

Poster Presentation

14.2 REMEDIATION OF LAND IN ISRAEL CONTAMINATED BY ASBESTOS CEMENT WASTE MATERIAL

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The source of contamination

From 1952 to 1997, a plant in northern Israel manufactured asbestos-cement pipe and sheet products, using chrysotile, crocidolite and amosite asbestos fiber. An aerial view of this plant is shown in **Figure 1**. The friable and non-friable waste material from the manufacturing process (**Figure 2**) was partly disposed of in a slurry that ran through drainage trenches that are shown in **Figure 3**. This slurry contaminated property between the plant boundary and the Mediterranean Sea. Other wastes were buried under the ground in landfills around the plant.

The plant is closed and contaminated areas on plant property have been undergoing clean-up. The buildings and equipment are still in place and remain contaminated.

Not all of the asbestos waste material was disposed of around the plant. Some of the “turning waste” – fine dust from beveling the ends of pipe – was given and sold to local residents. It was used to pave driveways, paths and farmyards all over western Galilee as shown in **Figure 4**.

The City of Nahariya started construction of an amusement park on the contaminated property between the plant fence and a patrol road in 1997. The construction site is less than a kilometer from a residential area. In early 1998, there was extensive vehicular and pedestrian traffic on the road, which runs between the beach and the park site – both of which were heavily contaminated with visible asbestos debris.

Despite a fence with warning signs (**Figure 5**), residents were observed walking on the contaminated beach. Shortly thereafter, gates were placed across the road at both ends of the park site to limit access to construction workers and Israeli Defense Forces patrols.

Beach sand was excavated to a depth of one meter in an attempt to remove the contamination. Due to the mobility of the beach sand, debris that is buried deeper than one meter continues to surface and the area remains off-limits for recreational purposes.

Figure 6 shows a cross-section of the area from the plant to the Mediterranean Sea.

A contaminated construction site

Mr. Oberta visited the plant and park site in 1998 at the invitation of the Israeli Ministry of the Environment. At that time, concrete foundations for the amusement park rides and facilities had been poured and underground electric utilities were in place (*Figure 7*).

Despite the fact that 15,000 m³ of dirt was removed in 1997, the site was heavily contaminated with visible asbestos debris (*Figure 8*). In addition to pieces of non-friable scrap material, there were large amounts of friable clumps of dried slurry that had overflowed the trenches. This material contaminated the dirt to a depth of 4 m in places, and excavation during construction continually brought it to the surface.

The debris had also mixed with the beach sand to a depth of more than a meter. The sand was washed and blown across the patrol road onto the construction site, bringing asbestos debris with it (*Figure 9*).

Workers at the site were observed to be disturbing the contaminated dirt without any protection against exposure to asbestos fibers, such as wearing respirators or wetting the dirt and debris (*Figure 10*). Air samples taken in 1997 during removal of contaminated dirt, when respirators were worn and the dirt was kept wet, had shown fiber levels below the Israeli exposure limit of 0.3 f/cm³ then in effect, but above the U.S. Permissible Exposure Limit of 0.1 f/cm³.

Mr. Oberta made several recommendations in his report to the Ministry, including the installation of a protective barrier at final grade level across the construction site. His recommendation of closing the patrol road to keep residents off the site was promptly implemented.

Shortly after his visit, local community organizations obtained a court order that has halted further construction of the amusement park until the problem of asbestos contamination is brought under control.

A protective membrane

The first major phase of controlling asbestos contamination at the site was recently completed. The area that was remediated is a strip of land between the wall and fence on the east side of the park and the plant fence. This strip of land includes an area referred to as the “roadway” and a ditch along the fence.

The ditch was filled in and the roadway raised to a level above the park site contours. All contaminated dirt was covered with a minimum of 20 cm of clean fill, which was packed down with a roller (*Figure 11*). To prevent upward migration of asbestos debris and also to provide a warning barrier in the event future excavation is necessary, a 2 mm thick geomembrane (used for hazardous waste control) was laid across the roadway and filled-in ditch, up to the fence (*Figure 12*). The seams of the membrane were heat-sealed to provide a leak-tight surface (*Figure 13*). The membrane was then covered with another 20 cm layer of clean fill (*Figure 14*).

To prevent contaminated water from the plant from washing onto the remediated strip of land, a low wall was built just outside the fence. This wall will divert runoff to a collection pond at the south end of the plant (*Figure 15*).

The installation of a similar membrane over the park site itself is scheduled to begin shortly.

FOR FURTHER INFORMATION

You are invited to contact

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Figure 1. Aerial view of asbestos-cement products plant. *[Full Size]*

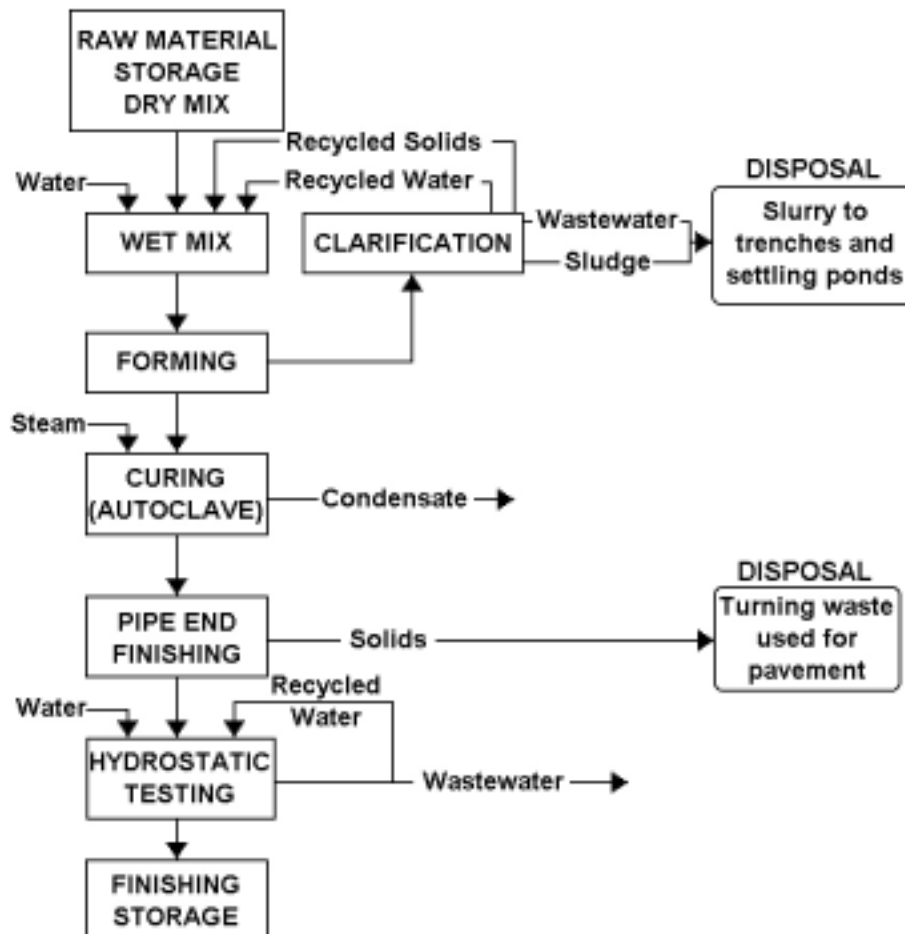


Figure 2. Manufacturing process and waste streams for asbestos-cement pipe.



Figure 3. Slurry trenches running downhill from plant. *[Full Size]*



Figure 4. "Cowyard" pavement made from asbestos-cement pipe waste. *[Full Size]*



Figure 5. Pedestrian and vehicle traffic through contaminated park site. [Full Size]

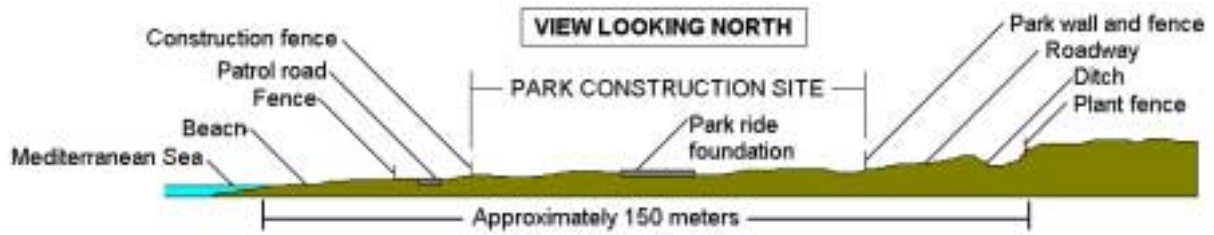


Figure 6. Cross-section of park site from plant to beach.



Figure 7. View across park site toward plant. Man is indicating location of a former slurry trench. *[Full Size]*



Figure 8. Asbestos debris from excavation on park site. *[Full Size]*



Figure 9. Sand and debris washed onto park site from beach. *[Full Size]*



Figure 10. Workers digging hole in contaminated sand on beach. *[Full Size]*



Figure 11. Packing dirt before installing protective membrane. *[Full Size]*



Figure 12. Geomembrane laid out over roadway area. *[Full Size]*



Figure 13. Heat-sealing seams of geomembrane. *[Full Size]*



Figure 14. Covering geomembrane with clean fill dirt. [Full Size]



Figure 15. Wall along fence to collect contaminated run-off from plant site. [Full Size]