through computers both in the office and as process controllers, automated start-ups and shut-downs and programmable controllers.

Let us consider what that means to the operating cost of a plant (Table II).

TABLE II

Operating Costs of a Processing Plant (Proforma Cost/Ton in US Dollars/Million Tons)

	Present industry average	Potential minimum	Percentage improvement possible
Capacity: 2000 million ton/day			
Solvent @ $1.40/USG	0.88	0.35	60
Steam usage: present natural gas @ $3.50/MCF, potential coal @ $50/ST	2.89	1.25	55
Drier fuel @ 3000 BTU/bushel/% H_2O	1.00	0.55	45
Power consumption (5¢/kWh)	2.50	2.00	20
Personnel:			
Hourly	2.11	1.52	
Supervisory	0.81	0.54	
Administrative and sales	0.81	0.54	
Total personnel	3.73	2.60	30
Other cash costs	2.00	2.00	–
Total cash costs	13.00	8.75	33
¢/bushel	33.6	22.6	33

Consider a 2000 metric ton/day plant. The solvent loss was calculated on the basis of its current US price of $1.40/US gallon; for steam usage at present natural gas at $3.50/thousand cubic feet and for potential minimum – coal at $50/short ton. For drier fuel – the same price as boiler fuel which means it is assumed that grain driers can be run on steam generated from coal; for personnel – present US wages, salaries and benefits were used. All other cash costs, which primarily are maintenance and insurance, were assumed to be ca. $2.00/metric ton. The result is that cash costs excluding depreciation today probably average ca. $13.00/metric ton or 33.6 cents/bushel for a large, reasonably efficient plant. I think that the potential minimum operating cash cost is $8.75/ton or 22.6 cents/bushel – a one-third reduction. Will we reach this? Probably not in most plants but every plant will, I am sure, do some of these things and reach the minimum in some areas. If they do not, they may not be in business for long.

While we are discussing operations, I would like to discuss new solvents. There are two that show promise. Carbon dioxide's real challenge, it seems to me, is to determine how, at the high capacities at which we operate, to get flakes in and out of a high pressure vessel while keeping CO_2 losses to econonical levels.

Isopropyl alcohol (IPA) concerns me because I believe that any commercial system will have to blow down some alcohol. There will also be some spillage. In both, the challenge here is to keep IPA, a flammable solvent, reliably miscible in water out of sewers.

Let us now turn to the possibility that our assumptions are wrong.

What if we do develop a worldwide depression with extensive trade wars? We do not really need to deal with this question. The industry, relying as it does on export trading and increasing meat consumption, would be devastated.

A severe worsening of USA-USSR relations would not greatly affect the picture. The USA is exporting little oilseed or its products to the USSR now anyway. If the USSR, in its next generation of leaders, should decide to make a turn to reward performance in its workers, it would have worldwide impact on the crushing industry. Improved agricultural practices, higher yields, less grain left in the field, and a more efficient crushing industry would probably develop over time. The USSR and its friends, however, would import lots of products for a long time. In short, everyone would be bullish.

In the petroleum section, if indeed we have not learned our lessons and cannot prevent large increases in oil prices, or if severe disruptions occur, this would probably be helpful to the relative situation of the USA. Our natural gas supplies are ample, we are partially self-sufficient in oil and we have huge reserves of coal.

Summary of Discussion Session A-1 on Solvent Extraction

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Discussion session chaired by Roger Leysen; the panel consisted of Messrs. Christensen, Carr (for Becker), Myers, Mangold and Lusas.

The following issues were raised:

- Darkening and loss of agglomerating capacity of cottonseed meal in desolventizing. The panel and also the audience do not know which measures should be taken to prevent abovementioned problems.
- Availability of computer programs for solvent extraction plants. Several instrument manufacturing companies are able to supply these computer programs.
- Extraction with supercritical CO_2.

In experiments so far to extract rapeseed with supercritical fluids, the extracted meal has not been thoroughly investigated as regards thioglucosides.

The technical problems in the implementation of the method for a continuous multithousand ton per day soybean extraction plant have not yet been solved.