Erosion Control Projects on the Alberta Oil Sands Pipeline

by
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Abstract

The Alberta Oil Sands Pipeline System (AOSPL) is a 435 km long, 559 mm diameter pipeline that transports the entire production of synthetic crude oil from the Syncrude Canada Inc. plant to the Edmonton Area where it is distributed to local refineries and to other pipeline systems leaving Alberta. The AOSPL system has been operated by its agent, AEC Pipelines, a division of Alberta Energy Company Ltd. since April 1, 1987. Average daily throughput for July, 1990 stands at 186,895 barrels per day which is approximately 14% of Canada's current oil production. The system is designed for a peak capacity of 226,000 barrels per day. An interruption of pipeline service would create an economic impact.

The pipeline was constructed in 1976 and 1977 with the northern 290 km portion constructed in winter and the southern 145 km constructed in summer. As part of its on-going operating and maintenance program, AEC Pipelines regularly reviews the pipeline route for possible leaks as well as any evidence of surface erosion or instability. Company policy is to correct any potential problems to ensure the integrity of the pipeline system. Two sites were judged to require preventative erosion control measures in 1989 - the north-facing slope at the Athabasca River crossing and the north-facing slope at the House River crossing.

At the Athabasca River crossing, several erosion control berms installed at the time of pipeline construction failed to properly channel water off the right-of-way. As a consequence a small mud slide developed in conjunction with some soil erosion over the pipe trench. The area had lost topsoil, was devoid of vegetation, and had erosion fissures in the soil. Remedial work included the reconstruction of the erosion control berm at a steeper angle, installation of an underground pipeline ditch plug, recontouring to promote drainage away from the pipeline trench, replacement of topsoil and revegetation.

At the House River crossing, a series of herringbone erosion control berms channelled water back and forth down the slope. As a consequence, water repeatedly crossed the pipeline trench and water was retained on the slope. Hydrophytic plants typical of marsh areas were observed growing on the slope. The herringbone design was removed by extending two berms to discharge well off the right-of-way. Revegetation followed immediately.

The remedial work was successful in correcting the drainage and erosion problems at both sites. Based on the observations at these sites, the following recommendations are suggested for use in designing surface drainages on pipeline rights-of-way:

1. Surface drainages, particularly erosion control berms, should be reviewed by the designers during construction. Typical drawings are often not site-specific and do not fit the topography after construction. Many times, important design decisions are left to the pipeline inspector or the contractor.
2. Erosion control berms must be set at a steep enough angle that sediment does not accumulate. A minimum downslope angle of 5°

(9%, 11:1) is recommended to maintain water flow through a well-vegetated erosion channel. Steeper angles may be necessary on excessively steep slopes. Potential erosion in the channels by the use of rip-rap, matting, or sand bags.

3. Erosion berms should not change angle but have a consistent downslope gradient. Berms should not become more shallow at the downslope end if sedimentation is to be avoided. Gradients should be confirmed with the aid of device to measure angles (clinometer).
4. Erosion control berms should channel water completely off the right-of-way and discharge into dense vegetation where there is a minimum risk of erosion damage.
5. Erosion control berms that cross the pipeline trench should be designed in such a manner that subsidence of the trench backfill will not render the drainage inoperable. Such designs could include sandbag fill, a short, steep gradient protected by rip--rap, or compact backfill.

Land Reclamation of Oil Sands & Heavy Oil Developments

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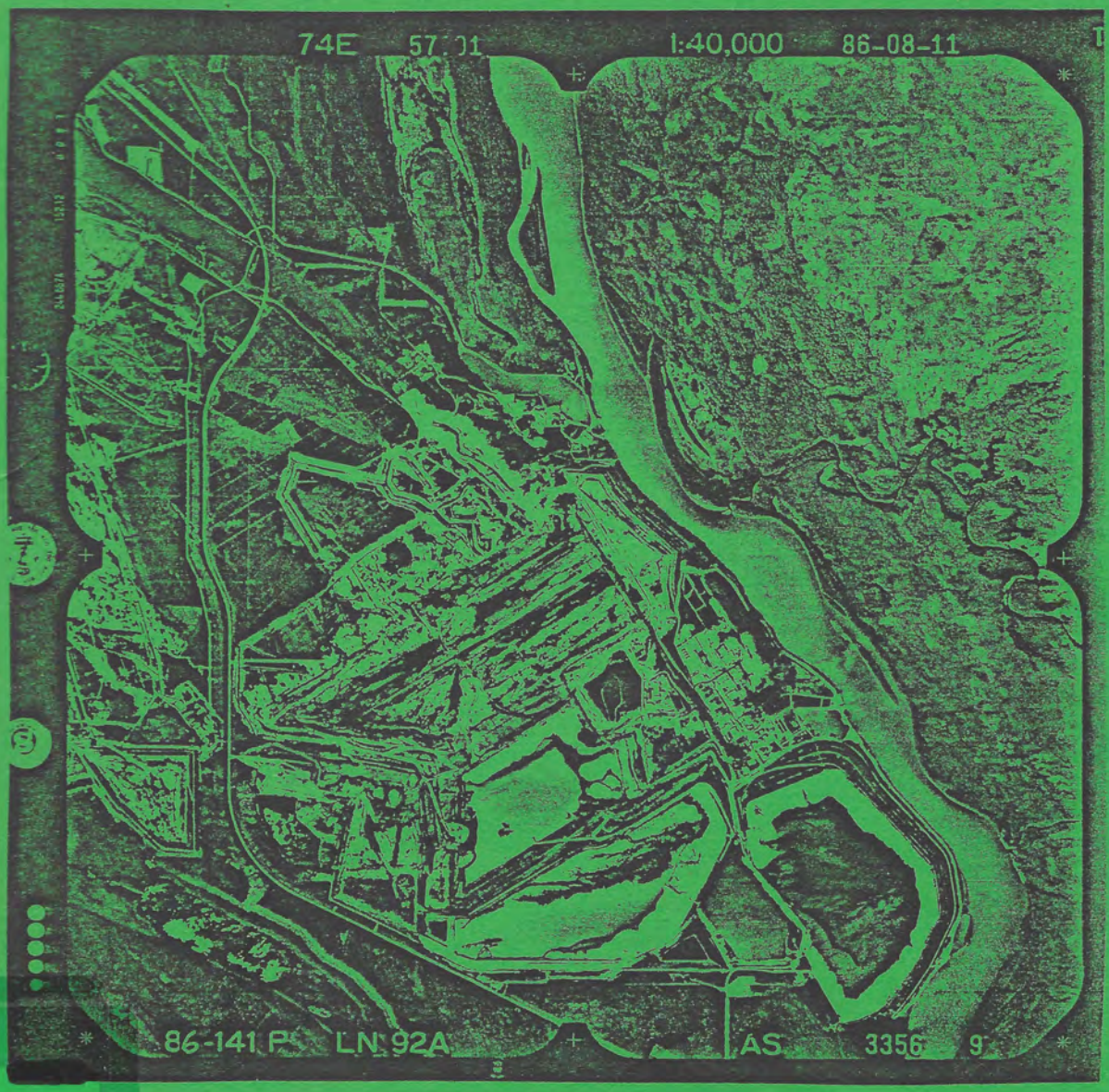

Compiled by C.B. Powter

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Front Cover: 1986 airphoto of the Suncor facility, north of Fort McMurray, Alberta.

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DEDICATION

These proceedings are dedicated to the memory of Bruce Runge and Michael Mensforth. These two reclamationists passed away in the fall of 1990 while on the job.

Bruce Runge worked for Western Oilfield Environmental Services Ltd. as Operations Manager and was on his way to conduct a pipeline inspection in the Primrose Lake area when the helicopter he was in crashed on the outskirts of Edmonton. Bruce was 45 years old.

Michael Mensforth worked as a reclamation technologist for Alberta Environment, Land Reclamation Division and was on his way to a site in northern Alberta when he was killed in a freak vehicle accident. Micheal was 35 years old.

The loss of these two specialists is a blow to the small reclamation community of our province. It also points out to the rest of us that ours can be a dangerous profession and that safety is critical in our business.

SPONSORS

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