Asbestos Issues at Interstate 66 Road Improvements

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The Virginia Department of Transportation recently monitored the construction of road improvements along a 12.9-km (8-mi) section of Interstate 66 in Fairfax County, Virginia. Approximately 4 km (2.5 mi) of the road improvements were located in soils and rocks that contain naturally occurring asbestos (actinolite/tremolite). Precautions were exercised to protect the safety of the workers and the public from airborne particles. The presence of the asbestos added extra costs and time delays to the project. Part of the problem was the lack of clear language in the initial contract bid requests. It is best to acknowledge the presence of naturally occurring asbestos before a contract goes to bid.

The Virginia Department of Transportation (VDOT) has monitored the construction for road improvements to Interstate 66 in Fairfax County, Virginia. The improvements consisted of (*a*) a lane widening for high-occupancy vehicles (HOV), (*b*) adding a traffic lane in the median to replace a lane dropped at an exit (drop lane problem), and (*c*) installation of sound wall barriers. The entire project was approximately 12.9 km (8 mi) long, and the improvements were bid under different contacts. Approximately 4 km (2.5 mi) of the road improvements were located in soils and rocks that contain naturally occurring asbestos (actinolite/tremolite).

The purpose of this paper is to highlight the experience and lessons learned from the on-site VDOT inspectors and superintendents. The paper was prepared by interviewing Cher Kennedy, the project superintendent for a portion of the project, and her staff during July 1992.

The construction of these projects had to comply with Occupational Safety and Health Administration standards. The Virginia Division of Occupational Health, Department of Labor and Industry believes that there are two main issues regarding asbestos exposure. The first is health. The primary health consideration and source of entry into a body is through inhalation of airborne particles. Asbestos is known to produce two types of pulmonary cancer and interstitial lung diseases known as asbestosis. Employers may be liable for asbestos-related injuries many years after the conclusion of a project.

The second issue is the legal impact imposed by regulatory agencies to control asbestos exposure. The Virginia Division of Occupational Health, Department of Labor and Industry ruled in 1989 that employees exposed to natural asbestos are covered under the same standard as that for manufactured asbestos.

To satisfy the standards, contractors who encounter natural asbestos must, at the minimum, satisfy the following standards:

1. Monitor the employees for their potential exposure,
2. Establish a regulated area and control airborne particles by using wet methods to eliminate dust,
3. Provide and ensure the use of respirators and protective clothing, and
4. Train the employees regarding the hazards of asbestos.

VDOT and the project contractor, Lane Construction of Meriden, Connecticut, had to comply with OSHA regulations. Lane also did not want any problems with the legal and liability issues concerning the naturally occurring asbestos. All workers were required to comply fully with OSHA regulations and were required to wear protective suits and respirators to reduce asbestos contamination as much as possible.

For VDOT, the main lesson learned from this project was not to use vague language in the contract documents. The first contract for this site was for the HOV lane widening. The bid documents issued by the Richmond VDOT office used language that said that naturally occurring asbestos "may" occur on site. This cautious language was used although VDOT had conducted test borings in the project area and knew that naturally occurring asbestos was present. As a result, the project experienced a $1.2 million cost of extras caused by asbestos abatements and remediation. The initial bid for the project was $9 million and with all the extras, including asbestos abatement, the project cost was approximately $12.5 million. The additional cost caused by asbestos issues was approximately 9.6 percent of the total project costs.

The contract for the median lane widening contained specific language that naturally occurring asbestos was present. The cost of the lane widening project was approximately $2 million, and the cost for the asbestos abatement was $61,900. The cost for asbestos abatement and remediation was approximately 3.1 percent of the total project cost. Similar problems were encountered in both construction projects. On the basis of this comparison, it appears that the declaration of the presence of asbestos can reduce project costs.

When the asbestos problem was an extra, VDOT had to open a force account when monitoring this aspect of the project. They continually monitored the quantity of work done by the contractor, and paid him on a unit price basis. The state also had to train and equip their personnel and provide supervision of the asbestos work.

The asbestos work was not limited to one phase of any project, but extended throughout the project duration. Asbestos monitoring was required during excavation of road subgrades, storm sewer pipe excavation, and for the placement of signs. Sign placement occurred near the completion of the project. At any point where the earth materials were exposed, asbestos protection procedures were required. It is also important to note that the actual encountered asbestos was spotty within the asbestos-laden rock (Greenstone). The

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actual location where asbestos material was found extended outside the areas shown on available maps.

Because of the presence of asbestos, a complicated series of contracts was made so that the project could continue. Lane Construction did not have and could not afford the required asbestos liability insurance. As a result, the abatement work was given to the Falcon Company, and Lane performed the construction work. The abatement work consisted of maintaining asbestos liability insurance and providing waste handling of used protective suits and contaminated wash water. Waste products were taken to registered asbestos dumps.

Lane also hired Hillmann Environmental Company of Virginia, Inc., to prepare a standard operating procedure (SOP) for the project and to provide the required inspection and monitoring services. The SOP, which was prepared to conform to OSHA standards, was prepared by Hillmann and submitted to VDOT for approval. As previously mentioned, the OSHA guidelines used for this project were primarily written for asbestos in building construction and not specifically for naturally occurring asbestos.

The SOP developed by Hillmann divides the construction project where asbestos was present into regulated and nonregulated areas. In areas not containing asbestos, the SOP is not applicable. Nonregulated areas were defined as areas where no earth moving or excavation occur. Regulated areas were defined as any area where earth moving occurs or where construction activity results in an elevated airborne fiber concentration.

The SOP showed the following items were required in regulated areas:

- Areas must be conspicuously marked;
- Warning signs must be posted for tremolite or actinolite, or both;
- A dust-suppression system to eliminate all visible emissions of dust and potential fiber release must be employed. Acceptable systems are (*a*) manual water misting using hoses, (*b*) sprinkler/wand systems, (*c*) water trucks, (*d*) amended water; and
- Sediment- and erosion-control systems must be installed to control runoff and prevent asbestos particles from leaving the site with overland flow.

Persons wanting to work within a regulated area were required to have passed a medical examination, to complete successfully a safety course that explained the hazards of asbestos and proper safety procedures, and to be fit-tested for respirators. To reduce delay time, a medical equipment van was brought to the site to give the physical examinations. Not all of Lane's employees passed the physical, and thus the available work force was reduced. A close-out physical was also required at the completion of the project.

Workers were required to log in and out of the regulated areas that were monitored by an inspector. Within the regulated area, they were required to wear OSHA-approved protective suits and respirators. Every time workers left a regulated area for breaks or to have meals, they were required to remove the protective gear and to take showers. The protective gear was not reusable and was kept for disposal on exiting the regulated area. The waste water from the showers was collected and later transported to an asbestos waste disposal site. Typical construction productivity rates were not possible within regulated areas. The protective gear restricted workers' movements and reduced their efficiency. Excavation equipment operated at a slower pace to reduce the creation of dust. Additional time was also needed for decontamination and dust suppression and control measures.

All heavy equipment, vehicles, and small tools leaving the regulated area had to be decontaminated. Vehicles and heavy equipment were parked on a wash rack and regulated workers used shovels, spades, and other equipment to remove mud and other large debris from all surfaces. All interior and exterior surfaces and engine compartments were washed with a fire hose until visually clean and dust free. All cab areas and compartments were rinsed and wet wiped until visually clean. All accessible parts of the air systems of vehicles were cleaned. The air filters and other dry filter systems were replaced. This process was repeated each time the piece of equipment left the regulated area.

The decontamination process was lengthy and considerable down time was experienced. Each piece of equipment was inspected by the on-site asbestos consultant before its removal from the regulated area.

The contractor was required to monitor the asbestos exposure of the workers and the presence of airborne asbestos fibers at the project limits. This was done by having random employees in each worker classification wear a monitoring badge and by setting up air monitors at the perimeter of the site. The air monitors were spaced at approximately 76-m (250-ft) intervals. The badges and air monitors were checked several times per shift.

Workers did not experience significant exposure to naturally occurring asbestos in comparison with the prevailing standards. The highest recorded fiber content on any badge was 0.03 fibers/cm^3. The permissible exposure level stated by OSHA was 0.2 fibers/cm^3 for an 8-hr time-weighted average. The action level at which personnel should don personal protective gear was 0.1 fibers/cm^3.

Grading and excavation in asbestos areas generated material containing asbestos that was not acceptable for use as compacted controlled fill or trench backfill. Such material was stored in on-site stockpiles located within the limits of asbestos. On completion of the stockpile, it was covered with at least 152 mm (6 in.) of clean, compacted, controlled fill that was seeded and mulched.

In-place soil and rock containing naturally occurring asbestos had to be sealed from the environment by nonasbestos earthen material. For pavement subgrades, soil containing asbestos was undercut 51 to 76 mm (2 to 3 in.). The undercut area was backfilled with VDOT No 21*B* coarse aggregate. In nonpavement areas, 152 mm (6 in.) of asbestos-free soil was used as cover.

In summary, the experience of the VDOT personnel at the I-66 project in Fairfax County was similar to that at other construction projects in the area. When naturally occurring asbestos was observed at the site, precautions were taken to protect the safety of the workers and the public. Projects in soil and rock containing naturally occurring asbestos add extra costs and time delays to the project. It is best to acknowledge the presence of naturally occurring asbestos before the contract goes to bid.

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