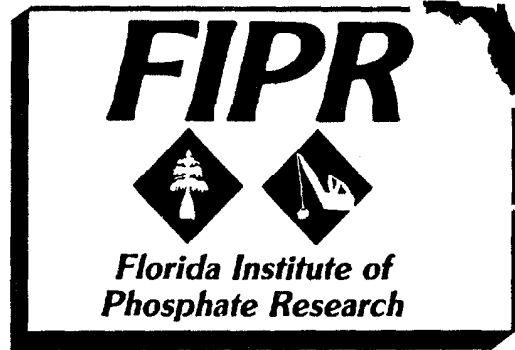


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**AN INVESTIGATION OF THE CURRENT  
STATUS OF CITRUS PLANTINGS ON  
RECLAIMED LAND IN CENTRAL  
FLORIDA**



Prepared By

Zellars-Williams, Inc.

Under a Grant Sponsored by the  
**Florida Institute of Phosphate Research**  
Bartow, Florida

March 1988



The Florida Institute of Phosphate Research was created in 1978 by the Florida Legislature (Chapter 378.101, Florida Statutes) and empowered to conduct research supportive to the responsible development of the state's phosphate resources. The Institute has targeted areas of research responsibility. These are: reclamation alternatives in mining and processing, including wetlands reclamation, phosphogypsum storage areas and phosphatic clay containment areas; methods for more efficient, economical and environmentally balanced phosphate recovery and processing; disposal and utilization of phosphatic clay; and environmental effects involving the health and welfare of the people, including those effects related to radiation and water consumption.

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**AN INVESTIGATION OF THE CURRENT STATUS OF CITRUS PLANTINGS  
ON RECLAIMED PHOSPHATE LAND IN CENTRAL FLORIDA**

**FINAL REPORT**

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**March 1987**

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## PERSPECTIVE

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Despite the fact that surface mining for phosphate ore in the Bone Valley of central Florida is geographically coincident with the state's most productive citrus-growing area, little reclaimed land has been devoted to citrus groves. Citrus requires a well-drained, but not particularly fertile soil. It also requires a site that is free from prolonged sub-freezing temperatures. Traditionally, the best citrus land in central Florida has been the sand hills of the Lake Wales and Winter Haven Ridges, preferably in areas bordered on the north by a lake for cold protection. Nearly all of the best citrus land has either already been planted in citrus or developed for other purposes. Moreover, in recent years a considerable acreage of prime citrus land has been lost to urbanization.

Since citrus grows best in well-drained soils with minimal quantities of clay, quartz sand tailings from phosphate ore beneficiation may be a good medium for citrus if properly amended. These same characteristics, however, make tailings a poor soil for general agriculture. In fact, sand tailings are rarely left exposed on the surface of reclaimed land any longer except where the droughty nature of the material is an asset, as in xeric ecosystem reclamation. More commonly, tailings are used to fill mining cuts, then are capped with a layer of overburden to improve soil fertility, structure, and moisture retention.

Given the poor agricultural character of the sand, it seems anomalous that the majority of agricultural research on reclaimed land until recently has been conducted on tailings. In May 1968, Hortenstine and Rothwell, two researchers from the University of Florida, incorporated composted municipal waste and commercial fertilizer into sand tailings plots and planted sorghum and oats. Cation exchange capacity, water holding capacity, conductivity, and organic matter content were increased by the compost, but yields remained poor. When fertilizer was added to the compost, yields increased greatly over treatments using either compost or fertilizer alone (Hortenstine and Rothwell 1972).

Two other University of Florida investigators, Mslevy and Blue (1981), began similar experiments on sand tailings in 1976. Instead of using municipal waste compost, Mslevy and Blue experimented with phosphatic clay, clay and sewage sludge, and clay and topsoil. Their experimental plants included tropical forage grasses, forage legumes, and summer annual grasses. In general, amending the tailings with phosphatic clay and sewage sludge or topsoil produced better yields of the grasses, although yield increases in the perennial species

disappeared after the second year. The forage legumes were beset with problems, but generally showed little response to the soil amendments. Nonetheless, the results indicated that relatively low forage yields of good quality and adequate nutritional content for beef cattle can be produced on tailings.

In 1986, the Institute sponsored the Zellars-Williams Company of Lakeland to study citrus planted on reclaimed land. This report presents the findings of the survey. Zellars-Williams identified 23 plantings on mined and reclaimed land. Most of the plantings are small (less than 30 acres), and most are on overburden, although some are on sand tailings, tailings capped with overburden, and on a mixture of sand tailings and phosphatic clay. Contrary to widely held opinion, Zellars-Williams found that most of the groves are performing at least as well as groves established on unmined land in the same area, and the perception that citrus groves are not viable following reclamation may be the result of a few highly visible, untended groves on poor soil that have failed in recent years.

The Institute is providing support for another citrus-related project, but the research is not being conducted on reclaimed land. Researchers at the U.S. Department of Agriculture's Agricultural Research Center in Orlando have indications that soils rich in calcium tend to suppress root rot diseases. These scientists are trying to develop citrus soils with improved fertility and disease suppressiveness through the addition of calcium sulfate in the form of phosphogypsum, a waste from the manufacture of phosphate fertilizer. Phosphatic clay is also being incorporated in the soil to improve the moisture retention.

In this project, "Use of Phosphatic Clay and Phosphogypsum to Modify Soils for Improved Nutrition, Soil Structure, and a Suppressiveness to Citrus Root Diseases" (FIPR #85-03-064), the two principal amendments have been mixed deeply into the soil in new plantings along Florida's east coast and near Bartow. The plan of study calls for monitoring tree health, fruit yield, soil microbiology, and physical characteristics of the soil over a period of three years with support from the Institute and for an additional ten years afterward.

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## **EXECUTIVE SUMMARY**

1. The search for unidentified parcels was thorough. Twenty-three plantings of citrus on land reclaimed from phosphate mined areas were located.
2. These plantings were relatively small, ranging from 0.75 to 80 acres. Over 50% of the plantings were 30 acres or less and only three were larger than 50 acres.
3. Most of the plantings were on overburden and only one was on sand tailings. Some were on sand tailings with an overburden cap and two were a sand tailings-phosphatic clay "mix" of approximately a 4:1 or higher ratio. Several plantings were among finger lakes and one consisted of sand tailings covered with overburden and capped with 8-inches of trucked in top soil.
4. All plantings were visited and evaluated and 11, which are representative of the plantings, were selected for more detailed study.
5. Observations and soil analyses data showed clearly that terms such as overburden and sand tailings are very general and the soil characteristics of each varied considerably.
6. The reclaimed sites were well-drained to over-drained and two had pockets of fine textured material that resulted in wet spots and tree decline.
7. Freeze damage during the past few years complicated the evaluation of some groves.
8. It is obvious that a number of reclaimed sites had been elevated above the surrounding ones and given a slope that made them warmer. The finger lake sites were also quite warm and undamaged. The ability to



produce reclaimed sites that are warmer than surrounding ones should be considered if citrus is to be produced on them.

9. The successful plantings found on sites reclaimed with overburden indicate clearly this type of reclamation is sound. Those plantings on overburden that failed were due to lack of care and not to soil characteristics.
10. The experimental sand-clay mix sites can not be evaluated with any confidence because trees are too young. From the growth made to date, and the soil analyses, it appears trees can be grown successfully on such sites if proper care is given, including irrigation.
11. Trees on sand tailings with an overburden cap are also too young to assess with confidence. Much will depend on the depth of the cap and the nature of the overburden. Uneven settling and wet spots due to pockets of clay appear to be problems.
12. There is insufficient information on which to evaluate sand tailings alone as a soil for citrus. From the limited observations made, it is speculated that trees could be successfully produced on sand tailings if adequate irrigation water is applied and care given. costs of production would, however, be higher than on better soils and the plantings might not be profitable.

The only planting on sand tailings (IMC 3) was not irrigated or given proper care. It was abandoned in 1962.

13. All things considered, citrus appears a very good candidate crop for properly reclaimed land. Citrus tolerates a wide range of soil types, but good water drainage and a warm site are absolute necessities. Even overdrained coarse sands can be utilized, but profitability of citrus on them becomes questionable.

## INTRODUCTION

In April 1986, the Florida Institute of Phosphate Research selected the Zellars-Williams Company and Dr. A. H. Krezdorn to conduct a survey of citrus plantings on reclaimed phosphate lands. The Institute specified the objectives to be met by the study, and provided a preliminary listing of parcels thought to have notable citrus plantings.

The investigation was conducted during Summer and Fall, 1986, and all objectives were fully met. Fifteen parcels beyond the original eight identified by the Institute were found and evaluated - data for all 23 are presented in this report.

The plantings investigated represented a broad spectrum of soil and drainage conditions, site histories, and grove management practices. In many instances, successful groves on reclaimed land performed at least as well as counterparts on unmined land. Where observed plantings on reclaimed land have failed, the cause has primarily been lack of grove maintenance, particularly irrigation or abandonment. With proper planning and proper care, citrus groves on mined phosphate land appear to represent a viable and important reclamation alternative.

Over 130,000 acres of land have been mined for phosphate in Polk County alone, and it is estimated that 200,000 acres will have been mined by the year 2000. By that date, mining for phosphate will have been completed in this area and operations will have moved to counties farther south.

The mining operation consists of stripping off up to 60 feet of soil (the overburden) in order to mine and hydraulically transport the phosphate ore or matrix underneath. In the hydraulic processing operation, phosphatic clays and sand tailings are waste products. Clays and sand tailings are, respectively, less and greater than approximately 106 microns in diameter.

These are mining and not agricultural terms. The U.S. Department of Agriculture has classified soils on the basis of texture or particle size into 5 categories of sand (very coarse, coarse, medium, fine and very

fine), silt and clay (Table 1.2). A clay, by agricultural standards, has a particle size of 2.0 microns or less, and the phosphatic clays of the mining industry would include very fine sand, silt and clay. Even so, the phosphatic clay residue from mining has many of the properties of clays in that it absorbs and holds much water; it is sticky and plastic, and very difficult to cultivate. The sand tailings include sands ranging from very coarse to fine. They tend, however, to be coarse and overdrained.

The termination of phosphate mining in Polk County and certain adjoining areas after the turn of the century will reduce the county tax base and eliminate many jobs. Prior to reclamation, large areas of land are characterized by open pits, clay settling ponds and piles of sand tailings and overburden. Within the limits imposed by economic feasibility, the phosphate industry has the ability to reclaim these disturbed areas to a wide range of landforms. Much land has already been reclaimed, particularly for pastures. The potential exists to broaden the approach to reclamation, providing better accommodation of Polk Country's non-phosphate future.

#### OBJECTIVES

The general area of phosphate mining is in the heart of the important citrus production and processing region. In fact, phosphate companies have bought citrus orchards underlain by phosphate and exploited the areas for mineral resource recovery.

Citrus is an important crop because of the region's climate and suitable soils. Thus, it would appear reasonable to attempt to reclaim a portion of the mined areas in such a manner that citrus could be economically grown. The phosphate mining activity need be only a temporary land use.

Many years are required to produce a mature citrus orchard. Approximately 25 years are required for sweet orange trees planted at 2.5 x 25 ft. to attain maximum production. About 5 years are required before trees produce sufficient fruit to pay for costs of production. Even at 15 x 20 ft. spacings, 13-15 years are required to reach maximum production per acre.

While this does not rule out conducting research with new plantings on land reclaimed in various ways, it does suggest that more immediate answers might be obtained from a study of commercial orchards already planted on reclaimed land.

Thus, the specific objectives of this study were to:

1. Locate all citrus plantings on reclaimed land.
2. Detail the history of the planting site, i.e., the type of reclamation, scion variety, rootstock, tree spacing and tree age or density of planting.
3. Determine the current condition and productivity of the trees.
4. identify, where possible, the factors that led to the degree of success of the various orchards studied.

#### PROCEDURE

##### IDENTIFICATION OF PLANTINGS

The site location map appears at the end of this report. Identification of citrus plantings on reclaimed land was made by Zellars-Williams staff by several methods:

1. File information of 8 identified plantings was used to provide further leads.
2. Aerial photographs taken for the survey of lands mined before July 1, 1975 were reviewed in Tallahassee at the Department of Natural Resources. Several of the citrus plantings on the present known list were identified in that survey and reidentified for a previous Institute-sponsored project, "Radioactivity in Foods Grown on Florida Phosphate Lands".
3. A letter was sent to present mining companies explaining the project and requesting information on any citrus plantings on reclaimed land either before or after July 1, 1975.

4. County agricultural agencies in Polk and Hillsborough Counties were contacted for information on citrus on reclaimed land.
5. Once in the field, a word-of-mouth survey was made to locate citrus plantings on reclaimed land that is no longer owned by mining companies.

#### DETAILS OF PLANTING SITE HISTORY AND CHARACTERISTICS

1. Letters were sent to owners or managers of citrus plantings identified as growing on reclaimed land, asking for information outlined in Objective 2 in the Introduction. Personal conversation via telephone was also used to obtain this information and to obtain permission to visit and study the plantings.
2. Results from the letters and telephone conversations did not yield all the information requested. Additional information was obtained from a short visit to each planting by Dr. A. H. Krezdorn, the Principal Technical Investigator, and a member of Zellars-Williams staff (week of July 7, 1986).
3. Even with these efforts, some information was not obtained because records of the owners or managers were lacking. As examples, some did not know the rootstock used and yield records were mostly lacking or indefinite.
4. The known details concerning the plantings are given in the field data sheets in Appendix 2.

#### CURRENT STATUS OF PLANTINGS

A first visit was made to each planting identified as being on reclaimed land, taking care to disinfect vehicle and personnel entering the planting, as appropriate. Of the 24 identified, one planting was found not to exist, and three growers would not permit entrance to their property.

An evaluation was made of the trees and the crop in each planting. The planting was subjectively rated as abandoned, poor, good, and excellent. These terms are defined as follows:

- 0 Abandoned. Trees receiving no care for several years.
- 0 Poor. Substandard trees that obviously could not consistently produce profitable crops. Tree vigor is low and foliage is thin.
- 0 Good. Trees that should produce profitable crops. Foliage dense and vigor moderate to high. Current crop reasonably good and history of good production where records exist.
- 0 Excellent. Excellent crop on trees, foliage strikingly dense and deep green in color.

These are fairly broad categories, but more finite ones would add nothing to the major answer sought; i.e., whether citrus is or is not being satisfactorily produced on the various parcels of reclaimed land.

Freeze damage not related to reclamation confounded the evaluation at the time. In such cases, the evaluation was based on tree condition and vigor of recovery without any consideration of cropping, unless past records were available.

Information on tree care was not obtained in great detail and varied greatly. By and large, however, it was obvious from the information available that plantings on reclaimed land received essentially the same range of care as that on natural mineral soils. Growers with trees on both reclaimed and natural land did not distinguish between them in their management programs.

After studying the results of visits and information from growers, 11 sites were selected for more detailed study. Thus, a second visit was made to these 11 sites on September 15, 16, 17, 1986, at which times there were further talks with some of the growers, further examination of the trees, and soil samples were taken.

In order to get representative soil samples, each planting was roughly divided into three sections. Using a standard soil sampling tube, 10 or

more 6-12 inch soil cores were taken across each section of each planting. Samples from each of three sections were aggregated and stored in plastic bags for subsequent physical and chemical analyses.

#### LABORATORY ANALYSES

The three aggregate samples from each orchard were analyzed for particle size, using a wet sieving method; i.e., each soil sample was washed through a 20 mesh screen with the remainder through a 65 mesh screen, and that remainder through a 325 mesh screen. The 20, 65, and 325 mesh screens correspond to particle diameters of 850, 212, and 47 microns, respectively.

The soil samples were also analyzed for pH, Ca, Mg and P<sub>2</sub>O<sub>5</sub> in the Zellars-Williams laboratory. Standard methods of analyses were essentially the same as those used by the University of Florida's Citrus Research and Education Center at Lake Alfred.

The values obtained for particle size, pH, Ca, Mg and P<sub>2</sub>O<sub>5</sub> are presented in Tables 1.1, 1.3, and 1.4, respectively.

### RESULTS AND DISCUSSION

#### SITE HISTORY AND CHARACTERISTICS

##### Planting Size and Number

An examination of the data on planting characteristics (Appendix 2) shows clearly there are a limited number of citrus plantings on reclaimed land and that the various plantings are relatively small. Only 23 citrus plantings are on reclaimed land, the largest and smallest of which are 80 and 0.75 acres, respectively. Over 50% of the plantings were 30 acres or less, and only 3 were over 50 acres.

Moreover, the 23 sites represented less than 23 owners because some owners had more than one distinct block of trees on reclaimed land that were sufficiently different to be treated separately. Such a small population

which, as will be shown later, contains a number of widely varying characteristics, precludes a statistical treatment relating tree performance to planting history and characteristics. Instead, conclusions must be drawn from observations and data on a planting by planting basis.

#### Reclamation Method

There are few well-defined reclamation procedures. Moreover, some of the terms used are very general. Sand tailings can vary considerably in particle size and phosphorus content, depending on the nature of the matrix and the mining technology used, respectively. The soils varied before mining, and stripping off the top 30 to 60 or more feet of soil and backfilling into the pits after mining didn't increase the uniformity.

There is only one site (IMC #4) that is purely sand tailings, and it has been abandoned since 1962.

One block, owned by Mr. Richard Clark of Bartow, was reclaimed by pumping in sand tailings, covering with overburden and then capping with 8 inches of topsoil that was trucked in. It was well leveled and given a 6 inch per 100 ft. slope. This type of reclamation has produced a superb citrus planting, but was considered an unrealistic way of reclaiming large acreages.

Two plantings owned by Brewster Phosphate Corp. (BP-L-1 and BP-L-SP2), were reclaimed by experimental methods. BPL-1 is about a 4:1 "mix" of sand tailings and phosphatic clay. Layers of phosphatic clay and sand tailings were produced by alternately pumping in phosphatic clay and covering it with a layer of sand tailings which were "sprayed" or floated on, more or less uniformly. Some mixing was accomplished through mechanical leveling. A small amount of overburden was pushed over a small part of the completed area, but the site is essentially a 4:1 sand clay mix.

BP-L-SP2 was somewhat similar but not mixed as well. Clay was pumped in, but the sand tailings were spread by pumping them in from one end and allowing them to flow over the clay.



The reason for the sand-spray mix method was to utilize as much of the phosphatic clay as possible. The 4:1 ratio resulted from the material available rather than by intent.

Most of the others were simply pits, backfilled with overburden or with sand tailings and an overburden cap.

One unique situation was the Shady Grove Nursery plantings which were reclaimed with relatively narrow strips of overburden interspersed with water-filled pits to form what are called the finger lakes system of reclamation. Mr. Maynard Leetun, the owner, had mature blocks of sweet oranges and grapefruits growing under this situation.

One future parcel was identified and is scheduled for planting either this Fall or next Spring. Fifty-two hundred trees are scheduled to be planted on a reclaimed Gardiner plot approximately 45 acres in size. The site designation is GAR-FM-82(4).

#### Horticultural Characteristics

General. Tree spacings were mostly 25 x 25 ft. ; however, a seedling orange planting was 30 x 35 ft. and some spacings were slightly closer than 25 x 25 ft. None of the plants could be considered closely spaced, such as 10 x 15 ft., by today's standards.

The scion variety was most commonly one of the standard sweet oranges such as Hamlin, Parson Brown, Pineapple or Valencia; however, there was also a sweet orange seedling grove, two navel orange plantings, and blocks of pink and red grapefruit, respectively.

The rootstock was most commonly sour orange; however, there was also Cleopatra mandarin and Carrizo citrange. At the Agrico plantings there was a wide mixture of rootstocks, including Milam lemon, sweet lime, Cleopatra mandarin, and Volkamer lemon. Rough lemon was notably absent; however, one grower listed his rootstock as "sour" lemon. No root sprouts were available for a definite identification.

Thus, the range of planting material and tree spacings is more or less standard and representative of that used in the region.

Tree age also varied widely from 2 years of age to those approximately 40 years old. The plantings were mostly of a commercially productive age. Thus, most of the plantings were old enough to determine their performance with confidence.

Soils. Water drainage appeared to be adequate in the great majority of cases. IMC #2 appeared to be an exception. Settling had occurred in spots and water was standing in them. Trees in these low spots had either died or declined to a point of uselessness. While no extensive study of the soil and root development in the planting was made, it appeared these low spots contained heavier or more finely textured soils that contributed to the wet spots and tree death. It is likely that better surface drainage developed through better land preparation could have alleviated this problem. This condition also demonstrates the variability of the soil in overburden.

There were also random wet spots in Agrico FG 10. Here again, there appears to be some settling and wet, sticky spots that are becoming worse as a result of grove traffic during wet periods. This condition is also worsened by the fact the orchard is cleanly cultivated by discing.

### Soil Analyses

Soil particle size. The soil particle size data are presented in Table 1.1, and the U.S.D.A. soil classification system in Table 1.2.

The largest portion of the soil in most of the plantings falls into what is Medium sand-the lower portion of Coarse sand by the U.S.D.A. classification system. The next largest portion included Fine sand and Very Fine sand. In a few cases, this portion was larger than the coarser sand fractions. Together, the above categories which ranged in particle diameter from 0.85 - 0.05 mm, accounted for most of the soil. The next largest portion

included the Silt and Clay fractions. The smallest portion included the Very Coarse sand and the upper portion of the Coarse sand fractions.

Only IMC #2 (the Virginia Carolina) planting had an appreciable portion of the sample in the Very Coarse and upper portion of the Coarse sand category. This was probably due to the common occurrence of pebble size rocks in the soil. This suggests a considerable amount of mining debris was added to the overburden.

This planting also had a higher than usual amount of Silt and Clay. This finer textured portion, which appeared to occur in random pockets, was probably responsible for the wet spots in the planting.

It was noted while sampling that there were pockets of clay of varying size in several of the plantings. This indicates the soil is not uniform. Where these pockets are small they are unimportant, but where they are relatively large they can result in the death of trees due to waterlogging.

By and large the particle size values indicate soils that are well-drained and possibly over-drained. However, citrus is often grown on soils of this texture with irrigation.

It is noteworthy that samples from the Hill Planting of Mr. Albert Miles had from 55% to 79% of the soil in the Fine and Very Fine sand category and only very small portions of coarser sands and clay. This is an excellent soil and undoubtedly is what makes the planting so productive even without irrigation.

Soil pH. There was nothing unusual about soil pH. There had been a question as to whether pH might be unusually high because of lime rock brought to the surface in the mining operations; however, pH values (Table 1.3) were not exceptionally high.

Native Florida sands have pH values of about 4.5, but growers maintain pH's from 5.5 to 7.0 with either high calcium or dolomitic limestone applications every two years.

It is not unusual to find a fairly wide range of pH values, within the above range , in a given orchard. Spray chemicals, fertilizer, road building material and water source all affect the pH. As examples, water from lakes is acid while that from wells is basic. Growers using sulfur as a pesticide add considerable acid-forming material to the soil.

The pH values in Table 1.3 probably reflect amendments added, such as dolomite, and other materials applied rather than the nature of the soil itself.

Soil Ca and Mg. The Ca values were not unusual while the Mg values were somewhat low. The low Mg values were not reflected in any Mg leaf deficiencies; however, this is not too surprising since plant available soil Mg, which is what was measured, is not always correlated with that actually taken up by the plant.

The data are primarily meaningful in showing the mining and reclamation methods did not, in general, incorporate meaningful amounts of Ca and Mg into the soil.

Soil P2O5. The P2O5 values represent total rather than plant available phosphorus. Some sites had substantial P2O5 concentration. IMC #2, for example, contained over 9% P2O5. Even the old, abandoned IMC #3 sand tailing site had over 7% P2O5. Two of the better plantings which were planted on overburden (Hemphill and Hill) had less than 1% P2O5, the lowest of any.

All chemical analyses are summarized in Table 1.4 of the Appendix.

#### Freeze Damage

Florida has recently undergone some of the most damaging freezes in its history. Most of the older groves suffered little to no damage from these freezes, thereby indicating that the region in general and the sites in particular were unusually warm ones.

Some of the younger plantings were, however, damaged severely in the recent freezes. A good example is IMC #1. Of course, young trees are much more subject to cold damage; however, it is noteworthy that the young trees that were damaged or, killed are growing in isolated locations some distance from other citrus or forest trees. Such locations tend to be colder.' A measure of protection from the freezes was provided in some young orchards with low volume irrigation during the freezes.

It was also evident that most of the older plantings were on sites that were slightly higher than the surrounding area. This resulted from the leveling and backfilling operations. Of course, the plantings among the finger lakes (pits filled with water) were especially warm as a result of the warming effect of these lakes;

Thus, it is obvious that the warmth and desirability of a site can be influenced during the reclamation process.

#### Management Practices

Weed control measures varied widely, and included trunk to trunk weed control with herbicides, clean cultivation by discing and herbicide use in the tree row, with mowed grass or native cover between the trees. In some cases, hairy indigo had been grown prior to planting citrus and continued to reseed itself in the middles between the trees. The sweet seedling trees were so large that the soil beneath them was largely free of weeds.

Hedging and topping were being conducted in a standard fashion where needed, except for the sweet orange seedling planting (the Hill Grove).

Applications of fertilizer, soil amendments for pH control and pest control fall within the range of that used in other commercial groves of the region. No unusual pest problems were evident. Evidence of blight and tristeza, Florida's two primary tree killers, were notably absent. Conversations with growers and managers indicated their management practices for citrus on reclaimed land and their other groves were essentially the same.

Irrigation was used in some plantings, but not in others. This is true in other groves of the region as well. There is little question but that proper irrigation would almost always measurably improve production. This would most likely be the case where citrus is grown on coarse sands. The abandoned IMC #4 grove that was planted on sand tailings did not have irrigation.

Thus, management practices, with the important exception of the lack of irrigation in some plantings, were generally sound.

#### TREE PERFORMANCE

A number, but not all of the plantings on reclaimed land, are discussed in some detail below. These plantings were selected because they represent both the extremes of performance and the general status of citrus on reclaimed land.

#### IMC #3 and IMC #4.

The two groves are on overburden and sand tailings, respectively. They are 27 years old, and unirrigated. Both have been abandoned since 1962. In effect, they were never cared for properly and the general consensus is that the plantings were planted for the publicity they generated. Even so, the IMC manager said that large saleable crops had been produced by them from time to time in the past. The trees ultimately suffered from freezes.

It is unfortunate that no care was given to the only planting on sand tailings. The lack of care precludes drawing strong conclusions; however, the relatively large dead trees on these sites suggests they could have been profitable groves with irrigation and care.

Their visibility from a public highway has given many the opinion that citrus on reclaimed land is not feasible.

Quite apart from the tree performance, it is noteworthy that the sand tailings had a very high phosphate content (Table 1.4) as a result of the

inefficient mining methods used. Also, distribution of soil particle sizes (Table 1.1) doesn't indicate these particular sand tailings are much coarser than other soils analyzed.

#### IMC #2.

This historic old (27 years) grove of sweet orange on Cleopatra mandarin rootstock was originally developed by the Virginia Carolina Company on overburden backfill . The very high phosphate content (Table 1.4), however, and the pebble-size rocks that are common suggest it also contains debris from the mining operation.

The orchard was rated poor. This was due in part to random areas of soil that had settled and can hold water. Trees had died or declined to uselessness in these spots. Poor tree performance is also due to the lack of care given the trees until recently, when a modest program of care was started.

There are no yield records, but the current crop is modestly good. The foliage shows some minor deficiencies, but it is otherwise good, although less dense than in a good orchard. Since the wet spots constitute only a minor part of the grove, it appears the grove could become profitable if proper care, including a low volume irrigation system, is given the trees. Further study might show the low wet Spots could be corrected through drainage.

#### Hill Grove.

This old (30-40 years) sweet orange grove consists of huge trees that have grown together. The trees are beautiful and rated good. The caretaker, Mr. Albert Miles, indicated the grove has been a relatively high-yielding, profitable planting as compared with others under his care, even though it is not irrigated.

The lack of foot rot, to which sweet seedlings are unusually susceptible and the particle sizes resulting from the soil analyses (Table 1) indicate good, but not excessive drainage.

Hemphill.

The Hemphill grove is rated good to excellent. This fine, mature (24 years) planting of Hamlin on sour orange and Cleopatra mandarin rootstock receives excellent care, including irrigation from a low volume system. The owner, Mr. Don Hemphill, keeps good yield records indicating the Hamlins produce about 600 boxes of fruit per acre annually, and that it rates among the best groves under his care.

The soil is overburden and on the basis of both appearance and analyses should produce productive trees.

Part of Mr. Hemphill's planting is on reclaimed land and part is on unmined land. Trees appear identical in both sections.

Shady Grove Nursery #1 and #3.

These groves, owned and developed by Mr. Maynard Leetun, rate good to excellent. Site #1 consists of Pink Marsh grapefruit on Cleopatra, spaced 15 by 25 ft. The crop on the trees was quite heavy and the trees had thick dense foliage. Site #3 contained mature Hamlin on Cleo.

The trees receive excellent care, including a microjet irrigation system, and the soil, developed from overburden and some leached material, is very good. These plantings are among finger lakes and very warm.

Mr. Leetun also has a small young navel orange on Carrizo citrange planting among the finger lakes and its appearance is excellent. It should be a fine orchard when mature.

IMC #1

This is a young (4 years) sweet orange on sour orange rootstock planting on sand tailings with an overburden cap. It has been frozen back severely, but the lower parts of the trees were protected with a low volume irrigation system. The trees have recovered beautifully and are beginning to bear a few fruit. On the basis of tree appearance, this planting is rated good to excellent.



One can only speculate as to the performance of this orchard in the future, but on the basis of the excellent care it is receiving, the tree performance to date, and the soil characteristics, it should perform very well.

BP-L-1.

This is a young (2 years) planting that is experimental in nature. It is planted on land reclaimed by the sand-clay mix method. There are 2 rootstocks, sour orange and Carrizo citrange and 2 scion varieties, Hamlin and Pineapple sweet orange.

There has been limited freeze damage, but on the appearance of the trees the planting is rated good. Soil characteristics and general appearance indicates good drainage.

It would be highly speculative at this time to evaluate the potential profitability of this planting; however, there appears no reason good trees can not be grown on this site.

Whether the 4 to 1 sand tailings-clay mix will prove to be one that will produce trees without excessive fertilizer and water will be determined only with time.

BP-L-SP-2.

This is a sweet orange on sour orange planting that is somewhat similar to BP-L-1; however, the soil mixing was not done as carefully and there is no irrigation system. Tree loss from freezes has been moderately high. There was some, but not extensive, indication of herbicide damage. General tree appearance was rated as poor.

It is doubtful that a profitable orchard can be produced there without irrigation.

Agrico FG 10.

This planting is young (2-3 years) and planted on sand tailings with an overburden cap. This planting has been damaged severely by freezes and many trees were lost. The remaining trees rate poor to good.

The irrigation system is not adequate for protecting all the trees during a freeze.

In addition to the freeze damage, some trees have been killed in wet spots resulting from land settling.

Unless protection from cold is furnished, or the grove experiences a series of warm winters, it will be difficult to produce a uniformly good orchard on this site.

Also, attention must be given to correcting the wet spots which are getting larger due to orchard traffic. It may be necessary to develop a mowed grass cover in the middles used for traffic while the trees are young. The practice of clean cultivation by discing also could result in damage from blowing sand if high winds develop.

This is also an experimental planting, but the results will be of questionable value.

It is also noteworthy that the Carrizo citrange and Volkamer lemon use in part of this planting induce less cold hardiness than stocks such as sour orange, Cleopatra mandarin and Swingle citrumelo.

**SUMMARY OF TREE PERFORMANCE**

The mature to excellent groves on a number of sites developed from overburden, which varies considerably in its characteristics, leave no doubt that producing citrus on land reclaimed in this manner is feasible.

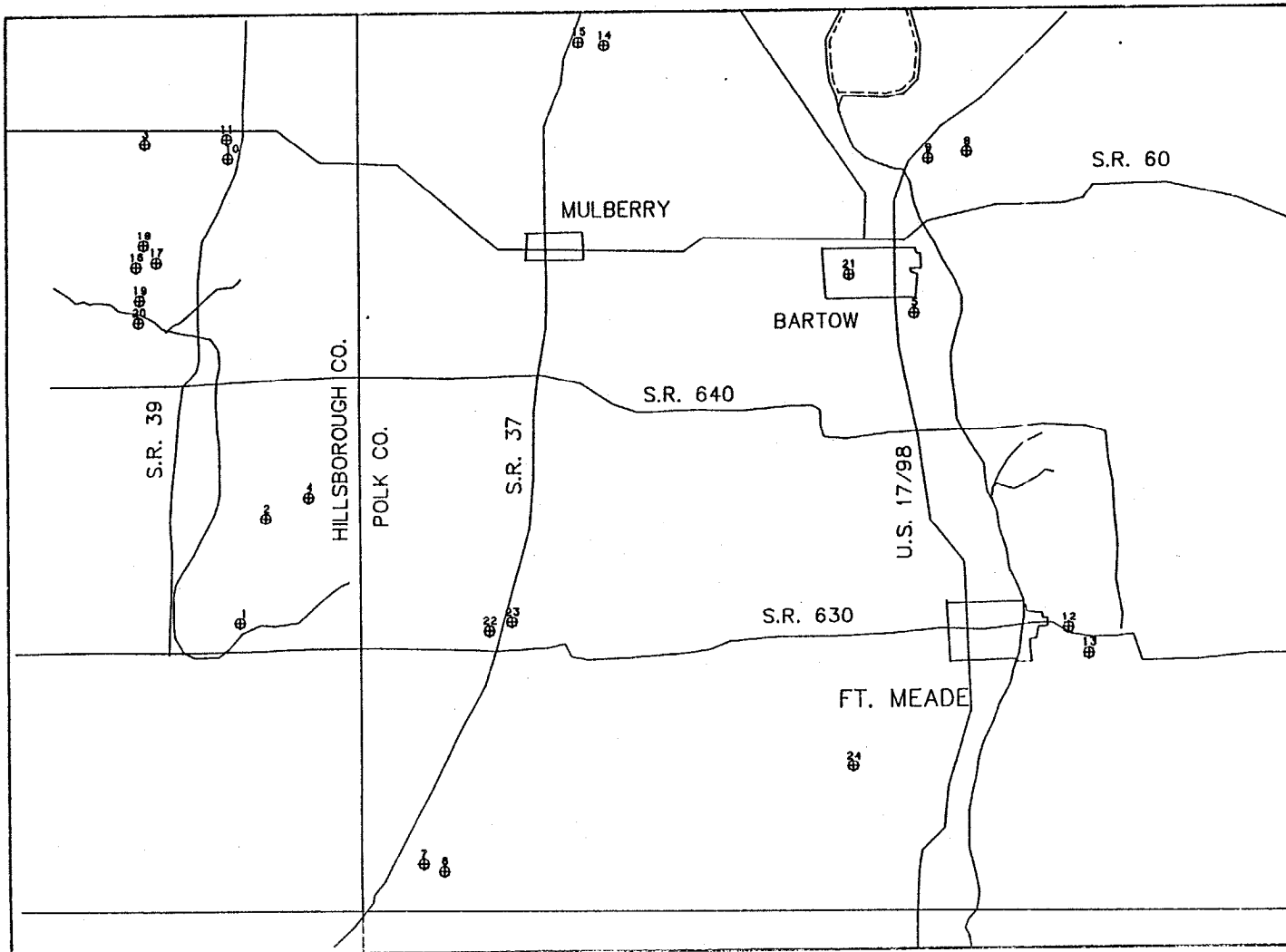
In fact, developing elevated, sloping sites, or sites among pits filled with water, can add to the warmth and desirability of the site.

In developing groves on overburden, it is well to allow for settling prior to planting so as to avoid the need for correctional procedures later.

There is insufficient evidence from the plantings surveyed to determine whether citrus can be grown economically on sand tailings. There is little question, however, as to whether the trees will grow on such sites if irrigation and proper care are given. The question is one of economics or profitability. Also, sand tailings vary in their characteristics and some will undoubtedly be more likely candidates for citrus production than others.

Similarly, it has not yet been demonstrated that the sand-clay mix procedure will prove profitable even though there is no reason to suspect trees will not grow and produce well on it with proper care. The main advantages of this procedure would be to utilize some of the clays and produce a soil medium more retentive of moisture and mineral elements.

Where plantings on reclaimed land currently in existence have failed, the cause has primarily been lack of care, and particularly lack of irrigation.



LEGEND

NAME	SITE #
BP-L-1	1
BP-L-SP2	2
H. COOPER	3
IMC #1	4
IMC #2	5
FG-3	6
FG-10	7
IMC #3	8
IMC #4	9
HILL BLOCK	10
ISLAND BLOCK	11
C. BARNETT	12
A. WINDHAM	13
PIPKIN SOUTH	14
PIPKIN NORTH	15
SHADY GROVES #1	16
SHADY GROVES #2	17
SHADY GROVES #3	18
PIT GROVE	19
DANA GROVE	20
CLARK GROVE	21
BP-H-1	22
DOBBS GROVE	23
GAR-FM-82(4)	24



SCALE: 1/4" = 1 MILE

CITRUS PLANTING LOCATION MAP  
 AN INVESTIGATION OF THE CURRENT STATUS  
 OF CITRUS PLANTINGS ON RECLAIMED LAND IN  
 CENTRAL FLORIDA

APPENDIX 1

**SOIL CLASSIFICATION AND ANALYSIS**

**Table 1.1**

**Table 1.2**

**Table 1.3**

**Table 1.4**

Table 1.1

PARTICLE SIZE ANALYSIS FROM ELEVEN SELECTED  
CITRUS PLANTINGS ON RECLAIMED LAND

Planting Name	Sample Number	% by Weight within size range indicated				(micron) (US Tyler)
		+850 +20 mesh	-850x+212 -20x65	-212x+47 -65x325	-47 -325	
BP-L-1	1	2.9	59.5	30.4	7.2	
	2	3.6	64.8	25.8	5.8	
	3	4.4	62.8	26.4	6.4	
BP-L-SP2	1	2.9	58.5	32.1	6.5	
	2	2.4	58.7	37.1	1.8	
	3	.0	62.3	37.7	.0	
IMC #1	1	4.7	55.8	33.2	6.3	
	2	2.3	59.4	31.0	7.3	
	3	3.7	60.3	30.3	5.7	
IMC #2	1	17.9	38.2	32.0	11.9	
	2	14.5	41.6	31.1	12.8	
	3	15.3	38.6	33.7	12.4	
IMC #3	1	1.7	50.4	31.7	16.2	
	2	.2	51.0	28.8	20.0	
	3	4.4	55.4	29.3	10.9	
IMC #4	1	1.7	65.6	31.3	1.4	
	2	1.1	61.9	34.8	2.2	
	3	2.8	73.1	22.6	1.5	
Agrico FG-10	1	1.1	50.8	33.4	14.7	
	2	.7	52.5	37.5	9.3	
	3	1.4	52.3	39.6	6.7	
Hemphill (Don Hemphill)	1	1.4	39.7	55.2	3.7	
	2	.7	34.8	57.4	7.0	
	3	.4	27.1	67.6	4.9	
Hill Grove (Albert Miles)	1	.6	41.2	54.8	3.3	
	2	1.1	35.0	59.5	4.4	
	3	.4	14.8	78.7	6.1	
Shady Grove Nursery #1	1	2.8	44.0	44.1	9.1	
	2	4.2	48.9	39.4	7.5	
	3	3.8	44.5	41.2	10.5	
Shady Grove Nursery #2	1	4.8	48.8	33.9	12.5	
	2	8.2	41.0	36.2	14.7	
	3	5.2	39.2	47.8	7.9	

Refer to Table 1.2 for comparison of soil classification to grain size. In our analysis, categories were identified as follows:

+20 mesh	very coarse sand and upper portion of coarse sand
-20x+65	lower portion of coarse
-65x+325	fine and very fine sand
-325	silt and clay

**Table 1.2**  
**CLASSIFICATION OF SOIL PARTICLES**  
**ACCORDING TO THE U.S. SYSTEM<sup>1</sup>**

<b><u>Soil Separates</u></b>	<b><u>Diameter Limits (mm)<sup>2</sup></u></b>
Very coarse sand	2.00 - 1.00
Coarse sand	1.00 - 0.50
Medium sand	0.50 - 0.25
Fine sand	0.25 - 0.10
Very fine sand	0.10 - 0.05
Silt	0.05 - 0.002
Clay	below 0.002

<sup>1</sup> From Soil Survey Manual (U.S. Department of Agriculture Handbook No. 18, 1951) P 207.

<sup>2</sup> Multiply by 1,000 to convert to microns.

Table 1.3

SOIL pH VALUES FROM ELEVEN SELECTED  
CITRUS PLANTINGS ON RECLAIMED LAND

<u>Planting Name</u>	<u>Sample Number</u>	<u>pH</u>	<u>Planting Name</u>	<u>Sample Number</u>	<u>pH</u>
BP-L-1	1	7.4	Agrico FG 10	1	7.0
	2	7.6		2	7.0
	3	7.5		5	6.1
BP-L-SP2	1	6.2	Hemphill Don Hemphill	1	6.6
	2	6.3		2	6.2
	3	6.2		3	5.6
IMC #1	1	6.6	Hill Grove Albert Miles	1	6.1
	2	7.1		2	5.9
	3	6.9		3	6.3
IMC #2	1	6.5	Shady Grove Nursery #1	1	5.0
	2	5.6		2	5.5
	3	6.2		3	5.6
IMC #3	1	6.4	Shady Grove Nursery #3	1	4.8
	2	6.5		2	5.7
	3	6.4		3	5.0
IMC #4	1	6.5			
	2	6.1			
	3	6.2			



Table 1.4

CHEMICAL ANALYSIS FROM ELEVEN SELECTED  
CITRUS PLANTINGS ON RECLAIMED LAND

<u>Planting Name</u>	<u>Sample Number</u>	<u>% P<sub>2</sub>O<sub>5</sub></u> (1)	<u>Ca(ppm)</u> (2)	<u>Mg(ppm)</u> (2)
BPL-L-1	1	4.80	1801	68
	2	4.73	1613	76
	3	4.61	1794	110
BP-L-SP2	1	1.03	1171	20
	2	0.98	1667	49
	3	0.40	1283	10
IMC #1	1	2.12	3525	49
	2	1.74	2895	10
	3	1.74	2895	10
IMC #2	1	9.56	3065	129
	2	8.71	2966	69
	3	9.93	3227	98
IMC #3	1	4.22	3457	123
	2	2.57	5197	260
	3	2.17	4352	363
IMC #4	1	6.78	1591	40
	2	7.25	1499	37
	3	7.88	1391	14
Agrico FG-10	1	1.33	2489	189
	2	1.03	2175	168
	3	1.91	1639	96
Hemphill (Don Hemphill)	1	0.85	1799	28
	2	0.68	2173	99
	3	0.21	993	10
Hill Grove (Albert Miles)	1	0.29	1679	10
	2	0.65	1462	10
	3	0.61	2154	10
Shady Grove Nursery #1	1	1.47	2299	64
	2	1.95	3198	110
	3	1.76	3449	153
Shady Grove Nursery #3	1	3.36	5356	427
	2	5.04	2908	103
	3	5.43	1795	40

(1) Analysed as "total" P<sub>2</sub>O<sub>5</sub>.

(2) Analysed as "available" Ca and Mg.

APPENDIX 2

**CITRUS PLANTINGS IDENTIFIED**

**Table 2.1**  
**Field Survey Data**

Table 2.1

## CITRUS PLANTING ON RECLAIMED LAND

Name	Location		Owner
	County	S.-T.-R.	
BP-L-1	Hillsborough	28-31S-22E	Brewster
BP-L-SP2	Hillsborough	10-31S-22E	Brewster
H. Cooper	Hillsborough	30-29S-22E	Hilda Cooper
IMC #1	Hillsborough	11-31S-22E	IMC
IMC #2	Polk	16-30S-25E	IMC
FG-3	Polk	28,29-32S-23E	Agrico
FG-10	Polk	29-32S-23E	Agrico
IMC #3	Polk	27-29S-25E	IMC
IMC #4	Polk	28-29S-25E	IMC
Hill Block	Hillsborough	28-29S-22E	Hopewell (Caretaker- A. Miles)
Island Block	Hillsborough	28-29S-22E	Hopewell (Caretaker- A. Miles)
C. Barnett	Polk	25-31S-25E) 30-31S-26E)	Conley Barnett
A. Windham	Polk	31-31S-26E	Alvy Windham
Pipkin South	Polk	7-29S-24E	W.A. Pipkin Estate
Pipkin North	Polk	12-29S-23E	W.A. Pipkin Estate
Shady Groves #1	Hillsborough	7-30S-22E	Maynard Leetun
Shady Groves #2	Hillsborough	7-30S-22E	Maynard Leetun
Shady Groves #3	Hillsborough	6-30S-22E	Maynard Leetun
Pit Grove	Hillsborough	7-30S-22E	Don Hemphill
Dana Grove	Hillsborough	7,12-30S-22E	Unknown
Clark Grove	Polk	7-30S-25E	Richard Clark
BP-H-1	Polk	27-31S-23E	Brewster
Dobbs Grove	Polk	27-31S-23E	W. A. Dobbs
GAR-FM-82(4)	Polk	18-32S-25E	Gardinier

GROVE NAME : BP-L-I (BREWSTER PHOSPHATES-LONESOME-1)  
LOCATION: SEC 28-TWSP 31S-RG 22E WEST OF FT. LONESOME MI NE OFF I CE  
DATE : 07/08/86 INSPECTOR: AHK/TPO/HMC  
OWNER: BREWSTER PHOSPHATES  
CONTACT: BILL TROYER PHONE NO.: 813-634-5551  
GROVE SIZE: 20 ACRES  
TREE AGE: 2.0 YEARS. ORIGINAL TREE PLANTING WAS IN JULY 1984.  
TREE SPACING: 17.5 x 22.5 FEET  
CHRONIC COLD SPOT :  
NO. ABOUT 50 TREES OUT OF 2200 WERE LOST. MOSTLY DUE TO COLD.  
PRESENTLY MAINTAINED: YES  
GROVE RATING :  
VERY PROMISING YOUNG GROVE

SOIL TYPE/TEXTURE :  
SAND-CLAY MIXTURE CAPPED WITH OVERBURDEN. MIX WAS OBTAINED BY  
USUAL BREWSTER SAND-SPRAY METHOD.

METHOD OF RECLAMATION :  
RECLAIMED BY SAND-SPRAY METHOD. BEFORE PLANTING TREES AREA WAS  
SEEDED WITH BAHIA AND HAIRY INDIGO, WHEN GROWTH REACHED WAIST  
HIGH. IT WAS BURNED OFF.

NATURAL GROWTH:  
MOWING IS USED BETWEEN ROWS AND HERBICIDES USED UNDER AND BETWEEN  
TREES. GROVE IS NEVER DISCED.

DRAINAGE:  
GOOD. WITH SHALLOW BEDDING PERHAPS 18 INCHES IN HEIGHT. SOIL  
WATER pH REPORTED TO BE ABOUT 7.50.

PESTS :  
NO UNUSUAL OR SERIOUS PROBLEMS.

ROOTSTOCK:  
ONE HALF SOUR ORANGE AND ONE HALF CARRIZO. THERE ARE FOUR COMBI-  
NATIONS OF TREES, ONE IN EACH QUADRANT OF THE GROVE. SEE SCION  
INFO BELOW.

SCION VARIETY :  
HAMLINS ON SOUR ORANGE IN SE. PINEAPPLE ON SOUR ORANGE IN SW,  
PINEAPPLE ON CARRIZO IN NW AND HAMLIN ON CARRIZO IN THE NE  
QUADRANT.

TREE SOURCE :  
ONE HALF FROM ADAMS NURSERY AND ONE HALF FROM BILL CHESSEY. IN  
WILDWOOD.

BLIGHT: NONE OBSERVED

COMMENTS :  
IRRIGATION IS BY A LOW VOLUME MICRO JET TYPE SYSTEM. VISITED  
AGAIN ON 03/15/86 AND OBTAINED SOIL SAMPLES.

GROVE NAME: BP-L-SP2

LOCATION: SEC 10-TWSP 31S-RG 22E. GROVE IS WEST OF KINGSFORD PLAN-r.

DATE : 07/08/86

INSPECTOR: AHK/TPO/HMC

OWNER: BREWSTER PHOSPHATES

CONTACT : BILL TROYER

PHONE NO. : 813-634-5551

GROVE SIZE: 35 ACRES

TREE AGE: ORIGINAL PLANTINGS IN 07/84. LARGE NUMBER OF RESETS IN 06/85.

TREE SPACING: SPACING IS VARIED, RANGES FROM 20x25 TO 25x25 FEET.

CHRONIC COLD SPOT:

NO. HOWEVER 25-30% OF ORIGINAL TREES LOST TO FREEZES. SEE COMMENTS

PRESENTLY MAINTAINED: YES

GROVE RATING:

TREES VARY IN QUALITY. BUT OVERALL THIS GROVE WOULD NOT BE RATED AS HIGH AS BREWSTER'S BP-L-1 GROVE.

SOIL TYPE/TEXTURE:

OVERBURDEN CAP ON TOP OF MINED OUT AREA WITH SAND/CLAY BACKFILL.

METHOD OF RECLAMATION:

PUMPED SEPARATE LAYERS OF SAND & CLAY. NOT-MIXED AS WELL AS BP-L-1. RECLAIMED AREAS NEXT TO GROVES ARE ALSO SAND FILLED AND GROVE HAS SUFFERED SOME DAMAGE IN PAST FROM "SAND BLASTING".

NATURAL GROWTH:

WEEDS AND SOME WILD GRASSES.

DRAINAGE:

DRAINAGE IS ADEQUATE. NO BEDS WERE MADE. UNLIKE SITUATION IN BP-L-1.

PESTS :

NO UNUSUAL OR SERIOUS PROBLEMS.

ROOTSTOCK:

SOUR ORANGE

SCION VARIETY :

HAMLIN

TREE SOURCE :

ONE THIRD ARE FROM ADAMS NURSERY AND TWO THIRDS ARE FROM BILL CHESSEY IN WILDWOOD.

BLIGHT: NONE OBSERVED

COMMENTS :

IRRIGATION HAS BEEN REQUESTED. THIS MINED AREA WAS WITHIN AN EXISTING GROVE. OF WHICH THE NORTH PART WASN'T MINED. IN APPROVED RECLAMATION PLAN. DNR REQUIRED NEW GROVE TO TIE IN WITH REMNANTS OF OLD GROVE. MOST OF REMNANTS HAVE BEEN LOST TO FREEZES. VISITED AGAIN ON 09/15/86 AND OBTAINED SOIL SAMPLES.

GROVE NAME: HILDA COOPER

LOCATION: SOUTH SIDE OF HIGHWAY 60 ABOUT ONE MILE WEST OF SR 39.

DATE : 07/09/86

INSPECTOR: AHK/HMC

OWNER: HILDA COOPER

CONTACT : HILDA COOPER

PHONE NO.: 813-737-1742

GROVE SIZE: 9.0 ACRES

TREE AGE: 25 YEARS OLD

TREE SPACING: 15x25 FT IS AN ESTIMATE. TREES CLOSER THAN IN OWNERS OTHER GROVES

CHRONIC COLD SPOT:

NO. DOES NOT APPEAR TO BE SO.

PRESENTLY MAINTAINED: YES

GROVE RATING:

GOOD

SOIL TYPE/TEXTURE:

CLAYEY SAND

METHOD OF RECLAMATION :

OWNER DOES NOT KNOW. LAND IS MUCH HIGHER THAN SURROUNDING AREA  
AND SLOPES TO THE WEST AND THE SOUTH.

NATURAL GROWTH:

GRASSES IN THE ROWS. APPEARS THAT HERBICIDES ARE USED UNDER AND  
BETWEEN THE TREES AS THESE AREAS ARE FREE OF ALL GROWTH.

DRAINAGE:

DITCHING IS NECESSARY TO MAINTAIN ADEQUATE DRAINAGE.

PESTS :

NO WORSE THAN OTHER GROVES OF OWNER.

ROOTSTOCK:

SOUR ORANGE

SCION VARIETY:

HAMLIN

TREE SOURCE :

GROWN BY OWNER

BLIGHT: NO

COMMENTS :

OWNER DOES NOT WISH TO PARTICIPATE IN STUDY. IRRIGATION IS BY A  
LOW VOLUME MICRO JET TYPE SYSTEM. LOCATED IN SEC. 30 - TWSP 295  
- RGE 22E.

GROVE NAME: IMC #1

LOCATION: WEST SIDE CLAY SETTLING AREA K-6 SEC 11-TWSP 31S-RG 22E

DATE : 06/16/86

INSPECTOR: JRM/AHK

OWNER: INTERNATIONAL MINERALS & CHEM.

CONTACT : RICHARD LEWIS-IMC DEVELOPMENT

PHONE NO. : 613-534-1761

GROVE SIZE: 35 ACRES

TREE AGE: 4.0 YEARS

TREE SPACING: 25 FEET

CHRONIC COLD SPOT:

YES

PRESENTLY MAINTAINED: YES

GROVE RATING:

VERY GOOD. GROVE APPEARED VERY HARDY.

SOIL TYPE/TEXTURE:

POROUS : SAND TAILINGS WITH FIN OVERBURDEN CAP

METHOD OF RECLAMATION:

SAND TAILINGS FILL AND THEN CAP WITH OVERBURDEN FROM THE SPOILS PILES.

NATURAL GROWTH:

GOOD BAHIA GROWTH

DRAINAGE :

GOOD - SLOPES TO WEST

PESTS:

APHIDS - BUT NO-WING SERIOUS

ROOTSTOCK :

SCION VARIETY:

TREE SOURCE:

BLIGHT: NO

COMMENTS :

MICROJET IRRIGATION SYSTEM. VISITED AGAIN ON 09/16/86 FIND OBTAINED SOIL SAMPLES.

GROVE NAME: IMC #2- THE OLD VIRGINIA-CAROLINA GROVE  
LOCATION: SOUTH SIDE OF CLEAR SPRINGS ENTRANCE ROAD, OFF HWY 17 SO..BARTOW  
DATE : 06/16/86 INSPECTOR: JRM/AHK  
OWNER: INTERNATIONAL MINERALS & CHEM.  
CONTACT : RICHARD LEWIS--IMC DEVELOPMENT PHONE NO. : 813-534-1761  
GROVE SIZE: 40 ACRES  
TREE AGE: 27.0 YEARS  
TREE SPACING: 18 FEET  
CHRONIC COLD SPOT:  
NO  
PRESENTLY MAINTAINED: YES. BUT ONLY FOR THE LAST 3 YEARS.  
GROVE RATING:  
FAIR

TYPE/TEXTURE:  
FILL WAS OVERBURDEN. CLAY FIND SOME LEACH ZONE MATERIAL.

METHOD OF RECLAMATION:  
AREA WAS BACKFILLED USING SPOILS PILES.

NATURAL GROWTH:

DRAINAGE :  
SOME AREAS ARE STANDING IN WATER WHICH HAS CONTRIBUTED TO THE  
DEATH OF SOME TREES.

PESTS :  
SNOW SCALE ON MANY OF THE TREES.

ROOTSTOCK:  
CLEOPATRA MANDARIN

SCION VARIETY :  
VALENCIA

TREE SOURCE:  
UNKNOWN

BLIGHT': NO

COMMENTS :  
LOCATED IN SEC. 16-TWSP. 30S - RGE 25E. VISITED AGAIN ON  
09/16/86 AND COLLECTED SOIL SAMPLES.



GROVE NAME: FG-3

LOCATION: SEC 28.29-TWSP 32S-RG 23E

DATE : 07/08/86

INSPECTOR: AHK/TPO/HMC

OWNER: AGRICO

CONTACT : RANDY MATHEWS OR DALE CARSON

PHONE NO. : 813-428-1431

GROVE SIZE: 40 ACRES RECLAIMED, 32 A. ARE GROVE & 8 A. ARE HARDWOOD NURSERY.

TREE AGE: FOUR YEARS OLD.

TREE SPACING: 25x25 FEET

CHRONIC COLD SPOT:

NO

PRESENTLY MAINTAINED: YES. BY ABBOTT GROVE SERVICE. BOWLING GREEN.

GROVE RATING:

PROMISING GROVE. BOTH N. & S. HALVES HAVE BEEN HARVESTED IN EACH OF THE LAST TWO YEARS.

SOIL TYPE/TEXTURE:

SAND TAILINGS WITH AN OVERBURDEN CAP OF ABOUT 12 INCHES.

METHOD OF RECLAMATION :

SAND TAILINGS WITH RN OVERBURDEN CAP

NATURAL GROWTH:

RECLAIMED ORIGINALLY AS PASTURE COVERED WITH BAHAI THEN DECIDED TO PLANT GROVE. NOW THERE IS ALMOST NO GROWTH IN THE GROVE.

TOTAL WEED CONTROL.

DRAINAGE:

DRAIN GENERALLY TO WEST. LOW SPOT IN THE NW QUADRANT WHICH IS NO LONGER CITRUS. DRAINAGE NOT AS GOOD AS FG-10 BECAUSE LACK OF BEDS. SWALES & POOR SLOPE.

PESTS:

NO UNUSUAL OR SERIOUS PROBLEMS. SOME ROOT ROT AND FOOT ROT DUE TO POOR DRAINAGE.

ROOTSTOCK :

CLEOPATRA OR MILAM. RESETS ARE SOUR ORANGE

SCION VARIETY:

HAMLIN-MIX. SEVERAL DIFFERENT - ORIGINALLY: HAMLIN ON CLEO:  
VALENCIA ON MILAM: HAMLIN ON SWEET LIME: PINEAPPLE ON MILAM:  
HAMLIN ON MILAM.

TREE SOURCE :

SEVERAL : BILL LAMBERT, ADAMS NURSERY. RESETS ARE FROM LAMBERT AND FARCUS

FLIGHT: NO

COMMENTS :

IRRIGATION BY OVERHEAD RAINBIRDS.

GROVE NAME: FG-10

LOCATION: SEC 29-TWSP 32S-RG 23E

DATE : 07/08/86

INSPECTOR: AHK/TPO/HMC

OWNER: AGRICO

CONTACT : RANDY MATHEWS OR DALE CARSON

PHONE NO. : 813-428-1431

GROVE SIZE: 80 ACRES

TREE AGE: 60 G. SET IN 09/82, SW 20 G. SET 05/83. THESE LOST & RESET 4/86

TREE SPACING: 20x25 FEET

CHRONIC COLD SPOT:

NO. BUT THERE HAS BEEN TREE LOSS IN THE PAST DUE TO FREEZES.  
PRESENTLY MAINTAINED: YES, BY ABBOTT GROVE SERVICE, BOWLING GREEN  
GROVE RATING:

FAIR TO GOOD

SOIL TYPE/TEXTURE:

SAND TAILINGS WITH OVERBURDEN CAP. SLOPED SLIGHTLY

METHOD OF RECLAMATION :

SAND TAILINGS CAP WITH ABOUT 8" OF OVERBURDEN AND SLOPED SLIGHTLY  
ALFALFA USED GS COVER FOR 1 YEAR BEFORE GROVE PLANTED. (BAHIA  
WAS THOUGHT UNDESIREABLE)

NATURAL GROWTH:

PROPERTY IS VERY BARE. HERBICIDE AND DISC PROGRAM IS USED. DRY.  
WINDY SEASON MAY CAUSE PROBLEMS BECAUSE TRACT IS SO BARE.

DRAINAGE:

GOOD DRAINAGE DUE TO BEDS AND SWALES. ALSO PROPERTY SLOPES  
SLIGHTLY IN ALL DIRECTIONS.

PESTS :

NO SERIOUS OR UNUSUAL PROBLEMS

ROOTSTOCK:

ORIGINAL PLANTINGS WERE ON CARRIZO PRIMARILY. AND 20 A. HAMLIN ON  
VOLKAMARINA. ENTIRE 20 ACRES LOST TO FREEZE. RESETS ARE ALL  
HAMLINS ON SOUR ORANGE.

SCION VARIETY:

ORIGINAL PLANTINGS WERE RED MARSH G.F.. NAVELS AND HAMLINS ALL  
ON CARRIZO. AND THE 20 G. HAMLINS ON VOLKAMARIANA. BUT THIS 20 A.  
LOST TO FREEZE.

TREE SOURCE :

ADAMS MAINLY : FARCUS IN VALRICO PROVIDED THE HAMLIN ON SOUR  
ORANGE RESETS.

BLIGHT: NO

COMMENTS :

LOCATED OFF AGRICO ENTRANCE ROAD. IRRIGATION BY SENNINGER HEADS.  
BUT ONLY ENOUGH CAPACITY TO IRRIGATE 10 ACRES AT A TIME. VISITED  
AGAIN ON 03/15/86 AND OBTAINED SOIL SAMPLES.

GROVE NAME: IMC #3

LOCATION: NORTH OF 31 MINE RD. AND SOUTH OF THE AIRPORT

DATE : 06/16/86

INSPECTOR: JRM/AHK

OWNER: INTERNATIONAL MINERALS & CHEM.

CONTACT : RICHARD LEWIS-IMC DEVELOPMENT

PHONE NO.: 813-534-1761

GROVE SIZE: TREES GRE SCATTERED OVER THE RECLAIMED GREG

TREE AGE: 27.0 YEARS

TREE SPACING: VARYING

CHRONIC COLD SPOT:

YES

PRESENTLY MAINTAINED: NO. GROVE HAS BEEN ABANDONED SINCE THE EARLY 1960' S.

GROVE RATING:

POOR. TREMENDOUS DECLINE IN THE GROVE SINCE THE RADIONUCLIDE SAMPLING DUE TO THE COLD WINTERS.

SOIL TYPE/TEXTURE:

OVERBURDEN ONLY WITH NO TAILINGS.

METHOD OF RECLAMATION :

BACKFILL WITH OVERBURDEN

NATURAL GROWTH:

PASTURELAND AND GRASSES

DRAINAGE:

POOR, HOWEVER THERE IS A MILD ROLL IN THE GREG.

PESTS :

NONE WERE SEEN

ROOTSTOCK:

UNKNOWN (NO RECORDS AVAILABLE).

SCION VARIETY:

VALENCIA. AS A GUESS (NO RECORDS AVAILABLE).

TREE SOURCE:

UNKNOWN

BLIGHT: NO

COMMENTS :

LOCATED IN SEC. 27 - TWSP 29S - RGE 25E. VISITED AGAIN ON (09/16/86 AND OBTAINED SOIL SAMPLES.

GROVE NAME: IMC #4 (WEST OF #3)

LOCATION: EAST OF HIGHWAY 17 TAILING PILE, NORTH OF BARTOW

DATE : 06/16/86 INSPECTOR: JRM/AHK

OWNER: INTERNATIONAL MINERALS & CHEM.

CONTACT : RICHARD LEWIS-IMC DEVELOPMENT

PHONE NO. : 813-534-1761

GROVE SIZE: SCATTERED

TREE AGE: ABOUT 27 YEARS

TREE SPACING: VARYING

CHRONIC COLD SPOT:

YES

PRESENTLY MAINTAINED: NO

GROVE RATING:

POOR. GROVE HAS BEEN ABANDONED SINCE THE EARLY 1960's. TREMENDOUS  
DECLINE SINCE THE RADIONUCLIDE SAMPLING DUE TO THE COLD WINTERS.

SOIL TYPE/TEXTURE:

SAND TAILINGS

METHOD OF RECLAMATION:

SAND TAILINGS BACKFILL

NATURAL GROWTH:

DRAINAGE:

GOOD

PESTS :

ROOTSTOCK :

UNKNOWN

SCION VARIETY:

VALENCIA, AS A GUESS

TREE SOURCE:

UNKNOWN

BLIGHT:

COMMENTS :

LOCATED IN SEC. 28 - TWSP 296 - RGE 25E. VISITED AGAIN ON  
09/16/86 AND SOIL SAMPLES.

GROVE NAME: HILL BLOCK

LOCATION: SEC 28-TWSP 29S-RG 22E/S OF HWY 60, ABOUT 500 FT. E OF WEIGH STAT

DATE : 07/09/86

INSPECTOR: AHK/HMC

OWNER: NORANDA-HOPEWELL LAND COMPANY

CONTACT : ALBERT MILES

PHONE NO. : 813-752-4133

GROVE SIZE: 20 ACRES

TREE AGE: 30 TO 40 YEARS

TREE SPACING: 30x30 FEET

CHRONIC COLD SPOT:

NO. BUT SOME TREE LOST DUE TO FREEZES

PRESENTLY MAINTAINED: YES. MAINTENANCE BY MILES GROVE SERVICE, PLANT CITY  
GROVE RATING:

BEST SEEDLING GROVE LEASOR HAS. VERY HEALTHY TREES WITH A HEAVY  
CROP OF FRUIT. YEILD AVERAGES 12-15 BOXES PER TREE IN GOOD YEAR.

SOIL TYPE/TEXTURE:

CLAYEY SAND

METHOD OF RECLAMATION :

OVERBURDEN AND DEBRIS BACKFILL INTO A MINED OUT AREA. THIS BLOCK  
IS HIGHER THAN SURROUNDING, NATURAL LAND ELEVATION.

NATURAL GROWTH:

SOME GRASSES BUT THEY ARE VERY SPARSE DUE TO A DISC AND HERBICIDE  
PROGRAM.

DRAINAGE:

OK, HOWEVER THERE IS ABOUT A 2 ACRE AREA IN THIS BLOCK WITH NO  
TREES BECAUSE IT IS TOO WET. AREA IS TOO LOW WITH GUMBO CLAY.

PESTS:

SOME FOOT ROT

ROOTSTOCK :

SEEDLING TREES

SCION VARIETY:

TREE SOURCE :

HOME GROWN PROBABLY

E I G H T : N O N E

COMMENTS :

NORTH OF HOPEWELL ROAD. SMALL GROVE SEMI-CIRCLE IN SHAPE. SOUTH  
OF POND. THERE IS NO IRRIGATION. TREES ARE 35-40 FT IN HEIGHT.  
VISITED AGAIN ON 09/17/86 AND OBTAINED SOIL SAMPLES.

GROVE NAME: ISLAND BLOCK  
LOCATION: NEXT TO HOPEWELL HILL BLOCK. BUT NORTH SIDE OF POND  
DATE : 07/09/86 INSPECTOR: AHK/HMC  
OWNER: NORANDA-HOPEWELL LAND COMPANY  
CONTACT : ALBERT MILES-MILES GROVE SERV. PHONE NO.: 813-752-4133  
GROVE SIZE: 5 ACRES  
TREE AGE: 30 TO 35 YEARS. THIS BLOCK SLIGHTLY YOUNGER THAN THE HILL BLOCK.  
TREE SPACING: 25x25 FEET  
CHRONIC COLD SPOT:  
NO, BUT MORE TREES LOST TO COLD IN THIS BLOCK THAN IN HILL BLOCK.  
PRESENTLY MAINTAINED: YES, MILES GROVE SERVICE, PLANT CITY  
GROVE RATING:  
SAME AS THE HILL BLOCK. THE BEST SEEDLING GROVE THE LEASOR HAS.  
YIELD IS ABOUT 12 TO 13 BOXES PER TREE IN A GOOD YEAR.

SOIL TYPE/TEXTURE:  
OVERBURDEN AND DEBRIS

METHOD OF RECLAMATION :  
TWO AREAS IN THIS BLOCK. ONE IS A, MINED OUT AREA BACKFILLED USING  
OVERBURDEN AND DEBRIS. THE OTHER IS AN UNMINED AREA BACKFILLED  
WITH OVERBURDEN AND DEBRIS.

NATURAL GROWTH:  
SOME GRASSES BUT THEY ARE VERY SPARSE DUE TO A DISC AND HERBICIDE  
PROGRAM.

DRAINAGE:  
GOOD

PESTS :  
SOME FOOT ROOT

ROOTSTOCK:  
THIS IS A SEEDLING GROVE. HOWEVER THERE ARE A FEW HAMLINS ON SOUR  
ORANGE FROM RESETS.

SCION VARIETY:

TREE SOURCE:  
PROBABLY HOME GROWN

BLIGHT: NO

COMMENTS :  
THERE IS NO IRRIGATION. LOCATED IN SEC. 28 - TWSP 29S - RGE 22E.

GROVE NAME: CONLEY BARNETT  
LOCATION : NORTH SIDE OF HWY 98 EAST, ABOUT 3 MILES OUTSIDE FT. MEADE.  
DATE : 07/08/86 INSPECTOR: AHK/TPO/HMC  
OWNER: CONLEY BARNETT  
CONTACT : CONLEY BARNETT PHONE NO. :  
GROVE SIZE: 20 ACRES  
TREE AGE: 2 YEARS AS A GUESS. TRUNKS ARE LARGE FOR TOPS SO COULD BE OLDER.  
TREE SPACING: NOT SURE  
CHRONIC COLD SPOT:  
NO, BUT THERE IS EVIDENCE OF COLD FROM SOME BARK SPLIT  
PRESENTLY MAINTAINED: YES  
GROVE RATING:  
FAIR

SOIL TYPE/TEXTURE:

METHOD OF RECLAMATION :

NATURAL GROWTH:  
APPEARS TO BE NO WEED CONTROL PROGRAM. WEEDS ARE BAD ESPECIALLY  
ON THE EAST END.

DRAINAGE :

PESTS :

ROOTSTOCK :

SCION VARIETY:

TREE SOURCE :

BLIGHT:

COMMENTS :  
OWNER DOES NOT WISH TO PARTICIPATE IN THE STUDY. LOCATED IN S.E.  
CORNER OF SEC 25-TWSP 31-RG 25 AND CORNER OF SEC 30-TWSP 31-RG 26  
IRRIGATION IS LOW VOLUME MICRO JET TYPE.

GROVE NAME: ALVY WINDHAM  
LOCATION: 3340 HWY 98 EAST FORT MEADE  
DATE : 07/08/86 INSPECTOR: AHK/TPO/HMC  
OWNER: ALVY WINDHAM PHONE NO. : 813-285-3534  
CONTACT : ALVY WINDHAM  
GROVE SIZE: APPROXIMATELY 2 ACRES.  
TREE AGE: UNKNOWN. SOME TREES APPEAR TO BE ABOUT 2-3 YEARS OLD BASED ON SIZE  
TREE SPACING:  
CHRONIC COLD SPOT:  
YES. APPEARS TO BE ESPECIALLY ON THE LOW END OF WESTWARD SLOPE.  
PRESENTLY MAINTAINED:  
GROVE RATING:  
VERY IRREGULAR TREE GROWTH

SOIL TYPE/TEXTURE:  
PROBABLY SAND TAILINGS WITH OVERBURDEN CAP.

METHOD OF RECLAMATION:

NATURAL GROWTH:  
GROVE WAS DISCED RECENTLY. BUT THERE IS NO WEED CONTROL AROUND OR  
UNDER THE TREES.

DRAINAGE:  
PROPERTY SLOPES DOWN TO THE WEST

PESTS :

ROOTSTOCK :

SCION VARIETY:

TREE SOURCE :

BLIGHT:

COMMENTS :  
WE HAVE BEEN UNABLE TO CONTACT THE OWNER. SO ALL OUR INFORMATION  
HAS COME FROM A RIDE-BY VISIT UF THE GROVE. NO IRRIGATION WAS  
VISIBLE. LOCATED IN SEC. 13 - TWSP 31S - RGE 26E.



GROVE NAME: WA PIPKIN SOUTH  
LOCATION: SO. SIDE OF FITZGERALD RD. OFF LAKE SCOTT SEC 7- TWSP 29S- RG 24E  
DATE : 07/08/86 INSPECTOR : AHK/TPO/HMC  
OWNER: WA PIPKIN ESTATE  
CONTACT : WA PIPKIN ESTATE PHONE NO. : UNKNOWN  
GROVE SIZE: 40 ACRES  
TREE AGE: 25 YEARS AS A GUESS. A FEW REPLANTS BUT MOST TREES SAME SIZE & AGE  
TREE SPACING: 20x30 FEET  
CHRONIC COLD SPOT:  
NO. BUT A TRACE OF COLD DAMAGE SEEN FROM CUT BACK TREES  
PRESENTLY MAINTAINED: YES  
GROVE RATING:  
AVERAGE OR SLIGHTLY ABOVE AVERAGE GROVE FOR THIS TYPE TREES.  
MODERATELY VIGOROUS BUT RELATIVELY UNIFORM GROVE. TREES JUST LOOK  
A LITTLE "HARD".  
SOIL TYPE/TEXTURE:  
SANDY CLAY

METHOD OF RECLAMATION:  
PROBABLY A HYDRAULICALLY MINED AREA WITH OVERBURDEN BACKFILL.

NATURAL GROWTH:  
BERMUDA GRASS BETWEEN ROWS WHICH HAS BEEN MOWED. PROBABLY A  
HERBICIDE PROGRAM IS USED UNDER AND AROUND THE TREES AS THERE WAS  
NO GROWTH HERE.

DRAINAGE:  
NO STANDING WATER WAS SEEN DURING VISIT

PESTS :  
TRACE OF LIGHT SNOW SCALE, SOME APHIDS AND A TRACE OF FOOT ROT.  
BUT NO SERIOUS OR UNUSUAL PROBLEMS

ROOTSTOCK :  
PROBABLY SOUR ORANGE

SCION VARIETY:  
VALENCIA

TREE SOURCE:  
UNKNOWN

BLIGHT: NO

COMMENTS :  
WE HAVE BEEN UNABLE TO CONTACT OWNER. INFORMATION WAS GATHERED  
BY A RIDE-BY VISIT. IRRIGATION IS BY A LOW VOLUME MICRO JET TYPE  
SYSTEM. NORTH AND WEST OF THIS GROVE IS A CEMETARY. TO THE EAST  
IS RESIDENTIAL AND TO THE SOUTH IS A MINED OUT AREA.

GROVE NAME: WA PIPKIN NORTH  
LOCATION: NO.SIDE OF FITZGERALD RD, OFF SCOTT LK RD/SEC 12- TWSP 29S- RG 23E  
DATE : 07/08/86 INSPECTOR : AHK/TPO/HMC  
OWNER: WA PIPKIN ESTATE  
CONTACT : UNKNOWN PHONE NO. :  
GROVE SIZE: 20 ACRES  
TREE AGE: UNKNOWN HUT TREES ARE SMALLER THAN TREES IN PIPKIN SOUTH GROVE  
TREE SPACING: 20x30 FEET  
CHRONIC COLD SPOT:  
NO, BUT TREES SHOW SIGNS OF BEING CUT BACK MORE SO THAN PIPKIN SO.  
PRESENTLY MAINTAINED: YES  
GROVE RATING:  
ABOUT THE SAME AS PIPKIN SOUTH BUT THE TREES ARE A LITTLE SMALLER

SOIL TYPE/TEXTURE:  
SAME AS PIPKIN SOUTH

METHOD OF RECLAMATION :  
PROBABLY A HYDRAULICALLY MINED AREA WITH OVERBURDEN BACKFILL.

NATURAL GROWTH:  
BERMUDA GRASS BETWEEN TREE ROWS WHICH HAS BEEN MOWED AND PROBABLY  
AN HERBICIDE IS USED UNDER AND AROUND THE TREES AS THERE IS NO  
GROWTH IN THIS AREA.

DRAINAGE:  
NO STANDING WATER WAS SEEN, THERE IS A SLOPE TO THE EAST BACK  
TOWARD LAKE SCOTT.

PESTS :  
INDICATION OF ZINC DEFICIENCY WAS SEEN ON SEVERAL TREES.

ROOTSTOCK:

SCION VARIETY:

TREE SOURCE:  
UNKNOWN

BLIGHT:

COMMENTS :  
WE HAVE BEEN UNABLE TO LOCATE THE OWNER SO ALL INFORMATION IS  
FROM A RIDE-BY VISIT. IRRIGATION IS A LOW VOLUME MICRO JET TYPE  
SYSTEM.

GROVE NAME: SHADY GROVES NURSERY #1  
LOCATION: OFF SWILLEY ROAD, BETWEEN SR 39 AND KEYSVILLE RD. SO. OF HWY 60  
DATE : 07/03/86 INSPECTOR: AHK/HMC  
OWNER: MAYNARD LEETUN  
CONTACT : MAYNARD LEETUN PHONE NO. : 813-647-1451  
GROVE SIZE: 2.5 ACRES  
TREE AGE: ABOUT 8 YEARS  
TREE SPACING: 15x25 FEET  
CHRONIC COLD SPOT:  
NO, FINGER LAKES AROUND GROVES PROVIDE EXCELLENT COLD PROTECTION  
PRESENTLY MAINTAINED: YES, BY OWNER  
GROVE RATING:  
EXCELLENT GRAPEFRUIT GROVE

SOIL TYPE/TEXTURE:  
OVERBURDEN AND SOME LEACH MATERIAL

METHOD OF RECLAMATION :  
RECLAIMED BY OWNER BY LEVELING OVERBURDEN SPOIL PILES.

NATURAL GROWTH:  
HERBICIDE IS USED UNDER AND BETWEEN THE TREES AND MOWING IS USED  
BETWEEN ROWS.

DRAINAGE:  
EXCELLENT

PESTS :  
NO UNUSUAL OR SERIOUS PROBLEMS. A TRACE OF IRON DEFICIENCY WAS  
SEEN IN SOME TREES.

ROOTSTOCK:  
CLEOPATRA

SCION VARIETY:  
PINK MARSH GRAPEFRUIT

TREE SOURCE :

BLIGHT : NO

COMMENTS :  
IRRIGATION IS LOW VOLUME MICRO JET TYPE. AREA WAS MINED IN THE  
1910'S ACCORDING TO THE OWNER. LOCATED IN SEC. 7 - TWSP 30S -  
RGE 22E. VISITED AGAIN ON 09/22/86 AND OBTAINED SOIL SAMPLES.

GROVE NAME: SHADY GROVES NURSERY #2  
LOCATION: NEXT TO SHADY GROVES NURSERY #1  
DATE : 07/03/86 INSPECTOR: AHK/HMC  
OWNER: MAYNARD LEETUN  
CONTACT : MAYNARD LEETUN PHONE NO. : 813-647-1451  
GROVE SIZE: THREE FORTHS OF AN ACRE  
TREE AGE: 5 TO 8 YEARS OLD AS A GUESS  
TREE SPACING: 15x20 FEET  
CHRONIC COLD SPOT:  
NO, FINGER LAKES PROVIDE COLD PROTECTION  
PRESENTLY MAINTAINED: YES, BY OWNER  
GROVE RATING:  
EXCELLENT GROVE. SQUATTY TREES LOADED WITH FRUIT.

SOIL TYPE/TEXTURE:  
SAME AS SHADY GROVES NURSERY #1

METHOD OF RECLAMATION :  
SAME AS SHADY GROVES NURSERY #1

NATURAL GROWTH :  
SAME AS SHADY GROVES NURSERY #1

DRAINAGE:  
GOOD. NO STANDING WATER

PESTS :

ROOTSTOCK :  
CARRIZO)

SCION VARIETY:  
NAVELS

TREE SOURCE:

BLIGHT: NO

COMMENTS:  
IRRIGATION IS A LOW VOLUME MICRO JET TYPE SYSTEM. LOCATED IN  
SEC. 7 - TWSP 30S - RGE 22E.

GROVE NAME: SHADY GROVES NURSERY #3  
LOCATION: NEXT TO SHADY GROVES NURSERY #2  
DATE : 07/03/86 INSPECTOR: AHK/HMC  
OWNER: MAYNARD LEETUN  
CONTACT : MAYNARD LEETUN PHONE NO. : 813-647-1451  
GROVE SIZE: GROVE IS 45 ACRES TOTAL BUT ONLY ONE HALF IS ON RECLAIMED LAND  
TREE AGE: ABOUT 8 YEARS.  
TREE SPACING:  
CHRONIC COLD SPOT:  
NO, FINGER LAKES PROVIDE COLD PROTECTION  
PRESENTLY MAINTAINED: YES, BY THE OWNER  
GROVE RATING:  
EXCELLENT GROVE, YIELD WAS 800 BOXES PER ACRE IN 1365.

SOIL TYPE/TEXTURE:  
SAME AS SHADY GROVES NURSERY #1 AND #2

METHOD OF RECLAMATION:  
SAME AS SHADY GROVES NURSERY #1 AND #2

NATURAL GROWTH:  
SAME AS SHADY GROVES NURSERY #1 AND #3

DRAINAGE:  
GOOD

PESTS :

ROOTSTOCK:  
CLEOPATRA

SCION VARIETY:  
HAMLIN

TREE SOURCE:

BLIGHT: NO

COMMENTS :  
IRRIGATION IS BY LOW VOLUME MICRO JET TYPE SYSTEM. LOCATED IN  
SEC. 6. 7 - TWSP 30S - RGE 22E. VISITED AGAIN ON 09/22/86 AND  
OBTAINED SOIL SAMPLES.

GROVE NAME : PIT GROVE  
LOCATION: SO. OF PLANT CITY-ON KEYSVILLE RD. WEST OF SR 39 AT 1st RR TRACKS  
DATE : 07/09/86 INSPECTOR: AHK/HMC  
OWNER: DON E. HEMPHILL  
CONTACT: DON E. HEMPHILL PHONE NO.. : 813-752-3568  
GROVE SIZE: AREA IS 56 ACRES BUT ONLY 52 A. ARE PLANTED, THERE IS 3 A. POND.  
TREE AGE: 24 YEARS  
TREE SPACING: SPACING VARIES FROM 23 TO 27 FEET BUT 25x25 FEET IS AVERAGE  
CHRONIC COLD SPOT:  
NO  
PRESENTLY MAINTAINED: YES, EXTREMELY WELL  
GROVE RATING:  
EXCELLENT, THICK CRISP FOLIAGE. PROBABLY BEST GROVE WE VISITED

SOIL TYPE/TEXTURE:  
SANDY WITH SOME CLAY, EAST OF THE POND THE SOIL IS MORE COARSE  
THAN IN OTHER AREAS OF THE GROVE.

METHOD OF RECLAMATION :  
LEVELING OF SPOIL PILES AROUND M.O.A.

NATURAL GROWTH:  
TREE TO TREE WEED CONTROL PROGRAM. THERE WAS VERY LITTLE GROWTH  
FIT FILL.

DRAINAGE:  
GENERALLY GOOD, THE GROVE SLOPES TO THE SOUTH AND THERE ARE SOME  
WET AREAS BUT NOTHING SERIOUS.

PESTS:  
NO PROBLEM AS LONG AS SPRAY PROGRAM IS MAINTAINED

ROOTSTOCK:  
MOSTLY SOUR ORANGE & CLEOPATRA

SCION VARIETY:  
MOSTLY HAMLINS, SOME PINEAPPLES

TREE SOURCE:  
VARIOUS NURSERY'S

BLIGHT: NO

COMMENTS :  
IRRIGATION IS BY OVERHEAD RAINBIRDS SUPPLIED FROM A 3 ACRE POND  
IN MIDDLE OF GROVE. MOST RESETS ARE DOUBLE SET. LOCATED IN SEC.  
7 - TWSP 30S - RGE 22E. VISITED AGAIN ON 09/17/86 AND OBTAINED  
SOIL SAMPLES.

GROVE NAME: DANA GROVE  
LOCATION: NO. SIDE KEYSVILLE RD WEST OF SR 39, 3/4 MILE WEST HEMPHILL GROVE  
DATE : 07/03/86 INSPECTOR: AHK/HMC  
OWNER: UNKNOWN  
CONTACT: D. HEMPHILL, M. LEETUN PHONE NO. :  
GROVE SIZE: 70 ACRES AS A GUESS  
TREE AGE: UNKNOWN  
TREE SPACING: 20x25 FEET AS A GUESS  
CHRONIC COLD SPOT:  
NOT SURE, TREES LOOK AS THOUGH THEY MAY HAVE BEEN CUT BACK  
PRESENTLY MAINTAINED: YES  
GROVE RATING :  
FAIR

SOIL TYPE/TEXTURE:

METHOD OF RECLAMATION:  
UNKNOWN, HOWEVER IT APPEARED AS THOUGH THE NORTH SIDE OF THE  
PROPERTY MIGHT BE IN THE PROCESS OF BEING FILLED IN AT THIS TIME.

NATURAL GROWTH :  
APPEARED THAT ROWS HAVE BEEN MOWED AND HERBICIDE USED UNDER AND  
AROUND TREES.

DRAINAGE:  
APPEARED TO BE OK. PROPERTY SLOPES TO THE SOUTH

PESTS :

ROOTSTOCK :  
LOOKED LIKE A TRIFOLIATE ORANGE OR CARRIZO

SCION VARIETY:  
HAMLINS OR VALENCIA

TREE SOURCE:  
UNKNOWN

BLIGHT:

COMMENTS :  
WE HAVE BEEN UNABLE TO LOCATE THE OWNER SO ALL INFORMATION WAS  
GATHERED BY A RIDE-BY VISIT. LOCATED IN SEC. 7, 12 - TWSP 30S -  
RGE 22E.

CITRUS SURVEY DATA

Record : 21

GROVE NAME: RICHARD CLARK  
LOCATION: E. SIDE OF HWY 555, OFF HWY 60 WEST, BARTOW, BEHIND CHEVY DEALER  
DATE : 07/09/86 INSPECTOR: AHK/HMC

OWNER: RICHARD CLARK

CONTACT: RICHARD CLARK

PHONE NO.: 813-533-2891

GROVE SIZE: 60 ACRES

TREE AGE: 5.5 YEARS

TREE SPACING: 12.5x25 FEET

CHRONIC COLD SPOT:

NO

PRESENTLY MAINTAINED: YES

GROVE RATING:

EXCELLENT, ONE OF THE BEST VISITED, TREES WERE OF A UNIFORM SIZE  
WITH A VERY HEAVY CROP OF FRUIT

SOIL TYPE/TEXTURE:

SAND TAILINGS WITH AN OVERBURDEN CAP AND ABOUT 8 INCHES OF TOP  
SOIL

METHOD OF RECLAMATION:

WINDROWS WERE FILLED BY PUMPING IN TAILS, OWNER COVERED THIS BY  
LEVELING SPOIL PILES THEN HAULED IN TOPSOIL FROM OTHER AREA FOR  
8" COVER.

NATURAL GROWTH:

BAHAI BETWEEN TREE ROWS MAINTAINED BY MOWING AND HERBICIDE UNDER  
AND AROUND TREES.

DRAINAGE:

EXCELLENT, WHEN THE PROPERTY WAS RECLAIMED THERE WAS A 6 INCH PER  
100 FEET SLOPE DEVELOPED

PESTS:

FIRE ANTS

ROOTSTOCK:

CARRIZOS

SCION VARIETY:

ALL ORANGES ARE EARLYS-PARSON BROWNS & HAMLIN. THERE ARE ALSO 16  
ROWS OF SUNBURST TANGERINES AND ORLANDO POLLENIZERS.

TREE SOURCE:

HOME GROWN BY OWNER

BLIGHT: NONE

COMMENTS:

IRRIGATION IS A LOW VOLUME MICRO JET TYPE SYSTEM. LOCATED IN  
SEC. 7 - TWSP 30S - RGE 25E.



GROVE NAME: BP-H-1, BREWSTER PHOS. HAYNESWORTH #1, ALSO KNOWN AS CAVILIER GROVE  
LOCATION: SEC 27-TWSP 31-RG 23-ON WEST SIDE OF HWY 37 S. MULBERRY  
DATE: 07/08/86 INSPECTOR: AHK/TPO/HMC

OWNER: BREWSTER PHOSPHATES

CONTACT : BILL TROYER

PHONE NO. : 813-654-5551

GROVE SIZE: 4 ACRE ESTIMATED, 176 TREES BY COUNT

TREE AGE: 37 YEARS

TREE SPACING: 25x25 FEET

CHRONIC COLD SPOT:

NO, BUT SOME TREE HAVE BEEN Los-r TO COLD  
PRESENTLY MAINTAINED: YES, BY JAMES CROCKER, BONE VALLEY GROVES  
GROVE RATING:  
POOR

SOIL TYPE/TEXTURE:

HYDRAULICALLY PLACED OVERBURDEN FROM PIT JUST WEST OF GROVE.  
UNSURE WHETHER FILL PLACED IN MINED OUT AREA OR ON ORIGINAL  
NATURAL GOUND.

METHOD OF RECLAMATION :

HYDRAULICALLY PLACED OVERBURDEN FROM PIT JUST WEST OF GROVE.

NATURAL GROWTH:

WEED CONTROL USING HERBICIDE AND MOWING, PRESENTLY FAIRLY HEAVY  
LANTANA IN GROWTH AROUND MANY TREES.

DRAINAGE :

GOOD

PESTS :

ROOTSTOCK:

PROBABLY SOUR ORANGE. BASED ON ABSENCE OF SPROUTS

SCION VARIETY:

HAMLINS

TREE SOURCE:

BLIGHT: NONE OBSERVED

COMMENTS :

NO IRRIGATION AT THIS TIME AND NO PLANS.

GROVE NAME: W. A. DOBBS  
LOCATION: EAST SIDE OF HWY 37 SO., MULBERRY, ACROSS FROM BP-H-1 (CAVILIER)  
DATE : 07/08/86 INSPECTOR: AHK/TPO/HMC  
OWNER: W.A. DOBBS  
CONTACT: MRS. W. A. DOBBS PHONE NO.: 813-683-5379  
GROVE SIZE: 30 ACRES  
TREE AGE: 31 YEARS  
TREE SPACING: 55 TREES PER ACRE  
CHRONIC COLD SPOT:  
NO, BUT THERE WAS A TRACE OF COLD DAMAGE VISABLE FROM THE ROAD  
PRESENTLY MAINTAINED: YES  
GROVE RATING :  
VERY GOOD ACCORDING TO OWNER

SOIL TYPE/TEXTURE:  
CLAYEY SAND

METHOD OF RECLAMATION:  
OWNER DOES NOT KNOW,, BUT POSSIBLY THIS PROPERTY WAS PART OF THE  
SOME MINING OPERATION RS BREWSTER'S BP-H-1 STRAIGHT ACROSS HWY  
37 & RECLAIM SAME.  
NATURAL GROWTH:  
GROVE HAS BEEN DISCED RECENTLY.

DRAINAGE:  
EXCELLENT DRAINAGE

PESTS :  
NO PROBLEMS

ROOTSTOCK:  
SOUR LEMON

SCION VARIETY:  
OWNER THINKS HAMLINS, BUT NOT SURE

TREE SOURCE:  
NURSERY ON HIGHLANDS RD. LAKELAND

BLIGHT: NO

COMMENTS :  
OWNER DOES NOT WISH TO PARTICIPATE IN STUDY. SO OUR OBSERVATIONS  
WERE MADE FROM THE ROAD. LOCATED IN SEC. 27 - TWSP 31S - RGE 23E

CITRUS SURVEY DATA

Record : 24

GROVE NAME : GAR-FM-82 (4)  
LOCATION: SEC. 18 - TWSP 32S - RGE 25E. S. E. QUADRANT.  
DATE : 10/14/86 INSPECTOR:  
OWNER: GARDINIER  
CONTACT : RICHARD HUNTER PHONE ND. : 813-533-8103  
GROVE SIZE: 45 ACRES  
TREE AGE:  
TREE SPACING: 15x25 FEET  
CHRONIC COLD SPOT:  
  
PRESENTLY MAINTAINED: YES  
GROVE RATING:

SOIL TYPE/TEXTURE:  
SAND TAILINGS WITH OVERBURDEN CAP

METHOD OF RECLAMATION:

NATURAL GROWTH:

DRAINAGE:

PESTS :

ROOTSTOCK :  
SOUR ORANGE

SCION VARIETY:  
HAMLIN

TREE SOURCE:  
HIMROD, HARDEE COUNTY

SLIGHT:

COMMENTS :  
5200 TREES TO BE SET. PLANTING EITHER WINTER '86 OR SPRING '87.  
MIRCO JET IRRIGATION. NEXT TO ESTABLISHED GROVE. MINED LAND WAS  
ORIGINALLY IN CITRUS.