Bendix

Contract NAS 5-21762

Bi-Monthly Progress Report

Reporting Period

1 November 1972 thru 1 January 1973

(E73-10003) ECOLOGICAL EFFECTS OF STRIP MINING IN OHIO Bimonthly Progress Report, 1 Nov. 1972 - 1 Jan. 1973 (Bendix Corp.) 5 p HC $3.00 CSCL 08I

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Prepared By: Bendix Aerospace Systems Division

Prepared For: NASA/Goddard Space Flight Center

Enclosure (1) to BxA
Letter 73-141-079
Contract #NAS 5-21762

Bi-Monthly Progress Report
Period 1 November 1972 - 1 January 1973

a. TITLE: Ecological Effects of Strip Mining in Ohio, GSFC PR 569, SR 309, Mr. Phillip Chase

b. Objectives:

1. To map the acreage stripped or otherwise disturbed by coal mining operations in southern and eastern Ohio.

2. To detect, identify, and map the secondary effects of coal mining operation (strip) on the environment. These include erosion, vegetative stress, and stress, and sedimentation in rivers and lakes. The effects of water drainage and mine acid seepage are also of interest.

3. To study the after-effects of mining operations and compare recovery time and effectiveness with which mined areas are restored to usefulness.

4. To investigate the feasibility to transfer of knowledge gained by this study of Ohio to other strip mining regions of the U.S.

c. There are no problems impeding the progress of the investigation.

d. Accomplishments

(1) Maps of stream water quality as measured by hardness, pH, dissolved iron, sulfate, chloride, and total dissolved solids are completed.

(2) Maps of thickness of coal deposits are completed.

(3) Imagery of the test area and corresponding CCT's were received during the reporting period. The initial comparison of the ERTS-1 imagery to air photos (one year old) indicates that the stripped areas are easily monitored by ERTS-1. Stages of reclamation are not as readily observable. However, probability density of stripped areas obtained from processing of the CCT's is expected to sort out various stages of reclamation.

(4) Probability density has been developed from the CCT's for another test site and task. In addition 70 mm strip images of the scene can be produced for each band from the CCT's.

(5) The quick look interpretation of strip mining and other geological and hydrogeological features of the initially received ERTS-1 imagery has been completed for Southeastern Ohio and the final report is in process.

(6) Activities planned for the next reporting period are:

(a) Prepare and submit Type II reports of (1) Initial interpretation of imagery and (2) a narrative history of strip mining in Ohio.

(b) For a minimum of two strip mines (probably in Coshocton County) prepare a series of graphics which includes air photos, ERTS-1 images in the four bands and overlays, probability density cal comp plots of standing water, bare soil, 50% (very approximate) reclaimed, and 100% reclaimed areas, and strip imagery of the probability density for the classifications.

(c) Prepare and use software that corrects processed CCT cal comp probability density plots geometrically for curved earth, scanner attitude errors, and earth's rotation. The intention is to produce maps corrected as nearly as possible to ERTS-1 bulk imagery.

(d) Prepare a presentation for the March symposium.

e. One result significant as a practical application and for cost-benefit analysis is the relative ease with which ERTS-1 will monitor new and unclaimed stripping activities in Southeastern Ohio and in all of Appalachia.

The width of new or unreclaimed stripped areas are listed below by band numbers. This measurement is obtained from comparison to air photos. The photographic enlargement of ERTS-1 is 1:500,000, which is smaller than that possible electronically or even in scale photographically. This size is comfortable for a photo interpreter to work with for preliminary interpretation and training site selection from the whole test site.

Minimum Dimension of Strip Mines by Band
(Width of a stripped contour in feet)

Band 4	Band 5	Band 6	Band 7
400	200	800	800

Band 5 "resolution" appears to be better than the often reported 80 meters. The strip mines stand out well enough to be easily identified without other graphic aids (photos or maps). Since the shape is quite distinctive, monitoring of other areas in Appalachia without other graphic aids appears possible for a trained photo interpreter.

Standing water within the strip mined area stands out in either bands 6 or 7. Areas of several acres are visible. Significant increases in surface extent of water in stripped areas should be detectable on a comparative basis. However, geometric control in the change detection process would have to be carefully maintained.

The degree of reclamation is observable in the imagery in rather gross percentage steps and for areas larger than the bare earth sizes in the table. The gradation in tones in the different bands indicates that probability density imagery using the four bands in CCT data (and statistical processing) is likely to separate degrees of vegetative reclamation.

f. No release of information or requests for permission to release information have been made during the reporting period.

h. There has been changes in the standing order form over the period. The changes are listed in a letter to the Technical Monitor dated 21 November 1972.

i. ERTS Image Descriptor Forms are attached.

j. Retrospective Data Forms are attached covering the reporting time period.

k. Work to date conforms to schedule (Item C in paragraph 3.1 of spec 5-250-P-1C)

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D
N
ID

DATE 12 January 1973

PRINCIPAL INVESTIGATOR Phil Chase

GSFC PR 569

ORGANIZATION Bendix Aerospace Systems Division

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS* Strip Mines			DESCRIPTORS
1029-15354M	✓			
1029-15361M	✓			
1030-15412M	✓			
1030-15414M	✓			
1048-15414M	✓			

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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