

**ASBESTOS MATERIALS SURVEY
FOR
CANADIAN COAST GUARD SERVICES**

VESSEL NAME: CCGS VAKTA

VESSEL NO.: 825542



Prepared for:

Canadian Coast Guard
Marine Engineering
520 Exmouth Street
Sarnia, Manitoba
N7T 8B1

Pinchin Environmental Ltd Project No. 01-02-00111

March 2009

EXECUTIVE SUMMARY

Pinchin LeBlanc Environmental Ltd. (PLEL) was retained by the Department of Fisheries and Oceans to perform asbestos surveys for asbestos-containing materials (ACMs) within selected Canadian Coast Guard Services (CCGS) vessels throughout Canada. To accomplish the task of surveying vessels on a national scale, PLEL utilized the Pinchin Group of companies. A total of fourteen (14) selected vessels were included within the survey program. This report will provide the findings for the following vessel;

VESSEL NAME: CCGS VAKTA

VESSEL NO.: 825542

VESSEL DESC.: Specialty Vessel

No friable ACMs were identified within the vessel during the survey.

No non-friable ACMs were identified within the vessel during the survey.

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	SURVEY AND ASSESSMENT CRITERIA.....	2
2.1	SURVEY INFORMATION	2
2.2	SURVEY METHODOLOGY.....	2
2.3	SURVEY SCOPE.....	2
2.3.1	<i>Friable Materials</i>	2
2.3.2	<i>Non-Friable Materials</i>	3
2.3.3	<i>Sampling Strategy</i>	3
2.3.4	<i>Analytical Methods</i>	4
2.3.5	<i>Field Data Collection</i>	4
2.3.6	<i>Limitations of Survey</i>	5
3.0	DISCUSSION OF ASBESTOS-CONTAINING MATERIALS	5
4.0	FRIABLE ASBESTOS-CONTAINING MATERIALS	6
4.1	SPRAYED OR TROWELLED FIREPROOFING OR THERMAL INSULATION.....	6
4.2	TEXTURE FINISHES.....	6
4.3	PIPING INSULATION.....	6
4.4	VENTILATION TRUNKING INSULATION.....	6
4.5	HIGH TEMPERATURE MACHINERY INSULATION.....	6
4.5.1	<i>Main Propulsion</i>	6
4.5.2	<i>Generators</i>	6
4.5.3	<i>Emergency Generator</i>	6
4.6	BULKHEADS AND DECKHEADS.....	6
5.0	NON-FRIABLE ASBESTOS-CONTAINING MATERIALS	6
5.1	DECK COVERING MATERIALS	6
5.1.1	<i>Vinyl Sheet Flooring</i>	7
5.1.2	<i>Vinyl Floor Tiles</i>	7
5.2	ASBESTOS CEMENT PRODUCTS.....	7
5.3	OTHER ASBESTOS-CONTAINING MATERIALS	7
6.0	SUSPECT ASBESTOS-CONTAINING MATERIALS.....	7
7.0	CONCLUSIONS.....	7

APPENDICES

APPENDIX I

SURVEY DATA

APPENDIX I-A

GUIDE TO SURVEY SHEETS

APPENDIX I-B

LOCATION AND SAMPLE TABLE

APPENDIX I-C

ASBESTOS DATA REPORT

APPENDIX I-D

ALL DATA REPORT

APPENDIX II

ASBESTOS ASSESSMENT MATRIX

1.0 INTRODUCTION

Pinchin LeBlanc Environmental Ltd. (PLEL) was retained by the Department of Fisheries and Oceans to perform asbestos surveys for asbestos-containing materials (ACMs) within selected Canadian Coast Guard Services (CCGS) vessels throughout Canada. To accomplish the task of surveying vessels on a national scale, PLEL utilized the Pinchin Group of companies. A total of fourteen (14) vessels were included within the survey program. The surveys have been conducted to address inaccurate or unavailable information regarding the presence of asbestos of CCGS vessels. This report will provide the findings for the following vessel;

VESSEL NAME: CCGS Vakta

VESSEL NO.: 825542

VESSEL DESC.: Specialty Vessel

The survey included both friable¹ and non-friable² ACM as well as suspect ACM. Both Federal and Provincial regulations and guidelines distinguish between friable and non-friable materials. All provincial regulations regarding asbestos materials distinguish between friable and non-friable materials when assigning appropriate work practices.

The most common friable ACM used in the past are surfacing materials (usually sprayed fireproofing, texture, decorative or acoustic plaster) and thermal insulations. Asbestos-containing manufactured materials include deck covering materials, deckhead and bulkhead panels, gasket materials, asbestos cement pipe or board, and asbestos textiles. Depending on the formulation these may be friable or non-friable. Note that though a product may be considered non-friable when new, if the product releases fine dust due to deterioration or during removal, the free dust is considered friable. For example, lay-in acoustic ceiling tiles may release significant dust at the time of major removal.

1 The term friable is applied to a material that can be readily reduced to dust or powder by hand or moderate pressure. Friable ACM has a much greater potential to release airborne asbestos fibres when disturbed. The most common friable ACM used in the past are sprayed or trowelled materials (for fireproofing or thermal insulation), texture plaster (decorative or acoustic), and mechanical insulations.

2 Common non-friable ACM include vinyl floor tiles, ceiling tiles, gasket materials, asbestos cement pipe or board (transite), and asbestos textiles. Although a product may be considered non-friable when new, if the product releases fine dust due to deterioration or during removal, the free dust is considered friable. For example, most lay-in or glued on acoustic ceiling tiles release significant dust during removal of large quantities of these tiles.

2.0 SURVEY AND ASSESSMENT CRITERIA

2.1 Survey Information

The vessel was located in Gimli, Manitoba and therefore the regional Pinchin Group office conducting the fieldwork was Pinchin Environmental Ltd. (Pinchin). The fieldwork was performed by Mr. Rodney Legault of Pinchin on March 10, 2009.

2.2 Survey Methodology

The collection of information was on a room-by-room basis and the approximate quantities of the ACM were noted where appropriate. In order to determine the location of the ACM and develop recommendations of the work required, the surveyor entered each room, cabin, or space where practical. Representative views were made above accessible suspended ceiling systems. Access above and within solid bulkheads and deckheads was made through existing hatches or panels. Where required, intrusive inspections were made within cavities, particularly in areas where mechanical equipment was suspected to be present. The intrusive investigations involved the removal of existing bulkhead panels or deckhead panels to assess the conditions within. The survey did not include demolition of floors, ceilings or walls or other demolition to check on conditions behind.

The surveyor assigned a unique location number to each area or individual room surveyed. Where a room name was available, it was recorded along with the assigned location number (Location XX). The information from the field data collection sheets, was entered into the Pinchin Group's *Hazardous Materials Inventory System* computer database. The computer generated print-outs are included as Appendix I of this report.

2.3 Survey Scope

2.3.1 Friable Materials

The survey included the following asbestos and non-asbestos materials:

- ◆ Sprayed Materials including:
 - fireproofing
 - thermal insulation (not including mechanical)
 - texture finishes (for acoustic or decorative purposes)

(NOTE: Although usually installed by spray application the materials above may also have been installed by roller or trowel).

- ◆ Mechanical Insulation on:

- boiler and breeching
- generators and exhausts
- ventilation trunking
- piping
- tanks and equipment
- ◆ Deckhead Tiles (Suspended Ceiling Tiles):
 - suspended ceiling tiles are included, as they may become friable upon handling

2.3.2 Non-Friable Materials

The survey also included the identification for the following non-friable materials:

- ◆ Deckhead and bulkhead panels
- ◆ Textiles
- ◆ Asbestos cement boards
- ◆ Firestop material
- ◆ Vinyl floor tiles and vinyl sheet flooring
- ◆ Drywall joint compound
- ◆ Plaster (walls and ceilings)
- ◆ Other (gaskets and door packings)

Some of these products (i.e. asbestos cement boards) were visually identified as asbestos-containing. For the remaining materials, due to the inconsistent use of asbestos, any materials which were not sampled or visually confirmed as non-asbestos are identified in this report as suspect material (SM).

No identification was made of asbestos products used in the vessel operations (i.e. kitchens or manufacturing operations), or curricula (i.e. laboratories or trade shops). No testing of dust within supply or return ducts was performed.

2.3.3 Sampling Strategy

Asbestos samples were collected in accordance with the National Institute for Occupational Safety and Health (NIOSH) method 9002. The collection of samples was

performed in sufficient frequency to obtain a general pattern of asbestos use within the vessel. It is known that inconsistencies within construction or later repair or refit may result in deviation from the general pattern however without sampling of every wall, foot of pipe, pipe fitting, HVAC unit, ductwork, etc., it is not possible to individually characterize every asbestos material present. Therefore the surveyor relies on visual identification of similar materials with asbestos content based on representative bulk samples. While our experience is that this methodology is reliable and practical, it should be noted that the possibility remains that visually similar materials may have different asbestos content.

2.3.4 Analytical Methods

During the survey, materials suspected of containing asbestos were identified visually, based on the surveyor's knowledge of the historic use of asbestos-containing products. The vessel was constructed in 2003. Due to the age of construction, no sampling of materials was performed as asbestos was no longer in use during that time period.

2.3.5 Field Data Collection

In each of the inspection locations the surveyor completed a field data collection sheet. On the field data sheet, the absence or presence of ACMs was recorded in the following components.

- Floor (decks)
- Ceiling (deckheads)
- Wall (bulkheads)
- Piping
- Structure
- Duct
- Mechanical Equipment
- Other

The computer generated field data sheets found in Appendix I provide an easy reference for maintenance workers in the event of work in a particular room or area. The information, as presented on these sheets, lists all materials present as either asbestos-containing or not. The sheets list both the "condition" and "accessibility" of the asbestos material. These terms are defined in Appendix II.

The quantities shown are approximations, based on visual examination. Quantities were not provided on a consistent or reliable basis. For the quantities shown no measured take-off was performed and these quantities should not be utilized for cost estimating or budgeting purposes. Furthermore, (particularly for pipe insulation) it must also be realized that without removing all deckhead panels, bulkhead panels, etc. that not all asbestos materials present in the vessel were visually inspected or noted.

Appendix I also provides the "Guide to Survey Sheets" along with summaries of the numerical or alphabetical codes used.

2.3.6 Limitations of Survey

A number of limitations are described throughout this report. The intent of the limitations is to clearly identify to the user of this report that some limitations exist as to the possible thoroughness of a survey. Some of these limitations have been specifically identified above.

As per industry standards the field observations, measurements, and analysis are considered sufficient in detail and scope to form a reasonable basis for an asbestos hazard assessment of this property. PLEL warrants that the findings and conclusions contained herein have been promulgated in accordance with generally accepted asbestos inventory methods, for the site referenced in this report.

These evaluation methods have been developed to provide the client with information regarding apparent indications of existing or potentially hazardous conditions relating to the property and are necessarily limited to the conditions observed and information available at the time of the site visit and research. There is a distinct possibility that conditions may exist which could not be reasonably identified within the scope of the assessment or which were not apparent during the site visit. PLEL believes that the information collected during the survey period concerning the property is reliable. However, PLEL cannot warrant or guarantee that the information provided is absolutely complete or accurate beyond the current asbestos consulting industry standards. No other warranties are implied or expressed.

3.0 DISCUSSION OF ASBESTOS-CONTAINING MATERIALS

A summary of the findings for the ACM survey are discussed below under the following headings:

- 3.1 Sprayed or Trowelled Fireproofing or Thermal Insulation
- 3.2 Texture Finishes (for acoustic or decorative purposes)
- 3.3 Piping Insulation
- 3.4 Ventilation Trunking Insulation
- 3.5 High Temperature Machinery Insulation
- 3.6 Bulkheads and Deckheads
- 3.7 Deck Covering Material (i.e. flooring products)
- 3.8 Door, Hatch, Scuttle Insulation and Packings
- 3.9 Other Asbestos-Containing Materials
- 3.10 Suspect Asbestos Materials

The location numbers (Location XX) are cross-referenced to the Location Table found in Appendix I-B and referred to on the Survey Data Sheets in Appendix I. The information below provides a summary of information contained in the Survey Data Sheets. Refer to Appendix I for detailed information on the observations made at each of the survey locations including estimated quantities, locations and conditions of identified ACM.

4.0 FRIABLE ASBESTOS-CONTAINING MATERIALS

4.1 Sprayed or Trowelled Fireproofing or Thermal Insulation

No sprayed or trowelled fireproofing is present in the vessel.

4.2 Texture Finishes

No textured finish surfaces were observed in the vessel.

4.3 Piping Insulation

Piping in the vessel was not observed to be insulated.

4.4 Ventilation Trunking Insulation

Typical bathroom exhaust ducts present are not insulated.

4.5 High Temperature Machinery Insulation

4.5.1 Main Propulsion

There are two (2) engines in the Engine Room (Location 01), none of which are insulated. The main propulsion exhaust (uptakes) is insulated with a new high temperature textile and mineral wool textile which does not contain asbestos.

4.5.2 Generators

The main generator, located in the Engine Room (Location 01), is not insulated. The generator exhaust is insulated with a new high temperature textile and mineral wool textile which does not contain asbestos.

4.5.3 Emergency Generator

There was no emergency generator found.

4.6 Bulkheads and Deckheads

No ceiling tiles are present in the vessel.

5.0 NON-FRIABLE ASBESTOS-CONTAINING MATERIALS

5.1 Deck Covering Materials

5.1.1 Vinyl Sheet Flooring

No vinyl sheet flooring was observed to be present in the vessel.

5.1.2 Vinyl Floor Tiles

No vinyl floor tiles were observed to be present in the vessel.

5.2 Asbestos Cement Products

No asbestos cement products were observed to be present in the vessel.

5.3 Other Asbestos-Containing Materials

No other ACMs were observed in the vessel.

6.0 SUSPECT ASBESTOS-CONTAINING MATERIALS

In addition to the ACM described in the sections above, a number of other materials may be present in the vessel that can potentially contain asbestos. These materials are grouped under the heading of Suspect Asbestos-Containing Materials (the need for demolition/dismantling equipment and the lack of access limit our ability to determine the asbestos content).

Materials which are not accessible and/or can not be sampled without demolition, dismantling or causing irreparable damage include: components or wiring within motors, lights, high voltage wiring, mechanical packing and gaskets, and materials located inside electrical fixtures, light fixtures, switch gear or transformers.

7.0 CONCLUSIONS

ACMs were not found on the surveyed vessel.

Prepared by:



Rodney Legault, C.E.T., CEPIT
Project Manager
Pinchin Environmental Ltd.

Reviewed by:



Trevor Houweling, P.Eng.
Project Manager
Pinchin LeBlanc Environmental Ltd.

APPENDIX I
SURVEY DATA

APPENDIX I-A

GUIDE TO SURVEY SHEETS

**GUIDE TO THE ASBESTOS SURVEY SHEETS
ASBESTOS MATERIALS SURVEY**

The following Appendices contain printouts from Hazardous Materials Inventory System (HMIS) computer database. The appendices include information that the majority of our clients find useful.

Each Appendix is discussed below:

Appendix I-B Locations Report	The Locations Report provides a list of all functional areas (rooms) of the vessel where the surveyor recorded information. The information recorded includes the, unique Location Number, location by floor or room number, name of the areas (if available), whether the room was accessible, the square foot area of the room (optional), the date of the survey, surveyor's name and notes specific to the location
Appendix I-B Asbestos Samples Report	The Asbestos Samples Report provides information on the materials, where they were sampled, and the results of the samples collected and analyzed during the survey. If the sample contains two distinct layers the results are reported separately. The sample numbers are referenced on the Asbestos Only Report.
Appendix I-C Asbestos Only Report	The Asbestos Only Report, is one of a multitude of customized reports available via the HMIS database. The Asbestos Only Report provides information regarding materials that have been determined to contain asbestos, either through sample analysis or based on the observations and knowledge of the surveyor.
Appendix I-D All Data Report	The All Data Report, provides information regarding all materials that have been surveyed, either through sample analysis or based on the observations and knowledge of the surveyor. This report provides both asbestos-containing as well as non-asbestos materials.

APPENDIX I-B

LOCATION AND SAMPLE TABLE

Location List

Building#	Loc #	Floor	Room Prefix	Room Number	Room Suffix	Room Name	No Access	Square Feet	Survey Date	Surveyor	Notes
82554 2	1	NA				Engine Room			2009-03-13	Rodney Legault	M - Textile not suspect to contain asbestos - built in 2003
82554 2	2	NA				Sleeping/Cooking Quarters			2009-03-13	Rodney Legault	
82554 2	3	NA				Helm			2009-03-13	Rodney Legault	
82554 2	4	NA				Deck			2009-03-13	Rodney Legault	

Client: Canadian Coast Guard
Site: Vessels
Building Number(s): 825542

Bulk Sample Analysis

Building #: 825542 **Building Name:** CCGS Vakta **Surveyor:** Rodney Legault **Survey Date:** 2009-03-13

Sample #	System	Material	Loc #	Asbestos	Result A	Type A	Result B	Type B	Result C	Type C	Result D	Type D	Result
----------	--------	----------	-------	----------	----------	--------	----------	--------	----------	--------	----------	--------	--------

APPENDIX I-C
ASBESTOS DATA REPORT

Confirmed Asbestos and Presumed Asbestos Report

Legend:

Action		Access		Condition		Sample Number			
(1)	Clean Up of ACM Debris	(2)	Precautions for Access Which may Disturb ACM Debris	A	Accessible to all building occupants	Good	No visible damage or deterioration.	S####	Sample collected
(3)	ACM removal	(4)	Precautions for Work Which may Disturb ACM in Poor Condition	B	Accessible to maintenance and operations staff without a ladder	Fair	Minor, repairable damage, cracking or deterioration.	V####	Material is visually identified to be identical to S###
(5)	Proactive ACM removal (Minimum repair required for fair condition)	(6)	ACM repair	C	Accessible to maintenance and operations staff with a ladder. Also rarely entered, locked areas	Poor	Irreparable damage or deterioration with exposed and missing material	V0000	Known non-asbestos material
(7)	Management program and surveillance			D	Not normally accessible or without demolition	NOTE: See report for full definitions of action, access and condition		V9000	Material is visually identified to contain asbestos
								V9500	Material is presumed to contain asbestos
NOTE: Actions in round brackets () are auto-calculated. Actions in square brackets [] are manual								Note: Presumed various materials identified in the report are ACM if not sampled.	

Units

SF - Square feet

LF - Linear feet

EA - Each

% - Percentage

APPENDIX I-D
ALL DATA REPORT



Client: Canadian Coast Guard

Site: Vessels

Building Number(s): 825542

All Data Report

Building #: 825542		Building Name: CCGS Vakta		Surveyor: Rodney Legault		Survey Date: 2009-03-13		Square ft:						
Location #: 1		Location Name: Engine Room		Floor: NA		Room #:								
System	Component	Material	Item	Covering	Access	Visible	Condition, Quantity & Action				Units	Sample	Hazard	Friability
							Good	Fair	Poor					
	Main Engine Exh	Textile	Surface		A	Y	100				%	V0000	None	
Floor		Steel											None	
Ceiling		None Found											None	
Walls		Fibreglass	Surface	Foil Face	A	Y							None	
Walls		Steel											None	
Structure		Steel											None	
Piping	All	Not Insulated											None	
Duct	All	Not Insulated											None	
Mechanical Equipment	Exhaust	Textile	Surface		A	Y	100				%	V0000	None	
Mechanical Equipment	Generator Unit	Not Insulated											None	

Note: M - Textile not suspect to contain asbestos - built in 2003

Building #: 825542		Building Name: CCGS Vakta		Surveyor: Rodney Legault		Survey Date: 2009-03-13		Square ft:						
Location #: 2		Location Name: Sleeping/Cooking Quarters		Floor: NA		Room #:								
System	Component	Material	Item	Covering	Access	Visible	Condition, Quantity & Action				Units	Sample	Hazard	Friability
							Good	Fair	Poor					
Floor		Rubber											None	
Ceiling		Aluminum											None	
Walls		Aluminum											None	
Structure		Steel											None	
Piping	All	Not Insulated											None	
Duct	Not Found	None Found											None	
Mechanical Equipment	Not Found	None Found											None	



Client: Canadian Coast Guard

Site: Vessels

Building Number(s): 825542

All Data Report

Building #: 825542		Building Name: CCGS Vakta		Surveyor: Rodney Legault		Survey Date: 2009-03-13		Room #:		Square ft:		Condition, Quantity & Action		Units	Sample	Hazard	Friability
Location #: 3		Location Name: Helm		Floor: NA													
System	Component	Material	Item	Covering	Access	Visible	Good	Fair	Poor								
Floor		Rubber															None
Ceiling		Aluminum															None
Walls		Aluminum															None
Structure		Steel															None
Piping		None Found															None
Mechanical Equipment		None Found															None

Building #: 825542		Building Name: CCGS Vakta		Surveyor: Rodney Legault		Survey Date: 2009-03-13		Room #:		Square ft:		Condition, Quantity & Action		Units	Sample	Hazard	Friability
Location #: 4		Location Name: Deck		Floor: NA													
System	Component	Material	Item	Covering	Access	Visible	Good	Fair	Poor								
Floor		Skid Proof Tile															None
Ceiling		None Found															None
Walls		Steel															None
Structure		Steel															None
Piping		None Found															None
Duct		None Found															None
Mechanical Equipment		None Found															None

All Data Report

Legend:

Action		Access		Condition		Sample Number			
(1)	Clean Up of ACM Debris	(2)	Precautions for Access Which may Disturb ACM Debris	A	Accessible to all building occupants	Good	No visible damage or deterioration.	S####	Sample collected
(3)	ACM removal	(4)	Precautions for Work Which may Disturb ACM in Poor Condition	B	Accessible to maintenance and operations staff without a ladder	Fair	Minor, repairable damage, cracking or deterioration.	V####	Material is visually identified to be identical to S###
(5)	Proactive ACM removal (Minimum repair required for fair condition)	(6)	ACM repair	C	Accessible to maintenance and operations staff with a ladder. Also rarely entered, locked areas	Poor	Irreparable damage or deterioration with exposed and missing material	V0000	Known non-asbestos material
(7)	Management program and surveillance			D	Not normally accessible or without demolition	NOTE: See report for full definitions of action, access and condition		V9000	Material is visually identified to contain asbestos
								V9500	Material is presumed to contain asbestos
NOTE: Actions in round brackets () are auto-calculated. Actions in square brackets [] are manual								Note: Presumed various materials identified in the report are ACM if not sampled.	

Units

SF - Square feet

LF - Linear feet

EA - Each

% - Percentage

APPENDIX II

ASBESTOS ASSESSMENT MATRIX

1.0 EVALUATION CRITERIA AND BASIS OF RECOMMENDATIONS FOR ASBESTOS-CONTAINING MATERIALS

This reassessment provides accurate information regarding the location, condition and accessibility of the ACM used in the construction of the vessel. In order to make recommendations for compliance with current regulations, PLEL developed the following ACM evaluation criteria based on the conclusion of previous published studies, particularly the "Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario" and our experience with structures containing ACM. The same criterion that was initially employed has been utilized for the reassessment.

1.1 Evaluation of Condition

1.1.1 Spray Applied Fireproofing, Insulation and Texture Finishes

To evaluate the condition of ACM spray applied as fireproofing, non-mechanical thermal insulation, or texture, decorative or acoustic finishes, the following criteria is applied:

GOOD Surface of material shows no significant signs of damage, deterioration or delamination. Up to 1 percent visible damage to surface is allowed within range of **GOOD**. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of fireproofing as installed. **GOOD** condition includes unencapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.

POOR Sprayed materials show signs of damage, delamination or deterioration. More than 1 percent damage to surface of ACM spray.

In observation areas where damage exists, in isolated locations, both **GOOD** and **POOR** condition may be applicable. The extent or percentage of each condition will be recorded on the room-by-room survey form. **FAIR** condition is not utilized in the evaluation of the fireproofing, non-mechanical insulation, or texture coat finishes.

The evaluation of ACM spray applied as fireproofing, non-mechanical thermal insulation, or texture, decorative or acoustic finishes which are present above ceilings, may be limited by the number of observations made, and by building components such as ducts or full height bulkheads that obstruct the above ceiling observations. Persons entering the ceiling are advised to be watchful for ACM **DEBRIS** prior to accessing or working above ceilings in areas of buildings with ACM regardless of the reported condition.

1.1.2 Mechanical Insulation

The evaluation of the condition of mechanical insulation (on surface of boilers, breeching, exhausts, ductwork, piping, tanks, equipment etc.) utilizes the following criteria:

- GOOD** Insulation is completely covered in jacketing and exhibits no evidence of damage or deterioration. No insulation is exposed. Includes conditions where the jacketing has minor damage (ie., scuffs or stains), but the jacketing is not penetrated.
- FAIR** Minor penetrating damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination) or undamaged insulation that had never been jacketed. Insulation is exposed but not showing surface disintegration. The extent of missing insulation ranges from minor to none. Damage can be repaired.
- POOR** Original insulation jacket is missing, damaged, deteriorated or delaminated. Insulation is exposed and significant areas have been dislodged. Damage cannot be readily repaired.

The evaluation of mechanical insulation may be limited by the number of observations made and vessel components such as ducts or bulkheads that obstruct observations. It is not possible to observe each foot of mechanical insulation from all angles. Persons working in proximity to mechanical insulation or entering ceilings with mechanical insulation are advised to be watchful of ACM **DEBRIS** regardless of the reported condition.

1.1.3 Non-friable and Potentially Friable Materials

The condition of non-friable ACM, such as plaster finishes containing asbestos, and manufactured products such as acoustic ceiling tiles and asbestos cement products (transite), all of which have the potential to become friable when handled are evaluated as follows:

- GOOD** No significant damage. Material may be cracked or broken but is stable and not likely to become friable upon casual contact.
- POOR** Material is severely damaged. Loose **DEBRIS** is present or binder has disintegrated to the point where contact will cause the material to become friable.

The evaluation of the condition of non-friable and potentially friable materials does not utilize a **FAIR** condition rating.

If the ACM is damaged but stable, and there is no friable **DEBRIS** present, the condition is rated as **GOOD**.

1.2 **Evaluation of Accessibility**

The accessibility of materials known or suspected of being ACM is rated according to the following criteria:

- ACCESS (A)** Areas of the vessel within reach (from deck level) of all general occupants. Includes areas such as storage areas where activities of the general occupants may result in disturbance of ACM not normally within reach from deck level.
- ACCESS (B)** Frequently entered maintenance and service areas of the vessel within reach of staff, without the need for a ladder (less frequently accessed than Access A areas). Includes:
- areas within reach from a fixed ladder or catwalk, ie. tops of equipment, mezzanines.
 - frequently entered pipe chases, stack towers, tunnels and service areas.
- ACCESS (C)** Areas of the vessel above 8'-0" where use of a ladder is required to reach the ACM (less frequently accessed than Access B areas).
- Refers to ACM materials that are exposed to view, from the floor or ladder, without the removal or opening of other vessel components such as deckheads/bulkheads, or service access doors or hatches. Does not include infrequently accessed service areas of the vessel.
- ACCESS (D)** Areas of the vessel behind inaccessible solid deckhead and/or bulkhead systems, or mechanical equipment etc. where demolition or removal of the deckhead/bulkhead or equipment etc. is required to reach the ACM. Evaluation of condition and extent of ACM is limited or impossible, depending on the surveyor's ability to visually examine materials in ACCESS D.

1.3 Evaluation of ACM DEBRIS

1.3.1 DEBRIS From Friable ACM

The presence of fallen ACM is noted separately from the presumed friable ACM source (sprayed fireproofing, thermal insulation, texture, decorative or acoustic finishes or mechanical insulation) and is referred to as **DEBRIS**.

1.3.2 DEBRIS From Damaged Non-Friable ACM

The presence of fallen ACM from damaged non-friable ACM is also reported separately from the non-friable ACM source. Only fallen non-friable ACM that has become friable is reported as **DEBRIS**.

The identification of the exact location or presence of **DEBRIS** on the top of deckhead panels is limited by the number of observations made and the presence of vessel components such as ducts or compartment bulkheads that obstruct observations. Workers are advised to be watchful for the presence of **DEBRIS** prior to accessing or working in proximity to mechanical insulation or above deckheads in areas of the vessel with ACM regardless of the reported presence or absence of **DEBRIS**.

1.4 Evaluation of SUSPECT MATERIALS

The evaluation of **SUSPECT MATERIALS** (SM), which are materials and products that may randomly contain asbestos but were not tested, is based on the assumption that these unsampled SUSPECT MATERIALS are asbestos-containing.

A number of potentially ACM's that are difficult to identify may be present in some areas. These materials are grouped under the heading of Suspect Asbestos-Containing Materials (the need for demolition/dismantling equipment and the lack of access limit our ability to determine the asbestos content).

Several areas of equipment base insulating materials are concealed with cladding, and every effort has been made to collect representative samples of base insulating materials. It is possible however that certain asbestos-containing base insulation is present behind solid cladding. A level of destructive testing prior to activities that may expose such materials is a standing recommendation.

1.5 Action Matrix and Definitions

PLEL's evaluation of viability of a specific asbestos control options is based on the consideration of the ACM's condition and accessibility. The logic used is that damaged ACM located in an area frequently accessed by all vessel occupants is of a higher priority than damaged ACM located in an infrequently accessed service area.

Under current regulations and guidelines, the owner is required to control all disturbance of ACM. A number of abatement options, such as repair, removal, enclosure, or encapsulation are available to comply with the regulatory requirements.

The following factors are also considered in making site-specific recommendations for compliance with the provincial regulations:

- i) ACM in **POOR** condition is not routinely repairable.
 - o If an abatement action is necessary, removal is the recommended action (enclosure is a viable option in unusual circumstances).
- ii) Mechanical insulation in **FAIR** condition can be repaired or removed based on the following general recommendations applied on a case by case basis (Note: Either repair or removal are legally acceptable options for the treatment of ACM found in **FAIR** condition):
 - o Repair ACM mechanical insulation found in **FAIR** condition in **ACCESS (B)** or **ACCESS (C)** areas.
 - o Remove ACM mechanical insulation found in **FAIR** condition in **ACCESS (B)** and **ACCESS (C)** areas, where future damage to the ACM is likely to occur.
 - o Remove ACM mechanical insulation found in **FAIR** condition with **ACCESS (A)** to eliminate the potential for re-damaging ACM by all vessel users.
- iii) ACM in **GOOD** condition present in **ACCESS (A)** at a minimum is subject to

surveillance, as long as it is not disturbed by future renovation, maintenance or demolition. PLEL recommends pro-active removal of the ACM in **ACCESS (A)** where damage is possible by ongoing occupant activity (accidental or intentional). This recommendation exceeds current regulatory requirements.

- iv) Non-friable or manufactured products are considered in the action matrix as follows:
 - o Non-friable and manufactured products reported in **POOR** condition or friable **DEBRIS** resulting from the deterioration of non-friable ACM are treated as friable materials and the appropriate action, depending on accessibility, is determined from the Action Matrix for friable ACM.
 - o For non-friable or manufactured products reported in **GOOD** condition, Action 7 (surveillance) is recommended regardless of Accessibility.
 - o For non-friable or manufactured products **FAIR** condition is not utilized.
- v) Remove all ACM from a particular area where small quantities of asbestos are present and removal will negate the need for the use of the Asbestos Management Program in that area.

With these principles in mind, the following Action Matrix Tables establish the recommended asbestos control action. Note that factors not included in the above discussion, such as an owner's policy decision to remove material, knowledge of upcoming maintenance, etc., may result in a recommendation that differs from this table. The **ACTIONS** are defined in full following the tables.

1.6 Action Matrix Tables

1.6.1 FRIABLE ACM

ACCESS	CONDITION			DEBRIS	SUSPECT MATERIAL
	GOOD	FAIR	POOR		
(A)	ACTION 5/7 ¹	ACTION 5/6 ²	ACTION 3	ACTION 1	ACTION 7
(B)	ACTION 7	ACTION 6/5 ³	ACTION 3	ACTION 1	ACTION 7
(C) Exposed	ACTION 7	ACTION 6	ACTION 4	ACTION 2	ACTION 7
(C) Concealed	ACTION 7	ACTION 7	ACTION 4	ACTION 2	ACTION 7
(D)	ACTION 7	ACTION 7	ACTION 7	ACTION 7	ACTION 7

¹ If material in **ACCESS (A)/GOOD** condition is not removed **ACTION 7** is required.

² If material in **ACCESS(A)/FAIR** condition is not removed **ACTION 6** is required.

³ Remove ACM in **ACCESS (B)/FAIR** condition if ACM is likely to be disturbed.

1.6.2 NON-FRIABLE AND POTENTIALLY FRIABLE ACM

ACCESS	CONDITION		DEBRIS	SUSPECT MATERIAL
	GOOD	POOR		
(A)	ACTION 7	ACTION 3 ⁴	ACTION 1	ACTION 7
(B)	ACTION 7	ACTION 3 ⁴	ACTION 1	ACTION 7
(C) Exposed	ACTION 7	ACTION 4 ⁴	ACTION 2	ACTION 7
(C) Concealed	ACTION 7	ACTION 4 ⁴	ACTION 2	ACTION 7
(D)	ACTION 7	ACTION 7 ⁴	ACTION 7	ACTION 7

⁴ Non-friable and potentially friable ACM found in **POOR** condition and friable **DEBRIS** (from a non-friable ACM source) shall be treated as friable ACM.

1.7 Action Definitions

The following definitions relate to the Action Matrix Tables presented above, and as calculated by PLEL's Hazardous Materials Information System (HMIS). The corresponding Action is presented alongside the quantity in the Re-Assessment Survey Data sheets in Appendix I.

ACTION 1 Immediate Clean-Up of DEBRIS that is Likely to Be Disturbed

Restrict access that is likely to cause a disturbance of the ACM **DEBRIS** and clean up ACM **DEBRIS** immediately. Utilize correct asbestos procedures. This action is required for compliance with regulatory requirements. The surveyor will immediately notify the owner of this condition.

ACTION 2 Type 2 Precautions for Entry into Areas with ACM DEBRIS

At locations where ACM **DEBRIS** can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons utilizing Type 2 asbestos precautions. The precautions will be required until the ACM **DEBRIS** has been cleaned up, and the source of the **DEBRIS** has been stabilized or removed.

ACTION 3 ACM Removal Required for Compliance

Remove ACM for compliance with regulatory requirements. Utilize asbestos procedures appropriate to the scope of the removal work.

ACTION 4 Type 2 Precautions for Access into Areas Where ACM is Present and Likely to be Disturbed by Access

Use Type 2 asbestos precautions when entry or access into an area is likely to disturb the ACM. **ACTION 4** must be used until the ACM is removed (Use ACTION 1 or 2 if **DEBRIS** is present).

ACTION 5 Proactive ACM Removal

Remove ACM in lieu of repair, or at locations where the presence of asbestos in **GOOD** condition is not desirable.

ACTION 6 ACM Repair

Repair ACM found in **FAIR** condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the repair work treat ACM as material in **GOOD** condition and implement **ACTION 7**. If ACM is likely to be damaged or disturbed, during normal use of the area or room, implement **ACTION 5**.

ACTION 7 Asbestos Management Program with Routine Surveillance

Implement an Asbestos Management Program, including routine surveillance of ACM. Trained workers or contractors must use appropriate asbestos precautions (Type 1, Type 2 or Type 3) during disturbance of the remaining ACM.

SUSPECT MATERIALS are to be treated as ACM and subject to the Action Matrix, until bulk sampling confirms the absence of asbestos. Bulk sampling, of **SUSPECT MATERIALS**, is recommended prior to the start of renovation, demolition, or maintenance work that will result in a significant disturbance of the **SUSPECT MATERIAL**.