

APPENDIX II
Soil Testing Plan

After rough backfilling and grading, Alcoa will place permanent markers on 500-foot centers in the regraded area to delineate a 5.7-acre grid system for monitoring postmine soil quality. Such markers will be maintained until release of the land from all reclamation obligations. The soil grid map is provided as Plate .145-C1.

Initial soil sampling will consist of composite samples from grids no larger than 5.7 acres. Adjacent soil samples will be collected no less than 200 feet apart. One composite sample per depth increment will be obtained by collecting one sub-sample per acre from the available sampling area within each grid or partial grid. If grids are less than 2.0 acres in size, they may be combined with an adjacent grid for reporting purposes. No more than two adjacent grids will be combined into a composite sample. If a grid is greater than or equal to 0.5 but less than 2.0 acres, additional sampling will be conducted on 200-ft centers. Composite samples will be representative of the 0-1 ft and 1-4 ft depth increments in topsoil-substitute scenarios. The samples will be collected using standard techniques for sampling soils. The samples will be collected, analyzed, and the results reported to the Commission within two years following rough backfilling and grading. This period allows sufficient time for additional reclamation efforts if the soil suitability criteria are not immediately met. Alcoa will submit minesoil-monitoring results prior to the initiation of the extended responsibility period (ERP) and prior to Phase I bond release. Partial grids, sampled for inclusion in an ERP or bond release application, will be designated by the grid number followed by the suffix “-1”, (hyphen 1). Subsequent sampling(s) will be designated by the suffix “-2” etc. This procedure will allow partially-reclaimed grids, e.g., those occupied by temporary structures, to enter into the ERP and to receive bond release in a timely manner. The sampled portion of these partial grids will be marked in the field and will be designated on maps provided with initial soil testing reports and bond release and ERP applications.

The surface 0-1 ft composite samples will be analyzed for the following parameters:

1. pH
2. Potential acidity
3. Exchangeable acidity
4. Neutralization potential
5. Acid/base accounting = Neutralization potential - (Potential acidity + Exchangeable acidity)
6. Texture - sand, silt, and clay: USDA-NRCS
7. Nitrate-nitrogen
8. Plant available phosphorus, potassium, calcium, and magnesium
9. Cation exchange capacity
10. Sulfur forms (pyritic, organic, total, sulfate)

The 1-4 ft composite samples will be analyzed for the following parameters:

1. pH
2. Potential acidity
3. Exchangeable acidity

4. Neutralization potential
5. Acid/base accounting = Neutralization potential - (Potential acidity + Exchangeable acidity)
6. Texture – sand, silt, and clay: USDA-NRCS
7. Cation exchange capacity
8. Sulfur forms (pyritic, organic, total, sulfate)

In addition to the above analyses, a random ten percent of the grids (entire top four feet) will have the following analyses performed:

1. Electrical conductivity
2. Sodium adsorption ratio
3. Total Cd, Mo, Se and hot-water-extractable B

Analytical procedures will be in accordance with RCT recommendations dated May 16, 1989, including Attachment A (Overburden Parameters and Procedures) and Attachment B (Soil Testing Procedures, March 1980, Texas Agricultural Extension Service) for plant-available nutrients.

The analytical results and a map showing the area represented by each composite sample shall be submitted to the Commission, in hard copy and digital formats, by the end of the first quarter of the following year. The map shall illustrate the following information:

- A. A grid system of the mine area consisting of 5.7 acres each. Each sampled grid will be labeled for identification;
- B. Index marks identifying the Texas coordinate numbering system.

The statistical soil baseline will serve as the basis for determining postmine soil quality pertaining to the presence of acid- or toxic-forming materials as discussed in §12.386 of the Regulations. Alcoa Inc. proposes to use a banking method to establish postmine-soil suitability by comparison of premine and postmine acreage exceeding baseline soil-quality criteria. The bank area is delineated by the actual and projected extent of soil disturbance within the approved permit boundary. The bank area will follow permit revisions for the life-of-the-mine, irrespective of permit terms or other time constraints.

The proposed substitute material in the one- to four-foot zone is of the same origin as the proposed topsoil-substitute material. Therefore, it is projected to have comparable qualities for root development as the topsoil-substitute material. Final demonstration of quality will be based on postmine productivity. Prime farmland soils will be replaced in the same manner and reverse sequence as they were removed; therefore, reclaimed prime farmland soils are projected to have identical qualities for root development as the premine prime farmland soils since they are the same soils. Final demonstration of quality will be based on postmine productivity.

Postmine-soil performance standards for these parameters are described in the following tables:

**POSTMINE-SOIL PERFORMANCE STANDARDS
AREALLY WEIGHTED FREQUENCY DISTRIBUTIONS**

pH

Soil Depth	4.0 - 4.4	4.5 - 4.9
	-----% area-----	
0 - 12"	-	7
12"- 48"	1	16

**ACID-BASE ACCOUNTING (ABA)
Tons/1000 Tons (t/kt)**

Soil Depth	-7	-6	-5	-4	-3	-2	-1
	-----% area-----						
0 - 12"	-	-	-	-	-	1	7
12"- 48"	-	1	1	10	8	8	21

SAND (%)

Soil Depth	81%-85%	86%-90%	91%-95%
	-----% area-----		
0 - 12"	11	10	1

CLAY (%)

Soil Depth	41% -45%	46% - 50%	51% - 55%
	-----% area-----		
0 - 12"	1	1	1

ELECTRICAL CONDUCTIVITY (EC) ≤ 4 mmhos/cm

Soil Depth	--% area--
0 - 12"	100
12" - 48"	100

SODIUM ADSORPTION RATIO (SAR) ≤ 13

Soil Depth	--% area--
0 - 12"	100
12" - 48"	100

BORON (B) ≤ 5 ppm

Soil Depth	--% area--
0 - 12"	100
12" – 48"	100

CADMIUM (Cd) ≤ 0.7 ppm

Soil Depth	--% area--
0 - 12"	100
12" – 48"	100

MOLYBDENUM (Mo) ≤ 5 ppm

Soil Depth	--% area--
0 - 12"	100
12" – 48"	100

SELENIUM (Se) ≤ 2 ppm

Soil Depth	--% area--
0 - 12"	100
12" – 48"	100

The 0 - 1' interval will be sampled for fertilizer augmentation and analyzed for pH, nitrate-nitrogen, and plant-available P, K, Ca, and Mg, according to the methods for plant-available nutrients found in RCT overburden parameters and procedures list, at the end of the growing season in the year prior to the first year of productivity assessment and during the first and second years of productivity assessment. Samples will be collected and analyzed for nutrients prior to the first and second years of productivity assessment when the years of assessment are nonconsecutive. Prime farmland reclamation areas will be sampled prior to and during each of the three years of productivity assessment. No fertilizer is applied after the second year of ERP in areas where trees are planted; therefore, Alcoa proposes to omit areas with trees from fertilizer augmentation sampling. Analytical results and a map showing the area involved will be provided to the Commission by the end of the first quarter of the year following each reporting period.

Sub-samples will be collected from areas of like land use and management within ERA's (management units) at a rate of approximately one sub-sample per 10 acres. Composite sub-samples will represent management units no larger than 100 acres for sampling and monitoring purposes. Management units larger than 100 acres will be subdivided into approximately equal proportions, or where practicable, for sampling and monitoring purposes, each part being no larger than 100 acres. A 5.7-acre grid line or a natural boundary, such as a road or an

obvious land use change, will serve as the dividing line for separating sampling units.

During the fourth year of the ERP, a random 10% of the 5.7-acre postmine soil monitoring grids will be resampled by 0-1' and 1'-4' intervals and analyzed for the following parameters: pH, acid-base accounting, texture, and cation exchange capacity. Results from these analyses will be provided to the Commission by the end of the first quarter of the fifth year of the ERP.

In the event the postmine soil-monitoring program identifies possible AFM/TFM problems, an alternate soil-monitoring program will be initiated that will identify the extent of the soil problem. Composite samples will be collected and analyzed for those parameters identified in the postmine monitoring program as a potential problem. Following treatment and re-sampling, analysis results, and a map showing impacted areas will be reported to the Commission to verify the successful correction of the soil problem previously identified in the postmine soil-monitoring program.