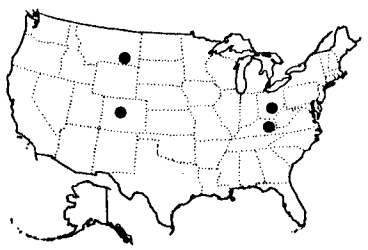
TECHNICAL ASSISTANCE

Experimental Practices

Research is vital in the development of new techniques to improve the state-of-the-art in surface mining, reclamation, revegetation, abandoned mine, and other engineering and scientific advancements required for OSM activities. Experimental practices determine the feasibility of using the new techniques under actual field conditions. OSM approves experimental projects involving practices to determine possible applications and practical values of the techniques produced by the various research and development efforts. Some of these practices were not only successful, but produced useful by-products.

Among the four projects are an experimental practice for a technique which will allow operators to vary from the approximate original contour rules for highwall elimination, a project studying methods for removal of spoil from the mine site, an experiment for varying from the four-foot level buildup for excess spoil, and an effort to determine a variance in the disposal method for excess spoil.



FY 1982 EXPERIMENTAL PRACTICES

Small Operator Assistance Progra

The small operators assistance program (SOAP) is designed to assist small mine (less than 100,000 tons per year) operators with initial technical support. This support entails determining probable hydrologic consequences and gathering results of test boring and core samplings. In 1982, 1,437 operators applied for assistance, and 395 were approved.

The regulatory authority assumes the costs of these testings which are performed by qualified public or private laboratories. In Fiscal Year 1982, 423 SOAP contracts were approved totaling approximately $10.6 million.

In line with the regulations which delegate SOAP responsibilities to States, 20 States were operating their own SOAP programs. These States awarded contracts with qualified laboratories totaling $9.6 million.

Technical Informatio Assistance

During the fiscal year the agency's technical information staff completed the first projects developed to aid OSM field operations, State regulatory agencies and surface coal mine owners.

This included completion of the "Permanent Program Regulation Notebook" which contains all the original regulations, approved revisions, and proposed changes. Monthly addenda are issued in order that the user will have up-to-date information on the status of the Federal and State regulations in one comprehensive publication.

OSM also started to produce and distribute technical reports and manuals to OSM offices, State regulatory agencies, and surface coal operators. These publications, prepared by OSM or by contractors for the agency, contain scientific and technical information based on research and development programs or the state-of-the-art practices in completing various surface mining or reclamation work in compliance with the regulations.

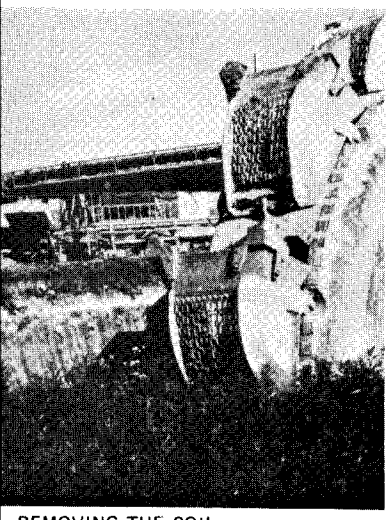
Mixing Of Soil Horizons Experimental Practice

Section 711 of the Surface Mining Act allows exemption from compliance with the performance standards. This exemption is allowed on an experimental basis, to encourage advances in mining and reclamation technologies.

An experiment was conducted under OSM supervision by the Southwestern Illinois Coal Corporation near Pinkneyville, Ill. The company proposed that instead of replacing the original topsoil, the top 10 to 15 feet of earth be mixed. One of the problems was the layer of compacted soil known as "hard pan" which prevented any plant root penetration. The experimental practice eliminates this hard pan by breaking it up and mixing it with the other soil.

The technique was based on scientific studies and demonstrated in the laboratory. The idea of mixing soil layers from different horizons after surface mining activities was first identified by German scientists. Their experiments indicated by mixing B, and C soil horizons crop production would increase.

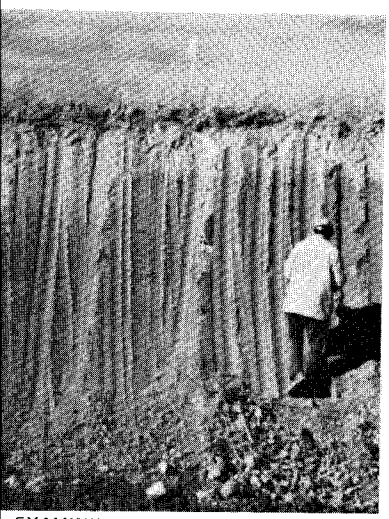
This basic research was then extended when the mining company contacted scientists at the University of Illinois. Working under the direction of Dr. Ivan Jansen, agronomists conducted greenhouse experiments, using soil from different horizon levels at the Captain Mine site, and determined the mixture would out-perform the standards in both standing crop growth rate and pod weight established by the rule.



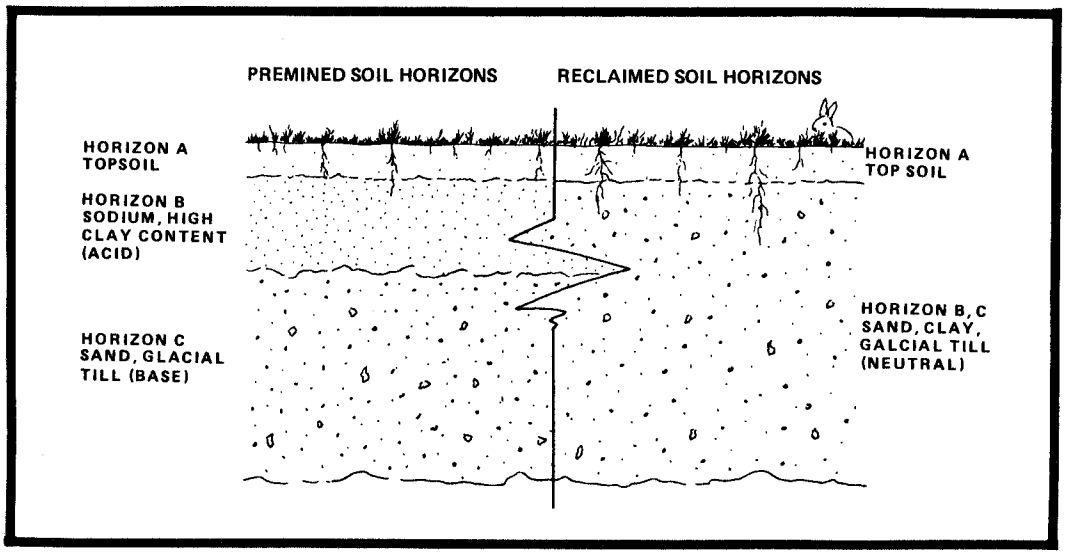
REMOVING THE SOIL

As laboratory or greenhouse conditions are not substitutes for actual field results, the coal company filed a request for an exemption to test the results on a 100-acre section. Department of the Interior and OSM officials then approved the plan.

The coal company extended their efforts beyond the soil experiment technique. Two recognized soil-related problems are the compacting of the soil when heavy earth-moving equipment is used and the deterioration of the soil while it remains stockpiled. Two unusual concepts were used to eliminate these problems. First, they used a bucket wheel excavator and conveyors which simultaneously removed



EXAMINING THE SOIL HORIZONS

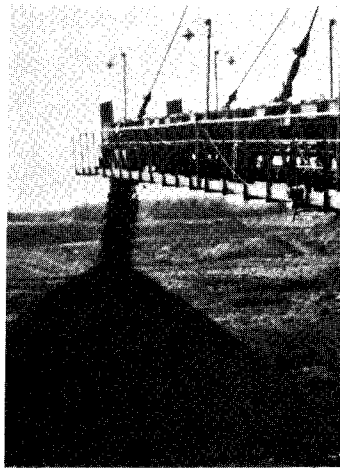


the top layer of soil along with the earth to a depth of 10 to 15 feet and transported it to where it would be used. The machine, which combines earth digging, conveyor belt, soil grinding, and earth distribution machinery, is over 200 feet long, about 40 feet wide, over 50 feet high, and distributes already mixed soil to the final site without soil bacteria and fungus buildup.

The second technique used machinery with very low soil compaction results due to the low ground pressure of the equipment. The complex spreader and the other equipment used consist of light rubber-tired machines which have minimal weight effect on the soil. In this case a mine site becomes a large outdoor laboratory.

The outdoor laboratory follows the disciplines exercised in research facilities. Conventional soil processing techniques are being used at an adjacent site to substantiate the results by comparing the new technique with the old.

Initial work has indicated there will be definite growth improvement in the vegetation planted in the reclaimed areas. If the final reports are as encouraging, not only will the mining industry gain a new technique, but the agriculture industry will be able to improve the ever important crop growth for the Nation's food supply.



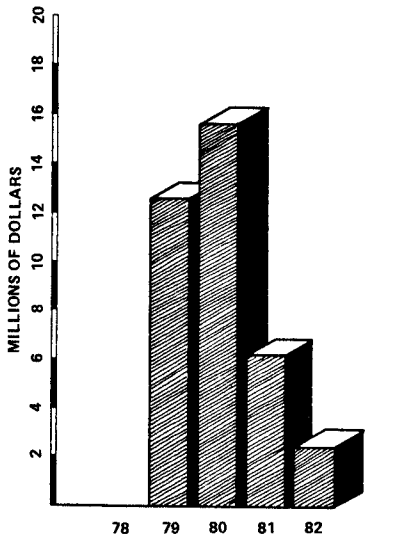
TRANSPORTING THE MIXED SOIL

TILLING THE RECLAIMED SOIL

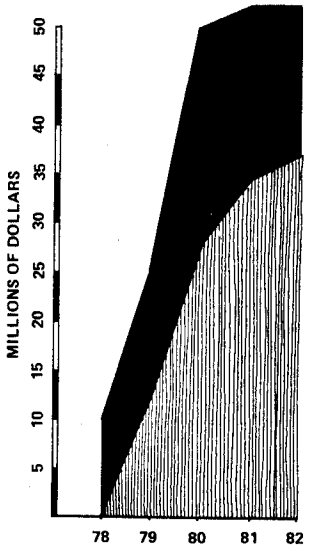
BUCKET-WHEEL EXCAVATOR REMOVING THE TOPSOIL

COMBINING ON THE RECLAIMED LAN

Small Mine Operators Assistance Program: Grants To States



FY 1978 - 1982 TOTAL GRANTS TO STATES



FY 1978 - 1982 CUMULATIVE APPROPRIATIONS/GRANTS

UNSPENT APPROPRIATED FUNDS (AML AND R & T)
TOTAL GRANTS

STATE	ADMINISTRATION GRANTS FY 1982	OPERATIONAL GRANTS FY 1982	TOTAL GRANTS FY 1978 - 1982
ALABAMA	35,170	0	3,684,442
ARKANSAS	0	0	70,323
COLORADO	0	0	269,182
ILLINOIS	0	0	944,500
INDIANA	0	$1,500,000	1,500,000
IOWA	0	0	67,040
KANSAS	0	0	10,500
KENTUCKY	158,542	0	16,532,401
MARYLAND	0	0	706,523
MISSOURI	0	0	138,000
MONTANA	0	0	71,073
NEW MEXICO	0	0	100,000
OHIO	40,135	0	3,492,134
OKLAHOMA	0	0	223,600
TENNESSEE	0	750,000	750,000
VIRGINIA	0	0	2,129,178
WEST VIRGINIA	0	0	6,327,809
TOTAL	$233,847	$2,250,000	$37,016,705

James R. Schoolfiel SOAP Grant

In September 1981, James R. Schoolfield submitted a SOAP application for his proposed 40 acre mine site near Pikeville, Tennessee. Known as the H & S Coal Company Site Number 3, the site is expected to produce 20,000 tons of coal per year. Schoolfield's application was approved by OSM in October 1981.

OSM approved the necessary reports and work statements which allowed contracts to be awarded to Commonwealth Technology Inc. (CTI), and Environmental Planning Engineers (EPE).

CTI was selected to collect data and report on the geological and overburden material. EPE was responsible for collecting hydrological data and preparing a report determining probable hydrological consequences of the proposed mining operation.

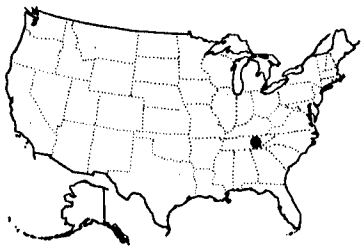
The report on geological and overburden characteristics provides data for acidic, toxic or alkaline chemicals present and whether they require special processing during the mining and reclamation activities. The hydrologic report provides data on baseline characteristics, groundwater and surface water flow and quality under seasonal conditions. It also provides an impact projection of proposed mining operations on these baseline conditions.

Schoolfield received copies of the statement and copies of the contracts between OSM and the two commercial firms. These copies allowed Schoolfield to track the progress and gave him the opportunity to become involved in the technical analysis.

CTI and EPE submitted their draft of the geology and overburden report to OSM. After technical revision, this report was returned to CTI and EPE. Under the permanent State regulatory program, these reports were incorporated into the operators permit application.

Schoolfield received the revised technical information reports 14 months after his original application.

There had been no previous hydrologic data collected for the site and it required six months of sampling to complete the data requirements. Schoolfield modified his mining and reclamation plan to eliminate potential problems.



PIKEVILLE, TENNESSEE

MEASURING STREAM FLOW

RECLAMATION RETURNS A SURFACE MINING SITE TO A PEACEFUL SCENE

RESEARCH

Technical Services and Research concentrates on managing research efforts conducted by the Office of Surface Mining (OSM) and other related research and development projects in conjunction with State and Federal agencies. These research projects, started in FY 1982, deal with short- and long-range solutions to problems related to surface mining regulatory programs and abandoned mine reclamation scientific and engineering studies. New and continuing research efforts for the 1982 fiscal year amounted to more than $2 million for 27 projects.

OSM's research staff is currently working in several areas to improve surface mining reclamation requirements and techniques. 1982 studies and projects included:

- Subsidence, one of the major abandoned mine problems which occurs when the overburden collapses into old underground mines. These studies include prediction methods, prevention techniques, and correction or reclamation solutions.

- Evaluating reconstructed soil for rooting characteristics and determining the proper species for successful revegetation.

- Determining when highwalls may be left, in whole or in part, which would reduce the environmental disruption time.

- Developing different highwall removal techniques to determine which methods would substantially reduce the environmental impact.

- Haul road reclamation and construction methods which would allow for minimum reclamation for the local water and earth resources after the access routes are no longer required.

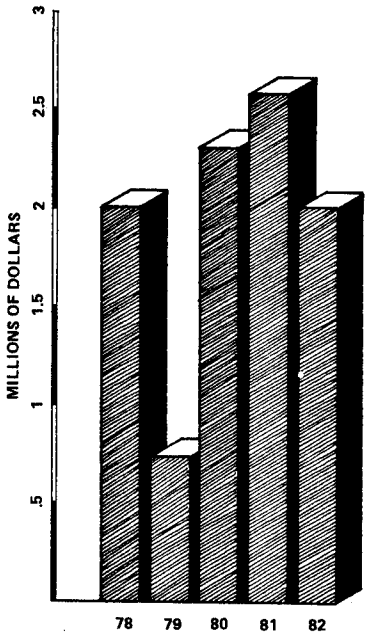
- Investigating the potential of using satellite infrared thermal photograpic techniques to locate and identify actual and potential "hot spots" and indicate underground mine fires for emergency or future abandoned mine reclamation action.

- The use of aerial photography to obtain data on areas of large-scale reclamation activities in order to determine the most cost effective procedures for corrective action and final reclamation.

- Incorporating abandoned benches, or steps of earth, into valley-fill operations to eliminate blighted landscape areas and to allow the land to achieve an appearance comparable to the adjacent countryside.

New And Continuing Applied Research Projects

Project	FY'81 Funding	FY'82 Funding	Estimated Completion Date
Development of Design Manual for Backfilling and Grading of Surface Coal Mine Areas	$76,424	--	3/83
Development of Environmental and Design Manual for Disposal of Excess Coal Mine Spoil	79,300	--	1/83
Coal Waste Leachate Problems	12,856	--	5/83
Effects of Drill Stem Grease on Overburden Samples	18,620	--	1/83
Collection of Representative Coal Refuse Samples for Leachate Generation Studies	45,767	--	3/83
Highwall Stability Analysis	24,192	--	1/83
Hydrologic Connection Between Surface Waters and Ground Waters in the Carbondale Group of Indiana Counties	25,594	--	1/83
Design Manual for Sediment Control	--	$48,000	3/83
State of the Art in Alleviating Compaction	--	60,000	1/84
Improvement of Overburden Analytical Technology	--	165,000	9/84
Subsidence Damage Criteria	--	72,624	9/83
Regional Alluvial Valley Floor Assessment	--	99,762	3/83
The Effect of Controlled Overburden Placement on Mine Soil Properties	--	49,120	6/83
TOTAL	$282,753	$494,506	



FY 1978 - 1982 RESEARCH FUNDING

Interagency Research Projects

Project	Cooperating Agency	FY'81 Funding	FY'82 Funding	Status
TUG FORK HYDROLOGIC STUDY	USGS	97,050	109,500	Cancelled
FEDERAL HIGH ALTITUDE PHOTOGRAPHY PROGRAM	USGS	95,000	95,000	Continuing
STONY FORK HYDROLOGY STUDY	USGS	40,000	20,400	Cancelled
ESTABLISHMENT OF COOPERATIVE STATEWIDE FISH AND WILDLIFE SPECIES INFORMATION SYSTEM	FWS	400,000	--	Complete 10/83
SEDIMENT/HYDROLOGY ON 18 SMALL WATERSHEDS OF THE APPALACHIAN PLATEAU: MARYLAND, PENNSYLVANIA AND WEST VIRGINIA	TVA	225,000	100,000	Complete 10/84
CUMULATIVE HYDROLOGY IMPACT INFORMATION	USGS	--	275,000	Complete 3/83
CORE PROGRAM SUPPORT	NAS	55,000	55,000	Continuing
OPTIMUM MOISTURE REQUIREMENT FOR THE ESTABLISHMENT OF NATURAL SPECIES ON TOPSOILED COAL MINE SPOILS IN THE FOUR CORNERS AREA OF NEW MEXICO	USDA/FS	168,000	120,000	Complete 9/84
GROUND-WATER (GEORGIA)	TVA	48,000	--	Complete 4/83
PENNSYLVANIA FISH AND WILDLIFE DATABASE	State of PA	--	5,000	Continuing
EFFECTIVENESS OF OSM REGULATION IN PREVENTING GROUND-WATER CONTAMINATION	EPA	--	70,000	Complete 12/83
CONCEPTS OF HIGHWALL REMOVAL AND APPROXIMATE ORIGINAL CONTOUR RESTORATION	NAS	--	200,000	Complete 3/83
AERIAL PHOTOGRAPHY	TVA	--	90,000	Complete 12/83
SAMPLING PROCEDURES FOR VEGETATION	State of ND	--	47,548	Complete 9/83
REMOTE SENSING SUPPORT OF AML PROJECTS	USFS	--	15,000	Complete 9/84
PLANT MATERIALS STUDY TO IDENTIFY PLANT ASSOCIATIONS SUITED TO COAL MINE RECLAMATION	USDA	92,000	92,000	Complete 12/84
TOTAL		$1,220,050*	$1,294,448	

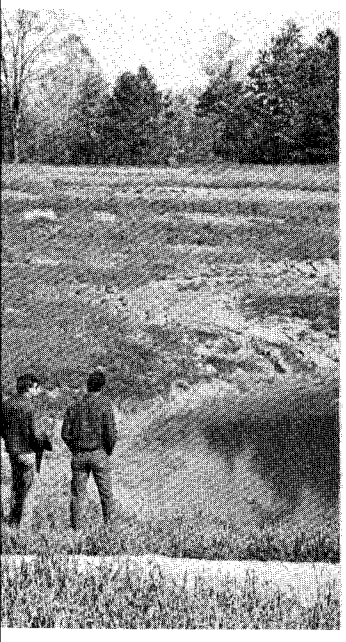
*INCLUDED ONLY PROJECTS THAT CARRIED OVER INTO FY 82

Planning And Management Of Mine-Cut Lakes Project

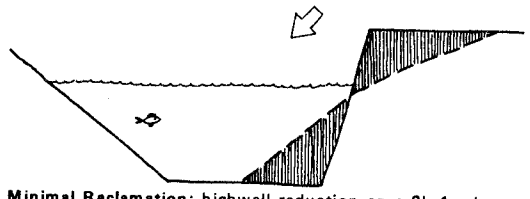
One of the Office of Surface Mining (OSM) research projects carried out during the year was the final cut lake study conducted by OSM, a private contractor, representatives from the coal industry, various government agencies, public interest groups, coal associations, academic participants, and independent consultants.

This project researched the feasibility of developing final mine cuts into valuable permanent water facilities. These lakes are being developed at surface mining sites across the country. The reclamation cost of providing recreational or natural wildlife habitat lakes and surrounding watershed features is a feasible alternative for postmining land use and can be developed at a fraction of the ordinary reclamation technique costs.

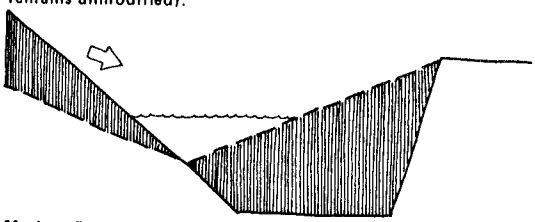
The research project resulted in the development of physical, chemical, and biological techniques aimed at producing lakes for fish and wildlife, recreation, water supply, and other purposes. Criteria used in the development of these techniques included: the economic feasibility of new lakes, adjoining land use compatability, fish and wildlife requirements, and existing lake-design concepts.



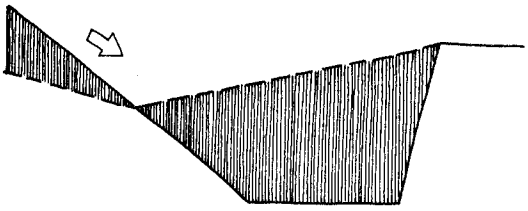
INSPECTING A MINE-CUT LAKE



Minimal Reclamation: highwall reduction on a 2h:1v slope to 6 feet below water line, resulting in a large, deep mine-cut lake (spoil slope remains unmodified).



Modest Reclamation: highwall and spoil modified to a 2h:1v slope, resulting in a small, shallow mine-cut lake.



Full Reclamation: highwall and spoil modified to a 5h:1v slope, resulting in a return to dry land (assuming shallow depression will drain).

APPROACHES TO MINE-CUT BACKFILLING WITH A GIVEN PIT CONFIGURATION AND WATER TABLE ELEVATION

The economic considerations were based on initial cost factors. Consideration was made for maintenance costs and, in the case of wildlife habitats and recreational areas, for stocking and upkeep costs for recreational facilities.

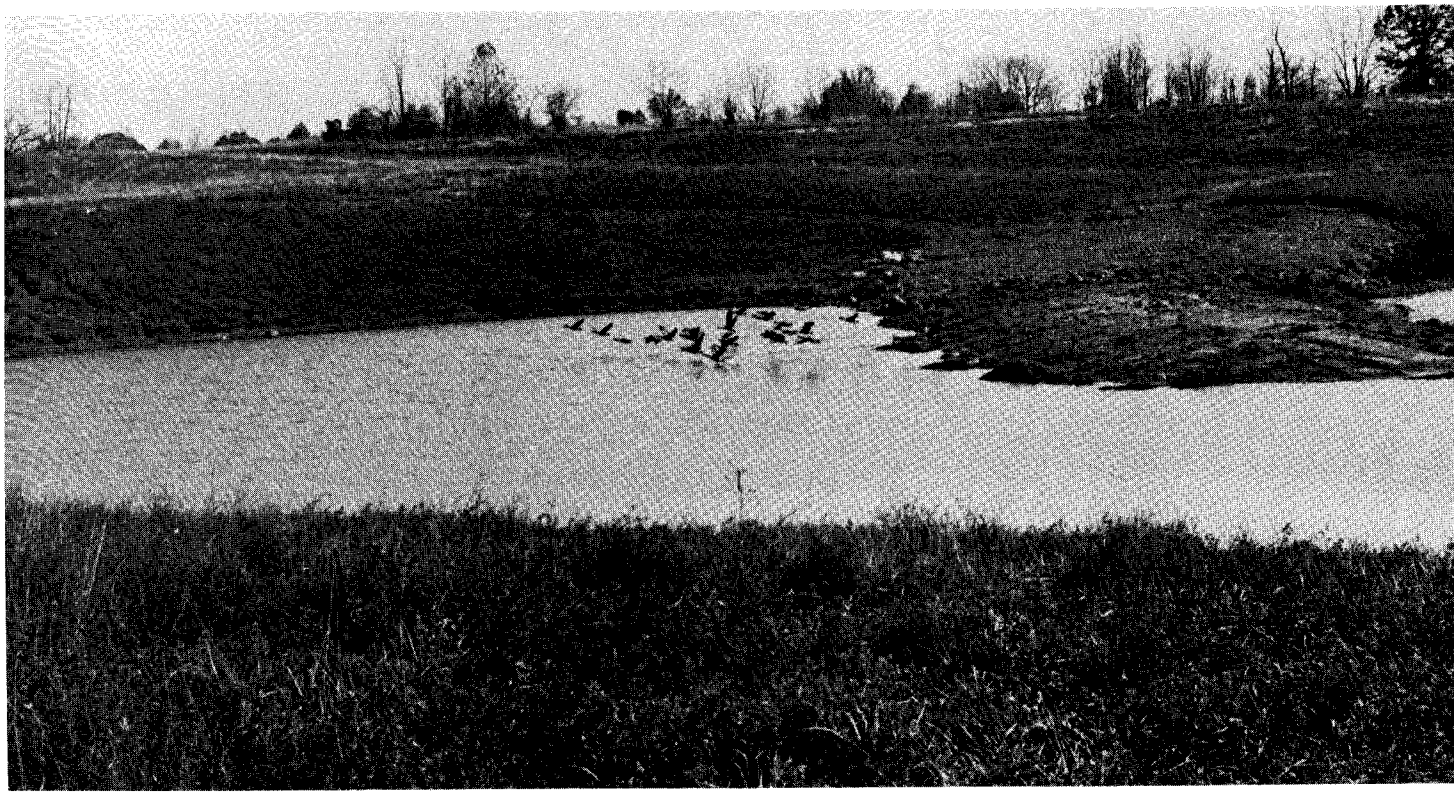
The compatability for various uses requires research as to possible conflicts between the physical characteristics of the site and the of the anticipated final use. For example the hydrologic characteristics of the reclaimed site influence the elevation of water in the lake.

Primary use factors include special considerations required for fish and wildlife, water recreation, agriculture, or water supply. The various groups in the research study developed standards to determine the best application for a particular site.

Feasibility studies were developed to evaluate the planned use consistent with locally established policies and trends. Another part of the project developed lake design concepts for application by surface mine operators.

Based on the research study, a comprehensive collection of data, required for mine-cut lake construction or restoration, is now available for government agencies, mining companies, environmental groups, and citizens interested in improving their surroundings.

Photos courtesy R. Wayne Nelson & Associates



CANADA GEESE INHABITING A PENINSULA IN A 30-FOOT DEEP LAKE BUILT AT THE OLD BEN NO.2 MINE IN PIKE COUNTY, INDIANA

OSM INSPECTOR EXAMINING AN AGRICULTURE POSTMINING LAND USE.