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TO: MTA BOARD MEMBER AND ALTERNATES
RCC BOARD MEMBERS

FROM: EDWARD McSPEDON

SUBJECT: MORE TUNNEL CONSTRUCTION EXPERIENCES

Attached are two recently published articles describing difficulties experienced on current tunnel projects being built in Boston and Denmark. High risk and uncertainty are unfortunately ever present factors in this type of work.

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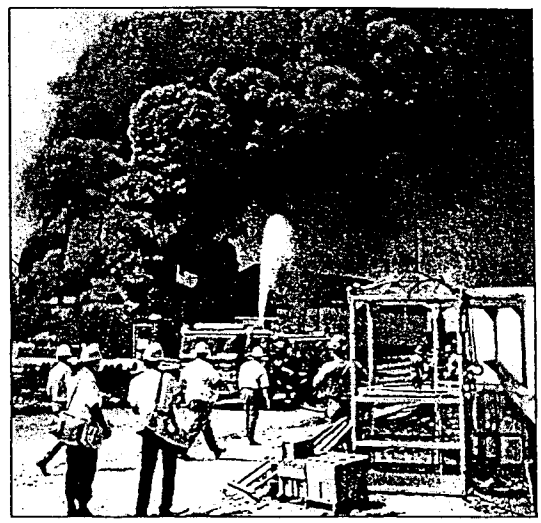
FIRES

Boston sewage tunnel hit

A 5-mile-long sewage tunnel being built under Boston Harbor and already plagued by water seepage now faces a new problem—fire damage. The blaze occurred June 15 in the 300-ft-deep main access shaft of the Interisland tunnel, a key part of the city's $3.5-billion wastewater treatment project. Officials have yet to assess damage figures and schedule impact on the $74-million tunnel, but sources say both could be significant.



Fire engulfs tunnel access shaft on Boston's Deer Island.

The 14-ft-dia tunnel, of which 3.5 miles have been bored, will eventually link the new main treatment plant on Deer Island to sewage flows from southern Boston area towns via headworks on nearby Nut Island. The contractor is a joint venture of S.A. Healy Construction Corp., Chicago and Modern Continental Construction Co., Inc., Cambridge, Mass.

The 25-ft-dia main shaft, located on Deer Island, is also used to take muck out of the tunnel. Forty-three workers were in the tunnel when the fire started, but there were no serious injuries, says Walter Armstrong, program manager for project owner, the Massachusetts Water Resources Authority. He says workers escaped through a 4-ft-dia ventilation/evacuation shaft on Long Island, about 1.5 miles from the fire.

The fire is under investigation by the U.S. Occupational Safety and Health Administration and Boston fire officials. At ENR press time, access was still impeded by 22 ft of water in the tunnel.

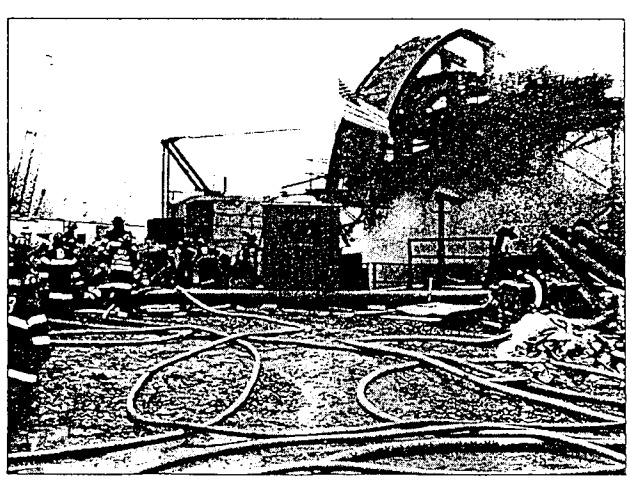
The fire knocked out power to the tunnel, shutting down a dewatering system that had been able to pump out up to 11,000 gal per minute. Water levels rose to 50 ft, says Armstrong. "It took two days to get any pumps running," says a project official. The blaze also destroyed the muck conveyor, and MWRA is now assessing damage to the tunnel's locomotives and TBM.

Armstrong says remaining water was to be pumped out by last week, and damage assessed this week. The contractor has hired Chicago-based structural engineer Kneppers, Madsen and Associates to assess shaft and equipment stability. "Everything in the tunnel will have to be replaced, or dried out and overhauled," says the official.

Armstrong would not comment on what started the fire, but sources point to an electrical short or sparks from welding equipment that may have ignited rubber on the conveyor.

Armstrong could not say when tunneling would resume, although one official says it could take up to three months. Work has already been slowed over the past several months by high levels of water seepage in a particularly "bad rock zone," he notes. ▣

By Debra K. Rubin



Damage could not be assessed until tunnel water level was reduced.

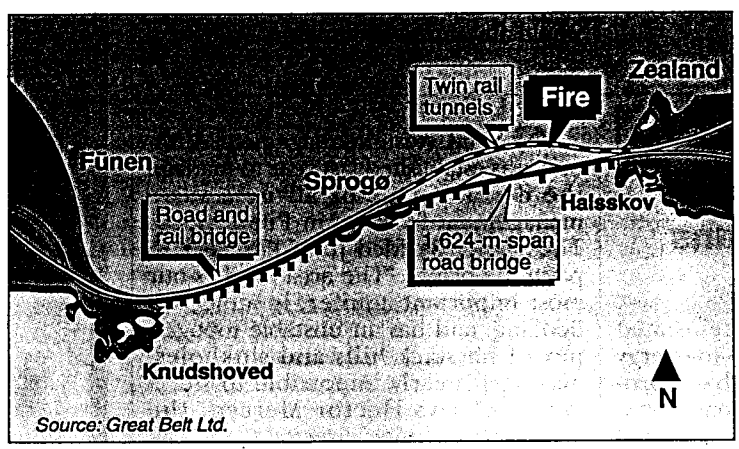
TUNNELS

Fire in a TBM delays work in Great Belt railroad bore

Vaporized hydraulic oil is thought to have been a likely cause of a fire in a tunnel boring machine in one of Denmark's Great Belt twin tunnels. But engineers say that ground methane is also considered possible.

Nobody was hurt in the June 11 fire, but up to 20 meters of concrete lining suffered severe cracking, according to the client Great Belt Ltd. Copenhagen. Project engineers believe that as no water entered the tunnel, damage may not be as bad as first feared. They hope that it may be possible to construct a structural inner lining, as there appears to be enough space for it.

Fearful of water flooding through the burned linings, contractor MT Group, Copenhagen, constructed bulkheads near the eastern portal on Zealand. It closed off the damaged north tunnel and the adjacent south bore. "Nobody has been in there since then, but video cameras show there is no water," says GBL's chief spokesman Jacob Vestegaard. The fire occurred where the tunnel is well above its lowest point, with water pressures of around 8,000 psf.



Great Belt fixed link suffered a delay when a TBM caught fire in a railroad tunnel.

The fire occurred 2.2 kilometers from the east portal in one of two converging TBMs. The 8.75-m-dia machine had been operating for just a few days after stopping for retooling and was only about 50 m from completing its drive. Tunnel specialists from the joint project consultant, Mott MacDonald Group, London, flew out to investigate structural damage. Their report is expected any day.

TBMs in the south tunnel broke through in May (ENR 6/6 p. 19). Although the threat of flooding halted work in both tunnels east of the fire, the contractor continued its western drive in the north tunnel from the island of Sprogø.

The northern TBMs were converging for a final breakthrough in difficult, wet ground that has to be frozen. Since the fire, MT Group has been preparing to freeze the ground ahead, ready to make a final connection in July or August.

The 7.4-km-long railroad twin bores form part of the $3.3-billion Great Belt fixed link. Construction has cost MT Group many headaches and only last month the contractor and client settled all claims on the tunnels. This pushed tunnel construction costs up to $900 million, 58% above the contract price.

MT Group is led by Monberg & Thorsen AS, Denmark, and includes Sogea SA and Campenon Bernard SA, France, Dyckerhoff & Widmann AG, Germany, and Kiewit Construction Co. Ltd., Omaha. ▣