LIMITED-SCOPE ASBESTOS SURVEY REPORT

Minneapolis Public Housing Authority
630 Cedar Avenue South, Cedar Hi Apts

Minneapolis, Minnesota

Angstrom No.00-0616

Prepared by:

Angstrom Analytical Inc.
12203 Princeton Avenue
Eden Prairie
MN 55347
(612) 941-4805

June 16th, 2000

Table Of Contents

LIMITED-SCOPE ASBESTOS SURVEY REPORT

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1.0 Introduction

1.1 Purpose

Angstrom Analytical, Inc. (Angstrom), was contracted to perform a survey for asbestos-containing materials (ACM) for Minneapolis Public Housing Authority at 630 Cedar Avenue South in Minneapolis, Minnesota. The purpose of the survey was to identify and assess ***accessible*** materials that contain asbestos so as to provide a limited survey and inventory of ***accessible*** ACM. Angstrom's services were requested by Mr. Michael H. Barrowclough, Central Heating Chief Engineer, Minneapolis Public Housing Authority.

1.2 Scope of Work

From 5/15/00 to 6/7/00, MN licensed asbestos inspectors as representatives of Angstrom Analytical, Inc. conducted a building survey for the identification and assessment of accessible suspect ACM. This survey was conducted on all floors, excluding mechanical areas (as they have been previously surveyed and are included for reference as Appendix 2 in this report) of 630 Cedar Avenue South in Minneapolis, Minnesota. To date, the following work has been completed:

A walk-through of the building's interior spaces, with observations of accessible suspect ACM and assessment of potential hazards from suspect ACM.

Suspect ACM bulk sample collection from representative areas and material types.

Analysis of bulk samples by polarized light microscopy using U.S. Environmental Protection Agency (EPA) Method 600/M4-82-020.

Preparation of this building survey report, including sample analysis results.

Compilation of an inventory of the identified ACM.

2.0 Project Results

2.1 Area of Investigation

The project consisted of 1 structure which is scheduled to be subject to limited renovation and is described in this report as follows:

- **630 Cedar Avenue South, Minneapolis**, a twenty-five-story brick constructed apartment building containing 191 apartments plus various common areas. This structure is one of four buildings at this particular complex (Cedars). There are various common laundry / service rooms throughout the structure. Hot water heat is used throughout the building. Evidence of recent remodeling and new construction on the ground floor was noted. This was confirmed by the on-site manager(s).

The name of this building / structure was designated or taken from verbal and written information Angstrom personnel received from Mr. Michael Barrowclough with Minneapolis Public Housing Authority Building materials were identified and assessed in all representative areas requested by Mr. Barrowclough. Exempted areas include, but are not limited to, the mechanical room(s), see Appendix 2 of this report, and inaccessible areas that would need demolition of major building components, sheetrock or plaster on lath ceilings, walls and various pipechases.

These materials were then grouped into homogenous systems and sampled, as explained in section 4.0 "Asbestos Building Survey Remarks." The survey did not include inaccessible interior components (e.g. pipe insulation in concealed chases).

2.2 Bulk Analysis Results

Please refer to the following section of this report for the analytical laboratory results of the samples collected, quantities, the response ratings and the material's locations.

Abbreviation Code List

DAMAGE POTENTIAL - damage potential of the material

PSD - potential for significant damage
PD - potential for damage

COND - condition of material

N - little or no damage
D - moderate damage
SD - significant damage

UNITS - units of measurement

LF - linear foot
SF - square foot
EA - fitting

MATERIAL

CP - ceiling panel
CT - ceiling tile
CTA - ceiling tile adhesive
FT - floor tile
FTA - floor tile adhesive
BB - baseboard
BBA - baseboard adhesive
PI - pipe insulation
PFI - pipe fitting insulation
FG - fiberglass
corr - corrugated paper

TYPE OF ASBESTOS

ANTH - Anthophyllite
CHR - Chrysotile
AM - Amosite
CROC - Crocidolite
ACT - Actinolite
TREM - Tremolite

* These samples were not analyzed. These results were inferred as consistent with the analyzed samples in the homogeneous set.

ND - No asbestos was detected in the sample submitted for analysis.
NS - Material not sampled.
NAC - Material not accessible.
< - less than the value specified.

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Angstrom Analytical & Environmental Services

Building Name: 630 Cedar Avenue South, Minneapolis
Survey Date: 5/15/00 to 6/13/00
Project No. Minneapolis Public Housing Authority
Attn: Michael H. Barrowclough
Central Heating Chief Engineer
1611 South 6th Street
Minneapolis, Minnesota 55454

PSD = potential for significant damage
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Location	Material Identification	Sample Number	Types of Asbestos	%	Quantity	Units	Cond.	Damage Potential	Response Rating
Apartment 1306	12"x12" tan-speckled floor tile	1 to 3	ND	-	500-550	SF	N	PD	0
"	black floor tile mastic	4 to 6	CHR	2-3	500-550	SF	N	PD	1
"	tan cove base	7 to 9	ND	-	120-150	LF	N	PD	0
"	brown cove base adhesive	10 to 12	ND	-	120-150	LF	N	PD	0
Bathroom	brown cove base	13 to 15	ND	-	10-12	LF	N	PD	0
"	brown cove base adhesive	16 to 18	ND	-	10-12	LF	N	PD	0
"	12"x12" white floor tiles	19 to 21	ND	-	25-30	SF	N	PD	0
"	black floor tile mastic	22 to 24	CHR	2-3	25-30	SF	N	PD	1
Walls and Ceilings	sheetrock	25 to 27	ND	-	2000-3000	SF	N	PD	0
Throughout	white ceiling texture	28 to 30	CHR	3-5	500-600	SF	N	PD	3
Kitchen	sink undercoating	31 to 33	CHR	5-8	1	EA	N	PD	2
25th Floor Corridor	12"x12" tan floor tiles	34 to 36	CHR	1-2	550-600	SF	N	PD	1
"	black floor tile mastic	37 to 39	CHR	2-3	550-600	SF	N	PD	1
"	tan cove base	40 to 42	ND	-	200-250	LF	N	PD	0
"	tan cove base adhesive	43 to 45	ND	-	200-250	LF	N	PD	0
"	white ceiling texture	46 to 48	CHR	2-3	550-600	SF	N	PD	3
"	sheetrock	49 to 51	ND	-	1500-2500	SF	N	PD	0

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Location	Material Identification	Sample Number	Types of Asbestos	%	Quantity	Units	Cond.	Damage Potential	Response Rating
25th Floor Janitor's Rm	TSI on fitting	52 to 54	ND	-	10-15	EA	D	PD	0
25th Floor Stairwell	skim coat on walls	55 to 57	ND	-	160-200	SF	N	PD	0
"	cove base stringer	58 to 60	ND	-	40-60	LF	N	PD	0
"	brown cove base adhesive	61 to 63	ND	-	40-60	LF	N	PD	0
"	sheetrock	Ref 49 to 51	ND	-	170-200	SF	N	PD	0
Apartment 2504	ceiling texture	64 to 66	CHR	2-3	500-600	SF	N	PD	3
"	sheetrock, tape & compound	67 to 69	CHR	<1	1000-1500	SF	N	PD	0
20th Floor Corridor	same as 25th floor corridor	-	-	-	-	-	-	-	-
13th Floor Corridor	same as 25th floor corridor	-	-	-	-	-	-	-	-
13th Floor Stairwell	same as 25th floor stairwell	-	-	-	-	-	-	-	-
4th Floor Stairwell	same as 25th floor stairwell	-	-	-	-	-	-	-	-
4th Floor Corridor	same as 25th floor corridor	-	-	-	-	-	-	-	-
4th Floor Corridor	sheetrock	70 to 72	ND	-	1500-2500	SF	N	PD	0
Main Fl Compactor Rm	TSI on fittings	73 to 75	ND	-	30-40	EA	D	PD	0
"	sheetrock, tape & compound	76 to 78	ND	-	40-50	SF	N	PD	0

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Location	Material Identification	Sample Number	Types of Asbestos	%	Quantity	Units	Cond.	Damage Potential	Response Rating
Main Floor									
South Corridor	ceiling texture	79 to 81	CHR	<1	100	SF	SD	PD	0
"	sheetrock	Ref 76 to 78	ND	-	250-300	SF	N	PD	0
"	tan cove base adhesive	82 to 84	ND	-	50-60	LF	N	PD	0
"	brown cove base adhesive	85 to 87	ND	-	50-60	LF	N	PD	0
Elevator Lobby	2'x2' ceiling tiles	88 to 90	ND	-	1000-1500	SF	N	PD	0
Janitor's Closet	12"x12" brown floor tiles	91 to 93	CHR	1-2	20-25	SF	D	PD	1
"	black floor tile mastic	94 to 96	CHR	3-5	20-25	SF	N	PD	1
"	ceiling texture	Ref 79 to 81	CHR	<1	20-25	SF	D	PD	0
"	sheetrock	Ref 76 to 78	ND	-	120-150	SF	N	PD	0
Social Workers Office	2'x4' fissured ceiling tiles	97 to 99	ND	-	120-150	SF	N	PD	0
"	sheetrock, tape & compound	100-102	ND	-	300-350	SF	N	PD	0
"	12"x12" floor tiles	103 to 105	ND	-	120-150	SF	N	PD	0
"	tan cove base	Ref 82 to 84	ND	-	30-40	LF	N	PD	0
"	brown cove base adhesive	Ref 85 to 87	ND	-	30-40	LF	N	PD	0
"	TSI on fittings	Ref 73 to 75	ND	-	5-7	EA	N	PD	0

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Location	Material Identification	Sample Number	Types of Asbestos	%	Quantity	Units	Cond.	Damage Potential	Response Rating
Main Floor									
Restrooms	ceiling texture	Ref 79 to 81	CHR	<1	50-60	SF	N	PD	0
"	sheetrock	Ref 76 to 78	ND	-	350-450	SF	N	PD	0
Laundry Room	2'x4' ceiling tiles	Ref 97 to 99	ND	-	600-700	SF	N	PD	0
"	TSI on fittings	Ref 73 to 75	ND	-	25-30	EA	N	PD	0
"	sheetrock	Ref 100-102	ND	-	250-300	SF	N	PD	0
"	window caulk / black tar	106 to 108	CHR	<1	30	LF	N	PD	0
Library	2'x2' ceiling tiles	Ref 88 to 90	ND	-	550-600	SF	N	PD	0
"	sheetrock	Ref 76 to 78	ND	-	600-700	SF	N	PD	0
"	TSI on fitting	Ref 73 to 75	ND	-	10-15	EA	N	PD	0
Basement									
North Office Area	2'x2' ceiling tiles	Ref 88 to 90	ND	-	900-1000	SF	N	PD	0
"	ceiling texture	109 to 111	CHR	3-5	900-1000	SF	N	PD	0
"	sheetrock	112 to 114	ND	-	500-600	SF	N	PD	0
"	12"x12" floor tiles	Ref 103-105	ND	-	900-1000	SF	N	PD	0
West Office Area	TSI on fittings	115 to 117	ND	-	10-15	EA	N	PD	0
"	2'x2' ceiling tiles	Ref 88 to 90	ND	-	200-230	SF	N	PD	0

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Location	Material Identification	Sample Number	Types of Asbestos	%	Quantity	Units	Cond.	Damage Potential	Response Rating
Basement Continued									
West Office Area Cont.	12"x12" floor tiles	Ref 103-105	ND	-	200-250	SF	N	PD	0
"	sheetrock	Ref 112-114	ND	-	300-400	SF	N	PD	0
Lunch Room	12"x12" floor tiles	Ref 103-105	ND	-	300-350	SF	N	PD	0
"	2'x2' ceiling tiles	Ref 88 to 90	ND	-	300-350	SF	N	PD	0
"	TSI on fittings	Ref 115-117	ND	-	10-15	EA	N	PD	0
"	sheetrock	Ref 112-114	ND	-	1000-1500	SF	N	PD	0
"	tan cove base adhesive	Ref 82 to 84	ND	-	50-60	LF	N	PD	0
"	brown cove base adhesive	Ref 85 to 87	ND	-	50-60	LF	N	PD	0
Elevator Lobby	2'x2' ceiling tiles	Ref 88 to 90	ND	-	200-250	SF	N	PD	0
"	sheetrock	Ref 112-114	ND	-	1000-1300	SF	N	PD	0
"	12"x12" floor tiles	Ref 103-105	ND	-	250-300	SF	N	PD	0
"	tan cove base	Ref 82 to 84	ND	-	50-60	LF	N	PD	0
"	brown cove base adhesive	Ref 85 to 87	ND	-	50-60	LF	N	PD	0
Classroom	2'x4' ceiling tiles	Ref 97 to 99	ND	-	650-700	SF	N	PD	0
"	sheetrock	Ref 112-114	ND	-	800-900	SF	N	PD	0
"	TSI on fitting	Ref 115-117	ND	-	15-20	EA	N	PD	0
"	tan cove base	Ref 82 to 84	ND	-	110-120	SF	N	PD	0

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Location	Material Identification	Sample Number	Types of Asbestos	%	Quantity	Units	Cond.	Damage Potential	Response Rating
Basement Continued									
Classroom Continued	brown cove base adhesive	Ref 85 to 87	ND	-	110-120	LF	N	PD	0
Maintenance	TSI on fittings	Ref 115-117	ND	-	10-12	EA	N	PD	0
South Storage Room	sheetrock	Ref 112-114	ND	-	120-130	SF	N	PD	0
Restrooms	sheetrock	Ref 112-114	ND	-	600-650	SF	N	PD	0
Apartment 907	same as Apt 1306	-	-	-	-	-	-	-	-
Apartment 1608	same as Apt 1306	-	-	-	-	-	-	-	-

630 Cedar Avenue South - Discussion

630 Cedar Avenue South, Minneapolis, a twenty-five-story brick constructed apartment building containing 191 apartments plus various common areas. This structure is one of four buildings at this particular complex (Cedars). There are various common laundry / service rooms throughout the structure. Hot water heat is used throughout the building. Evidence of recent remodeling and new construction on the ground floor was noted. This was confirmed by the on-site manager(s).

Representative bulk samples of suspect ACM were acquired from the building. Materials considered suspect and subsequently sampled included:

- Sheetrock
- Various floor tiles and associated mastics
- TSI on fittings
- Various ceiling tiles
- Sink undercoating
- Cove base and associated adhesives
- Ceiling texture
- Skim coat on walls
- Window caulk

Of the materials sampled, the following were found to be asbestos-containing (pursuant to EPA definitions):

- **Black floor tile mastic beneath non-ACM 12"x12" floor tiles**
- **12"x12" white floor tiles and the associated black mastic**
- **Ceiling texture**
- **Sink undercoating**

Specifically:

Black floor tile mastic beneath non-ACM 12"x12" floor tiles:

- Approximately 525 to 575 square feet of black floor tile mastic beneath non-ACM 12"x12" floor tiles in each apartment. Mastic appears to be in generally good condition.

12"x12" Floor Tiles and Associated Mastics –

- Approximately 550 to 600 square feet of 12"x12" tan floor tiles plus the associated black floor tile mastic in each of the upper twenty-five corridors. Floor tiles and mastics were found to be in generally good condition.
- Approximately 20 to 25 square feet of 12"x12" floor tiles with associated black mastic in the Main floor Janitor's Closet in generally fair condition.

Ceiling Texture

- Approximately 500 to 600 square feet of white ceiling texture in each dwelling unit in generally good condition.
- Approximately 550 to 600 square feet of white ceiling texture in each of the upper twenty five corridors in generally good condition.
- Approximately 900 to 1,000 square feet of white ceiling texture in the north office area of the basement in generally good condition.

Sink Undercoating

- Gray sink undercoating on the kitchen sinks in the dwelling units in generally good condition.

2.3 Response Action Ratings and Alternatives

There are four recognized alternative courses of action to control ACMs in buildings: (1) removal and disposal; (2) enclosure; (3) encapsulation; and (4) no action, with implementation of an operations and maintenance (O & M) / continued surveillance program. The selection of any particular alternative should be based on intended use of the building, exposure potential, construction or demolition activity, cost, and current regulations.

Each Assessment Table includes a response action based on factors such as friability, accessibility, potential for disturbance, etc. Definitions for the response ratings are listed below:

0 = Material does not contain detectable amounts of asbestos and requires no asbestos related abatement action.

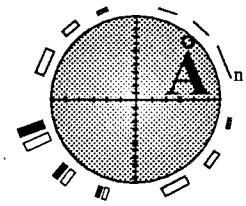
1 = Material contains asbestos, was nonfriable, and requires no abatement action unless sanded, abraded, drilled, or otherwise disturbed. We recommend periodic reassessment of condition.

2 = Material contains asbestos and was friable. Damage was not observed; no immediate abatement action is required. We recommend periodic inspections for confirmation of the condition of the material.

3 = Material contains asbestos, was friable, and shows signs of localized damage with a potential for disturbance. Repair or removal is recommended to reduce the potential for fiber release. Periodic inspections are highly recommended.

4 = Material contains asbestos, was significantly damaged, and immediate removal is recommended.

2.4 Photography



ngstrom Analytical

Plates 1 & 2: Showing the ceiling texture (ACM) in Apt. # 907 and on the 25th floor corridor in 630 Cedar Avenue, Minneapolis.

Plates 3 & 4: Showing the 12" x 12" floor tile and mastic (ACM) - typical throughout.

3.0 RECOMMENDATIONS

3.1 Long-Term Response Actions

Please note that any asbestos-containing building materials that may become friable during demolition must be removed prior to that time, pursuant to EPA National Emissions Standards for Hazardous Air Pollutants regulations.

3.2 Deferred Action Consideration

The EPA has indicated that there are no longer grounds for completely deferring action once asbestos is identified in a building. Under ideal conditions (minimum access by occupants, no mechanical vibrations, no physical or water damage, no excessive airstream exposure, etc.), the minimum corrective action should be implementation of an O&M program and periodic surveillance of the material. An O&M program would require the identification of all accessible asbestos in the building and establishment of guidelines for proper safety precautions, cleaning methods, etc., that should be undertaken when emergency or routine maintenance work may disturb asbestos.

Please note that recommendations in this report to defer action regarding certain materials are accompanied by a recommendation to implement an O&M program. A recommendation to defer action means that, in our opinion, the condition of the particular material at the time of observation was such that release of airborne fibers appeared relatively low, and that other response actions did not appear to be warranted at the time. Any changes in the condition of the material may warrant corrective actions at a later date. The effective management of these particular situations is, therefore, crucial.

4.0 Asbestos Building Survey Remarks

Prior to the collection of bulk material samples, suspect ACM was categorized into homogeneous material types and areas. A homogeneous material type is defined as friable or nonfriable suspect ACM that has the same visual appearance (color, texture, pattern), that was either applied or constructed during the same general time period. Material composition appeared to be consistent within a defined type and area. Friable materials are those that can be crushed, pulverized, or reduced to powder by hand-pressure when dry.

The samples were collected at random locations from the predetermined homogeneous sampling areas to provide analytical data to document and evaluate current site conditions. Data were obtained from discrete sample locations, and no guarantee is given that the inferred conditions currently exist. Materials were wetted prior to sampling to minimize potential fiber release; the samples were then sealed in polyethylene bags.

Bulk samples were analyzed according to EPA Method 600/M4-82-020, utilizing polarized light microscopy and dispersion staining techniques. The lower detection limit for verification of bulk asbestos fibers is 1 percent asbestos by volume. The method cited above provides the percentage of asbestos present and distinguishes the following types of asbestos: chrysotile, amosite, crocidolite, tremolite, actinolite, and anthophyllite. The portions of the samples that were not consumed in the analysis will be retained by Angstrom for a period of 30 days from the date of this report. The samples will be disposed of if Angstrom does not receive written notification prior to the 20th day.

The sets of samples from each homogeneous area were analyzed until positive. That is, under the EPA guidelines, once a sample in a set from a homogeneous material is found to contain greater than one percent asbestos by volume, the homogeneous material area is assumed to contain asbestos and additional sample analysis is terminated. This information is used only to determine whether a material is ACM and the appropriate response actions that should be taken.

Any discussion or recommendations contained in this report represent our professional opinions. These opinions are based on currently available information and are arrived at in accordance with currently accepted industrial hygiene practices at this time and location. Other than this, no guarantee is implied or intended.

The recommendations contained in this report represent our professional opinions. These opinions are based on currently available information and are arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

This report was prepared by **Angstrom Analytical, Inc.**

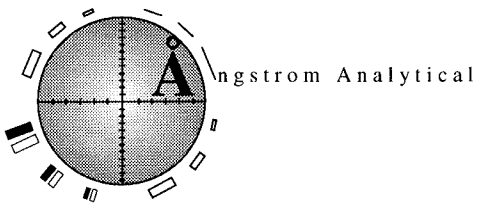
Date 6/16/00

Charles Tye
Asbestos Inspector #13395
Certified by State of Minnesota

Date 6-16-00

Les Plath
Asbestos Inspector #13390
Certified by State of Minnesota

5.0 Licenses & Certifications



MINNESOTA
MDH
DEPARTMENT of HEALTH

Angstrom Analytical, Inc.
12203 Princeton Avenue
Eden Prairie, MN, 55347

is hereby authorized in accordance with Minnesota Rules, parts 4761.1000 - 4761.1230, to practice in the State of Minnesota as a:

Lead Certified Firm
License No. 127
Expires 5/1/02

This certificate is nontransferable.

Patricia A. Bloomgren

Jan K. Malcom
Commissioner

Patricia A. Bloogren, Director
Division of Environmental Health

Minnesota Department of Health

Asbestos Contractor License

License Number: 413 *Issued on: November 1, 2000*

To

Angstrom Analytical, Inc.
12203 Princeton Avenue
Eden Prairie, MN 55347

Responsible Individual: Charles Tye

This license expires on October 31, 2001.

Pursuant to Minnesota Statutes, section 144.99, this license may be suspended or revoked for failure to conduct asbestos-related work in compliance with applicable regulations.

Asbestos-related work must be conducted according to Minnesota Statutes, sections 326.70 to 326.81 and Minnesota Rules, parts 4620.3000 to 4620.3724.

Patricia A. Bloomgren

Patricia A. Bloomgren, Director
Division of Environmental Health

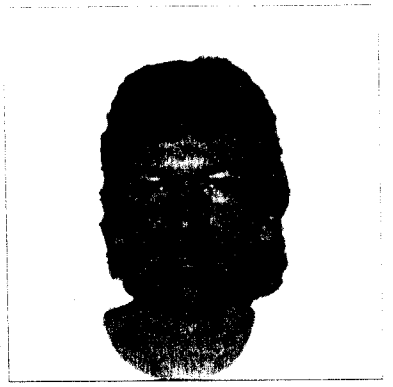
MDH ASBESTOS INSPECTOR

Certified by:
State of Minnesota
Department of Health
Expires: 01/19/2002

Charles Tye
12203 Princeton Ave
Eden Prairie, MN 55347

Commissioner of Health

No. AI395 Issued: 01/26/2001



MDH ASBESTOS INSPECTOR

Certified by:
State of Minnesota
Department of Health
Expires: 08/07/2002

John M Partlow
29923 Karmel Ave
Chisago City, MN 55013

Commissioner of Health

No. AI2226 Issued: 08/13/2001

MDH ASBESTOS INSPECTOR

Certified by:
State of Minnesota
Department of Health
Expires: 06/26/2002

Robert J Landowski
2936 Lee Ave N
Golden Valley, MN 55422

Commissioner of Health

No. AI2646 Issued: 07/05/2001

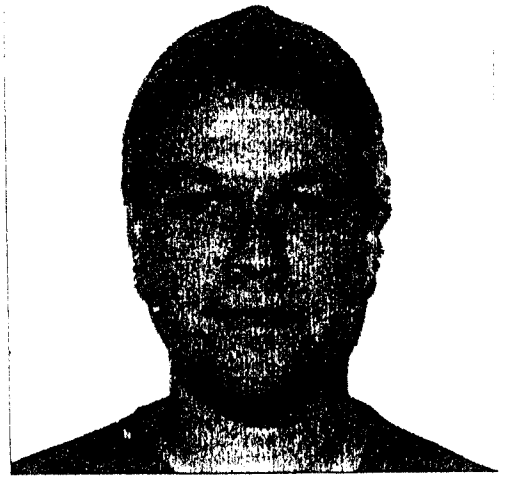
MDH ASBESTOS INSPECTOR

Certified by:
State of Minnesota
Department of Health
Expires: 03/15/2002

Darrell T Potocnik
6538 Deerwood Lane
Lino Lakes, MN 55014

Commissioner of Health

No. AI2219 Issued: 03/29/2001



MDH ASBESTOS INSPECTOR

Certified by:
State of Minnesota
Department of Health
Expires: 11/10/2001

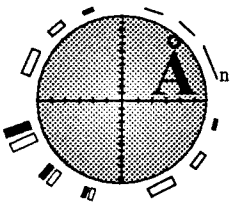
Les R Plath
8330 Oak Ln
Becker, MN 55308

Commissioner of Health

No. AI3390 Issued: 12/06/2000

6.0 Appendix 1

Analyst's Work Sheets



Abbreviation Code List

DAMAGE POTENTIAL - damage potential of the material

PSD - potential for significant damage
PD - potential for damage

COND - condition of material

N - little or no damage
D - moderate damage
SD - significant damage

UNITS - units of measurement

LF - linear foot
SF - square foot
EA - fitting

MATERIAL

CP - ceiling panel
CT - ceiling tile
CTA - ceiling tile adhesive
FT - floor tile
FTA - floor tile adhesive
BB - baseboard
BBA - baseboard adhesive
PI - pipe insulation
PFI - pipe fitting insulation
FG - fiberglass
corr - corrugated paper

TYPE OF ASBESTOS

ANTH - Anthophyllite
CHR - Chrysotile
AM - Amosite
CROC - Crocidolite
ACT - Actinolite
TREM - Tremolite

* These samples were not analyzed. These results were inferred as consistent with the analyzed samples in the homogeneous set.

ND - No asbestos was detected in the sample submitted for analysis.
NS - Material not sampled.
NAC - Material not accessible.
< - less than the value specified.

Angstrom Analytical, Inc.

12203 Princeton Avenue
Eden Prairie, MN 55347
Office: (952) 941-4805
FAX: (952) 829-7273

ANALYSIS OF BULK SAMPLES FOR ASBESTOS USING POLARIZED LIGHT MICROSCOPY (PLM)

Prepared for:	**Michael H. Barrowclough, Chief Engineer** Minneapolis Public Housing Authority 1611 South 6th Street Minneapolis, MN 55454
Client Job or reference:	**630 Cedar Ave So, Minneapolis, MN (Cedar Hi Apts)**
Number of samples:	**117 collected / 95 analyzed.**

METHOD AND DEFINITIONS

The submitted samples were analyzed using the EPA Interim Method #600/M4-82-020 *(polarized light microscopy with optional dispersion staining). The method defines an asbestos-containing material as one that contains greater than 1% asbestos by weight, and asbestos is defined as the fibrous forms of serpentine and certain amphiboles. While the fibrous and non-fibrous forms of minerals are discernible macroscopically in hand specimens, the distinction between them is not clear on a microscopic level, especially after processing or manufacturing. Fibrous amphiboles are generally those whose mean aspect ratios (length over width) under the microscope are approximately >10; non-fibrous amphiboles are generally those whose mean aspect ratios are approximately <6. During analysis, morphology and an estimate of mean aspect ratio are used to assign a given mineral fiber population to fibrous of non-fibrous categories. That non-fibrous amphiboles are not reported as asbestos is consistent with mineralogical definitions, but does not imply that non-fibrous amphiboles are not hazardous. Airborne concentrations of them may be regulated by OSHA under certain circumstances. The type of dispersion staining used is generally phase contrast, although central stop dispersion staining may also be used.*

PERCENTAGE REPORTING

The percentage of each fiber type present was determined using volume percents estimated from stereoscopic examination, projected area percents from mounted slide examination and percents from comparison to weight percent standards. Such estimations are suitable for most samples, but do have large error ranges. Errors are estimated to be 100 relative percent uncertainty for percentage estimates under 10% ranging down to as little as 10 relative percent uncertainty for percentage estimates greater than 50%. Friable samples which have been estimated by the above methods to contain less than 10% asbestos can be point-counted, according to the EPA Interim Method, as required by NESHAPS. In low percentage samples, point counting may produce false negatives or positives, due to the small number of points counted.
For samples consisting of more than one apparent type of material or layer, the percentage of each fiber type in each type of material or layer is determined and reported separately; an overall average for the sample of each fiber type is then calculated. The reported friability of a sample refers to that friability observed in the condition analyzed (broken, crushed, etc), and is not to be substituted for an on-site assessment of friability.
Each Angstrom Analytical Lab report relates only to the sample tested and may not, due to the sampling process, be representative of the material sampled.

Tom Key ----------Date: June 19, 2000

Tom Key

Angstrom Analytical

Angstrom
12203 Princeton Ave.
Eden Prairie, MN 55347

ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via
MPHA	630 Cedar Ave So, Mpls	Report

CLIENT ADDRESS: ATtn: Michael Barrowclough

Fax #

Client/Receiving # 61009

Assigned/Lab #

Data Entry 5-19-00 Approved By

Project # On Site Analyst TK

Date Rec'd 5-16-00 Analyzed 5-19-00

Date Mailed Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
01	12"x12" Floor Tile	Tan Speckled	Apartment 1306	None Detected	
02	↓	↓	↓	None Detected	
03	↓	↓	↓	None Detected	
04	Floor Tile Mastic	Black	↓	CHR	2-3%
05	↓	↓	↓	Not Analyzed	
06	↓	↓	↓	Not Analyzed	
07	Cove Base	Tan	↓	None Detected	
08	↓	↓	↓	None Detected	
09	↓	↓	↓	None Detected	

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ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	630 Cedar Ave. So., Mpls, MN	Report	Data Entry 5-19-00 Approved By
CLIENT ADDRESS	Client/Receiving #		Project # On Site Analyst TK
Attn: Michael Barrowclough	10 to 18		Date Rec'd 5-16-00 Analyzed 5-19-00
Fax #	Assigned/Lab #		Date Mailed Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
10	Cove Base Adhesive	Brown	Apt. 1306	None Detected	
11	↓	↓	↓	None Detected	
12	↓	↓	↓	None Detected	
13	Cove Base	Brown	Apt. 1306 Bathroom	None Detected	
14	↓	↓	↓	None Detected	
15	↓	↓	↓	None Detected	
16	Cove Base Adhesive	Brown	↓	None Detected	
17	↓	↓	↓	None Detected	
18	↓	↓	↓	None Detected	

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ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	630 Cedar Ave So. Mpls, MN	Report	Data Entry 5-19-00 / Approved By
CLIENT ADDRESS	Client/Receiving #		Project # Ond. Te / Analyst TK
Attn: Michael Barrowclough	19 to 27		Date Rec'd 5-16-00 / Analyzed 5-19-00
Fax #	Assigned/Lab #		Date Mailed / Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
19	12" x 12" Floor Tile	White	Apt. 1306 Bathroom	None Detected	
20	↓	↓	↓	None Detected	
21	↓	↓	↓	None Detected	
22	Floor Tile Mastic	Black	↓	CHR	2-3%
23	↓	↓	↓	Not Analyzed	
24	↓	↓	↓	Not Analyzed	
25	Sheetrock	White	Throughout	None Detected	
26	↓	↓	↓	None Detected	
27	↓	↓	↓	None Detected	

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ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location & 30 Cedar	Results Via	Data Entry 5-19-00	Approved By
MPHA	Ave. So., Mpls, MN	Report	Project # Onsite	Analyst TK
CLIENT ADDRESS	Client/Receiving #		Date Rec'd 5-16-00	Analyzed 5-19-00
Attn: Michael Barrowclough	28 to 36		Date Mailed	Phoned
Fax #	Assigned/Lab #			

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
28	Textured Ceiling	White	Apt. 1306 Throughout	CHR	3-5%
29	↓	↓	↓	Not analyzed	
30	↓	↓	↓	not analyzed	
31	Sink Undercoating	Grey	Apt. 1306 Kitchen	CHRZ	5-8%
32	↓	↓	↓	Not analyzed	
33	↓	↓	↓	not analyzed	
34	12" x 12" Floor Tile	Tan	25th Floor Hallway	CHR	1-2%
35	↓	↓	↓	not analyzed	
36	↓	↓	↓	not analyzed	

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ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	630 Cedar Ave So, Mpls, MN	Report	Data Entry 5-23-00 / Approved By
CLIENT ADDRESS	Client/Receiving #		Project # On Site / Analyst TK
Attn: Michael Barrowclough	37 to 45		Date Rec'd 5-16-00 / Analyzed 5-23-00
Fax #	Assigned/Lab #		Date Mailed / Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
37	Floor Tile Mastic	Black	25th Floor Hallway	CHR	2-3%
38	↓	↓	↓	Not Analyzed	
39	↓	↓	↓	Not Analyzed	
40	Cove Base	Tan	↓	None Detected	
41	↓	↓	↓	None Detected	
42	↓	↓	↓	None Detected	
43	Cove Base Adhesive	Tan	↓	None Detected	
44	↓	↓	↓	None Detected	
45	↓	↓	↓	None Detected	

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ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT: MPHA	Project Location: 630 Cedar Ave So, Mpls, Minn	Results Via: Report	Data Entry: 5-23-00 Approved By:
CLIENT ADDRESS: Attn: Michael Barrowclough	Client/Receiving #: 46 to 54		Project #: On Site Analyst: TK
Fax #	Assigned/Lab #		Date Rec'd: 5-16-00 Analyzed: 5-23-00
			Date Mailed: Phoned:

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
46	Textured Ceiling	White	25th Floor Hallway	CHR	2-3%
47	↓	↓	↓	Not Analyzed	
48	↓	↓	↓	Not Analyzed	
49	Sheetrock	White	↓	None Detected	
50	↓	↓	↓	None Detected	
51	↓	↓	↓	None Detected	
52	TSI Fitting	White/Grey	25th Floor Janitor's Closet	None Detected	
53	↓	↓	↓	None Detected	
54	↓	↓	↓	None Detected	

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ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	630 Cedar Ave So, Mpls, MN	Report	Data Entry 5-23-00 Approved By
CLIENT ADDRESS	Client/Receiving #		Project # On Site Analyst TK
Attn: Michael Barrowclough	55 to 63		Date Rec'd 5-16-00 Analyzed 5-23-00
Fax #	Assigned/Lab #		Date Mailed Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
55	Cement Skim Coat	Gray	25th Floor Stairwell	None Detected	
56	↓	↓	↓	None Detected	
57	↓	↓	↓	None Detected	
58	Cove Base	Light Brown	↓	None Detected	
59	↓	↓	↓	None Detected	
60	↓	↓	↓	None Detected	
61	Cove Base Adhesive	Brown	↓	None Detected	
62	↓	↓	↓	None Detected	
63	↓	↓	↓	None Detected	

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ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	630 Cedar Ave. So, Mpls, MN.	Report	Data Entry 5-23-00 Approved By
CLIENT ADDRESS	Client/Receiving #		Project # Onsite Analyst TK
Attn: Michael Barrowclough	64 to 72		Date Rec'd 5-16-00 Analyzed 5-23-00
Fax #	Assigned/Lab #		Date Mailed Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
64	Texture Ceiling	White	Apartment 2504	CHR	2-3%
65	↓	↓	↓	Not Analyzed	
66	↓	↓	↓	Not Analyzed	
67	Sheetrock, Tape + Compound	white	Compound Only	CHR	<1
68	↓	↓	↓	CHR	<1
69	↓	↓	↓	CHR	<1
70	Sheetrock	White	4th Floor Hallway	None Detected	
71	↓	↓	↓	None Detected	
72	↓	↓	↓	None Detected	

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Eden Prairie, MN 55347

ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	630 Cedar Ave So., Mpls, Minn	Report	Data Entry 5-24-00 / Approved By
CLIENT ADDRESS	Client/Receiving #		Project # Onsite / Analyst TK
Attn: Michael Barrowclough	73 to 81		Date Rec'd 5-16-00 / Analyzed 5-24-00
Fax #	Assigned/Lab #		Date Mailed / Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
73	TSI F. Hngs	Wh. te/Grey	Compactor Room	None Detected	
74	↓	↓	↓	None Detected	
75	↓	↓	↓	None Detected	
76	Sheetrock/Tape	white	↓	None Detected	
77	↓	↓	↓	None Detected	
78	↓	↓	↓	None Detected	
79	Textured Ceiling	White	South Hallway Main Floor	CHR	<1%
80	↓	↓	↓	CHR	<1%
81	↓	↓	↓	CHR	<1%

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ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	Aud Sq, Mpls, MN	Report	Data Entry 5-24-00 Approved By
CLIENT ADDRESS	Client/Receiving #		Project # On Site Analyst TK
Attn: Michael Barrowclough	82 to 90		Date Rec'd 5-16-00 Analyzed 5-24-00
Fax #	Assigned/Lab #		Date Mailed Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
82	Cove Base	Tan	South Hallway Main Floor	None Detected	
83	↓	↓	↓	None Detected	
84	↓	↓	↓	None Detected	
85	Cove Base Adhesive	Brown	↓	None Detected	
86	↓	↓	↓	None Detected	
87	↓	↓	↓	None Detected	
88	2'X2' Ceiling Tile	Fissured w/ Pinholes	Main Floor Elevator Lobby	None Detected	
89	↓	↓	↓	None Detected	
90	↓	↓	↓	None Detected	

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Eden Prairie, MN 55347

ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	630 Cedar Ave. So., Mpls. Minn	Report	Data Entry 5-24-00 Approved By
CLIENT ADDRESS	**Client/Receiving #**		Project # On Site Analyst TK
Attn. Michael Barrowclough	91 to 99		Date Rec'd 5-16-00 Analyzed 5-24-00
Fax #	Assigned/Lab #		Date Mailed Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
91	12" x 12" Floor Tile	Brown	Main Floor Janitor's Closet	CHR	1-2%
92	↓	↓	↓	Not Analyzed	
93	↓	↓	↓	Not Analyzed	
94	Floor Tile Mastic	Black	↓	CHR	3-5%
95	↓	↓	↓	Not Analyzed	
96	↓	↓	↓	Not Analyzed	
97	2'x4' Ceiling Tile	Fissured w/ Pinhole	Social Worker's Office	None Detected	
98	↓	↓	↓	None Detected	
99	↓	↓	↓	None Detected	

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Eden Prairie, MN 55347

ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	630 Cedar Ave. So, Mpls, MN	Report	Data Entry 5-24-00 Approved By
CLIENT ADDRESS	Client/Receiving #		Project # Onsite Analyst TK
ATTN: Michael Barrowclough	100 to 108		Date Rec'd 5-16-00 Analyzed 5-24-00
Fax #	Assigned/Lab #		Date Mailed Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
100	Sheetrock, Tape + Compound	White	Social Worker's office	None Detected	
101	↓	↓	↓	None Detected	
102	↓	↓	↓	None Detected	
103	12" x 12" Floor Tile	White w/ Blue Streaks	↓	None Detected	
104	↓	↓	↓	None Detected	
105	↓	↓	↓	None Detected	
106	Window Caulking	Black	Main Floor Laundry Room	CHR	<1%
107	↓	↓	↓	CHR	<1%
108	↓	↓	↓	CHR	<1%

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Eden Prairie, MN 55347

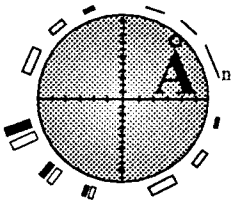
ASBESTOS (PLM) BULK SAMPLES: REPORT OF MATERIALS ANALYSIS

CLIENT	Project Location	Results Via	
MPHA	Ave So, Mpls.	Report	Data Entry 5-24-00 Approved By
CLIENT ADDRESS	Client/Receiving #		Project # On Site Analyst TK
Attn: Michael Barrowclough	109 to 117		Date Rec'd 5-16-00 Analyzed 5-24-00
Fax #	Assigned/Lab #		Date Mailed Phoned

Sample Number	Material	Physical Description	Location	Asbestos Type	Approximate Percent
109	Ceiling Texture	White	Basement Floor Office Area	CHR	3-5%
110	↓	↓		Not Analyzed	
111	↓	↓		Not Analyzed	
112	Sheetrock	white		None Detected	
113	↓	↓		None Detected	
114	↓	↓		None Detected	
115	TSI Fittings	White/Gray	Basement West Office Area	None Detected	
116	↓	↓	↓	None Detected	
117	↓	↓	↓	None Detected	

7.0 Appendix 2

Asbestos Survey of Boiler Room & Mechanical Spaces



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ANALYSIS OF BULK SAMPLES FOR ASBESTOS USING POLARIZED LIGHT MICROSCOPY (PLM)

Prepared for:	**Michael H. Barrowclough, Chief Engineer** Minneapolis Public Housing Authority 1611 South 6th Street Minneapolis, MN 55454
Client Job or reference:	**630 Cedar Ave So / Bsmt, 25th & 26th Floor Mech Rms.**
Number of samples:	**87 collected / 69 analyzed.**

METHOD AND DEFINITIONS

The submitted samples were analyzed using the EPA Interim Method #600/M4-82-020 *(polarized light microscopy with optional dispersion staining). The method defines an asbestos-containing material as one that contains greater than 1% asbestos by weight, and asbestos is defined as the fibrous forms of serpentine and certain amphiboles. While the fibrous and non-fibrous forms of minerals are discernible macroscopically in hand specimens, the distinction between them is not clear on a microscopic level, especially after processing or manufacturing. Fibrous amphiboles are generally those whose mean aspect ratios (length over width) under the microscope are approximately >10; non-fibrous amphiboles are generally those whose mean aspect ratios are approximately <6. During analysis, morphology and an estimate of mean aspect ratio are used to assign a given mineral fiber population to fibrous of non-fibrous categories. That non-fibrous amphiboles are not reported as asbestos is consistent with mineralogical definitions, but does not imply that non-fibrous amphiboles are not hazardous. Airborne concentrations of them may be regulated by OSHA under certain circumstances. The type of dispersion staining used is generally phase contrast, although central stop dispersion staining may also be used.*

PERCENTAGE REPORTING

The percentage of each fiber type present was determined using volume percents estimated from stereoscopic examination, projected area percents from mounted slide examination and percents from comparison to weight percent standards. Such estimations are suitable for most samples, but do have large error ranges. Errors are estimated to be 100 relative percent uncertainty for percentage estimates under 10% ranging down to as little as 10 relative percent uncertainty for percentage estimates greater than 50%. Friable samples which have been estimated by the above methods to contain less than 10% asbestos can be point-counted, according to the EPA Interim Method, as required by NESHAPS. In low percentage samples, point counting may produce false negatives or positives, due to the small number of points counted.
For samples consisting of more than one apparent type of material or layer, the percentage of each fiber type in each type of material or layer is determined and reported separately; an overall average for the sample of each fiber type is then calculated. The reported friability of a sample refers to that friability observed in the condition analyzed (broken, crushed, etc), and is not to be substituted for an on-site assessment of friability.
Each Angstrom Analytical Lab report relates only to the sample tested and may not, due to the sampling process, be representative of the material sampled.

Tom Key

Tom Key ----------**Date: May 7th, 1998**

Prepared by: **Angstrom Analytical, Inc.**
12203 Princeton Avenue • Eden Prairie, MN 55347
Office: (612) 941-4805 • FAX: (612) 829-7273

Angstrom Analytical & Environmental Services

Building Name: 630 Cedar Avenue South
Survey Date: 4/27/98

Project No.
Attn: Michael H. Barrowclough
Chief Engineer / Central Heating
Minneapolis Public Housing Authority
1611 South 6th Street
Minneapolis, MN 55454

PSD = potential for significant damage
PD = potential for damage
N = little or no damage
D = moderate damage
SD = significant damage

LF = linear foot
SF = square foot

EA = fitting
TREM = Tremolite
CHR = Chrysotile
AM = Amosite
CROC = Crocidolite

ACT = Actinolite
ANTH = Anthophyllite

ND = no asbestos was detected in the sample submitted for analysis
NS = material not sampled
NAC = material not accessible
< = less than value specified
* = These samples were not analyzed. These results are inferred a consistent with the analyzed samples in the homogeneous set.

Location	Material Identification	Sample Number	Types of Asbestos	%	Quantity	Units	Cond.	Damage Potential	Response Rating
Basement Mech. Room	Boiler #2 End TSI	1 to 3	CHR	30-35	40	SF	N	PD	3
"	Boiler #2 Side TSI	4 to 6	CHR	25-30	150	SF	N	PD	3
"	Horizontal water tank TSI	7 to 9	ND	-	75	SF	N	PD	0
"	Boiler #2 steam line fitting TSI	10 to 12	ND	-	30-40	EA	N	PD	0
"	Boiler #2 steam line TSI	13 to 15	ND	-	150-200	LF	N	PD	0
"	3" domestic line fitting TSI	16 to 18	CHR	<1	25-40	EA	N	PD	0
"	3" domestic water line TSI	19 to 21	ND	-	150-200	LF	N	PD	0
"	Duct Work TSI	22 to 24	ND	-	600	SF	N	PD	0
"	2" steam line fitting TSI	25 to 27	CHR	2-3	30-40	EA	N	PD	3
"	Main steam line TSI	28 to 30	ND	-	75-100	LF	N	PD	0
"	Mian steam line fitting TSI	31 to 33	ND	-	25-30	EA	N	PD	0
"	TSI from Air Handler	34 to 36	ND	-	350	SF	N	PD	0
"	Expansion Tank TSI	37 to 39	CHR	25-30	30	SF	N	PD	3
"	Vibration Dampener	40 to 42	ND	-	1	EA	N	PD	0
25th Floor Mech Room	Expansion Tank TSI	43 to 45	CHR	20-25	25	SF	N	PD	3
"	6" steam line TSI	46 to 48	ND	-	150-200	LF	N	PD	0
"	6" steam line fitting TSI	49 to 51	CHR	20-25	25-30	EA	D	PD	4

Prepared by: **Angstrom Analytical, Inc.**
12203 Princeton Avenue • Eden Prairie, MN 55347
Office: (612) 941-4805 • FAX: (612) 829-7273

Angstrom Analytical & Environmental Services

Building Name: 630 Cedar Avenue South
Survey Date: 4/27/98
Project No.
Attn: Michael H. Barrowclough
Chief Engineer / Central Heating
Minneapolis Public Housing Authority
1611 South 6th Street
Minneapolis, MN 55454

PSD = potential for significant damage
PD = potential for damage
N = little or no damage
D = moderate damage
SD = significant damage
LF = linear foot
SF = square foot

EA = fitting
TREM = Tremolite
CHR = Chrysotile
AM = Amosite
CROC = Crocidolite
ACT = Actinolite
ANTH = Anthophyllite

ND = no asbestos was detected in the sample submitted for analysis
NS = material not sampled
NAC = material not accessible
< = less than value specified
* = These samples were not analyzed. These results are inferred a consistent with the analyzed samples in the homogeneous set.

Location	Material Identification	Sample Number	Types of Asbestos	%	Quantity	Units	Cond.	Damage Potential	Response Rating
25th Floor Mech Room	1" dom. water line fitting TSI	52 to 54	ND	-	5-10	EA	N	PD	0
"	1" domestic water line TSI	55 to 57	ND	-	30-40	LF	N	PD	0
"	Duct Work TSI	58 to 60	ND	-	1000	SF	N	PD	0
"	Vibration Dampener	61 to 63	ND	-	5	EA	N	PD	0
"	3" steam line fitting TSI	64 to 66	ND	-	30-40	EA	N	PD	0
"	3" steam line TSI	67 to 69	ND	-	100	LF	N	PD	0
26th Floor Mech. Room	Boiler #0 Side TSI	70 to 72	CHR	30-35	100	SF	N	PD	3
"	Boiler #0 End TSI	73 to 75	CHR	25-30	40-50	SF	N	PD	3
"	Steam line fitting TSI	76 to 78	CHR	20-25	<15	EA	N	PD	3
"	Steam line TSI	79 to 81	ND	-	20	LF	N	PD	0
"	Duct Work TSI	82 to 84	ND	-	600	SF	D	PD	0
"	Fire Stop Putty	85 to 87	ND	-	1	SF	N	PD	0