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AN OVERVIEW OF COAL PREPARATION IN CANADA

by

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ABSTRACT

This paper presents an outline of coal preparation as practiced at mines across Canada.

At some mines coal preparation is limited to breaking or crushing and screening. However, all major producers of bituminous coal now operate sophisticated coal cleaning facilities that include jigs, heavy media cyclones, hydrocyclones, flotation cells, centrifuges and filters. Clearly, emphasis is on treatment and dewatering of fine coal and tailings. This emphasis is out of respect for both market demands and environmental concern.

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INTRODUCTION

An unprecedented growth in the coal supply in Canada has occurred in the past five years concurrent with a decline in oil and natural gas reserves. Production in 1976 was about 27 million tons and projections based on demand indicate production capability by 1980 of 40 million tons and a doubling of this by the mid 1980's.

Along with the expansion in coal production has been a greater requirement for coal beneficiation. This requirement is due to the exploitation of high ash coalfields, less discrimination in mining with modern mechanized methods, the increasing demands from discerning markets and environmental concern.

The major producers of coal have undertaken coal preparation plant modifications and development to enable them to adhere to quality specifications demanded by both domestic and export markets. In 1976 modern mechanical coal beneficiation plants were operated in Canada by all major producers of bituminous coal that accounts for 58 per cent of Canada's coal production. Due to lack of such plant capacity in 1966 only about 28 per cent of the country's coal production could have been processed (1). Most of the clean coal from these plants is ultimately consigned to the domestic or Japanese steel making markets.

There are presently in Canada no mechanical cleaning facilities for subbituminous and lignite coals.

This paper presents a résumé of coal beneficiation practices in the various coal producing areas of Canada.

RESUME OF COAL PREPARATION FACILITIES IN CANADA

About 58 percent of the coal produced in Canada is bituminous, 16 percent is subbituminous and 26 percent is lignite. Thirty-one percent of the bituminous coal is produced from mines in Alberta, 54 percent in British Columbia, 13 percent in Nova Scotia and 2 percent in New Brunswick.

Preparation of subbituminous coals from Alberta and lignite coals from Saskatchewan is limited to crushing and screening.

All major producers of bituminous coal in Canada have modern coal preparation facilities as outlined below but elsewhere preparation is limited to breaking or crushing, mechanical screening, oil treatment and hand-picking. Plans are being made at least at two coal mines to erect sophisticated cleaning systems. Byron Creek Collieries Limited, Coal Mountain River, British Columbia has plans for 1977 or 1978 and in August, 1976, Luscar Sterco, a wholly owned subsidiary of Luscar Limited, began preparations to erect a heavy media wash plant designed to prepare more than 2.5 million tons a year of clean high-volatile C bituminous coal from the Coal Valley area, Alberta.

Table 1 shows the quantities of raw bituminous coal processed and the clean coal produced by province. The average yield of clean coal from the raw coal processed is 70 percent.

TABLE 1

Raw Coal Processed and Clean Coal Produced (2)

Province	Raw Coal Processed (st)	Clean Coal Produced (st)	Per Cent Yield of Clean Coal
Nova Scotia	970,000*	760,000*	78
New Brunswick	235,000**	174,000**	74
Alberta	6,553,000	4,299,000	66
British Columbia	14,358,000	10,560,000	74

* Includes 124,800 tons of raw coal processed and 34,371 tons of clean coal produced by Thorburn Mining Ltd.

** Information from private communication.

Present coal preparation emphasizes cleaning and dewatering of fine coal and tailings and demonstrates environmental concern by coal mine operators. Continued research and processing directed to desulphurization of both metallurgical and thermal coals is required to meet market demands and alleviate environmental problems.

A brief description of present coal preparation facilities in Canada follows.

NOVA SCOTIA

Thorburn Mining Limited, Stellarton.

Since 1974 a small wash plant has been operated to reclaim coal from the waste dumps that resulted from earlier coal mining. This operation is a source of fuel for the local coal fired electricity generating plant as well as being of environmental benefit. The plant capacity is about 100 tph and consists of a Vissac jig and hydrocyclones. Approximately 125,000 tons of waste material are processed yearly, yielding about 35,000 tons of commercial grade coal.

Cape Breton Development Corporation (Devco), Sydney.

A Baum jig washer has been used to process about 840,000 tons of coal from the Devco operations in the Sydney coalfield. In October, 1976 Devco opened the newest coal preparation plant in Canada at Victoria Junction. Construction of the facilities was started in May, 1974 and the cost was more than $30 million. Designed throughput of the plant is 4.3 million tons per annum.

Coal cleaning at the new Devco plant is centered in the DSM heavy media cyclones (Figure 1). The plant contains eight primary modules each one consisting of a desliming screen, cyclone, rinsing screen and vibrating centrifuge. Rejects from all eight primary circuits are collected in a common tank and pumped to two secondary cyclones. Overflow from the primary cyclones is metallurgical grade coking coal; that from the secondary cyclones is for the thermal coal market. Fines (minus 28 mesh) are beneficiated by flotation cells. Dewatering is accomplished by centrifuges.

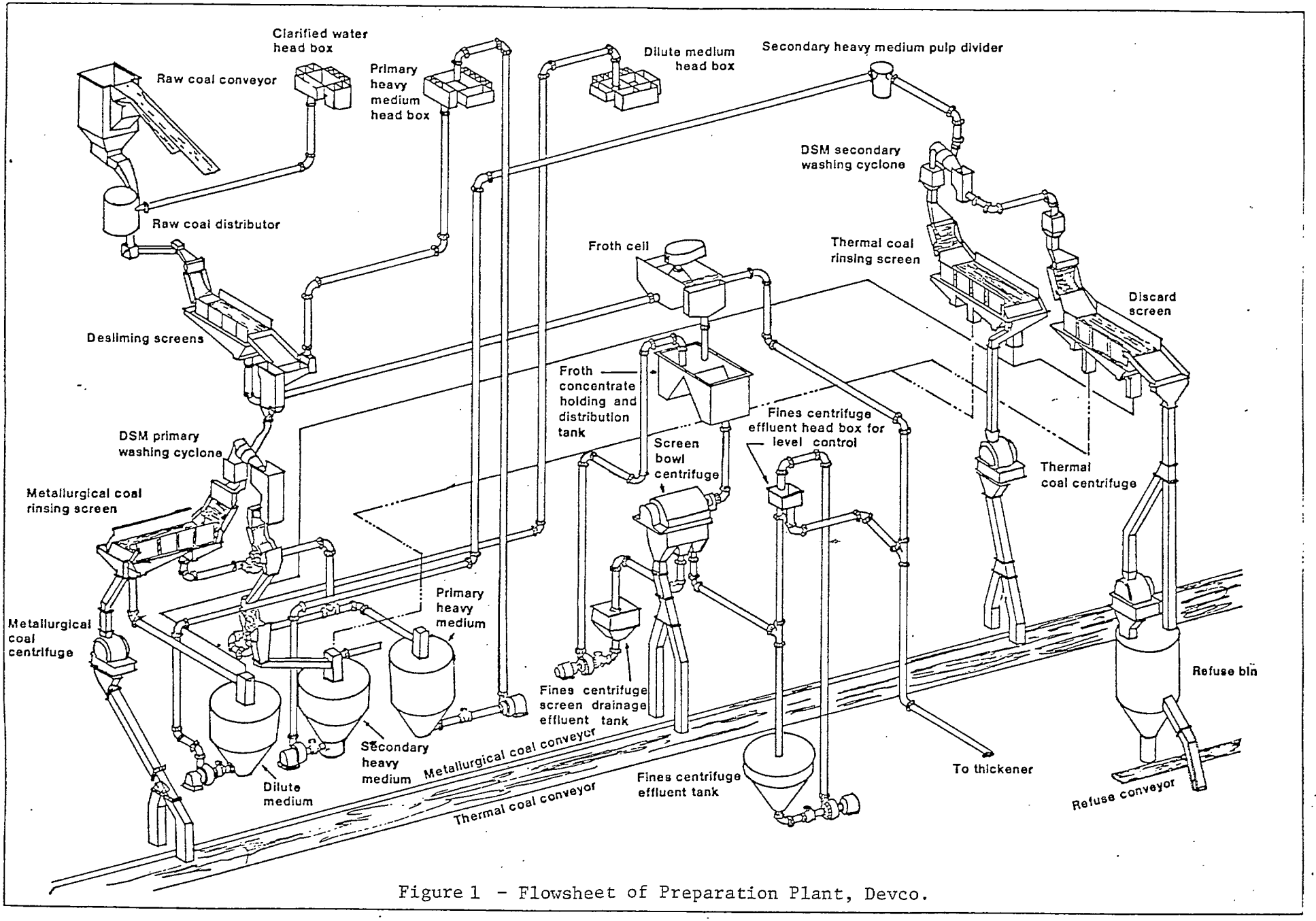

Figure 1 - Flowsheet of Preparation Plant, Devco.

NEW BRUNSWICK

N.B. Coal Limited, Minto

All coal produced in New Brunswick is surface mined in the Grand Lake coal basin in the Minto-Chipman area by this provincial crown company. In 1976, the company produced about one-half million tons of coal. About one-half of the coal is cleaned in a wash plant equipped with a 150 tph McNally Baum-type jig and a Bird Humboldt Dryclone.

ALBERTA

There are presently four operators of bituminous coal mines in Alberta with a total production in 1976 of 4.8 million tons. All operators have modern coal preparation facilities and are producing cleaned coal for the metallurgical market.

Coleman Collieries Ltd., Coleman

In 1975 this company processed about 1.3 million tons in a 300-350 tph capacity plant based on a 3-cell Baum jig, hydrocyclones and a bank of 16 Diester tables. Dewatering is accomplished by cross flow screens, centrifuges, a static thickener, disc filters and a thermal dryer. The filter cake from the disc filters is fed to a fluid bed dryer.

The Canmore Mines Ltd., Canmore

In 1975 this company processed about 166,000 tons of metallurgical grade coal in a 235 tph capacity plant equipped with a Vissac jig for cleaning plus 1 1/4 in. coal; two 24 in. hydrocyclones for cleaning minus 1 1/4 in coal' ten 8 in. hydrocyclones for recleaning the minus 1/8 in coal screen underflow; and four 8 in. hydrocyclones operating in parallel to reclean the underflow from the ten 8 in. hydrocyclones.

Dewatering is accomplished by vibrating screens, centrifuges and vacuum filters.

Figure 2, the flowsheet of the preparation plant, is included as this plant represents the widest use in Canada of hydrocyclones developed in Canada.

Cardinal River Coals Ltd. (Luscar Ltd), Hinton

In 1975, the company processed about 2.2 million tons in a 450 tph capacity plant equipped with heavy media McNally jigs, flotation cells and a

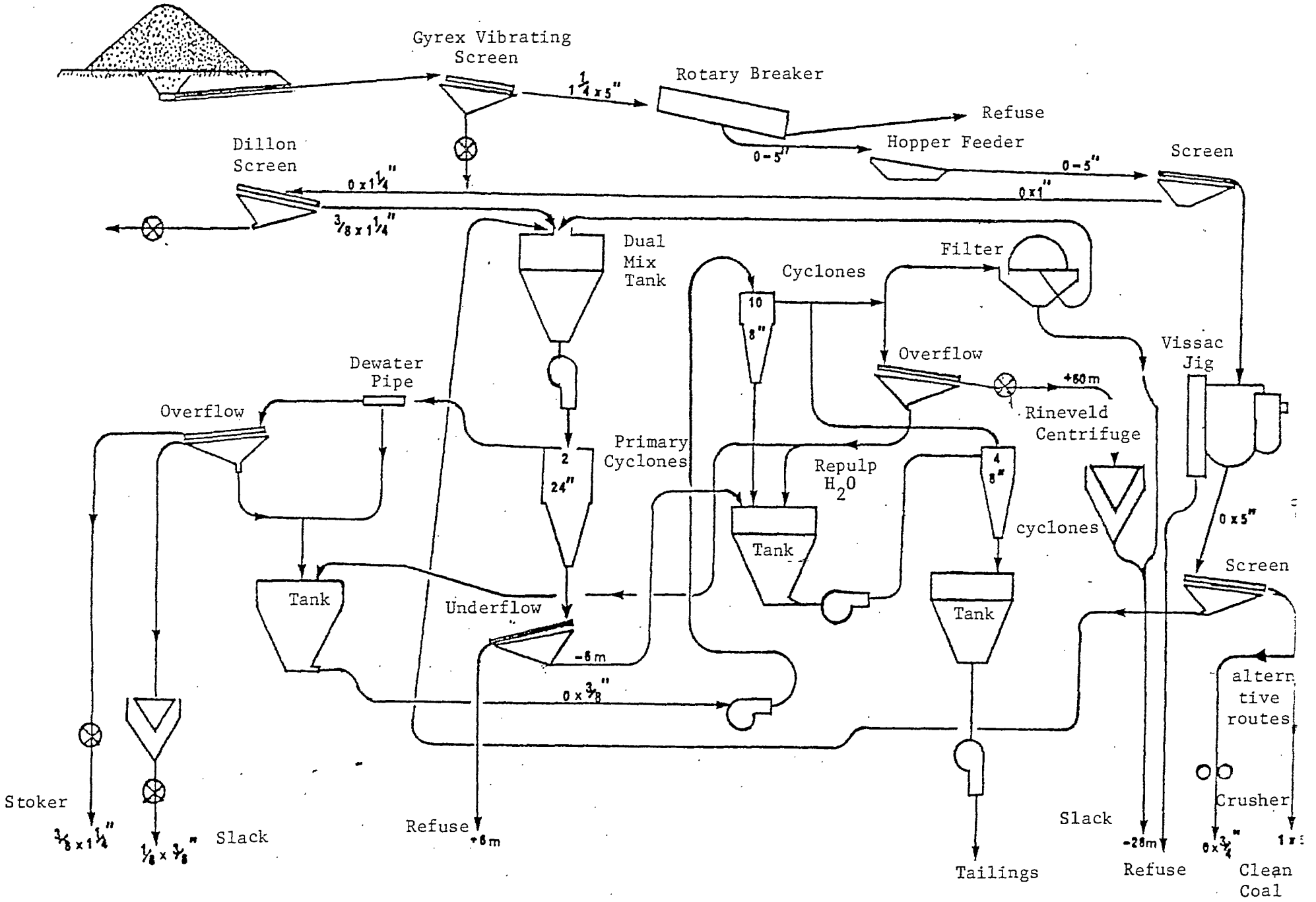

Figure 2 - Coal Preparation Plant Flowsheet, Canmore Mines Limited

cross flow dryer.

McIntyre Mines Limited, Grand Cache

Dense media cyclones and flotation cells were used to process about 2.9 million tons of coal in 1975. The plant capacity is 650 tph.

BRITISH COLUMBIA

Fording Coal Limited, Elkford

This company processes about 4.8 million tons of low volatile bituminous coal averaging 25 percent ash to produce about 3.5 million tons of cleaned metallurgical coal to specified 9.5 percent ash; the coal is dried to 8.5 percent moisture. Cleaning is accomplished by an open heavy medium bath, heavy media cyclones, hydrocyclones and flotation cells. The products are dewatered by centrifuges and filters.

Kaiser Resources Ltd., Sparwood and Michel

This is the largest coal mining operation in Canada with production in 1975 of about 8.5 million tons.

Input to the coal preparation plant in 1975 was about 8.3 million tons and the output was about 6.3 million tons.

The capacity of the coal cleaning plant is about 1400 tph and the plant includes heavy media vessels and cyclones, flotation cells, centrifuges and filters.

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