

089946

B-114850

RESTRICTED - For use only by the General Accounting Office
Accounts of the Tennessee Valley Authority, a record of which is kept
by the Office of the Comptroller General of the United States, U.S.
8-9-72



RELEASED

Opportunities For Improvements In Reclaiming Strip-Mined Lands Under Coal Purchase Contracts

B-114850

Tennessee Valley Authority

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

089946

913597

AUG 9 1972



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D C 20548

B-114850

Dear Mr. Hechler

This is our report on opportunities for improvements in reclaiming strip-mined lands under Tennessee Valley Authority coal purchase contracts. Our review was undertaken pursuant to your request of August 17, 1971.

Color photographs illustrating some of the conditions described in this report are enclosed in the envelope on the inside back cover.

We plan to make no further distribution of this report unless copies are specifically requested, and then we shall make distribution only after your agreement has been obtained or public announcement has been made by you concerning the contents of the report.

Sincerely yours,

A handwritten signature in black ink that reads "James B. Stacks".

Comptroller General
of the United States

The Honorable Ken Hechler
House of Representatives

GAO note The photographs mentioned above are not included
 in this copy of the report

C o n t e n t s

		<u>Page</u>
DIGEST		1
CHAPTER		
1	INTRODUCTION	5
	Methods of strip mining	6
	Types of coal purchase contracts	7
	TVA's reclamation requirements	10
2	ADEQUACY AND ENFORCEMENT OF TVA'S RECLAMATION REQUIREMENTS	13
	Limitations on mining on steep slopes	15
	Grading requirements after contour strip mining	17
	Factors affecting successful revegeta- tion	20
	Problem of excess soil acidity	20
	Other problem areas	22
	Need for achieving timely contractor compliance with reclamation require- ments	23
	Need for a more effective inspection program	26
	Conclusions	29
3	OTHER RECLAMATION PROBLEMS	31
	Reclamation of orphan lands	31
	Lack of uniform reclamation standards	32
APPENDIX		
I	Letter dated August 17, 1971, from Congress- man Ken Hechler to the Comptroller General of the United States	35
II	TVA's 1965 reclamation requirements	37
III	TVA's 1968 reclamation requirements (paragraph g)	39
IV	TVA's 1970 reclamation requirements	40

APPENDIX

Page

V	TVA's 1971 surface mining reclamation and conservation requirements	43
VI	TVA's statement on background information on the development of TVA reclamation policies	53

ABBREVIATIONS

GAO	General Accounting Office
TVA	Tennessee Valley Authority

CHAPTER 1

INTRODUCTION

At the request of Congressman Ken Hechler (see app. I), the General Accounting Office (GAO) reviewed the administration of the land reclamation requirements of the Tennessee Valley Authority (TVA) for contractors which strip (surface) mine under TVA coal purchase contracts. Our review was concerned mainly with the adequacy of TVA's reclamation requirements under such contracts and the extent to which such requirements were enforced. We did not examine into the desirability of strip mining as a method of extracting coal.

TVA is the Nation's largest producer of electric power and its largest consumer of coal. It generates, transmits, and sells power to 161 distribution systems, 46 industries which have large or unusual power requirements, and 11 Federal installations.

In calendar year 1970 TVA purchased more than 33.6 million tons of coal for generating power at its 11 steam plants. About 53 percent of that amount came from strip mines and represented about 13 percent of the total strip-mined coal produced in the six States where TVA bought coal.

The following table shows the total production of coal in calendar year 1970 in the six States where TVA purchased strip-mined coal, the quantity of that coal produced through strip mining, and the quantity and percentage of each of the State's production of strip-mined coal purchased by TVA.

<u>State</u>	<u>Total production of coal</u>	<u>Total strip-mined coal</u>	<u>Strip-mined coal purchased by TVA</u>	
			<u>Quantity</u>	<u>Percent of State's production</u>
		(tons)		
Alabama	20,560,000	11,482,000	798,813	6 96
Illinois	65,119,000	33,026,000	333,826	1 01
Indiana	22,263,000	20,169,000	190,462	94
Kentucky	125,305,000	62,695,000	14,121,885	22 52
Tennessee	8 237.000	3,886,000	2,344,016	60 32
Virginia	<u>35,016,000</u>	<u>6,998,000</u>	<u>137,263</u>	1 96
Total	<u>276,500,000</u>	<u>138,256,000</u>	<u>17,926,265</u>	12 97

METHODS OF STRIP MINING

There are two primary methods of strip mining--area and contour. Area strip mining is done on relatively flat terrain. Through the use of earthmovers, such as bulldozers and large power shovels, the operator digs an initial trench or pit by removing the overburden (earth, rock, and other materials which lie above a coal deposit) to expose part of the coal deposit. As each succeeding parallel pit is made, the overburden is deposited in the pit previously excavated. The last pit is usually left unfilled with an exposed high-wall (vertical cliff) which is as high as the thickness of the overburden and the coal removed, and the pit often fills with water. Thus, unless the terrain is graded and leveled, area strip mining produces ridges similar to a great concentration of small hills, as shown in the following photograph.



Scene in Jackson County, Ala , of ridges resulting from an area strip-mining operation prior to any grading

Contour strip mining, most commonly practiced where coal deposits are in rolling or mountainous terrain, consists of removing the overburden above the coal seam and creating a shelf or bench on the hillside bordered by a

highwall which may exceed 100 feet. The overburden, removed by bulldozers and large power shovels, generally is cast over the side of the hill or stockpiled on the outermost part of the bench. Much of the overburden stockpiled on the bench slides down the hill as it is loosened by rain and by the freezing and thawing weather cycles. Unless controlled or stabilized, the discarded overburden (spoil) can cause severe erosion and landslides. The following photograph shows a mountainous area where contour strip mining has been used



Scene in Campbell County, Tenn , of the results of a contour strip-mining operation

Strip-mining operations have been the subject of intense controversy in the United States because of their effect on the environment through acid pollution and destruction of the soil, land erosion, landslides, sedimentation in streams, deterrence of vegetation and wildlife, and unsightly scarring of mountainous terrain

TYPES OF COAL PURCHASE CONTRACTS

TVA purchases coal from strip-mine sources under three types of contracts--term, emergency, and spot--depending

- 125 -

upon the length of the contract period. Term contracts, awarded on the basis of competitive bids, must be for a minimum of 6 months and must require a production level of not less than 500 tons a week and a total commitment of at least 25,000 tons. Term contracts account for most of TVA's coal purchases. Emergency contracts, awarded through negotiation, are usually for periods up to 6 months, although some are for several years. Spot contracts, awarded on the basis of competitive bids, are for periods of 4 weeks or less. In calendar year 1970 TVA purchased 85 percent of its coal under term contracts, 13 percent under emergency contracts, and 2 percent under spot contracts.

TVA began including reclamation requirements in all of its term contracts for strip-mined coal in 1965. It has included the requirements in emergency contracts on a judgmental basis since 1965. The major fact influencing such a judgment was the length of the contract period. All active emergency contracts contain reclamation requirements. Since September 1971 TVA has included reclamation requirements also in spot contracts. In the 3-month period ended November 1971, TVA awarded 81 spot contracts which included the reclamation requirements.

TVA's coal purchase contracts are awarded, administered, and enforced by its Division of Purchasing, Fuels Procurement Branch, in Chattanooga, Tenn. Inspection of mining operations and reclamation activities is done by TVA's Division of Forestry, Fisheries, and Wildlife Development, Forest and Habitat Revegetation Section, in Norris, Tenn., near the area in which the greatest amount of mountain strip mining occurs. This section has a supervisor and five inspectors to inspect reclamation work performed by contractors under TVA coal purchase contracts.

From 1965 through November 1971, TVA awarded 329 coal purchase contracts which contained reclamation provisions. During that period it awarded some emergency and spot contracts which did not contain reclamation requirements. At the time of our review, however, all active contracts contained reclamation requirements. The following schedule shows the types and status of the 329 contracts as of December 1, 1971.

<u>Type and status of contracts</u>	<u>Number of contracts</u>	
Term and emergency:		
Active mining	56	
Deliveries completed but contractor not released from reclamation re- quirements	166	
Deliveries completed and contractor released from reclamation require- ments	<u>26</u>	248
Spot (all since September 1971)		<u>81</u>
Total		<u>329</u>

TVA'S RECLAMATION REQUIREMENTS

The reclamation requirements formulated by TVA in 1965 were that the contractor was (1) to bury all toxic materials, (2) to keep the drainage free of spoil and to control water runoff, (3) to grade the spoil banks to provide for revegetation, (4) to revegetate the stripped areas, and (5) to complete required reclamation work within 24 months after the delivery of all the coal supplied under the contract. Included in the provisions were the following broad, general phrases "as closely as practicable following the mining operation," "as necessary," and "to the maximum extent practicable." The 1965 provisions are included as appendix II.

In February 1968 TVA modified its reclamation requirements to add a paragraph (paragraph g) on the prevention of landslides. (See app. III.) All other requirements of the 1965 provisions remained the same.

In December 1970 TVA again modified its requirements (1) to prohibit mining within 100 feet of any stream channel, (2) to require additional grading to improve the general appearance of the mine area, (3) to require scalping (removing organic material on the original slope) and to control bench width, (4) to prohibit mining on slopes steeper than 28°, (5) to specify revegetation requirements, including hydroseeding (the sowing of grasses, shrubs, and trees by spraying a solution of the applicable seeds, fertilizers, mulch, and water on the land to be planted), and (6) to require construction of silt basins in drainage channels below mining operations, to help control siltation. (See app. IV.)

In December 1971 TVA adopted new strip-mine reclamation and conservation requirements. Under these requirements TVA will not award any contracts unless the bidder has previously submitted to TVA a mining plan of the area from which the coal being bid on will be mined. The plan must meet all of TVA's reclamation and conservation requirements. In addition, TVA will have the contractual right to prohibit mining in certain areas where serious reclamation, pollution, or esthetic problems would be encountered.

TVA also modified its reclamation requirements by adding more stringent provisions and by stating more specifically

previous requirements that had been stated generally. For example, such terminology as "to the extent practicable" and "as necessary" was eliminated. The major modifications included specification of

- criteria for road building;
- limitations on slope steepness, bench widths, scalping, and handling of spoil materials;
- burial of toxic materials to a minimum depth of 4 feet,
- time schedules for grading and backfilling;
- the types of and time schedule for planting trees and grasses;
- the amounts of seed and fertilizer to be used; and
- criteria for determining a seeding or planting failure.

Also the December 1971 reclamation provisions require the establishment of a reclamation account equaling 2 percent of the face value of a contract during its first year, or 3 percent in the case of contracts of less than a year. TVA will hold the funds in this account until such time as its reclamation requirements have been fully satisfied, or TVA may use the funds to perform reclamation itself if the contractor fails to satisfy the contract reclamation requirements. In the event that reclamation costs exceed the amount covered by the contractor's reclamation account, the contractor remains liable for all excess costs. (See app. V.)

A TVA official stated that TVA was attempting to renegotiate the inclusion of the new reclamation provisions into all contracts expiring after June 1972. The expiration dates are the dates on which the final coal deliveries are to be made.

We examined contract and inspection records and visited the strip-mine sites for 25 selected coal purchase contracts. The basis for our selection is described in the next chapter.

TVA personnel accompanied us on our visits to the 25 mining sites. We interviewed TVA officials and discussed strip mining and reclamation with mine operators in Tennessee and with directors of the reclamation divisions in the States of Kentucky, Tennessee, Pennsylvania, and West Virginia.

TVA furnished us with its comments on the matters discussed in this report and with a statement of background information (see app. VI) on the development of its reclamation policies. We considered TVA's comments in preparing this report.

CHAPTER 2

ADEQUACY AND ENFORCEMENT OF TVA'S RECLAMATION REQUIREMENTS

In 1959 TVA joined the Tennessee Department of Conservation and Commerce in a strip-mine survey in Tennessee; since 1960 TVA has worked with State officials of all the coal-producing States in the Tennessee Valley region in developing and supporting State legislation to regulate strip mining.

TVA's view is that, to have adequate reclamation of strip-mined areas, States must enact and enforce stringent reclamation legislation to conform to each of the respective States' unique combination of geologic, topographic, economic, and social conditions. However, because only three of the six States where TVA purchased coal had enacted strip-mining reclamation legislation by 1965, TVA established reclamation requirements for inclusion in its coal purchase contracts.

By 1969 all six States had enacted legislation requiring reclamation of strip-mined lands; however, according to TVA officials, this legislation varied in degrees of effectiveness and enforcement. Therefore in 1970 and 1971 TVA again strengthened its reclamation requirements to incorporate recent technological developments related to slope restrictions, placement of overburden, structures to control water flow and siltation, and a year-round vegetation effort including the use of mulches and fertilizer.

Through November 1971 TVA's reclamation requirements in coal purchase contracts were stated in broad, general terms which did not provide sufficiently precise standards to achieve adequate reclamation. TVA's 1971 requirements are more specific than any of its earlier versions and are a significant improvement in TVA's approach to reclamation of strip-mined lands. However, TVA could improve its reclamation activities, we believe, by placing greater emphasis on steepness-of-slope restrictions, grading requirements, and factors affecting successful revegetation and through a stronger enforcement and inspection program.

The 25 contracts we selected for review were either term or emergency contracts in various stages of reclamation. Some contracts had not been completed and were in the active-mining stage; some had been completed with respect to coal deliveries but not with respect to reclamation work; some had been completed as to both coal deliveries and reclamation work. These contracts contained the 1965, 1968, or 1970 version of TVA's reclamation requirements, as shown in the following table.

TVA reclamation requirements	Number of contracts selected		
	<u>Term</u>	<u>Emergency</u>	<u>Total</u>
1965	10	2	12
1968	4	5	9
1970	<u>2</u>	<u>2</u>	<u>4</u>
Total	<u>16</u>	<u>9</u>	<u>25</u>

We did not include any spot contracts in our sample because reclamation requirements were not included in such contracts before September 1971.

The contracts we selected covered mining operations in the four States from which TVA buys most of its strip-mined coal: Kentucky, Tennessee, Alabama, and Illinois. We compared the reclamation requirements of these four States with the 1970 and current (1971) versions of TVA's reclamation requirements. TVA's current requirements closely parallel Kentucky's requirements. TVA's current requirements are more precise and more stringent than the requirements of Tennessee, Alabama, and Illinois.

Although no contracts containing TVA's 1971 reclamation requirements had been awarded up to June 29, 1972, our observations on TVA's reclamation activities, discussed in the following sections of this chapter, consider the impact of such revised requirements on specific problem areas.

LIMITATIONS ON MINING ON STEEP SLOPES

TVA's first restriction on mining on steep slopes was included in the 1970 reclamation provisions which specified that mining not be performed on any slope greater than 28° and that materials from second or subsequent mine cuts not be placed on the outer one-third of the bench created by the first mine cut.

The 1965 requirements contained no reference to mining on steep slopes or to the prevention of landslides. The 1968 requirements contained no reference to mining on steep slopes but did specify that mining be conducted and spoil material be handled so as to prevent landslides and that bench widths be controlled in relation to the steepness of slope.

TVA's 1971 requirements contained the same slope limitations as did the 1970 requirements; however, they specifically limited scalping distances and bench widths in direct relation to the steepness of the slopes above and below the coal seam being mined. (See app. V)

The operations under 13 of the 25 contracts we reviewed were in mountainous areas requiring contour mining, only four of the 13 contracts contained the 1970 requirements which included specific slope restrictions for preventing landslides. However, slides had occurred at two sites which were subject to the slope restrictions and at three other sites. All but one of the slides appeared to have stabilized, and attempts had been made to revegetate the mountain slopes.

Despite the slope restrictions imposed on a strip-mining operation in Campbell County, Tenn., the operation has experienced seven slides, all of which were on slopes between 24° and 28°. A TVA official informed us that the contractor's engineer had examined the area prior to mining and had not anticipated any slides. One coal seam did not hold as expected, and the slides resulted. TVA asked the contractor to refrain from mining on that seam until a study could be made of the situation. The contractor stopped mining at these sites but moved around the mountain and continued mining. The landslide study had not been completed at the close of our review.

TVA officials informed us that TVA's current bench-width slope requirements, coupled with its materials-handling and revegetation requirements, and its ability to limit mining where reclamation failures may occur due to geology or other circumstances should minimize landslides where strip mining is conducted on steep slopes

A TVA director advised the Subcommittee on Minerals, Materials and Fuels, Senate Committee on Interior and Insular Affairs, that reclamation requirements limiting strip mining on slopes of 28° or less should be changed to limit it to slopes of 24° or less, to provide greater insurance against permanent damage and to provide for the protection of esthetic values. In areas where it is determined that slopes up to 28° could be mined with no risk, the Director stated, mining could then be authorized by specific action of the TVA Board of Directors.

The biggest advantage to limiting mining on steep slopes is the reduced possibility of landslides. In view of the slides which occurred on slopes which met TVA's current slope limitations, TVA should consider the need to further limit mining on steep slopes

TVA informed us that the 28° slope was the maximum slope on which mining could be done and allowed TVA to declare areas having lesser slopes to be unminable if it appeared that landslides or other reclamation failures might occur. TVA indicated that it would limit mining to slopes where proper reclamation could be obtained

GRADING REQUIREMENTS AFTER
CONTOUR STRIP MINING

TVA's requirements allow contractors to leave a vertical highwall in mountainous areas where contour strip mining was conducted. The requirements specify that the final bench be sloped downward and in toward the highwall at a grade not to exceed 10° and in a manner that prevents depressions which may entrap water. However, we believe that a requirement to grade the bench in such a manner that it slopes away from the highwall would be preferable in that the reclaimed area would more closely conform to the original contour of the land, would minimize the entrapment of water, and would diminish the view of the unsightly highwall.

TVA's 1965 and 1968 reclamation requirements specified that the contractor grade the spoil banks only as necessary to provide for the reestablishment of vegetation. In 1970 the requirements were slightly expanded to specify additional grading to improve the general appearance of the mined area. None of the requirements distinguished between area and contour strip mining

The 1965, 1968, and 1970 reclamation requirements generally resulted in little more than strike-off grading in area strip mining--a bulldozer leveled off the tops of the spoil rows to widths of about 15 feet. The 1971 requirements for area strip mining specify that the contractor grade and backfill the mined area to the approximate original contour.

TVA's 1971 requirements for grading specify that the face of the coal seam, the bottom of the pit; and all toxic materials, metal, lumber, and other mining refuse be covered with spoil to a depth of at least 4 feet, provided, however, that the coal seam may be covered by a permanent water impoundment, if approved by TVA. Previously this clause was stated in general terms and merely required that mining refuse be buried.

TVA previously had no requirements pertaining specifically to grading of contour strip-mined areas. Although the current grading provisions are more specific, they still do not provide for alleviating the exposed highwall.

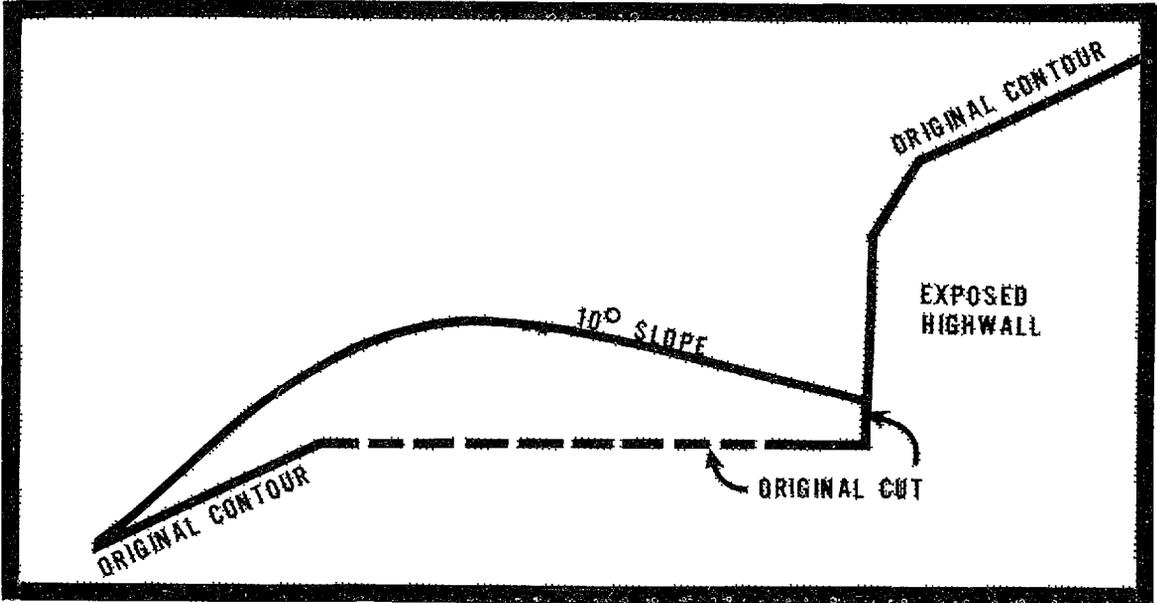
We were advised by a TVA official that it would be expensive to alleviate the highwall resulting from contour strip mining and that TVA was studying new techniques for contour strip mining and reclamation, including those for reducing or eliminating highwalls. This study was being conducted under a special contract for the mining of TVA's coal reserves in Campbell County. No definite conclusions had been reached by the close of our review.

We visited the Pennsylvania State Bureau of Land Protection and Reclamation, Mine Reclamation Division, and inspected various strip-mine sites in Pennsylvania to determine what was being done in that State to eliminate highwalls. Although Pennsylvania does not have many 3,000-foot-high peaks similar to those where mining is conducted in Tennessee, we were advised that mining was performed on slopes of the same or greater degrees. During our visit we observed five mining sites on slopes which ranged from 19° to 26°.

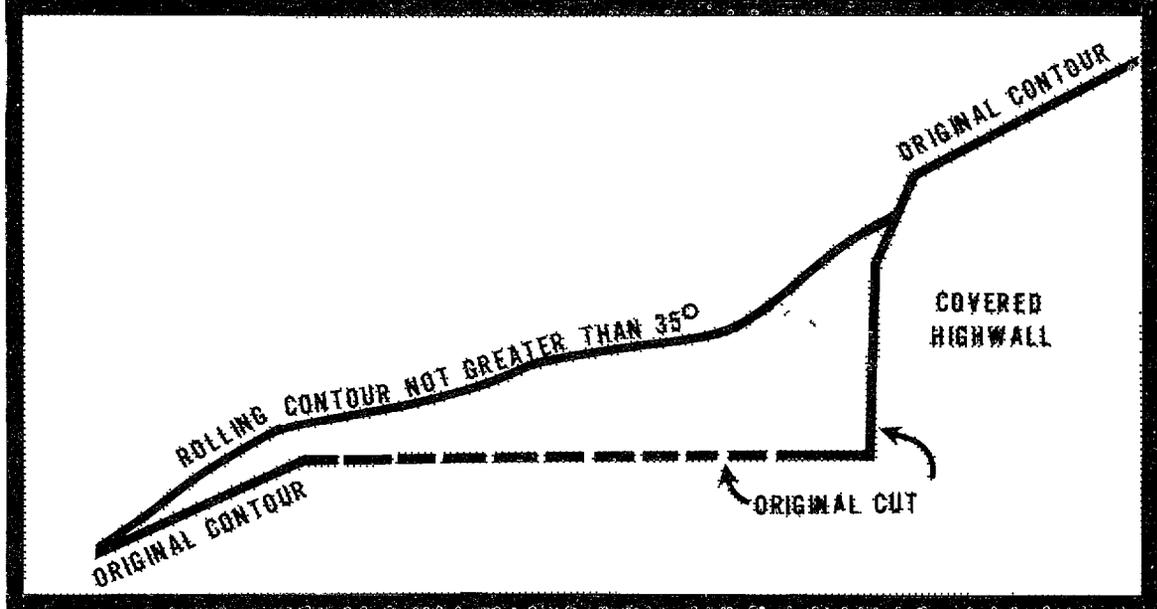
A Pennsylvania official advised us that at one time contractors were permitted to grade the highwall to a downward slope of 45° and the adjoining bench to an upward slope of 15°. Because that sloping collected water and caused erosion, the official said, the contractors currently were required to grade to a rolling slope of no more than 35°.

The following illustration shows the difference in grading required by TVA and that required by Pennsylvania. The grading required by Pennsylvania tends to prevent acid mine drainage, water entrapment, and landslides.

COMPARISON OF FINAL GRADING UNDER TVA AND PENNSYLVANIA RECLAMATION REQUIREMENTS



TVA ACCEPTABLE GRADING FOR CONTOUR MINING



PENNSYLVANIA ACCEPTABLE GRADING FOR CONTOUR MINING

FACTORS AFFECTING SUCCESSFUL REVEGETATION

TVA's requirements for revegetation were the same in both the 1965 and 1968 versions of its reclamation provisions. These provisions required contractors to revegetate stripped areas with trees--or, with TVA's approval, with grasses, legumes, and shrubs--to insure that the stripped land would be covered with well-distributed vegetation. In 1970 TVA modified its revegetation provisions to require hydroseeding and the planting of deep-rooted trees.

None of these requirements specified (1) what types or quantities of trees, grasses, shrubs, and fertilizers should be used, (2) a survival rate, or (3) what constituted survival or failure of revegetation attempts.

TVA's current requirements are much more detailed than the prior versions. They specify the types and quantities of vegetation and fertilizer required and when the vegetation must be planted; define what TVA considers to be an acceptable survival rate for revegetation; and clarify the time schedule for revegetation.

Soil acidity, rocks, loss of topsoil, and improper planting techniques can adversely affect revegetation. We noted all of these problems during our visits to different mining sites included in our review.

Problem of excess soil acidity

Seven of the 25 mining sites we visited had some amount of soil acidity which affected the revegetation efforts. Revegetation had been attempted at most of the sites with varying degrees of success. The size of the affected areas differed widely. Reclamation efforts of only one of the seven contractors had been accepted by TVA. We noted that some loss of vegetation had taken place since TVA's acceptance of the reclaimed area.

Coal deposits usually are accompanied by toxic materials which, when exposed to air and water, form sulphuric acid. This, and other chemical compounds resulting from strip mining, can have severe, adverse effects on plant and marine life.

TVA's earlier reclamation provisions required the contractor, as soon as practicable after mining, to cover coal seams and bury all toxic materials, including coal wastes and strongly acid shales. The current reclamation provisions are generally the same as the prior provisions but require the contractor to bury the materials to a depth of at least 4 feet. This work is to be completed within a specific time (15 days) and is never to be more than 1,500 feet behind the final-cut coal removal; reclamation work in any area is to be completed not later than 6 months following initial disturbance of the area. The current provisions also permit TVA to prohibit mining in areas where reclamation may be questionable because of acid soil conditions.

We were advised by officials of the Northeastern Forest Experiment Station, U.S. Forest Service, Department of Agriculture; the Commonwealth of Pennsylvania; and the U.S. Geological Survey, Department of the Interior, that the acidity of the soil could be determined prior to starting any mining operation by:

1. Core drilling--Drilling to remove a core of the earth's surface to show the types and the composition of soil covering the coal seam
- 2 Soil sampling
3. Engineering expertise--Mining engineers, after allowing for variation in height and contour, can determine the level of soil acidity for a proposed mine from the results obtained from soil testing at an operative or inoperative mine on an adjacent hill because both coal seams are generally of the same composition.

TVA officials advised us that soil acidity could be determined prior to mining but that, for economical reasons, the tests necessary to determine the acidity were not always made.

TVA officials said that TVA had never refused to award a contract because of soil acidity even when such a condition was known to exist, as on the Jellico seam in Tennessee. They also said that revegetation attempts on the Jellico

seam had produced mixed results because the spoil from one cut might not be acid while that from another cut might be highly acid. One TVA official said that, under current reclamation requirements, problem seams would be evaluated individually and might be deleted from an approved mining plan as a seam which was unminable.

We believe that TVA should give careful attention to the problem of excess soil acidity prior to including an area in an approved mining plan, to minimize the number of areas where revegetation may not be successful.

Other problem areas

Improper planting techniques resulted in a poor survival rate at a site in Sequatchie County, Tenn., where we saw as many as four pine seedlings planted in the same hole. We saw that seedlings had been stuffed into shallow holes, which resulted in the roots' being doubled up, instead of planted in holes of appropriate depths, which would have permitted proper spreading of the roots. TVA officials have informed us that they do not supervise the planting of any vegetation because it is the responsibility of the contractors. However, TVA's 1971 requirements, as stated on page 20, should help to reduce the number of such situations.

The area in Sequatchie County was planted in 1969. Black spoil could be seen on top of the area which had been planted. We believe that, if the topsoil had been stockpiled and had been used to cover this black spoil after grading, the chances for successful vegetation would have been increased. TVA's current requirements do not provide for stockpiling topsoil and using it to cover spoil after the mining operation has been completed.

NEED FOR ACHIEVING
TIMELY CONTRACTOR COMPLIANCE
WITH RECLAMATION REQUIREMENTS

TVA's coal purchase contract provided for enforcement of reclamation by (1) terminating the contractor's right to make deliveries, (2) forfeiting the contractor's performance bond, and (3) normal breach of contract remedies.

In 1971 TVA stopped deliveries of coal shipments from three contractors in northern Tennessee because two of the contractors were operating on slopes in excess of TVA's limit of 28° and the third had failed to control landslides. Although TVA, under the coal contract, can refuse deliveries from a contractor which is mining on a slope steeper than 28°, it cannot stop the contractor from mining on such slopes and selling the coal to someone else. Tennessee's reclamation requirements did not contain any restrictions on strip mining on steep slopes.

TVA's Division of Law informed us that TVA had no legal means, under its earlier reclamation provisions, for requiring reclamation of lands from which TVA refused to accept deliveries of coal. Under the new reclamation requirements, however, the contractor must submit a mining and reclamation plan which TVA must approve before awarding a contract. If the contractor mines an area included in the approved plan and violates the reclamation requirements, TVA, under the contract, can require the contractor to do the reclamation work or TVA can have the reclamation work done at the contractor's expense, regardless of whether the coal was delivered to TVA or to someone else.

Under term contracts containing the old reclamation requirements, TVA required the contractors to have performance bonds. The bonds covered all facets of the contracts, including reclamation. We were informed that in some instances TVA had not obtained bonds on emergency contracts because the contractors were unable to obtain such bonds.

TVA's earlier reclamation requirements specified that the reclamation efforts be completed no later than 24 months after the delivery of all coal to be supplied under the contract, unless TVA agreed to a longer period of time. TVA's

policy for extending time for completion of reclamation was vague and inconsistent. TVA told us that the contractor had an obligation to reclaim the land whether or not the contractor received a formal extension of time.

TVA has not enforced this 24-month requirement in many cases. As of December 1, 1971, TVA had not released 46 term contracts for which coal deliveries had been completed for more than 2 years. Of these 46 contracts, 18 had been completed for more than 4 years, three of the 18 had been completed for more than 5 years.

TVA had never taken legal action against a bonding company for a contractor's failure to adequately reclaim the land. TVA had taken the position that no contractor had failed to perform reclamation, although some took longer than others.

A TVA official stated that the contractors involved in the 46 contracts were cooperating with TVA to complete reclamation. However, for various reasons, such as soil acidity, rocky conditions, or weather, the reclamation had not been successfully completed at the time of our review. TVA, in commenting on a draft of this report, stated that the fact that TVA had not released contracts up to 5 years after deliveries have been completed was the result of its continuing effort to obtain satisfactory reclamation rather than its lack of diligence. TVA stated that, had the contracts been released earlier, the contractors could not have been required to complete reclamation. We are not suggesting that contracts be released earlier, but we are suggesting that contractors be required to perform the reclamation work promptly, as required by the contract. The longer a contractor is allowed to delay reclamation, the more environmental damage is apt to occur to the land.

TVA's current reclamation requirements do not provide for performance bonds for reclamation work but do provide for the establishment of a reclamation account to help insure satisfactory performance of reclamation. The account will be funded by withholding amounts from payments due to the contractors. The amount to be withheld from the first year's face value of contracts extending longer than 1 year is 2 percent. For contracts of less than 1 year, 3 percent of

the face value of the contract is to be withheld. If a contractor fails to complete reclamation to TVA's satisfaction, TVA may use the funds in the account to contract for reclamation or to do the reclamation itself. The performance bond still will be required by TVA for the other performance aspects of the contract. The performance bond required by TVA is in addition to any bonds required by a State.

We believe that the reclamation account should help provide a means for bringing about satisfactory performance by contractors of reclamation in future contracts. However, TVA is still faced with the problem of effective reclamation for the earlier contracts where deliveries have been completed but where the contractors have not met the reclamation requirements.

We recognize that there are inherent differences between reclamation programs carried out by governmental units possessing statutory and regulatory authority and TVA's reclamation program which is carried out under coal procurement contracts. However, we believe that TVA could strengthen the enforcement of its reclamation requirements by establishing guidelines on the types of enforcement action that should be taken when contractors are not reclaiming the land in accordance with contract requirements.

NEED FOR A MORE EFFECTIVE INSPECTION PROGRAM

TVA's inspection program had weaknesses which stemmed from a lack of adequate procedures for conducting and reporting on inspections of reclamation activities.

At the time of our review, TVA had five full-time inspectors and a section supervisor performing TVA's inspections of reclamation activities under the 329 contracts in six States. The supervisor spent about 30 percent of his time on inspection duties. The supervisor and the chief inspector have bachelor's degrees in forestry, three inspectors have associate degrees in forestry, and the fifth inspector has an associate degree in wildlife management. The inspectors receive on-the-job training by accompanying experienced inspectors on inspections and by conducting inspections themselves. According to a TVA official, it takes about 1 year for a person to become an effective inspector.

TVA's expenditures for inspections of strip-mined areas have increased each year since the inception of its inspection program. The following tabulation shows the annual expenditures.

<u>Fiscal year</u>	<u>Expenditures</u>
1966	\$12,546
1967	25,975
1968	33,299
1969	36,694
1970	40,269
1971	79,059

The increase in expenditures from 1970 to 1971 reflects program expansion as well as a change in the method of accounting to fully show the costs of the program. Prior to fiscal year 1971, reclamation inspection costs did not include salaries of employees who spent only a small percentage of their time on strip-mine reclamation inspections. In addition to such costs, reclamation inspection costs presently include expenditures for inspectors' salaries, per diem, transportation, supplies, and photography.

TVA's stated inspection policy was to inspect mining sites in Kentucky about three or four times a year and to inspect sites in the other States at about 2-week intervals. However, we were advised by a TVA official that TVA's frequency of inspection depended on the State's requirements, the status of the contract, the location of the site, and the time of year. For example, TVA informed us that sites in Kentucky were visited about twice a year because Kentucky, with more than 40 inspectors, had a better reclamation program than any of the other States from which TVA buys coal.

TVA inspectors visit mining sites most frequently during the active contract period when coal deliveries are being made. For example, at a site in southern Tennessee, TVA averaged 1.8 inspections a month during the 6-month period of active mining and less than one a month for the remaining 39 months required to complete the reclamation required by the contract.

TVA's inspectors, headquartered in Norris, Tenn., visit strip-mining sites near Norris more frequently than more distant sites, such as those in western Kentucky and Illinois. On the average, TVA visited the sites in northern Tennessee more than once a month, whereas it visited sites in western Kentucky and Illinois only about twice a year. TVA officials told us that the mining sites near Norris were inspected more often because most of the contour strip mining was done in this area of Tennessee and because Tennessee's reclamation law was weak.

No inspections were made from March 1970 to November 1971 at the five western Kentucky sites included in our review; no inspections were made from June 1970 to November 1971 at the Illinois site included in our review. TVA officials told us that they had not inspected sites in western Kentucky and Illinois during those periods because TVA had only three inspectors; area strip mining was being performed that did not require frequent inspections, the Kentucky law was strong, and the operators were large, responsible coal companies.

In September 1971 TVA began including reclamation requirements in spot contracts. Through November 1971 a total of 81 such spot contracts had been awarded. TVA was unable

to inspect the mining operations and reclamation work associated with each spot contract because the coal being furnished under such a contract had already been mined in many cases and represented a part of the contractor's production from various sites or from one large mining site. Therefore identification of the exact area from which coal was supplied to TVA was difficult.

We were advised by a TVA official that TVA did not have written instructions on inspection procedures, requirements, or the preparation of inspection reports. Although inspection reports generally were prepared, they did not always show the extent and adequacy of contractor compliance with the reclamation requirements. The report is basically a yes-or-no checklist. The inspector evaluates mining operations, grading, water control, haul roads, and revegetation by the use of codes 1 through 3. Code 1 means that a function of the operation is acceptable, code 3 means that an enforcement action by TVA is required because the contractor has violated a contract provision or reclamation requirement.

TVA's reclamation requirements require, for example, that the contractor cover all coal seams and bury all toxic materials including coal wastes and strong acid shales. We found that at four of the sites covered by our review the contractor had not met this requirement. However, the inspection reports for these same sites showed that grading was satisfactory and that coal wastes had been buried. For example, two inspectors prepared a report, dated September 2, 1971, on an operation in Tennessee that was inspected 15 times during the 11-month period ended November 1971. The report stated that toxic materials had been buried and that the area had been adequately backfilled and was ready for planting. Our visit to the same site in October 1971 showed that coal wastes had not been buried; in our opinion, the area had not been adequately reclaimed for revegetation.

TVA's inspection program could be strengthened if TVA established procedures for use in performing and reporting on inspections which would provide guidance as to the frequency of inspections and which would require inspectors to document their conclusions as to the extent and adequacy of the contractors' compliance with reclamation requirements.

CONCLUSIONS

TVA's earlier reclamation requirements did not provide sufficiently precise standards for achieving adequate reclamation. The requirements did, however, represent a significant step toward minimizing the damages caused by strip mining. TVA's 1971 requirements represent a significant improvement in TVA's approach to reclamation of strip-mined lands.

TVA's reclamation requirements could be improved further by providing for:

- Greater restrictions on strip mining on steep slopes.
- Grading the final bench on contour strip-mining sites to closely conform to the original contour of the land and thereby minimize the entrapment of water and diminish the view of the unsightly highwall.
- Careful attention to the problem of excess soil acidity prior to including an area in an approved mining plan.
- Stockpiling and using topsoil to enhance revegetation.

TVA informed us that it had been studying the feasibility of implementing improvements in the above areas. At the time of our review, however, action had not been taken to incorporate such improvements as part of TVA's reclamation requirements.

Additionally, TVA could strengthen the enforcement of its reclamation requirements by:

- Establishing guidelines on the types of enforcement action that should be taken when contractors are not reclaiming the land in accordance with contract requirements.
- Establishing procedures for use in performing and reporting on inspections which would provide guidance.

as to the frequency of inspections and which would require inspectors to document their conclusions as to the extent and adequacy of the contractors' compliance with reclamation requirements.

CHAPTER 3

OTHER RECLAMATION PROBLEMS

We noted some additional matters which affect TVA's program to successfully reclaim the land stripped by contractors furnishing coal to TVA. These matters involve the problem of reclaiming orphan land and the lack of uniform reclamation requirements among Federal agencies and States.

RECLAMATION OF ORPHAN LANDS

Orphan lands (lands strip mined prior to the existence of Federal or State regulatory laws) represent a problem from both the esthetic and the environmental viewpoints. The orphan lands remain largely barren and exposed, except where some natural vegetation grows. The problems of erosion, acid discharge, and other physical and chemical aftereffects of strip mining generally are associated with orphan lands. The reclamation of orphan lands has been a continuing problem, although various procedures and financing methods are now being used to assist in reclaiming them. TVA's 1971 reclamation provisions require the contractor to plant trees on orphan lands where a second or subsequent cut is made

TVA has unsuccessfully sought Federal appropriations for the reclamation of orphan lands. The Chairman of TVA's Board of Directors testified before the Subcommittee on Mines and Mining of the House Committee on Interior and Insular Affairs in October 1971 that, in view of TVA's inability to receive funds to reclaim orphan lands, the Federal Government should give attention to the need for some type of program dealing with the reclamation of orphan lands. The Department of the Interior, in its 1967 report entitled "Surface Mining and the Environment," recommended that the Federal Government participate in a program for the reclamation of orphan lands.

The Appalachian Regional Commission, established by the Congress in 1965, can provide a maximum of 75 percent of the total cost of reclaiming strip-mined areas on public land. The States requesting the funds to reclaim certain public lands must contribute the balance of the cost of the project. About \$10 million was available from the Appalachian Regional

Commission in fiscal year 1972 for the Federal share for reclaiming publicly owned orphan lands

Some States have established their own programs for reclaiming orphan lands. For example, West Virginia funds its reclamation of orphan lands by assessing an operator a fee of \$60 an acre for each acre included in a new permit area.

We were unable to determine the number of acres of orphan land which had resulted from coal furnished to TVA. Although a need to reclaim orphan land exists, the means of filling this need have not been definitely established. Some alternatives which are now being used or which have been proposed are (1) establishing a reclamation fund by each State, (2) obtaining financial assistance from the Appalachian Regional Commission, and (3) establishing a Federal program for the reclamation of orphan lands.

LACK OF UNIFORM RECLAMATION STANDARDS

Some of the reclamation problems encountered by TVA and noted during our review indicated the need for uniform reclamation standards. TVA has the authority to require adequate reclamation of the land from which coal is mined for sale to TVA but does not have the authority to require the reclamation of land from which coal is mined for sale to others. As discussed on page 23, TVA stopped deliveries on a contract because the contractor was mining on slopes exceeding TVA's limitations. Because the State's provisions had no slope restrictions, however, the contractor was not required to stop mining at that site. Under TVA's current reclamation requirements, TVA can prohibit mining on slopes exceeding 28° if the area is included in the approved mining plan.

In another case TVA's contractor had completed deliveries under its contract and had attempted to reclaim the land involved. Before vegetation reached the point where TVA could release the contract, another contractor redisturbed the same area in strip mining coal for delivery to someone other than TVA. The second contractor's operations negated the reclamation efforts of the contractor responsible to TVA, and TVA had no control over the second contractor.

The reclamation requirements in the States where TVA buys coal vary considerably from one another and from TVA's reclamation requirements. Our review showed that Kentucky's requirements were more stringent than any of the other requirements we examined, including TVA's. For example, Kentucky's reclamation requirements specify that no strip mining be performed within 100 feet of any public road or stream, but the requirements of Alabama, Illinois, and Tennessee do not contain such a restriction. TVA's current requirements restrict mining within 100 feet of any stream and closely parallel Kentucky's other provisions. However, TVA does not provide for elimination of highwalls caused by contour mining, whereas Kentucky specifies that terraced backfilling be performed to help alleviate the highwall.

Similar standards among Federal agencies and States for reclamation of strip-mined lands seem to be necessary to achieve uniformity in environmental regulation of mining operations. Bills to establish uniformity of reclamation standards, namely Senate bill 993 and House bill 5689, have been introduced in the ninety-second Congress.

KEN HECHLER
4TH DISTRICT WEST VIRGINIA

WASHINGTON OFFICE
242 CANNON OFFICE BUILDING
TEL. 202 225 3452

STAFF ASSISTANTS
DICK LEONARD PRESS SECY
SUSAN BROH
REBECCA ESHENBAUGH
CAROL ESTEP
RICHARD D HEIRONIMUS JR
RON LIVELY
DIANN McCORMICK
MARY MARGARET MILLER
VIRGINIA SKEEN

-PLUS ANY VOLUNTEER
HELP WE CAN GET!

Congress of the United States
House of Representatives
Washington, D C. 20515

COMMITTEE
SCIENCE AND ASTRONAUTICS

DISTRICT OFFICES
HUNTINGTON W VA 25712
ROOM 219 POST OFFICE BLDG
TEL 304 529 3359 OR
529 2311 EXT 589

PARKERSBURG W VA 26101
JAMES A FITTRO
IN CHARGE
406 JULIANA STREET
TEL. 304 422 8551 EXT 240

August 17, 1971

Honorable Elmer B. Staats
Comptroller General of the
United States
General Accounting Office
441 G Street
Washington, D. C. 20548

Dear Elmer

The Tennessee Valley Authority bought 32 million tons of coal last year, which is about ten percent of the coal burned by the entire electrical industry. Half of this TVA coal is strip-mined, and there have been many protests from areas in Kentucky where coal for the TVA has devastated strip-mined land and polluted streams.

The TVA failed to file an environmental impact statement in compliance with the National Environmental Policy Act of 1969 until after a court suit, and finally on March 18, 1971, TVA filed a draft environmental impact statement entitled "Policies relating to sources of coal used by TVA for Electric Power Generation." The statement indicates that in 1965 "TVA decided to require reclamation as part of its surface mined term coal purchase contracts." The statement also indicates that in "December, 1970, the reclamation requirements were substantially strengthened to incorporate recent technological developments." A copy of this revision is enclosed, and as will be observed, it contains phrases like "as closely as practicable" and "to the maximum extent practicable."

I am enclosing a copy of an article which I wrote, entitled "TVA Ravages the Land", which appeared in the July, 1971 issue of the Environmental Journal. I am receiving a wide number of reports that a

Honorable Elmer B. Staats
Page - 2 -

considerable amount of land and stream damage is occurring as a result of surface mining for TVA, and also that the requirements for reclamation are inadequate or that reclamation is simply uneconomic to perform in many instances.

It would be most helpful for the General Accounting Office to review TVA's contracts for surface-mined coal, including the nature, extent and effectiveness of reclamation by TVA contractors following surface mining operations. Questions such as these occur, although this list is not all-inclusive

- (1) adequacy of the reclamation requirements,
- (2) extent to which these requirements are effectively enforced,
- (3) methods of enforcement, e. g., I note no bond is required of the contractor to insure compliance,
- (4) instances where TVA has permitted waivers or exceptions,
- (5) extent to which TVA accepts "as fulfillment of the requirements of this contract compliance by the contractor with applicable reclamation laws having standards comparable",
- (6) adequacy and frequency of inspections by TVA of the contractor's mining operations to determine compliance.

I note also that these 1970 requirements do not deal with the very serious problem of prohibiting surface mining where reclamation is not possible or would not be effective.

I hope you will furnish me with a report of your findings, including any comments or recommendations you believe appropriate.

Sincerely,


Ken Hechler

TVA'S 1965 RECLAMATION REQUIREMENTS

11. Strip Land Reclamation. (This section will be included in any contract for strip or surface auger coal.) As part of the consideration for the award of this contract the Contractor agrees to perform in accordance with the following standards and to the satisfaction of TVA reclamation and conservation work upon all the lands which are affected by the strip mining (including surface auger) of any coal supplied under this contract

- a Contractor shall, as closely as practicable following the mining operation, cover coal faces and bury all toxic materials including coal wastes and strongly acid shales
- b Contractor shall seal off any breakthrough to former underground mines
- c Contractor shall conduct the mining in such a manner as to keep the drainage free of spoil.
- d. Contractor shall control water from the mines and haul roads by
 - (1) Channeling runoff into drainages either naturally non-eroding or made that way through construction of checks, or
 - (2) By impoundments, or
 - (3) A combination of (1) and (2)
- e. Contractor shall cover all holes at the face that have been made by augers

APPENDIX II

- f. Contractor shall grade the spoil banks as necessary to provide for the reestablishment of vegetation.
- g. Contractor shall revegetate the disturbed area with trees (but with TVA's approval grasses, legumes, and shrubs may be substituted) so as to ensure that the disturbed area will be covered by vegetation well distributed throughout the entire area.
- h. To the maximum extent practicable, the foregoing work shall be performed at the same time the mining operation is taking place, and all the above work shall be completed no later than 24 months after the delivery of all the coal supplied under this contract unless TVA agrees to a longer period of time.

TVA shall have the right to inspect the Contractor's mining operation and the lands involved from time to time to determine the Contractor's compliance with the foregoing standards. TVA shall at all times be the sole judge as to whether Contractor is complying with the standards above set out. TVA, in its discretion, may accept as fulfillment of the requirements of this contract compliance by the Contractor with applicable reclamation laws having standards comparable to the foregoing.

TVA' S 1968 RECLAMATION REQUIREMENTS

(paragraph g)

- g. Contractor shall conduct mining and reclamation so that any spoil placed on the slope below the bench will be handled with the objective of preventing landslides. This provision will generally control the bench width of the first cut in relation to the steepness of slope, the total volume of overburden which may be cast downslope, and the natural and proposed drainage pattern.

APPENDIX IV

TVA'S 1970 RECLAMATION REQUIREMENTS

12 Strip Land Reclamation Contractor agrees to perform in accordance with the following standards and to the satisfaction of TVA reclamation and conservation work upon all lands which are affected by the strip mining (including surface auger) of any coal supplied under this contract

- a. Contractor shall, as closely as practicable following the mining operation, cover coal faces and bury all toxic materials including coal wastes and strongly acid shales.
- b. Contractor shall seal off any breakthrough to former underground mines.
- c. Contractor shall conduct the mining in such a manner as to keep the drainage free of spoil. This will include no mining activities (except building roadways) within 100 feet of any stream channel.
- d. Contractor shall control water from the mines and haul roads by
 - (1) Channeling runoff into drainages either naturally non-eroding or made that way through constructions of checks, or
 - (2) By impoundments, or
 - (3) A combination of (1) and (2)
- e. Contractor shall cover all holes at the face that have been made by augers.
- f. Contractor shall grade the spoil banks as necessary to provide for the reestablishment of approved vegetation and to improve the general appearance of the mine area.
- g. Contractor shall conduct mining and reclamation so that any spoil placed on the slope below the bench will be handled with the objective of preventing landslides. This provision will require that all organic material in the proposed cut and fill sections be removed and wind-rowed just below the calculated toe of the fill material. It will

also control the bench width of the first cut in relation to the steepness of slope as follows

28°+	No surface mining
26.1° - 28°	80'
24.1° - 26°	105'
22.1° - 24°	125'
20.1° - 22°	145'
18.1° - 20°	165'
0° - 18°	No restrictions

In special instances where slope reduction is permitted, the bench widths may be exceeded as determined by TVA.

No materials from second or subsequent mine cuts will be placed anywhere on outer one-third of the fill bench created by first mine cut.

- h. Contractor shall seed, mulch, and fertilize by hydroseeder all spoil material on all out slopes and other critical areas as determined by TVA within one week of final placement. All other areas will be seeded and fertilized on the same schedule. Immediate reseeding, remulching, and refertilization will be required in case of all failures. During first winter planting season, deep-rooted trees and wildlife food and cover plants will be planted on all out slopes and other areas designated by TVA and consistent with long-range surface management objectives.
- i. As needed to help control siltation, contractor shall construct small silt basins in drainage channels below mining operations as required by TVA.
- j. To the maximum extent practicable, the foregoing work shall be performed at the same time the mining operation is taking place, and all the above work shall be completed no later than 24 months after delivery of all the coal supplied under this contract, unless TVA agrees to a longer period of time.

TVA shall have the right to inspect the Contractor's mining operation and the lands involved from time to time to determine the Contractor's compliance with the

APPENDIX IV

foregoing standards TVA shall at all times be the sole judge as to whether Contractor is complying with the standards above set out TVA, in its discretion, may accept as fulfillment of the requirements of this contract compliance by the Contractor with applicable reclamation laws having standards comparable to the foregoing

TVA'S 1971 SURFACE MINING

RECLAMATION AND CONSERVATION REQUIREMENTS

The following TVA Reclamation and Conservation Requirements are applicable to all term contracts for the purchase of coal produced by surface mining operations

I Reclamation and Conservation Plan In order to be considered for award, bids offering surface mined coal to TVA must be accompanied by a Reclamation and Conservation Plan (hereinafter called ' Plan') approved by TVA Plans (4 copies required) may be submitted to TVA for approval at any time Each invitation to bid will specify a date by which plans must be submitted for approval in order to be considered for award under that invitation TVA reserves the right to reject any Plan which fails to conform to these requirements, or with TVA's policies as set forth in the policy statement entitled *Coal Mining Land and Water Resource Protection* incorporated in the Invitation to Bid, and any additional policies which may also be incorporated in the Invitation, or to approve a plan with modifications so that it conforms with these requirements and/or said policies This includes, but not by way of limitation, the right to identify certain areas as 'unmineable' during the contract term because of slopes geology, proximity to a stream, aesthetic or other considerations related to these requirements or said policies This also includes but not by way of limitation the right to identify certain areas as 'unmineable' during the contract term because of the possibility that the requirements of Section II hereof may not be sufficient to prevent landslides or other reclamation failures due to special circumstances in the proposed mine area Plans approved by TVA, together with any modifications, shall become a part of any contract awarded, and Contractor agrees to conduct its mining operations as prescribed therein TVA approval is required for changes to or deviations from the Plan The Plan shall include

A A TVA or a United States Geological Survey topographic map or portions thereof, at a scale no smaller than 1 inch = 2,000', showing the mining areas and haul roads

B A specific location map at a scale of not less than 1" = 400' including or accompanied by (an enlargement of the topographic map or portion thereof mentioned in "A" is acceptable)

- 1 North arrow and quadrangle names.
- 2 Name and address of the bidder
- 3 Date the plan was prepared and names of individuals or firms responsible for its preparation
- 4 The location of areas affected by the mining operation, including the mining area, tippie, preparation plant, coal storage area(s), existing roads proposed new roads, and any other land use changes
- 5 Adjacent mining operations including worked out and abandoned mines on or within five hundred (500) feet of any part of the area to be mined

APPENDIX V

6 A designation showing the average slope in degrees of the area to be scalped (as measured from the map) at each five hundred (500) foot interval along the outcrop of the seam(s) to be mined

7 The name thickness and location of cropline for each coal seam to be mined, together with a statement identifying the proposed surface mining method(s) (contour area auger, or a combination of these methods) In addition, the plan must specify how many mining cuts will be made the sequence in which each coal seam will be mined and the approximate points at which mining will begin and end Any portion of any coal seam which cannot be mined during the contract term because of these reclamation and conservation requirements must be clearly identified and marked unmineable

8 The proposed drainage controls for the mine and roads, including the identification of silt trap dams

C The following general information must also be furnished

1 A complete listing of the equipment to be used in the mining operation

2 The plan and schedule for revegetation

3 A copy of the deeds leases or other documents authorizing the bidder to mine the coal identified in the Plan This shall be considered proprietary information unless bidder authorizes otherwise

4 Any forms which may be supplied by TVA requesting information concerning the Plan or proposed methods must be completed and returned as a part of the Plan

5 Evidence satisfactory to TVA that bidder has obtained all required Federal, state, or other regulatory agency coal mining permits, certificates, or licenses necessary to mine the coal offered

6 A signed statement by bidder acknowledging that he has read these reclamation and conservation requirements and understands that the submitted Mining and Reclamation Plan, and any modifications, will, if and as approved, become a part of any contract awarded Statements executed by an agent must be accompanied by proof of agency authority

II Mining and Reclamation Requirements All mining and reclamation shall be performed as follows

A **General** On lands where any surface mining is conducted (contour, auger, or area) Contractor shall perform the following in addition to other requirements stated herein

1 Properly handle and segregate toxic materials within the pit

2 Cover the face of the coal the bottom of the pit, and bury all toxic materials, metal, lumber, and other mining refuse with spoil to a depth of at least four feet, provided, however, that the coal seam may be covered by a permanent water impoundment if approved by TVA This work is to be completed as soon as possible but not later than the time specified in subsections II B 5 and II C 3

3 Immediately close any breakthrough to underground mines

4 Refrain from all mining and associated activities within 100 feet of any stream except that roads may be constructed within 100 feet of a stream where approved by TVA

5 Control the water flow from the mine area and haul roads to minimize soil erosion, damage to other lands and pollution of streams or other waters. This may include construction of checks, impoundments, silt-trap dams and water bars in conjunction with other control measures.

6 Refrain from dumping or otherwise placing any spoil outside the approved mining area and further refrain from placing spoil in such a way that erosion or slides will likely cause it to go outside the approved mining area. In the event such material or substances do slide or otherwise go outside the approved mining area, Contractor shall notify TVA of such occurrence within twenty-four (24) hours and shall take immediate steps to minimize and correct the problem.

7 Roads

a New roads, constructed for or during the term of this contract, shall be located, designed and maintained to meet the following standards:

- (1) No grades in excess of 20 percent
- (2) No grades in excess of 10 percent for more than 100 feet
- (3) Culverts of sufficient number, size, and location to provide adequate drainage
- (4) Ditching, crowning and maintenance to minimize erosion
- (5) Revegetation in accordance with subsection II A 8, of denuded areas adjacent to roads which result from road construction

b Roads existing prior to date of contract award and used during this contract term shall be maintained according to subsections II A 7 a, 3, 4, and 5.

c Roads used during the contract term and having no anticipated post contract use shall be subject to the following lay-by provisions:

- (1) Upon abandonment, culverts shall be removed and water bars constructed on the roadbed.
- (2) Where practicable, the roadbed shall be revegetated in accordance with section II A 8 a.

8 Revegetation

a **Grasses** A mixture containing at least one variety from each of the two following columns, with a minimum of one-third (1/3) from each column, must be used:

Kentucky 31 Fescue	Korean Lespedeza
Sericea Lespedeza	Cereal Rye
Weeping Lovegrass	Kobe Lespedeza
Perennial Ryegrass	Annual Rye

(Or others as approved by TVA)

A minimum of forty (40) pounds of seed per acre and fertilizer containing a minimum of fifty (50) pounds of nitrogen and forty-four (44) pounds of phosphorus (equivalent to one hundred (100) pounds of P₂O₅) per acre must be used. The grass seed must be planted on all spoil or other disturbed areas within seven (7) days after final grading and/or placement of spoil on any area.

APPENDIX V

Immediate reseeding and refertilizing is required in any case where less than seventy (70) percent of the seed takes hold and/or where bare areas of more than one thousand (1,000) square feet exist

b **Trees and Shrubs** A minimum of nine hundred (900) seedlings per acre must be planted on all outcrops, spoils, and other critical areas as identified by TVA at the time of approval of the bidder's Reclamation and Conservation Plan or any modification thereof. This includes the outcrop of a previous unreclaimed cut where a second or subsequent cut is made. Such seedlings are to be selected from two or more of the following species with at least two hundred and twenty five (225) seedlings coming from each column:

Trees	Shrubs
Loblolly Pine	Bicolor Lespedeza
Shortleaf Pine	Autumn Olive
Virginia Pine	Russian Olive
White Pine	Silky Dogwood
European Alder	Multiflora Rose
Black Locust	Amur Honeysuckle
Ash	(Or others as approved by TVA)
River Birch	
Cottonwood	
Flowering Crab	
(Or others as approved by TVA)	

The trees and shrubs must be planted during the first planting season (November-March) following grading and/or final placement of spoil on any area. Replanting is required during the next planting season in case of all failures. A failure is defined as less than 600 living plants per acre and/or bare spots greater than ten thousand (10,000) square feet.

c **Planting Deferrals** The planting of grasses, trees, and shrubs may be deferred with the approval of TVA.

B **Contour Mining** On lands where the mining operation produces a bench (contour and/or surface auger mining) Contractor shall perform the following additional requirements:

1. Conduct the mining operation so that any spoil placed on the slope below the bench will be handled with the objective of preventing landslides. To accomplish this, scalping shall be required above and below the coal seam, and the bench width of the first cut shall be controlled in relation to the steepness of the slope as shown on the following tabulation:

BENCH WIDTH MAXIMUMS AND
SCALPING DISTANCES

Slope Above Coal (Degrees)

Slope Below Coal (Degrees)	Less than 18°		18° 20°		20° 22°		22° 24°		24° 26°		26° 28°		28°	
	Scalp Above Coal (Feet)	Solid Bench Width (Feet)												
Less than 18°	NO RESTRICTIONS													
18° 20° 159 feet	128	114	121	106	117	100	113	95	110	91	108	86	106	83
20° 22° 156 feet	118	106	113	100	109	94	106	89	104	85	101	81	100	78
22° 24° 151 feet	109	98	105	92	101	87	98	82	95	78	94	75	92	72
24° 26° 145 feet	98	88	94	83	91	78	88	74	86	71	84	67	83	64
26° 28° 130 feet	80	72	77	68	75	64	72	61	71	58	69	55	68	53
More than 28°	NO MINING													

In some instances such as where slope reduction is permitted, the bench width controls shown on the tabulation may be exceeded as determined by TVA

- 2 Refrain from placing any spoil from a subsequent mine cut on the outer one third (1/3) of the fill bench created by the first mine cut (see diagram in section III B)
- 3 Conduct the mining operation in such a manner as to keep all streams free of spoil
- 4 Pick up all coal within thirty (30) days following removal of the overburden (For the purpose of this provision, overburden shall be considered removed when less than four (4) feet remains above the coal)
- 5 Smoothly grade and backfill the final bench to slope toward the highwall at a grade not to exceed ten (10) degrees and in a manner that prevents depressions which may accumulate water (except for water impoundments approved by TVA)

The grading schedule shall be as follows

- a Where only stripping (no augering) is involved, grading and backfilling must be completed within fifteen (15) days following final cut coal removal but in no event shall it be more than fifteen hundred (1 500) feet behind the final cut coal removal
- b Where only augering (no stripping) is involved, grading and backfilling must be completed within fifteen (15) days following the augering but in no event shall it be more than fifteen hundred (1 500) feet behind the coal augering
- c Where stripping and augering are involved the augering shall follow the strip coal removal by not more than sixty (60) days and the grading and backfilling

APPENDIX V

shall follow the coal augering by not more than fifteen (15) days but in no event shall it be more than fifteen hundred (1 500) feet behind the coal augering

d Notwithstanding the above schedule modifications may be made by TVA when circumstances warrant such as when rain or wet conditions make grading and backfilling impractical and reasonable time extensions are needed provided however that no area shall be left ungraded for any reason for more than six (6) months after its initial disturbance

6 Bury all toxic waste as soon as practicable, and where such wastes pose an imminent danger to a stream, they shall be buried immediately

7 Grass revegetation as provided in subsection II A 8 a shall be performed by hydraulic seeding equipment A minimum of 1 500 pounds of wood fiber mulch per acre or an equivalent amount of other types of mulch approved by TVA, shall be used

C **Area Surface Mining** On area mines as defined herein Contractor shall perform the following requirements

1 Grade and backfill the mined area to approximate original contour There shall be no slopes in excess of ten (10) degrees and no depressions to accumulate water except for water impoundments approved by TVA

2 Grade spoil abutting adjoining unstripped lands as required by TVA

3 Grade and backfill so there are not more than two (2) ungraded spoil ridges behind the pit being worked The spoil from the pit being worked shall be considered the first ridge Where mining is susoended, terminated, or completed all grading must be completed within ninety (90) days thereafter Notwithstanding this schedule modifications may be made by TVA when circumstances warrant such as when rain or wet conditions make grading and backfilling impractical and reasonable time extensions are needed provided however that no area shall be left ungraded for any reason for more than six (6) months after its initial disturbance

4 Grass revegetation as provided in subsection II A 8 a may be performed by either hydraulic or agricultural planting equipment

5 Except where an approved impoundment is to be created, Contractor shall bury all toxic wastes as soon as practicable and where such wastes pose an imminent danger to a stream they shall be buried immediately

III The following definitions and diagram are applicable to these reclamation and conservation requirements

A **Definitions**

1 Acid overburden—Rock material with an inherent acid forming potent^{al}

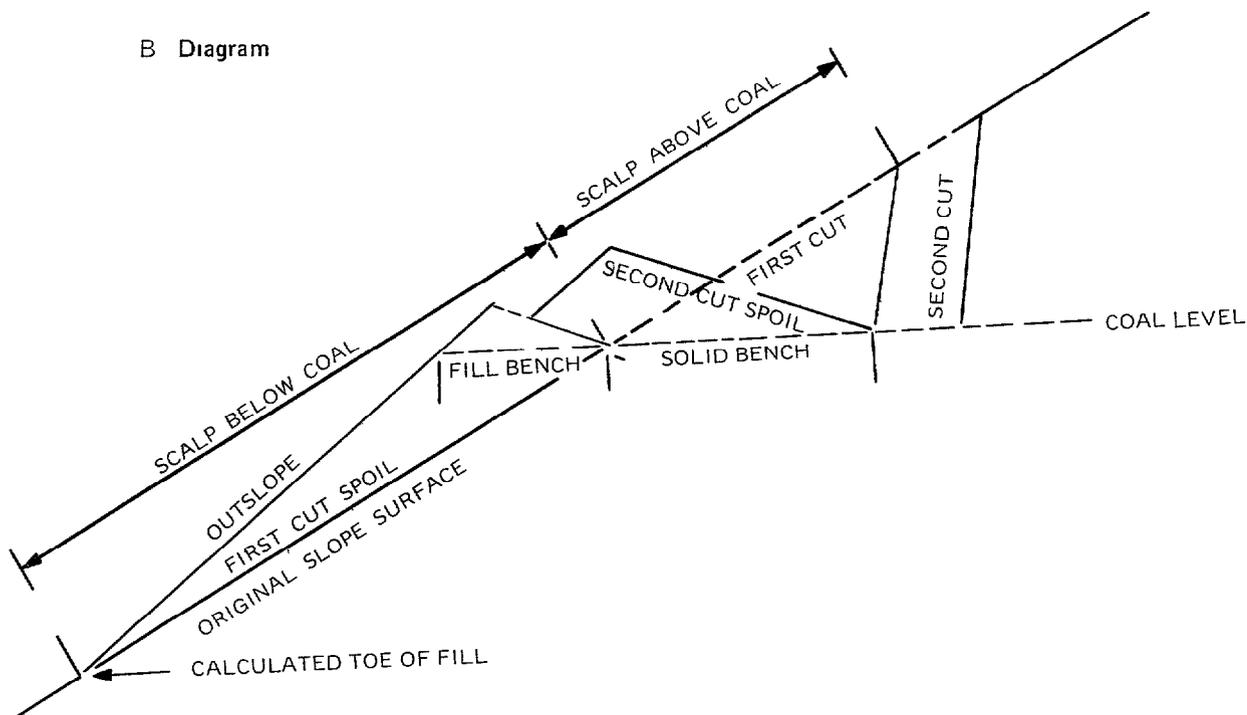
2 *Approved mining area*—The area between a proposed cut and the calculated toe of the fill, as described in the Reclamation and Conservation Plan

3 *Area mining*—Surface mining of areas having slopes below the coal seam less than 18 degrees

- 4 Calculated toe of the fill—That point on the slope below the coal at which the outslope spoil should come to rest and be stable
- 5 Contour mining—Surface mining of areas with slopes below the coal seam of 18 degrees or more
- 6 Fill bench—See Diagram in subsection III B
- 7 Highwall—The near vertical face of overburden remaining after a strip mine cut
- 8 Initial disturbance—Movement of overburden
- 9 Landslide—An unanticipated movement of outslope spoil
- 10 Outslope—See Diagram in subsection III B
- 11 Overburden—All earth and rock material which lies above a natural deposit of coal
- 12 Percent grade—Measurement of slope derived by dividing the elevation difference between two points by the horizontal distance traversed between the two points times 100
- 13 Road layby—Planned abandonment designed to minimize erosion of an unpaved road
- 14 Scalp—Removal of all organic material on the original slope surface above and below the coal and its placement just below the calculated toe of the fill
- 15 Silt trap dam—Any structure placed across a drainage channel to retain silt laden waters (generally of earth or rock construction)
- 16 Slope reduction—The practice of pushing downhill a portion of the overburden deposited on a slope so as to better distribute its weight and lower the angle of repose
- 17 Solid bench—See Diagram in subsection III B
- 18 Spoil—Moved overburden
- 19 Stream—Any watercourse exhibiting flow at least six (6) months per year, and any other watercourse so designated by TVA on the bidder's Reclamation and Conservation Plan
- 20 Toxic wastes—Coal associated material with an acid formation potential (e.g. rash, bone, partings)
- 21 Water bar—Water diversion structure built across a road to minimize erosion (log type recommended)

APPENDIX V

B Diagram



IV These requirements are to be liberally construed in favor of minimizing environmental damage and any disagreements concerning the scope or meaning of these requirements shall be resolved in favor of protecting the environment. It is agreed that TVA shall be the sole judge of the meaning of these requirements their application to a particular situation and of the Contractor's compliance therewith. In all cases of failure to comply with these requirements including Contractor's Plan (and any modification thereof) as approved by TVA TVA may in addition to any other remedies, exercise its rights under Section , Terms and Conditions by refusing to accept further deliveries until Contractor has provided assurance satisfactory to TVA that the operation can be conducted in accordance with these requirements.

V TVA may, in its sole discretion, waive any of these requirements. No such waiver shall be effective unless made in writing by the contracting officer.

VI TVA or its assigns shall have the right to enter upon any of the land affected by Contractor's mining operation at any time and without the necessity of giving notice for any purposes related to enforcing these reclamation and conservation requirements or observing mining or reclamation completed or in progress.

VII To assure satisfactory performance of these requirements it is agreed that

A For contracts having a delivery term of one year or more TVA will establish maintain and be custodian of a reclamation account in an amount equal to two percent (2%) of the first year face value of the contract. For the purposes of this provision the first year face value of the contract shall be determined as follows

[first year's scheduled tonnage] times [(the awarded contract price per ton) minus (in the case of coal purchased at an f o b destination steam plant price, the transportation cost per ton as quoted in the bid)]

TVA will until such time as the account is fully funded, or at such times as the fund is depleted on account of work performed as provided in subsection C, withhold from Contractor's invoices an amount to be determined as follows

4 percent of [tons invoiced] times [(the awarded contract price per ton) minus (any applicable transportation cost as described above)]

B For contracts having a delivery period of less than one year, TVA will establish and maintain a reclamation account in an amount equal to three percent (3%) of the face value of the contract. The face value of the contract shall be calculated and the account funded in the same fashion as that set forth in section A above.

C The reclamation account will be maintained by TVA until all of these requirements have been performed to TVA's satisfaction. In the event Contractor fails to perform these requirements to TVA's satisfaction, TVA shall give Contractor written notice of its nonperformance, specifying the particular reclamation and conservation provision(s) not performed. If the work is not then performed to TVA's satisfaction within 30 days, TVA may perform such work by using its own employees, by contracting for such work, or both. Regardless of the method used by TVA to perform such work, it shall have the right to use the reclamation account funds to pay for the direct reclamation costs plus applicable overheads, and general and administrative costs during the term of this contract. Without limiting in any way application of the requirements of this section, the provisions thereof shall be applicable during the contract term in the event contractor mines in an area identified as "unmineable" on the plan, whether or not the coal therein is delivered to TVA. In such event, TVA shall have the right in addition to all other rights hereunder to require such extra reclamation work as it deems appropriate provided, however that the cost of such extra work shall not exceed the sum of \$2,500 per acre.

D The reclamation account will be credited at the end of each calendar quarter with interest at the rate of six percent (6%) per annum, computed on that quarter's reclamation account minimum balance. Following the satisfactory completion of all reclamation work by Contractor or by TVA under the contract, the reclamation account balance on hand will be refunded to Contractor.

E In the event reclamation costs, including overhead and general and administrative costs, exceed that covered by the reclamation account, Contractor shall remain liable for all such excess cost.

VIII In addition to these provisions, this contract and the performance thereof shall be subject to all applicable Federal and state laws concerning reclamation provided, that should any standard or requirement of these provisions exceed a comparable standard or requirement in any state or Federal law then the standard or requirement contained in these provisions shall govern in the performance of this contract.

IX TVA reserves the right to require and Contractor agrees to perform over and above the requirements specified herein any "special or additional reclamation work" which TVA

APPENDIX V

deems necessary to ensure that the mining operation complies with TVA's overall policy for protection and enhancement of the environment. TVA agrees to compensate Contractor for the performance of such work in an amount to be mutually agreed upon before the commencement thereof. No work performed by Contractor shall be deemed 'special or additional reclamation work' for the purposes hereof unless it is so designated in writing by TVA.

TVA'S STATEMENT ON
BACKGROUND INFORMATION ON THE DEVELOPMENT OF
TVA RECLAMATION POLICIES

For many years there has been substantial legislation concerning underground mining, but until recently very little legislative or regulatory control has been applied to surface mining. About 1960 TVA began to encourage adoption of surface mine environmental protection legislation in the states in which it procures coal. By 1965 only three of the six states in which TVA then acquired coal had enacted such legislation and TVA decided to require reclamation as a part of its term contracts for procurement of surface mined coal. TVA believed this not only would result in reclamation by its suppliers but also would serve to promote better reclamation by the industry in general and stimulate the enactment of needed legislation. By 1969 all states in the area from which TVA procures coal had enacted legislation requiring reclamation, but with varying degrees of effectiveness. Since that time TVA has supported strengthening of these statutes and substantially stronger laws have been enacted in several of these states. In addition, TVA has supported the enactment of federal reclamation legislation.

TVA regards its reclamation program as a temporary one which will continue until such time as adequate regulation is established by appropriate state or federal units of government. It must be recognized that, since TVA has no regulatory authority in this area, inclusion of reclamation and conservation provisions in TVA's coal purchase contracts is entirely voluntary on TVA's part. To the extent TVA's contract reclamation requirements exceed the requirements of applicable state laws, they represent increased costs to TVA not experienced by other power producers. It must further be recognized that TVA does not dominate either the Appalachian or midwestern coal markets and that in the recent era of coal supply shortages TVA has had to take into account in the strengthening of its reclamation provisions the possibility that producers might rather sell their coal to other buyers than meet such requirements. Despite a critical coal shortage in 1970, TVA strengthened its provisions in that year and again substantially strengthened them in 1971.

Over the years TVA has conducted and participated in numerous research activities relating to reclamation, and the results of such research have been employed in the development of strengthened reclamation

May 22, 1972

APPENDIX VI

requirements. For example, TVA has experimented with and subsequently required the use of hydraulic seeding equipment for the application of seed, mulch and fertilizer as part of the reclamation process. Hydraulic seeding has now become the generally accepted seeding method in Appalachian mine areas. Similarly, TVA research has resulted in the development of requirements for the use of specific types of trees and shrubs in the reclamation process. The varieties involved grow quickly, are well suited to mine area soil conditions, and have been selected to provide wildlife food and cover. TVA is continuing research efforts, including a project to test the feasibility of virtual complete highwall elimination in steep slope contour mine areas.