

Effect of corrosion on wear rate

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At Vaal Reefs, where free-fall conditions existed in schedule 80 pipes (with a nominal bore of 50 mm), the replacement cost due to pipe wear exceeded R3,00 per tonne of fill placed. At other Vaal Reefs sites, the costs were less than R0,10 per tonne placed, but the overall tonnage per range was still relatively low.

At Western Deep Levels, where schedule XXS pipes (with a nominal bore of 80 mm) are used, the current replacement cost associated with the wear of backfill pipes is around R0,05 per tonne, but this figure will rise as the tonnage increases and more failures occur.

It should be noted that all these costs are associated with mild-steel (grade A106) pipes, and that figures are not yet available for the other pipes used owing to the low tonnage placed via each range to date.

Conclusions

The research has shown that corrosion and, more importantly, the corrosion-erosion interaction contribute a significant portion of the overall wear (loss in pipe mass) in backfill pipelines (up to 80 per cent). This conclusion is drawn for two typical backfill materials under various flow conditions.

Where steel piping is used, attempts to reduce the overall wear rate should include measures to reduce the corrosion effect. A viable and cost-effective alternative is the use of a corrosion-resistant lining (such as polyurethane).

Cathodic protection of the test samples of steel pipe was found to be problematic in the transportation of backfill slurries owing to the plating-out of metallic ions and the formation of scale.

With any backfill pipeline, it is essential that the flow velocities are reduced to a minimum (i.e. full-flow conditions must prevail). This will assist in reducing the wear rate significantly since

Wear \propto Velocity²

Cold comfort for CFCs*

World refrigeration expert Professor Günter Heinrich, at the invitation of the School of Mechanical Engineering at the University of the Witwatersrand (Wits), recently addressed industry representatives in Johannesburg on alternative refrigerants.

Professor Heinrich is managing director of the Institut für Luft- und Kältetechnik (ILK), Germany's largest privately funded institute for research into refrigeration and air-conditioning. According to John Sheer, John Orr Professor of Mechanical Engineering at Wits, the visit was significant in terms of both the Montreal Protocol and research activities within the School of Mechanical Engineering.

The seminar attracted some 45 people from industry, indicating current interest in the Montreal Protocol, in terms of which signatory countries have agreed to cease production of CFCs by the end of 1995. The items discussed included new refrigerants, paths of changeover, and further utilization of existing plants.

'Although some local industries already have short-term solutions, the School of Mechanical Engineering has recently embarked on a long-term research programme on alternative refrigeration processes', says Professor Sheer.

'Professor Heinrich's interest in our work has resulted in valuable co-operation, one example being the joint supervision by the Professor and myself of a local M.Sc. student's thesis on the use of mixtures of refrigerants.'

One of the refrigeration techniques that Professor Heinrich believes would be particularly attractive in Southern Africa is evaporative cooling using the Desiccative and Evaporative Cooling (DEC) process.

'While cooling by adiabatic humidification has been in use successfully for decades, particularly in the textile and mining industries', says Professor Heinrich, 'new applications have recently been established in all fields of air-conditioning in which the cooling effect is increased by drying the air before it is humidified. Through sorptive drying followed by heat recovery, combined with the evaporative cooling of water into the unsaturated air, the cooling effect becomes technically more useful. The DEC-process is realized with a DEC plant, which incorporates a sorption-regenerator wheel packed with desiccant-treated paper or fabric material.'

An agreement has been reached between the ILK and a local company on the marketing of this technology.

* Lynne Hancock Communications, Honeydew 2040.

ENVIRONMENTALLY RELATED INTERNATIONAL ACTIVITIES

20-22 April, 1994

Third International Congress on Catalysis and Automotive Pollution Control

Brussels, Belgium

Contact: J.M. Bastin, Secretary CAPoC3, ULB—Catalyse Heterogene, CP 243, Campus de la Plaine, B-1050 Bruxelles, Belgique

Tel: 32-(0)2-650-57 09/10; Fax: 32-(0)2-650 57 08

24-29 April, 1994

Conference on Stationary Source Sampling and Analysis for Air Pollutants

Florida, USA

Contact: Ms B.K. Hickernell, Conference Director, Engineering Foundation, 345 E 47 Street, New York 10017 USA

Tel: 212-705 7837; Fax: 212-705-7441

25-29 April, 1994

An International Land Reclamation and Mine Drainage Conference

Pittsburgh, Pennsylvania, USA

Contact: D. Lowanase, U.S. Bureau of Mines, P.O. Box 18070, Pittsburgh, Pennsylvania, USA 15236

Tel: (412) 892-6708; Fax: (412) 892-4067

16-19 May, 1994

24th International Symposium on Environmental Analytical Chemistry

Ottawa, Canada

Contact: Dr M. Malaiyandi, CAEC, Chemistry Department, Carleton University, Ottawa, Ontario, Canada K1S 5B6

Fax: (613) 788-3749

20-23 June, 1994

1st Canadian Conference on Environmental Issues in the Mineral Industry

Quebec City, Canada

Contact: Jean-Marc Robert, Centre de Recherche Minerales

Tel: (418) 643 4540; Fax: (403) 241 9460

19-21 July, 1994

6th Symposium on Handling of Environmental and Biological Samples in Chromatography

University of Surrey, Guildford, UK

Contact: Dr D. Stevenson, Robens Institute Chemistry Department, University of Surrey, Guildford Surrey, GU2 5XH UK

Tel: (+44) 0483 509220; Fax: (+44) 0483 503517

21-25 August, 1994

Impurity Control and Disposal in Hydrometallurgical Processes

Toronto, Canada

Contact: Dr B. Harris, Mining Technology Council of Canada, 1105-350 Sparks Street, Ottawa, Ontario K1R 7S8, Canada

Fax: (613) 233 0579

17-19 October, 1994

1st International Conference on Mining Environmental Management

Reno/Sparks, Nevada, USA

Contact: Mining Journal Conferences, 60 Worship Street, London, ECSA 2HD England

Tel: (+44 71) 377 2020; Fax: (+44 71) 247 4100

OR

Mining World News (MEM Conference), 90 West Grove Street—Suite 200, Reno, Nevada 89509 USA

Tel: (+1) 702 827-1115; Fax: (+1) 702 827-1292

19-21 October, 1994

2nd International Conference of the Recycling of Metals

Amsterdam, The Netherlands

Contact: ASM European Office, Rue de l'Orme 75, B-1040 Brussels Belgium

Tel: 32 2 736 5211; Fax: 32 2 733 4383

November, 1994

Institute of Measurement and Control Meeting on Effluent Monitoring

London, UK

Contact: L. Woods, Institute of Measurement & Control, 87 Gower Street, London WC1E 6AA UK