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PRELIMINARY RESULTS OF ATTEMPTED COAL RECOVERY AND ASH CONTENT REDUCTION OF WASTE MATERIAL FROM THE LUSCAR STRIP MINING OPERATION

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The sample from the Luscar Operation was obtained with some difficulty. A near-blizzard prevented access to the slurry pond at the first visit, and, as the mine was shut down, a sample could not be obtained from the exit pipe. On the second attempt (October 5, 1972), the mine was again shut down but a sample was obtained from the slurry pond. A composite sample was prepared by taking small shovelfuls at random of moist but not water-covered solids from an area of several hundred square feet, into a five-gallon pail. This area was located approximately one hundred yards from the exit pipe. The sample was slurried with distilled water, briefly mixed, and used for the following studies.

The sample was determined to have an average ash content of approximately 33% and was exclusively -8 mesh. By grinding a sample to -100 mesh and agglomerating with Varsol in a Waring blender, followed by washing, the ash content was reduced to approximately 16%.

The original sample was categorized as to particle size as shown in Figure 1.

When each of the mesh sizes was ashed and the combustibles present determined, a plot was made of the percent of total combustibles versus particle size. This is shown in Figure 2. From this graph we see the relationship between the distribution of the combustibles as opposed to the distribution of particles in the original sample. This analysis suggests that the total quantity of particles over 16 mesh (1 mm) constitutes 7% of the sample but 10% of the total combustibles. As the ash content of this grouping is approximately 6%, it is low enough to be used withouth further treatment. Particles with a size of -16 to + 60 mesh contain 70% of the combustibles in 58% of the sample, with an average ash content of 16%. Thus, this fraction alone will be used for enrichment by the spherical agglomeration procedure. This -16 to +60 mesh fraction was ground in the ball mill until -100 mesh. This sample was then agglomerated using varying amounts of bridging liquid (Varsol), and the ash content of the recovered portion determined. This

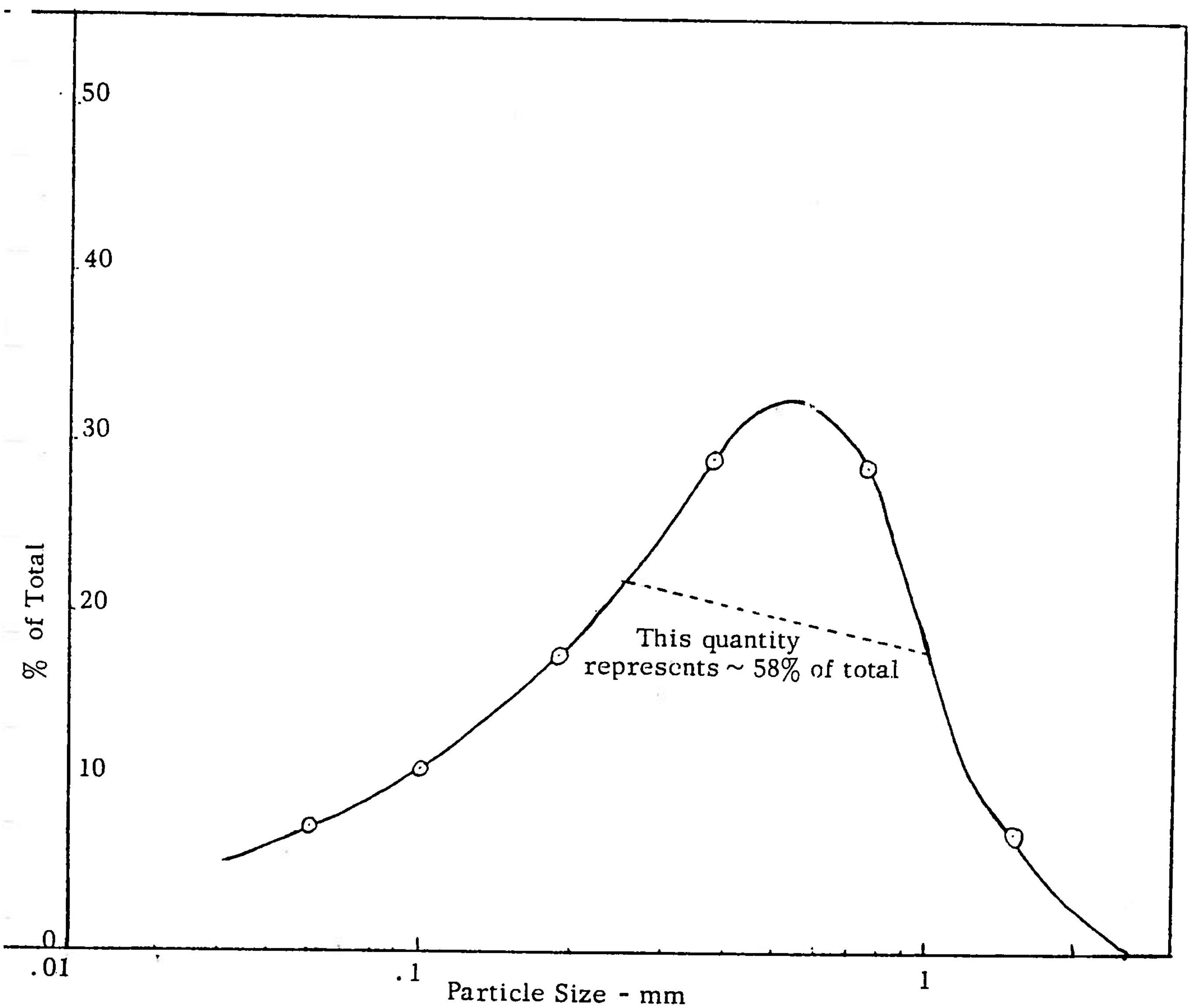

Figure 1. Distribution of Particle Size in Luscar Slurry

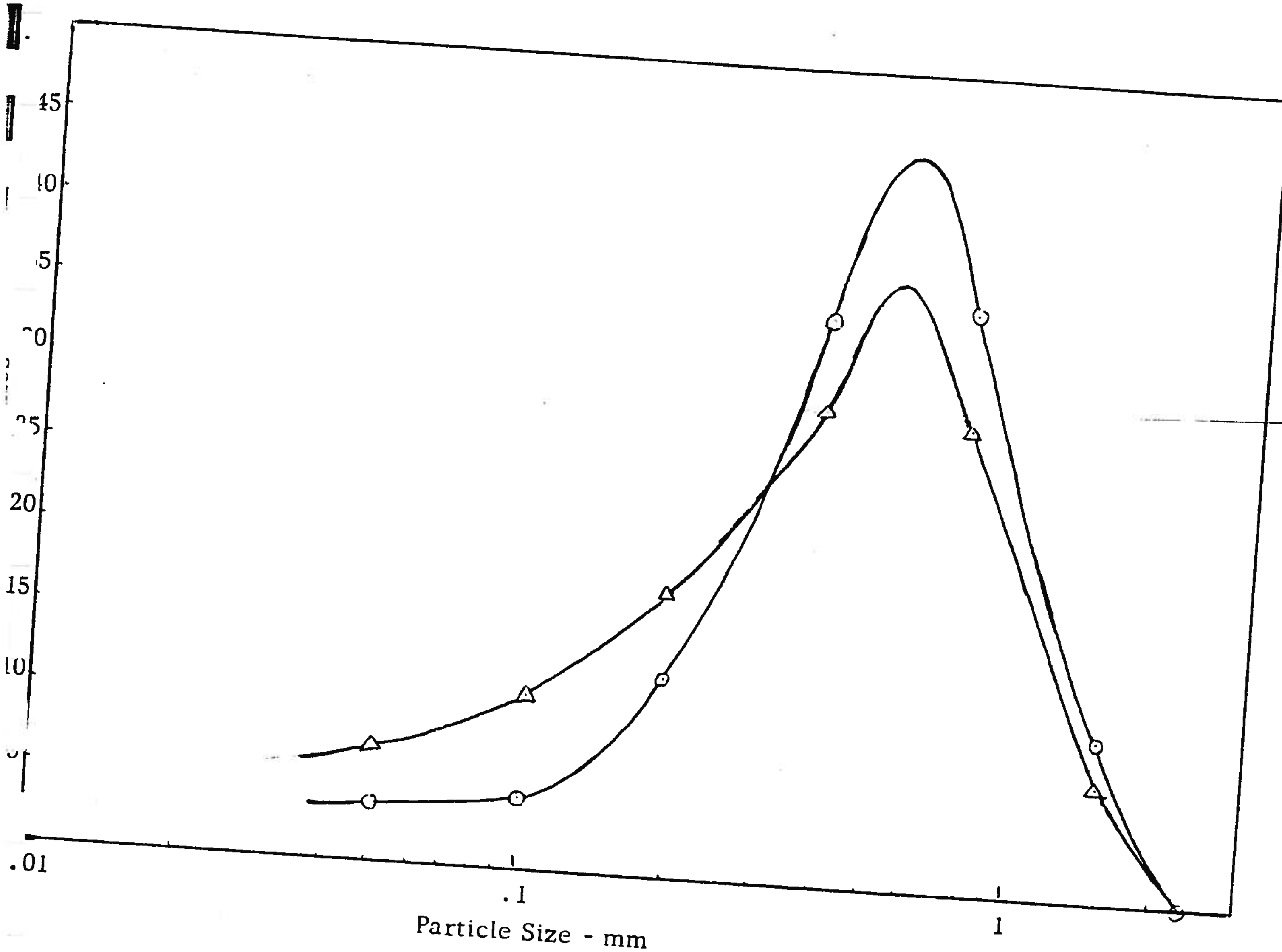

Figure 2. Distribution of Combustibles as to Particle Size in Luscar Slurry Pond

data is shown in Figure 3. While doing this set of runs the degree and efficiency of

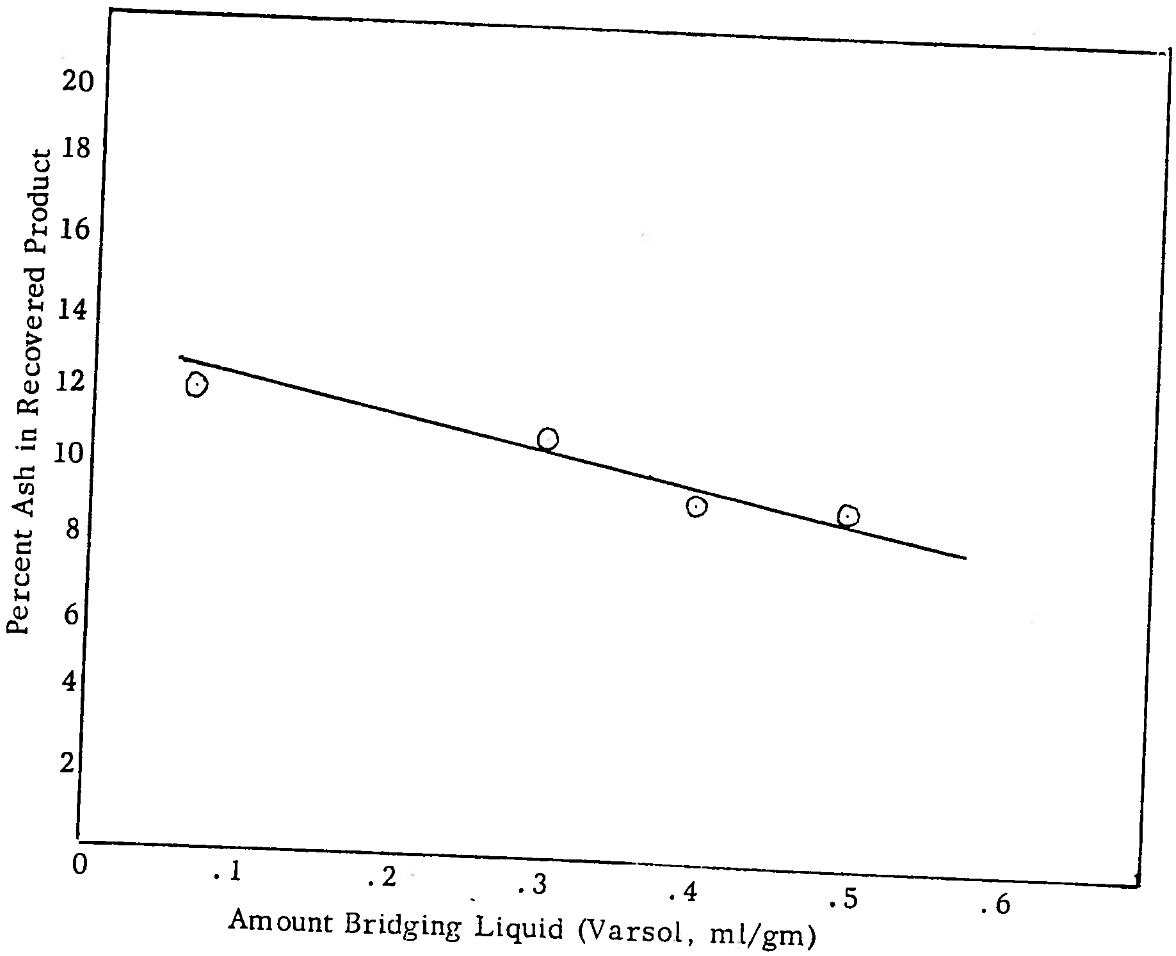

Figure 3. Effect of Bridging Liquid Quantity on Recovered Product Ash Content

washing the recovered product came into doubt so an attempt was made to determine the effect of prolonged washing. In this case the recovered material was returned to the blender with a portion of water and a small volume of bridging liquid, the material agitated for two minutes, separated on the screen and a small sample taken for ashing. This process was repeated and the results are shown in Figure 4. This data also suggests that the minimal ash level achievable by this method will be 8 to 9 percent.

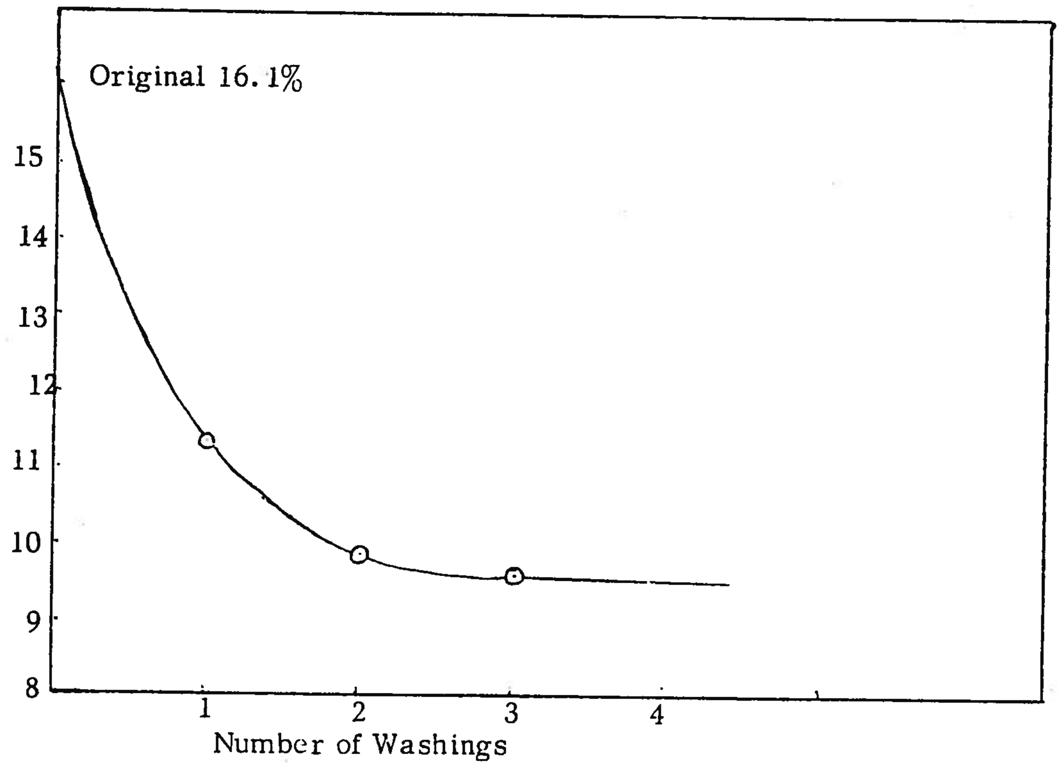

Figure 4. Effect of Multiple Washings on Ash Content.

A quantitative set of runs was undertaken in an effort to determine the effect of volume of bridging liquid used versus percent of combustible material recoverable. In this case stove oil (which, for these purposes, is the same as diesel oil) was used due to its much lower price. These results appear in Figure 5. The material obtained using 0.4 and 0.5 ml/gm of coal had an ash content of 8% which is in good agreement with that predicted in Figure 4. The appearance of the recovery product after high shear agglomera-

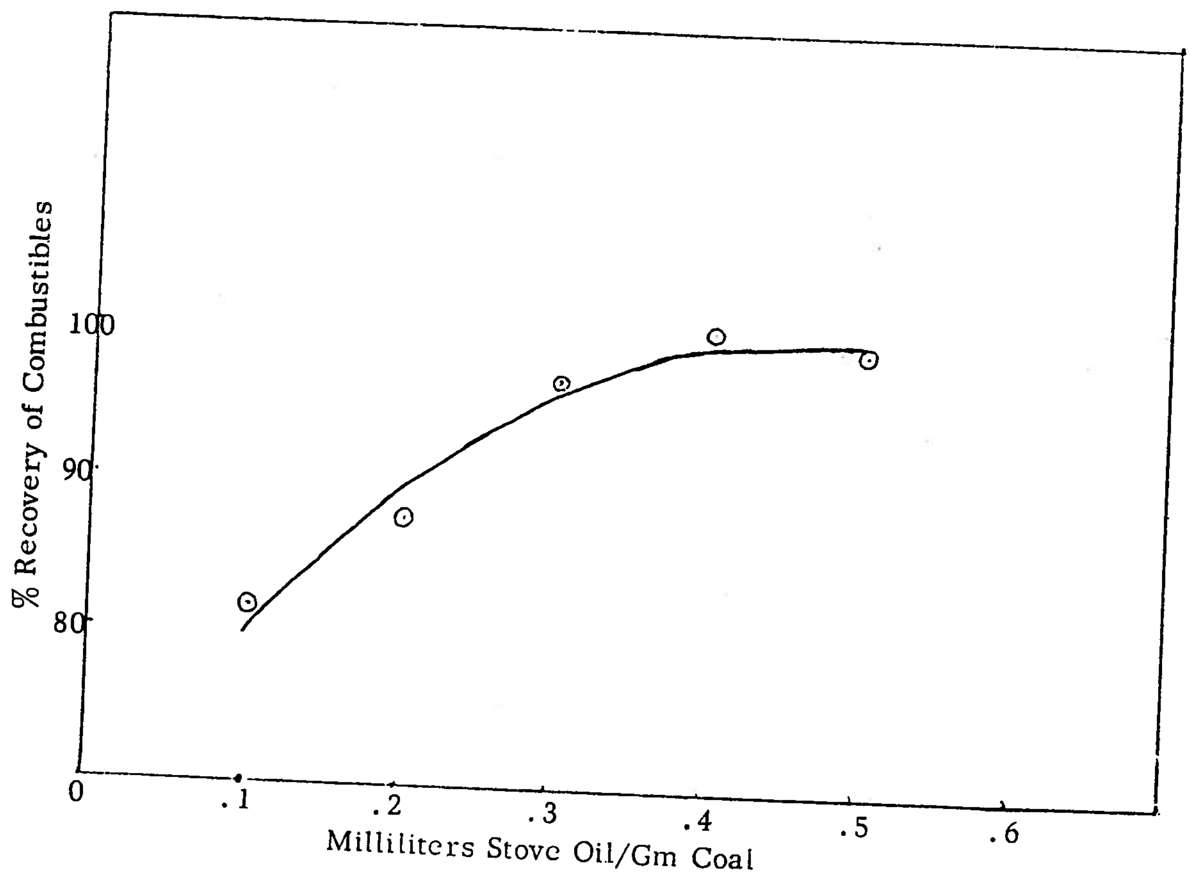

Figure 5. Percent Recovery of Combustibles.

tion in the blender followed by gentle shaking for several minutes is shown below.

Amount Briding Liquid (ml/gm)	Appearance
0.1	Flocced
0.2	Flocced
0.3	Spheres -60 to + 100
0.4	Spheres -16 to +32
0.5	Spheres ~ 3 mm

In order to obtain a rough value of the cost (not including capital cost of equipment) in treating these tailings, the following calculations were made:

One ton slurry → Screening, all above +16 mesh: 2000 x 7 = 140 lbs coal -(5.8% x 140) ~ 131 lb combustibles

↓ Screening -16 to +60 mesh

2000 x .58

= 1160 lb coal

↓ Spherical agglomeration @ .4 ml/gm.

Requires:

$$1160 \text{ lb} \times 454 \text{ gm/lb} \times \frac{.4 \text{ ml}}{\text{gm}} \times \frac{1}{3150 \text{ ml}} \text{ Imp. Gal.}$$

= 6.7 Imp. Gal.

1160 - (1160.8) = 1067 lb Combustible coal

+ 60 lb Combustible oil

1127 lb Combustibles from agglomeration

142 lb Combustibles from screening

Total Combustibles from 1 ton slurry: 1269 lb Combustibles

Cost of stove oil: 6.7 Imp. Gal. x 20.2 = 1.36/ton F.O.B. Edmonton.