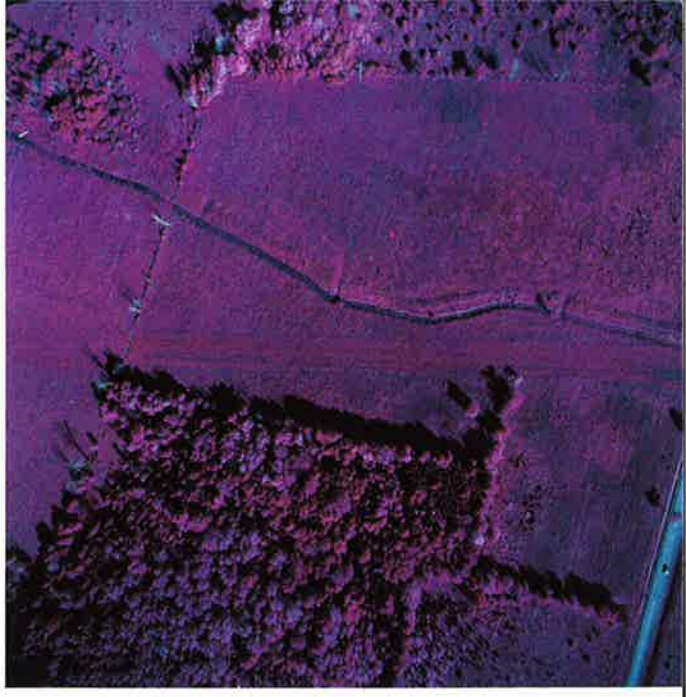
To What Extent Is Topsoil Conservation Necessary In Pipelining?

by S. Alex Ramsay



Many a landsman, while acquiring right of way for pipeline construction, has guaranteed the landowner that his land will be restored as closely as possible to its pre-construction state. The question of topsoil separation and replacement may have arisen during preliminary discussions, but more likely this subject has been left until just prior to construction when the company inspector and landowner have agreed on a practical width and depth of topsoil to be stripped from the right of way. This information is then relayed to the contractor. At this point, the landsman must depend on the contractor's appreciation of the local environment and the skill of individual bulldozer operators who carry out the work.

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Photo #13. An abandoned pasture in Glengarry County, Ontario. The right of way had a 3:1 vegetation increase, once rehabilitation was complete. Photo #5 was taken 1500 feet above ground level. The Inter Provincial Pipe Line easement is 60 feet wide and cuts through a hardwood woodlot and dormant field. The right of way was seeded by a contractor in 1977 to a mixture of bird's foot-trefoil and timothy with 400 lbs/acre of 10-20-20 fertilizer. Deeper color depicts a more active plant growth. Note the kidney shaped pond is south of the right of way which cuts across the gravel road to the east. The municipal drainage ditch is 1000 feet to the south.

There are a number of important items on the contractor's agenda besides topsoil conservation. He is primarily concerned with getting welded pipe into the ground as efficiently as possible. Topsoil separation and subsequent replacement may, in the bustle of construction activity, be given a low priority, and, if wet weather predominates during the construction period, topsoil may be buried or diluted with subsoil. If this happens it is certain that the landsman will hear about it and the company may have to pay for the contractor's lack of expertise in conserving topsoil. The landowner won't hesitate to voice his dissatisfaction through damage claims. In some cases long-term crop loss payments may result. What improvements can be made to add credibility to the guarantee of land restoration?

In the past, environmental assessment reports have only provided guidelines for agricultural lands; in the

future to be effective they should provide useful details which will contribute to better topsoil conservation.

Any environmental assessment of the region to be traversed should include detailed information on soils along the pipeline route. If topsoil ("the layer of soil moved in cultivation")* is to be separated, exact depths should be delineated for each field to be crossed and qualified inspectors put on the job to ensure that the work is carried out properly.

The preservation of agricultural land generally, and topsoil conservation specifically, has been traditionally left up to private landowners who may or may not have intimate knowledge of their land. The variable nature of soil requires that a detailed assessment of the atrributes of each field be undertaken. Where a longstanding appreciation for the soil has been developed by a well informed farmer, topsoil separation according to his suggestions will likely be satisfactory as long as the construction period is dry. Unfortunately, good weather and pipeline construction don't always go hand and hand. Restrictions on working in wet weather should be spelled-out in detail where soils are subject to damage.

An agreed upon width and depth of topsoil to be stripped, should be listed for each property. This detailed list should then be included as an appendix to the construction specifications so that the contractor knows the exact requirements of the job in advance.

Research on the impact of pipeline construction on soil productivity has been carried out across Canada. In Western Canada the negative impact of pipelining with no topsoil separation is apparently minimal. In fact, an improvement in crop growth for a number of soils has been found over pipelines and has been reported by Dejong and Button (1973) in Saskatchewan and, by Toogood (1974) in Alberta.

The greatest increase in growth was noted over the pipeline trench in Solonetzic soils on the Prairies. These soils are characterized by a very dense subsoil which prevents root penetration. Ditching effectively breaks up this hard pan allowing deeper rooting, and better soil moisture availability to plants.

Crop yield is the best measure of soil productivity, but it is not necessarily the whole story. Farmers are also concerned with maintaining a uniform friable seedbed. Subsoil which may be brought to the surface during pipelining may produce cloddy, undesirable soil aggregates which require extra tillage. This illustrates the need for a detailed site specific examination of topsoil separation, which involves communications with the landowners, and the development of measures which will enhance public relations.,

In Eastern Canada topsoil conservation seems more important. Recent studies showed that pipeline construction carried out under adverse working conditions resulted in mixing of topsoil and subsoil and significant short term crop losses. Dr. A. F. MacKenzie and the writer determined crop loss at a number of sites on right of way between Sarnia, Ontario and Montreal, Quebec two years after construction, and found that yields were reduced an average of 33% for the 91 fields monitored. This loss was attributed to a significant decrease in soil organic matter (humus) of the pipelined soil which was indicative of poor soil structure as well as a loss of fertility. Significant increases in soil pH (low pH=acidic, high pH=alkaline) on right of way were also found which was a further indication that mixing of topsoil sand subsoil had occurred. The results were confirmed by Culley et at (1981) four years after construction with smaller but significant yield depressions persisting over time at some locations.

A good contrast to these findings is provided by a study of agricultural land by Andre Marsan and Associes Inc., one-to-two years after winter construction of a gas pipeline in Quebec, where no topsoil stripping had been carried out. Construction under frozen conditions resulted in decreased

*Topsoil, as defined in Glossary of Terms in Soil Science, Agriculture Canada. Publication 1459, 1976.