PLAINTIFF'S EXHIBIT

CAP-1490

A/C Pipe
Producers Association

Internal Correspondence

TO Public Affairs Committee
International Affairs Committee

DATE October 22, 1981

FROM J. F. Welch
J. F. Welch, Director, Public Affairs

SUBJECT Field Problem - Blairsville, Pennsylvania

REF: PAC meeting, October 13, 1981

ACTION REQUIRED: Review for information

Background

Enclosed is Hal Olson's (Johns-Manville) description of the events leading up to this field problem, as well as actions taken to resolve it. Staff has deleted Attachment 2 (routed with correspondence on Lakewood field problem); Attachment 4 has been updated with the letter sent from J-M to the Blairsville Water Authority Board.

Current Status

J-M will continue to manage this field problem and routinely report its progress through Hal Olson.

If you have any questions, please do not hesitate to call.

JFW/ajb

Enclosure

cc: A. Kahn, Esq.
N. Rahn, Esq.
N. Battle

copies to:

Public Affairs Committee	International Affairs Committee
H. Olson	R. Dorner
I. Adams	B. Giboin
W. Perrell	C. Walters
J. Woods	R. Hobbs
J. Baker	A. Saoulis
T. Dougherty	R. Jalan
D. Stinson	V. Pattabhi
W. McCallie	H. Hudson
B. Collier	C. Barton
	S. Al-Tarkait
	E. van der Rest

HEGA/6
Chrono

Johns-Manville
Sales Corporation

Ken-Caryl Ranch
Denver, Colorado 80217
(303) 979-1000

September 24, 1981

John Welch
A/C Pipe Producers Association
1600 Wilson Blvd.
Suite 1008
Arlington, VA 22209

RECEIVED OCT 2 1981

Re: Blairsville, PA
Hot Spot for the Month

Dear John:

Our latest candidate for the asbestos and health hot spot for the month is Blairsville, PA.

The "Blairsville Committee for Safe Drinking Water" met with the Blairsville Water Authority board on September 9, 1981. The meeting was covered by W.T.A.E., a Pittsburgh, PA T.V. station, and reporters from the Tribune Review and Evening Gazette. We have a tape of the 6 p.m. and 11 p.m. W.T.A.E. news broadcasts.

A Myron Kok is the spokesman for the protest group. Attachment #1 is a letter from Mr. Kok to Gordon Robeck of the E.P.A. in which Mr. Kok "summarizes the basic problem". In checking the references made in Mr. Kok's letter it is obvious that data comes from industrial exposure, but they do state G.I. cancer incidence is related to asbestos ingestion.

It is fortunate Mr. Kok wrote to Gordon Robeck. At least Gordon's reply will not be as prejudiced as we have observed in Jim Millette's and Lee McCabe's letters, speeches, and quotes in newspapers. By copy of this letter to Tom Scally I'm asking if he can secure a copy of Gordon Robeck's reply.

Tom Scally, our territorial manager attended the board meeting and showed the AACPP Audio Visual on "A/C Pipe and Health". The town engineer, a George Roman of EAOS Engrg. Co. spoke at the meeting, but was not very helpful in putting the citizens minds at ease. His contribution to the meeting was that he was told by the Farmers Home Administration who helped fund the project that A/C pipe must be included in the specs as an alternate, and that the board was required by F.H.A. to accept the low bid on A/C pipe. In other words his position was, "It ain't my fault."

Prior to the board meeting Tom Scally suggested to the board that they might consider establishing a panel to investigate A/C pipe and report back to the board and the citizens, i.e. similar to the action taken by the Lakewood, CA city council when they were presented with a similar situation. I had advised Tom about Lakewood's successful handling of their situation.

The board has apparently asked George Roman to act as their "panel" to investigate asbestos in water supply, and George Roman has called me regarding information on how Lakewood, CA handled the situation. I will contact Legion Kramer at Lakewood to determine if he will discuss with Mr. Roman the actions his investigative panel took before they met with the council and the protesting citizens. For the information of carbon copy holders, I will summarize what the Lakewood panel did.

1. Prepared a detailed report. (see attachment #2) for an outline of their report.

2. Had samples of old and corroded cast iron pipe and old but not affected A/C pipe available for display at the meeting so that the reason for using A/C pipe was apparent. It also showed A/C pipe did not contribute significant quantities of asbestos to the water supply.

3. Had a panel of recognized authorities available to answer citizen's questions. The panel included:

    a. The California State Sanitary Engineer from the California Department of Public Health.

    b. Robert Bryant, Chief Engineer for the Los Angeles Dept. of Water & Power, and who is also the chairman of the AWWA A/C Pipe Committee.

    c. Dr. K. Kilborn from the Univ. of So. Calif., a leading authority on disease caused by asbestos.

    d. Dr. H. M. Conrad, Ecological Systems Corp., a water quality consultant.

By carefully preparing for the citizen's meeting the city officials on the investigative panel were able to dispel the concern that had been generated, and the city council voted to bury the issue of A/C pipe being hazardous to public health.

From my conversation with George Roman and the position he took at the first meeting, I seriously doubt he will be as prepared as the Lakewood panel was to respond to the citizens.

At the Sept. 9 meeting the Blairsville Committee for Safe Drinking Water presented some demands on the water board (see attachment #3). I have drafted a potential response from J-M (see attachment #4) that would primarily address the demand for J-M to furnish a guarantee that no health problems would result from use of our TRANSITE pipe. By copy of this letter to Wyatt McCallie I am asking for him to review and advise if he sees any adverse legal problems from our responding in this manner. If we do give such a response I believe it should be given to the press. By copy of this letter to Curt Linke I am asking for his comments on this course of action.

Very truly yours,

H. L. Olson, Manager
Environmental & Engineering Development

HLO:bja

attachments

cc: Jack Cran
Wyatt McCallie/Jim Reis - Legal
Curt Linke/Mary Tomenco - Corp. Rel.
John Turbeville/Ron Bradford - L.A.
Pete Mascola - NERO
Tom Scally - NERO
Joel Youkers - Zelienople
file/chrono

ATTACHMENT #1

MYRON KOK
CONSULTING MINING ENGINEER
14 MILLER DRIVE
BLAIRSVILLE PA 15717
412 459-7074

September 14, 1981

Mr. Gordon G. Robeck,
Division Director
U.S. Environmental Protection Agency
Drinking Water Research Division
26 West Saint Clair Street
Cincinnati, Ohio 45268

RE: Blairsville, PA Water System

Dear Mr. Robeck:

On Tuesday, September 8, 1981, I called Mr. Michael Schock and acquainted him with the Blairsville, PA Boro water system and some of the inherent problems.

May I summarize the basic problem. The Boro of Blairsville, PA is located south of Indiana, PA and approximately 45 miles east of Pittsburgh, PA on U.S. Route 22. The Blairsville Boro receives its present water supply from a manmade reservoir located approximately four miles from the boro. The water is gravity fed through a 12 inch cast iron transmission line. The water is chlorinated at the reservoir. This water system was installed in 1925-26 and has been in continuous service. Numerous water leaks had developed. the capacity of the pipe lines had been reduced by the incrustation of solid depositions on the inside of the pipe lines, necessitating the replacement of the water system.

A Water Authority was organized and set up to install a new water system. During the early discussions of the Water Authority, ductile iron pipe had been considered as the main transmission line. After several Water Authority meetings, it was decided to use 16 inch diameter asbestos-cement pipe as the main transmission line. Branch lines using 12, 10, eight, six and four inch asbestos-cement lines were also installed. The asbestos-cement pipe lines were installed without the general populace of Blairsville being notified.

This entire water system is ready to be turned on. However, some of the concerned citizens became aware of the use of the asbestos-cement pipe, and organized a committee to meet with the Water Authority on Wednesday, September 9, 1981 to air the problems. These are described in the attached Xerox copies of the news media stories.

The main concern of the citizens was the leaching out of the calcium carbonate in the pipe and releasing the asbestos fibres into the drinking water. Another factor that was determined was that the Blairsville water was an aggressive water and the engineers in charge failed to recognize this as a very important problem.

The citizens are clamoring for action and want these asbestos pipes removed and replaced with a safe product because of the evidence that ingested asbestos fibres cause gastro-intestinal cancer. We have two government pamphlets that state categorically ingested asbestos fibres do cause cancers of the esophagus, stomach, colon and rectum. These are:

"Health Hazards of Asbestos", Cancer Alert Series, U.S. Dept. of Labor, 1978, OSHA 3040, Pages 3,4 and 6; and

"Workplace Exposure to Asbestos, Review and Recommendations", DHHS (NIOSH) Publication No. 81-103, NIOSH-OSHA, April, 1980, Pages 24 and 25.

Also, we have a letter from Dr. Thomas Mancuso, M.D., research professor of Graduate School of Public Health, who also confirms the cause-effect relationship of ingested asbestos fibres and gastro-intestinal cancers and advises us not to use asbestos-cement pipe (see attached letter).

This new water project has cost the Blairsville residents over two million dollars.

When I talked with Mr. Michael Schock, he suggested I write you. As spokesman for Concerned Citizens Group, I was analyzing the possibility of monitoring the water system with the help of the EPA. Since the water has not been turned on, it is now possible to evaluate the entire water system, install such pre-treatment as is necessary to prevent the internal erosion of the asbestos pipe and monitor the system so that the people of Blairsville are satisfied that there is little or no asbestos fibre in their drinking water.

We solicit your help and cooperation in the Blairsville water problem.

If you have any communications, please direct them to:

Mr. John Joseph, President
Blairsville Boro Water Authority
Boro Building
Blairsville, PA 15717

September 14, 1981

For me to keep abreast of these matters and keep my committee informed, I would appreciate your sending me copies of any and all communications with Mr. Joseph.

May I ask you to please take time and assist us with a very touchy problem. I am sure the Water Authority and the citizens will be most grateful for your help.

Very truly yours,

Myron Kok

Myron Kok
~~Council~~ Chairman
Committee

MK:klh
CC: Al Kovacik, President
Blairsville Boro Council

Mr. John Joseph, President
Blairsville Water Authority

Mr. Michael Schock, EPA

ATTACHMENT #3

09/08/81

The BLAIRSVILLE COMMITTEE ON SAFE DRINKING WATER takes the following position:

1. That the Blairsville Water Authority withhold the turning on of the water through the new main sixteen inch diameter 21,177 feet of asbestos-cement pipe and any other asbestos cement branch line circuits until a complete investigation is made of the health risks involved using the asbestos-cement pipe.

2. The above action may present some legal and financial problems that the Water Authority may have to resolve with the lending agencies and any other involved agencies.

3. Consult your legal counsel and other counsel to determine Johns-Manville's misrepresentation of the health risks involved with the use of this asbestos pipe.

4. Legal counsel to determine the risk involved with a suit against Johns-Manville. The suit to cover complete reimbursement for all asbestos-cement pipe installed and replacement of all asbestos-cement pipe with suitable safe water lines. Johns-Manville is so sure of the safety of their pipe and that no cancer risk is involved, have them agree in writing that Johns-Manville will absolve the Blairsville Water Authority from any suits involving cancer that is traceable to asbestos-cement pipe installed in the Blairsville water system. If Johns-Manville is so sure that there are no health risks involved, let them accept the above responsibilities.

5. The Water Authority approved the installation of the asbestos-cement pipelines at their August 6, 1980 meeting. At the time of this meeting, there had been a motion approved and passed at the April 24, 1980 meeting to use ductile iron pipe. This motion was never rescinded. At the Wednesday, May 14, 1980 meeting, under Item 10,

Mr. Joseph stated that ductile iron will be specified in the specification forms. At the July 3, 1980 meeting, Mr. Roman of EAOS stated that the ductile iron would be better for our project. At this same meeting under Item 21, Mr. Roman was to give recommendations on asbestos-cement and ductile iron pipe at the next Water Authority Meeting. Ironically, at the same July 3, 1980 meeting, the bids for the Blairsville project were opened and the low bidders identified.

6. The Blairsville Water Authority and its engineers, EAOS, did not recognize and failed to act to determine the Aggressive Index of the Blairsville water. This index is part of a recognized standard as recommended by the American Water Works Association and defined in their Standards.
To our knowledge, these tests on the Blairsville water have not been determined. We tried to locate information on all tests run on the Blairsville water.
We refer you to American Water Works Association Research Bulletin titled "the Behavior of Asbestos-Cement Pipe under Various Water Quality Conditions: A Progress Report dated February, 1980 by authors Ralph W. Buelow, James R. Millette, Earl F. McFarren and James M. Symons."
This report covers an evaluation of ten different water systems, including water characteristics, calculated aggressiveness index (AI) and collection of samples for asbestos fibre count. We also submit a letter from Doctors Tackett and Park of Indiana University of Pennsylvania on recent tests on asbestos pipe. They also have evaluated literature furnished to them and their comments are included in their letter.

The tests outlined in this report categorically relate the significance of erosion in cement-asbestos pipes under varying conditions.

7. It is a recognized fact that asbestosis fibres are carcinogous. This committee takes the position that any asbestos fibres when induced into a human body by respiration or ingestion, there is a dangerous health risk. There is no safe carcinogen according to Dr. Mancuso of the University of Pittsburgh. See Dr. Mancuso's attached letter.

8. The Water Authority when polled as individual members, their individual belief was that the asbestos pipe was safe. This committee does not know how the Water Authority, either individually or collectively, arrived at the conclusion that asbestos-cement pipe was safe.

9. This committee recognizes that the asbestos-cement water pipe lines have been installed and at present some of the Blairsville citizens are already subjected to asbestos hazards. The committee is not sure that the asbestos pipe installation has been done in accordance with good safety practices to prevent asbestos fibre contamination.

Where asbestos pipe installations have been connected for domestic water use, water samples should be taken and an an asbestos fibre count made.
The United States Environmental Protection Agency (EPA), Drinking Water Research Division (DWRD), Cincinnati, Ohio should be contacted immediately and their advice, help and input be recognized in the Blairsville Water System analysis and tests to be run.

BCSDW 09/08/81

10. This committee is not out to seek vengeance on any of the members of the Water Authority. It only seeks to remind the Authority that the residents of Blairsville are adequately advised of the health risks involved that may not surface twenty-five to thirty years in the future. The young children of Blairsville residents are the ones to face the health risks outlined. We, the concerned citizens, do not want to be a part of the group who support the use of asbestos-cement pipes.

MK:klh

BCSDW 09/08/81

ATTACHMENT #4

Johns-Manville

Internal Correspondence

To: Tom Scally - MAD

Date: October 8, 1981

From: H. L. Olson 3-01, Ext. 3422

RECEIVED OCT 16 1981

Copies: J. Cran 3-01, W. McCallie 2-20, Jim Reis 1-03, J. L. Fischer, C. Linke 1-04, M. Tomenko 1-04, B. Collier 1-07, P. Mascola - MAD, J. Welch - AACPP, file/chrono

Subject: BLAIRSVILLE, PA

Attached is a copy of a letter sent to the Blairsville Water Authority Board.

Some thought had been given to releasing this letter to the press, but it was decided to refrain from such action on our part and let the Water Board handle it as they felt best for them. If they would care to do so, and would require assistance from the association's public relations firm, please let me know.

HLO:bja

attachment

Johns-Manville
Sales Corporation

Ken-Caryl Ranch
Denver, Colorado 80217
(303) 979-1000

October 7, 1981

Blairsville Water Authority
Blairsville, PA 15717

Gentlemen:

We are in receipt of a copy of the statements and requests presented to you by the "Blairsville Committee on Safe Drinking Water". In response to this document we would like to make the following comments and offer.

1. There has been no pipe that has been subjected to so many tests and studies in an attempt to prove a health hazard exists with its use as asbestos-cement pipe. These studies have covered a period of over eight years, and millions of dollars have been spent by the U. S. E.P.A. on these studies. All of these studies have failed to establish a causal relationship between asbestos ingested in potable water supply and any health hazard, including cancer.

   After a careful review, Dr. Kotin, our Sr. Vice President for Health Safety & Environment has stated,

   > "On the basis of all the data now available there is no demonstrated risk associated with the ingestion of asbestos in potable water supplies."

   Dr. Kotin's statement reflects an opinion shared by qualified doctors who have investigated the many studies that have been directed at trying to establish a link between asbestos ingested in water supplies and any health hazard.

2. The Blairsville Committee on Safe Drinking Water states, "If Johns-Manville is so sure of the safety of their pipe and that no cancer is involved, have them agree in writing that Johns-Manville will absolve the Blairsville Water Authority from any suits involving cancer that is traceable to asbestos-cement pipe installed in the Blairsville Water System". This statement presumes that asbestos cement pipe is potentially dangerous to the citizens of Blairsville and that there are other "no risk" pipes that should have been used. It is the

opinion of Johns-Manville that our asbestos-cement pipe is no more of a health hazard to the public who drink water flowing through it than any other commonly used water main materials. We stand ready, willing and even eager to offer any guarantee regarding health implications from the use of our A-C pipe that would be offered by any other pipe manufacturer.

We specifically request that the "Blairsville Committee on Safe Drinking Water" obtain a "health guarantee" from any major manufacturer of water main pipes and a similar "guarantee" will then be offered by Johns-Manville covering the use of our TRANSITE Asbestos-Cement Water Pipe.

Very truly yours,

H. L. Olson, Manager
Environmental & Engineering Development

HLO:bja

attachment: U.S. Environmental Protection Agency-
Region IV letter to the City of Lakeland, FL

Executive Committee

John F. Welch

John F. Welch, Vice President

July 9, 1982

Kirkland & Ellis Information Request

REF: JFW correspondence, same title, April 21, 1982

ACTION REQUIRED: Review for completion by July 22, 1982

This is a reminder that the position papers, "The Control of Worker Exposure to Airborne Asbestos Fibers in the Asbestos Cement Manufacturing Industry" and "The Control of Worker Exposure to Airborne Asbestos Fibers in the Installation of Asbestos-Cement Pipe" were to have been reviewed and returned to AACPP no later than June 4, 1982. With the very real prospect of a Notice of Proposed Rulemaking on the OSHA asbestos standard scheduled for this Fall, Kirkland & Ellis would appreciate receiving the position papers by the July 22, 1982 Executive Committee meeting.

If you have any questions, please do not hesitate to call.

JFW/ajb

Enclosure

cc: A. Kahn, Esq.

copies to: Executive Committee

L. Ambler
J. Cran
L. Taylor

II03EI20605
Chrono

Executive Committee

J.F. Welch

J. F. Welch, Vice President

April 21, 1982

Kirkland & Ellis Information Request

REF: (1) Executive Committee meeting minutes, January 20-21, 1982
(2) Public Affairs Committee minutes, (Regulatory Affairs Program), October 13, 1981

ACTION REQUIRED: Review for comment by June 4, 1982

Background

On December 17, 1979, the Environmental Protection Agency (EPA) issued an Advanced Notice of Proposed Rulemaking (ANPRM) on Commercial and Industrial Uses of Asbestos Fibers. Kirkland & Ellis was retained as special regulatory counsel to AIA/NA and assumed responsibility for preparing industry's affirmative case for the rulemaking.

On April 17, 1980, AACPP Board of Directors passed a motion that AACPP should act as an independent industry subcommittee and prime coordinator for the collection of all information necessary to complete the product sector profile for A/C pipe. Since that time, AACPP has been operating in this capacity under the "umbrella" of AIA/NA and Kirkland & Ellis.

After the election of Ronald Reagan, the preparation of an affirmative case for the industry took a different approach. Taking advantage of a more favorable political climate, the industry engaged in "regulatory negotiations" with EPA to reach a cooperative agreement on the regulation of asbestos and asbestos-containing products.

Current Status

An important part of any negotiated settlement with EPA depends on industry's showing that substantial progress has been made in controlling worker exposures in A/C pipe manufacturing and installation. The enclosed drafts, prepared by Kirkland & Ellis and edited by AACPP Staff, address these two issues. Both rely heavily on the Research Triangle Institute report to the Occupational Safety and Health Administration (OSHA) because that document seems to enjoy the highest relative credibility by EPA and OSHA.

The position paper entitled "The Control of Worker Exposure to Airborne Asbestos Fibers in the Asbestos Cement Manufacturing Industry" should be transmitted to appropriate industrial hygiene/manufacturing personnel for review and comment. Note that considerable information is needed for discussion of industry's position on the feasibility of proposals for more stringent exposure controls during fiber introduction, mixing and conveying, and pipe formation, curing and finishing.

The position paper entitled "The Control of Worker Exposure to Airborne Asbestos Fibers in the Installation of Asbestos Cement Pipe" should be transmitted to appropriate field engineering or marketing personnel with firsthand knowledge on potential asbestos exposures during A/C pipe installation. Note that input is needed on Member Company positions on the feasibility of engineering controls and work practices requirements during A/C pipe installation.

Comments on both position papers should be submitted to AACPP no later than June 4, 1982. If there are any questions about these documents, please do not hesitate to call.

JFW/ajb

Enclosures

cc: A. Kahn, Esq.
B. J. Pigg
T. S. Hardy (K&E)

copies to: Executive Committee

L. Ambler
J. Cran
L. Taylor

H03EI21903
Chrono

THE CONTROL OF WORKER EXPOSURE TO AIRBORNE ASBESTOS FIBERS IN THE ASBESTOS CEMENT PIPE MANUFACTURING INDUSTRY

The asbestos cement pipe manufacturing industry produces annually approximately $200 million worth of pipe for sewer service and water supply systems in the United States.[1] At the present time, eight plants manufacture asbestos cement pipe, and these plants employ (____) workers. This industry consumes approximately 40% of the asbestos used in the United States.[2] This paper discusses the levels of worker exposure to asbestos fibers in the asbestos cement pipe manufacturing industry and the feasibility of improved control technologies.

I. ASBESTOS CEMENT PIPE PRODUCTION AND ASSOCIATED EXPOSURE LEVELS

The production of asbestos cement pipe can be broken down into five discrete stages: (i) asbestos fiber receipt and storage, (ii) fiber introduction, (iii) conveying and mixing, (iv) pipe formation and curing, and (v) pipe and coupling finishing. Each stage has different levels of

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1/ Unpublished data, Association of Asbestos Cement Pipe Producers (1981).

2/ United States Dep't of the Interior, Asbestos 3 (1980).

exposure and requires different control technology. This paper discusses these stages sequentially.

A. Fiber Receipt and Storage

The initial step in the production of asbestos cement pipe is the receipt of asbestos as a raw material packed in bags. Until the mid-1950's, asbestos was packed loosely and shipped in bags made of paper or jute. Since the fiber was air-conveyed, the bags were aerated during filling and tended to leak dust whenever they were handled.

In 1954, asbestos suppliers began to use hydraulic pressure in place of compressed air to fill the bags with asbestos. These "pressure-packed" bags are much cleaner when shipped, stored and opened.

Even these bags, however, may release asbestos fibers if broken during shipment and handling. To reduce exposure from this form of leakage, bags now are shipped on specially wrapped wooden pallets that reduce the likelihood of breakage when the bags are moved by forklift.[3/] Asbestos suppliers also increasingly use shrinking film-wrapped or stretch-wrapped pallets and double-sealed bags to reduce further the

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3/ Research Triangle Institute, Asbestos Dust: Technological Feasibility Assessment and Economic Impact Analysis of the Proposed Federal Occupational Standard IV-11 (September 1978) [hereinafter cited as "RTI Report"].

risk of breakage.[4] In addition, when bag damage does occur, the bags are taped, and spills are vacuumed promptly.[5]

The major supplier of crocidolite also has introduced fiber processing developments to improve dust control in asbestos cement pipe plants. The inherent physical characteristics of crocidolite make it more difficult to package and handle. Generally speaking, it is considered a "dustier" fiber than chrysotile. In 1979, some crocidolite suppliers began to wash the crocidolite-bearing ore to reduce fine dust and micro-fiber content. All ore is subjected to high pressure waterjets as it is sized prior to milling. The effect of water washing is a finished crocidolite with an (x) percent reduction in the micro-fiber content. This translates directly to reduced exposure levels during fiber introduction. [Insert data, if available, on reduction of crocidolite exposures in plants.]

These packaging and dust control measures have resulted in a steady decline in exposure levels during fiber receipt and storage. Various studies have estimated asbestos fiber concentrations at this process stage. The results, expressed as an eight-hour time-weighted averages (TWA) are reported as follows:

4/ *Id.* at IV-12.

5/ *Id.*

	Range (fibers/cc)	TWA (fibers/cc)
Weston (1976)[6/]	0.25 - 2.5	1.0
RTI (1978)[7/]	0.1 - 2.5	---
AIA Survey (1980)[8/]	<0.1 - 0.23	0.1

B. Fiber Introduction

Asbestos fiber is introduced into the production process in two steps. First, the bags of raw asbestos must be opened and dumped onto an enclosed conveyor belt. Second, the fiber must be "fluffed" to transform it into a relatively uncompacted state suitable for the manufacturing process.

Bag opening and dumping may be performed manually or with automated, completely enclosed equipment. The manual process involves moving bags of asbestos from a pallet to a hooded dump station where the bags are opened and emptied. The station is equipped with a receptacle (usually a heavy plastic bag) to dispose of empty asbestos bags.[9/] Both the

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6/ Weston Environmental Consultants-Designers, Technological Feasibility and Economic Impact of OSHA Proposed Revision to the Asbestos Standard 4-23 (March 29, 1976) [hereinafter cited as "Weston Report"].

7/ RTI Report at IV-13.

8/ The results of this survey of all nine currently operating asbestos cement pipe plants are not yet published. It also should be noted that due to limitations in the accuracy of monitoring equipment at these low levels, these measurements should not be considered precise.

9/ RTI Report at IV-14.

dump station and bag receptacle are kept under negative pressure to prevent air outflow and control worker exposure to asbestos fibers.[10/]

The automatic asbestos bag opener is a completely automated and environmentally isolated asbestos processing system. The opener automatically opens, dumps, compacts and fluffs all asbestos materials. The automatic bag opener also compacts the empty bag and places it in a sealed container for subsequent disposal. This type of equipment is used in (______) A/C pipe plants.

Two studies have reported worker exposures from fiber introduction:

	Range (Fibers/cc)
Weston (1976)[11/]	0.5 - 3.5
RTI (1978)[12/]	0.1 - 4.8

C. Conveying and Mixing

After fiber introduction, the asbestos is conveyed to a dry mixing step. Here the various fiber types are agitated and blended into a homogenous fiber mix. The fiber mix is conveyed to a milling step where the Portland cement and silica flour are then added at a mixing station. The blend

10/ Id. at IV-14 to IV-15.

11/ Weston Report at 4-23.

12/ RTI Report at C1-2.

is then conveyed pneumatically to the next production stage (wet mix) in which water is added to form the asbestos-cement-mortar-silica slurry.

In the past, conveying fiber or fiber-containing mixes was an extremely dusty operation. More recently, however, the use of closed pneumatic conveying systems kept under constant negative pressure has minimized leakage. For example, negative pressure is maintained inside the dry mixer by connection with a local-exhaust dust-control system.[13/] The mixer is generally a totally enclosed unit, and regular maintenance is conducted to restrict leaks from seals or loose-fitting equipment.[14/]

As the dry blend is wet mixed, local exhaust is employed to prevent worker exposure.[15/] Once the mixture becomes wet, little asbestos fiber becomes airborne.[16/]

Steps to control airborne concentrations of asbestos fibers from mixing operations have dramatically reduced exposure levels. Concentrations due to mixing have been measured as follows:

13/ RTI Report at IV-17 to IV-18.

14/ Weston Report at C-21.

15/ Id.

16/ RTI Report at IV-18.

	Range (fibers/cc)	TWA (fibers/cc)
NIOSH (1967)17/	---	6.2
NIOSH (1971)18/	0.2 - 7.0	2.3
Weston (1976)19/	0.8 - 3.0	1.2 or 1.8
RTI (1978)20/	0.4 - 3.0	---
AIA Survey (1980)	<0.1 - 1.62	0.32

D. Pipe Formation and Curing

After wet-mixing is complete, the slurry is conveyed to the pipe-forming machine. Here, it is first filtered through rotating screens to form a cement-fiber ply. Then, it is picked up by a continuous felt, vacuum dewatered and wrapped, under pressure, on a rotating mandrel until the desired wall thickness is reached. The newly formed pipe is electrolytically stripped from the mandrel, "pre-cured" under controlled temperature and humidity and "final cured" in an autoclave using saturated steam.

Throughout pipe forming and curing stages, the asbestos is in aqueous solution, wet or cement ply or hardening into pipe, and generally special equipment to control fiber

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17/ National Institute for Occupational Health and Safety, Occupational Exposure to Asbestos Table XV (1972) [hereinafter cited as "NIOSH Report"].

18/ Id. at Table I, Table XV.

19/ Weston Report at 4-23.

20/ RTI Report at C1-2.

release is not required.[21] Good housekeeping measures are conducted to clean up slurry splashes, bits of ply or fragments of pipe that could dry and become a source of fiber emissions.

Good housekeeping practices during pipe formation and curing have progressively reduced concentrations of asbestos fibers. Exposures at this stage (measured in TWA f/cc) have been estimated as follows:

	Range (fibers/cc)	TWA (fibers/cc)
NIOSH (1967)[22]	---	1.8
NIOSH (1971)[23]	<0.1 - 3.7	1.1
Weston (1976)[24]	0.5 - 1.1	0.75
RTI (1978)[25]	0.1 - 1.4	---
AIA Survey (1980)	<0.1 - 2.5	0.32

E. Pipe Finishing

In the finishing process, the pipe is cut into uniform lengths. The pipe ends are machined on a lathe to ensure a

21/ Id. at IV-18.

22/ Id. at Table XV. The NIOSH averages cited here are weighted means of the averages reported for pipe formation and pipe curing.

23/ Id. at Table I, Table XV.

24/ Weston Report at 4-23.

25/ RTI Report at C1-2.

tightly fitting joint, and the finished pipe tested. In addition, pipe couplings and other special lengths or fittings (tees, elbows, reducers, etc.) are produced. Defective sections and scrap are crushed and recycled.

To capture and control fiber emissions during pipe finishing, the industry uses local exhaust systems and partial hooding near the working point of the tool. In addition, single-point cutting and chipping tools are used in place of diamond or carborundum abrasion wheels, thereby substantially reducing fiber levels. When practicable, wet sawing is used to reduce fiber emissions of certain finishing stations. Local exhaust systems also are used in the vicinity of the rework saw and scrap crusher.[26/]

Reductions in exposure levels in pipe finishing operations have been reported over the years:

	TWA (fibers/cc)
NIOSH (1967)[27/]	5.0 (pipe finishing) 12.8 (coupling finishing)
NIOSH (1971)[28/]	1.7 (pipe finishing) 5.3 (coupling finishing)
Weston (1976)[29/]	2.0 (pipe finishing)

26/ Weston at 2-24.

27/ NIOSH Report at Table XV.

28/ *Id.*

29/ *Id.* at 4-23.

RTI (1978)[30]	0.1 to 1.9 (sawing) 0.1 to 0.7 (lathes) 0.2 to 2.3 (coupling cutoff) 1.5 to 2.1 (fitting and specialties) 0.1 to 0.5 (drilling) 2.0 to 2.9 (rework saw and crushing)
AIA Survey (1980)	0.1 to 1.41 (average of 0.22)

II. OVERALL EXPOSURE LEVELS IN THE PRODUCTION OF ASBESTOS CEMENT PIPE

Due to the installation of increasingly effective dust control measures, asbestos concentrations throughout the industry have declined steadily. Data from the Johns-Manville asbestos cement pipe plants in Long Beach and Stockton illustrate the dramatic reduction that has taken place over the last decade.[31]

Measurements	1969-79	1978-79
less than .5 f/cc TWA	3%	72%
.5 to 1.0 f/cc TWA	14%	21%
1.0 to 2.0 f/cc TWA	33%	6%
more than 2.0 f/cc TWA	52%	<1%

30/ RTI Report at C1-2.

31/ *See* Johns-Manville Canada, Submission to the Royal Commission on Matters of Health and Safety Arising from the Asbestos in Ontario (January 14, 1981).

A similar study by CertainTeed Corporation found that current exposure levels were one to two orders of magnitude lower than 1961 concentrations.[32/]

The 1980 AIA survey of nine asbestos cement pipe facilities also confirms the progress made in reducing worker asbestos exposures. The study found that of the 917 workers exposed to asbestos fibers in asbestos cement pipe plants, 881 (96.1%) were exposed only to concentrations of 0.5 f/cc TWA and below. Only 11 workers (1.2%) were exposed to concentrations in excess of 1.0 f/cc TWA.

This study also considered the worker-hours of exposure at various concentrations. Broken down by concentration level, the relative worker-hours of exposure were as follows:

less than 0.1 f/cc TWA	40.1%	(635,804)
0.1 to 0.5 f/cc TWA	55.1%	(873,385)
0.5 to 1.0 f/cc TWA	3.2%	(50,000)
1.0 to 2.0 f/cc TWA	1.4%	(22,600)
more than 2.0 f/cc TWA	0.3%	(4,000)

III. POTENTIAL ADDITIONAL CONTROL TECHNOLOGIES

Despite the great progress that has been made in reducing asbestos exposures in asbestos cement pipe manufacture and the generally very low levels now achieved, suggestions have been advanced for further improvements. These suggestions

32/ *See* CertainTeed Corporation Answers to Questions of John Dekany (EPA) Concerning Asbestos Rulemaking 2 (July 8, 1980).

will be discussed on a production stage by production stage basis.

A. Fiber Receiving and Storage

The Research Triangle Institute reports that consistent application of good housekeeping measures (such as power-vacuuming at least once per shift) could keep fiber levels consistently below 0.3 f/cc TWA.[33/] In addition, RTI suggests that new control measures might be used, including high-density fiber blocks, improved packaging, stronger pallets, standardized sizes for bags, and improved transportation practices. Use of these practices, according to RTI, could reduce exposure levels to less than 0.2 f/cc TWA within two years.[34/]

> [Insert discussion of industry position on feasibility of RTI proposals for more stringent control of exposure during fiber receiving and storage]

B. Fiber Introduction

RTI proposes greater use of the following practices to reduce worker exposure to asbestos during fiber introductions:

33/ RTI Report at IV-13.

34/ Id.

-- maximum use of local exhaust systems and empty bag receptacles;

-- regular performance checks and preventive maintenance;

-- vacuuming at least once per shift and immediately following spillage; and

-- mechanically supplied contaminant-free makeup air to balance the local exhaust capacity.

RTI estimates that these procedures would achieve average exposure levels consistently below 0.4 f/cc TWA.[35/] In addition, RTI believes that within two years exposures can be maintained at a level below 0.2 f/cc through the maximum use of hooded dumping stations with integrated bag collection, high-density fiber blocks, and process-recyclable containers.[36/]

[Insert discussion of industry position on feasibility of RTI proposals for more stringent control of exposure during fiber introduction]

C. Mixing and Conveying

RTI suggests the maximum use of continuous exhaust of hoods and maintenance of negative pressure throughout the mixing and conveying stages.[37/] RTI also notes that the dry mix stage might be bypassed completely, with wet mixing conducted immediately after fiber introduction.[38/]

35/ Id. at IV-16.

36/ Id.

37/ Id at IV-18.

38/ Id at IV-19.

[Insert discussion of industry position on feasibility of RTI proposals for more stringent control of exposure during mixing and conveying. Since many of RTI's recommended additional controls are currently in place, it would be appropriate to assess the validity of RTI's 1978 projections.]

D. Pipe Formation, Curing and Finishing

In addition to maximum use of local exhaust systems, RTI proposes increased use of a number of advanced control technologies. These include the redesigning of machinery with integrated local exhaust and increased automation, wet dust suppression for pipe lathes, and wet finishing.[39/]

[Insert discussion of industry position on feasibility of RTI proposals for more stringent control of exposure during pipe formation, curing and finishing]

39/ Id.

PRIVILEGED & CONFIDENTIAL DRAFT

4/6/82

THE CONTROL OF WORKER EXPOSURE TO AIRBORNE ASBESTOS FIBERS IN THE INSTALLATION OF ASBESTOS CEMENT PIPE

Approximately 90 million linear feet of asbestos cement pipe are installed annually in sewer service and water supply systems in the United States.[1/] This pipe is manufactured in standard lengths of ten and thirteen feet and is also produced in half and quarter lengths.[2/] In addition, special fittings such as couplings, elbows and reducers are available for most pipe sizes.[3/] Occasionally, however, asbestos cement pipe must be cut or machined during field installation. These operations generally are brief and infrequent, and when proper work practices are used they produce minimal worker exposure to asbestos fibers.

I. PIPE INSTALLATION PROCEDURES

The installation of asbestos cement pipe initially involves the unloading of the pipe. This may be done with a

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1/ Research Triangle Institute, Asbestos Dust: Technological Feasibility Assessment and Economic Impact Analysis of the Proposed Federal Occupational Standard III-23 (September 1978) [hereinafter cited as "RTI Report"].

2/ Id.

3/ Id.

forklift, a sling, or a special boom. Smaller diameter pipe may be hand-passed or lowered with ropes and skids. The pipe usually is laid alongside the trench prior to lowering and laying it in the trenches and bottom. During these operations the pipe remains intact, and virtually no asbestos is released into the air.[4/]

A major advantage of asbestos cement pipe is its ease of installation and the quality and variety of available joints and fittings.[5/] Consequently, little field fabrication is necessary for installation of this pipe.[6/] Sometimes, however, pipe must be cut, drilled or machined during installation, and workers may be exposed to asbestos fibers released during these processes.

A variety of tools are available for cutting asbestos cement pipe. Cutting may be performed manually with a bow saw or hack saw or with special equipment fitted with carbide-tipped blades. Pneumatic or electrically-driven blade cutters also are available but not commonly

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4/ A study by Equitable Environmental Health, Inc. measured exposure levels during this stage of installation at less than 0.1 fibers/cc. See Equitable Environmental Health, Inc., Dust Exposures During the Cutting and Machining of Asbestos/Cement Pipe: Additional Studies 16 (December 15, 1977).

5/ Cogley, et al., Life Cycle of Asbestos in Commercial and Industrial Use Including Estimates of Releases to Air, Water and Land 36 (October 1979) (draft).

6/ Id. See also RTI Report at III-23.

used. Snap cutting equipment is a relatively recent innovation in which cutting discs mounted on a chain are wrapped around and squeezed into the pipe until a cut is made. The cutting is controlled hydraulically by an operator standing 10 to 15 feet from the pipe. This procedure can be completed in less than three minutes.

Another procedure used to cut pipe is the gasoline-powered abrasive disc saw. This method produces particularly high asbestos exposure levels. Sometimes a hose or special blade shrouds are used to deliver water to the cutting area in an effort to reduce exposure levels.

Finally, cutting may be done with a Doty tool, which also has a station for machining pipe. Doty tool cutting may be used with a shroud and with water applied to the cutting area in order to reduce fiber levels.

After cutting, the pipe is machined. This may be performed with a manual or a power lathe. Hole cutting is occasionally required and may be performed with a drill and rasp or a powered hole cutter. Likewise, when the pipe is drilled or "tapped" to provide customer service connections, manual or power equipment may be used. If couplings must be removed from pre-assembled pipe, a hammer and chisel may be used.

The frequency of field operations depends largely on the type of A/C pipe (water or sewer) being laid, installation locale (urban or rural area) and the experience of the contractor. For example, there may be a relatively higher frequency of tapping operations in urban or suburban installations than in rural projects where homes are further apart. The duration of field operations depends on the type of operation, type of equipment (manual or power driven) and the skills of the equipment operator.

On any given day a crew may perform none, any one, or all of these operations. This, of course, depends on the individual job and its requirement.

As noted above, little fabrication is necessary in the field.[7/] The Research Triangle Institute has estimated that one cutting or machining operation is required for each 1,300 feet of installed asbestos pipe.[8/] Dividing the annual production of asbestos cement pipe by this figure yields an estimate of 69,230 cutting or machining operations annually.

II. WORKER EXPOSURE LEVELS FROM THE INSTALLATION OF ASBESTOS CEMENT PIPE

A typical work crew for installation of asbestos cement pipe is three to four people (the estimated average crew size is 3.41 people) and a crew can install an average of 222.5 feet of pipe per day.[9/] If one assumes that 225

7/ RTI Report at III-23.

8/ *Id.*

9/ *Id.*

days per year of labor are expended installing asbestos cement pipe, approximately 6,130 man-years are devoted to this installation.10/

The estimated 69,230 cutting or machining operations take an average of 15 minutes each to perform.11/ Thus, about 17,307 hours will be spent annually on cutting and machining operations that have the potential to produce exposure to asbestos fibers. If an average of 3.41 workers are exposed to these operations, the result will be 59,016 man-hours of exposure (0.53% of total work hours). This is a liberal estimate because not all workers will actually perform field operations. The operations usually involve only an equipment operator and a helper while remaining workers perform other tasks which may or may not be in the immediate vicinity of the fabrication operation.

If one makes the extreme assumption that a discrete group of workers installs asbestos cement pipe and no other type of pipe, these workers perform 9.5 hours per year of operations that may result in asbestos exposure. (1800 hours x 0.53%).12/

10/ Id.

11/ Id.

12/ Asbestos cement pipe, however, only accounts for one-third of all distribution piping installed in the United States. Id. Furthermore, installation of other types of pipe is estimated to take three times as many man-years as installation of asbestos cement pipe. Id. Based on these figures, approximately 42,900 man-years annually are devoted to pipe installation.

If one adopts the more realistic assumption that the workers who install asbestos cement pipe also install other types of pipe, and vice versa, the frequency of an individual worker's exposure to asbestos fibers is much lower. Under this scenario, the typical worker will have 1.38 hours per year in which he may be exposed to asbestos.[13/]

Not only are the frequency and duration of exposure to asbestos very brief, but the concentrations to which workers are exposed also are generally quite low. A study by Equitable Environmental Health, Inc. measured peak exposures for various operations on different types of asbestos cement pipe.[14/] Their results are summarized in Table 1 on the next page.

13/ Id. at III-24.

14/ Equitable Environmental Health, Inc., Dust Exposures During the Cutting and Machining of Asbestos/Cement Pipe: Additional Studies (December 15, 1977).

TABLE 1

PEAK EXPOSURE LEVELS[15/]

Operation	Sewer Pipe Operator	Sewer Pipe Helper	Pressure Pipe Operator	Pressure Pipe Helper
Cutting Operations				
Hack saw	0.18	0.1	<0.1	0.11
Snap cutting	<0.1	<0.1	<0.1	<0.1
Abrasive disc, wet	42.1	10.2	65.0	49.2
Abrasive disc, dry	35.5	64.0	20.3	59.7
Chisel, hammer and rasp	0.30	0.25	1.99	0.87
Machining Operations				
Manual lathe	0.15	0.13	0.51	0.22
Power lathe	<0.1	0.10	0.29	0.18
Doty Machine, dry	3.83	0.29	1.90	2.23
dry, shroud	0.23	0.10	1.29	0.18
wet, shroud	0.20	0.10	0.21	0.27
Tapering tool	0.18	<0.1		
Hole Cutting				
Power hole cutter	0.44	0.23	1.65	0.38
Drill, hammer and rasp	0.23	0.13	0.22	<0.1
Dry tap with Mueller J tool	<0.1	<0.1	<0.1	<0.1
Tapping with Mueller B-100	<0.1	<0.1	<0.11	<0.13
Coupling Removal				
Hammer and chisel	<0.1	<0.1	0.30	<0.1

15/ Data in this table are taken from the Equitable Environmental Health, Inc. Study. *Id.* at 16-22.

As Table 1 demonstrates, most cutting, machining and tapping operations produce very low concentrations of fibers. Only cutting with an abrasive disc saw and frequent machining with a Doty tool result in peak concentrations in excess of 1.0 f/cc. Fortunately, these peak exposure levels are brief and infrequent. Table 2 gives the time weighted average exposures over a year for various operations. These estimates are based on two very conservative assumptions: (i) that every cutting, machining or tapping operation performed during the year was of the type listed and (ii) that the affected workers installed asbestos cement pipe exclusively.

TABLE 2

TIME WEIGHTED AVERAGE EXPOSURES[16]

Operation	Sewer Pipe Operator	Sewer Pipe Helper	Pressure Pipe Operator	Pressure Pipe Helper
Cutting Operations				
Hack saw	<0.1	<0.1	<0.1	<0.1
Snap cutting	<0.1	<0.1	<0.1	<0.1
Abrasive disc, wet	0.22	0.1	0.34	0.26
Abrasive disc, dry	0.19	0.34	0.11	0.32
Chisel, hammer and rasp	<0.1	<0.1	<0.1	<0.1
Machining Operations				
Manual lathe	<0.1	<0.1	<0.1	<0.1
Power lathe	<0.1	<0.1	<0.1	<0.1
Doty Machine, dry	<0.1	<0.1	<0.1	<0.1
dry, shroud	<0.1	<0.1	<0.1	<0.1
wet, shroud	<0.1	<0.1	<0.1	<0.1
Tapering tool	<0.1	<0.1		
Hole Cutting				
Powerhole cutter	<0.1	<0.1	<0.1	<0.1
Drill, hammer and rasp	<0.1	<0.1	<0.1	<0.1
Dry tap with Mueller J tool	<0.1	<0.1	<0.1	<0.1
Tapping with Mueller B-100	<0.1	<0.1	<0.1	<0.1
Coupling Removal				
Hammer and chisel	<0.1	<0.1	<0.1	<0.1

16/ These figures are derived from the peak exposure levels in Table 1, adjusted for duration of exposure.

Even using assumptions that tend to dramatically overstate the exposure level attributable to a specific operation, only cutting with an abrasive disc saw produces concentrations in excess of 0.1 f/cc as a time weighted average exposure. And, even a worker who installed only asbestos cement pipe and who used an abrasive disc saw for every operation would have a maximum time weighted average exposure of only 0.34 f/cc.

If it is assumed that half the field operations performed are machining rather than cutting operations, a worker who cuts pipe only with an abrasive disc saw would receive a time weighted exposure of less than 0.2 f/cc. Furthermore, if these workers also install other types of pipe, even exclusive use of the abrasive disc saw for cutting operations will not produce time weighted average exposure levels in excess of 0.1 f/cc.

III. STEPS TAKEN TO REDUCE EXPOSURE LEVELS

Although exposure levels in the installation of asbestos cement pipe are already quite low, the industry has taken a number of steps to reduce them still further. Since 1973, the Association of Asbestos Cement Pipe Producers (AACPP) has recommended against the use of abrasive disc saws for cutting A/C pipe. At least one pipe manufacturer maintains a supply of tools that produce low exposure levels, which it makes available at no charge to contractors who purchase its pipe.[17/]

The AACPP also commissioned studies by Equitable Environmental Health, Inc. of exposure levels in pipe installation. Upon receiving the data from the first study, the Association published and distributed nearly 85,000 copies of a field manual entitled "Recommended Work Practices for A/C Pipe." As a result of the widespread acceptance of this manual, the American Water Works Association adopted these same recommendations in its manual entitled "Work Practices for Asbestos-Cement Pipe." All A/C pipe manufacturers in the U.S. have incorporated the work practices into their pipe installation guides. Two manufacturers label A/C products with a bilingual warning that recommended work practices should be followed.

The AACPP manual covers shipping, receiving, handling, assembling, cutting, machining, hole cutting, tapping, and coupling removal for all asbestos cement pipe products. The manual also discusses appropriate procedures for good housekeeping at the work site and waste disposal. AACPP is convinced that when these recommended work practices are followed, no adverse health effects attributable to asbestos will result from normal employment in a construction environment where asbestos cement pipe is used.

17/ RTI Report at IV-59.

IV. POTENTIAL ADDITIONAL CONTROL TECHNOLOGIES

A) Engineering Controls

The Research Triangle Institute has suggested that local exhaust ventilation could be used on power tools cutting asbestos cement pipe in order to reduce exposure levels.[18/] Such a system would require a mobile vacuum unit and a mobile engine generator power source. According to RTI, this system could keep peak fiber levels below 2.0 f/cc.[19/]

RTI also has proposed process modifications to reduce exposure levels. The use of special field cutting tools, such as snap cutting, might be required for asbestos cement pipe.[20/] Alternatively, RTI would consider a requirement that all necessary cutting, machining and hole cutting be performed prior to shipping the pipe to the field. In this way, worker exposure would be controlled by a manufacturer, who is likely to have systems in place for controlling fiber levels.[21/]

18/ Id. at IV-54.

19/ Id. at IV-55.

20/ Id. at IV-59.

21/ Id. at IV-59.

[INSERT DISCUSSION OF INDUSTRY POSITION ON ENGINEERING CONTROLS]

B) Work Practice Requirements

The Research Triangle Institute has also suggested that a variety of work practice requirements might be used to reduce peak airborne fiber concentrations These practices include: (i) vacuuming dust generated during cutting and machining; (ii) burying chips that accumulate on the work site; and (iii) catching the chips produced during cutting and machining in a bag or sheet spread beneath the operation.[22/] Standards also would be set for disposal of the materials gathered.[23/]

[INSERT DISCUSSION OF INDUSTRY POSITION ON WORK PRACTICE REQUIREMENTS]

22/ *Id.* at IV-62.

23/ *Id.*