

Granular Resource Requirements for Proposed Mackenzie Valley Pipelines:

Technical Papers and Workshop Proceedings

**Sponsored by:
Northern Oil and Gas Action Program (NOGAP) Project A4:
Granular Resources Inventory and Management**

**NOGAP Project Manager:
R.J. Gowan
Department of Indian Affairs
and Northern Development (DIAND)**

**Prepared by:
R.J. Mahnic and T.J. Fujino
Stanley Associates Engineering Ltd.**

June, 1993



SECTION 7.

DISCUSSION PANEL "A"

INDUSTRIAL BORROW DEMAND ISSUES

GAS PIPELINE BORROW DEMAND ISSUES

Ollie Kaustinen

*Vice-President, Engineering
Polar Delta Pipeline Project, Calgary, Alberta*

I was asked to present the method Polar Delta used in determining the borrow requirements for the proposed gas pipeline. This information is extracted from the National Energy Board application for the gas pipeline in 1984-85. Some 5.5 million m³ of borrow material would be required for the line from the Mackenzie Delta to the Caroline-Edson areas of south-central Alberta (Figure 1). About 4.6 million of that granular requirement is in the Northwest Territories (NWT), along the 1,500 km of right-of-way.

The Polar Gas line more or less follows the Norman Wells pipeline route from Norman Wells to Zama. In our consortium with the other producers (note Alaska Natural Gas Transport System/Dempster Lateral routes which have been proposed by Foothills Pipelines in Figure 1). Foothills and Polar Delta has looked at other pipeline routes and so the Mackenzie Valley proposal might not be the ultimate routing.

Also, in order to determine the borrow requirements, we also have to examine the preferred and required design elements. The aggregate needs are really based on how you design the pipeline. As mentioned earlier, very high numbers for aggregate and granular material were generated in the original pipeline concept because of how we were to design and build that pipeline. When I now talk about the borrow requirements, they relate, for the most part, to pipeline stress.

Also, granular requirements will depend on the soil conditions enroute. What Polar Delta has said is that a gas pipeline in the continuous permafrost areas will be a buried pipeline operating at minus 0°C. In the discontinuous zone, we require more pipeline weights because of above freezing conditions. A large gas pipeline will float under those conditions.

We do not intend to have a gravel pad to work from. In earlier concepts for pipeline, we had a granular pad and also, on the Polar Gas Project, we had to have a road to bring all the equipment up along the right-of-way. The cost of building that pad in the Mackenzie Valley was almost as much as installing the pipeline itself. The costs were considerably higher and the granular requirements were much, much, higher as a

result. What we need now is only for the pipeline itself, padding along the pipe which was not used on the Norman Wells pipeline because it is a smaller line and more flexible. So we need much more select fill for the pipeline itself. This is a concept that's used in the TransCanada PipeLine system in northern Ontario, where the whole pipeline is padded in the rock areas. We do not need it for our pipeline project except for slope protection.

So looking at the Norman Wells oil pipeline versus the Mackenzie Valley gas pipeline, you'll notice that we've got a sand pad that's 46% of the pipeline route. No protection--only one third of the pipeline route.

Here are the aggregate requirements. This is in linear feet, not in metric. Granular for weights is 145,000 cubic metres. These are very heavy weights and they do not necessarily have to be cast in that area. They can be brought from other areas if local aggregate is not available.

There's also the pipeline facilities: the airports, the operator maintenance facilities, compressor stations, and stockpile sites. A lot of the granular material is required off the pipeline right-of-way for access roads and logistics facilities. As far as the pressure station sites and all operation maintenance facilities, what we require is mostly sand and gravel.

In our application to the Board we identify the number of borrow sites. We don't say where we're going to take it from as we did not drill the sites. So, we don't really know how much is there, but we listed enough sites that we knew that there should be more than enough material available to build. For spread 3 in year 3, these are the sites (shown on overhead transparency) and we have actually done the length of haul, just to get a cost estimate. First we get a cost estimate of constructing a pipeline, we do not combine how much we would take from each site whether we use that site or not, these are potential sites.

For spread 3, year 3, about 250,000 m³ for the two month period including preparation for pipe padding and site material, weight casting, and site preparation.

To summarize, how do we arrive at these numbers for granular requirements? Well, we have a "book" of all pipeline material and supply requirements that can be cross-checked by construction spread. It tells you

exactly how to get a cost estimate so it's not just "taking numbers out of the air". That detailed information is, however, confidential and proprietary to Polar Delta.

Note: The text of this presentation has been transcribed from an audio-tape recording of the workshop presentations. If necessary, we would suggest that the reader verify the accuracy of these comments with the presenter.

Figure 1. Mackenzie Valley Gas Pipeline and Prebuild Extension Projects

