. 1996 (memorandum).

†Brock Nicholson to Regional Supervisors, *et al.*, "Wet Suppression at Crushers," 25 Sept. 1998 (memorandum).

‡*Ibid.*

LIGHTWEIGHT AGGREGATE: 15A NCAC 2D. 0511

Crushing at lightweight aggregate facilities is subject to the same ambient dispersion modeling requirements as quarries.*

WOOD PRODUCTS FINISHING: 15A NCAC 2D .0512

Finishing of Wood

Finishing of wood includes giving final touches to embellish or to perfect; giving a desired surface effect; anything used to give a desired surface effect, as paint, varnish, etc.; the method in which the surface, as of furniture, is painted, varnished, smoothed, etc.†

Spray Booths

Uncontrolled spray booths in existence (September 6, 1984) may be permitted in compliance with **15A NCAC 2D .0512** if the ambient standards and PSD increments are protected, and regional evaluation indicates no excessive particulate off property. If off-property impacts are causing an ambient or nuisance problem, the DAQ should use monitoring or modeling to resolve the problem. Modeling should be done on a case-by-case basis.‡

New booths should have particulate controls such as baffles, water wash systems, or filters. For water wash systems, check with the Division of Water Quality for proper disposal of waste water.¶

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*Lee A. Daniel to Fred R. Allen, "Revision to Dispersion Modeling Requirements for Crushing Operations," 23 Mar. 1990 (letter).

†Fin Johnson to Regional Supervisors and Air Quality Staff, "DEM Policy Concerning Particulates from Wood Finishing, Air Regulations 15 NCAC 2D .0512 and .0515," 6 Sept. 1984 (memorandum).

‡*Ibid.*

¶*Ibid.*

Direct Wood-fired Wood Chip Dryers

Particulate emissions from direct wood-fired wood chip dryers are regulated under **15A NCAC 2D .0515** and not under **15A NCAC 2D .0512**.*

PORTLAND CEMENT PLANTS: 15A NCAC 2D .0513

One barrel of cement weighs 376 pounds.

MISCELLANEOUS INDUSTRIAL PROCESSES: 15A NCAC 2D .0515

Spray Booths: Wood Products

15A NCAC 2D .0512 applies to particulate emissions from painting or finishing of wood or wood products; **15A NCAC 2D .0515** does *not* apply to such processes.†

Spray Booths: Non-Wood Products

Stack testing is not required for spray booths with acceptable particulate filter systems that are properly operated.

When computing an allowable particulate emission rate for a spray booth, the process rate is determined by adding the weight of all materials entering the process including the weight of the materials being coated.‡

Air Curtain Burners

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*N. O. Gerald to Glen Wood,"Particulate Emissions," 13 Oct. 1988 (letter).

†Fin Johnson to Regional Supervisors and Air Quality Staff, "DEM Policy Concerning Particulates from Wood Finishing, Air Regulations 15 NCAC 2D .0512 and .0515," 6 Sept. 1984 (memorandum).

‡N. O. Gerald to Don Willard,"Interpretation of 15 NCAC 2D .0515 'Particulates from Miscellaneous Industrial Processes,'" 27 June 1989 (letter).

Rule **15A NCAC 2D .0515** does *not* apply to air curtain burners.*

Internal Combustion Engines

Rule **15A NCAC 2D .0515** does *not* apply to internal combustion engines.

Process Weight Rate

Process weight rate is determined on a unit basis and not a stack basis.

The weight of all materials entering a process should be included in determining the allowable emission rate.†

Emission Control Standards

Rule **15A NCAC 2D .0515** applies to "emissions of particulate matter from any stack, vent, or outlet of any industrial process for which no other *emission control standards* are applicable." *Emission control standards* means any particulate emission standard found in **15A NCAC 2D.** It does not include limits taken to avoid the applicability of any federal or State rule, regardless of the averaging time of the limit.‡

CONTROL OF VISIBLE EMISSIONS: 15A NCAC 2D .0521

Rock Cutting Operations

The visible emission limitations of **15A NCAC 2D .0521** apply to rock cutting operations.¶

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*Brock M. Nicholson to Regional Supervisors, *et al.,* 29 May 2001, "15A NCAC 2D .0515" (memorandum).

†Laura Butler and B. Keith Overcash to Regional Air Quality Supervisors, *et al.,*"Allowable Determination under 2D .0515: Applicable Regulation 2D .0515," 23 May 1997 (memorandum).

‡Laura Butler to Regional Air Quality Supervisors, *et al.,*"Emission Control Standard under 2D .0515: Applicable Regulation 2D .0515," 22 Jan. 1997 (memorandum).

¶Lee A. Daniel to B. Keith Overcash,"Rock Cutting Operations," 22 June 1990 (memorandum).

PARTICULATES FROM FUGITIVE NON-PROCESS DUST EMISSION SOURCES: 15A NCAC 2D .0540

Rule **15A NCAC 2D .0540** applies only to non-process portions of industries that are required to comply with **15A NCAC 2D .0506**, Hot Mix Asphalt Plants, **2D .0509**, Mica and Feldspar Processing, **2D .0510**, Sand, Gravel, or Crushed Stone, or **2D .0511**, Lightweight Aggregate. After the *second* substantive complaint, the owner or operator of a facility subject to this rule has 30 days from receipt of a Director's letter notifying him of the second compliant to submit a written description of what has been done in the short term to reduce fugitive emissions. The owner or operator has 90 days after receipt of the Director's letter to submit a control plan that includes all the requirements of Paragraph (e). The facility must be in compliance with the plan within 30 days of the Director's approval. Being in compliance with the plan does not necessarily mean that any equipment has to be installed and running. Compliance can include an approved schedule for installation or purchase of any necessary equipment. The plan has to include this schedule to be approved. After implementation, if the plan is found to be inadequate to control emissions, the Director shall require the owner or operator to resubmit the plan with changes to address the deficiencies. A revised plan must be submitted within 90 days of receipt of notification.

Paragraph (d) of **15A NCAC 2D .0540** offers the Division of Air Quality the opportunity to bring facilities under this Rule without waiting for two substantive complaints within a year. The Division has two methods: (1) ambient air quality measurements or dispersion modeling that show a violation or potential for violation or (2) Division staff observation of excessive non-process emissions beyond the property line. Division staff determines excessive emissions using common sense and experience with that facility. Factors such as weather should be considered in making an excessive emissions determination.

ABRASIVE BLASTING: 15A NCAC 2D .0541

The primary concern of **15A NCAC 2D .0541** is the regulation of abrasive blasting operations conducted outside a building. It does not apply to abrasive blasting done within a building and the associated air emissions of these operations. If abrasive blasting operations are conducted inside a building, the stack or chimney emissions from these operations its emissions are subject to other air quality rules such as **15A NCAC 2D .0521**, Control of Visible Emissions.*

The underlying intent of **15A NCAC 2D .0541** is to prevent particulate problems and nuisance problems by preventing dust from abrasive blasting operations from migrating offsite.†

Visible Emissions Evaluations

15A NCAC 2D .0541(b) establishes a visible emission standard for abrasive blasting. It states that the visible emissions reading for abrasive basting performed outside a building shall be taken at a spot approximately one meter above the points of abrasive blasting with a viewing distance of approximately five meters. However, field inspectors should exercise their best judgement when it comes to personal safety and may conduct the visible emissions reading from a further distance if they believe that five meters may present some personal danger. Visible emissions readings are only performed on the emissions that escape from the enclosures or shrouding into the outside atmosphere. The opacity of emissions within an enclosure is not regulated by this Rule.‡

Removal of Parts from a Structure for Blasting

The intent of **15A NCAC (d)(2)** is to allow removal of parts of structures in places where blasting cannot be done on the structure itself. The parts can be removed and blasted elsewhere—presumably in close proximity of the structure. The Rule does not define this distance, i.e., the distance that constitutes "not farther away than is necessary." For most situations, a hundred yards or so from the structure would not be farther

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**Report of Proceedings of Public Hearing on Proposed Amendments to Permitting Rules 15A NCAC 2D .0524 and Adoption of 15A NCAC 2D .0541 (Control of Emissions from Abrasive Blasting)*, August 20, 1999, pp. I-2 – I-3

†Thom Allen to Tom Moore, "RE: Control of Emissions from Abrasive Blasting," 10 Apr. 2000 (e-mail).

‡*Report of Proceedings of Public Hearing on Proposed Amendments to Permitting Rules 15A NCAC 2D .0524 and Adoption of 15A NCAC 2D .0541 (Control of Emissions from Abrasive Blasting)*, August 20, 1999, pp.. I-3 – I-4.

away than is necessary. However, a mile would be highly questionable and probably be difficult to justify except under unusual and rare circumstances.*

Power Washing

Routine cleaning of the external surfaces of buildings and houses, such as power washing, is not considered a form of abrasive blasting. However, true abrasive blasting operations, which are intended to strip and remove the paint and other architectural coatings from the exterior of a structure, are required to comply with the requirements of **15A NCAC 2D .0541**.†

Appropriate Control Measures

The mitigation techniques presented in **15A NCAC 2D .0541(e)** only serve to indicated commonly accepted practices that can be used to ensure that the fugitive dust emissions created by abrasive blasting operations do not migrate beyond property lines and violate the standards of **15A NCAC 2D .0541**. Abrasive blasting operators may use any available technique to maintain compliance with this Rule, provided the technique used violates no applicable rules or laws.‡

Shrouded Blasting

The term "shrouded blasting" used in **15A NCAC 2D .0541(f)** does not have an exact definition. Instead it represents any number of generally accepted industry practices used by abrasive blasting operators to physically contain the airborne emissions of their operations within enclosures or partitions.¶

Migration of Fugitive Dust

Field inspectors may make their determinations on the migration of abrasive blasting emissions based upon onsite visual observations and

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*Thom Allen to Tom Moore, "RE: Control of Emissions from Abrasive Blasting," 10 Apr. 2000, (e-mail).

†*Report of Proceedings of Public Hearing on Proposed Amendments to Permitting Rules 15A NCAC 2D .0524 and Adoption of 15A NCAC 2D .0541 (Control of Emissions from Abrasive Blasting)*, August 20, 1999, p.. I-2.

‡*Ibid.*, p. I-3.

¶*Ibid.*, p.. I-3

the visual observation of abrasive blasting material deposited on the ground beyond the adjacent property lines.*

*Ibid., p. I-4.