CREATING A RECREATION LAKE AT TRANSALTA UTILITIES WHITEWOOD MINE

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ABSTRACT

This paper describes the co-operative participation of the Alberta Government Departments of Forestry, Lands and Wildlife; Recreation and Parks; Environment; the County of Parkland and TransAlta Utilities in the design and construction of a replacement lake for Whitewood Lake and Lake 'A', both of which had to be drained in preparation for safe and efficient coal mining. The water in the replacement lake will cover 18.5 hectares set in a reclaimed area of 108 hectares. The lake site has been designed to have the potential for development as a put and take fishery, day use recreation and nature viewing. Special features incorporated in the lake design are a picnic area, campsite, boat launch and beach. The lake design was started in 1982, construction was underway in 1987 and the area surrounding the lake will be revegetated by the end of 1990. After revegetation, the lake and adjacent land, a total of 126 hectares, will be exchanged with the Alberta Government for the land under Whitewood Lake and Lake 'A'.

INTRODUCTION

TransAlta Utilities is the largest investor-owned electric utility in Canada producing approximately 80% of the electricity generated in the province of Alberta. The electricity is generated at 13 hydroelectric plants located in the mountains and foothills of Alberta, and three coal fired generating plants located adjacent to Wabamun Lake, 80 kilometers west of Edmonton in the plains.

The coal fired generating plants contribute 75% of the electric power delivered to electricity consumers in Alberta. Of the three plants, Sundance and Keephills are supplied with coal from the Highvale mine and Wabamun is supplied with coal from the Whitewood mine. The ERCB permit for the Whitewood mine covers an area of 4700 hectares. Within the ERCB permit are two licence areas, one east and one west. The mine was opened in 1962 and had delivered 45 million tonnes of coal from the strip mine to the Wabamun plant by December 1987.

PRE-MINING CONDITIONS

The Whitewood mine is located in a gently undulating landscape dominated by aspen forest on the higher ground and numerous ponds and sloughs in the lowlying areas. Small parcels of land have been cleared and developed for hay crops. Prominent features of the mine permit area were two lakes; the larger Whitewood Lake 40 ha in area, and the small Lake 'A' 22 ha in area. The two lakes were surrounded by boggy vegetation primarily cattails, sedges, moss, willows and smalls areas of cultivated mineral soils. Both lakes were shallow, with the maximum depth of water in Whitewood Lake about 3.5m and in Lake A, about 1.5m. The lakes could not support a permanent fishery because the shallow the water tended to be relatively warm in the summer and deprived of oxygen in winter. Whitewood Lake was used once for water skiing and the last building of a small cottage development was demolished in 1983. The perched lakes were supplied with water from adjacent bogs and only rarely did water drain from Whitewood Lake south to Wabamun Lake.

MINING METHODS

The Whitewood Mine is a strip mine operation using a dragline to remove overburden and shovels to excavate and load coal into bottom dump coal haulers. The active mine pit from which coal is removed is confined at any one time to a strip 120 metres wide and 2500 meters long with spoil piles on one side and cleared, drained land on the opposite, highwall, side. In an average year, 2.5 million tonnes of coal are delivered to the Wabamun generating plant; approximately 30 hectares of land are mined and reclaimed.

In 1982, the last coal was removed from the mine area at the east end of the Whitewood Mine, and all mining coal deliveries have since been made from the west mine area. The east mine area included unreclaimed spoil and an open mine cut 100 metres wide and 800 metres long surrounded on both sides by spoil piles. The 'end cut' is the focus of our attention for the lake construction project.

MINING PLANS

To ensure that adequate coal can be excavated and delivered to the Wabamun generating station each year to meet electricity demand forecasts, detailed mine planning for the forthcoming five years and long range planning for ten years is regularly carried out to identify future requirements for overburden stripping, topsoil salvage, tree clearing and surface drainage.

In 1981, the long range forecast for coal required at the Wabamun generating station showed that drainage of Whitewood Lake and the smaller Lake 'A' would be essential to recover the 16 million tonnes of coal lying under the lakes. The lake drainage application by TransAlta Utilities was approved by Alberta Environment in Interim Licence 11965 on the condition that a replacement lake would be constructed. The drainage of Whitewood Lake and Lake 'A' was started in 1982 and completed by 1984. The lake basins are kept drained with a network of ditches and sumps.

LAKE REPLACEMENT PLAN AND CONSTRUCTION

The approval for lake drainage, and identification of Whitewood Lake and Lake 'A' as significant natural resources was followed by a series of investigations. First, the feasibility of constructing a new lake was assessed and confirmed. Five potential sites were identified and the decision was made that the east mine end cut would be the most acceptable. Next, the potential uses of a replacement lake were identified as recreational fishing, a day use area including beach, picnic area and camping and nature viewing. The design criteria of the lake to meet these potential uses were determined and agreed by all participants.

Following this agreement in 1983, TransAlta Utilities started to prepare the design features of the lake and the schedule for the construction, revegation and land exchange. The application for amendment to Development and Rreclamation Approval C-12-77 was submitted to Alberta Environment in 1986 including the design criteria, proposed contours, revegetation plan and schedule. The approval was granted in 1987 and construction work started in May 1987.

Construction of the replacement lake started with the relocation of a dragline into the east mine area. The dragline was followed by three dozers and scrapers contouring and dressing the slopes. In 1988, the final contouring and grooming will be completed. Revegetation of the surface will be complete in 1989 after trees and shrubs have been planted at selected areas. A short term monitoring program will be started in 1988 to keep a record of water quality in the early years of the lake's life. TransAlta Utilities will apply for a reclamation certificate when revegetation is successfully completed. The land underlying Whitewood Lake and Lake 'A' is presently owned by the Crown and will be exchanged for an equivalent area of land occupied by the replacement lake and surrounding features.

DESIGN FEATURES OF THE REPLACEMENT LAKE

With the cooperation of Government departments and the County of Parkland, TransAlta started the preparation in 1986 of a detailed design for the lake. The design was to serve two purposes. First, to meet the requirements of the drainage licence and the Development and Reclamation Approval; and second, the design was required as the basis of awarding and managing a construction contract.

After three months of detailed work and frequent communications, the final design of the replacement lake showed that there would be ultimately 18.5 ha of water at a predicted maximum elevation of 772m ASL. The lake will be filled and fed with groundwater and small quantities of surface runoff from the surrounding slopes. Special design features of the lake include a beach 250m long and 40m wide, a boat launching ramp at the west end, parking areas, a picnic and camping area of approximately 4 ha and a shoreline of 3500m with water depths up to 7.8m toward the center and east end of the lake. The design features of the lake were selected to ensure that a fishery could be managed and maintained year round, that boating would be possible on the lake and low intensity recreation such as walking, picnicing and camping in the summer and cross country skiing in the winter would be practical. Consideration was also given to public safety by reducing the slope angles in most places to 10° or less and ensuring that at the shore line the underwater slopes to 770m would be sloping only 10°.

TransAlta Utilities is responsible for the construction work to create the potential for beach, campsite, boat launch ramp, access roads and picnic areas. The future development and management of these features will be the responsibility of Alberta government departments.

PROGRESS AND PROSPECTS

During 1987, the construction of the replacement lake was started using a dragline and dozers to modify spoil piles, to fill in major depressions and to create the boat launch area and the picnic area and campsite. While the dragline was working on the spoil, water previously collected in the end cut was pumped out to allow the beach slopes and border of the lake to be contoured to provide safe and accessible slopes under water. By October of 1987, the dragline had handled close to 1.3 million bcm of material. All remaining spoil handling and contouring will be completed using dozers and scrapers. Theoughout the winter of 1987/88, smaller areas of spoil and shoreline features were contoured and developed using dozers and backhoe.

Final contouring of all the slopes and repairs of eroded areas will be completed after 1988 spring runoff followed by reseeding to be carried out in spring and summer.

In early 1989, a tree and shrub planting plan will be completed. As soon as the required trees and shrubs are available, planting will start in the field. Two years will have passed for the lake basin to fill with water, although it is not expected to reach the 772m level for at least 15 or 20 years. When the ground cover of plants is completed and tree planting is progressing, an area of 126 hectares including the lake will be fenced to mark the boundary of the replacement lake and surrounding reclaimed land.

SUMMARY

The Whitewood Mine has been operating since 1962 to deliver coal to TransAlta's Wabamun electricity generating plant. Within the next ten years, coal mining will advance into two shallow lake basins, Whitewood Lake and Lake 'A' which have now been drained. The approval for drainage was given by the Alberta Government on condition that a replacement lake would be constructed. A site for the replacement lake was selected in 1983, design concepts were approved in 1987, construction started in 1987 and the lake is scheduled to be completed in 1990, including revegetation. With successful revegetation and approval of a reclamation certificate, a total of 126 hectares of land including 18.5 hectares of water will be exchanged with the Alberta Government for the land underlying Whitewood Lake and Lake 'A' basins.

The design and construction of the replacement lake has been an excellent example of a cooperative effort between numerous Provincial Government departments, the County of Parkland, and Transalta Utilities.

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	v
Planning for soil conservation by the oil and gas industry (D. Bratton)	1
Evaluation of alternative procedures and equipment for conserving topsoil during pipeline construction in Western Canada (D.F. Mutrie and D.M. Wishart)	5
Effectiveness of soil conservation procedures on recent major pipeline construction in western Canada (D.M. Wishart and J.W. Hayes)	21
An evaluation of non-seeding reclamation techniques on an oil sands pipeline right-of-way (D. McCabe and A.J. Kennedy)	35
Creating a recreational lake at TransAlta's Whitewood mine (P.D. Lulman)	57
Soil handling at the Highvale mine (J. Hastie and T. Schori)	63
Improving soil tilth in reclaimed soils at the Highvale mine (D. Chanasyk, H. Martens and J. Hastie)	79
Bow River back channel rehabilitation (W.M. Veldman and P. Young)	91
Wildlife habitat mitigation for the Oldman River dam project (J. Green and A. Nilson)	101
Fisheries habitat mitigation for the Oldman River dam project (J. Englert)	117
Do highway rights-of-way have to be dull? (C.B. Powter)	121
Buying seed: The pitfalls and blunders and how to avoid them (K. Lowen and D. Walker)	139
Factors influencing the native species invasion of a reclaimed subalpine minesite near Grande Cache, Alberta (S.F. Van Zalingen, T.M. Macyk and	145
V. BETTS)	145
(W.H. James)	153

Effect of grasses and soil amendments on soil aggregates and aggregate strength (D.J. Thacker)	161
Field measurement of wind erosion in southern Alberta: Preliminary results (W.M. White, A.G. Limbird and S.C. Josefowich)	169
LIST OF PARTICIPANTS	179

All papers are presented here as submitted by the authors; the material has not been edited.

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