Paper No. 17

Author(s): D.M. Galbraith

Title of Paper: "Systems Inventory of Surficial Disturbance. Peace River Coal Block, B.C."

ABSTRACT

The Peace River Coal Block in B.C. extends a distance of 150 miles from the Williston reservoir to the Alberta border. Approximately seven hundred and fifty Coal Licences are involved, each one mile square. Activity occurs both within the Licences - roads, drill sites, trenches, adits; and outside (access via Chetwynd, Dawson Creek and Grande Prairie). This disturbance requires identification and inventorying in a systemized manner for purposes of bonding, approval of proposed work under Section 8 of the Coal Mines Regulation Act, for field inspection of work and reclamation, and for design of exploration and development protection and reclamation programs.

The scope and detail of the requirement can only satisfactorily be met through the use of aerial photography. The system developed has eight basic steps:

1) Procurement of airphotos of suitable date and quality.
2) Incorporation into an airphoto mosaic.
3) Marking of boundaries of Coal Licences.
4) Identification of nature of disturbance, referencing on an inventory sheet by Licence.
5) Measurement of identified disturbed area by digitized planimeter.
6) Presentation of individual licences and inventory sheets in field format.
7) Field checking and discussions with company based on format.

8) Summarization of critical data in computer program for future retrieval.

The first seven steps will have been completed in the areas of major interest in the summer of 1977, and the details of step 8 will be determined.

AIRPHOTO INVENTORY OF SURFACE DISTURBANCE

INTRODUCTION

MY TALK TODAY CONCERNS THE USE OF AERIAL PHOTOGRAPHY IN THE RECLAMATION OF SURFACE DISTURBANCE RELATED TO COAL EXPLORATION IN THE NORTHEAST COAL BLOCK OF B.C.

ACCESS TO THE COAL BLOCK IS VIA CHETWYND AND DAWSON CREEK, BRITISH COLUMBIA, OR BEAVERLODGE, ALBERTA. The N. E. COAL BLOCK CONTAINS 721 COAL LICENSES TYPICALLY OF 1 SQ. MILE EXTENT, OUR PROGRAM INCLUDED 212 LICENCES IN THE AREAS OF MAJOR DISTURBANCE.

THE COAL BEARING FORMATIONS OF THE PEACE RIVER BLOCK OCCUR IN THE ROCKY MOUNTAIN FOOTHILLS, WHICH IS TYPIFIED NEAR THE ALBERTA BORDER BY ALPINE COUNTRY AND NEAR THE WILLISTON RESERVOIR BY FOREST.

SURFACE DISTURBANCE OCCURS THROUGHOUT.

THE ROLE OF AERIAL PHOTOGRAPHY

IN THE ADMINISTRATION OF THE LEGISLATION IT IS A MAJOR TASK JUST TO KEEP TRACK OF ACTIVITY OVER SUCH A WIDE AREA. THE OBJECT OF THE LEGISLATION IS THE PLANNING OF WORK AND ACHIEVEMENT OF RECLAMATION IN SUCH A MANNER THAT THE ENVIRONMENT IS PROTECTED. IF WE WORK BACKWARD FROM THIS OBJECTIVE TO WHERE WE ARE TODAY, WE CAN BETTER DEFINE THE ROUTE WE MUST TRAVEL TO REACH THIS GOAL.

WE COULD REASON AS FOLLOWS: THE MAJOR REQUIREMENT FOR RECLAMATION IS SITE PREPARATION; SITE PREP. REQUIRES OPERATIONAL PLANNING; OPERATIONAL PLANNING REQUIRES PROFESSIONAL DECISION MAKING; PROFESSIONAL DECISION MAKING REQUIRES A PLANNING MEDIA; THE BEST PLANNING MEDIA IS AERIAL PHOTOGRAPHY.

WE MIGHT REASON DIFFERENTLY. WE MIGHT ASSUME THAT THE OBJECTIVE WAS THE MINIMIZATION OF SURFACE DISTURBANCE. WE WOULD THEN CONCLUDE THAT THE MAJOR REQUIREMENT FOR THIS WOULD BE OPERATIONAL PLANNING. AGAIN WE WOULD RETURN TO THE NEED FOR

AERIAL PHOTOGRAPHY. ORGANIZATION OF AVAILABLE PHOTOGRAPHY

OUR USE OF AERIAL PHOTOGRAPHY WITHIN THE WIDE EXPANSE OF THE N.E. COAL BLOCK HAS REQUIRED ORGANIZATION AND USE OF SAME WITHIN A SYSTEM, AND THUS OF TITLE. AID PROGRAM (AERIAL INVENTORY OF DISTURBANCE) HAD A BETTER RING TO IT THAN AISD, HOWEVER THE MATERIAL WAS SLIGHTLY TAILORED TO FIT THE PURPOSES OF THIS CONFERENCE. THE STEPS IN OUR ORGANIZATION OF AIRPHOTOS, AND IN THEIR APPLICATION TO THE RECLAMATION OF SURFACE DISTURBANCE WERE AS FOLLOWS:

(SLIDE 9L)

CONSIDERING EACH OF THE STEPS SHOWN IN TURN:

(SLIDE 10L)

STEP 1. DOCUMENTATION OF USABLE AERIAL PHOTOGRAPHY.

ALTHOUGH COAL EXPLORATION LEASES EXTENDED ALMOST CONTINUOUSLY FROM THE PEACE RIVER RESERVOIR TO THE ALBERTA BORDER.

IT WAS FOUND THAT ONLY APPROXIMATELY ½ OF THIS AREA WAS COVERED BY AERIAL PHOTOGRAPHY. (LICENCES ARE SHOWN IN THIN LINE.)

BLACK AND WHITE PHOTOGRAPHY IS SHOWN IN HEAVY BLUE, COLOUR PHOTOGRAPHY IS SHOWN IN HEAVY RED.

STEP 2. THE ASSEMBLY OF UNCONTROLLED MOSAICS.

(SLIDE 13L)

THESE WERE PREPARED FROM USABLE PHOTOGRAPHY AT APPROX. 1:10,000 SCALE OF INTENSIVE DISTURBANCE, AND THEIR LOCATIONS ARE SHOWN IN GREEN.

LESS THAN ONE-QUARTER OF THE AVAILABLE COVERAGE WAS UTILIZED IN MOSAICS AS ILLUSTRATED IN THE NEXT SLIDE.

SOME MOSAIC SHEETS INDICATE COVERAGE IN AREAS WITHOUT PHOTOGRAPHY. THIS ILLUSTRATES THAT THIS SLIDE IS ALREADY OUTDATED.

STEP 3. THE MARKING OF LICENCE BOUNDARIES.

THESE WERE MARKED ON THE PREPARED MOSAICS USING AS CONTROL WATERCOURSE JUNCTIONS SHOWN ON THE 1:50,000 NTS MAPS.

STEP 4. PREPARATION OF PHOTOPOSITIVE MYLARS.

(SLIDE 19L)

STEP 5. IDENTIFICATION OF DISTURBANCES WITHIN INDIVIDUAL LICENCES.

(SLIDE 20L)

THOSE OF YOU WHO HAVE IDENTIFIED THAT SLIDE AS A DRILL PAD SHOULD KNOW THAT IT IS IN FACT AN OLD MILL SITE.

STEP 6. INDEXING OF INDIVIDUAL DISTURBANCES ON THE PREPARED MOSAICS.

(SLIDE 23L) (SLIDE 24R)

STEP 7. MEASUREMENT OF DISTURBED AREAS

(SLIDE 25L)

WITH THE USE OF A DIGITIZED ELECTRONIC PLANIMETER.

STEP 8. RECORDING OF DISTURBANCES

(SLIDE 28L)

ON INDIVIDUAL LICENCE INVENTORY SHEETS.

STEP 9. FIELD CHECKING OF THE CALCULATION OF DISTURBED AREAS FOR ACCURACY.

(SLIDE 32L)

FURTHER WORK

THE FURTHER STEPS WHICH WE ARE NOW WORKING ON INDLUCE:

10. SUMMARIZATION OF THE ABOVE DATA ELECTRONICALLY FOR INSTANT RECALL. APPLICATION WOULD BE TO BONDING IN PARTICULAR, AND PROGRAM MANAGEMENT IN GENERAL.

COST OF THE PROGRAM TO THE FIELD USE LEVEL (STEP 8) IS $10,800 AND IT IS ESTIMATED APPROXIMATELY 3/4 OF THE DISTURBANCE IN THE PEACE RIVER COAL BLOCK HAS BEEN INVENTORIED. FUNDING FOR THIS HAS BEEN PROVIDED BY THE ENVIRONMENT AND LAND USE COMMITTEE FOR THE NORTH EAST COAL BLOCK. THIS IS NOW A FEDERAL PROVINCIAL PROGRAM.

FINDINGS

WHAT DID WE FIND OUT? WELL, WITH RESPECT TO ITEM 1 - DOCUMENTATION OF USABLE AERIAL PHOTOGRAPHY WE DISCOVERED THAT MOST OF THE LICENCE AREAS WERE NOT COVERED BY PHOTOGRAPHY. ATTENTION OF THE AGENCIES RESPONSIBLE FOR THIS HAS IN THE PAST BEEN DIRECTED TO SETTLED AREAS AND RELATED TO AGRICULTURAL ACTIVITY. THE COMPANIES AND THE B.C. GOVERNMENT HAVE

AND IN THIS CURRENT YEAR IT IS BEING EXPANDED. FURTHER CO-ORDINATION OF COVERAGE IS REQUIRED. WE FOUND OUT THAT A SCALE OF 1:15,000 DOES NOT SHOW SUFFICIEN DETAIL AND 1:10,000 IS JUST RIGHT.

WE ALSO FOUND OUT THAT COLOUR WAS PREFERRED BY THE INTERPRETER FOR IDENTIFICATION BUT BLACK AND WHITE MADE THE MOST LEGIBLE CHRONAFLEX'S, FROM WHICH THE BLUE-PRINTS WHICH WERE CARRIED INTO THE FIELD WERE MADE. WE HAVE SINCE FOUND OUT THAT YOU CAN HAVE YOUR CAKE AND EAT IT WITH RESPECT TO COLOUR AND BLACK AND WHITE. THAT PROCEDURE IS TO OBTAIN COLOUR NEGATIVES AT A SCALE OF 1:20,000. THEN SUBSEQUENTLY COLOUR PRINTS CAN BE MADE AT A SCALE OF 1:10,000. BLACK AND WHITE NEGATIVES MAY ALSO BE MADE DIRECTLY FROM THE COLOUR NEGATIVES, AND FROM THESE BLACK AND WHITE PHOTOGRAPHS CAN BE PRINTED FOR THE PREPARATION OF MOSAICS AND CHRONAFLEX'S. THE ADVANTAGES ARE THREE-FOLD:

1) PHOTOGRAPHIC COVERAGE AND FLYING IS REDUCED BY A FACTOR OF 4 CONSIDERABLY REDUCING COST.

2) BOTH B & W COLOUR PRESENTATION ARE POSSIBLE, WITHOUT REQUIRING SOPHISTICATED EXPENSIVE DOUBLE CAMERA SET-UP.

3) DISTORTION IS DECREASED BECAUSE OF THE HIGHER ELEVATION FLYING.

WHAT DID WE LEARN WITH RESPECT TO APPLICATION OF THE SYSTEM?

1) THE PHOTOGRAPHS OF THE LICENCES IN MOSAIC FORM LEND THEMSELVES WELL TO THE DETERMINATION OF FUNCTIONAL MAP UNITS KEYED TO VEGETATION. THESE MAY BE DEVELOPED FURTHER INTO SENSITIVITY ZONES WHICH HAS APPLICATION TO BOTH WORK AND RECLAMATION. AND RECLAMATION.

2) THE FORMAT AVAILABLE TO THE FIELD CREW FOR LOCATION OF WORK AND ASSESSMENT OF RECLAMATION IS SUPERIOR TO THE MAP FORMAT. SPECIFIC ADVICE TO THE COMPANY AS TO FURTHER WORK REQUIRED CAN BE NOTED DIRECTLY ON THE PHOTO.

3) THE PHOTOGRAPHIC FORMAT IS TRANSMITTABLE FROM FIELD TO HEADQUARTERS, TO OTHER AGENCIES AND TO THE COMPANY AT ANY LEVEL NOTHING IS LOST OR CHANGED IN THE TELLING, AND ALL USE THE SAME DATA BASE.

4) A RATIONAL BASIS IS ESTABLISHED FOR CALCULATING AREAS FOR BONDING PURPOSES AND FOR UPDATING OF SAME. A DIRECT RELATIONSHIP IS ESTABLISHED BETWEEN A COMPANY'S PERFORMANCE IN THE FIELD, AND THE COSTS WHICH ARE ASSESSED.

GOVERNMENT

WHAT DID WE LEARN REGARDING THE PRESENT STATUS OF RECLAMATION IN THE NORTH EAST COAL BLOCK?

WE LEARNED THE FOLLOWING:

1) 83 OF THE 212 LICENCES INVENTORIED (ABOUT 40%) HAD NO EXPLORATION WORK DONE ON THEM.
2) TOTAL DISTURBANCE AMOUNTED TO 408.7 HA. FOR AN ANVERAGE OF 3.2 HA. PER WORKED LICENCE.
3) NON MINING RELATED DISTURBANCE TOTALLED 256 HA. (SIESMIC FOR GAS/OIL EXPLORATION AND FORESTRY).

4) THE PRELIMINARY CONCLUSION FROM MEASUREMENT OF THE TOTAL DISTURBANCE IS THAT IT IS OF THE SAME RELATIVE MAGNITUDE AS THE FIGURES SUPPLIED BY THE COMPANIES, ALTHOUGH WE HAVE NOT REACHED THE END OF OUR COMPARISON AS OF YET. THE BEST APPLICATION OF THE INVENTORY SYSTEM MAY THEREFORE PROVE TO BE IN THE ESTABLISHMENT OF A RATIONAL SYSTEM WHICH HAS THE FLEXIBILITY TO RELEASE BONDING WHEN SPECIFIC WORK IS DONE RATHER THAN USING IT AS A CHECK OF CALCULATIONS SUBMITTED BY THE COMPANIES.

THE OPPORUTNITY SHOULD NOT BE LOST TO MENTION TO YOU AT THE CONCLUSION THAT WE NOW HAVE AN ANNUAL MINE RECLAMATION AWARD IN B.C. THIS IS PRESENTED AT

(SLIDE 33)

A RECLAMATION SYMPOSIUM WHICH IS SCHEDULED TO TAKE PLACE SOMETIME AROUND ST. PATRICK'S DAY.

(SLIDE 34R)

WE WOULD GUESS VERNON, B.C. MARCH 15 AND 16. LAST YEARS WINNER WAS KAISER RESOURCES LTD.

PROCEEDINGS

OF

THE SECOND ANNUAL GENERAL MEETING

OF THE

CANADIAN LAND RECLAMATION ASSOCIATION

August 17, 18, 19 & 20 — 1977 Edmonton, Alberta

(Sponsored by the Faculty of Extension, University of Alberta)

P R O G R A M

Canadian Land Reclamation Association

Second Annual General Meeting

August 17, 18, 19, 20, 1977

Edmonton, Alberta

Wednesday, August 17 (Optional Field Trips)

Field Trip No. 1 (Athabasca Tar Sands)

Leader: Philip Lulman (Syncrude Canada Ltd.)

Fee: $100.00 (covers bus and air transportation, lunch, and field trip information pamphlets)

Schedule: 7:30 a.m.- delegates board bus at Parking Lot T, located immediately south of the Lister Hall Student Residence complex. Air transportation from Edmonton Industrial Airport to Fort McMurray and return. Guided bus tour of surface mining and reclamation operations on Syncrude Canada Ltd. and Great Canadian Oil Sands Ltd. leases.
6:30 p.m.- delegates arrive back at Parking Lot T, University of Alberta campus.

Field Trip No. 2 (Aspen Parkland; Forestburg Coal Mine Reclamation)

Leader: George Robbins (Luscar Ltd.)

Fee: $25.00 (covers bus transportation, lunch, and field trip information pamphlets)

Schedule: 8:00 a.m. - delegates board bus at Parking Lot T, located immediately south of the Lister Hall student residence complex. Guided bus tour southeast of Edmonton, stopping at various points of interest (oil spill reclamation field plots; Black Nugget Park [abandoned minesite]; trench plots on Dodds-Roundhill Coal Field; solonetzic soil deep ploughing site) on the way to the Luscar Ltd. Coal Mine at Forestburg.
6:30 p.m. - delegates arrive back at Parking Lot T, University of Alberta campus.

Thursday, August 18

Events:	Opening of Formal Meeting; Presentation of Papers
Location:	Multi-Media Room, located on second floor of Education Building, University of Alberta.
8:00 a.m.	Authors of papers being presented on August 18 meet with paper presentation chairmen and audio-visual co-ordinator (Douglas Patching)
9:00 a.m.	Meeting Opened by Dr. Jack Winch (President of the C.L.R.A.; Head of the Department of Crop Science, University of Guelph). Comments by Dr. Winch.
9:15 a.m.	Welcome to delegates on behalf of the Government of Alberta by the Hon. Mr. Dallas Schmidt, (Associate Minister Responsible for Lands, Alberta Department of Energy and Natural Resources)
9:25 a.m.	Commencement of Paper Presentations. Morning session chaired by Mr. Henry Thiessen (Chairman of the Land Surface Conservation and Reclamation Council and Assistant Deputy Minister, Alberta Department of Environment).
9:30 a.m.	Paper 1. Combined Overburden Revegetation and Wastewater Disposal in the Southern Alberta Foothills by H.F. Thimm, G.J. Clark and G. Baker (presented by Harald Thimm of Chemex Reclamation and Sump Disposal Services Ltd., Calgary, Alberta).
10:00 a.m.	Paper 2. Brine Spillage in the Oil Industry; The Natural Recovery of an Area Affected by a Salt Water Spill near Swan Hills, Alberta by M.J. Rowell and J.M. Crepin (presented by Michael Rowell of Norwest Soils Research Ltd., Edmonton, Alberta)
10:30 a.m.	Coffee Recess
11:00 a.m.	Paper 3. The Interaction of Groundwater and Surface Materials in Mine Reclamation by Philip L. Hall of Groundwater Consultants Group Ltd., Edmonton, Alberta.
11:30 a.m.	Paper 4. Subsurface Water Chemistry in Mined Land Reclamation; Key to Development of a Productive Post-Mining Landscape by S.R. Moran and J.A. Cherry (presented by Stephen Moran of the Research Council of Alberta, Edmonton, Alberta).
12:00 noon	Lunch Recess

1:25 p.m. Continuation of Paper Presentations. Afternoon session chaired by Mr. Philip Lulman (member of C.L.R.A. executive; reclamation research ecologist with Syncrude Canada Ltd.).

1:30 p.m. Paper 5. Coal Mine Spoils and Their Revegetation Patterns in Central Alberta by A.E.A. Schumacher, R. Hermesh and A.L. Bedwany (presented by Alex Schumacher of Montreal Engineering Company Ltd., Calgary, Alberta).

2:00 p.m. Paper 6. Surface Reclamation Situations and Practices on Coal Exploration and Surface Mine Sites at Sparwood, B.C. by R.J. Berdusco and A.W. Milligan (presented by Roger Berdusco of Kaiser Resources Ltd., Sparwood, B.C.).

2:30 p.m. Paper 7. Agronomic Properties and Reclamation Possibilities for Surface Materials on Syncrude Lease #17 by H.M. Etter and G.L. Lesko (presented by Harold Etter of Thurber Consultants Ltd., Victoria, B.C.).

3:00 p.m. Paper 8. The Use of Peat, Fertilizers and Mine Overburden to Stabilize Steep Tailings Sand Slopes by Michael J. Rowell of Norwest Soils Research Ltd., Edmonton, Alberta.

3:30 p.m. Coffee Recess

4:00 p.m. Paper 9. Oil Sands Tailings; Integrated Planning to Provide Long-Term Stabilization by David W. Devenny of E.B.A. Engineering Consultants Ltd., Edmonton, Alberta.

4:30 p.m. Paper 10. Bioengineering. The Use of Plant Biomass to Stabilize and Reclaim Highly Disturbed Sites by H. Schiechtel and K. (Nick) Horstmann (presented by Margit Kuttler).

5:00 p.m. End of August 18 Sessions.

Friday, August 19

Events: Presentation of Papers; C.L.R.A. Annual General Business Meeting; C.L.R.A. Annual Dinner.

Locations: Paper presentations and C.L.R.A. Annual General Business Meeting in Multi-Media Room, located on second floor of Education Building, University of Alberta.
- Annual Dinner held in Banquet Room located on second floor of Lister Hall.

8:00 a.m. Authors of Papers being presented on August 19 meet with paper presentation chairmen and audio-visual co-ordinator (Douglas Patching).

8:30 a.m. Showing of Film Rye on the Rocks. This film depicts reclamation situations at Copper Cliff, Ontario and is being shown for the purpose of introducing delegates to the site of the 1978 C.L.R.A. meeting (Sudbury, Ontario).

8:55 a.m. Continuation of Paper Presentations. Morning session chaired by Dr. J.V. Thirgood (Vice-President of C.L.R.A.; member of Forestry Faculty, University of British Columbia).

9:00 a.m. Paper 11. Reclamation of Coal Refuse Material on an Abandoned Mine Site at Staunton, Illinois by M.L. Wilkey and S.D. Zellmer (presented by Michael Wilkey of the Argonne National Laboratory, Argonne, Illinois).

9:30 a.m. Paper 12. A Case Study of Materials and Techniques Used in the Rehabilitation of a Pit and a Quarry in Southern Ontario by Sherry E. Yundt of the Ontario Ministry of Natural Resources, Toronto, Ontario).

10:00 a.m. Coffee Recess.

10:30 a.m. Paper 13. Amelioration and Revegetation of Smelter-Contaminated Soils in the Coeur D'Alene Mining District of Northern Idaho by D.B. Carter, H. Loewenstein and F.H. Pitkin (presented by Daniel Carter of Technicolor Graphic Services Inc., Sioux Falls, South Dakota).

11:00 a.m. Paper 14. The Influence of Uranium Mine Tailings on Tree Growth at Elliot Lake, Ontario by David R. Murray of the Elliot Lake Laboratory, Elliot Lake, Ontario.

11:30 a.m. Paper 15. Weathering Coal Mine Waste. Assessing Potential Side Effects at Luscar, Alberta by D.W. Devenny and D.E. Ryder (presented by David Devenny of E.B.A. Engineering Consultants Ltd., Edmonton, Alberta).

12:00 noon Lunch Recess.

1:25 p.m. Continuation of Paper Presentations. Afternoon session chaired by Dr. John Railton, (Manager, Environmental Planning, Calgary Power Ltd., Calgary, Alberta).

1:30 p.m. Paper 16. The Distribution of Nutrients and Organic Matter in Native Mountain Grasslands and Reclaimed Coalmined Areas in Southeastern B.C. by Paul F. Ziemkiewicz of the Faculty of Forestry, University of B.C., Vancouver, British Columbia.

2:00 p.m. Paper 17. Systems Inventory of Surficial Disturbance, Peace River Coal Block, B.C. by D.M. (Murray) Galbraith of the British Columbia Ministry of Mines and Petroleum Resources, Victoria, British Columbia.

2:30 p.m. Paper 18. The Selection and Utilization of Native Grasses for Reclamation in the Rocky Mountains of Alberta by D. Walker, R.S. Sadasivaiah and J. Weijer (presented by David Walker of the Department of Genetics, University of Alberta, Edmonton, Alberta).

3:00 p.m. Coffee Recess; Distribution of Proceedings.

3:30 p.m. Commencement of 1977 General Business Meeting of the Canadian Land Reclamation Association. Meeting chaired by Dr. J.V. Winch, C.L.R.A. President.

7:30 p.m. Commencement of C.L.R.A. Annual Dinner in Banquet Room, second floor of Lister Hall.

Guest Speaker: William T. Plass, Principal Plant Ecologist, U.S.D.A. Forest Service, Northeastern Forest Experiment Station, Princeton, West Virginia.

Topic of Speech: Challenges in Co-operative Reclamation Research.

Note: Following the Annual Dinner and Mr. Plass's speech, delegates may retire to the adjacent Gold Room. A bartender will be on service until midnight.