FARMLAND SPREADING
OF
CTMP MILL SLUDGE

1994

Slave Lake Pulp Corporation
P.O. Box 1790
Slave Lake, AB
T0G 2A0

This is a joint publication of the Canadian Forest Service
and Alberta Land and Forest Services pursuant to the
Canada-Alberta Partnership Agreement in Forestry.

A3004-118

DISCLAIMER

The study on which this report is based was funded in part under the Canada-Alberta Partnership Agreement in Forestry.

The views, conclusions and recommendations are those of the authors. The exclusion of certain manufactured products does not necessarily imply disapproval nor does the mention of other products necessarily imply endorsement by the Canadian Forest Service or Alberta Land and Forest Services.

This report is a technology transfer note. For a more technical report, see *"Landspreading ash and sludge at the operations of Slave Lake Pulp Corporation"*.

(c) Minister of Supply and Services Canada 1994
Catalogue No.: Fo42-91/118-1994E
ISBN: 0-662-22858-8

Additional copies of this publication are available at no charge from:

Canadian Forest Service
Natural Resources Canada
Northern Forestry Centre
5320 - 122nd Street
Edmonton, Alberta
T6H 3S5
Telephone: (403) 435 - 7210

or

Land and Forest Services
Alberta Environmental Protection
10th Floor, 9920 - 108th Street
Edmonton, Alberta
T5K 2M4
Telephone: (403) 427 - 3551

ABSTRACT

A total of 6,185 oven dry tonnes, at 15 to 20% solids, of effluent sludge from storage at Slave Lake Pulp Corporation (SLPC) was hauled to farms in the Smith-Hondo area of Alberta. The sludge was then spread on these farms by commercial manure spreading contractors, and then incorporated into the soil by the farmers. The hauling and spreading was carried out in two different periods: one in early May 1993, prior to the farmers planting the crop; the other in the August-September period following the removal of the crop by each farmer. This was done to assess the full-scale viability of the landspreading of sludge on farmland. It follows pilot-size plots at the SLPC site which proved the sludge is beneficial to the soil and improved vegetation growth. The program was successful, with the farmers being pleased to receive the sludge as they considered it to be a beneficial supplement to the soil. The local district agriculturist was supportive of the sludge spreading program, and his support was a comfort to the farmers involved in the trial work. No clear crop yield improvement was evident from the spring spreadings; it is felt that the 1994 and subsequent crops will be a better judge on yield improvements.

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Slave Lake Pulp Corporation produces 30 to 40 tonnes per day, dry basis, of combined primary and secondary effluent treatment sludge. The original mill concept was to mix this sludge, produced from the dewatering equipment at about 20% solids, with waste wood, bark, and chip screening fines and burn it in the on-site Olivine waste wood burner. In practice, the wet sludge has turned out to be not suitable when added directly to the burner because of icing of feed conveyors, damage to the burner refractory, and blocking off the burner underfire air supply. A gas-fired dryer was then installed in mid-1992 to dry the sludge to 50% solids content. This has worked well at producing an acceptable sludge for the burner.

During this period, an inventory of wet sludge built up on the site and alternatives were explored to dispose of it. This inventory of sludge was about 40,000 cubic metres, or 6000 tonnes, dry basis. The alternative disposal methods included reclaiming to the mill sludge handling system, reclaiming to the effluent bioreactor system, reclaiming to the waste wood burner, and spreading the sludge on farmland.

In 1991, SLPC contracted the Alberta Research Council, Environmental Research and Engineering Division, to evaluate the feasibility of using the sludge as a soil additive. Pilot trials carried out under this program in 1992 showed the sludge was a very positive additive for soils in the Smith-Hondo area (the nearest available agricultural land) because of nitrogen and phosphorus (chemicals added in the mill effluent treatment system) and the organic content and alkaline pH of the sludge.

Approval, with conditions, was obtained from Alberta Environment in April, 1993, to spread the sludge on farmland. These conditions included the application rate (25 dry tonnes per hectare), and background soil sampling and monitoring (two locations every 10 hectares of land, with eight samples at different depths at each location).

A public meeting was held April 6, 1993, at the Smith Agriplex to explain to the community, and interested farmers, the program that SLPC planned to undertake, describe the properties of the sludge, and explain how it might affect the farmland and crops. Part of the presentation was by Alberta Research Council personnel describing their pilot scale work at the mill. The meeting went over very well with the farmers, and several farmers committed to taking sludge on their land that spring.

RESULTS

1. A total of 44,300 cubic metres, or 6,185 tonnes, dry basis, were hauled to 13 areas of farmland, owned by eight different farmers. The details of the sludge spreading are provided in Table 1.

2. There was no evident increase in crop yield through 1993 for the four farms that received sludge in the spring. It is interesting, however, that three of the four farmers were sufficiently impressed with the sludge that they were willing to take more sludge in the fall. (The fourth farmer did not want to take additional sludge because he had no additional land to do so.)

3. It is also interesting that one of the farmers who received sludge in the spring does not use pesticides, herbicides, or even chemical fertilizers. Additionally, he was sufficiently impressed with his crop from the spring spreading that he willingly took significantly additional quantities of sludge for the fall spreading.

4. The sludge was hauled safely using commercial hauling trucks. Care was taken to ensure that the box was not overloaded with sludge to avoid the possibility of material falling out as the truck moved. A tension-loaded chain system was used on each tailgate as a safety backup in case the main tailgate closing device failed.

5. The sludge dryer at the mill worked well at producing an acceptable dryness that the waste wood burner could handle. The sludge spreading program for farmland eliminated the previous on site inventory of sludge. No sludge is now being put into inventory.

6. Baseline soil analysis was done by the Alberta Research Council. The requirement was to take two cores every 10 hectares of land where sludge was applied with samples at eight different depths for each core. The work will be repeated, in the same locations, in the fall of 1994 to determine whether the sludge application has affected the soil chemistry.

Table 1. Sludge Spreading on Farmland, 1993

Farmer	Date Applied	Specific Plot	Hectares	Sludge Applied O.D. Tonnes	Sludge Rate Tonnes Per Hectare	Crop 1993	Crop 1994	Comments
Don Weinrich	7-May-93	S6T70R26W4	40	780	19.5	Oats	Oats	Sandy soil; no rain May, no significant yield increase.
John Drennan	7-May-93	NW34T69R26W4	40	657	16.4	Oats	Oats	Silty clayey loam; no significant yield increase.
Alfred Morrill	12-May-93	SW5T70R26W4	10	162	16.7	Oats	Oats	No pesticides, herbicides, chem fertilizers used.
Arnie Weber	14-May-93	NE18T71R26W4	13	145	10.8	Alfalfa	Alfalfa	Wanted low (10 tonnes per ha) sludge rate.
Gerald Attfield	22-Aug-93	SE33T71R26W4	24	560	23.3	Summer-fallow	Oats	Only application north of Athabasca River.
Alfred Morrill	27-Aug-93	SW5T70R26W4	22	571	26.0	Alfalfa	Oats	
Jack Lebeau	30-Aug-93	NE24T26R1W5	16	361	22.6	Alfalfa	Oats	
Jack Lebeau	15-Oct-93	SE25T69R27W4	15	279	18.6	Oats	Oats	
Alfred Morrill	17-Oct-93	NW5T70R26W4	27	644	23.9	Grass (Pasture)	Alfalfa	Being converted to crop use in 1994.
Jack Lebeau	19-Oct-93	NW24T69R27W4	29	739	25.5	Oats	Oats	
Jack Lebeau	22-Oct-93	NW24T69R27W4	20	501	25.1	Alfalfa	Oats	
Ernie Weinrich	15-Sep-93	NE16T69R26W4	10	274	26.3	Grass (Pasture)	Alfalfa	Recently cleared land.
Al Swanson	12-Oct-93	NW6T70R26W4	20	512	25.6	Wild (Hay)	Alfalfa	Land abandoned for over 10 years.

CONCLUSIONS

1. The addition of SLPC sludge to farmland is a positive for the soil -- no negatives to the soil or crop growth were noted from the spring sludge spreading. The 1994 crop growth has to be assessed to determine the effects of the 1993 fall sludge spreading.

2. All farmers who received the sludge were pleased to receive it and believe it will be good for the soil.

3. The cost to haul and spread sludge on farmland in the Smith-Hondo area has been determined and is similar to other handling alternatives, such as dewatering/drying/burning.

4. Soil analysis done by the Alberta Research Council provided a background to measure any effects of the sludge on soil chemistry.