

Sampling Surface Mine Lands Before And After Mining

V. P. Evangelou and R. I. Barnhisel*

Purpose Of Soil Sampling Surface Mine Lands

The purpose of sampling surface mine lands is to gather information on the physical and chemical characteristics of the area to help assure a successful reclamation effort. Laboratory analysis of a soil sample representative of the area can be used to evaluate deficiencies or toxicities for various crops, estimate nutrient needs, determine proper fertilizer applications and identify overburden layers that may be used for a topsoil substitute or rooting medium.

In order to gain an accurate assessment of the area, a number of factors should be considered when sampling. For example, is the area to be sampled prime farm land? Has it been mined? Future use of the land should also be considered when sampling an area. In other words, what is the primary intended use for the land? Is it simply to provide a cover to prevent erosion until trees are established or is the land to be used as cropland and/or for hay and pasture production? Answers to these questions can influence how, when and how many samples should be taken. In order for the county agricultural agent to give you the most accurate recommendations of your test results, fill in Section I and II carefully by checking the appropriate boxes on the SURFACE MINING OR MINED AREA SOIL SAMPLE INFORMATION SHEET (see Appendix A).

Importance of Representative Sampling

The most important factor that should be remembered when sampling is that the sample should be representative of the land in question. Very often this isn't easily done. An acre of mineral soil 6 inches deep weighs nearly 2 million pounds. A composite mineral soil sample of about a pint volume weighs about one pound and often represents anywhere from 10 to 20 acres. In the testing procedure, only a small fraction of that sample is actually used. This means the dilution factor can be at least one billion! Because of this, take care in sampling so that the laboratory tests accurately reflect the chemical nature of the area sampled. For this reason, do not make composite samples from too large an area.

Remember that the ultimate objective of spoil and/or soil sampling and testing is to correctly assess the chemical and physical properties of the area. This will lead to successful reclamation and at the same time bring economic savings.

THE COMPOSITE SAMPLE

In most cases single samples should be avoided since spoils and restored soils tend to be highly variable. In order to obtain a representative sample of an area, a composite sample may be necessary. If the cost of making a composite sample is prohibitive, as in taking several drill cores for an alternative top soil material, make sure the single core sample is not contaminated during collection from handling, storage or fluids from the drilling equipment. To this date there is no evidence that single core samples may represent a large geologic information, and for this reason they are not recommended as a sampling technique for an alternative topsoil material.

The composite sample should be made by mixing a number of individual samples taken from an area. Each individual site sample within the area should contribute the same amount of weight to the composite. By doing this, the composite sample test results should represent the area's average fertility level. If a composite sample represents diverse soils or spoil types, then the fertilizer and lime recommendations may be overestimated for certain portions of the field and underestimated for others. This can lead to only partial success in revegetation and the loss of time and money.

The number of composite samples needed to adequately represent an area and the number of subsamples needed for each composite sample will depend on the uniformity of the area to be sampled and, to some degree, on the objective of revegetation. In general, when dealing with highly uniform soils, a composite sample should not represent more than 10 acres and a minimum of 10 subsamples should be taken for each composite sample. Remember that the 10-acre area for each composite sample is the upper limit for size of area to sample. In many cases, 5 acres of land for each composite sample may be more realistic. And in some cases, when visual variability is obvious within an even smaller field, each area should be sampled separately so that it can be treated separately during revegetation.

*Extension Agronomy Specialist—Disturbed Land Reclamation and Professor of Agronomy specializing in reclamation research of drastically disturbed soils, respectively.

Sampling Equipment

There are several types of sampling tools: shovel, tile spade, probe, auger (Figure 1). Which one is used will depend on the type of soil or spoil material to be sampled. For example, in sampling spoils or cherty agricultural soils, a tile spade may work best (Figure 2). For chert-free agricultural soils, a soil probe is easy to use, relatively rapid and takes uniform size cores which is very important in taking composite samples (Figure 3). A soil probe may also work well in moist, weathered spoils. However, it does have some limitations as it does not move *well* in dry soils or rocky material.

An auger works better for dry soils or those with a hard subsoil. An auger is slower than the probe and will not work well in rocky material.

A shovel or a spade may be used to take a sample from any kind of material when a probe or an auger is not suited or not available.

A clean bucket (preferably plastic) is useful for collecting and mixing subsamples. A backpack may be useful for carrying composite samples. Quart-size heavy-wall plastic bags with a wire tab for sealing are recommended. Such bags prevent contamination with other composite samples etc., during transport until samples may be air dried. Water-proof felt -tip pens should be used to label these bags. However, "water-proof" inks are not always water-proof on plastic, so each pen should be checked.

Sample boxes for transporting air-dried samples to the Kentucky Agricultural Experiment Station laboratories may be obtained from the county agricultural agent.

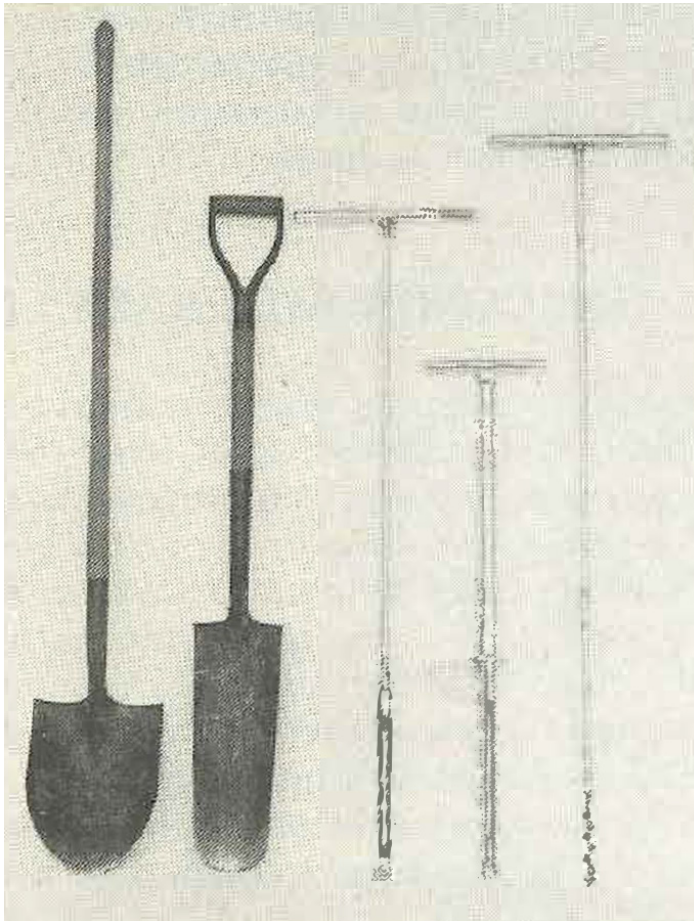


Figure 1. Sampling tools: (left to right) shovel, tile spade, regular probe, foot assisted probe, auger.

How to Take a Subsample

When using a probe or an auger to take a sample, the most important factor to remember is to insert the tool to the same depth for each sample. When using a shovel or a spade, the following procedure is recommended (Figure 4). First, make a vertical cut 4



Figure 2. A tile spade may work the best in sampling spoils or cherty soils.



Figure 3. A soil probe takes uniform size cores and is a relatively easy tool to use when conditions in the soil or spoil permit.

to 6 inches deep (depending on the material to be sampled) and discard it. Proceed by making a second cut 1 to 3 inches behind the first to obtain the sample. Then slice a band of soil 1 to 3 inches wide with a knife and place it in a plastic bucket. Discard any hard rock fragments larger than about 1/2 to 3/4 inches in diameter. It is important that each subsample contribute about the same amount of material to the composite sample. Be consistent with the dimensions of each slice.

How to Prepare a Composite Sample

The procedure for taking a composite sample is repeated 10 times at 10 different sites since 10 subsamples should be taken for each composite. The sampling sites should be chosen in random or zig-zag pattern. When all 10 subsamples have been added to the plastic bucket, mix them thoroughly by stirring. About one quart of the composite sample should be transferred to a plastic bag or some other type of container. Properly identify and label each sample (Figure 5).

The composite samples should then be spread out separately on clean paper in an area free of contaminants for drying. Don't allow the samples to mix and don't use artificial heat to hasten drying since this may change the test results. When the samples have air dried, place a portion of each into its own small paper box (which can be obtained from the county agent). Label each box correctly and then take it to the county agent for testing (Figure 6).

Soil Sampling Prior To Mining

Land being considered for surface coal mining needs to be characterized according to fertility level and potential agricultural productivity for mine permit purposes. Thorough sampling prior to mining is the initial step of any successful revegetation effort. It can also save money in the long run. For example, non-representative samples may lead to the storage of topsoil not suitable for revegetation as an alternative topsoil material. In this case, large amounts of lime and fertilizer may be necessary to establish vegetation. Poor quality topsoil may also lead to poor stand development which will require costly reseeding during revegetation.

When to Collect Pre-mined Samples

Topsoil samples can be obtained prior to mining at any time of the year. However, it is important the lab know the time of year the soil samples were collected. This can make some difference. For example, if soil samples are taken during heavy plant growth, a large percentage of available nutrients may be in the plant and not in the soil and low soil-test values may be obtained.

A mine operator should remember that it takes a minimum of three weeks for the analyses to be performed. This time lag must be considered so as not to delay the desired filing date for the permit application.

How to Sample Pre-mined Land

A soil survey map is a useful tool in soil sampling. Check with the local Soil Conservation Service to determine how to obtain a soil map. Such maps delineate and describe all the different soils within an area. Use the soil survey maps as a guide, however, not as the final word. Soils separated on maps may include variations in soil properties that could not be shown at the scale of mapping. Good advice is to check the soil (A horizon) and subsoil (B and

C horizons) with a soil probe or auger at different locations and observe if what you see is what the survey map describes. Then proceed to take composite samples as previously explained.

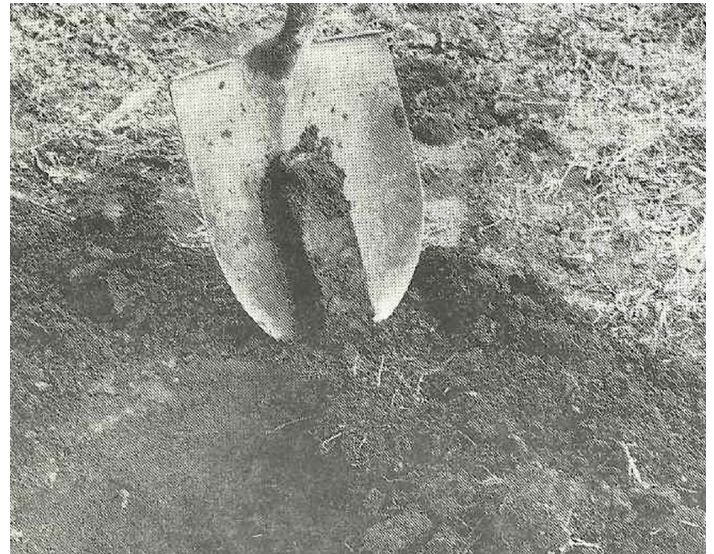


Figure 4. When using a shovel, the sample should be trimmed as shown.



Figure 5. The mixed composite sample should be transferred from the bucket to a container, such as a plastic bag, and taken to the drying area.

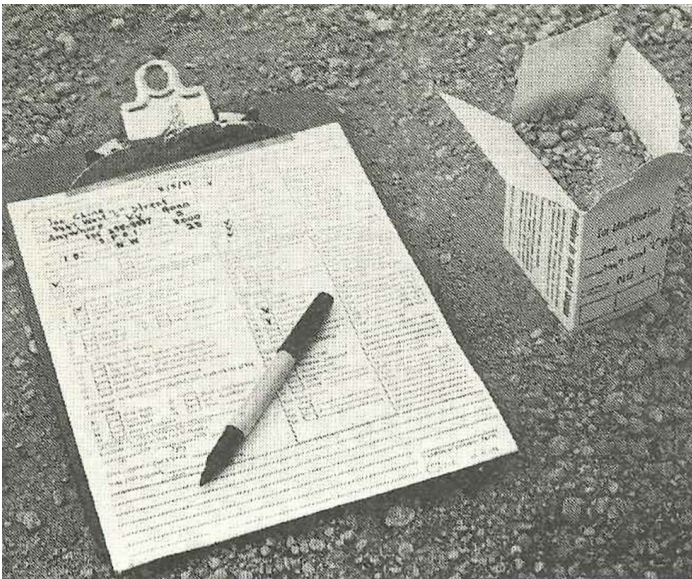


Figure 6. When the sample is air dry, fill a sample box, identify the sample with a notation on the box, fill out the information sheet and take the sample to the County Extension Office.

When sampling prime farmland, get composite samples from: (a) each different soil type. (b) any area with the same soil type that has a different cropping history, hence different fertilization practices and (c) any area within the same soil type that has erosion problems. Don't collect samples from: (a) back furrows and dead furrows, (b) old fence rows. (c) rows where fertilizer has been applied. (d) areas where animals congregate, i.e. near a water source or a shaded area or (e) areas used for manure or hay storage.

Samples should be taken at depths of 6 to 7 inches. When the topsoil is less than 6 inches thick, take the sample at a depth of at least 6 inches to include some subsoil.

How to Sample Subsoil

In sampling subsoil, use the same guides as for topsoil. Accurate survey maps normally have a good description of the subsoil. Follow the survey maps in making a composite sample. If they do not exist for the area to be sampled, use a probe or an auger to check the uniformity of the subsoil. When this has been established, proceed with the sampling of the area as discussed previously.

How to Sample Alternative Topsoil Material

When topsoil is lacking and subsoil is too poor to be used as topsoil, then another soil type material may be introduced as topsoil if there is enough of it. Under these circumstances, the operator may sample the highwall material as a source of alternative topsoil. Sampling highwall material may be a problem since only a small amount of it is exposed in relationship to the total amount that will be used as topsoil. This is a barrier to obtaining a good representative sample. In sampling highwall color and textural "feel" will be the primary criteria in making a composite sample. Assume that materials of the same color and textural "feel" are chemically similar and therefore qualify for composite samples. The textural "feel" can be examined by moistening the material and allowing it to disintegrate as does shale, a commonly used topsoil material. After disintegration, the material should be wet enough to be pliable. Rub it between the thumb and fingers.

A sandy material will feel scratchy or gritty. A silty material will feel slippery but not sticky and a high clay material will be both slippery and sticky. When material similar in color and textural "feel" has been identified, proceed with taking composite samples.

When using highwalls as a site for obtaining subsamples, a few points should be considered: (a) Select sites far away from areas where mining equipment has traveled heavily or has been stored. Dust and exhaust fumes may have contaminated the area. Analysis of samples taken from such sites will give results that are not representative of the material proposed as topsoil. (b) Always dig into the highwall to obtain samples that have not been in contact with the open environment. Exposed sites on highwalls may act like a wick causing an accumulation of salts and heavy metals. This may provide non-representative information.

Take composite samples from any type of material that has a potential to be used as topsoil. Individual drill core samples whose analysis will be used to evaluate a soil-like material as an alternative topsoil should be handled carefully since the potential for contamination around drilling equipment is great.

Mark the appropriate box in Section III "Sampled Prior to Mining" in the SURFACE MINING OR MINED AREA SOIL SAMPLE INFORMATION SHEET.

Soil And Spoil Sampling After Mining

Restored land that is to be revegetated should be sampled to assess the nutritional status of the soils and/or spoils. As with pre-mined lands, sample to a depth of 6 to 7 inches.

When to Sample Mined Lands

Samples should be collected soon enough ahead of the job to allow time for testing and preparation of recommendations from the laboratory analyses. This in turn will allow time for ordering seed, fertilizer and liming material, and will eliminate unnecessary delays in seeding. Remember, it takes a minimum of one and a half to three weeks, depending on the type of tests requested, for the soil to be analyzed and the results returned to the operator. In spoils, samples should be taken as soon as the rough grading is completed unless large movements of top material will be required in the final grading. Such activity may change the composition of the surface materials, especially if the spoils are a mixture of shale and sandstone.

How to Sample Restored Prime Land

Before sampling, inspect the whole area that you propose to sample. Identify the area on a map and differentiate the different soils by color and textural "feel." Take composite samples using the procedures described previously. If the color and texture varies within small areas, you can still include these areas in your composite sample with the precaution that the composite sample should be represented proportionally by these small areas.

How to Sample Topsoil or "A" Horizon of Restored Land

Inspect the area before proceeding with the sampling. Be careful when sampling restored topsoil since other material may have been incorporated during restoration and may have altered the uniformity. For this reason, inspect the whole area before sampling and use the same method and precautions that were used to sample prime land.

How to Sample Orphan Lands and Graded Spoils

Orphan lands are those that have been mined prior to existing regulations but may be similar to spoils that were abandoned after a revegetation attempt had failed. They may also be lands where revegetation was never attempted. In either case, some vegetation may exist. Before proceeding to sample such land, make a reconnaissance survey of the area. Note on a map the locations of various vegetation, areas of no vegetation and eroded areas. Areas that appear uniform in color and composition should also be identified on the map. Take a separate composite sample from each where color, composition and vegetation are similar. Areas that appear "greasy" or have no vegetation should be sampled separately since the amount of lime required may differ significantly from areas with vegetation. Special treatment of these "greasy" areas may reduce the overall reclamation costs. If the grading has been completed, it may be useful to mark these isolated areas that have similar color rock material and textural "feel" by color-coded plastic flags or stakes. This will aid the person applying the liming material in locating the separate treatment areas.

In sampling freshly re-graded spoils, alternative topsoil material or abandoned lands, take care to make the composite samples equally represented by the individual samples. It was recommended earlier that for pre-mined areas, rock fragments of 1/2 to 3/4 inches should be discarded. Such a practice on orphan spoils or graded lands may result in a nonrepresentative composite sample. For this reason, it is recommended that stony rock fragments be discarded. If fragments are shaly, they should be kept. Shale may disintegrate easily in rainwater and develop soil-like qualities.

Be sure to mark the appropriate box under Section III, Part B on the sample form.

Surface Mining Or Mined Area Soil Sample Information Sheet

A supply of the SURFACE MINING OR MINED AREA SOIL SAMPLE INFORMATION SHEET can be obtained from the county agricultural agent (Appendix A). A completed form should accompany each sample submitted to your county agent. This form has been especially designed for pre-mined lands, restored AGR-41 soils and graded spoil materials. Do not use this form for other purposes. Be sure that all the appropriate boxes are filled with the appropriate information. If you have questions about this form, contact your county agent.

Sample Accuracy

In order for a reliable recommendation to be made, it is important that the soil or spoil sample accurately represents the area from which it was taken. Analytical results reported on the soil or spoil test form are for the sample submitted and the recommendations given are based on those results. All recommendations are made on the assumption that representative soil or spoil samples were properly taken. If sampling procedures are questionable, accurate recommendations cannot be assured.

Acknowledgment

The authors wish to acknowledge the assistance of their colleagues in preparing this manuscript, especially Mr. Glenn Kelley of the Soil Conservation Service. Dr. Willie R. Curtis, U.S. Forest Service, Berea. Mr. Jim Villines, Director of the Division of Standards and Specifications and Mr. Joey Roberts, Division of Reclamation, Frankfort.

Cooperative Extension Service

Agriculture and Natural Resources
Family and Consumer Sciences
4-H Youth Development
Community and Economic Development

MARTIN-GATTON COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT

Educational programs of Kentucky Cooperative Extension serve all people regardless of economic or social status and will not discriminate on the basis of race, color, ethnic origin, national origin, creed, religion, political belief, sex, sexual orientation, gender identity, gender expression, pregnancy, marital status, genetic information, age, veteran status, physical or mental disability or reprisal or retaliation for prior civil rights activity. Reasonable accommodation of disability may be available with prior notice. Program information may be made available in languages other than English. University of Kentucky, Kentucky State University, U.S. Department of Agriculture, and Kentucky Counties, Cooperating.

Lexington, KY 40506 Revised 02-2025



Disabilities accommodated with prior notification.

Appendix A

This is the official SURFACE MINING OR MINED AREA SOIL SAMPLE INFORMATION SHEET. The quality of the recommendations that you receive will depend on the accuracy with which this form is completed. Carefully read it and understand it before you proceed to fill it out.

UNIVERSITY OF KENTUCKY
 Department of Agronomy College of Agriculture Cooperative Extension Service Division of Regulatory Services
SURFACE MINING OR MINED AREA SOIL SAMPLE INFORMATION SHEET

<p>SECTION I. IDENTIFICATION (Please print) DATE: _____</p> <p>Name _____</p> <p>Address _____</p> <p>City _____ State _____ Zip _____</p> <p>Telephone Number _____ / _____ Acres: _____</p> <p>Sample Identification <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> Permit No. _____</p> <p>Slope <input type="checkbox"/><input type="checkbox"/> % Aspect <input type="checkbox"/><input type="checkbox"/> Acres in Permit _____</p> <p>Projected Use After Reclamation (Mark (x) one only).</p> <table style="width: 100%;"> <tr> <td><input type="checkbox"/> Cropland</td> <td><input type="checkbox"/> Forestry</td> </tr> <tr> <td><input type="checkbox"/> Pasture</td> <td><input type="checkbox"/> Wildlife/Recreation</td> </tr> <tr> <td><input type="checkbox"/> Hay</td> <td><input type="checkbox"/> Other _____</td> </tr> </table>	<input type="checkbox"/> Cropland	<input type="checkbox"/> Forestry	<input type="checkbox"/> Pasture	<input type="checkbox"/> Wildlife/Recreation	<input type="checkbox"/> Hay	<input type="checkbox"/> Other _____	<p>SECTION II. TEST(S) TO BE MADE</p> <p>04 <input type="checkbox"/> Reclamation Test (P, K, pH, buffer pH)</p> <p>11 <input type="checkbox"/> Calcium-Magnesium Option (P, K, pH, buffer pH, Ca, Mg)</p> <p>06 <input type="checkbox"/> Acid Spoil Test (P, K, pH, buffer pH, PA, EF)</p> <p>OM <input type="checkbox"/> Organic Matter</p> <p>WH <input type="checkbox"/> Water Holding Capacity</p> <p>TC <input type="checkbox"/> Textural Class</p> <p>Other, Specify _____</p>	<p>SECTION VI. Lab Use Only</p> <p>SECTION VII. <input type="checkbox"/> For County Use Only</p> <p><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> County Code</p> <p><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> County Sample #</p> <p>TEST RESULTS <input type="checkbox"/></p> <p>P _____ lbs/A K _____ lbs/A pH _____ buffer pH _____ Ca _____ lbs/A Mg _____ lbs/A PA _____ T/A OM _____ % WH _____ % TC _____ % _____ % Sand _____ % Silt _____ % Clay Al _____ ppm mg/l Fe _____ ppm mg/l Mn _____ ppm mg/l Na _____ ppm mg/l Ca _____ ppm mg/l Mg _____ ppm mg/l TD _____ ppm mg/l SAR _____</p> <p>RECOMMENDATIONS:</p> <p>N _____ lbs/A P₂O₅ _____ lbs/A K₂O _____ lbs/A Lime _____ T/A</p>								
<input type="checkbox"/> Cropland	<input type="checkbox"/> Forestry															
<input type="checkbox"/> Pasture	<input type="checkbox"/> Wildlife/Recreation															
<input type="checkbox"/> Hay	<input type="checkbox"/> Other _____															
<p>SECTION III. TYPE OF MATERIAL (Use Part A OR Part B, NOT BOTH)</p> <p>Part A. Sampled Prior to Mining; Mark (x) one only</p> <p>02 <input type="checkbox"/> Top Soil, "A" Horizon</p> <p>04 <input type="checkbox"/> Subsoil <input type="checkbox"/> "B" <input type="checkbox"/> "C" Horizon (✓ one)</p> <p>08 <input type="checkbox"/> Alternative Material (for Top Soil)</p> <p>90 <input type="checkbox"/> Other _____</p> <p>If "Alternative" Marked, then Mark (x) one of the following:</p> <table style="width: 100%;"> <tr> <td>10 <input type="checkbox"/> Gray Shale</td> <td>16 <input type="checkbox"/> Cast Overburden</td> </tr> <tr> <td>12 <input type="checkbox"/> Dark Shale</td> <td>92 <input type="checkbox"/> Other _____</td> </tr> <tr> <td>14 <input type="checkbox"/> Sandstone</td> <td></td> </tr> </table> <p>Part B. Sampled After Mining</p> <p>22 <input type="checkbox"/> Prime Land (Top Soil or "A" Horizon)</p> <p>24 <input type="checkbox"/> Top Soil or "A" Horizon of Restored Land</p> <p>26 <input type="checkbox"/> Orphan (Surface 6" of Abandoned Land)</p> <p>28 <input type="checkbox"/> Graded Spoil or Alternative Top Soil Mixture</p> <p>94 <input type="checkbox"/> Other _____</p> <p>If "Orphan" or "Graded Spoil" Marked, then Mark (x) one of the following:</p> <table style="width: 100%;"> <tr> <td>30 <input type="checkbox"/> Gray Shale</td> <td>38 <input type="checkbox"/> Shale - Soil Material</td> </tr> <tr> <td>32 <input type="checkbox"/> Dark Shale</td> <td>40 <input type="checkbox"/> Soil - Sandstone</td> </tr> <tr> <td>34 <input type="checkbox"/> Sandstone</td> <td>96 <input type="checkbox"/> Other _____</td> </tr> <tr> <td>36 <input type="checkbox"/> Shale - Sandstone</td> <td></td> </tr> </table>	10 <input type="checkbox"/> Gray Shale	16 <input type="checkbox"/> Cast Overburden	12 <input type="checkbox"/> Dark Shale	92 <input type="checkbox"/> Other _____	14 <input type="checkbox"/> Sandstone		30 <input type="checkbox"/> Gray Shale	38 <input type="checkbox"/> Shale - Soil Material	32 <input type="checkbox"/> Dark Shale	40 <input type="checkbox"/> Soil - Sandstone	34 <input type="checkbox"/> Sandstone	96 <input type="checkbox"/> Other _____	36 <input type="checkbox"/> Shale - Sandstone		<p>SECTION IV. PLANT SPECIES TO BE GROWN (Mark (x) or write the names of the species).</p> <p>Crops</p> <p>18 <input type="checkbox"/> Corn</p> <p>50 <input type="checkbox"/> Soybeans</p> <p>86 <input type="checkbox"/> Other _____</p> <p>88 <input type="checkbox"/> Other _____</p> <p>Pasture/Hay</p> <p>02 <input type="checkbox"/> Alfalfa</p> <p>16 <input type="checkbox"/> Birdsfoot Trefoil</p> <p>22 <input type="checkbox"/> Fescue, Tall</p> <p>36 <input type="checkbox"/> Orchardgrass</p> <p>38 <input type="checkbox"/> Red Clover</p> <p>43 <input type="checkbox"/> Ryegrass, perennial</p> <p>90 <input type="checkbox"/> Other _____</p> <p>92 <input type="checkbox"/> Other _____</p> <p>Wildlife/Recreation/Forestry</p> <p>03 <input type="checkbox"/> Alfalfa</p> <p>23 <input type="checkbox"/> Fescue, Tall</p> <p>45 <input type="checkbox"/> Ryegrass, perennial</p> <p>55 <input type="checkbox"/> Sweet Clover</p> <p>29 <input type="checkbox"/> Lespedeza, Sericea</p> <p>94 <input type="checkbox"/> Other _____</p> <p>96 <input type="checkbox"/> Other _____</p> <p>List Tree Species</p> <p>97 <input type="checkbox"/> _____</p> <p>98 <input type="checkbox"/> _____</p> <p>99 <input type="checkbox"/> _____</p>	<p>SECTION V. FERTILIZER-LIME HISTORY</p> <p>Fertilizer Applied in The Past 12 Months:</p> <p>_____ lb/A _____ lb/A _____ lb/A</p> <p>N P₂O₅ K₂O</p> <p>Lime Applied in Past 3 Years: _____ T/A</p> <p>Date Lime Applied: _____ _____ Month _____ Year</p>
10 <input type="checkbox"/> Gray Shale	16 <input type="checkbox"/> Cast Overburden															
12 <input type="checkbox"/> Dark Shale	92 <input type="checkbox"/> Other _____															
14 <input type="checkbox"/> Sandstone																
30 <input type="checkbox"/> Gray Shale	38 <input type="checkbox"/> Shale - Soil Material															
32 <input type="checkbox"/> Dark Shale	40 <input type="checkbox"/> Soil - Sandstone															
34 <input type="checkbox"/> Sandstone	96 <input type="checkbox"/> Other _____															
36 <input type="checkbox"/> Shale - Sandstone																

Signature of Extension Agent

PAID RS-50-01d

Instructions for Surface Mining or Mined Area Information Sheet

1. Samples must be submitted through your County Extension Agent in boxes furnished by the Agent, No sample will be tested unless it is in the pint box and is accompanied by the properly completed form,
2. A full box of material is required for each of the following tests: water holding capacity and saturation extract. If other tests are desired, submit an additional box full.
3. Explain any management or plant problems associated with the sample to the County Agent so he can consider this in any subsequent recommendation.
4. Sections I, II, III, IV and V are to be completed by the person doing the sampling. Section VI is for use of the Central Laboratory only. Section VII except for TEST RESULTS is to be completed by the County Agent.

SPECIFIC:

- Section I Print name, address and date; include zip code. Sample Identification - any combination of numbers or letters that will identify the location of the sampled area, for example, SPOI, TR21, VETA, SOBY, etc. Mark (x) the appropriate box to indicate the projected use of the land after reclamation. Aspect is the direction the slope is facing: N, E, S, W, NE, NW, etc.
- Section II Mark (x) the appropriate box for the tests desired, a brief description of the tests follows:
- RECLAMATION TEST: P - phosphorus, K - potassium, pH - water pH, buffer pH - SMP buffer
- CALCIUM-MAGNESIUM OPTION: Same as reclamation test plus Ca - calcium and Mg - magnesium (ammonium acetate extracts)
- ACID SPOIL TEST: Same as reclamation test plus PA - potential acidity and EF - effervescence in 6N HCl
- OM: organic matter
- WH: water holding capacity
- TC: textural classification
- SATURATION EXTRACT: If pH of the saturation extract is 5.5 or less then Fe (iron), Mn (manganese), Al (aluminum), and TD (total dissolved solids) will be determined and reported as milligrams per liter (mg/l).
- If pH is greater than 5.5 but less than 8.5 then only TD will be determined (mg/l).
- If pH is equal to or greater than 8.5 then Na (sodium), Mg (magnesium), Ca (calcium), and TD will be determined and a SAR (sodium adsorption ratio) will be calculated.
- EXTRACTABLE ELEMENTS: If the water pH is 5.5 or less then ammonium chloride extracts **will** be taken and analyzed for Fe (iron), Mn (manganese), and Al (aluminum) and reported as ppm.
- If the water pH is greater than 5.5 then an ammonium acetate extract will be taken and analyzed for Na (sodium), Ca (calcium), and Mg (magnesium) and reported as ppm.
- Section III Use either Part A OR Part B (NOT BOTH). Mark (x) the box that describes the area from which the sample was obtained. Note the additional information required for the "if" statements.
- Section IV Fill in the appropriate box or boxes. If crops to be grown are not listed on the form then write them in under "Other".
- Section V Fertilizer - Write in pounds of N, P₂O₅ and K₂O applied per acre to the sampled area in the past 12 months. Limestone - Write in the tons of agricultural limestone applied per acre to the sampled area in the past 3 years. Enter month and year of last application,
- Section VI For Central Laboratory Only.
- Section VII For County Use Only except for TEST RESULTS. Write in the County Code and County Sample Number. Recommendations are to be made by the County Agent based on information indicated in the form.