

Air Bags Free Wedged Digester Lid

Transcript of the scanned article. Source: *Water Environment & Technology* (Water Environment Federation), Vol. 11, No. 5 (May 1999), p. 77, "Problem Solvers" section; no author listed. JSTOR stable URL: <https://www.jstor.org/stable/24667479> (DOI 10.2307/24667479). Rick reposted the scan on the Hart International, Inc. website at datahart.com/hart-international/airbags/demo1/images/article.jpg.

Transcription notes: the wording is as printed. Line-end hyphenation has been joined (for example "Waste-/water" becomes "Wastewater"). Metric spacing is kept as printed ("100 000"). Every word was legible, so nothing is marked [illegible]. The unit after "1113" is a small superscript. It reads as m³, which matches the 294 000 gal in parentheses.

Problem: Anaerobic digester lid tilts and firmly wedges.

Solution: High-pressure Kevlar air bags lift the lid free.

The Phoenixville (Pa.) Wastewater Treatment Plant has four anaerobic digesters. When seals in two of the digesters were broken by bent pipes, excess gas flowed in and tilted the digesters' floating lids. Once tilted, solids seeped onto the lids and weighed them down until they wedged.

An attempt to fix one digester lid using a crane caused severe damage, and a \$100 000 replacement lid had to be ordered. Operators tried to lift the larger 1113-m³ (294 000-gal) digester lid using water pressure, but it simply tilted further.

Faced with what seemed an impossible situation, plant staff decided to try an entirely new approach to solving the problem — high-pressure Kevlar air bags.

The approach, developed by consulting firm Barry Isett & Associates Inc. (BIA) of Trexlertown, Pa., first called for flammable methane gas to be flushed out of the digester by inert nitrogen gas. To help prevent sparking, the lid, air bags, and concrete digester walls were greased.

"Once we drained the methane, we also had to be careful not to let oxygen back into the system [because] once oxygen mixes with methane, it can ignite from a spark and explode," says Thomas J. Yuhas, BIA project manager.

Two Lampe Lifter air bags from Hart International Inc. of Ambler, Pa., an emergency rescue products supply company, then were slipped under the lid through a 102-mm (4-in.) gap created by the tilt. By alternating the air pressure and the solids level in the digester, the 54-Mg (60-ton), 15-m-diameter (50-ft-diameter) lid slipped out of its wedged position. "It was like pulling out a rusty bolt," Yuhas says. "We pushed a little on one side and then the other until it unwedged." The entire process took about 4 hours.

The plant's public works director, Donald T. Edwards, sent BIA a letter commending its "cost-effective solution." The problem, which could have cost as much as \$320 000 to fix if the digester lid was damaged, was solved for less than \$10 000.

For more information, contact Yuhas at 1-610-278-0166, or visit Hart's Web site at <http://www.datahart.com/hart-international/>.

Photo caption 1: The operation required two air bags. One had a maximum lifting capacity of 60 Mg (66 ton) and the other had a lifting capacity of 20 Mg (22 ton).

Photo caption 2: The hose shown in the photo was used to pump material off the tilted digester lid.

Photo credit (both photos): BARRY ISETT & ASSOCIATES INC.

Hart International demo page (datahart.com/hart-international/airbags/demo1/index.html)

Text from the Wayback Machine capture of 2003-09-03, as published. Original spelling is kept, including "unlodge" and "our our".

Demo

We arrived on site at 07:55 A.M. Tuesday January 13, 1998. In the background you'll see 4 circles. We worked on the 2nd largest one 50 feet in diameter. The lid to the digester had become wedged and the local workers were not able to unlodge the lid. They tried to lift the lid (66 tons) with water but the lid only slid further and further down into the cylinder. On the digester just to the left our our site, workers tried to lift a similar lid with a crane, but failed and destroyed a cover which costs over \$100,000 to replace. They were looking for a bullet proof solution and as it happens, our Lampe Lifter Airbags are made from Kevlar.

We scanned the article in the May issue of "Water Environment Technology", which is the flagship publication of the Water Environment Federation.

High Lift - Low Pressure | 66 Ton Lift Demo | High Pressure - Medium Lift

The first capture (1998-01-28, "Last Updated 01/27/98") has the same story without the article line. Its header reads: "Airbags - High Pressure - High Lift Systems - Hart International, Inc. 265 North Main Street Ambler, PA 19002 Voice - USA & Canada: 800-453-8665 / Voice Worldwide: 215-643-3474 / Fax Worldwide: 215-643-1349".

Photo file names on the page (they act as the captions; the page has no alt text):

1. airial shot - phoenixville digester site 01-13-98 (recovered)

2. free body diagram of digester lid (not archived)
3. rough sketch - phoenixville digester site 01-13-98 (not archived; probably Rick's phone-call sketch)
4. setup 1 greese the walls & airbags (not archived)
5. setup 2 put airbags inplace (thumbnail recovered)
6. setup 3 flood under the cover (thumbnail recovered)
7. setup 4 put steel plate in front of airbags (not archived)
8. setup 5 more fllooding airbags gp underwater (not archived)
9. setup 6 cover starts to move back into place (not archived)
10. setup 7 airbags model 22 in place (thumbnail recovered)