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**Information on the Use of
Asbestos-Cement Pipe in USAID/Egypt
Water and Wastewater Projects**

**Information Report No. 6-263-91-03-I
February 28, 1991**

UNITED STATES OF AMERICA
AGENCY FOR INTERNATIONAL DEVELOPMENT
OFFICE OF THE REGIONAL INSPECTOR GENERAL/AUDIT

February 28, 1991

MEMORANDUM FOR D/USAID/Egypt, Marshall D. Brown

FROM : RIG/A/Cairo, F. A. Kalhammer 

SUBJECT: Information on the Use of Asbestos-Cement Pipe
in USAID/Egypt Water and Wastewater Projects

RIG/A/C has gathered information on the use of asbestos-cement pipe in selected Mission projects. We believe the Mission needs to be aware of this information and the fact that the subject of this report was included in a RIG/A/C audit report issued in 1982. Your comments on the draft information report have been included as Appendix II. We appreciate the courtesies extended by your staff in this review.

Background

USAID/Egypt has made an extensive commitment to the water and wastewater sector of Egypt since 1977. More than \$3 billion has been authorized for projects that provide substantial capital and technical assistance for water and wastewater projects in Egypt. About \$2 billion has thus far been expended. Mission officials estimated that the investment in the water/wastewater sector represents 24 percent of U.S. economic assistance to Egypt over the last 15 years.

The projects have focused primarily on the rehabilitation and expansion of existing systems in Cairo, Alexandria, the canal cities of Ismailia, Port Said and Suez, the provincial cities of Fayoum, Beni Suef and Minia, and a large number of small villages. The intent of the water and wastewater projects is to increase the availability of potable water supplies and to reduce environmental problems and public health hazards caused by sewage flooding in residential areas.

Asbestos-cement pipe is locally manufactured and widely used in USAID/Egypt's water projects and to a lesser extent in wastewater projects. A public sector firm, SIEGWART Company, is responsible for the production of asbestos-cement pipe. The production of this pipe has gradually increased from about 57,000 tons in 1981 to about 70,000 tons in 1990. According to Egypt's Second Five-Year Plan (1987), asbestos-cement pipe is one of the most important industrial goods manufactured in Egypt. A company official stated that SIEGWART employs about 5000 workers. The U.S. Environmental Protection Agency (EPA) has found, and past A.I.D. policy statements appear to agree, that exposure to asbestos poses an unreasonable risk to human health.

Information Objectives

We recently conducted an audit of the Provincial Cities Development (PCD) project and made our audit results known in a separate report (Audit Report No. 6-263-91-05). As part of our work, we also obtained information on the use of asbestos-cement pipe under PCD and other USAID/Egypt projects, and how the latest EPA regulations might affect USAID/Egypt project implementation. Since the purpose of this inquiry was to obtain information, this report contains no conclusions or recommendations and is not to be viewed as the results of an audit. In making our inquiry, we had the following objectives in mind:

1. Has USAID/Egypt been notified that the manufacture and use of asbestos-cement pipe may present certain health risks?
2. What is the latest U.S. EPA position regarding the potential health hazards associated with the manufacture and use of asbestos-cement pipe?
3. Is USAID/Egypt financing the procurement of asbestos-cement pipe for water and wastewater projects in Egypt?
4. What is known about the condition of potable water distribution systems in Egypt?
5. What are USAID/Egypt's plans with respect to future financing of asbestos-cement pipe procurement?

Appendix I describes the scope of our work and the methodology we used for this inquiry.

Information on the Use of Asbestos-Cement Pipe in USAID/Egypt Projects

1. Has USAID/Egypt been notified that the manufacture and use of asbestos-cement pipe may present certain health hazards?

In April 1982 a USAID/Egypt financed contractor, CHEMONICS, published a report, "Review of the Health Effects of Asbestos Pipe" under the Mission's Basic Village Services (BVS) project (No. 263-0161). The report concluded:

- Caution should be observed in the use of asbestos pipe. Its potential hazards to health should be recognized.
- The aggressiveness index (a measure of corrosiveness) should be evaluated in new water systems before using asbestos pipe.
- Serious consideration should be given to shifting from asbestos pipe to lead-free PVC (polyvinyl chloride) or other apparently suitable materials.
- A program of water analysis to determine asbestos content and aggressiveness index of existing water supplies should be undertaken by water officials.

RIG/A/Cairo audit report No. 6-263-82-5, dated April 29, 1982, on the BVS project also made recommendations on the Mission's use of asbestos-cement pipe in BVS potable water projects:

Recommendation No. 1

USAID/Egypt document, for the record, an official position on the use of asbestos-cement pipe in AID-financed BVS potable water projects.

If AID chooses to continue funding asbestos-cement pipe for BVS potable water projects, we recommend a written decision to do so be placed in the record showing the basis for that decision and the signatures of the authorizing persons. If AID decides to discontinue funding asbestos-cement pipe for BVS potable water projects due to potential health problems, we believe the following actions should be taken:

Recommendation No. 2

USAID/Egypt arrange for lead-free PVC or other suitable materials to be used for piping in BVS potable water projects.

Recommendation No. 3¹

USAID/Egypt (a) arrange water analysis of all BVS funded potable water systems containing asbestos-cement pipe, and (b) take any corrective action required based on the results of such tests.

On June 24, 1982, the Mission requested that all three recommendations be closed. Available correspondence states that USAID/Egypt was unable to document an official position (Recommendation No. 1) because the evidence at the time was inconclusive as to whether asbestos-cement pipe was a health hazard. We were unable to determine from available records how this issue was finally resolved. Recommendations No. 2 and 3 were closed on the basis of the information provided by the Mission on June 24. USAID/Egypt stated that the GOE's implementing agency had agreed that other suitable pipe would be procured and that if this pipe was not available in Egypt, it would be procured in the United States. USAID/Egypt also stated that the BVS consultants would conduct tests to monitor the aggressiveness index of potable water to determine if corrective actions were needed. The aggressiveness index is a measure of corrosiveness. The more corrosive the water, the higher the probability that asbestos will be present in the water distribution system. The Mission promised to closely monitor these tests. However, tests to directly determine the presence of asbestos fibers in the water could not be done in Egypt because they require electron microscopy. The laboratory equipment needed for electron microscopy was not available in Egypt. Mission officials told us on October 31, 1990 that water samples could be sent to the United States for analysis.

¹ This Recommendation was based on the results of a British study of rat digestive tracts (as quoted in the April 1982 Chemonics report). After both prolonged and short-term ingestion of Crysotile asbestos fibers, the cellular changes are consistent with the cellular changes resulting from cytotoxicity tests using cell culture. Also, cancer incidence studies for drinking water in San Francisco Bay Area counties (sponsored by the EPA) found that statistically significant positive trends were noted for white male lung cancer and white female gall bladder, esophageal and peritoneal cancer.

wastewater systems. The Asia and Near East Bureau's environmental coordinator was quoted as strongly recommending that no asbestos-cement products be used in Bureau supported projects, whether the material was financed by A.I.D. or the host government.

In a March 1987 telegram (Appendix II), the Asia and Near East Bureau issued additional guidance that reflected the latest EPA rule (40 CFR Part 763) to prohibit the manufacture, importation, and processing of asbestos in certain products and to phase out the use of asbestos in all other products in the United States. The cable is addressed to all USAID Missions in Asia and the Near East. The cable discussed the EPA guidance for water and wastewater projects as follows:

All personnel should recognize that USEPA restrictions on the use of asbestos-cement pipe and fittings are based primarily on the hazards of production of asbestos pipe and not the hazards of use of asbestos pipe in water and wastewater projects... It should be noted that the only serious known health exposure exists, in the case of water supply pipe, when it is used in situations where water that tends to be corrosive in nature may affect asbestos/concrete pipe in ways that may pose some hazard to water users...

It is intention of the U.S. Government to phase out the use of asbestos products over a 10 year period. A.I.D. fully supports this concept and requests that all technical personnel review the use of asbestos products on a case-by-case basis to determine if a suitable alternative exists.

2. What is the latest U.S. EPA position regarding the potential health hazards associated with the manufacture and use of asbestos-cement pipe?

On July 12, 1989 EPA issued a final rule to take effect in December 1990 under section 6 of the Toxic Substances Control Act to prohibit, at staged intervals, the future manufacture, importation, processing, and distribution in commerce of asbestos in almost all products, including asbestos-cement pipe. EPA has determined that these activities present or will present an unreasonable risk of injury to human health. The ban on the manufacture, importation and processing of asbestos-cement pipe in the United States will take effect by August 26, 1996.

The findings that supported EPA's final ruling advise that:

- Exposure to asbestos causes many painful, premature deaths due to mesothelioma (tumors of the lung pleura) and lung, gastrointestinal, and

other cancers, as well as pulmonary fibrosis (asbestosis). Studies show that asbestos is a highly potent carcinogen and that severe health effects occur after even short-term, high-level or longer-term, low-level exposures to asbestos.

- People are frequently unknowingly exposed to asbestos and are rarely in a position to protect themselves.
- Asbestos fibers are released to the air at many stages of the commercial life of the products.
- Release of asbestos fibers from many products during various phases of the products' lives (i.e. during the manufacture, distribution and use) can be substantial.
- Despite the proven risks of asbestos exposure and the current or imminent existence of suitable substitutes for most uses of asbestos, asbestos continues to be used in large quantities in the U.S.

The conclusions reached by EPA regarding the health effects of asbestos exposure represent a widely accepted consensus of opinions of health agencies, scientific organizations, and independent experts. The major health effects of asbestos are:

- Lung cancer and mesothelioma Lung cancer has been responsible for the largest number of deaths attributable to occupational exposure to all of the principal commercial asbestos mineral types: chrysotile, amosite, crocidolite, and anthophyllite. Asbestos induced lung cancer generally does not manifest itself until 20 years after the disease-initiating exposure. Most persons who develop lung cancer die within 2 years of diagnosis. The latency period for mesothelioma is generally between 25 and 30 years. In almost all instances, the disease is rapidly fatal, with survival times of less than 2 years after diagnosis.
- Gastrointestinal cancer Gastrointestinal cancers consist largely of cancers of the esophagus, stomach, colon, and rectum. A number of epidemiological studies have documented significant increases in the incidence of gastrointestinal cancer due to occupational exposure to asbestos.
- Other cancers in asbestos workers A number of studies have identified an elevated risk of other types of cancer.

- Asbestosis is a disabling fibrotic lung disease that has been associated with high levels of occupational exposure to asbestos. The disease becomes more severe with increasing dust levels and duration of exposure. Symptoms include chronic shortness of breath and pulmonary functional changes.

In 1981 EPA summarized the results of a nationwide (U.S.) sampling for asbestos in drinking water from 100 systems. The results indicated that asbestos occurs in various drinking water supplies across the country as a result of asbestos in the raw water supply or as a result of corrosion of asbestos-cement pipe in the distribution system.

Human exposure to asbestos in drinking water occurs primarily via ingestion but exposure via inhalation can occur as a result of the use of humidifiers and possibly showers. The rules proposed by EPA on November 13, 1985 for monitoring asbestos in drinking water recognized an inconclusiveness of evidence that asbestos ingested in water causes organ specific cancers in humans or animals.

However, the latest May 22, 1989 proposed EPA rule for the regulation of U.S. drinking water states: a) asbestos is a naturally occurring mineral that may also find its way into drinking water as asbestos-cement pipes corrode over time; b) ingestion of asbestos may increase the risk of cancer in humans. Drinking water which meets the EPA standard, however, is associated with little to none of this risk and should be considered safe with respect to asbestos. Vulnerability assessments and monitoring are recommended for water distribution systems that contain asbestos-cement pipe to ensure that EPA standards are not exceeded.

In July 1990 EPA made available to RIG/A/C the results of 1985 investigation done in a New York county to determine the source of asbestos in public water supplies and to assess the potential health implications for residents. The investigation showed that deteriorated asbestos-cement pipes were the primary source of asbestos in the county's potable water distribution system. The study also indicated that high concentrations of asbestos fibers in the residential tap water may have contributed low but measurable amounts of asbestos to indoor air. As a result of the study, steps were immediately taken by the county to reduce human consumption of contaminated water and potential exposure to asbestos.

USAID/Egypt officials on October 31, 1990 took the position that EPA rulings do not apply to Egypt notwithstanding the 1987 ENE Bureau telegram (Appendix II) which indicates that EPA guidance on asbestos was applicable to all USAID Missions in Asia and the Near East.

3. Is USAID/Egypt financing the procurement of asbestos-cement pipe for water and wastewater projects in Egypt?

Cognizant Mission officials stated that asbestos-cement pipe is frequently procured for USAID/Egypt water and wastewater projects. However, the amounts of asbestos-cement pipe procured under various A.I.D.-financed projects was not readily available.

The 1982 RIG/A/Cairo audit stated that the Mission had financed about 300 kilometers of asbestos-cement piping under the BVS project. GOE officials explained to us that asbestos-cement pipes have continued to be widely procured for BVS and its successor, Local Development-II, (No. 263-0182).

The Provincial Cities Development (PCD) project officer provided us with copies of plans and contracts for the procurement of about 40 kilometers of asbestos-cement pipe since 1983. The PCD project paper of June 1985 specifically recommended the use of locally produced asbestos-cement pipe, but also recognized the corrosive qualities of the cities' soil.

In contrast, the Mission has moved to eliminate the use of asbestos-cement pipe for potable water systems under one of its large projects. In December 1988 the Cairo Water II project officer informed the GOE implementing agency that the U.S. Government will no longer fund the domestic use of asbestos-cement pipe in water systems and that A.I.D. would therefore not object to the substitution of ductile iron pipe for the asbestos-cement pipe originally proposed in the project paper.

4. What is known about the condition of potable water distribution systems in Egypt?

CHEMONICS stated in a 1982 report to USAID/Egypt that the quality of the asbestos-cement pipe produced in Egypt was very poor. Water leak detection surveys conducted under the PCD project showed a high incidence of pipe leaks in the water distribution network of all three cities often caused by cracking or broken asbestos-cement pipes due to soil settlement. CHEMONICS explained that asbestos fibers are released into drinking water as a result of: 1) tapping and fitting during construction, and 2) erosion of the pipes themselves. The PCD cities' masterplans for their urban infrastructure (produced by another consultant Wilbur Smith) stated, on the other hand, that the locally produced asbestos-cement pipe is generally of good quality.

City representatives of Fayoum, Beni Suef and Minia stated that water quality was continuously monitored. The monitoring reports that were provided to us showed that

the properties being monitored varied among the cities. The monitoring standards used also differed. City representatives stated that the cities lacked the capability to monitor for asbestos, however, and that the incidence of asbestos fibers in the cities' potable water supplies is therefore unknown.

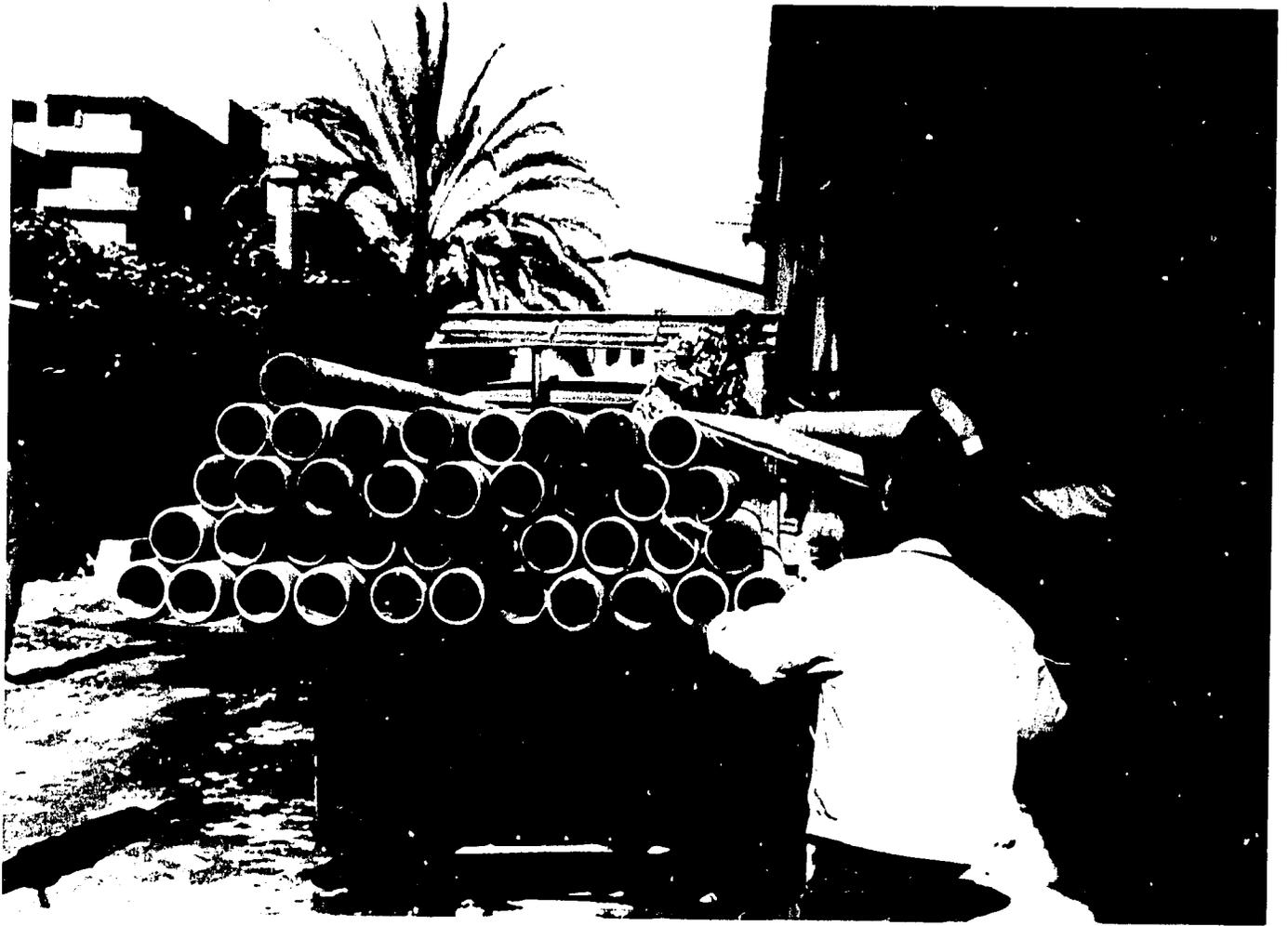
5. What are USAID/Egypt's plans for financing future procurement of asbestos-cement pipe?

On October 31, 1990 Mission representatives stated that U.S. EPA regulations did not specifically apply to Egypt and, since the U.S. EPA ban for asbestos-cement pipe does not take effect until 1996, there is no requirement that the Mission stop financing the use of asbestos-cement pipe in A.I.D. projects in Egypt at this time.*

Mission representatives stated that ENE Bureau policy (Appendix II), which requires technical personnel to review the use of asbestos products on a case-by-case basis, is adequate. The monitoring of asbestos requires expensive laboratory equipment that is not available in Egyptian laboratories. However, water samples could be sent to the U.S. for analysis, although USAID/Egypt has not conducted any such tests to date.

A.I.D. Policy Paper for Domestic Water and Sanitation (May 1982) does not provide specific guidance regarding asbestos products or whether A.I.D. should strive to meet EPA recommendations to achieve water quality standards for potable water projects overseas. The policy states that A.I.D.'s objective is to increase access to "safe" water, but does not define what this term means.

* Further elaboration of the Mission's position is found in Appendix II to this report.



Cement-coated strands of asbestos hanging from the ends of asbestos-cement pipe being loaded at the SIEGWART factory (December 1990) are clearly visible.

APPENDICES

Scope and Methodology

To address our inquiry's objectives, we examined (1) Audit Report (No. 6-263-82-5) on the Basic Village Service Program in Egypt and related correspondence; (2) CHEMONICS April 1982 report "Review of the Health Effects of Asbestos Pipe;" (3) CHEMONICS September 1982 report "Environmental Specialist's Closing Report;" (4) PCD project papers, master plans, environmental assessments, plans and contracts related to asbestos-cement pipe procurements; (5) Cairo Water II PID and correspondence related to asbestos-cement pipe plans for the water distribution systems; (6) A.I.D. Policy Paper of May 1982, "Domestic Water and Sanitation;" (7) Environmental Protection Agency Regulations (40 CFR Part 141, 142, and 143, and 40 CFR Part 763), (8) final report of August 1986 "Investigation of Indoor Airborne Asbestos;" and (9) chemical laboratory water monitoring reports for the cities of Fayoum, Beni-Suef and El Minia.

We also met several times with USAID/Egypt, PCD city officials and representatives, as well as SIEGWART Company officials to discuss the potential hazards of the asbestos-cement pipe manufacturing process and the use of asbestos-cement pipe in potable water distribution systems.



UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

CAIRO, EGYPT

MAR 3 1991

MEMORANDUM

TO: Frederick A. Kalhammer, RIG/A/C

FROM: Marshall D. Brown, DIR/USAID/Egypt *SM*

SUBJECT: Draft Report - "Information on the Use of Asbestos-Cement Pipe in USAID/Egypt Water and Wastewater Projects"

Following is the Mission's response to the subject draft report. As this response reflects a substantial effort by the Mission, I would appreciate our response being included in the final report in its entirety. In the event that draft report corrections result from the Mission's response, I would appreciate it if concomitant changes to the Mission response, if any, be cleared with the Audit Liaison.

Introduction

USAID/Egypt shares RIG/A's concerns regarding the environmental health implications of the use of asbestos-cement (A/C) pipe in water and wastewater systems. The Mission is fully cognizant of current U.S. Environmental Protection Agency (EPA) regulatory actions in this regard. Clarification of these actions as they relate to AID financing of A/C pipe in Egypt is provided below. The role of the AID Environmental Procedures with regard to issues such as financing the procurement and use of A/C pipe in Egypt is also discussed.

EPA Regulatory Actions and "Unreasonable Risk"

A July 12, 1989, final rule issued by EPA under section 6 of the Toxic Substances Control Act bans the manufacture, importation, processing and distribution in commerce of many asbestos-containing products, in three stages. The effective date of the rule was August 25, 1989. A/C pipe is classified under the rule as a "stage 3" product with a corresponding ban on manufacture, import, and processing effective August 26, 1996. The distribution in commerce ban on A/C pipe is effective August 25, 1997. A/C pipe was originally proposed for a stage 1 ban (effective August 27, 1990), but EPA, on the basis of public comments indicating that an asbestos-substitute fiber which could be used in cement pipe manufacturing is under development, decided to delay the ban until stage 3 to allow more time for further substitute development.

EPA's decision to delay the ban until 1996 was based on EPA's judgement that the total level of risk associated with A/C pipe is not sufficiently grave to necessitate an immediate ban, as well as the Agency's desire to allow time for the development of one or more suitable substitute fibers for use in cement pipe manufacturing. Introduction of a substitute for asbestos in this product category would have the added advantage of permitting the continued use of capital equipment currently used to produce A/C pipe. This regulation will halt the manufacture, importation, processing and distribution in commerce of A/C pipe in the U.S., and nothing in the EPA action indicates the need for any USAID/Egypt policy on A/C pipe to be more stringent (in terms of timing) than the EPA regulation. In fact, EPA responded as follows to a number of public comments which argued that if A/C pipe is banned in the U.S., other countries, including those where viable substitutes for A/C pipe are not readily available (e.g., Egypt), would be pressured to ban the product:

EPA's unreasonable-risk analysis for this rule for A/C pipe is based not only on the risk posed during the life cycle of the product in the U.S., but also on the availability of viable substitutes in the U.S. and other factors. Therefore, the fact that EPA finds in this rule that future A/C pipe production and use in the U.S. poses an unreasonable risk does not imply that a similar finding could be made outside of the U.S. [emphasis added]

The May 22, 1989, proposed regulation for asbestos in drinking water is one element of a regulatory package in which EPA is proposing maximum contaminant level goals (MCLG) and national primary drinking water regulations (NPDWR) for 30 synthetic organic chemicals and eight inorganic substances, asbestos being one of the latter. EPA has classified asbestos as a "Group A" known human carcinogen, based on human and animal evidence that inhaled asbestos is associated with lung tumors. However, EPA states that it has not proposed an MCLG for asbestos in drinking water based upon this classification, since "the evidence for the association between ingested asbestos and cancer is limited." Thus, EPA is proposing an asbestos MCLG considering asbestos for drinking water purposes as if it were a "Group C" substance (equivocal evidence of carcinogenicity).

The proposed EPA rule does not "recommend" vulnerability assessments and monitoring of water distribution systems that contain A/C pipe, as stated on p. 12 of the subject report. The rule as proposed would require the evaluation of a system's vulnerability to asbestos contamination within 18 months of rule promulgation. Under the regulation, States would be required to evaluate the vulnerability of water systems to asbestos contamination prior to any decision to perform asbestos monitoring. Such vulnerability assessments would be based on the following factors: (1) potential contamination of the water source; and (2) the use of A/C pipes for finished water distribution and the corrosive nature of the water. States would be required to consider systems to be vulnerable that have A/C pipe as well as "aggressive" water, i.e., water having a value of 10 or less on the "aggressive index," a standard composite measure of corrosiveness in finished water. Only systems determined to be "vulnerable" in this way would be subject to monitoring, using specific protocols.

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The Mission has made a technical determination, on the basis of consultation with a senior professional environmental engineer, that Egyptian water systems are not vulnerable to asbestos contamination from the use of A/C pipe. On the contrary, Nile River water (Egypt's principal source of piped drinking water) has a high pH and is well buffered, i.e., non-aggressive in terms of the potential to corrode A/C pipe. Therefore, should the proposed EPA regulation be applied in Egypt, no monitoring would be required.

Regarding the 1985 study referenced on p. 12 of the subject report, in which "high concentrations of asbestos fibers in the residential tap water may have contributed low but measurable amounts of asbestos to indoor air," EPA, in the preamble to the May 22, 1989, proposed regulation, cited the results of a 1986 investigation into inhalation exposure to indoor airborne asbestos resulting from asbestos-contaminated water, in which levels of asbestos in the indoor air were not significantly different from background air. On the basis of this study, EPA concluded that "the risk of this route of exposure is not significant."

AID Environmental Procedures and the Procurement/Use of A/C Pipe

The AID Environmental Procedures at Title 22, Code of Federal Regulations, Part 216 ("Regulation 16"), were originally developed and promulgated in response to a lawsuit as to the applicability of U.S. environmental regulations, specifically those resulting from implementation of the National Environmental Policy Act (NEPA), to AID operations overseas. The legal settlement concluded that due to the diverse and geographically dispersed activities financed by AID, it is not feasible for AID to be subject to the provisions of NEPA. The Agency was required, however, to develop and comply with a set of environmental procedures to, among other things, "ensure that the environmental consequences of AID-financed activities are identified and considered by AID and the host country prior to a decision to proceed and that appropriate environmental safeguards are adopted." [22 CFR 216.1(b)(1)]. This built-in flexibility is essential for AID operations, given the wide variety of contexts in which the Agency works.

16

The March 1987 (STATE 093077) ANE Bureau guidance statement on procurement and use of A/C pipe was issued at a time when the EPA ban on A/C pipe was still at the proposal stage. The statement did not indicate that "the EPA guidance would be applicable to all USAID missions in Asia and the Near East," as stated on p. 8 of the subject report. Rather, the guidance statement requested all technical personnel to "review the use of asbestos products on a case-by-case basis to determine if a suitable alternative exists." This is precisely the approach required by Regulation 16.

Conclusion

As discussed above, the EPA rule banning A/C pipe in the U.S. does not go into effect until 1996. It may not even apply to AID operations overseas. It is the responsibility of AID's Environmental Coordinator to advise field posts as to the applicability of new environmental rules, if they are beyond the scope of Regulation 16. The Mission contacted the cognizant AID/Washington Assistant General Counsel regarding this question and was assured that there is nothing forthcoming at this time which would alter the Bureau guidance or Regulation 16 with regard to A/C pipe. Until such time as further guidance is received from AID/Washington, USAID/Egypt will continue to comply with Regulation 16 in this and all other pertinent environmental matters.

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