



MECK CO
CONFIDENTIAL

Ronald H. Levine, M.D., M.P.H.
STATE HEALTH DIRECTOR

DIVISION OF HEALTH SERVICES
P.O. Box 2091
Raleigh, N.C. 27602-2091

August 7, 1984

Mr. Don Willard
Environmental Coordinator
Mecklenburg County Environmental
Health Department
1200 Blythe Boulevard
Charlotte, NC 28203

RE: Depot Street, Davidson, North Carolina Asbestos Disposal Site

Dear Don:

I have received a copy of Mr. Winfred R Ervin, Jr.'s letter of July 16, 1984 to you concerning your department's request that Mr. Kenyon execute and record, in the Mecklenburg County Registry, a document putting prospective purchasers on notice that solid waste is buried upon his property.

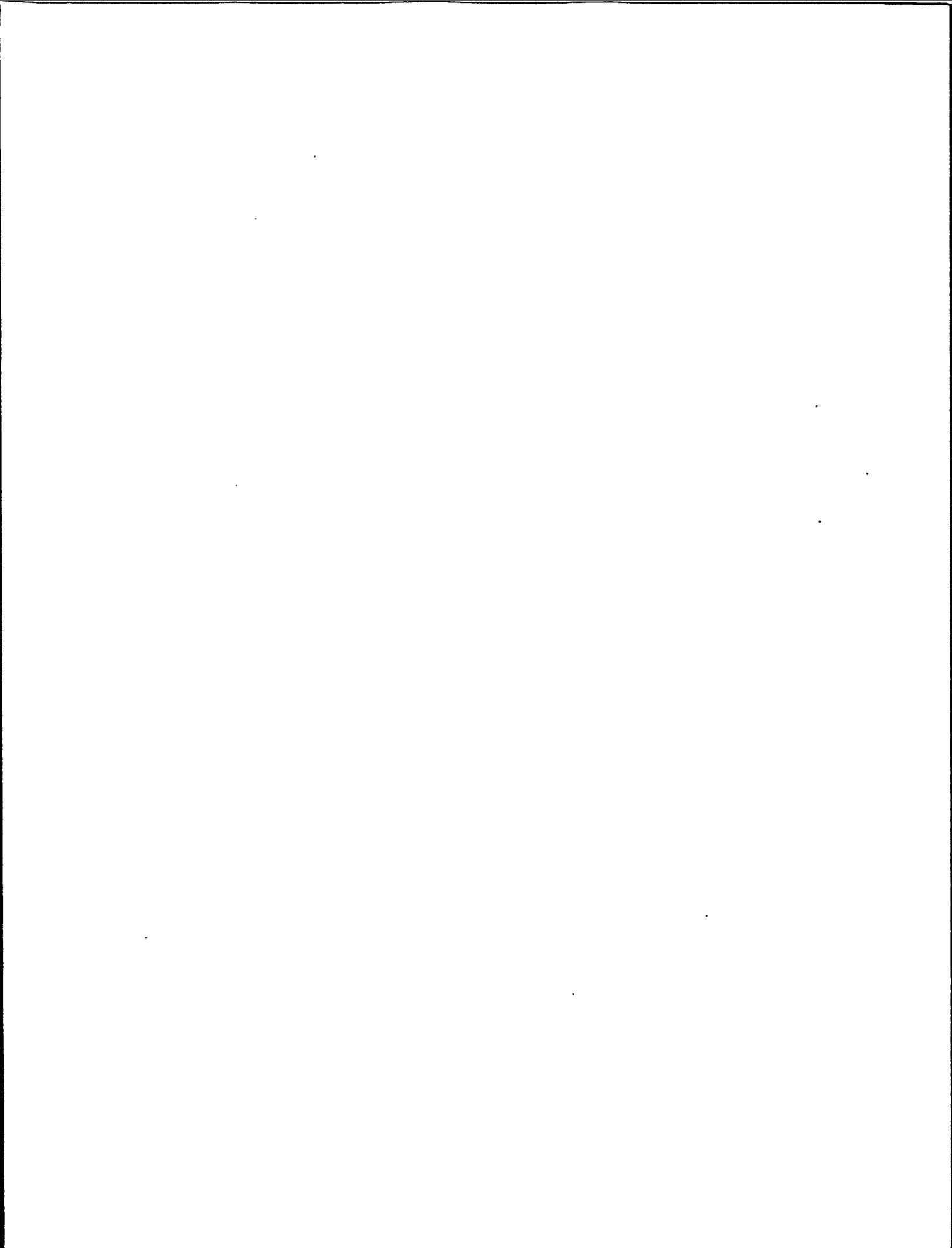
Please be advised that the Department of Human Resources has been directed by the North Carolina Legislature to submit to the General Assembly by February 1, 1985 plans to include recordation of sites, such as Mr. Kenyon's, in the office of the Register of Deeds in the county where it is located (G.S. 130A-294 Section 7(i)(2)).

Sincerely,

William L. Meyer, Environmental Engineer
Solid & Hazardous Waste Management Branch
Environmental Health Section

WLM:nlp





**MECKLENBURG COUNTY
DEPARTMENT OF ENVIRONMENTAL HEALTH**

1200 BLYTHE BOULEVARD
CHARLOTTE, NORTH CAROLINA 28203



July 19, 1984

Mr. Robert Kenyon
2411 Knollwood Road
Charlotte, NC 28211

Dear Mr. Kenyon:

As of this date, your property on Depot Street, Davidson, NC, (tax map reference 003-253-01) is in compliance with all physical conditions required in the Department's letter dated March 28, 1984. The abandoned asbestos disposal site has been covered with an adequate layer of soil, graded and landscaped, and sealed with a permanent ground cover.

After reviewing the July 16, 1984 letter from your attorney, Mr. Winfred R. Ervin, Jr., concerning the recordation of the disposal site with the Mecklenburg County Register of Deeds, we concur with his legal opinion and accept in the stead of recordation your pledge to notify the Department of Environmental Health thirty days prior to transferring ownership of the property in any manner.

Please be reminded that the closure plan which you have adopted will require continuing maintenance. A representative of this Department will inspect the site regularly and if any deficiencies are discovered which may expose the residents of Davidson to asbestos, you will be instructed to make the necessary corrections.

Thank you for your cooperation and the responsible manner in which you dealt swiftly and thoroughly with this serious situation.

Sincerely,

A handwritten signature in cursive script that reads "Don R. Willard".

Don R. Willard
Environmental Coordinator

DRW:dsb

cc: See Attached

cc: Mr. Winfred R. Ervin, Jr.
Ervin, Kornfeld, MacNeill & Ervin
Attorneys at Law
219 East Boulevard
Charlotte, NC 28203

✓ Mr. Bill Meyer
N.C. Department of Human Resources
Division of Health Services
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Mayor Nancy H. MacCormac
Town of Davidson
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Health Director
Mecklenburg County Health Department
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Mr. Ray Casner
Assistant County Manager
County Office Building

Dr. John Barry, Director
Environmental Health Department

ERVIN, KORNFELD, MACNEILL & ERVIN

ATTORNEYS AT LAW

219 EAST BOULEVARD

CHARLOTTE, NORTH CAROLINA 28203

WINFRED R. ERVIN
STANLEY D. KORNFELD
JOHN C. MACNEILL, JR.
WINFRED R. ERVIN, JR.
HENRY HALL WILSON, III

TELEPHONE 372-8000
AREA CODE 704

July 16, 1984

Mr. Don R. Willard
Environmental Coordinator
Mecklenburg County Department of Environmental Health
1200 Blythe Boulevard
Charlotte, North Carolina 28203

Re: Robert Kenyon - Property located on Depot Street, Davidson, North Carolina
Tax Reference: 003-253-01

Dear Mr. Willard:

Pursuant to your request this letter shall serve as a memorialization of our client's position in this matter, as expressed by me during our meeting this past week. As I had mentioned to you at our last meeting in May, Mr. Kenyon obviously is not opposed to maintaining the ground cover at his Depot Street property, as he genuinely shares your Department's concern that the asbestos deposits existing upon his property be appropriately contained. However, Mr. Kenyon takes a different stance with respect to your Department's request that he execute and record, in the Mecklenburg County Registry, a document putting prospective purchasers on notice that solid waste is buried upon his property and that the owner of the property shall be responsible for its continued maintenance. The basis of our client's position is that Mr. Kenyon would subject himself to a substantial financial loss should he comply with your Department's request. The recording of this document has some very far-reaching effects which are triggered by a sale of the property. First, not only the prospective purchaser is informed of the document but so is the lending institution and the title insurance company. The document constitutes a title defect and given the unusual (rare) nature of the defect it is our conviction that any reputable financial institution would harbor very serious doubts about accepting this property as security for any loan. Clearly, the recording of this document will have a substantial negative impact upon the marketability of the property and thus its value. The existence of this unwanted material upon the property, in and of itself, obviously has an adverse effect upon the market value; but in all likelihood there will be prospective purchasers who are interested in the property despite its condition. Mr. Kenyon has accepted this reality and is also aware that failure to notify a prospective purchaser of the existence of this substance upon his property may likely open him to substantial civil liabilities to the purchaser.

This past week I informed you that I had discovered a federal regulation requiring an owner to notify a prospective purchaser in writing of the existence of materials upon the property. I have gone back to those regulations (40 CFR 264 et seq and 40 CFR 265 et seq) and realize now that both of those regulations apply only to hazardous waste. As we both know, asbestos is a solid waste and a toxic substance (15 USC 2601). The only regulations which I have found dealing with either toxic substances

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Mr. Don R. Willard

in general or asbestos in particular do not obligate an owner to notify a prospective purchaser. Those regulations do comprehend some record keeping provisions but have no application to the present problem (40 CFR 702 et seq). After reviewing the rather lengthy regulations relating to non-hazardous solid waste, I am unable to discover any obligation on the part of an owner to notify a prospective purchaser to cause any informational documents to be publicly recorded. Notwithstanding the foregoing, Mr. Kenyon has agreed to give your office at least thirty (30) days written notice prior to any intended transfer of the property and, in fact, this letter shall serve as his acknowledgment of that obligation. As I had mentioned to you last week it would seem that your office should easily be able to identify any purchaser of the property even without Mr. Kenyon's assistance. The Mecklenburg County Tax Collector's office, as you know, is constantly updating its records as to ownership of its various tax parcels. I would expect that your office probably has computer access to that information. I am sure that the county is in a position to implement an effective tracking system for this and other similar sites.

I would like to reiterate our legal position in this matter. Mecklenburg County's Solid Waste Management Ordinance, which is the authority underlying your Department's action, in our opinion, does not apply to this case. That ordinance is in large part a veritable clone of the Federal Solid Waste Disposal Act (42 USC, Sec. 6901 et seq). Neither the Federal Act nor the County Ordinance applies to a disposal area which has been inactive since the effective date of legislation. A case of considerable interest is The United States vs. Waste Industries, a 1982 decision from the United States District Court, Eastern District of North Carolina, Wilmington Division (556 F. Supp. 1301). The Court in that case held that the Federal Solid Waste Disposal Act does not apply to inactive sites in that its language is limited to active conduct, and in fact points to this defect as giving rise to portions of the "super fund" legislation (42 USC 9601 et seq). In short, given that the asbestos in question was deposited upon this property many years prior to either Mr. Kenyon's acquisition of the property or the enactment of the County Ordinance, that ordinance has no application to this case.

As to applicable Federal law, as I have indicated above, the Federal Solid Waste Disposal Act does not apply to this situation in that the prior owners discontinued dumping operations years before either Mr. Kenyon's acquisition of the property or the enactment of SWDA. The Federal Toxic Control Substance Act might appear to have some application but, as you probably know, that Act is designed to control ongoing production and movement of toxic substances. Even assuming that it does apply, none of its provisions or any of the regulations promulgated pursuant to that Act provides authority for the recording that you have requested. I would also like to point out the application of the "super fund" statute (42 USC 9601 et seq). As you know, that statute empowers authorities to clean up hazardous and toxic substances. That statute does not contain any provisions obligating a property owner to notify a prospective purchaser or to make public, through recording, the condition of the property. You should know that under that statute an owner or operator is defined "in the case of any abandoned facility, any person who owned, operated, or otherwise controlled activities at such facility immediately prior to such abandonment." (42 USC 9601(20)(A). The liability section of that Act (Sec. 9607) imposes financial liability on a clean up only upon persons owning the facility at the time of disposal, as well as transporters.

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Mr. Don R. Willard

I am sure that you and your office would agree that Mr. Kenyon has to this point extended every cooperative effort with your Department and has, at his substantial expense, provided appropriate ground cover over the affected site. Mr. Kenyon's interest in cooperation has not been simply to comply with any applicable State or Federal laws but in a genuine effort to provide adequate control of the asbestos deposits which he unknowingly inherited. Unless I am made aware of any applicable statutes or regulations which I have not to this point discovered, it is our position that Mr. Kenyon cannot afford to comply with your recordation request. The administrative resolution of this case as outlined above I believe to be a workable solution which will best safeguard your Department's interest while at the same time not unduly burdening our client.

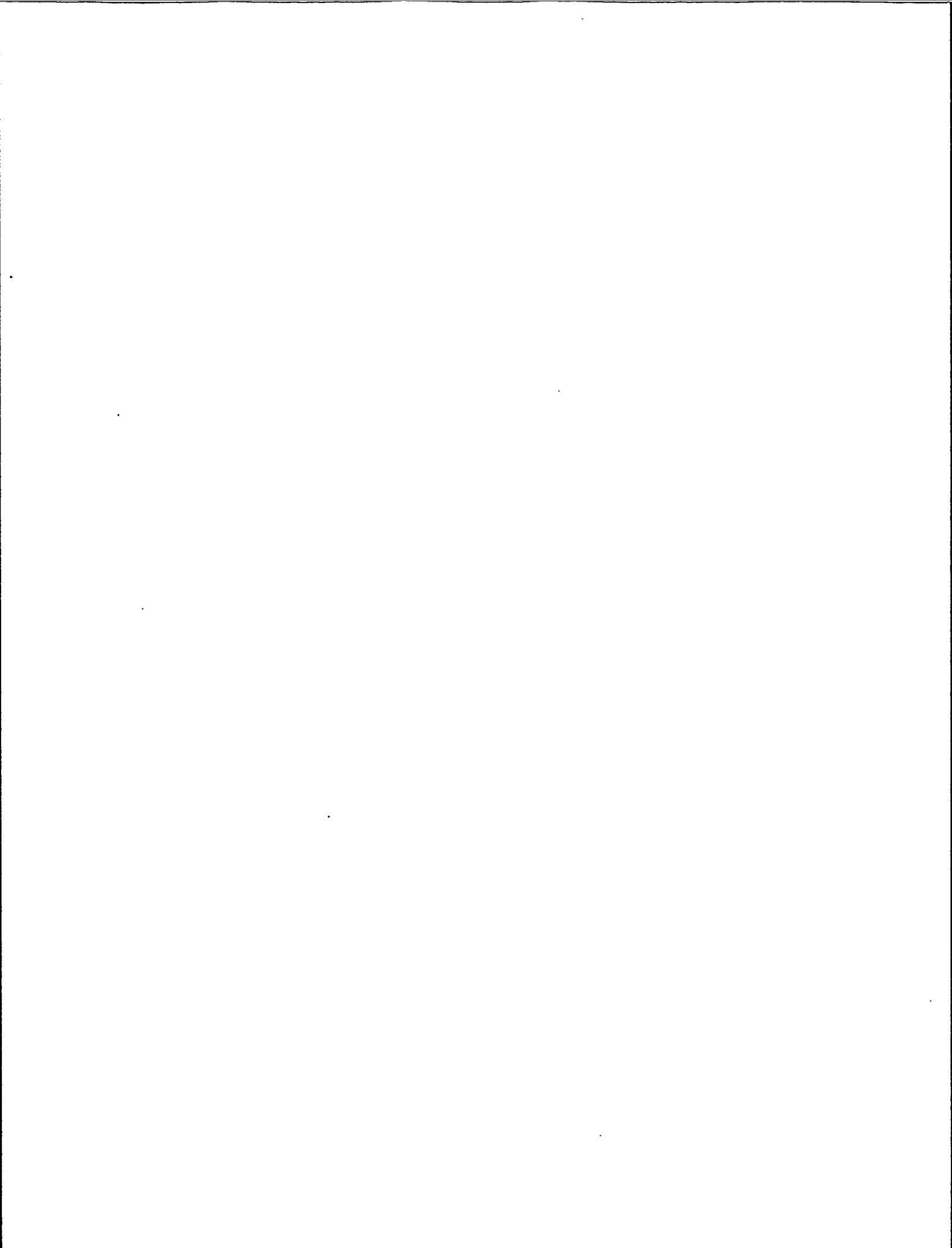
Very truly yours,



WREJr/od

Winfred R. Ervin, Jr.

cc:
Mr. Robert E. Kenyon



GENERAL ASSEMBLY OF NORTH CAROLINA

1983 SESSION (REGULAR SESSION, 1984)

RATIFIED BILL

CHAPTER 973
SENATE BILL 734

AN ACT TO CREATE THE NORTH CAROLINA HAZARDOUS WASTE TREATMENT COMMISSION.

The General Assembly of North Carolina enacts:

Section 1. Article 10 of Chapter 143B of the General Statutes is amended by adding a new Part 12 to read:

"PART 12.

"North Carolina Hazardous Waste Treatment Commission.

"§ 143B-470. Declaration of findings.--The General Assembly of North Carolina hereby finds and declares that the safe management of hazardous waste, and particularly the timely establishment of adequate facilities for the disposal and management of hazardous waste, is one of the most urgent problems facing North Carolina. The safe management and disposal of hazardous wastes are essential to continued economic growth and for protection of the public health and safety and the environment. Consequently, cooperation and coordination among the private sector, the general public and State and local agencies to assure the prevention of unnecessary waste and the establishment of a comprehensive and integrated system of adequate treatment and disposal facilities are essential.

The General Assembly of North Carolina finds and declares that prevention, recycling, detoxification and reduction of hazardous wastes should be encouraged and promoted. These are alternatives which ultimately remove such wastes' hazards to human health and the environment. When these alternatives are not technologically or economically feasible, long-term retrievable storage is preferable to other means of disposal until appropriate methods for recycling or detoxification of the stored wastes are found. Hazardous waste shall be treated prior to disposal or long-term storage in North Carolina. Long-term storage or disposal shall be used for the storage or disposal of the residual or ashes of hazardous waste which has been treated so that the toxicity is low enough to present no significant health or safety hazard in the event of leakage from the facility. Hazardous waste that cannot be reduced, stabilized or destroyed to the extent which renders it sufficiently low in toxicity as to present no significant health or safety hazard shall be stored in long-term retrievable storage until such methods are found. Hazardous waste in long-term retrievable storage shall be detoxified as soon as the Commission for Health Services determines, based upon a preponderance of the evidence, that the technology is available at a reasonable cost. Hazardous waste landfill facilities and polychlorinated biphenyl landfill facilities shall be detoxified as soon as economically feasible technology is available and sufficient money is available without additional appropriation. The General Assembly further finds that hazardous wastes shall be treated and disposed of in the most cost-effective manner while protecting public health and safety and the environment.

"§ 143B-470.1. Declaration of purposes.--It is the purpose of this Part to provide for the siting, construction and operation of comprehensive hazardous waste management facilities to the end that hazardous waste may be treated or disposed of in the most cost-effective manner, while protecting public health and safety and the environment. It is also the purpose of the General Assembly to create a Commission to site, finance, build, lease or operate, or oversee a hazardous waste treatment facility if private enterprise fails to do so within a specified time. It is also the purpose of the General Assembly through powers granted to the Governor's Waste Management Board to place limitations upon the exercise by all units of local government in North Carolina of the power to regulate the management of hazardous waste by means of special local or private acts or resolutions, ordinances, property restrictions, zoning laws, rules and regulations, fire laws, rules and regulations, civil defense laws, rules and regulations, public health laws, rules and regulations, building codes, and otherwise.

"§ 143B-470.2. Definitions.--Unless the context otherwise requires, the following definitions shall apply to this Part:

(1) 'Federal act' means the Resource Conservation and Recovery Act of 1976, P.L. 94-580, as amended; codified in Chapter 82 of Title 42 of the United States Code, as amended.

(2) 'Hazardous waste' means a solid waste, or combination of solid wastes, as solid waste is defined in G.S. 130A-290(18), which because of its quantity, concentration or physical, chemical or infectious characteristics may:

- a. Cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or
- b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed.

(3) 'Hazardous waste treatment facility' means a facility which is established, constructed, financed, sited and operated in accordance with this Part for the recovery, recycling, treatment, storage during collection and prior to treatment, short term storage after treatment, collection, processing, volume reduction, source separation, or transportation used exclusively in connection with the facility, of hazardous waste; and which facility includes several of the following equipments and processes: incinerators, rotary kilns, drum handling, washing and crushing facilities, raw waste tank storage, reduction, neutralization, detoxification, wastewater treatment facilities including settling systems, aerobic digesters, anaerobic digesters, clarifiers, neutralization facilities, solidifying facilities, evaporators, reactions to facilitate 'reuse' or recycling, analytical capabilities, and other similar appropriate technologies, activities and processes as may now exist or be developed in the future.

(4) 'Hazardous waste generation' means the act or process of producing hazardous waste.

(5) 'Hazardous waste long-term storage facility' means any facility or any portion of a facility constructed pursuant to the

rules adopted under this Part for storage of the residuals of the treatment of hazardous waste, on or in land.

(6) 'Hazardous waste management' means the systematic control of the collection, source separation, storage, transportation, processing, treatment, recovery and disposal of hazardous wastes.

(7) 'Long-term retrievable storage' means storage in closed containers in facilities (either above or below ground) with (i) adequate lights, (ii) impervious cement floors, (iii) strong visible shelves or platforms, (iv) passageways to allow inspection at any time, (v) adequate ventilation if underground or in closed buildings, (vi) protection from the weather, (vii) accessible to monitoring with signs on both individual containers and sections of storage facilities, and (viii) adequate safety and security precautions for facility personnel, inspectors and invited or permitted members of the community.

(8) 'Manifest' means the form used for identifying the quantity, composition, origin, routing and destination of hazardous waste during its transportation from the point of generation to the point of disposal, treatment or storage.

(9) 'Notice' shall include any written notice made in accordance with the provisions of G.S. 1A-1, Rule 4 of the North Carolina Rules of Civil Procedure, or any notice provision under this Article or the federal act.

(10) 'Operated' includes any phase of the planning, application, siting, financing, construction, operating and maintaining of the hazardous waste treatment facility.

(11) 'Person' means an individual, corporation, company, association, partnership, unit of local government, State agency, federal agency, or other legal entity.

(12) 'Recycling' means the process by which recovered resources are transformed into new products so that the original products lose their identity.

(13) 'Reuse' means a process by which resources are reused or rendered usable.

(14) 'Surface impoundment' or 'impoundment' means a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold an accumulation of hazardous waste(s) containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling, and aeration pits, ponds and lagoons.

(15) 'Treatment' means any method, technique or process, including neutralization, designed to change the physical, chemical or biological character, form or composition of any solid waste so as to neutralize the waste or to render the waste nonhazardous or less hazardous, safer for transport, amenable for recovery, amenable for storage or reduced in volume. The term includes any activity or processing designed to change the physical form or chemical composition of solid waste to render it nonhazardous.

(16) 'Treatment Commission' means the North Carolina Hazardous Waste Treatment Commission created by this Part.

(17) 'Unit of local government' means a county, city, town or incorporated village.

"§ 143B-470.3. Creation of Commission.--Membership, appointment, terms and vacancies, officers, meetings and quorum, compensation.

The North Carolina Hazardous Waste Treatment Commission is created. It shall be governed by a board composed of nine members herein referred to as the Treatment Commission. Members of the General Assembly shall be ineligible for appointment to membership on the Treatment Commission. The Governor shall appoint three members of the Treatment Commission, and the General Assembly shall appoint six members of the Treatment Commission.

The initial appointments by the Governor shall be made on or after January 31, 1985, one term to expire January 31, 1989, and two terms to expire January 31, 1987. Thereafter, at the expiration of each stipulated term of office all appointments made by the Governor shall be for a term of four years. The members of the Treatment Commission appointed by the Governor shall be selected from the State at large and insofar as practicable shall represent each geographic section of the State and the industrial and environmental interests of the State. Any vacancy occurring in the membership of the Treatment Commission appointed by the Governor shall be filled by the Governor for the unexpired term. The Governor shall have the authority to remove any member appointed by the Governor.

The General Assembly shall appoint three persons to serve terms expiring January 31, 1987. The General Assembly shall appoint three persons to serve terms expiring January 31, 1989. Successors shall serve for four-year terms. Of the three persons whose terms are to expire in 1987, two shall be appointed upon the recommendation of the President of the Senate and one shall be appointed upon the recommendation of the Speaker. Of the three persons whose terms are to expire in 1989, two shall be appointed upon the recommendation of the Speaker and one shall be appointed upon the recommendation of the President of the Senate. Appointments by the General Assembly shall be made in accordance with G.S. 120-121, and vacancies in those appointments shall be filled in accordance with G.S. 120-122. The members of the Treatment Commission appointed by the General Assembly shall be selected from the State at large and insofar as practicable shall represent each geographic section of the State and the industrial and environmental interests of the State. The General Assembly shall have the authority to remove any member appointed by the General Assembly. No member shall serve more than two consecutive four-year terms.

The Governor shall appoint from the members of the Treatment Commission the Chairman and Vice-Chairman of the Treatment Commission. The Secretary of Commerce or his designee shall serve as secretary of the Treatment Commission. The members of the Treatment Commission shall appoint a treasurer of the Treatment Commission. The Department of Commerce shall use funds already appropriated to the Department to implement this Part.

Should any one of the appointing authorities fail to make appointments by March 1, 1985, or in the event that the Chairman and Vice-Chairman of the Commission are not appointed by that

date, the Treatment Commission shall proceed to elect officers and begin operation.

The Treatment Commission shall meet once in each 60 days at such regular meeting time as the Treatment Commission by rule may provide and at any place within the State as the Treatment Commission may provide, and shall also meet upon the call of its chairman or a majority of its members. A majority of its members shall constitute a quorum for the transaction of business. The members of the Treatment Commission shall not be entitled to compensation for their services, but they shall receive per diem and necessary travel and subsistence expense in accordance with G. S. 138-5.

"§ 143B-470. 4. Powers and duties of the Treatment Commission.--

(a) To carry out the purposes of this Part, the Treatment Commission:

- (1) May exercise the powers of a body corporate, including the power to sue and be sued, to make contracts, and to adopt and use a common seal and to alter the same as may be deemed expedient;
- (2) May make all necessary contracts and arrangements with other authorities of this and other states for any other purposes of the Treatment Commission;
- (3) May rent, lease, buy, own, acquire, mortgage, or otherwise encumber, and dispose of real or personal property;
- (4) Shall establish an office for the transaction of its business at such place or places as, in the opinion of the Treatment Commission, shall be advisable or necessary in carrying out the purposes of this Part;
- (5) May create and operate any divisions it deems necessary or useful;
- (6) May pay all costs of the formation and organization of the Treatment Commission, and incident to its administration and operation, and may pay all other costs necessary in carrying out and accomplishing the purposes of this Part;
- (7) May apply for, accept and expend loans and grants of money from any federal agency or the State or any political subdivision thereof or from any public or private sources available for any of the purposes authorized in this Part, and to give any evidences of indebtedness as may be required. No indebtedness of any kind incurred or created by the Treatment Commission shall constitute an indebtedness of the State or any of its political subdivisions, and no such indebtedness shall involve or be secured by the faith, credit or taxing power of the State or any of its political subdivision. At no time may the total outstanding indebtedness of the Treatment Commission, excluding bond indebtedness, exceed a total of five hundred thousand dollars (\$500,000) without approval of the Governor, after receiving the advice of the Advisory Budget Commission;

- (8) May appoint an Executive Director, who shall report to the Treatment Commission and serve at the pleasure of the Treatment Commission. The Executive Director with the approval of the Treatment Commission shall appoint such management personnel as he deems necessary to serve at his pleasure. They shall report to the Executive Director. The salaries of these personnel shall be fixed by the Governor with the approval of the Advisory Budget Commission. The Executive Director or his designee shall appoint, employ, dismiss and, within the limits of available funding, fix the compensation of such other employees as he deems necessary to carry out the purposes of this Part. There shall be an executive committee consisting of the chairman of the Treatment Commission and two other members elected annually by the Treatment Commission. The executive committee shall be vested with the authority to do all acts which are authorized by the bylaws of the Treatment Commission. Members of the executive committee shall serve until their successors are elected;
- (9) May act as agent for the United States of America, or any of its agencies, departments, corporations, or instrumentalities, in any matter coming within the purposes or powers of the Treatment Commission;
- (10) May, pursuant to Article 2 of Chapter 150A of the General Statutes, adopt, alter or repeal its own bylaws, rules and regulations governing the manner in which its business may be transacted and in which the power granted to it may be enjoyed, and may provide for the appointment of any committees, and the functions thereof;
- (11) May do anything necessary to accomplish the purposes of this Part.

The property of the Treatment Commission shall not be subject to any taxes or assessments.

(b) If no permit to operate a hazardous waste treatment facility has been issued to a private operator by June 1, 1985, the Treatment Commission shall actively seek communities interested in hosting hazardous waste treatment facilities and private operators of hazardous waste treatment facilities and shall present appropriate sites, as prescribed in G.S. 130A-294(g), to those operators. If no permit to operate a hazardous waste treatment facility has been issued to a private operator by January 1, 1986, the Treatment Commission shall, on the basis of the criteria and procedures outlined in G.S. 130A-294(g), select appropriate site(s) and begin proceedings to purchase or if necessary condemn property for such site(s) under the State's power of eminent domain. Condemnation shall be upon the same terms and procedures as set forth in Article 9 of Chapter 136 of the General Statutes of North Carolina, except that the Treatment Commission shall have the same rights, duties, and responsibilities as set forth for the North Carolina Department of Transportation. The purposes for which the power of eminent

domain is used in this section are to enable a hazardous waste treatment facility to be built which will manage hazardous waste generated by the public or by private industry in making goods for the benefit of the public, and are, therefore, public purposes for these and related purposes. The Treatment Commission shall then actively seek private operators of hazardous waste treatment facilities and shall contract with at least one operator to purchase the site and construct a hazardous waste treatment facility. If no permit to operate a hazardous waste treatment facility has been issued by June 1, 1986, the Treatment Commission shall submit to the General Assembly plans for construction of a facility on one of the sites and shall proceed to begin construction of a facility within one year and shall seek a private operator to operate the facility. If no private operator can be found, the Treatment Commission shall operate the facility.

(c) The Treatment Commission shall submit to the General Assembly by May 1, 1985, a comprehensive plan for the treatment of hazardous waste in North Carolina, including a plan to provide for a statewide hazardous waste collection system. The Governor's Waste Management Board, the Solid and Hazardous Waste Branch of the Division of Health Services of the Department of Human Resources, and other State agencies and departments shall cooperate with the Treatment Commission in preparation of the plan. If the Treatment Commission, in its report to the General Assembly, indicates that the needs of the State for treatment of hazardous waste are being met, the Treatment Commission shall cease to exist as of October 1, 1985. If not, the Treatment Commission shall report periodically to the General Assembly or, if the General Assembly is not in session, to the Joint Legislative Commission on Governmental Operations, on progress toward meeting the State's needs.

"§ 143B-470.5. Issuance of bonds and notes. -- (a) As a means of raising the funds needed from time to time for the acquisition, construction, equipment, maintenance or operation of any facility, building, structure or any other matter or thing which the Treatment Commission is authorized to acquire, construct, equip, maintain, or operate, all or any of them, including authorized special user projects, the Treatment Commission may borrow money and in evidence thereof may issue bonds, notes and other obligations of the Treatment Commission as provided in the Local Government Revenue Bond Act, Article 5 of Chapter 159 of the General Statutes. Bonds, notes and other obligations may also be issued to (i) establish any reserves the Treatment Commission may determine to be desirable including, without limitation, a debt service reserve fund, and (ii) provide for interest during the estimated period of construction and for a reasonable period thereafter and (iii) provide for working capital.

(b) Any obligations issued by the Treatment Commission under the provisions of this Part, their transfer and the income therefrom (including any profit made on the sale of them), shall at all times be free from taxation by the State or any local unit or political subdivision or other instrumentality of the State, except inheritance or gift taxes."

Sec. 2. G.S. 130A-290 is amended by adding six additional definitions to read:

"(1a) 'Comprehensive hazardous waste treatment facility' means a facility designated as such by the Governor's Waste Management Board, meeting the following criteria:

- a. It is a commercial facility that accepts hazardous waste from the general public for treatment;
- b. It has the capacity and capability to treat and dispose of hazardous waste on at least an intrastate regional basis; and
- c. Its location will substantially facilitate treatment of hazardous waste for the State of North Carolina.

(7a) 'Hazardous waste long-term storage facility' means a facility as defined in G.S. 143B-470.2(5).

(7b) 'Hazardous waste treatment facility' means a facility as defined in G.S. 143B-470.2(3).

(8a) 'Landfill' means a disposal facility or part of a disposal facility where waste is placed in or on land and which is not a land treatment facility, a surface impoundment, an injection well, a hazardous waste long-term storage facility or a surface storage facility.

(8b) 'Long-term retrievable storage' means storage in closed containers in facilities (either above or below ground) with (i) adequate lights, (ii) impervious cement floors, (iii) strong visible shelves or platforms, (iv) passageways to allow inspection at any time, (v) adequate ventilation if underground or in closed buildings, (vi) protection from the weather, (vii) accessible to monitoring with signs on both individual containers and sections of storage facilities, and (viii) adequate safety and security precautions for facility personnel, inspectors and invited or permitted members of the community.

(12a) 'Reuse' means a process by which resources are reused or rendered usable."

Sec. 3. The first sentence of G.S. 130A-293(a) is amended by deleting the words "and the Governor have" and substituting the word "has".

Sec. 4. G.S. 130A-293(b) is rewritten to read:

"(b) When a hazardous waste facility would be prevented from construction or operation by a county, municipal or other local ordinance(s), the developer or operator of the facility or the Hazardous Waste Treatment Commission may petition the Governor's Waste Management Board to review the matter. After receipt of a petition, the Board shall hold a hearing in accordance with the procedures in subsection (c) of this section and shall either approve or disapprove the establishment and operation of the facility. If the Board makes the four findings set forth below, the Board shall approve the establishment of the facility. If the Board does not make all of the four findings set forth below, the Board shall disapprove the establishment or operation of the facility. The decision of the Board shall be final unless a party to the action shall, pursuant to G.S. 7A-29, file a written appeal within 30 days of the date of the decision. The record on appeal shall include all materials and information submitted to or considered by the Board in accordance with subsection (c) of this section. The scope of judicial review shall be limited to

questions of abuse of discretion. Before approving the facility, the Board must make the following findings:

- (1) That the proposed facility is needed in order to establish adequate capability for the management of hazardous waste generated in this State and serves the interest of the citizens of the State as a whole;
- (2) That all legally required State and federal permits or approvals have been issued by the appropriate State and federal agencies or that all State and federal permit requirements have been satisfied and that the permits or approvals have been denied or withheld only because of the local ordinance(s);
- (3) That local citizens and elected officials have had adequate opportunity to participate in the siting process; and
- (4) That the construction and operation of the facility will not pose an unreasonable health or environmental risk to the surrounding locality and that the facility developer or operator has taken or consented to take any reasonable measures to avoid or manage foreseeable risks and to comply to the maximum feasible extent with applicable ordinance(s).

The record for appeal shall include the Board's written decision, a complete transcript of the hearing, all written material presented to the Board regarding the site location and the specific findings required in this subsection and any minority positions on the recommendation and the specific findings required in this subsection. The Board's decision shall be in writing and shall identify the material submitted to the Board plus any additional materials used in arriving at the decision."

Sec. 5. G.S. 130A-293(c) is amended by rewriting the seventh sentence to read: "No later than 60 days after the hearing, the Board shall approve or disapprove the facility." and by deleting the remainder of the subsection.

Sec. 6. G.S. 130A-294(f) is amended by adding the following new paragraphs at the end of the subsection to read:

"Within 180 days after receiving a complete application for a permit or for an amendment to an existing permit for a comprehensive hazardous waste treatment facility, the Department shall approve or disapprove the application. In acting upon the application, the Department shall consider land use, zoning, buffer zones, utility availability, proximity to sources of waste, civil defense, fire safety, transportation and access, existing road network, general considerations of the public's health and safety, and any other objective factors reasonably related and relevant to the proper siting and operation of the comprehensive hazardous waste treatment facility. The Department may impose action responding to these factors as a condition in the permit. If the Department disapproves the application, the disapproval shall set forth specifically the reasons for the denial and the applicant shall have the right to appeal the disapproval."

Sec. 7. G.S. 130A-294 is amended by adding the following additional subsections:

"(g) The Commission shall develop and adopt criteria and standards to be considered in location and permitting of a hazardous waste facility by January 31, 1985. The standards and criteria shall be developed through public participation, shall be enforced by the Department and shall include, in addition to all applicable State and federal rules and regulations, consideration of:

- (1) Acceptability within the community where the facility is to be located or steps which should be taken if community acceptance is not forthcoming;
- (2) Hydrological and geological factors such as flood plains, depth to water table, groundwater travel time, proximity to public water supply watersheds, soil pH, soil cation exchange capacity, soil composition and permeability, cavernous bedrock, seismic activity, slope, mines and climate;
- (3) Natural resources such as wetlands, endangered species habitats, proximity to parks, forests, wilderness areas and historical sites, and air quality;
- (4) Local land use whether residential, industrial, commercial, recreational, agricultural, and proximity to incompatible structures such as schools and airports;
- (5) Transportation factors, such as proximity to waste generators and to population, route safety and method of transportation; and
- (6) Aesthetic factors such as the visibility, appearance and noise level of the facility.

(h) Rules adopted by the Commission shall be subject to the following requirements:

- (1) No hazardous waste landfill shall be established until at least one comprehensive hazardous waste treatment facility is fully operational in North Carolina.
- (2) Hazardous waste shall be treated prior to disposal in North Carolina. Long-term storage or disposal shall be used for the storage or disposal of the residual or ashes of hazardous waste which has been treated so the toxicity is low enough to present no significant health or safety hazard in the event of leakage from the facility. Hazardous waste that cannot be reduced, stabilized or destroyed to the extent which renders it sufficiently low in toxicity as to present no significant health or safety hazard in the event of leakage shall be stored in long-term retrievable storage until such methods are found. Hazardous waste in long-term retrievable storage shall be detoxified as soon as the Commission for Health Services determines based upon a preponderance of the evidence that the technology is available at a reasonable cost. The Commission shall determine the extent of waste

- treatment required before hazardous waste can be disposed of in a hazardous waste landfill facility.
- (3) Any hazardous waste landfill facility hereafter constructed in this State shall meet, at the minimum, the standards of construction imposed by federal regulations adopted under the Federal Act at the time the permit is issued.
 - (4) No hazardous waste landfill facility or polychlorinated biphenyl landfill facility shall be located within 25 miles of any other hazardous waste landfill facility or polychlorinated biphenyl landfill facility.
 - (5) No hazardous waste landfill facility or polychlorinated biphenyl landfill facility shall be permitted within 25 miles of a comprehensive hazardous waste treatment facility as defined in G. S. 130A-290(1a).
 - (6) The following will not be disposed of in a hazardous waste landfill or long-term retrievable storage: ignitables as defined in the Federal Act, polyhalogenated biphenyls of 50 ppm or greater concentration and free liquids whether or not containerized.
 - (7) The underground storage of either a hazardous waste landfill or long-term storage facility shall have at a minimum the following: a leachate collection and removal system above an artificial impervious liner of at least 30 mils in thickness, a minimum of five feet of clay or clay-like liner with a maximum permeability of 1.0×10^{-7} centimeters per second (cm/sec) below said artificial liner, and a leachate detection system immediately below the clay or clay-like liner.
 - (8) Hazardous waste shall not be stored at a hazardous waste treatment facility for over 90 days prior to treatment or disposal.
 - (9) The Commission shall consider any hazardous waste treatment process proposed to it, if the process lessens treatment cost or improves treatment over then current methods or standards required by the Commission.
- (i) The Department shall submit to the General Assembly by February 1, 1985, plans:
- (1) to monitor and regulate all generators of more than 100 kilograms per month of hazardous waste; and
 - (2) to locate, catalogue and monitor all existing hazardous waste impoundments and surface impoundments, including inactive hazardous waste disposal sites and 'orphan dumps', including those owned or operated by units of State and local government, and shall submit to the General Assembly by February 1, 1985, a plan to bring all of these under legal requirements in effect on February 1, 1985, including a timetable for compliance. This plan shall include recordation of

each of these sites in the office of the Register of Deeds in the county where it is located."

Sec. 8. G.S. 130A-295 is amended by designating the present language as subsection (a) and adding new subsections (b) and (c) to read:

"(b) The operator shall deposit in trust with the city or county government one half of one percent (0.5%) of the income of the comprehensive hazardous waste treatment facility, payable within 30 days of each calendar quarter, until the total shall equal an amount of two hundred fifty thousand dollars (\$250,000). As used herein, income means gross operating revenues less refunds, rebates and allowances. This fund shall be available to the city or county in which the comprehensive hazardous waste treatment facility is located for the purpose of defraying the cost of any cleanup which might be required at the comprehensive hazardous waste treatment facility. The city or county may, in its discretion, use up to fifty thousand dollars (\$50,000) of this total to establish an Emergency Response Team, trained and equipped to handle hazardous waste spills and to respond to accidents at hazardous waste treatment facilities. Financial records shall be subject to the audit of the local government for two years after any fee is paid. Any errors in the payment shall be corrected by credit or debit in the next payment or payments by the operator of the hazardous waste facility. If the North Carolina Hazardous Waste Treatment Commission owns and operates the facility, the North Carolina Hazardous Waste Treatment Commission, consistent with the resources available, shall compensate the local government for expenses incurred due to location of the facility. This compensation shall not exceed the amount of ad valorem tax revenues the local government would have received if the facility were privately owned. Nothing herein shall be construed to limit in any way funds which might be available to local government from other sources.

(c) Although no one is required to use a comprehensive hazardous waste treatment facility, use by North Carolina industry shall be encouraged. Nothing in this act shall be construed to prevent any hazardous waste or other waste generated or located in North Carolina from being removed from the State for disposal, treatment or storage."

Sec. 9. G.S. 143B-216.13 is amended by adding at the end of subdivision (7) the following:

"The Board shall provide a report to the General Assembly by February 1, 1985, to include:

- a. an analysis of the size, type and number of hazardous waste facilities needed in North Carolina and a plan to meet these needs;
- b. an analysis of the system of collection of hazardous waste in North Carolina, recommendations as to how that system might be improved and a plan to implement these recommendations; and
- c. an analysis of the cost incurred by local government because of the presence of a hazardous waste facility, a hazardous waste landfill facility or a comprehensive hazardous waste treatment facility."

and by adding a new subdivision to read:

"(17) The Board shall certify comprehensive hazardous waste treatment facilities which meet the criteria prescribed in G.S. 130A-290(1a)."

Sec. 10. This act is effective upon ratification.

In the General Assembly read three times and ratified, this the 26th day of June, 1984.

JAMES C. GREEN

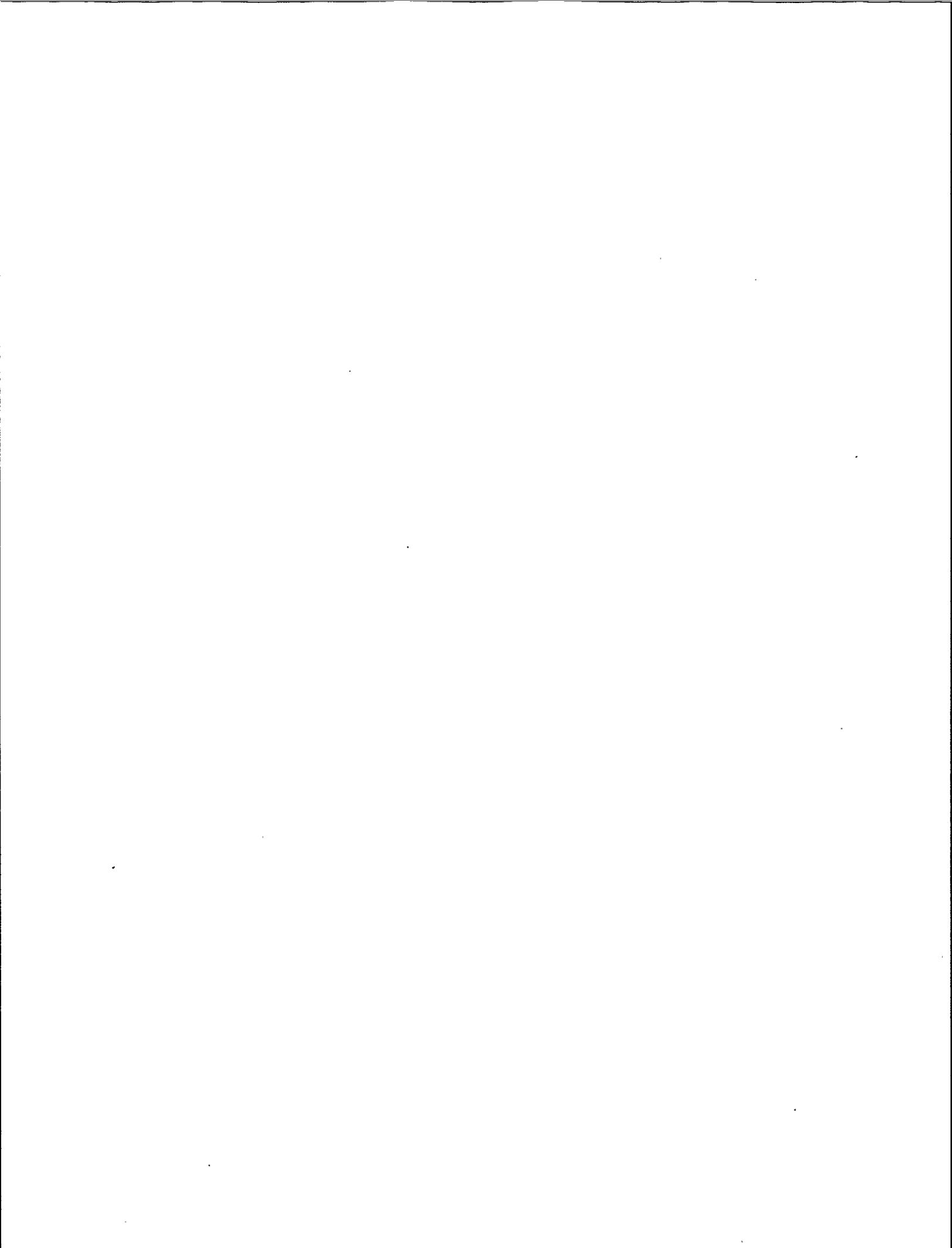
James C. Green

President of the Senate

LISTON B. RAMSEY

Liston B. Ramsey

Speaker of the House of Representatives





Strickland - info
Dr. Levine - info

RECEIVED

Memorandum

JUL 24 1984

ENVIRONMENTAL HEALTH SECTION

Bell + File

Date . May 15, 1984

From Health Scientist, Special Studies Branch, CDD, CEH
Medical Epidemiologist, SSB, CDD, CEH

Subject Superfund Review - Asbestos Waste Site, Davison, N.C.

To Stephen Margolis, Ph.D., Chief, Environmental Affairs Group, EHSD, CEH
Through: David C. Sokal, M.D. *DCS*
Henry Falk, M.D. *H. Falk*

A request for CDC assistance in evaluating the Davison, N.C. asbestos waste site was submitted by Region IV of the Environmental Protection Agency (EPA).

I. BACKGROUND - The asbestos waste site in Davison, North Carolina was used by an asbestos textile and tile manufacturer for waste disposal between 1930 and 1960. Prior to 1930, this area was a low depression. The disposal of waste asbestos tailings at this site filled this low area to its present level. From 1960 to 1976 the site was used by another company, but as yet, no information is available concerning its operations. In 1976, the present owner purchased the property and currently leases two original buildings to light industry and has built one prefabricated building on top of the tailings pile.

According to the information reviewed, the site occupies one large city block and is surrounded on three sides by a residential community of approximately 75 single family dwellings. Presently, the site has no access restrictions. Neighborhood residents and children routinely use the site for team sports and as a shortcut between their homes and school. Of specific concern is a well worn path on the 12' slope located at the edge of this site.

After this site was brought to the attention of the Mecklenburg County Department of Environmental Health (MCDEH) by a concerned local resident in February 1984, several inspections occurred involving EPA, CDC and MCDEH, and N.C. Department of Human Resources. The current owner of the property has subsequently covered the site with more than twelve inches of topsoil and reseeded the entire area.

II. ENVIRONMENTAL PATHWAYS -

Soil - On February 14, 1984, MCDEH collected 62 onsite and 4 offsite soil samples. A rough grid system was used when collecting the samples. It appears that samples were collected from the surface to depths of up to six inches. The analytical results range from "No Asbestos Found" to 60% Chrysotile. The distribution of onsite sample results were:

Number of Samples	% of Chrysotile Asbestos
1	< 1
17	1 - 10
33	11 - 30
11	> 31

The location of the offsite samples collected were not clearly marked in the documents reviewed, but it appears that 3 of the 4 samples analyzed contained 2-3% asbestos. One offsite sample's result was 30-35% chrysotile.

A residence adjacent to the site was evaluated for asbestos contamination. Two indoor samples were collected from clothes dryer lint and dust from an overcoat. Although these results are not available, the fact that the samples were not from sources of settled dust may bias these findings.

This site had apparently been covered with non-asbestos material at one time, but the cover has been compromised by erosion and use over time. Inspections of the site since February 1984 have indicated a lack of proper cover materials in several areas, particularly along the slope, which may allow the airborne transmission of asbestos fibers in the environment. The current owner of this property has subsequently covered the entire horizontal and bare portions of the slope with more than 12 inches of topsoil which has been compacted to approximately 6-8 inches. We have been advised that reseeding has been completed.

Air - No air sampling has been performed.

Water - No data were provided on surface or ground water conditions or quality.

III. CANCER MORTALITY DATA

To assess possible health effects associated with the Davison, N.C. asbestos site, we reviewed cancer mortality data for residents of Mecklenburg County. These age-adjusted, sex, race and anatomical site-specific cancer mortality rates were compiled for the years 1950-59, 1960-69, and 1970-78 (excluding 1972) by the Environmental Protection Agency from data collected by the National Center for Health Statistics and the Bureau of the Census. Thirty-one cancer types are specified for males and 32 for females; additional cancers are classified as "remainder, secondary, unspecified." We considered a county cancer mortality rate to be significantly increased if it was greater than the upper limit of a 95% confidence interval based on the national age-adjusted, sex, race, and cancer site-specific mortality rate (i.e., p less than .025).

Mortality rates for only one cancer site were significantly higher than the national rate for all three time periods reviewed. The mortality rate for cancers of the trachea, bronchus, lung, and pleura was significantly increased in white males living in Mecklenburg County in the 1950's, 1960's, 1970-78 when compared to the corresponding rate for the United States. The corresponding rate for white males in North Carolina was not-elevated. The absence of any significant increase in county cancer mortality rates common to both sexes during the three decades studied suggest no common exposure of Mecklenburg County residents to carcinogenic environmental contaminants. These mortality data, however, should not be interpreted as evidence that exposure pathways to contaminants do or do not exist.

One reason these data should be viewed with caution is that county-wide mortality data fail to distinguish among groups within the county which have different exposures to the Davison Asbestos site. Such groups are likely to include employees who have worked on the site, residents living nearby the site, and residents living far from the site and whose daily activities never bring them close to the site. Confounding factors and other causative agents cannot be accounted for when looking at these data.

IV.. SPECIFIC ISSUES CDC WAS ASKED TO ADDRESS

- A. An assessment of the human health threat posed to residents living adjacent to and in the area of the asbestos tailings disposal site in Davidson, N. C.

We feel that exposed friable asbestos may release fibers into the air and these fibers are considered a potential human health threat to nearby residents. The Davison asbestos tailings site will constitute a hazard for this community until all friable asbestos materials are fully covered. Access to the site should be restricted to prevent local residents from entering this contaminated area which would increase their exposure to asbestos fibers and possibly allow the individuals to bring asbestos fibers home to their families on their clothing.

- B. Guidance as to whether or not any human testing or other epidemiological actions should be taken to identify and screen residents who may have had a chronic long term exposure to the asbestos.

No information on the intensity or the degree of repetitive exposure is available for this residential population. The expected risk for short-term exposure of questionable intensity would be much lower than the risk of long-term exposure to low or high doses. Residents should be informed of the potential exposure to asbestos fibers from this site and instructed to tell their physician that they have resided near a site containing exposed asbestos material. Adverse health effects from low level exposure to asbestos would occur after an extended latency period; for cancer this period would be 20-25 years or more. Human testing or screening of residents in this community may not be useful at this time. If a group of individuals with a high potential for chronic exposure to asbestos from this site could be identified, a medical evaluation may be appropriate. Since the asbestos facility has been closed since 1960, an occupationally exposed group may be very difficult to identify.

- C. Comments and recommendations regarding whether or not additional offsite environmental and residential indoor testing for asbestos should be conducted to more fully define the potential public health and environmental threat posed by the site.

There is a need to further define the extent of offsite asbestos contamination. Soil samples from the yards of residences adjacent to the site should be randomly collected and analyzed for asbestos fibers. Wipe samples should be collected and analyzed from inside homes near this site to determine the extent of any contamination that may have occurred. EPA's Emergency Response Team and NIOSH are developing a protocol for residential sampling that may be helpful. If offsite contamination is found then further remedial actions must be considered.

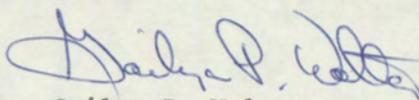
- D. Guidance as to whether or not an asbestos health advisory should be issued.

At this time with the current remedial actions underway, we do not feel that a health advisory is indicated. The State or county health departments should coordinate efforts to advise the community of the situation so that private physicians can provide informed guidance and care to their patients who may have been exposed to asbestos due to entering the site. Occupational exposures to company workers may have occurred. The North Carolina Department of Human Resources or the National Institute for Occupational Safety and Health (NIOSH) may wish to determine if occupational exposures have occurred which merit additional medical evaluations. A copy of this report will be forwarded to them. Neighborhood children should be encouraged not to smoke cigarettes because there may be a synergistic effect between cigarette smoking and some small amount of asbestos retained in the lung.

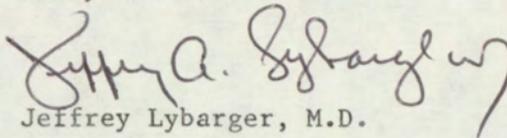
- E. An assessment as to whether or not the actions already taken to cover the horizontal and sloped areas of the site with topsoil are adequate to stabilize and isolate the asbestos from the open environment.

The principle concern from a health standpoint is the elimination of offsite migration of asbestos fibers to prevent human exposure. The most appropriate engineering techniques (methods) will be determined by EPA to ensure containment. I have attached a memorandum from the U.S. Army Corps of Engineers to the U.S. Department of Justice as an example of one approach to address adequate containment and stabilization.

There is a need to confirm that no other environmental contaminants are present at this site, prior to any additional efforts to contain the asbestos waste.



Gailya P. Walter



Jeffrey Lybarger, M.D.

cc:

N.C. Dept. of Health

NIOSH, Cincinnati, Attn: Jim Melius

DOCUMENTS REVIEWED

1. Request for assessment of health threat posed by potential superfund site, Davison, N.C., asbestos site from Chuck Pietrosewicz to Georgi Jones, SIG dated 27 March 1984.
2. History of Davison, N.C. Hillside Investigation.
3. Diagram and description of sample collection area dated 14 February 1984.
4. Analysis report from N.C. Department of Human Resources to MCDEH dated 16 February 1984.
5. Tax line map for Mecklenburg County, N.C.
6. Letter to Bruce Potoka, EPA, from Edwin C. Holstein, M.D., Mount Sinai Medical Center, New York, N.Y. dated 30 January 1984 concerning Ambler, Pennsylvania.
7. Letter to John Berry, MCDEH from John J. Curran, N.C. Division of Health Services dated 1 March 1984 concerning followup of children potentially exposed to asbestos.
8. Photographs of Davison, N.C. asbestos site.
9. Letter to Robert Kenyon, owner of Davison asbestos site, from Don Willard, Environmental Coordinator, MCDEH dated 28 March 1984.

DEPARTMENT OF HUMAN RESOURCES _____ RUSH

TO Bill Meyer

DATE 2-13-84 TIME 2:10

WHILE YOU WERE OUT

M Pat Curin

OF _____

PHONE 3-3680

TELEPHONED PLEASE PHONE

WANTS TO SEE YOU WILL CALL AGAIN

CAME TO SEE YOU RETURNED YOUR CALL

MESSAGE Important

6066, 6066 Med. Soc. Samples
closed - closed 15-20 p.m.
cowling Asbestos 20% par
Asbestos

DHR 0011 (Rev. 7-77) BY Shelby

DEPARTMENT OF HUMAN RESOURCES

 RUSH

TO Bill

DATE 2/16/84 TIME 9.45

WHILE YOU WERE OUT

M John Gibson "W. Chadote"

OF _____

PHONE (704) 376-4603

TELEPHONED

PLEASE PHONE

WANTS TO SEE YOU

WILL CALL AGAIN

CAME TO SEE YOU

RETURNED YOUR CALL

MESSAGE ^① Have you completed
the analysis of samples from
a trailer located in Industrial
Trailer in Rentals ^② Has the solid
Hazard been contacted for
disposal for sludge in the

DHR 0011 (Rev. 7-77)

BY Terrie

Sanitary landfill, Julian - send those
20 copies + my attention sent it.
Solid Hazard Waste Regulations over

DEPARTMENT OF HUMAN RESOURCES _____ RUSH

TO Bill

DATE 2-16 TIME 11:25

WHILE YOU WERE OUT
M Pat Curran
OF _____
PHONE _____

TELEPHONED
 WANTS TO SEE YOU
 CAME TO SEE YOU
 PLEASE PHONE
 WILL CALL AGAIN
 RETURNED YOUR CALL

MESSAGE is setting up a
conference call in
about 5 minutes for
you, himself and
another party.

DHR 0011 (Rev. 7-77) BY _____

DEPARTMENT OF HUMAN RESOURCES

RUSH

TO Bill

DATE 2/16/84 TIME 11:22

WHILE YOU WERE OUT

M Janet

OF 704-393-~~5836~~

PHONE 733-4471

TELEPHONED

PLEASE PHONE

WANTS TO SEE YOU

WILL CALL AGAIN

CAME TO SEE YOU

RETURNED YOUR CALL

MESSAGE CALL ASAP.

DHR 0011 (Rev. 7-77) BY Terrie

DEPARTMENT OF HUMAN RESOURCES RUSH

TO Bill

DATE 2/16/84 TIME 12:40

WHILE YOU WERE OUT

M Bryan Hasskins

OF Public Information

PHONE (704) 393-5836

TELEPHONED

PLEASE PHONE

WANTS TO SEE YOU

WILL CALL AGAIN

CAME TO SEE YOU

RETURNED YOUR CALL

MESSAGE Call at your Request.

DHR 0011 (Rev. 7-77)

BY Terrie

DEPARTMENT OF HUMAN RESOURCES _____ RUSH

TO Terry

DATE 2/16/84 TIME 11:23

WHILE YOU WERE OUT

M Fred Stroud

OF _____

PHONE (404) 881-3931

TELEPHONED

PLEASE PHONE

WANTS TO SEE YOU

WILL CALL AGAIN

CAME TO SEE YOU

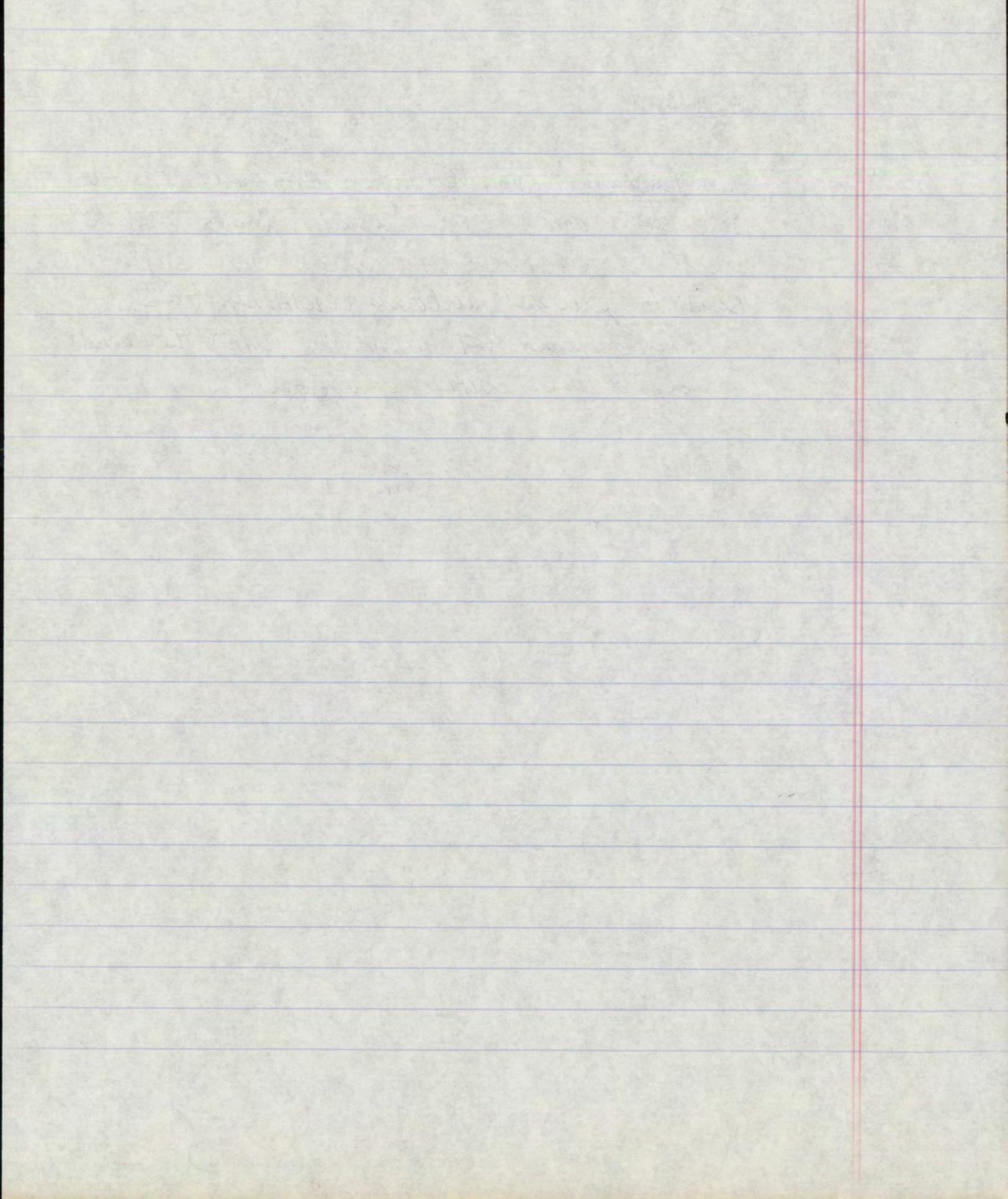
RETURNED YOUR CALL

MESSAGE Call ASAP.

DHR 0011 (Rev. 7-77) BY Terrie

Mr. Strickland

My response to Don WILLIAMS was to cover the "Disposal" areas with 2 feet of cover and to cover non-disposal areas with sufficient soil to prevent airborne contamination. It would appear that Meck. Co. wants the whole area covered with 2' of soil.



**MECKLENBURG COUNTY
DEPARTMENT OF ENVIRONMENTAL HEALTH**

1200 BLYTHE BOULEVARD
CHARLOTTE, NORTH CAROLINA 28203



March 28, 1984

Mr. Robert Kenyon
2411 Knollwood Road
Charlotte, NC 28211

Dear Mr. Kenyon:

On February 3, 1984 the Mecklenburg County Department of Environmental Health received a complaint from a Davidson resident concerning a whitish material covering her children upon returning from play. An investigation of this complaint and subsequent sampling of your property on Depot Street, Davidson, North Carolina (tax map reference 003-253-01) revealed that a portion of the property was an abandoned asbestos disposal site. The site had apparently been covered at one time, but now through the forces of nature it was becoming uncovered, exposing friable asbestos.

Asbestos is a proven cancer causing agent at very low levels in the atmosphere. Since the condition of your property on Depot Street poses a threat to the health of the nearby residents, it will be necessary for you to correct the conditions immediately. After consultation with State and Federal officials it has been agreed that the following actions or equivalents are required:

1. Cover the slope and level areas with two feet of compacted earth.
2. Stabilize and reduce slope permanently by either:
 - a. Using landscaping techniques (railroad ties, rip rap, etc.).
 - b. Backfilling with dirt (this would require closing Sloan Street).
3. Landscape and grade slope and level areas to minimize erosion. Submit final topography map indicating drainage.
4. Establish and maintain a permanent ground cover seal. Select ground cover at the direction of the N.C. Agricultural Extension Service or Soil and Water Conservation Service. Submit plan detailing types and locations of cover.
5. Execute the enclosed solid waste disposal record (see attachment for instructions).

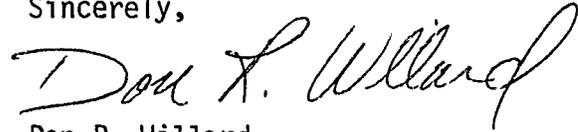
Please respond in writing to items number one - five above by stating projected completion dates and specific methodology by April 13, 1984. Given the serious nature of this problem, it is important that all work be completed as soon as possible, placing top priority on item number one.

Finally, please note that the property to the west of Sloan Street is still under investigation by this Department and may require future action.



Thank you for your continuing cooperation.

Sincerely,



Don R. Willard
Environmental Coordinator

DRW:dsb

cc: ✓ Mr. Bill Meyer
N.C. Department of Human Resources
Division of Health Services
Environmental Health Section
Solid & Hazardous Waste Management Branch
Post Office Box 2091
Raleigh, North Carolina 27602

Mr. Fred Stroud
Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Mayor Nancy H. MacCormac
Town of Davidson
Post Office Box 578
Davidson, North Carolina 28036

Mr. Ray Casner
Assistant County Manager
County Office Building

Dr. John Barry, Acting Director
Environmental Health Department

**MECKLENBURG COUNTY
DEPARTMENT OF ENVIRONMENTAL HEALTH**

1200 BLYTHE BOULEVARD
CHARLOTTE, NORTH CAROLINA 28203



April 25, 1984

Mr. Robert Kenyon
2411 Knollwood Road
Charlotte, North Carolina 28211

Dear Mr. Kenyon:

On April 24, 1984, Dan Hardin and I met with you at your property on Depot Street, Davidson, North Carolina, to determine the compliance status of the abandoned asbestos disposal site.

The following determinations were made:

1. The slope and level areas had been covered with red clay.
2. The site had been graded and landscaped to minimize erosion and rip rap had been used to line the drainage ditch along Eden Street.
3. The depth of cover material was tested by taking twenty-one core samples and was found to be adequate with two exceptions:
 - a. The slope nearest the intersection of Depot Street and Sloan Street. Asbestos was encountered at approximately six inches.
 - b. An uncovered "ridge" paralleling Depot Street from the warehouse to where it intersects the above mentioned slope (a). Asbestos was encountered at approximately one inch.

It was agreed that the areas described in item three a and b would receive new or additional cover and that once completed the area would be ready for seeding as prescribed by the Soil and Water Conservation Service.

Please be reminded that the method you have chosen for covering the slope will require much maintenance to prevent erosion and that if it fails, this department will require alternative solutions. Additionally, please contact me regarding recording the site with the Register of Deeds as soon as possible.

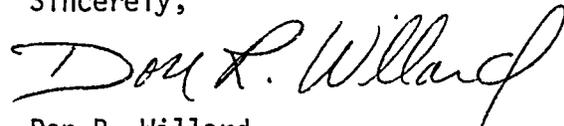
Mr. Robert Kenyon

- 2 -

April 25, 1984

Thank you for your continued cooperation.

Sincerely,



Don R. Willard
Environmental Coordinator

DRW/ir

cc: ✓ Mr. Bill Meyer
N. C. Department of Human Resources
Division of Health Services
Environmental Health Section
Solid & Hazardous Waste Management Branch
Post Office Box 2091
Raleigh, North Carolina 27602

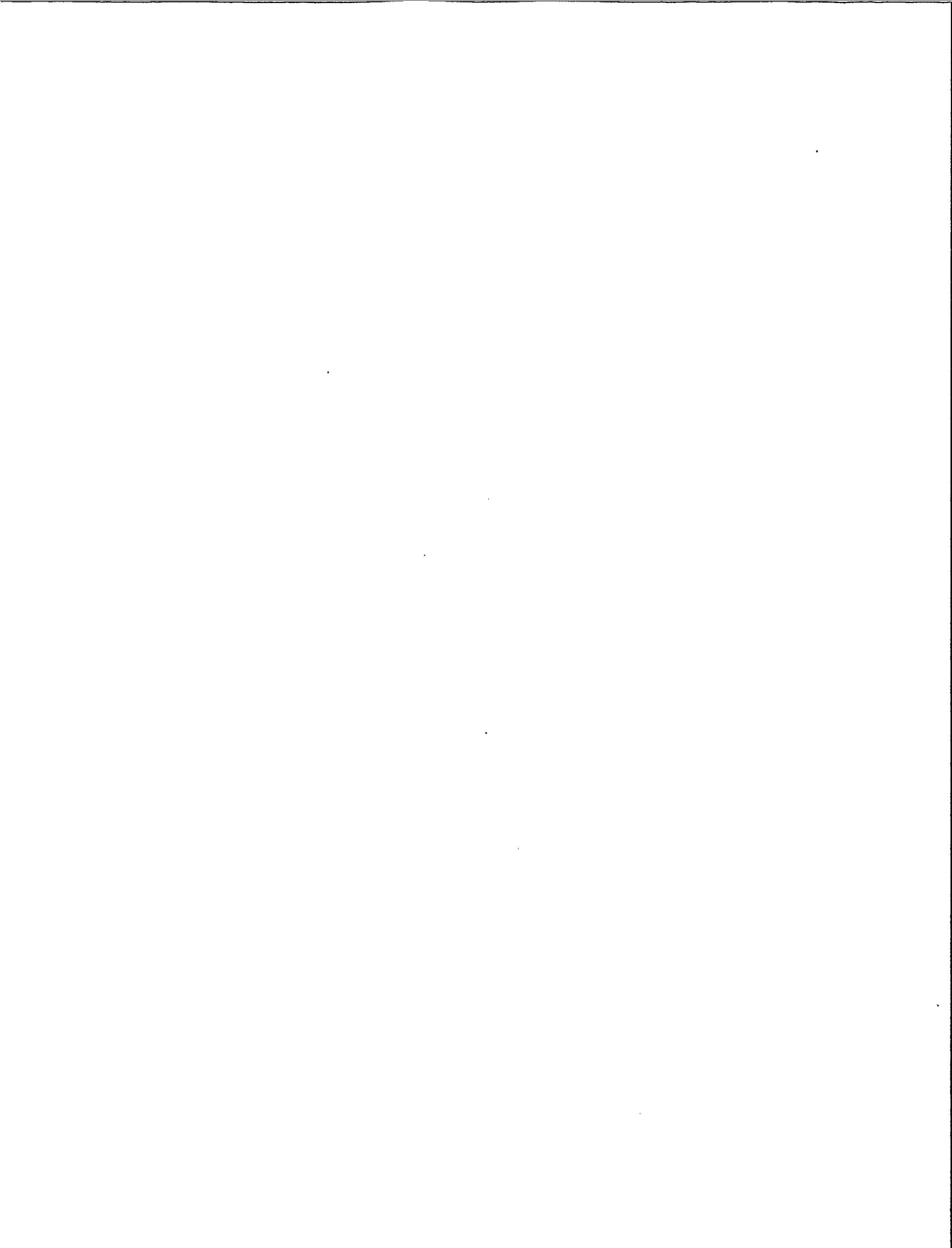
Mr. Fred Stroud
Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Mayor Nancy H. MacCormac
Town of Davidson
Post Office Box 578
Davidson, North Carolina 28036

Basil G. Delta, M.D., M.P.H.
Health Director
Mecklenburg County Health Department
249 Billingsley Road
Charlotte, North Carolina 28211

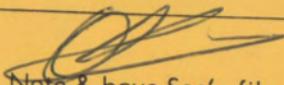
Mr. Ray Casner
Assistant County Manager
County Office Building

Dr. John Barry, Acting Director
Environmental Health Department



ROUTING SLIP

To: BILL MEYERS Department: _____



PLEASE

- | | | |
|---|--|--|
| <input type="checkbox"/> Note & have Sec'y file | <input type="checkbox"/> See me | <input type="checkbox"/> Call me |
| <input type="checkbox"/> Note & return to me | <input type="checkbox"/> Sign | <input type="checkbox"/> Please answer |
| <input type="checkbox"/> Note & see me about this | <input type="checkbox"/> For your information | |
| <input type="checkbox"/> For your approval | <input type="checkbox"/> Per our conversation | |
| <input type="checkbox"/> Take appropriate action | <input type="checkbox"/> Per your request | |
| <input type="checkbox"/> Make recommendations | <input type="checkbox"/> Request further information | |

REMARKS: _____

Date _____ From: BOBBY COBB
MECK. CO. ENV. HEALTH DEPT.

memorandum

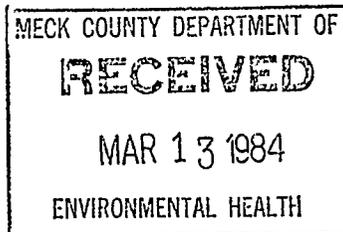
DATE: February 29, 1984

REPLY TO
ATTN OF:Rodney D. Turpin, Safety and Occupational Health Officer
Environmental Response Branch - Edison, NJ*Rodney D. Turpin*

SUBJECT:

Activity Options: Davidson Asbestos Site, North Carolina

TO:

Fred Stroud, On-Scene Coordinator *FBS*
EPA Region IV - Atlanta, GATHRU: Joseph P. Lafornera, Chief
Analytical Support Section*J. P. Lafornera*CONTAINMENT OPTIONS

In evaluating the suggested options, the following factors must be considered:

1. Proper skin/respirator equipment is required when potential asbestos conditions may be present.
2. All surfaces must be maintained regardless of option selected. The intent of the surface cover is to assure that asbestos does not migrate into the environment.
3. See Attachment No. 1 for general cost information.

A. Emergency Action

1. Slope Areas - ground cover
 - a. Hydro seeding (only cost reference is the Ambler, PA estimate of approximately 5c/ft²).
 - b. Burlap cover (no cost estimate).
 - c. Reduce slope via top soil backfill (this would involve closing off adjacent road).
 - d. Reduce slope via landscaping techniques (e.g., railroad ties, proper surface drainage, top soil backfill).
2. Slope Areas - security
 - a. Fence
 - b. Security guards



3. Level Areas - ground cover

a. Driveway areas

- (1) Seal off potential dust situations with black top, etc. Surfaces must be maintained.

b. Non-Driveway Areas

- (1) Same as paragraph A (1) above.
- (2) Fill/top soil cover. Depth 6 inches to 2 feet. Specifics should be determined by agronomist, soil scientist, landscaper, and in accordance with local, state, and federal requirements.
- (3) Black top, etc.
- (4) Vegetation - should be selected by local expert(s). Major selection factor should include root system and maintenance requirements.

4. Level Areas - security

- a. Same as paragraph A-2 above.

B. Long Term Containment

1. Slope/level areas, in addition to expanding/refining the emergency actions mentioned above in paragraph A above, long term containment has to address:

- a. Maintaining permanent seal of ground cover.
- b. Maintaining vegetation.
- c. Meeting local, state, and federal permit, registration, etc.

2. Slope/level areas - security

- a. Same as paragraph A 2 above.

AIR MONITORING - see Attachment No. 2

Attachments

cc: Andy Zownir
Jeff Pike, EPA Reg. III, OSC

Attachment No. 1

United States
Environmental Protection
Agency

Office of Emergency and
Remedial Response
Washington DC 20460

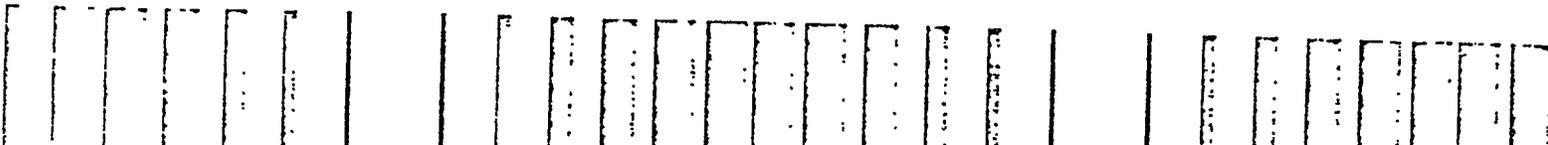
Office of Research and
Development
Municipal Environmental Re-
Laboratory
Cincinnati OH 45268

Technology Transfer

EPA

Handbook

Remedial Action at Waste Disposal Sites



ESTIMATED UNIT COSTS FOR SURFACE SEALING METHODS AND MATERIALS

<u>Cover material and/or method of installation</u>	<u>Unit costs*</u>	<u>Source of cost information</u>
Topsoil (sandy loam), hauling, spreading, and grading (within 20 miles)	\$13/yd ³	Haseley Trucking Company (1980)
Clay hauling, spreading, and compaction	\$8.50/yd ³	" " "
Sand hauling, spreading, and compaction	\$15/yd ³	" " "
Cement concrete (4 to 6" layer), mixed, spread, compacted on-site	\$8,000-10,000 /acre	Universal Linings, Inc. (1980)
Bituminous concrete (4 to 6" layer), including base layer	\$6-10/yd ²	Tolman et al., 1979
Lime or cement, mixed into 5" cover soil	\$3-5/yd ²	Tolman et al., 1979
Bentonite, material only; 2" layer, spread and compacted	\$1.50-2.10/yd ²	Lutton et al., 1979
Sprayed asphalt membrane (¼" layer and soil cover), installed	\$1.40/yd ²	Lutton et al., 1979
PVC membrane (20 mil), installed	\$1.50-2.50/yd ²	" " "
Chlorinated PE membrane (20-30 mil), installed	\$1.30-2.00/yd ²	" " "
Elasticized polyolefin membrane, installed	\$2.40-3.20/yd ²	" " "
	\$2.70-3.60/yd ²	DuPont Elastomer Chemicals Dept. (1980)

--continued--

TABLE 3-2 (Continued)

<u>Cover material and/or method of installation</u>	<u>Unit costs*</u>	<u>Source of cost information</u>
Hypalon membrane, (30 mil), installed	\$6.50/yd ²	DuPont Elastomer Chemicals Dept., (1980)
Neoprene membrane, installed	\$5.00/yd ²	Lutton et al., 1979
Ethylene propylene rubber membrane, installed	\$2.70-3.50/yd ²	" " "
Butyl rubber membrane, installed	\$2.70-3.80/yd ²	" " "
Teflon-coated fiberglass (TFE) membrane (10 mil), installed	\$20/yd ²	DuPont Elastomer Chemicals Dept. (1980)
Fly ash and/or sludge, spreading, grading, and rolling	\$1.00-1.70/yd ²	Tolman et al., 1979

*Note different units for volume (yd³) vs. surface area (yd²) costs.

Hazardous Waste Site
Asbestos Air Monitoring Guide

DRAFT

I. ON SITE SAMPLE

A. Type of Samples

1. Bulk Pile Samples

a. Sample Size - 8 oz. Sample Jar

1. Type of Analysis

(a) PLM (all samples)- see attached analytical method.

(b) SEM or TEM- Select 1-4, highest positive PLM samples.

b. Sample Location

1. Develop site specific sampling grid. Consider real time monitor reading and site conditions.

2. Air Samples

a. Filter Media

1. 25 mm - 37mm cellulose 3-stage cassette (0.45 um - 0.80 um size)

b. Flow Rates- Liter per minute

1. Low real-time monitor readings:	<u>17.6</u>
2. Medium real-time monitor readings:	<u>7.5</u>
3. High real-time monitor readings:	<u>2.5</u>

c. Analytical Methods

1. 10% of samples collected - TEM or SEM
2. 90% of samples collected - PLM

(TEM) - Transmission Electron Microscopy

(SEM) - Scanning Electron Microscopy

(PLM) - Polarized Light Microscopy

B. Weather CONDITIONS (see II, B.(4). Below)

II. Preliminary Ambient Air Sampling Off Site

A. Screen area with real time aerosol or particulate instrument.

1. RAM-1 or equivalent

B. Sample Collection

1. Types of Analysis- Duplicate samples (A & B) are collected at each station.

a. Analyze all (A) samples from each station by PLM (see attached procedure)

1. If (A) samples are positive for asbestos then analyze a minimum of 25% of the appropriate (B) samples by:

(a) TEM with selected area electron diffraction (SAED) or

(b) SEM with X-ray dispersion analysis (EXDA)

DRAFT

B. Sample Collection (cont'd)

2. Sampling grid (Station location)
 - a. Positive RAM readings
 1. Maximum 500 feet downwind from site
 2. Minimum of 1-2 samples per 1000 to 2000 feet perpendicular to wind direction adjacent to site.
 - b. Background stations
 1. Minimum of 3 stations
 2. angles of 45°, 90° and 135° 500 feet to 1 mile upwind of the site
3. Sampling Methodology at each station
 - a. Media - 25mm or 37mm 3 stage casset 0.45 to 0.8 um
 - b. Flow rates
 1. Low flow pumps (per station)
 - (a) 2.5 l/min for minimum of 30 minutes
 2. High flow pumps (Applicability/location) to be determined on site specific bases.
 - (a) 7.45 liters/minutes for minimum of 30 minutes
 - (b) 17.5 liters/minutes for minimum of 30 minutes
4. Weather Conditions
 - a. Minimum of 3 days of dry weather before sampling.
 - b. Wind speed minimum of 10-15 mph at time of sampling.
 - c. Soil condition should be dry/non-moist at time of sampling.

III. RESIDENTIAL- Non-Commercial Buildings (IF APPLICABLE)

- A. Screening- Random selection of residence to be tested.
 1. Residents directly adjacent to the disposal pile.
- B. Selected areas for Settled Dust Sampling
 1. Static areas
 - a. Attic (ascertain type insulation or asbestos use in attic).
 - b. Rafters- ie., attic, basement, crawlspace, etc.
 - c. Garage
 2. Living areas
 - a. behind and/or underneath appliances, ie., refrigerators, stoves, etc.
 - b. light fixtures
 - c. embedded in perimeter of carpet (under tables, couch)
 - d. surface areas of drapes.

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C. Sampling Design

1. Since the emphasis is to qualitatively assess exposure, the primary effort should be directed towards identifying the presence of asbestos. This could best be achieved through the collection and analysis of settled dust. This should be accomplished by:
 - a. selecting areas as defined in B. 1 and 2. These areas should be measured so as to allow determination of fiber concentration per area sample. These types of measurements may be useful for comparison purposes in this study.

D. Sample Apparatus

1. Battery operated sampling pump capable of 2.5 to 3.5 liters per minute flow rate through a cellulose ester filter with porosity of 0.8 micron and 37mm diameter.

E. Sample procedures

1. The attempt is to collect settled dust from exposed surfaces onto the filter media.
 - a. The area to be selected, measured and sampled will vary depending on the amount of "free" dust on the surfaces. The person collecting the sample will need to make this assessment.

Since the sample should not be overloaded or underloaded, the following maybe used as general guides to determine flow rate and sample area. The purpose of the two different areas is to identify the appropriate sample load if additional sampling is required:

Heavily visible settled dust- (a) 0.5 ft.² at 3 l/min.
(b) 1 ft.² at 3 l/min.

Moderately visible settled dust- (a) 1.5 ft.² at 3 l/min.
(b) 3 ft.² at 3 l/min.

Lightly visible settled dust- (a) 1 m² at 3 l/min.
(b) 2 m² at 3 l/min.

No visible settled dust- (a) 2 m² at 3 l/min.

- b. A sample holder or cassette should be used in which the surface of the filter is at a minimum of 1/4 inch from the top of the surface.

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E. Sample Procedures (cont'd)

The sample holder or cassette should be open faced and placed in contact with the surface to be sampled (The rim of the open faced cassette that contacts the surface should be notched to allow for reduced pressure buildup on the pump).

With the pump turned on, sample holder should be moved across the surface making sure the total defined area is sampled. Depending on the filter loading, repeated sampling across the same area may be warranted. Should the investigator decide that more particulate material is needed for proper filter loading, additional areas can be defined and measured for sampling. Using the same filter and procedures these areas should be likewise sampled. All areas should be physically measured by the investigator.

F. Sample Analysis

1. Optical Microscopy

- a. Filters should be prepared and analyzed by the most current NIOSH methodology by Phase Contract Microscopy.
- b. Concentration of fibers should be determined for unit area measured.

These fiber data should be used for comparison purposes in this study to assess extent of contamination and for making decisions for additional sampling and analysis.

2. Electron Microscopy

- a. A representative number of samples should be selected for fiber identification by either Scanning Electron Microscopy (SEM) or Transmission Electron Microscopy (TEM). These microscopy methodologies should be used for fiber count and also identification of the fibers, as well as the surrounding fiber matrix using Selected Area Electron Diffraction (SAED), TEM only, and/or Energy Dispersive X-Ray (EDX) analysis.

This data can be used for comparison with optical fiber counts and to ascertain the presence of asbestos. It may be possible to determine if asbestos contamination is the same type of fiber identified from the disposal piles.

- b. Soil surface samples should be prepared and analyzed in the same manner using Electron Microscopy.

DRAFT

FORMULA: various

FIBERS

METHOD: 7400

ISSUED: 2/15/84

SHA: 0.5 asbestos fibers (> 5 μm long)/mL

PROPERTIES: solid, fibrous

IOSH: 0.1 asbestos; 3 fibrous glass (> 10 μm long, < 3.5 μm wide)

CGIH: 0.2 crocidolite; 0.5 amosite; 2 chrysotile and other asbestos

SYNONYMS: asbestos (actinolite [CAS #77536-66-4], grunerite (amosite) [CAS #12172-73-5], anthophyllite [CAS #77536-67-5], chrysotile [CAS #12001-29-5], crocidolite [CAS #12001-28-4], tremolite [CAS #77536-68-6]); fibrous glass; mineral fibers.

SAMPLING

MEASUREMENT

SAMPLER: FILTER
(cellulose ester membrane, 0.8 to 1.2 μm ; 25 mm diameter)

TECHNIQUE: MICROSCOPY, PHASE CONTRAST

ANALYTE: fibers (manual count)

AIR FLOW RATE*: ≥ 0.5 L/min

SAMPLE PREPARATION: acetone/triacetin method

VOLUME-MIN*: 400 L @ 0.1 fiber/mL

COUNTING RULES: Set A (P&CAM 239 [1,2]) or Set B (modified CRS)

VOLUME-MAX*: 1920 L @ 0.1 fiber/mL (DNE 1 mg total dust)

ADJUSTMENT: adjust for 100 to 1300 fibers/mm² (step 4)

EQUIPMENT: 1. phase-contrast microscope

2. Walton-Beckett graticule (100 μm diameter): A rules use Type G-22; B rules use Type G-24

3. phase-shift test slide (HSE/NPL)

EQUIPMENT: routine

SAMPLER STABILITY: indefinite

CALIBRATION: phase-shift detection limit between 3 and 4 degrees

REPEATABILITY: 10% of samples (minimum 2) [1]

ANALYTICAL RANGE: 100 to 1300 fibers/mm² filter area [3]

ACCURACY

NUMBER OF SAMPLES STUDIED: 80 to 100 fibers counted

ESTIMATED LOD: 7 fibers/mm² filter area

REFERENCES: see Evaluation of Method

ANALYTICAL PRECISION: 0.10 to 0.12 (A rules)[1]; 0.157 (B rules)[3]

OVERALL PRECISION: 0.115 to 0.13 [1]

REPRODUCIBILITY: The working range is 0.02 fibers/mL (1920-L sample) to 1.25 fibers/mL (400-L sample). The method was designed to give an index of airborne asbestos fibers but may be used for other materials such as fibrous glass by inserting suitable parameters into the counting rules. The method does not differentiate between asbestos and other fibers. Asbestos fibers with diameters less than ca. 0.25 μm diameter will not be counted by this method [5].

INTERFERENCES: Any airborne fiber may interfere; all particles meeting the counting criteria will be counted. Chain-like particles may appear fibrous. High levels of non-fibrous dust particles may obscure fibers in the field of view and raise the detection limit.

RELATED METHODS: This method introduces changes for improved reproducibility and replaces P&CAM 239 [1,2].

REAGENTS:

1. Acetone.*
2. Triacetin (glycerol triacetate) (reagent grade).

*See Special Precautions.

EQUIPMENT:

1. Sampler: field monitor, 25 mm, 3-piece cassette with 50-mm extension cowl with cellulose ester filter 0.8 to 1.2 μm pore size.
NOTE: Analyze representative filters for fiber background before use and discard the filter lot if more than 5 fibers per 100 fields are found. Gridded filters give improved focusing capability for analysis and are recommended.
2. Personal sampling pump, ≥ 0.5 L/min (see step 4 for flow rate), with flexible connecting tubing.
3. Microscope, phase contrast, with green filter, 8 to 10X eyepiece, and 40 to 45X phase objective (total magnification ca. 400X), Numerical Aperture = 0.65 to 0.75.
4. Slides, glass, single-frosted, pre-cleaned, 25 x 75 mm.
5. Cover slips, 25 x 25 mm, no. 1-1/2.
6. Knife, #10 surgical steel, curved blade.
7. Tweezers.
8. Flask, Guth type, insulated neck, 250 to 500 mL (with single-holed rubber stopper and elbow-jointed glass tubing, 16 to 22 cm long).
9. Hotplate, spark-free, stirring type; or heating mantle; or infrared lamp and magnetic stirrer.
10. Syringe, hypodermic, with 22 gauge needle.
11. Graticule, Walton-Beckett type with 100 μm diameter circular field (area = 0.00785 mm^2) (Type G-22 for A rules; Type G-24 for B rules). Available from Graticules Ltd., Morley Road, Tonbridge, Kent, England TN9, 1RN.
NOTE: The graticule is custom-made for each microscope. Specify disc diameter needed to fit exactly the ocular of the microscope and the diameter (mm) of the circular counting area (see step 11).
12. HSE/NPL phase contrast test slide, Mark II. Available from PTR Optics Ltd., 145 Newton Street, Waltham, MA 02154.
13. Telescope, phase-ring centering.
14. Stage micrometer (0.01 mm divisions).

SPECIAL PRECAUTIONS: Acetone is an extremely flammable liquid and precautions must be taken to ignite it. The acetone must be heated in a ventilated laboratory fume hood using a flameless, spark-free heat source.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line [1].
2. Fasten the sampler to the worker's lapel as close as possible to the worker's mouth. Remove the top cover from the end of the cowl extension (open face) and orient face down. Wrap the joint between the extender and monitor body with shrink tape to prevent air leaks.
3. Submit at least two field blanks (or 10% of the total samples, whichever is greater) for each set of samples. Remove the caps from the field blank cassettes and store the caps and cassettes in a clean area (bag or box) during the sampling period. Replace the caps in the cassettes when sampling is completed.

NOTE: If a field blank yields fiber counts greater than 7 fibers/100 fields, report possible contamination of the samples.

4. Sample at 0.5 L/min or greater [6]. Do not exceed 1 mg total dust loading on the filter. Adjust sampling flow rate, Q (L/min), and time to produce a fiber density, E (fibers/mm²), of 100 to 1300 fibers/mm² (3.85×10^4 to 5×10^5 fibers per 25-mm filter with 385 mm² effective collection area, A_c (mm²)), for optimum counting precision. Calculate the minimum sampling time, t_{min} (minutes), at the action level (one-half the current standard), L (fibers/mL), of the fibrous aerosol being sampled:

$$t_{\min} = \frac{(A_c)(E)}{(Q)(L)10^3}$$

5. Remove the field monitor at the end of sampling, replace the plastic top cover and small end caps, and store the monitor.
6. Ship the samples in a rigid container with sufficient packing material to prevent jostling or damage.

SAMPLE PREPARATION:

NOTE: The object is to produce samples with a smooth (non-grainy) background in a medium with a refractive index equal to or less than 1.46. The method below collapses the filter for easier focusing and produces permanent mounts which are useful for quality control and interlaboratory comparison. Other mounting techniques meeting the above criteria may also be used (e.g., the non-permanent field mounting technique used in P&CAM 239 [2]).

1. Clean the glass slides and cover slips with acetone and set aside.
2. Place 40 to 60 mL of acetone into a Guth-type flask. Stopper the flask with a single-hole rubber stopper through which a glass tube extends 5 to 8 cm into the flask. The portion of the glass tube which exits the top of the stopper (8 to 10 cm) is bent downward in an elbow which makes an angle of 20 to 30° with the horizontal.
3. Place the flask on a stirring hotplate or wrap in a heating mantle. Heat the acetone gradually to its boiling temperature (ca. 58 °C).

CAUTION: The acetone vapor must be generated in a ventilated fume hood away from all open flames and spark sources.

NOTE: Alternate heating methods can be used, providing no open flame or sparks are present.

4. Mount either the whole sample filter or a wedge cut from the sample filter on a clean glass slide.
 - a. Cut wedges of ca. 25% of the filter area with a curved blade steel surgical knife using a rocking motion to prevent tearing.
 - b. Place the filter or wedge, dust side up, on the clean glass slide. Static electricity will usually keep the filter on the slide until it is cleared.

- c. Hold the glass slide supporting the filter wedge approximately 1 to 2 cm from the glass tube port where the acetone vapor is escaping from the heated flask. The acetone vapor stream should cause a condensation wet spot on the glass slide ca. 2 to 3 cm in diameter. By moving the glass slide gently in front of the vapor stream, the filter wedge should clear in 2 to 5 sec. If the filter wedge curls, distorts, or is otherwise rendered unusable, the vapor stream is probably not strong enough. Periodically wipe the outlet port with tissue to prevent liquid acetone dropping onto the filter.
 - d. Using the hypodermic syringe with a 22-gauge needle, place 1 to 2 drops of triacetin on the wedge. Gently lower a clean 25-mm square cover slip down onto the wedge at a slight angle to reduce the possibility of forming bubbles. If too many bubbles form or the amount of triacetin is insufficient, the cover slip may become detached within a few hours.
 - e. Glue the edges of the cover slip to the glass slide using a lacquer or nail polish [7].
- NOTE: Counting may proceed immediately after clearing of the filter is completed. If clearing is slow, the slide preparation may be heated on a hotplate (surface temperature 50 °C) for 15 min to hasten clearing.

CALIBRATION AND QUALITY CONTROL:

11. Calibration of the Walton-Beckett graticule. Determine the diameter, d_c , of the circular counting area:
 - a. Insert any available graticule into the eyepiece and focus so that the graticule lines are sharp and clear.
 - b. Set the appropriate interpupillary distance, and if applicable, reset the binocular head adjustment so that the magnification remains constant.
 - c. Install the 40X or 45X phase objective.
 - d. Place a stage micrometer on the microscope object stage and focus the microscope on the graduated lines.
 - e. Measure the magnified grid length, L_o (μm), using the stage micrometer.
 - f. Remove the graticule from the microscope and measure its actual grid length, L_a (mm). This can best be accomplished by using a stage fitted with verniers.
 - g. Calculate the circle diameter, d_c (mm), for the Walton-Beckett graticule:

$$d_c = \frac{L_a}{L_o} \times D$$

Example: If $L_o = 108 \mu\text{m}$, $L_a = 2.93 \text{ mm}$ and $D = 100 \mu\text{m}$, then $d_c = 2.71 \text{ mm}$.

- h. Check the circle diameter (acceptable range $100 \mu\text{m} \pm 2 \mu\text{m}$) with a stage micrometer upon receipt of the graticule from the manufacturer. Determine field area (μm^2).
2. Microscope adjustments. Follow the manufacturer's instructions and:
 - a. Adjust the light source for even illumination across the field of view at the condenser iris.

NOTE: Köhler illumination is preferred, where available.
 - b. Focus on the particulate material to be examined.
 - c. Make sure that the field iris is in focus, centered on the sample, and open only enough to fully illuminate the field of view.
 - d. Ensure that the phase rings (annular diaphragm and phase-shifting elements) are concentric.
3. Check the phase-shift detection limit of the microscope periodically.
 - a. Remove the HSE/NPL phase-contrast test slide from its shipping container and center it under the phase objective.

b. Bring the blocks of grooved lines into focus.

NOTE: The slide consists of 7 sets of grooves (approximately 20 grooves to each block) in descending order of visibility from set 1 to set 7. The requirements for asbestos counting are that the microscope optics must resolve the grooved lines in set 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 and 7 must be invisible. Sets 4 and 5 must be at least partially visible, but may vary slightly in visibility between microscopes. A microscope which fails to meet these requirements precisely has either too low or too high a resolution to be used for asbestos counting.

c. If the image quality deteriorates, clean the microscope optics and consult the microscope manufacturer.

14. Quality control of fiber counts.

a. Prepare and count field blanks along with the field samples. Report the counts on each blank. Calculate the mean of the blank counts, and subtract this value from each sample count before reporting the results.

b. Perform blind recounts by the same counter on 10% of filters counted (slides relabeled by a person other than the counter).

15. Use the following test to determine whether a pair of counts on the same wedge should be rejected because of possible bias. This statistic estimates the counting repeatability at the 95% confidence level. Discard the sample if the difference between the two counts exceeds $2.77 (F) s_r$, where F = average of the two fiber counts, and s_r = relative standard deviation, which should be derived by each laboratory based on historical in-house data.

NOTE: If a pair of counts is rejected as a result of this test, recount the entire set of samples and test the new counts against the first counts. Discard all rejected paired counts.

16. Enroll each new counter in a training course which compares performance of counters on a variety of samples using this procedure.

NOTE: To ensure good reproducibility, all laboratories engaged in routine asbestos counting should participate in an asbestos proficiency testing program such as the NIOSH Proficiency Analytical Testing (PAT) Program and routinely participate with other asbestos fiber counting laboratories in the exchange of field samples to compare performance of counters.

ANALYTICAL PROCEDURE

17. Place the slide on the mechanical stage of the calibrated microscope with the center of the wedge under the objective lens. Focus the microscope on the plane of the filter wedge.

NOTE: The use of gridded filters can be very helpful in locating the proper specimen plane.

18. Regularly check phase-ring alignment and Köhler illumination [5].

19. Select one of the following sets of counting rules:

NOTE: The two sets of rules have been demonstrated to produce equivalent mean counts on a variety of asbestos sample types [4], and must be strictly followed in order to obtain valid results. No hybridizing of the two sets of rules is permitted. The calibration of the microscope with the HSE/NPL test slide determines the minimum detectable fiber diameter (ca. 0.25 μm).

a. A rules (same as P&CAM 239 rules [2]).

NOTE: The A rules are required for monitoring asbestos for compliance purposes under OSHA or NIOSH standards.

1. Count only fibers longer than 5 μm . Measure the length of curved fibers along the curve.

2. Count only fibers with a length-to-width ratio equal to or greater than 3:1.
3. For fibers which cross the boundary of the graticule field:
 - a. Count any fiber longer than 5 μm which lies entirely within the graticule area.
 - b. Count as 1/2 fiber, any fiber with only one end lying within the graticule area.
 - c. Do not count any fiber which crosses the graticule boundary more than once.
 - d. Reject and do not count all other fibers.
4. Count bundles of fibers as one fiber unless individual fibers can be identified by observing both ends of a fiber, and it meets rules a.1 and a.2.
5. Count enough graticule fields to yield 100 fibers. Count a minimum of 20 fields. Stop at 100 fields regardless of fiber count.

b. B rules

NOTE: The B rules are preferred analytically because of their demonstrated ability to improve the reproducibility of fiber counts [4].

1. Count only ends of fibers. Each fiber must be longer than 5 μm and less than 3 μm diameter.
2. Count only ends of fibers with a length-to-width ratio equal to or greater than 5:1.
3. Count each fiber end which falls within the graticule area as one end, provided that the fiber meets rules b.1 and b.2.
4. Count visibly free ends which meet rules b.1 and b.2 when the fiber appears to be attached to another particle, regardless of the size of the other particle.
5. Count the free ends of fibers emanating from large clumps and bundles up to a maximum of 10 "ends" (5 fibers), provided that each segment meets rules b.1 and b.2.
6. Count enough graticule fields to yield 200 "ends." Count a minimum of 20 fields. Stop at 100 fields, regardless of the fiber count.
7. Divide the total "end" count by 2 to yield fiber count.

NOTE: Split fibers will normally be counted as more than 2 "ends" if the free ends meet the rules b.1. and b.2.

8. Start counting from one end of the wedge and progress along a radial line to the other end, shift either up or down on the wedge, and continue in the reverse direction [8]. Select fields randomly by looking away from the eyepiece briefly while advancing the mechanical stage. When an agglomerate covers 1/6 or more of the field of view, reject the field and select another. Do not report rejected fields in the number of total fields counted.

NOTE: When counting a field, continuously scan a range of focal planes by moving the fine focus knob, to detect very fine fibers which have become imbedded in the filter. The small diameter fibers will be very faint but are an important contribution to the total count.

Calculations:

- i. Calculate and report fiber density on the filter, E (fibers/ mm^2), by dividing the total fiber count, F , minus the mean blank count, B , by the number of fields, n , and the field area, A_f (0.00785 mm^2 for a properly calibrated Walton-Beckett graticule):

$$E = \frac{(F - B)}{(n)(A_f)}, \text{ fibers}/\text{mm}^2$$

- ii. Calculate the concentration, C (fibers/mL), of fibers in the air volume sampled, V (L), using the effective collection area of the filter, A_c (385 mm^2 for a 25-mm filter):

$$C = \frac{(E)(A_c)}{V \cdot 10^3}$$

NOTE: Check and adjust the value of A_c periodically, if necessary.

EVALUATION OF METHOD:

This method is a revision of NIOSH Method P&CAM 239 [1,2]. A summary of the revisions is:

A. Sampling

The change from a 37-mm to a 25-mm filter size was incorporated to reduce problems associated with non-uniform fiber loading reported on the 37-mm filters [8]. The change in flow rates allows for 2 m³ full shift samples to be taken, providing that the filter is not overloaded with non-fibrous particulates.

B. Sample Evaluation

1. The inclusion of the Walton-Beckett graticule in the method was made to standardize the field area observed through the eyepiece [3].
2. The introduction of the HSE/NPL test slide was made to standardize microscope optics to improve reproducibility.
3. A recent international collaborative study involved 16 laboratories using prepared slides from the asbestos cement, milling, mining, textile, and friction material industries [4]. The modified CRS (NIOSH B) rules were found to be more precise than the AIA (NIOSH A)* rules. The ranges of relative standard deviations (s_r), which varied with sample type and laboratory, were:

4. Because of past inaccuracies associated with low fiber counts, the minimum loading has been increased to 100 fibers/mm² filter area (80 fibers total count). This level yields an overall $s_r = 0.13$, as indicated in Fig. 3 (revised) of P&CAM 239 [1], which corresponds to an analytical $s_r = 0.12$ after removal of pump error [10]. Similarly at the maximum count of 100 fibers, overall $s_r = 0.115$ and analytical $s_r = 0.10$ are obtained.

	s_r (Intralaboratory)	s_r (Interlaboratory)	s_r (Overall)
AIA (NIOSH A Rules)*	0.12 to 0.40	0.27 to 0.85	0.46
Modified CRS (NIOSH B Rules)	0.11 to 0.29	0.20 to 0.35	0.25

*Under AIA rules, only fibers having a diameter less than 3 μm are counted and fibers attached to particles larger than 3 μm are not counted. NIOSH A rules are otherwise similar to the AIA rules.

The B rules have also been favorably received by analysts as less ambiguous and simpler to use; these rules also showed the least bias relative to AIA rules in the collaborative study. An independent NIOSH laboratory study using amosite fibers reported a relative standard deviation of 0.157 for the B rules [9].

Relative Levels of Count by Different Counting Rules* [4]

Sample Type	Number of Samples	Aspect Ratio > 3:1		Aspect Ratio > 5:1	
		AIA	Mod. CRS	AIA	Mod. CRS
Mining	10	100	127	74	92
Milling	10	100	112	84	95
Asbestos Cement	14	100	146	90	137
Textile Chrysotile	10	100	109	89	99
Friction Material	10	100	130	87	116
Others (Insulation, Amosite)	6	100	127	92	118
Mean	—	<u>100</u>	<u>125</u>	<u>86</u>	<u>110</u>

*Arithmetic means of counts made by different laboratories relative to the AIA (> 3:1) counts.

Sample Preparation Technique

The acetone vapor-triacetin preparation technique has been incorporated in the method as a faster and more permanent mounting technique than the dimethyl phthalate/diethyl oxalate method [2].

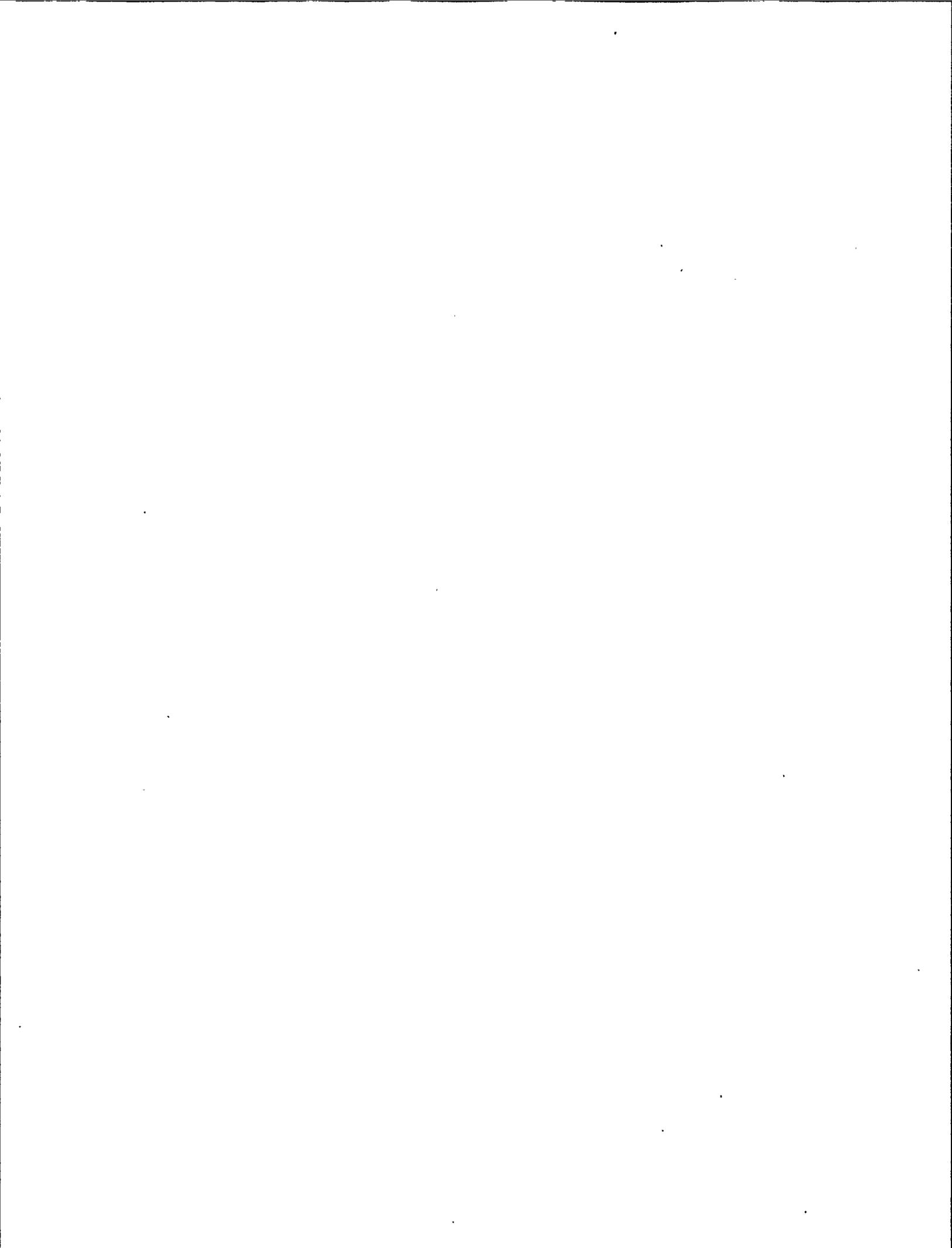
Evaluation of the method using the A and B counting rules will proceed on a continuing basis through the NIOSH Proficiency Analytical Testing (PAT) Program. The new PAT reporting form allows for reporting of results by either set of rules as of January, 1984.

REFERENCES:

- 1] Leidel, N. A., S. G. Bayer, R. D. Zumwalde, and K. A. Busch. USPHS/NIOSH Membrane Filter Method for Evaluating Airborne Asbestos Fibers, U.S. Department of Health and Human Services, Publ. (NIOSH) 79-127 (1979).
- 2] NIOSH Manual of Analytical Methods, 2nd. ed., V. 1., P&CAM 239, U.S. Department of Health and Human Services, Publ. (NIOSH) 77-157-A (1977).
- 3] Walton, W. H. "The Nature, Hazards, and Assessment of Occupational Exposure to Airborne Asbestos Dust: A Review," Ann. Occup. Hyg., 25, 115-247 (1982).
- 4] Crawford, N. P., Thorpe, and Alexander. "A Comparison of the Effects of Different Counting Rules and Aspect Ratios on the Level and Reproducibility of Asbestos Fiber Counts," Part I: Effects on Level (Report No. TM/82/23), Part II: Effects on Reproducibility (Report No. TM/82/24), Institute of Occupational Medicine, Edinburgh, Scotland (December, 1982).
- 5] Rooker, S. J., N. P. Vaughn, and J. M. LeGuen. "On the Visibility of Fibers by Phase Contrast Microscopy," Amer. Ind. Hyg. Assoc. J., 43, 505-515 (1982).
- 5] Johnston, A. M., A. D. Jones, and J. H. Vincent. "The Influence of External Aerodynamic Factors on the Measurement of the Airborne Concentration of Asbestos Fibres by the Membrane Filter Method," Ann. Occup. Hyg., 25, 309-316 (1982).
- 7] AIA Health and Safety Recommended Technical Method #1 (RTMI). "Airborne Asbestos Fiber Concentrations at Workplaces by Light Microscopy" (Membrane Filter Method).
- 3] Hooke, M. B., C. E. Feiglèy, and D. A. Ludwig. "Interwedge Variation in the Membrane Filter Method for Airborne Asbestos Fibers," Amer. Ind. Hyg. Assoc. J., 44 (1983).
- 1] Taylor, D. G., et al. "Identification and Counting of Asbestos Fibers," Am. Ind. Hyg. Assoc. J. 45 (Feb., 1984)

- 10] Busch, K. A. and D. G. Taylor. "Statistical Protocol for the NIOSH Validation tests", Chemical Hazards in the Workplace, Measurement and Control, ACS Symposium Series 149, American Chemical Society, Wash., D.C. (1981).

ETHOD REVISED BY: James W. Carter, David G. Taylor, Ph.D., CIH, and Paul A. Baron, Ph.D., NIOSH/DPSE; based on the revised Method P&CAM 239 [1].



ROUTING SLIP

To: Bill Meyer Department: _____

PLEASE

- | | | |
|---|--|--|
| <input type="checkbox"/> Note & have Sec'y file | <input type="checkbox"/> See me | <input type="checkbox"/> Call me |
| <input type="checkbox"/> Note & return to me | <input type="checkbox"/> Sign | <input type="checkbox"/> Please answer |
| <input type="checkbox"/> Note & see me about this | <input type="checkbox"/> For your information | |
| <input type="checkbox"/> For your approval | <input type="checkbox"/> Per our conversation | |
| <input type="checkbox"/> Take appropriate action | <input type="checkbox"/> Per your request | |
| <input type="checkbox"/> Make recommendations | <input type="checkbox"/> Request further information | |

REMARKS: Please look @ This attachment of
alternatives for the asbestos site at
Davidson, NC. - Please call me

Date 3/14/84 From: John Rubin

memorandum

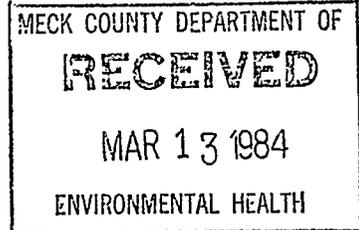
DATE: February 29, 1984

REPLY TO
ATTN OF:Rodney D. Turpin, Safety and Occupational Health Officer
Environmental Response Branch - Edison, NJ*Rodney D. Turpin*

SUBJECT:

Activity Options: Davidson Asbestos Site, North Carolina

TO:

Fred Stroud, On-Scene Coordinator *FBS*
EPA Region IV - Atlanta, GATHRU: Joseph P. Laforvara, Chief
Analytical Support Section*J. P. Laforvara*CONTAINMENT OPTIONS

In evaluating the suggested options, the following factors must be considered:

1. Proper skin/respirator equipment is required when potential asbestos conditions may be present.
2. All surfaces must be maintained regardless of option selected. The intent of the surface cover is to assure that asbestos does not migrate into the environment.
3. See Attachment No. 1 for general cost information.

A. Emergency Action

1. Slope Areas - ground cover
 - a. Hydro seeding (only cost reference is the Ambler, PA estimate of approximately 5c/ft²).
 - b. Burlap cover (no cost estimate).
 - c. Reduce slope via top soil backfill (this would involve closing off adjacent road).
 - d. Reduce slope via landscaping techniques (e.g., railroad ties, proper surface drainage, top soil backfill).
2. Slope Areas - security
 - a. Fence
 - b. Security guards



3. Level Areas - ground cover

a. Driveway areas

- (1) Seal off potential dust situations with black top, etc. Surfaces must be maintained.

b. Non-Driveway Areas

- (1) Same as paragraph A (1) above.
- (2) Fill/top soil cover. Depth 6 inches to 2 feet. Specifics should be determined by agronomist, soil scientist, landscaper, and in accordance with local, state, and federal requirements.
- (3) Black top, etc.
- (4) Vegetation - should be selected by local expert(s). Major selection factor should include root system and maintenance requirements.

4. Level Areas - security

- a. Same as paragraph A-2 above.

B. Long Term Containment

1. Slope/level areas, in addition to expanding/refining the emergency actions mentioned above in paragraph A above, long term containment has to address:

- a. Maintaining permanent seal of ground cover.
- b. Maintaining vegetation.
- c. Meeting local, state, and federal permit, registration, etc.

2. Slope/level areas - security

- a. Same as paragraph A 2 above.

AIR MONITORING - see Attachment No. 2

Attachments

cc: Andy Zownir
Jeff Pike, EPA Reg. III, OSC

Attachment No. 1

United States
Environmental Protection
Agency

Office of Emergency and
Remedial Response
Washington DC 20460

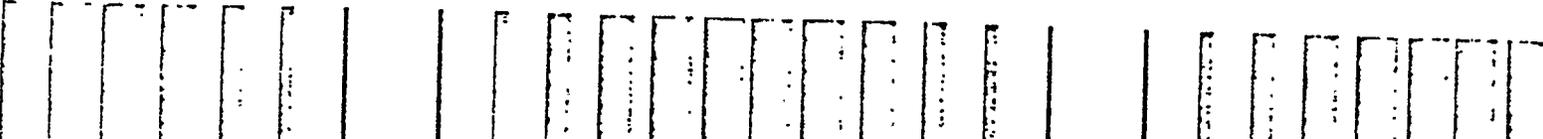
Office of Research and
Development
Municipal Environmental Re-
Laboratory
Cincinnati OH 45268

Technology Transfer

EPA

Handbook

Remedial Action at Waste Disposal Sites



ESTIMATED UNIT COSTS FOR SURFACE SEALING METHODS AND MATERIALS

<u>Cover material and/or method of installation</u>	<u>Unit costs*</u>	<u>Source of cost information</u>
Topsoil (sandy loam), hauling, spreading, and grading (within 20 miles)	\$13/yd ³	Haseley Trucking Company (1980)
Clay hauling, spreading, and compaction	\$8.50/yd ³	" " "
Sand hauling, spreading, and compaction	\$15/yd ³ \$8,000-10,000 /acre	" " " Universal Linings, Inc. (1980)
Cement concrete (4 to 6" layer), mixed, spread, compacted on-site	\$6-10/yd ²	Tolman et al., 1979
Bituminous concrete (4 to 6" layer), including base layer	\$3-5/yd ²	Tolman et al., 1979
Lime or cement, mixed into 5" cover soil	\$1.50-2.10/yd ²	Tolman et al., 1979
Bentonite, material only; 2" layer, spread and compacted	\$1.40/yd ²	Lutton et al., 1979
Sprayed asphalt membrane (¼" layer and soil cover), installed	\$1.50-2.50/yd ²	Lutton et al., 1979
PVC membrane (20 mil), installed	\$1.30-2.00/yd ²	" " "
Chlorinated PE membrane (20-30 mil), installed	\$2.40-3.20/yd ²	" " "
Elasticized polyolefin membrane, installed	\$2.70-3.60/yd ²	DuPont Elastomer Chemicals Dept. (1980)

--continued--

TABLE 3-2 (Continued)

<u>Cover material and/or method of installation</u>	<u>Unit costs*</u>	<u>Source of cost information</u>
Hypalon membrane, (30 mil), installed	\$6.50/yd ²	DuPont Elastomer Chemicals Dept., (1980)
Neoprene membrane, installed	\$5.00/yd ²	Lutton et al., 1979
Ethylene propylene rubber membrane, installed	\$2.70-3.50/yd ²	" " "
Butyl rubber membrane, installed	\$2.70-3.80/yd ²	" " "
Teflon-coated fiberglass (TFE) membrane (10 mil), installed	\$20/yd ²	DuPont Elastomer Chemicals Dept. (1980)
Fly ash and/or sludge, spreading, grading, and rolling	\$1.00-1.70/yd ²	Tolman et al., 1979

*Note different units for volume (yd³) vs. surface area (yd²) costs.

Hazardous Waste Site
Asbestos Air Monitoring Guide

DRAFT

I. ON SITE SAMPLE

A. Type of Samples

1. Bulk Pile Samples

a. Sample Size - 8 oz. Sample Jar

1. Type of Analysis

(a) PLM (all samples)- see attached analytical method.

(b) SEM or TEM- Select 1-4, highest positive PLM samples.

b. Sample Location

1. Develop site specific sampling grid. Consider real time monitor reading and site conditions.

2. Air Samples

a. Filter Media

1. 25 mm - 37mm cellulose 3-stage cassette (0.45 um - 0.80 um size)

b. Flow Rates- Liter per minute

1. Low real-time monitor readings:	<u>17.6</u>
2. Medium real-time monitor readings:	<u>7.5</u>
3. High real-time monitor readings:	<u>2.5</u>

c. Analytical Methods

1. 10% of samples collected - TEM or SEM

2. 90% of samples collected - PLM

(TEM) - Transmission Electron Microscopy

(SEM) - Scanning Electron Microscopy

(PLM) - Polarized Light Microscopy

B. Weather CONDITIONS (see II, B.(4). Below)

II. Preliminary Ambient Air Sampling Off Site

A. Screen area with real time aerosol or particulate instrument.

1. RAM-1 or equivalent

B. Sample Collection

1. Types of Analysis- Duplicate samples (A & B) are collected at each station.

a. Analyze all (A) samples from each station by PLM (see attached procedure)

1. If (A) samples are positive for asbestos then analyze a minimum of 25% of the appropriate (B) samples by:

(a) TEM with selected area electron diffraction (SAED) or

(b) SEM with Xray dispersion analysis (EXDA)

DRAFT

B. Sample Collection (cont'd)

2. Sampling grid (Station location)

a. Positive RAM readings

1. Maximum 500 feet downwind from site
2. Minimum of 1-2 samples per 1000 to 2000 feet perpendicular to wind direction adjacent to site.

b. Background stations

1. Minimum of 3 stations
2. angles of 45°, 90° and 135° 500 feet to 1 mile upwind of the site

3. Sampling Methodology at at each station

a. Media - 25mm or 37mm 3 stage casset 0.45 to 0.8 um

b. Flow rates

1. Low flow pumps (per station)

- (a) 2.5 l/min for minimum of 30 minutes

2. High flow pumps (Applicability/location) to be determined on site specific bases.

- (a) 7.45 liters/minutes for minimum of 30 minutes
(b) 17.5 liters/minutes for minimum of 30 minutes

4. Weather Conditions

- a. Minimum of 3 days of dry weather before sampling.
- b. Wind speed minimum of 10-15 mph at time of sampling.
- c. Soil condition should be dry/non-moist at time of sampling.

III. RESIDENTIAL- Non-Commercial Buildings (IF APPLICABLE)

A. Screening- Random selection of residence to be tested.

1. Residents directly adjacent to the disposal pile.

B. Selected areas for Settled Dust Sampling

1. Static areas

- a. Attic (ascertain type insulation or asbestos use in attic).
- b. Rafters- ie., attic, basement, crawlspace, etc.
- c. Garage

2. Living areas

- a. behind and/or underneath appliances, ie., refrigerators, stoves, etc.
- b. light fixtures
- c. embedded in perimeter of carpet (under tables, couch)
- d. surface areas of drapes.

DRAFT

C. Sampling Design

1. Since the emphasis is to qualitatively assess exposure, the primary effort should be directed towards identifying the presence of asbestos. This could best be achieved through the collection and analysis of settled dust. This should be accomplished by:
 - a. selecting areas as defined in B. 1 and 2. These areas should be measured so as to allow determination of fiber concentration per area sample. These types of measurements may be useful for comparison purposes in this study.

D. Sample Apparatus

1. Battery operated sampling pump capable of 2.5 to 3.5 liters per minute flow rate through a cellulose ester filter with porosity of 0.8 micron and 37mm diameter.

E. Sample procedures

1. The attempt is to collect settled dust from exposed surfaces onto the filter media.
 - a. The area to be selected, measured and sampled will vary depending on the amount of "free" dust on the surfaces. The person collecting the sample will need to make this assessment.

Since the sample should not be overloaded or underloaded, the following maybe used as general guides to determine flow rate and sample area. The purpose of the two different areas is to identify the appropriate sample load if additional sampling is required:

Heavily visible settled dust- (a) 0.5 ft.² at 3 l/min.
(b) 1 ft.² at 3 l/min.

Moderately visible settled dust- (a) 1.5 ft.² at 3 l/min.
(b) 3 ft.² at 3 l/min.

Lightly visible settled dust- (a) 1 m² at 3 l/min.
(b) 2 m² at 3 l/min.

No visible settled dust- (a) 2 m² at 3 l/min.

- b. A sample holder or cassette should be used in which the surface of the filter is at a minimum of 1/4 inch from the top of the surface.

DRAFT

E. Sample Procedures (cont'd)

The sample holder or cassette should be open faced and placed in contact with the surface to be sampled (The rim of the open faced cassette that contacts the surface should be notched to allow for reduced pressure buildup on the pump).

With the pump turned on, sample holder should be moved across the surface making sure the total defined area is sampled. Depending on the filter loading, repeated sampling across the same area may be warranted. Should the investigator decide that more particulate material is needed for proper filter loading, additional areas can be defined and measured for sampling. Using the same filter and procedures these areas should be likewise sampled. All areas should be physically measured by the investigator.

F. Sample Analysis

1. Optical Microscopy

- a. Filters should be prepared and analyzed by the most current NIOSH methodology by Phase Contract Microscopy.
- b. Concentration of fibers should be determined for unit area measured.

These fiber data should be used for comparison purposes in this study to assess extent of contamination and for making decisions for additional sampling and analysis.

2. Electron Microscopy

- a. A representative number of samples should be selected for fiber identification by either Scanning Electron Microscopy (SEM) or Transmission Electron Microscopy (TEM). These microscopy methodologies should be used for fiber count and also identification of the fibers, as well as the surrounding fiber matrix using Selected Area Electron Diffraction (SAED), TEM only, and/or Energy Dispersive X-Ray (EDX) analysis.

This data can be used for comparison with optical fiber counts and to ascertain the presence of asbestos. It may be possible to determine if asbestos contamination is the same type of fiber identified from the disposal piles.

- b. Soil surface samples should be prepared and analyzed in the same manner using Electron Microscopy.

DRAFT

FORMULA: various

FIBERS

METHOD: 7400

ISSUED: 2/15/84

SHA: 0.5 asbestos fibers (> 5 μm long)/mL

PROPERTIES: solid, fibrous

IOSH: 0.1 asbestos; 3 fibrous glass (> 10 μm long, < 3.5 μm wide)

CGIH: 0.2 crocidolite; 0.5 amosite; 2 chrysotile and other asbestos

SYNONYMS: asbestos (actinolite [CAS #77536-66-4], grunerite (amosite) [CAS #12172-73-5], anthophyllite [CAS #77536-67-5], chrysotile [CAS #12001-29-5], crocidolite [CAS #12001-28-4], tremolite [CAS #77536-68-6]); fibrous glass; mineral fibers.

SAMPLING	MEASUREMENT
WIPER: FILTER (cellulose ester membrane, 0.8 to 1.2 μm , 25 mm diameter)	! TECHNIQUE: MICROSCOPY, PHASE CONTRAST ! ANALYTE: fibers (manual count)
AIR FLOW RATE*: ≥ 0.5 L/min	! SAMPLE PREPARATION: acetone/triacetin method
VOLUME-MIN*: 400 L @ 0.1 fiber/mL VOLUME-MAX*: 1920 L @ 0.1 fiber/mL (DNE 1 mg total dust)	! COUNTING RULES: Set A (P&CAM 239 [1,2]) or Set B (modified CRS)
ADJUSTMENT: adjust for 100 to 1300 fibers/mm ² (step 4)	! EQUIPMENT: 1. phase-contrast microscope 2. Walton-Beckett graticule (100 μm diameter): A rules use Type G-22; B rules use Type G-24 3. phase-shift test slide (HSE/NPL)
EQUIPMENT: routine	! CALIBRATION: phase-shift detection limit between 3 and 4 degrees
SAMPLE STABILITY: indefinite	! ANALYTICAL RANGE: 100 to 1300 fibers/mm ² filter area [3]
REPRESENTATIVENESS: 10% of samples (minimum 2) [1]	! ESTIMATED LOD: 7 fibers/mm ² filter area
ACCURACY	! ANALYTICAL PRECISION: 0.10 to 0.12 (A rules)[1]; 0.157 (B rules)[3]
SCOPE STUDIED: 80 to 100 fibers counted	
REFERENCES: see Evaluation of Method	
OVERALL PRECISION: 0.115 to 0.13 [1]	

REPRODUCIBILITY: The working range is 0.02 fibers/mL (1920-L sample) to 1.25 fibers/mL (400-L sample). The method was designed to give an index of airborne asbestos fibers but may be used for other materials such as fibrous glass by inserting suitable parameters into the counting rules. The method does not differentiate between asbestos and other fibers. Asbestos fibers less than ca. 0.25 μm diameter will not be counted by this method [5].

REFERENCES: Any airborne fiber may interfere; all particles meeting the counting criteria will be counted. Chain-like particles may appear fibrous. High levels of non-fibrous dust particles may obscure fibers in the field of view and raise the detection limit.

RELATED METHODS: This method introduces changes for improved reproducibility and replaces SAM 239 [1,2].

REAGENTS:

1. Acetone.*
2. Triacetin (glycerol triacetate) (reagent grade).

*See Special Precautions.

EQUIPMENT:

1. Sampler: field monitor, 25 mm, 3-piece cassette with 50-mm extension cowl with cellulose ester filter 0.8 to 1.2 μm pore size.
NOTE: Analyze representative filters for fiber background before use and discard the filter lot if more than 5 fibers per 100 fields are found. Gridded filters give improved focusing capability for analysis and are recommended.
2. Personal sampling pump, ≥ 0.5 L/min (see step 4 for flow rate), with flexible connecting tubing.
3. Microscope, phase contrast, with green filter, 8 to 10X eyepiece, and 40 to 45X phase objective (total magnification ca. 400X), Numerical Aperture = 0.65 to 0.75.
4. Slides, glass, single-frosted, pre-cleaned, 25 x 75 mm.
5. Cover slips, 25 x 25 mm, no. 1-1/2.
6. Knife, #10 surgical steel, curved blade.
7. Tweezers.
8. Flask, Guth type, insulated neck, 250 to 500 mL (with single-holed rubber stopper and elbow-jointed glass tubing, 16 to 22 cm long).
9. Hotplate, spark-free, stirring type; or heating mantle; or infrared lamp and magnetic stirrer.
10. Syringe, hypodermic, with 22 gauge needle.
11. Graticule, Walton-Beckett type with 100 μm diameter circular field (area = 0.00785 mm²) (Type G-22 for A rules; Type G-24 for B rules). Available from Graticules Ltd., Morley Road, Tonbridge, Kent, England TN9, 1RN.
NOTE: The graticule is custom-made for each microscope. Specify disc diameter needed to fit exactly the ocular of the microscope and the diameter (mm) of the circular counting area (see step 11).
12. HSE/NPL phase contrast test slide, Mark II. Available from PTR Optics Ltd., 145 Newton Street, Waltham, MA 02154.
13. Telescope, phase-ring centering.
14. Stage micrometer (0.01 mm divisions).

SPECIAL PRECAUTIONS: Acetone is an extremely flammable liquid and precautions must be taken to ignite it. The acetone must be heated in a ventilated laboratory fume hood using a flameless, spark-free heat source.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line [1].
2. Fasten the sampler to the worker's lapel as close as possible to the worker's mouth. Remove the top cover from the end of the cowl extension (open face) and orient face down. Wrap the joint between the extender and monitor body with shrink tape to prevent air leaks.
3. Submit at least two field blanks (or 10% of the total samples, whichever is greater) for each set of samples. Remove the caps from the field blank cassettes and store the caps and cassettes in a clean area (bag or box) during the sampling period. Replace the caps in the cassettes when sampling is completed.

NOTE: If a field blank yields fiber counts greater than 7 fibers/100 fields, report possible contamination of the samples.

4. Sample at 0.5 L/min or greater [6]. Do not exceed 1 mg total dust loading on the filter. Adjust sampling flow rate, Q (L/min), and time to produce a fiber density, E (fibers/mm²), of 100 to 1300 fibers/mm² (3.85×10^4 to 5×10^5 fibers per 25-mm filter with 385 mm² effective collection area, A_c (mm²)), for optimum counting precision. Calculate the minimum sampling time, t_{min} (minutes), at the action level (one-half the current standard), L (fibers/mL), of the fibrous aerosol being sampled:

$$t_{\min} = \frac{(A_c)(E)}{(Q)(L)10^3}$$

5. Remove the field monitor at the end of sampling, replace the plastic top cover and small end caps, and store the monitor.
5. Ship the samples in a rigid container with sufficient packing material to prevent jostling or damage.

SAMPLE PREPARATION:

NOTE: The object is to produce samples with a smooth (non-grainy) background in a medium with a refractive index equal to or less than 1.46. The method below collapses the filter for easier focusing and produces permanent mounts which are useful for quality control and interlaboratory comparison. Other mounting techniques meeting the above criteria may also be used (e.g., the non-permanent field mounting technique used in P&CAM 239 [2]).

1. Clean the glass slides and cover slips with acetone and set aside.
2. Place 40 to 60 mL of acetone into a Guth-type flask. Stopper the flask with a single-hole rubber stopper through which a glass tube extends 5 to 8 cm into the flask. The portion of the glass tube which exits the top of the stopper (8 to 10 cm) is bent downward in an elbow which makes an angle of 20 to 30° with the horizontal.
3. Place the flask on a stirring hotplate or wrap in a heating mantle. Heat the acetone gradually to its boiling temperature (ca. 58 °C).

CAUTION: The acetone vapor must be generated in a ventilated fume hood away from all open flames and spark sources.

NOTE: Alternate heating methods can be used, providing no open flame or sparks are present.

1. Mount either the whole sample filter or a wedge cut from the sample filter on a clean glass slide.
 - a. Cut wedges of ca. 25% of the filter area with a curved blade steel surgical knife using a rocking motion to prevent tearing.
 - b. Place the filter or wedge, dust side up, on the clean glass slide. Static electricity will usually keep the filter on the slide until it is cleared.

- c. Hold the glass slide supporting the filter wedge approximately 1 to 2 cm from the glass tube port where the acetone vapor is escaping from the heated flask. The acetone vapor stream should cause a condensation wet spot on the glass slide ca. 2 to 3 cm in diameter. By moving the glass slide gently in front of the vapor stream, the filter wedge should clear in 2 to 5 sec. If the filter wedge curls, distorts, or is otherwise rendered unusable, the vapor stream is probably not strong enough. Periodically wipe the outlet port with tissue to prevent liquid acetone dropping onto the filter.
 - d. Using the hypodermic syringe with a 22-gauge needle, place 1 to 2 drops of triacetin on the wedge. Gently lower a clean 25-mm square cover slip down onto the wedge at a slight angle to reduce the possibility of forming bubbles. If too many bubbles form or the amount of triacetin is insufficient, the cover slip may become detached within a few hours.
 - e. Glue the edges of the cover slip to the glass slide using a lacquer or nail polish [7].
- NOTE: Counting may proceed immediately after clearing of the filter is completed. If clearing is slow, the slide preparation may be heated on a hotplate (surface temperature 50 °C) for 15 min to hasten clearing.

CALIBRATION AND QUALITY CONTROL:

1. Calibration of the Walton-Beckett graticule. Determine the diameter, d_c , of the circular counting area:
 - a. Insert any available graticule into the eyepiece and focus so that the graticule lines are sharp and clear.
 - b. Set the appropriate interpupillary distance, and if applicable, reset the binocular head adjustment so that the magnification remains constant.
 - c. Install the 40X or 45X phase objective.
 - d. Place a stage micrometer on the microscope object stage and focus the microscope on the graduated lines.
 - e. Measure the magnified grid length, L_0 (μm), using the stage micrometer.
 - f. Remove the graticule from the microscope and measure its actual grid length, L_a (mm). This can best be accomplished by using a stage fitted with verniers.
 - g. Calculate the circle diameter, d_c (mm), for the Walton-Beckett graticule:

$$d_c = \frac{L_a}{L_0} \times D$$

- Example: If $L_0 = 108 \mu\text{m}$, $L_a = 2.93 \text{ mm}$ and $D = 100 \mu\text{m}$, then $d_c = 2.71 \text{ mm}$.
- h. Check the circle diameter (acceptable range $100 \mu\text{m} \pm 2 \mu\text{m}$) with a stage micrometer upon receipt of the graticule from the manufacturer. Determine field area (μm^2).
 2. Microscope adjustments. Follow the manufacturer's instructions and:
 - a. Adjust the light source for even illumination across the field of view at the condenser iris.

NOTE: Köhler illumination is preferred, where available.
 - b. Focus on the particulate material to be examined.
 - c. Make sure that the field iris is in focus, centered on the sample, and open only enough to fully illuminate the field of view.
 - d. Ensure that the phase rings (annular diaphragm and phase-shifting elements) are concentric.
 3. Check the phase-shift detection limit of the microscope periodically.
 - a. Remove the HSE/NPL phase-contrast test slide from its shipping container and center it under the phase objective.

b. Bring the blocks of grooved lines into focus.

NOTE: The slide consists of 7 sets of grooves (approximately 20 grooves to each block) in descending order of visibility from set 1 to set 7. The requirements for asbestos counting are that the microscope optics must resolve the grooved lines in set 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 and 7 must be invisible. Sets 4 and 5 must be at least partially visible, but may vary slightly in visibility between microscopes. A microscope which fails to meet these requirements precisely has either too low or too high a resolution to be used for asbestos counting.

c. If the image quality deteriorates, clean the microscope optics and consult the microscope manufacturer.

14. Quality control of fiber counts.

a. Prepare and count field blanks along with the field samples. Report the counts on each blank. Calculate the mean of the blank counts, and subtract this value from each sample count before reporting the results.

b. Perform blind recounts by the same counter on 10% of filters counted (slides relabeled by a person other than the counter).

15. Use the following test to determine whether a pair of counts on the same wedge should be rejected because of possible bias. This statistic estimates the counting repeatability at the 95% confidence level. Discard the sample if the difference between the two counts exceeds $2.77(F)s_p$, where F = average of the two fiber counts, and s_p = relative standard deviation, which should be derived by each laboratory based on historical in-house data.

NOTE: If a pair of counts is rejected as a result of this test, recount the entire set of samples and test the new counts against the first counts. Discard all rejected paired counts.

16. Enroll each new counter in a training course which compares performance of counters on a variety of samples using this procedure.

NOTE: To ensure good reproducibility, all laboratories engaged in routine asbestos counting should participate in an asbestos proficiency testing program such as the NIOSH Proficiency Analytical Testing (PAT) Program and routinely participate with other asbestos fiber counting laboratories in the exchange of field samples to compare performance of counters.

ANALYTICAL PROCEDURE

17. Place the slide on the mechanical stage of the calibrated microscope with the center of the wedge under the objective lens. Focus the microscope on the plane of the filter wedge.

NOTE: The use of gridded filters can be very helpful in locating the proper specimen plane.

18. Regularly check phase-ring alignment and Köhler illumination [5].

19. Select one of the following sets of counting rules:

NOTE: The two sets of rules have been demonstrated to produce equivalent mean counts on a variety of asbestos sample types [4], and must be strictly followed in order to obtain valid results. No hybridizing of the two sets of rules is permitted. The calibration of the microscope with the HSE/NPL test slide determines the minimum detectable fiber diameter (ca. 0.25 μm).

a. A rules (same as P&CAM 239 rules [2]).

NOTE: The A rules are required for monitoring asbestos for compliance purposes under OSHA or NIOSH standards.

1. Count only fibers longer than 5 μm . Measure the length of curved fibers along the curve.

2. Count only fibers with a length-to-width ratio equal to or greater than 3:1.
3. For fibers which cross the boundary of the graticule field:
 - a. Count any fiber longer than 5 μm which lies entirely within the graticule area.
 - b. Count as 1/2 fiber, any fiber with only one end lying within the graticule area.
 - c. Do not count any fiber which crosses the graticule boundary more than once.
 - d. Reject and do not count all other fibers.
4. Count bundles of fibers as one fiber unless individual fibers can be identified by observing both ends of a fiber, and it meets rules a.1 and a.2.
5. Count enough graticule fields to yield 100 fibers. Count a minimum of 20 fields. Stop at 100 fields regardless of fiber count.

b. B rules

NOTE: The B rules are preferred analytically because of their demonstrated ability to improve the reproducibility of fiber counts [4].

1. Count only ends of fibers. Each fiber must be longer than 5 μm and less than 3 μm diameter.
2. Count only ends of fibers with a length-to-width ratio equal to or greater than 5:1.
3. Count each fiber end which falls within the graticule area as one end, provided that the fiber meets rules b.1 and b.2.
4. Count visibly free ends which meet rules b.1 and b.2 when the fiber appears to be attached to another particle, regardless of the size of the other particle.
5. Count the free ends of fibers emanating from large clumps and bundles up to a maximum of 10 "ends" (5 fibers), provided that each segment meets rules b.1 and b.2.
6. Count enough graticule fields to yield 200 "ends." Count a minimum of 20 fields. Stop at 100 fields, regardless of the fiber count.
7. Divide the total "end" count by 2 to yield fiber count.

NOTE: Split fibers will normally be counted as more than 2 "ends" if the free ends meet the rules b.1. and b.2.

3. Start counting from one end of the wedge and progress along a radial line to the other end, shift either up or down on the wedge, and continue in the reverse direction [8]. Select fields randomly by looking away from the eyepiece briefly while advancing the mechanical stage. When an agglomerate covers 1/6 or more of the field of view, reject the field and select another. Do not report rejected fields in the number of total fields counted.

NOTE: When counting a field, continuously scan a range of focal planes by moving the fine focus knob, to detect very fine fibers which have become imbedded in the filter. The small diameter fibers will be very faint but are an important contribution to the total count.

CALCULATIONS:

1. Calculate and report fiber density on the filter, E (fibers/ mm^2), by dividing the total fiber count, F , minus the mean blank count, B , by the number of fields, n , and the field area, A_f (0.00785 mm^2 for a properly calibrated Walton-Beckett graticule):

$$E = \frac{(F - B)}{(n)(A_f)}, \text{ fibers}/\text{mm}^2$$

2. Calculate the concentration, C (fibers/mL), of fibers in the air volume sampled, V (L), using the effective collection area of the filter, A_c (385 mm^2 for a 25-mm filter):

$$C = \frac{(E)(A_c)}{V \cdot 10^3}$$

NOTE: Check and adjust the value of A_c periodically, if necessary.

EVALUATION OF METHOD:

This method is a revision of NIOSH Method P&CAM 239 [1,2]. A summary of the revisions is:

A. Sampling

The change from a 37-mm to a 25-mm filter size was incorporated to reduce problems associated with non-uniform fiber loading reported on the 37-mm filters [8]. The change in flow rates allows for 2 m³ full shift samples to be taken, providing that the filter is not overloaded with non-fibrous particulates.

3. Sample Evaluation

1. The inclusion of the Walton-Beckett graticule in the method was made to standardize the field area observed through the eyepiece [3].
2. The introduction of the HSE/NPL test slide was made to standardize microscope optics to improve reproducibility.
3. A recent international collaborative study involved 16 laboratories using prepared slides from the asbestos cement, milling, mining, textile, and friction material industries [4]. The modified CRS (NIOSH B) rules were found to be more precise than the AIA (NIOSH A)* rules. The ranges of relative standard deviations (s_r), which varied with sample type and laboratory, were:

4. Because of past inaccuracies associated with low fiber counts, the minimum loading has been increased to 100 fibers/mm² filter area (80 fibers total count). This level yields an overall $s_r = 0.13$, as indicated in Fig. 3 (revised) of P&CAM 239 [1], which corresponds to an analytical $s_r = 0.12$ after removal of pump error [10]. Similarly at the maximum count of 100 fibers, overall $s_r = 0.115$ and analytical $s_r = 0.10$ are obtained.

	s_r (Intralaboratory)	s_r (Interlaboratory)	s_r (Overall)
AIA (NIOSH A Rules)*	0.12 to 0.40	0.27 to 0.85	0.46
Modified CRS (NIOSH B Rules)	0.11 to 0.29	0.20 to 0.35	0.25

*Under AIA rules, only fibers having a diameter less than 3 μm are counted and fibers attached to particles larger than 3 μm are not counted. NIOSH A rules are otherwise similar to the AIA rules.

The B rules have also been favorably received by analysts as less ambiguous and simpler to use; these rules also showed the least bias relative to AIA rules in the collaborative study. An independent NIOSH laboratory study using amosite fibers reported a relative standard deviation of 0.157 for the B rules [9].

Relative Levels of Count by Different Counting Rules* [4]

Sample Type	Number of Samples	Aspect Ratio > 3:1		Aspect Ratio > 5:1	
		AIA	Mod. CRS	AIA	Mod. CRS
Mining	10	100	127	74	92
Milling	10	100	112	84	95
Asbestos Cement	14	100	146	90	137
Textile Chrysotile	10	100	109	89	99
Friction Material	10	100	130	87	116
Others (Insulation, Amosite)	6	100	127	92	118
Mean	—	<u>100</u>	<u>125</u>	<u>86</u>	<u>110</u>

*Arithmetic means of counts made by different laboratories relative to the AIA (> 3:1) counts.

Sample Preparation Technique

The acetone vapor-triacetin preparation technique has been incorporated in the method as a faster and more permanent mounting technique than the dimethyl phthalate/diethyl oxalate method [2].

Evaluation of the method using the A and B counting rules will proceed on a continuing basis through the NIOSH Proficiency Analytical Testing (PAT) Program. The new PAT reporting form allows for reporting of results by either set of rules as of January, 1984.

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