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Region 4
345 Courtland Street, NE
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EPA

Environmental Impact Statement Supplement

Draft

Estech, Inc.
Duette Mine
Manatee County, Florida

SUPPLEMENT TO FINAL ENVIRONMENTAL IMPACT STATEMENT

for

Proposed Issuance of a New Source National Pollutant Discharge Elimination System Permit

to

Estech, Inc.'s
Duette Mine
Manatee County, Florida

prepared by:

U.S. Environmental Protection Agency
Region IV, Atlanta, Georgia 30365

Estech, Inc. has proposed an open pit phosphate mine, beneficiation plant, and rock dryer on a 10,394-acre site in northeastern Manatee County, Florida. The proposed project was addressed in an Environmental Impact Statement prepared by EPA. Since publication of the Final EIS in September 1980, Estech has made several revisions in their project plans. This Supplement to the Final EIS examines the new and revised project alternatives, impacts of the alternatives, and mitigative measures to avoid or minimize adverse impacts.

Comments will be received until MAR 0 1 1983

Comments or inquiries should be directed to

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Dec. 2, 1982
Date

Summary Sheet for Supplement to

Final Environmental Impact Statement

Duette Phosphate Mine

Estech, Incorporated

(X) Draft
( ) Final

U.S. Environmental Protection Agency, Region IV
345 Courtland Street NE
Atlanta, Georgia 30365

1. Type of Action: Administrative (X) Legislative ( )

2. Brief Description of Action:

The proposed action addressed in this Supplement is essentially the same as described in the Final Environmental Impact Statement (Final EIS) published in September 1980. It is the proposed issuance by EPA of a new source NPDES permit to Estech, Inc. for their proposed phosphate mining operation in Manatee County, Florida.

Estech is proposing to construct and operate an open pit phosphate mine, beneficiation plant and rock dryer located on a 10,394-acre site in northeastern Manatee County. The mine would produce 3 million tons of phosphate rock per year over a period of 21 years. Since the publication of the Final EIS, the State of Florida has reclassified the Manatee River at and below the discharge point from Class III to Class 1-A Standards. In order to minimize discharges from the Duette Mine and meet the more stringent water quality standards, Estech has made the following changes in its water management plan: (1) elimination of the planned diversion and impoundment of a portion of the flow of the East Fork of the Manatee River; (2) construction of an earthen embankment around the 210-acre reservoir to provide an additional 3500 acre-feet of water storage within the recirculation system; (3) reduction of groundwater usage by increased use of recycled process water (possibly after pretreatment in a reverse-osmosis plant); and (4) the use of active mining areas for water storage when prescribed levels are reached in the recirculation system storage. Moreover, as further required by the State of Florida, Estech proposes to use sand-clay mix (except in an emergency), instead of clay only, in the 480-acre initial settling area. All other aspects of Estech's proposed operations remain as in the Final EIS.

In February 1982, the EPA Region IV determined that, because of the changes above described, a Supplement to the Final EIS was required prior to taking action on Estech's NPDES permit application. This Draft Supplement addresses the changes in Estech's proposed project as well as the change in classification of the receiving water.

3. Alternatives Considered:

All alternatives evaluated in the Draft and Final EIS were re-examined to determine if the project revisions significantly affected the initial analyses. The alternatives requiring re-evaluation in this Supplement were: (1) process water source, (2) waste disposal/reclamation plan, (3) surface water discharge volume, (4) discharge point, and (5) no-action.

Process Water Source Alternatives:

Process water source alternatives considered in the EIS were: use of surface and ground water, total requirement from the deep Floridan Aquifer, use of surface water in rainfall catchment, and use of water from the surficial aquifer. Estech's proposed action in the EIS was for the combined use of surface water (by intake from the East Fork Manatee River) with deep ground water as the primary source. Estech's revised proposal calls for significantly reduced groundwater consumption (from 10 mgd to 2 mgd, approximate annual average), supplemented by surface water from on-site storage. This is to be accomplished by maximizing the use of available on-site storage such as mine cuts, constructing a reservoir embankment for additional storage, and modifying the flotation process to use recycle water. Intake of water from the East Fork Manatee River is also eliminated.

Waste Disposal/Reclamation Alternatives:

Two alternative waste disposal/reclamation plans--conventional and sand-clay mix (Estech's proposal)--were evaluated in the EIS. Estech's proposal called for a 480-acre initial clay settling area and 5426 acres of sand-clay mix. Estech's revised proposal remains the same except that the 480-acre initial settling area would be filled with sand-clay mix instead of clays only.

Surface Water Discharge Volume Alternatives:

The EIS considered four alternatives: containment of long-term accumulation, containment of short-term accumulation, containment to offset evaporation losses, and no containment. Estech's proposal as evaluated in the EIS was for containment to offset

evaporation losses, resulting in an average discharge of approximately 2000 gpm. Estech's revised proposal, evaluated in this Supplement, is for containment of long-term accumulation in order to eliminate a surface water discharge from the site.

Discharge Point Alternatives:

The EIS evaluated four discharge plans utilizing one or more of the following discharge points: direct to reservoir pool connected to the East Fork Manatee River, direct to the East Fork Manatee River, direct to the North Fork Manatee River, and deep-well injection. Estech's proposal in the EIS called for a combination of discharge points including discharge directly into the North Fork (discharge point 003), into the reservoir when not full (001), and directly into the East Fork when the reservoir was full (002). Changes in Estech's discharge point plan are a direct result of the revised water management plan. Estech's revised plan includes a change in the reservoir configuration which results in two discharge points (001 and 002) being in direct flow alignment. Discharge point 001 (upstream of 002) becomes redundant and can be eliminated. Discharge point 002 would be positioned to control discharges (if such unexpected discharges were to occur) at the downstream end of the reservoir. No change in discharge point 003 is proposed.

No-action Alternative:

The no-action alternative evaluated in the EIS was for Estech to not construct the Duette Mine and to allow the area to continue its present day socioeconomic and environmental trends. Under Estech's original proposal, this would have occurred had EPA denied the permit. The additional no-action alternative evaluated in this Supplement is for EPA to deny the permit application for the revised project.

4. Summary of Major Environmental Effects:

The Duette Mine project as originally proposed by Estech was evaluated in the EIS, and the impacts expected to result from its implementation were described therein. This Supplement has evaluated the new or revised alternatives proposed by Estech since the publication of the Final EIS. A summary of the potential impacts resulting from the revisions to the project is provided in the following table.

ELEMENT	IMPACTS OF PROPOSED PROJECT REVISIONS
Air Quality	Additional source of emissions due to reverse osmosis facility: particulates, SO_2, NO_2, CO--all less than Specified Significant Increase Levels
Groundwater Hydrology	Reduction in groundwater withdrawals from 10 mgd to 2 mgd annual average, causing slight reduction in drawdown of deep aquifer, small decrease in induced leakance from shallow ground water to deeper system, and decrease in potentiometric-surface drawdown at property boundary from 2.6 ft. to 0.5 ft. Slight seepage increase during initial operation of initial settling area (ISA) as sand-clay mix.
Groundwater Quality	R/O facility, if used, would introduce several chemicals into the recirculation system and redistribute suspended and dissolved solids ordinarily in recycle water. Contaminant sinks available to these compounds are expected to minimize the amounts entering the ground water through seepage.
Surface Water Hydrology	Eliminating the intake of water from the East Fork Manatee River (2.88 mgd annual average) would allow that quantity of water to remain in the stream channel and be available downstream. Since intake was limited to high flow periods, hydrological effect of this decrease is insignificant.
Surface Water Quality	Elimination of proposed surface water discharges has eliminated potential surface water quality degradation from site effluent. Conversion of 480-acre initial settling area to sand-clay mix slightly reduces probability of dam failure with resulting surface water degradation. In event of dam failure of the initial settling area, contents would no longer reach Lake Manatee Reservoir: downstream limit expected to be 3.4 miles upstream of lake. Probability of failure of embankment of 210-acre reservoir is 1 in 100,000. Failure would release maximum of 3,500 acre-feet of stormwater, with sedimentation impact of 25-year peak flow sediment flush from river system.
Soils	Use of sand in the initial settling area would replace 480 acres of overburden-capped clays with sandy-loam soil, with slightly improved physical, agronomic, and engineering properties.
Radiological Environment	Sand-clay mix in the initial settling area would reduce the post reclamation terrestrial gamma radiation from 13.8 μR/hr for the clay only to 8.7 μR/hr for the sand-clay mix.

5. EPA's Preferred Alternatives and Mitigating Measures:

Process Water Source Alternative

By refining the water management plan, Estech's revised alternative provides a means to reduce groundwater consumption without the construction of extensive impoundment areas and without diversion of river water. Therefore, the combined use of ground water and surface water (excluding the diversion of the East Fork Manatee River) as now proposed by Estech is also EPA's preferred alternative.

Waste Disposal/Reclamation Alternative

The principal advantage of using sand-clay mix instead of clays only in the initial settling area (ISA) is a significant reduction in the extent to which the ISA contents would flow in the event of a dam failure. The addition of sand would also improve the soil characteristics and result in a lower terrestrial gamma radiation level than with clays alone. Therefore, the revised proposal for sand-clay mix in the initial settling area is also EPA's preferred alternative.

Surface Water Discharge Volume Alternative

The revised alternative for containment of long-term accumulation and elimination of surface water discharge clearly reduces the potential for surface water degradation and is EPA's preferred alternative.

Discharge Point Alternative

Changes in the discharge point plan are attendant to the revised water management which is preferred by EPA.

Mitigative Measures

Controlling annual average water levels to 112 ft. MSL in the recirculation system and to 95 ft. MSL in the 210-acre reservoir would maintain seepage to the surficial aquifer at a minimum. In addition, observation wells should be installed and a monitoring program implemented to detect any possible contamination of the surficial aquifer from the sand-clay mix areas, including the initial settling area and the recirculation ditches. Limiting the carbon regenerating capacity of the kiln would assure that NO_x emissions would not exceed the specified "Significant Increase Level".

6. EPA's Proposed Action:

Pursuant to provisions of the Clean Water Act of 1977, EPA proposes to issue a NPDES permit to Estech, Inc. for their proposed Duette Mine in Manatee County, Florida. The proposed permit would impose as permit conditions all mitigating measures incorporated

within Estech's proposed project, including the revised alternatives addressed in this Supplement, and all mitigating measures recommended by EPA in the Environmental Impact Statement and in this Supplement.

7. Pending and Related Issues

Estech's consumptive use permit (CUP) granted by the Southwest Florida Water Management District (SWFWMD) on September 6, 1978, expires on September 5, 1984. The permit requires the construction of a recharge-well system to directly recharge 3,024,000 gallons per day (annual average) from the unconfined surficial aquifer and/or secondary artesian aquifer to the Floridan Aquifer. The project evaluation performed in the EIS included the recharge program of connector wells as a part of Estech's proposed action. The CUP and its conditions are still in effect, and the proposed project revisions submitted to EPA by Estech do not include changes to, or elimination of, the recharge program. The subject is, accordingly, not included in the scope of this Supplement. However, it has been brought to EPA's attention by Manatee County that a test recharge well on Estech's Duette property has shown gross alpha radiation levels in water drawn from the surficial aquifer which exceed drinking water standards. The source of the elevated gross alpha has apparently not yet been identified; meanwhile, SWFWMD has ordered the well capped. It seems probable that SWFWMD will consider eliminating the recharge project requirement, particularly in view of the currently proposed reduction in ground water withdrawals. Such action is clearly within the authority of SWFWMD and would be consistent with the Central Florida Phosphate Industry Areawide EIS recommendation which is for connector wells provided the drained water can meet drinking water standards.

If the recharge requirement were eliminated, the revised water balance and water management alternative presented in this Supplement would be unaffected. This is because a conservative approach was taken in establishing the water storage requirements in that no credit was given in the water balance calculations for removal of water by way of the connector wells. Therefore, elimination of the recharge program would not increase the requirement for available water storage.

A second unresolved issue concerns the issuance by the Florida Department of Environmental Regulation (FDER) of the required state permits and NPDES permit certification. On May 28, 1982, the FDER issued its final order stating that within 30 days the FDER would issue Estech a dam construction permit, dredge and fill permit, state discharge permit, and state certification for the NPDES permit. However, the issuance of these permits has been stayed pending the outcome of an appeal by Manatee County to the District Court of Appeal. The final order also found that Estech would be required to apply for and obtain a ground water discharge

permit from FDER. Regarding any future ground water permit, it is EPA's intention that the proposed NPDES permit condition requiring ground water monitoring would be consistent with any monitoring program developed by the FDER.

SUPPLEMENT TO FINAL
ENVIRONMENTAL IMPACT STATEMENT

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1.0 PURPOSE AND NEED

Estech, Inc., a wholly owned subsidiary of Esmark, is a producer of agricultural chemicals and phosphate products. Estech processes phosphate ore in the Central Florida area as part of their current operations in Southwestern Polk County, Florida. The Duette Mine phosphate reserve would serve as a replacement for the Watson and Silver City Mines as their reserves are depleted and their production expires.

Estech's proposed Duette Mine, encompassing 10,394 acres, would be located approximately thirty-four miles east of Bradenton in Northeastern Manatee County, Florida (Figure 1-1). The proposed project would allow Estech to maintain a supply of phosphate ore to its customers through an annual production rate of 3 million tons of phosphate product. The operation would mine a total of 6,600 acres of the 10,394-acre site over the 21-year life of the mine.

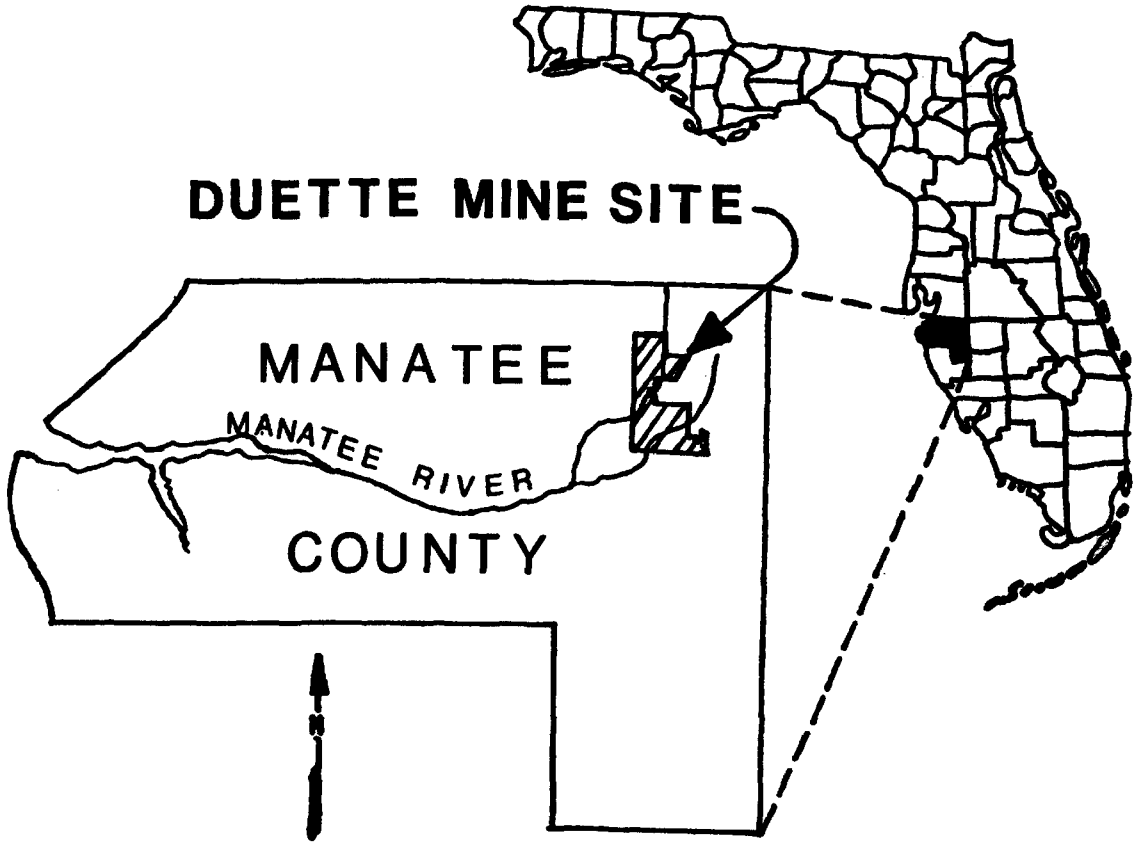

Figure 1-1 Location of Proposed Duette Mine

As required by the Federal Water Pollution Control Act, and the amendments of the Clean Water Act of 1977, Estech applied to the U.S. Environmental Protection Agency (EPA) for a National Pollution Discharge Elimination System (NPDES) permit for the proposed Duette Mine. The EPA Regional Administrator determined in May 1978 that the proposed discharge constituted a "new source" requiring issuance of an NPDES permit. The granting of the NPDES Permit would be a major Federal action significantly affecting the quality of the human environment. Therefore, EPA, as required by the National Environmental Policy Act of 1969 (NEPA), prepared an Environmental Impact Statement (EIS) for Estech's Duette Mine. The EIS was prepared by a third party contractor under the direction and review of EPA Region IV.

Since the publication of the Final Environmental Impact Statement, Estech has been engaged in administrative proceedings with the State of Florida Department of Environmental Regulation and other parties in an attempt to obtain the necessary state permits and state certification of the draft NPDES permit required by Section 401 of the Clean Water Act. In addition, in this interim period, the Manatee River has been reclassified from Class III (Recreation/ Fish and Wildlife Propagation) to Class 1-A (Potable Water Supply). As a result of requirements placed on Estech by the Department of Environmental Regulation (FDER, 1982) and the reclassification action, Estech now proposes certain revisions to its water management system that are designed to eliminate discharges from the Duette Mine to the East and North Forks of the Manatee River. These revisions include:

Elimination of Surface Water Intake - As originally proposed, Estech would have constructed a stationary weir designed to direct excess flow from the East Fork of the Manatee River under high flow conditions into an on-site reservoir (Figure 2-1). Under the current plan, there would be no diversion and impoundment of waters of the United States (Figure 2-2).

Increasing Storage Capacity of Reservoir - Estech proposes to construct an earthen embankment around the 210-acre reservoir to provide an additional 3,500 acre-feet of storage in the recirculation system.

Installation of Recycle Water Preparation Facility - As a means of reducing pumpage of ground water, Estech proposes to use recycled process water in the flotation circuit. Periodically during the mine life, it may be necessary to treat the recycle water to provide the high quality water needed for the flotation process. Although several water treatment methods are possible, a reverse osmosis facility is currently being considered.

Maximizing Available On-Site Storage - Estech has modified their water management plan to incorporate areas not previously used for water storage, i.e., active mining areas. These areas were always available but not integrated into the water storage/recirculation plan. By maximizing the available on-site storage and revising its water management program, a minimum storage capacity of

approximately 17,000 acre-feet (after the first five years of mining) has been developed.

An additional project revision proposed by Estech is the use of sand-clay mix in the 480-acre initial settling area. This revision was not proposed for water management purposes, but is required as a result of the State Development of Regional Impact process (Chapter 380, Florida Statutes).

In accordance with Section 1502.9 of the Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (CEQ, 1978), the U.S. EPA Regional Administrator has determined that these project revisions constitute possible "significant new circumstances or information relevant to environmental concerns". Therefore, the U.S. EPA is required to prepare a Supplement to the Final EIS to evaluate these revisions. Since the explicit purpose of the Supplement is to address the proposed project revisions, the Draft EIS (USEPA, 1979a) and its attendant Resource Documents (USEPA, 1979b) published in October 1979, and the Final EIS (USEPA, 1980) published in September 1980, are essential to full understanding of this Supplement.

2.0 DESCRIPTION OF THE PROPOSED ACTIVITY

The following description of the proposed activity incorporates those changes resulting from: a) requirements placed on Estech, Inc. by the Department of Environmental Regulation in state administrative proceedings; b) conditions imposed by the Florida Governor and Cabinet acting as members of the Land and Water Adjudicatory Commission; and c) reclassification of the Manatee River from Class III (Recreation/Fish and Wildlife Propogation) to Class I-A (Potable Water Supply). Figures 2-1 and 2-2 conceptually illustrate the activity as originally proposed and as currently proposed, respectively. In order to clearly show the changes relative to the entire project, a description of the proposed activity is presented verbatim from the Final EIS with the required deletions being struck through (----) and additions underlined (____).

Estech proposes to use equipment and design generally available and practiced by presently operating mines. The major components of the operation are large walking draglines; hydraulic ore transportation via pipeline to a central washer; a feed preparation and flotation plant; rock storage and drying; and shipment via rail.

The draglines strip overburden for deposit in mined-out cuts. Exposed matrix is excavated and dumped into a slurry pit or "well" -- an excavated sump within reach of the dragline. A pit control car directs high pressure water guns at the matrix breaking it into a slurry. Pumping systems deliver the slurried matrix to the plant.

Slurried matrix is passed through a wet screening process. Unacceptable pebble is discarded as waste. Product is stored in pebble bins for dewatering and quality control analysis prior to shipment or placement on storage piles.

Underflow fine material from washer screens moves to the feed preparation area where hydrocylones separate the waste clays from the sand-sized particles, termed feed. The feed is transported to the flotation circuit.

Flotation is a two-stage process; "rougher" flotation separates phosphate particles from silica sand and "cleaner" flotation by an amine flotation of the sand particles. The sand-sized product, termed concentrate, is then dewatered.

Rock dewaters to about 13% moisture while in storage with drainage directed to the plant water system. The storage system delivers wet rock to either the dryer feed bins or the wet rock loadout bins.

The last step in processing is drying. The average 13% moisture is reduced to 2% in the dryer. Dry product is transferred to

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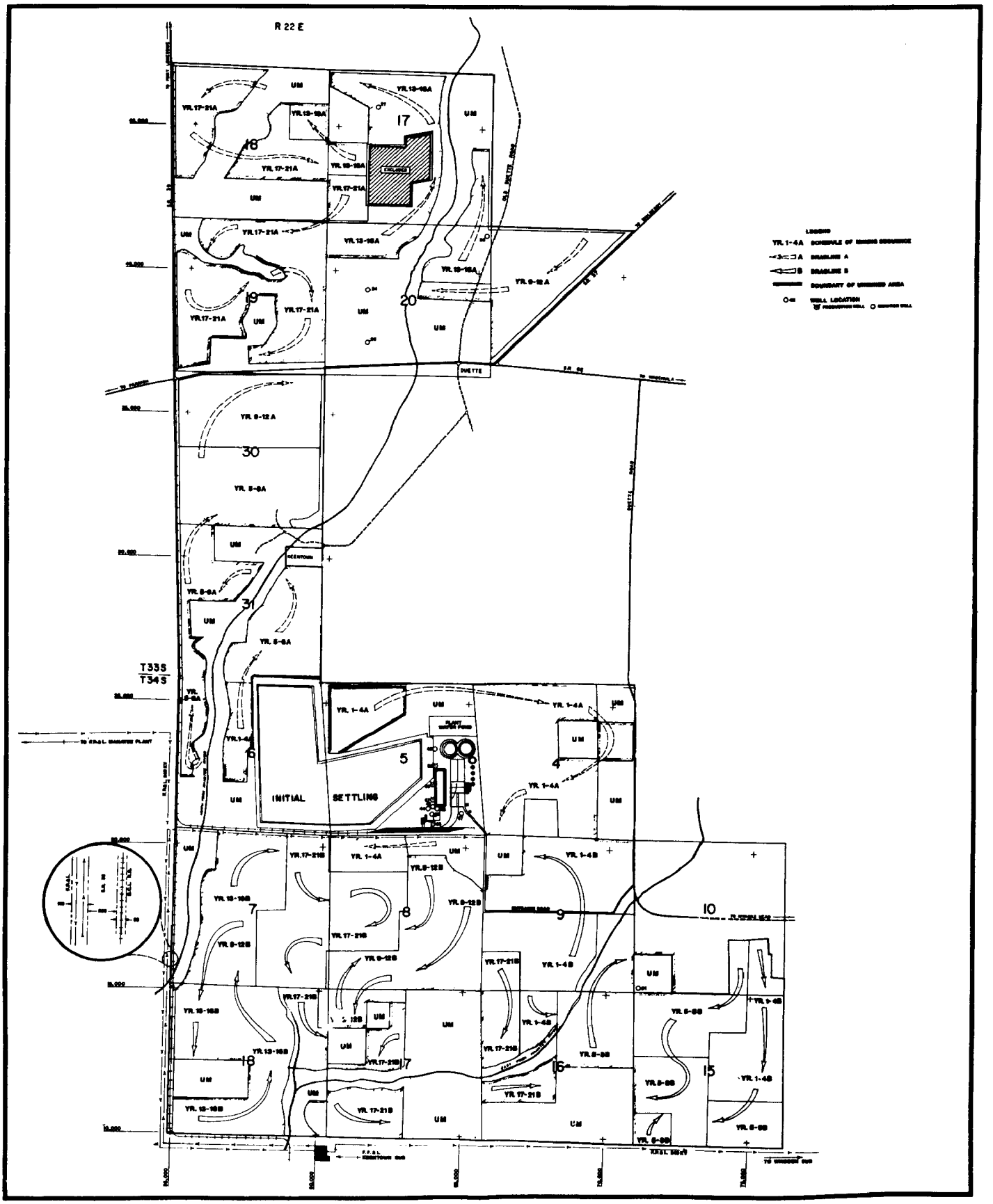

FIGURE : 2.3-1

MASTER DEVELOPMENT PLAN
WITH DRAGLINE SEQUENCE

SOURCE : ZELLARS - WILLIAMS , INC.

U.S. EPA - REGION IV
DRAFT ENVIRONMENTAL
IMPACT STATEMENT FOR
SWIFT AGRICULTURAL CHEMICALS
CORPORATION
PROPOSED DUETTE MINE
MANATEE COUNTY , FLORIDA

concrete silos for storage. Conveyors transfer dry rock from the silos to rail loadout facilities.

The beneficiation of phosphate ore generates two solid waste products: 1) clay or "slimes" and 2) sand tailings. Estech has committed in their mine plan to use a sand-clay mix in land reclamation and thereby reduce the need for traditional separate disposal areas. Estech plans to use a flocculant thickener method whereby clays are pumped from the beneficiation plant to mechanical thickeners where flocculants are added. Sand tailings from the plant are added to the thickened clays either directly at the thickener or at a downstream mixing station. Approximately ~~6,426~~ 5,906 acres are planned for use as sand-clay type disposal areas.

~~A-480-acre-conventional-clay-settling-area-is-planned-for-the mine.--This-area-will-receive-all-clay-wastes-generated-before-the sand-clay-mix-procedure-becomes-operational.~~ The 480-acre initial settling area will be a sand-clay mix as opposed to a conventional clay-only settling area.* The settling area will remain active throughout the mine life to receive clay and sand wastes ~~in-excess of-the-sand-clay-mix-requirements~~ and to serve as a secondary water clarification and storage area. By the end of the mine life, the area will be filled to about 25 feet above natural grade.

In the first years of mining, sand tailings will be used to construct retaining dikes. Thereafter, about 42 acres per year will be backfilled with tailings for a total of 848 acres.

The proposed water management plan divides the needed supply between surface and groundwater resources, minimizes mining process consumption, and provides for recharge of the Floridan Aquifer. Water management measures have been incorporated into the project design in an effort to maximize the use of recycle water, minimize withdrawal of ground water, and eliminate discharge to surface waters (FDAH, 1982; FDER, 1982).

Estech elected to modify the flotation process to permit the use of recycled process water in the acid rinse cycle. This modification, along with a modification which permits recycled water in the amine flotation circuit, resulted in a significant reduction of water input to the water system. With this reduction in process requirements and by increasing the storage capacity of the 210-acre clear-water reservoir (See Section 4.2.3), it was possible to balance the system over the long-term and to design a storage system that would eliminate overflow except during periods of long-term, exceptionally heavy rainfall.

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*Pursuant to a September 1980 condition of approval by the Governor and Cabinet, acting as members of the Land and Water Adjudicatory Commission.

Since the chance of overflowing the system during this exceptionally heavy rainfall would still be 1 in 25, Estech now proposes to divert this overflow into the current mining areas when all but 1500 acre-feet of the available storage within the recirculation system becomes filled. The effect of this action would be to eliminate overflow from the system even during periods of long-term, exceptionally heavy rainfall.

If the current mining areas were utilized, the minimum storage available for excess water during the mine life would be approximately 17,000 acre-feet (after the first five years), enough to provide the required additional storage. Table 2-A summarizes the probability of a cumulative rainfall event occurring which would exceed the smallest event required to accumulate 17,000 acre-feet of water during the critical years of the mine plan.

Table 2-A Summary of Probability of Exceeding 17,000 Acre-Feet of Storage.

Time Period (years)	Smallest Event To Fill System (inches)	Probability of Exceedance (percent)
1	110	0.000001
2	174	0.001
3	231	0.070
4	294	0.300
5	356	0.220
6	422	0.210

As shown, the highest probability of exceeding 17,000 acre-feet of capacity of the recirculation system and the current mining areas is 0.3 percent.

To further document that 17,000 acre-feet of storage is sufficient to contain the excess rainfall from an extreme rainfall event, computer analyses were performed using a 24-year rainfall record created by adding the four wettest rainfall years obtained at the Fort Green rainfall station to the 1921 to 1940 rainfall record obtained at the Bartow weather station. The simulated rainfall record averages 58.7 inches per year, a 24-year running average higher than any in the actual record. The results of these computer analyses showed the required maximum volume of stored water would be 16,491 acre-feet when the four rainfall years with the highest precipitation sequence (i.e., 257.5 inches during a 40-month period) were matched with the four mining years (1994-1997) having the lowest water consumption. The probability for exceedance of the 257.5 inches of rainfall during a 40-month period is less than 1 in 1000. Therefore, with 17,000 acre-feet of available storage there would be no discharge from the system for any combination of the created rainfall record with the mining sequence.

Based on the above analyses, utilization of the mine areas, if necessary, can essentially eliminate a discharge event from the Duette Mine. Furthermore, the outlet structures would be constructed to allow discharge at 15 percent of the streamflow at the time and point of discharge in the remote event that a discharge should occur (FDAH, 1982; FDER, 1982).

In order to monitor the capacity of the storage areas, staff gages would be installed on each spillway and the water level will be read at least daily. During normal rainfall periods, the sand-clay surface would be plumbed from a small boat once a month; during heavy rainfall periods, this would be performed twice a month or more often if necessary. The volume of sand-clay and supernatant water would be calculated and tabulated in a continual record.

The minimum available water storage capacity in the initial settling area, the disposal areas, and the reservoir at any time during the life of the mine has been projected to be 10,000 acre feet. (This does not include the first few years of start-up when storage is indeed less, but since less ground surface area has been disturbed, the runoff to be contained is smaller.) In order to provide an extra margin of safety and to allow sufficient time to act, 8,500 acre-feet of stored water has been selected as a "trigger" volume.

When the excess water stored on site reaches 8,500 acre-feet, the Florida Department of Environmental Regulation (FDER) would be notified and Estech would take all steps necessary to activate the system by which excess water can be diverted to current mining areas should such storage capacity be needed. Furthermore, when the excess water stored on site reaches the total available storage space within the recirculation system (10,000 acre-feet or greater) less 1,500 acre-feet, the FDER would be notified and Estech would divert the excess water to the mining areas for storage pursuant to the design plans (FDAH, 1982; FDER, 1982).

The diversion of water into the current mining areas would be accomplished by one of several procedures. Among these are:

(a) If the active disposal area contains water above the ground-surface elevation of the mining area, excess water would be allowed to flow through the spillway in the disposal area into a ditch, and thence directly into the mine.

(b) If the active disposal area contains water below the ground surface elevation of the mining areas or if a natural stream separates the active disposal areas and the mining areas, then excess water would be allowed to flow through the spillway in the disposal area, routed by ditch to a lift station, and thence by pipeline directly into the mining area. If the plant water pond is closer to the mining area than the active disposal area, then excess water would be routed directly from the plant water pond.

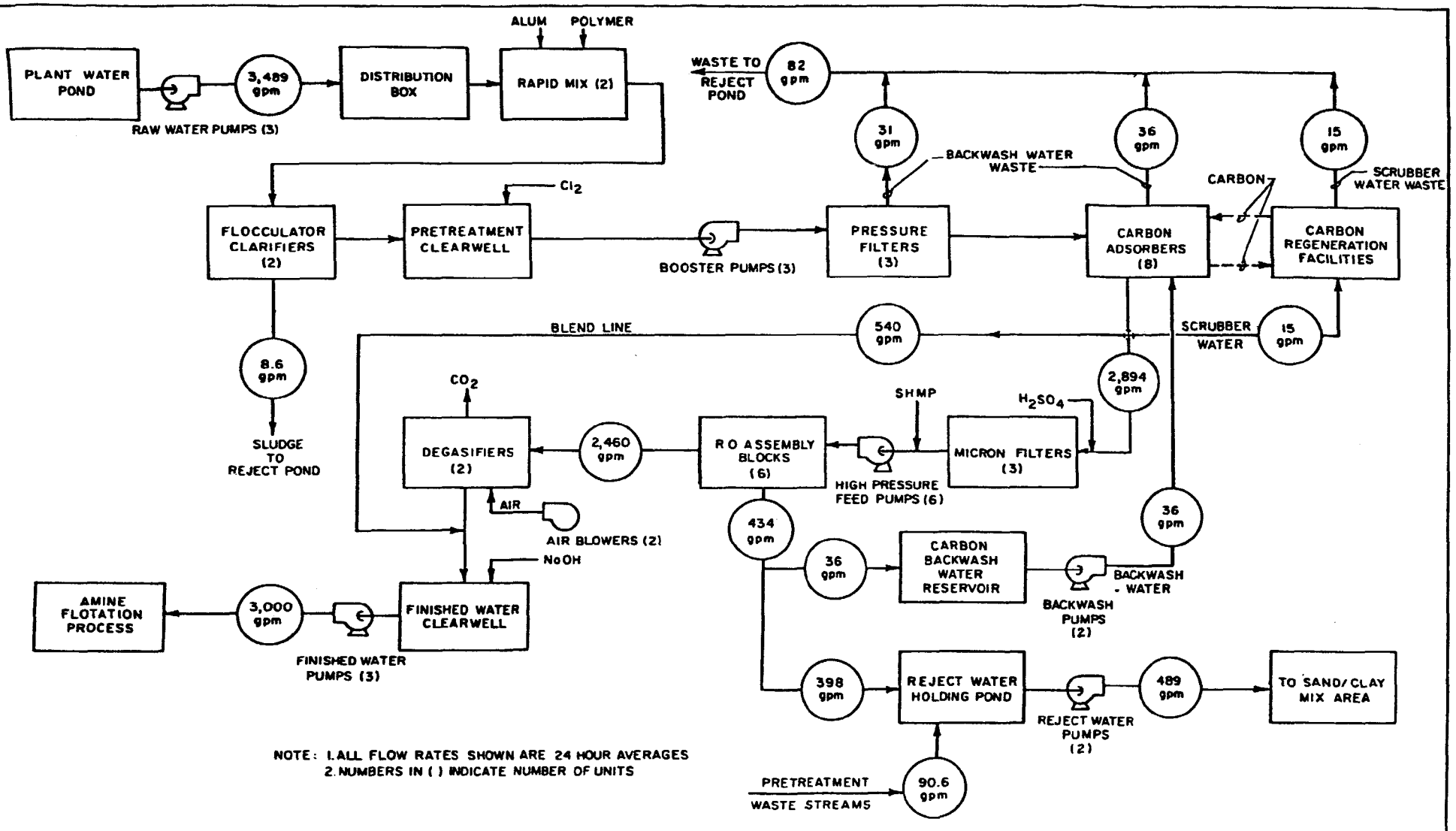
In the event the water stored on site reaches the maximum available storage (initial settling area, sand-clay disposal areas, reservoir, and the mining areas), Estech would discharge excess water on an emergency basis from discharge points 002 and 003 so that the discharge does not exceed more than 15 percent of stream flow at the time and at the point of discharge. Prior to making any such emergency metered discharges, Estech shall notify the FDER that it would make such discharges. Estech would continue such a discharge until the water in storage returns to the maximum available storage level. Such discharges are intended to be emergency in nature to avoid uncontrolled overflow discharges from the system. Should the maximum available storage in combination with the emergency metered discharges not provide adequate storage for excess water accumulating in the system, Estech shall be required to utilize the active dragline cuts as an additional storage area (FDAH, 1982; FDER, 1982).

An essential element in the revised water management plan is the significant reduction of deep groundwater input into the recirculation system during periods when sufficient recycle water is available in the storage areas. To assure a source of water to the amine flotation process of equivalent quality to deep ground water, Estech proposes to use a recycle water preparation plant when necessary to upgrade recycle water to the quality required for the flotation plant. A reverse osmosis facility is currently Estech's method of choice for this purpose.

Reverse osmosis (R/O) permits recovery of relatively pure water from aqueous solutions through high pressure water movement across a semi-permeable membrane. Dissolved solids are blocked by the membrane, but water is forced through. An R/O plant produces a clean water stream relatively free of solutes and a reject stream that contains the concentrated dissolved solids.

Recycled water requires several pre-treatment operations upstream of the R/O assembly blocks to prevent membrane fouling. A conceptual flow schematic of Estech's proposed R/O facility design is provided in Figure 2-3. The sequence of operations for the R/O facility is:

- raw water pumping from plant water pond
- addition of alum and polyectrolyte coagulants followed by clarification to remove solids
- addition of chlorine
- pressure filtration to remove remaining turbidity
- removal of organics (and probably chlorine) by carbon adsorption
- addition of sulfuric acid to prevent membrane scaling by calcium carbonate



NOTE: 1. ALL FLOW RATES SHOWN ARE 24 HOUR AVERAGES
2. NUMBERS IN ( ) INDICATE NUMBER OF UNITS

FIGURE 2-8

CONCEPTUAL FLOW SCHEMATIC RECYCLED WATER PREPARATION PLANT

SOURCE:
SVERDRUP & PARCEL AND ASSOCIATES, INC.

U.S. EPA - REGION 4
ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT

ESTECH, INC.
DUETTE MINE
MANATEE COUNTY, FLORIDA

- cartridge filtration to remove remaining solids
- addition of sodium hexametaphosphate to prevent membrane scaling by calcium sulfate and other scaling compounds
- high pressure feed through R/O assembly blocks
- degasification of dissolved carbon dioxide
- addition of sodium hydroxide for pH adjustment
- finished water pumping to amine flotation process

Operation of a small rotary kiln would be auxiliary to the R/O plant. The kiln would be used to regenerate activated carbon which removes organic compounds from recycled water as one of the pre-treatment steps.

Waste streams from the R/O facility would be combined with the high flow of clay slurry streams pumped to the sand-clay mix areas.

The Consumptive Use Permit issued by the Southwest Florida Water Management District allows groundwater withdrawal at a rate of 13 mgd for the first three years. ~~During this time, a 200 acre surface water reservoir will be constructed to provide storage for 6 mgd, thereby decreasing groundwater use to 10 mgd.~~ Prior to withdrawal, a recharge system will be constructed to transmit water from the surficial aquifer into the deep system.

With the exception of a 100-acre area, all land disturbed by the operation will be reconstructed and/or backfilled with waste materials in conformance with county and state slope requirements. In sand-clay mix landfills, the exterior levees and any protruding spoil piles will be graded down. ~~In the clay settling area, the formation of a surface crust will be encouraged by use of perimeter and interior ditches. When the crust has formed, the retaining dike will be pushed down.~~ In sand tailings landfills, the overburden in the protruding spoils will be distributed over the landfill to an average depth of two feet.

In land and lake areas, the spoils will be graded to conform with terrestrial slope requirements and to form littoral zones consisting of 12 to 1 subaqueous slopes out to a depth of 6 feet.

In addition to primary physical restoration techniques, several special techniques are planned to achieve particular reclamation goals. A three-quarter mile segment of the East Fork Manatee River is proposed to be restored by creation of an adjacent hardwood vegetated floodplain and channel with the same elevation and gradient as the existing stream. (Note: Estech has revised its proposed activity to exclude mining of the East Fork of the Manatee River.)

Shallow basins allowed to form around the drainage outlets in sand-clay landfills will be retained as marsh environments. Drainage swales will be constructed through adjacent sand-clay landfills to interconnect these marshes.

About 6,000 acres of reclaimed land will be planted to forage grasses and legumes. Forage species will be selected to match the potential productivity of each reclaimed soil type. Reforestation in upland areas will include mixed plantings of native species such as water oak, live oak, longleaf pine and slash pine. The shallow basins created in sand-clay landfills are expected to revegetate naturally with marsh-type vegetation. The minimally reclaimed 100-acre land and lake area will also be allowed to revegetate naturally.

Contouring and revegetation of land and lake areas is estimated to require two years to complete. Backfilling with sand tailings, capping with overburden and revegetation will require about three years. In sand-clay landfills, ~~two~~ three years have been allotted to filling, two years to subsidence and consolidation and an additional year to revegetation, for a total of ~~five~~ six years to complete reclamation.* ~~Because of the lengthy period required to form a surface crust, ten years has been allotted to complete reclamation of the single clay settling area.~~

*This does not constitute a change in the mine plan. Rather, it is now recognized that stage filling over a three-year period, allowing intermediate consolidation, will prevent the necessity of increased fill and dike elevations.

3.0 ALTERNATIVES EVALUATION

All alternatives evaluated in the Draft and Final EIS were re-examined to determine if the project revisions significantly affected the initial analyses. The following alternatives are not affected by the changes and are, therefore, not subject to additional evaluation within the Supplement:

- o Plant site location
- o Production rate alternatives
- o Resource recovery alternatives
- o Mining methods
- o Ore transportation alternatives
- o Beneficiation process alternatives
- o Rock drying alternatives
- o Product transportation
- o Energy sources

The following alternatives have been re-evaluated in light of the project changes and are individually addressed as a part of the Supplement:

- o Process water source alternatives
- o Waste disposal/reclamation alternatives
- o Surface water discharge volume alternatives
- o Discharge point alternatives
- o No action

3.1 PROCESS WATER SOURCE ALTERNATIVES

The process water supply objective is to provide to the mining operation water of sufficient quality and quantity to optimize operational and mineral recovery efficiency while conserving the regional water resource (Draft EIS, p. 11). Process water source alternatives considered in the EIS were: use of surface and ground water, total requirement from the deep Floridan Aquifer, use of surface water in rainfall catchment, and use of water from the surficial (water table) aquifer.

Estech's proposed activity in the EIS was for the combined use of surface water (by intake from the East Fork Manatee River) and deep ground water as the primary source (Final EIS, p. 12). The revised proposed action continues to utilize both surface and ground water; however, it relies primarily on on-site surface water storage of process water and rainfall catchment.

3.1.1 Description of the Revised Alternative

Estech's revised proposed action calls for significantly reduced groundwater consumption supplemented by surface water from on-site storage. The proposed use of recycled water in the acid rinse and

amine flotation circuit has contributed to the reduction of ground water withdrawal from an annual average of 10 mgd (Draft EIS, p. 63) to an annual average of approximately 2 mgd. During the dry months when make-up water is required, deep ground water, which is of higher quality than recycled water, would be introduced into the recirculation system via the flotation process. When sufficient water exists in the recirculation system so that no make-up water is introduced, recycled water would be used directly in the flotation process. A water preparation facility would be used, if and when necessary, to assure the quality of the recycled water for the quality-specific requirements of the flotation process. A reverse osmosis (R/O) facility is proposed by Estech as the most probable method to be used if water treatment is needed. (For additional discussion of the R/O facility, see Sections 2.0, 4.1 and 4.3.)

The revised proposed activity excludes the East Fork Manatee River as a possible water source by eliminating the intake structure. Additional water storage is attained by constructing an embankment around the surface water reservoir.

3.1.2 Environmental Advantages

The refined water management plan now proposed by Estech would significantly reduce the projected deep groundwater withdrawals and allow for the near-exclusive use of surface water without excessive impoundment areas. As a result of the reduced deep groundwater withdrawals, the water levels in the Floridan Aquifer would not be lowered to the extent anticipated for the original proposal. The reduced withdrawal would lessen the drawdown at the property boundary from 2.6 feet (Draft EIS, p. 64) to 0.5 feet. Compared to the project as evaluated in the EIS, the revised water source alternative, by lessening the decrease of the potentiometric head of the Floridan aquifer, also lessens the induced leakance from the shallow groundwater system to the deeper system (See Section 4.2.1). The proposed project assures a water balance with an extremely low probability of overflow (discharge) from the water management system. The use of an internal surface water supply which excludes the intake of water from the East Fork Manatee River would allow that quantity of water to be available for other downstream users.

3.1.3 Environmental Disadvantages

In the event that a reverse (R/O) plant were used to treat recycle water for the flotation process, selected soluble compounds would be introduced into the recirculation system (Section 4.3.1) The use of a kiln in association with the R/O facility would contribute a source of air emissions not originally present (Section 4.1.1).

3.1.4 Summary Comparison

The revised proposed activity parallels in some respects the "use of surface water in rainfall catchment" alternative evaluated in

the EIS and modifies the selected "use of surface and ground water" alternative. However, the exclusive use of regional and on-site drainage supply ("rainfall catchment" alternative) required that no ground water be withdrawn except for potable use. This alternative, as evaluated in the EIS (Draft EIS, Section 2.9), required further diversion of river water, extensive construction of impoundment areas, increased reduction in downstream supply, and possibly inundation of environmentally sensitive areas. By refinement of the water management plan, the revised proposed activity provides a process water source alternative which reduces the adverse impacts of deep groundwater withdrawals without creating the adverse impacts associated with the "rainfall catchment" alternative addressed in the EIS. Therefore, the combined use of ground water and surface water (excluding the diversion of the East Fork Manatee River) is the environmentally preferred alternative.

3.2 WASTE DISPOSAL/RECLAMATION ALTERNATIVES

The objective of the waste disposal/reclamation plan is to restore disturbed land to a productive state, considering both existing and created environmental systems. Two alternatives incorporating all elements of disposal/reclamation (waste disposal, physical restoration, and revegetation) were identified and evaluated in the EIS (Draft EIS, Section 2.8.). Estech's proposed alternative addressed in the EIS and the revised alternative remain essentially the same. Estech's revised proposal replaces the 480-acre clay settling area with a like area of sand-clay mix.

3.2.1 Description of the Revised Alternative

The Florida Cabinet, sitting as the Florida Land and Water Adjudicatory Commission, voted to approve the Duette Mine project subject to the condition that a sand-clay mixture be discharged into the initial settling area in place of clay only. Therefore, except during temporary emergency situations, the initial 480-acre clay settling area will now receive a sand-clay mix in a manner similar to that described for the other sand-clay mix areas throughout the site. However, the initial sand-clay mix settling area would be over unmined lands whereas other disposal areas are to be in mined-out cuts. The settling area would now employ the reclamation techniques outlined for sand-clay disposal/reclamation areas.

3.2.2 Environmental Advantages

The principal environmental advantage of adding sand to the clay settling area is the reduction in the extent to which the clays would flow in the event of dike failure. Should such an embankment failure occur, the released sand-clay mixture is not expected to reach Lake Manatee. Under this hypothetical case, the downstream limit of the spill is expected to be approximately 18,000 feet (3.4 miles) upstream of the beginning of the lake and

approximately 65,000 feet upstream of the Lake Manatee dam and intake structures.

The addition of sand to the initial clay settling area also provides an additional 480 acres of soil classified as a sandy loam. This type of soil is agronomically superior to the clay in that the sandy-loam soil can be expected to exhibit the advantages of clay (i.e., natural fertility with high moisture and nutrient retention) and the tillage and aeration characteristics inherent in sandy soil (Draft EIS, p. 53). The 480-acre sand-clay mix is expected to consolidate more rapidly and therefore be available for post-mining reclamation earlier than a clay-only settling area.

The conversion of the 480-acre clay-only settling area to a sand-clay mix area would provide a net decrease in terrestrial gamma radioactivity (See Section 4.7).

3.2.3 Environmental Disadvantages

In comparison with a 480-acre clay-only settling area, the sand-clay area may result in a temporary increase in water lost to seepage during the initial period of operation. Although the sand-clay mix area is expected to be more physically stable than clay-only, it still may not be suitable for construction requiring a substrate with high compressive strength.

The design-specific analysis of the probability of failure for the initial sand-clay mix impoundment indicates a probability of failure of 1 in 140,000. The probability of failure for a clay-only impoundment is essentially the same.

3.2.4 Summary Comparison

The comparison of the various waste disposal, physical reclamation, and revegetation alternatives evaluated in the EIS remains generally unchanged. It is recognized that both sand-clay mix and clay-only waste disposal techniques pose environmental problems. However, the overall advantage of reducing the probability of Lake Manatee receiving the contents of the initial settling area in the event of dike failure makes this the environmentally preferable alternative.

3.3 SURFACE WATER DISCHARGE VOLUME ALTERNATIVES

The objective of the selected water discharge volume alternative is to keep the amount of discharged water to a practical minimum while maintaining the quality of all discharged water at the applicable standards for the receiving water (Section 2.9, Draft EIS). The four alternatives considered in the EIS were: (1) containment of long-term accumulation, (2) containment of short-term accumulation, (3) containment to offset evaporation losses, and (4) no containment.

The preferred alternative identified in the EIS was Estech's proposal for containment to offset evaporation losses only, which would result in an average discharge over the life of the mine of approximately 2,000 gpm. The revised proposal essentially parallels the "containment of long-term accumulation" alternative with several notable exceptions which are discussed in Section 3.3.4. The objective of the revised proposal is to eliminate a surface water discharge from the site.

3.3.1 Description of the Revised Alternative

The revised alternative is a result of rigorous evaluation of water sources, water losses, process requirements, and physical components of the water management system (See Sections 2.0 and 4.4.1). Consequently, the revised alternative reduces the deep groundwater requirements, utilizes containment within areas not previously considered feasible for storage (e.g., current mine areas and active dragline cuts), and allows use of recycle water in the amine flotation circuit and the acid rinse cycle. The revised proposal would eliminate the intake of surface water from the East Fork Manatee River and requires the construction of an earthen embankment around the 210-acre reservoir to provide an additional 3,500 acre-feet of water storage.

These revisions to the water management system would result in a minimum total water storage capacity of approximately 17,000 acre-feet (including current mine areas) and no discharge expected over the life of the mine.

3.3.2 Environmental Advantages

The most significant environmental advantage of the revised proposed alternative would be the elimination of a discharge to the surface waters of the Manatee River. The inherent benefit of a zero discharge is the elimination of the release of contaminants to the aquatic environment.

3.3.3 Environmental Disadvantages

The construction of the earthen embankment around the 210-acre reservoir would present a potential environmental disadvantage not present in the original proposal. The probability of failure of the embankment has been determined to be 1 in 100,000. It should be noted that the embankment height ranges from 11' to 18' above ground level with standard operating water levels below ground level. The determination of the probability of failure assumed operational levels at approximately six feet above ground surface.

The containment of process water within the mine recirculation system creates a potential for an adverse effect on the surficial ground water (See Section 4.3). This effect is not expected to be significant due to the fact that almost all constituents would be trapped within the clay solids, and the minimal amounts of soluble constituents leaving the system would be removed or red-

duced in concentration in the ambient ground water with both time and distance traveled. Thus, the effect on the ground water would be expected to be greatest in the vicinity of the recirculation system and sand-clay mix disposal areas.

3.3.4 Summary Comparison

As indicated in the Final EIS (p. 16), the selected alternative did not necessarily define the best possible system. It was agreed that "improvements or modifications can be implemented by Estech, during design or operation, to further reduce discharge" (USEPA, 1980). The revised alternatives reflect such improvements and modifications. The revised proposed alternative is similar to the "containment of long-term accumulation" alternative which was originally rejected primarily due to the loss of mineral and other natural resources as a result of large impoundment areas and extensive dike construction (Draft EIS, Section 2.9). As a result of the project changes mentioned in Section 3.3.1 above, and an extensive review of the water management system (See Section 2.0, pages 2-5 through 2-8 and Section 4.4.1), long-term accumulation has been determined to be possible without construction of extensive impoundment areas and dike networks.

The significantly reduced potential for surface water degradation is deemed sufficient to offset the currently identified negative attributes. Therefore, given all other environmental considerations, elimination of surface water discharges clearly makes this the most environmentally preferable discharge volume alternative.

3.4 DISCHARGE POINT ALTERNATIVES

The objective of the discharge point(s) selection is to maximize the discharge flexibility for purposes of water conservation and management while meeting water quality standards for the receiving waters. The assessment of alternatives in the EIS considered four discharge plans which utilized one or more of the following discharge points: (a) direct to reservoir pool connected to the East Fork Manatee River, (b) direct to the East Fork Manatee River, (c) direct to North Fork Manatee River, and (d) deepwell injection.

Estech's proposed discharge point plan selected in the EIS called for a combination of discharge points including discharge directly into the North Fork (discharge point 003), into the river overflow pool (reservoir) when not full (discharge point 001), and directly into the East Fork when reservoir was full (discharge point 002) (See Figure 2-1). The revised plan retains discharge point 003, revises discharge point 002, and eliminates discharge point 001. (See Figure 2-2 for location of the proposed discharge points.)

3.4.1 Description of the Revised Alternative

The revised water management plan includes a change in the configuration of the reservoir and construction of an embankment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

JAN 7 1983

REF: 4PM-EA/AJT

TO: ALL INTERESTED GOVERNMENTAL AGENCIES, PUBLIC GROUPS, AND CONCERNED INDIVIDUALS

The Draft Supplement to the Final Environmental Impact Statement (EIS) for the Estech Duette Mine is enclosed for your review. This document has been prepared pursuant to Section 102(2)(c) of the National Environmental Policy Act (NEPA) (Public Law 91-190) and applicable EPA regulations at 40 CFR Part 6.9.

The Draft Supplement to the Final EIS may be reviewed at the following locations:

Lakeland Public Library, Lakeland, Florida
Bartow Public Library, Bartow, Florida
Ausley Memorial Library, Wauchula, Florida
DeSoto County Public Library, Arcadia, Florida
Sarasota Public Library, Sarasota, Florida
Manatee County Library System, Bradenton, Florida
Tampa-Hillsborough County Public Library System
Tampa, Florida

A public hearing to discuss this project has been scheduled for February 15, 1983, at 7:30 p.m. in the Harper-Kendrick Auditorium, 1303 17th Street, Palmetto, Florida. Persons may begin to register at 7:00 p.m.

Persons wishing to make comments should attend and speak at this hearing. A verbatim transcript will be made of the public hearing. The hearing chairman may request that lengthy or technically complex statements be summarized and that, to insure accuracy of the record, such statements be submitted in writing to:

Ms. A. Jean Tolman
Project Officer
Environmental Protection Agency
Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

The hearing record will remain open and additional written comments may be submitted until March 1, 1983. Such additional comments will be considered as if they had been presented at the public hearing.

Please bring this notice to the attention of all persons who may be interested in this matter.

Sincerely yours,

Charles R. Jeter
Regional Administrator

Enclosure: Draft Supplement to the Final EIS

around the reservoir for additional water storage capacity. These changes eliminate the capability to divert water from the East Fork Manatee River and result in two discharge points (001 and 002) being in direct flow alignment with each other. Discharge point 001, being upstream of 002, becomes redundant and is therefore proposed to be eliminated. Discharge point 002 would be positioned to control discharges (if any) at the downstream end of the reservoir. No change in discharge point 003 is proposed.

3.4.2 Environmental Advantages/Disadvantages

No environmental advantages or disadvantages peculiar to the revision of the discharge points have been identified. The changes were attendant to the changes in the water management plan and the elimination of any reasonably expected discharge.

3.4.3 Summary Comparison

Eight discharge point alternatives were evaluated in the EIS and, with the exception of deep well injection, were all found to be acceptable. The preferred alternative in the EIS was selected due to its operational effectiveness and inherent flexibility. The revised alternative meets the objectives of operational flexibility and water management without additional environmental disadvantages. Therefore, the proposed alternative is environmentally acceptable.

3.5 NO-ACTION ALTERNATIVE

The no-action alternative evaluated in the EIS was for Estech to not construct the Duette Mine and to allow the area to continue its present day socioeconomic and environmental trends. The results of this evaluation, presented in the EIS (See Draft EIS, pp. 22-23), are still valid.

An additional approach to the no-action alternative, and the one which is presented in this Supplement, is to view EPA's no-action alternative as the denial of the NPDES permit application. In the case of the original project proposal evaluated in the EIS, denial of the NPDES permit application would have resulted in Estech (1) terminating their project, (2) indefinitely postponing the project, or (3) restructuring the project to achieve zero discharge, for which no NPDES permit would be required. Final action has never been taken on the NPDES permit. However, administrative actions taken by local government and state agencies have effectively forced Estech to pursue the third course of action, i.e., to redesign the water management plan to achieve a zero discharge.

An NPDES permit is still being sought by Estech, apparently to address the highly improbable but statistically possible combination of events that would require a discharge. If EPA were to deny Estech's NPDES permit application for the revised proposal, arguably the project could nonetheless go forward, Estech having

sufficiently demonstrated a no-discharge system. Any discharge, although a remote possibility, would be a violation of Section 301 of the Clean Water Act, for which enforcement action could be taken by EPA against the company.

On the other hand, any mitigative measures recommended by EPA to be imposed as NPDES permit conditions could not be required by EPA if the NPDES permit application were denied.

3.6 MITIGATIVE MEASURES

This section presents mitigative measures not already included in the EIS or the revised proposed activity. These measures were developed as a result of evalution of the project revisions.

3.6.1 Air Quality

Estech proposes an additional source of air emissions not previously included in the original project design. The carbon regeneration kiln associated with the proposed reverse osmosis facility may contribute nitrogen oxide (NO_x) emissions approaching the significant increase level. (See Section 4.1.2). Other potential contaminants are all significantly lower than the "significant net emissions increase" levels that would require a detailed preconstruction review in accordance with the Prevention of Significant Deterioration concept (Table 4.1-A).

Mitigative measures should provide means for tracking emissions and assure that cumulative NO_x emissions do not exceed a specified limit. Restricting the kiln operating capacity to 50% of full-time use would limit the total estimated NO_x emissions to a rate not expected to exceed the "significant increase level". (See Section 4.1.1 for a description of operating capacity.) A secondary mitigative measure could be to require tracking of cumulative NO_x emissions, which could be accomplished by conducting EPA Reference Method stack tests in combination with the total recorded number of kiln operating hours. Should the cumulative NO_x emissions approach the significant increase limit, the company could be required to employ off-site carbon regeneration.

3.6.2 Groundwater Hydrology

Estech proposes to significantly reduce the groundwater withdrawals to accommodate the revised water balance. Revision of the Consumptive Use Permit (issued by the Southwest Florida Water Management District) to reflect the reduced withdrawals would provide additional regulatory assurance for control of groundwater impacts.

3.6.3 Groundwater Quality

As indicated in the water balance for the revised project (Table 4.4-D), water loss to seepage from the recirculation system is

expected to be approximately 800 gpm. This seepage could be maintained at a minimum by limiting water levels in the recirculation system and in the 210-acre reservoir to 112' MSL (annual average) and 95' MSL (annual average), respectively. These levels are at or near the average water table elevation at the respective locations.

Estech's Consumptive Use Permit requires extensive flow and quality monitoring for the connector or "recharge" wells. However, no provision is made to specifically monitor the quality of the surficial aquifer in the area of the sand-clay mix disposal areas, including the initial 480-acre initial settling area, nor the recirculation ditches. If observation wells were installed and a monitoring program implemented in these areas, early detection of any contamination would be possible and corrective measures could be undertaken.

3.6.4 Surface Water Quality

The mitigative measures identified for groundwater quality would be applicable to surface water quality, also. If seepage is maintained at a minimum, the primary mechanism for transport of contaminants through the surficial aquifer to surface waters is significantly reduced. Should the monitoring program suggested in Section 3.6.3 above be implemented, any migration toward surface waters could be detected and possible corrective measures implemented.

3.7 EPA'S PREFERRED ALTERNATIVES, MITIGATING MEASURES, AND RECOMMENDED ACTION

The proposed project changes provide net environmental benefits not considered at the time the EIS was prepared. In considering the overall environmental benefits, the project now proposed by Estech and alternatives preferred by EPA coincide.

In addition to determining the preferred alternatives, EPA has identified mitigating measures, not already included in the proposed activity, which should be incorporated into the project. Specifically, EPA recommends:

- Controlling annual average water levels to 112 feet MSL in the recirculation system and to 95 feet MSL in the 210-acre reservoir for the purpose of minimizing seepage to the surficial aquifer.

- Installing observation wells and implementing a monitoring program to detect any possible contamination of the surficial aquifer from the sand-clay mix areas, including the initial settling area, and from the recirculation ditches.

- Limiting the carbon regenerating capacity and monitoring the cumulative NO_x emissions of the kiln associated with the reverse osmosis facility.

EPA's recommended action is to issue the NPDES permit to Estech, Inc. for their proposed Duette Mine. The proposed permit would impose as permit conditions all mitigating measures incorporated within Estech's proposed project, including the revised alternatives addressed in this Supplement, and all mitigating measures recommended by EPA in the EIS and in this Supplement.

4.0 THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The Environmental Impact Statement addresses those elements of the natural and socioeconomic environments which would potentially be affected by the proposed activity. The various changes since publication of the Final EIS have required that selected elements previously investigated be re-evaluated in light of these changes. No baseline conditions would be affected by the revisions to the project.

Several elements would not be significantly impacted by the project changes and are therefore not discussed further in this Supplement. These include: Meteorological Conditions, Noise, Topography, Geology, Biology and Ecology, Demography, Community Services and Facilities, Economics (exclusive of internal cost), Land Use, Sensitive Manmade Areas, Transportation, Archaeological and Historical Properties, and Resource Use. The remaining elements would be either beneficially or negatively affected by the project changes and have therefore been subject to evaluation within the context of this Supplement. The elements are: air quality, groundwater hydrology, groundwater quality, surface water hydrology, and surface water quality. Two elements, soils and radiological environment, appear to be only marginally affected by the project changes.

4.1 AIR QUALITY

Because of changes in the water management plan for the Duette facility, an additional source of air contaminant emissions may be included in the overall process design. An evaluation of this potential additional source is presented in this section.

4.1.1 Description of Air Emission Source

A reverse osmosis (R/O) facility is being considered as a means of treating recycle water for use in the flotation process. (See pages 2-8 through 2-10 for a general description of the R/O facility.) Removal of dissolved organics (primarily the amine compound used in flotation) by carbon adsorption is one of the pre-treatment operations upstream of the reverse osmosis membranes. Periodic regeneration of the carbon would be performed on-site in a rotary kiln.

The planned regeneration kiln would process 1100 pounds of spent carbon per hour. An oil-fired rotary kiln would be used to regenerate spent carbon by thermally desorbing the organic compounds. Regeneration is best performed with a minimum of excess air so as to control carbon oxidation losses. Kiln effluent gases would contain the desorbed organics, carbon monoxide and other products of incomplete combustion of fuel oil, and some entrained carbon dust.

An oil fired afterburner chamber downstream of the kiln would operate with sufficient excess air to oxidize the combustibles, including the fixed carbon fraction of the entrained dust. Afterburner effluent gases would contain traces of the combustibles, the inorganic fraction of the entrained carbon dust, nitrogen oxides formed by oxidation of the amines, and by-products of fuel oil combustion (ash, carbon monoxide, nitrogen oxides, sulfur oxides).

A wet scrubber downstream of the afterburner would remove most of the particulate matter and about half of the sulfur dioxide. Negligible removal of the relatively insoluble carbon monoxide and nitrogen oxides is assumed. The point source of interest for air quality analyses would be the scrubber effluent gas containing particulate and gaseous contaminants that have penetrated the afterburner and scrubber.

Full-time operation of the kiln would result in estimated NO_x emissions exceeding the "significant increase level". (See following section for explanation of "significant increase level".) However, it is recognized that full capacity of the reverse osmosis facility (and concomitantly the kiln) would be required only during those times when deep well water could not be used or when the recycle water was not of sufficient quality for use in flotation. Thus, due to the anticipated limited use of the reverse osmosis facility (See Section 4.3), the kiln is expected to operate on an annual basis at a fraction of its operating capacity. For purposes of the following analysis, this fraction is conservatively taken to be 50% of the operating capacity.

4.1.2 Permitting Requirements

New facilities planning to emit air contaminants must receive local, state, and federal regulatory agency approval prior to initiation of construction. Typically, the applicant must prove compliance with technology based emission limiting standards. Also, through use of mathematical dispersion models, the applicant must prove that the ambient impact of proposed emissions will not violate ambient air quality standards. Modeling of particulate and sulfur dioxide emissions has the additional requirement of compliance with fixed degradation increments in accordance with the prevention of significant deterioration concept.

Air emission sources for the Duette site were subjected to a comprehensive review process during the previous EIS effort. As explained in the following discussion, such a detailed review does not appear necessary for the carbon regeneration furnace.

Phosphate rock processing plants are on the EPA list of major stationary sources subject to a review for the prevention of significant deterioration of air quality (PSD). The previously completed PSD analysis of the mine and beneficiation plant site included approval of best available control technology (BACT) for

the rock dryers and dry rock storage and transfer operations, and atmospheric dispersion modeling of site emission sources.

The PSD review process would be required for any additional point source at the Duette site if its annual emissions were greater than what is termed the "significant increase level". A comparison of carbon kiln emissions with the significant increase levels is provided in Table 4.1-A, which indicates that none of the projected pollutant emissions exceeds the significant increase levels.

Table 4.1-A. Emission Estimate vs. Specified Significant Net Emissions Increase

POLLUTANT	SIGNIFICANT INCREASE (ton/yr)	PROJECTED EMISSIONS[1] (ton/yr)
Particulate	25	6
Sulfur Dioxide	40	6
Carbon Monoxide	100	11
Nitrogen Oxides (as NO_2)	40	36[2]

(1) Assumes 50% annual average operating capacity for carbon regeneration kiln
(2) Includes oxidation of amines to NO_x

The NO_x emission estimate includes the fuel oil combustion and the NO_x formed by oxidation of the amine compound $CH_3-(CH_2)_{17}-NH_2$. Of the total 36 tons per year emission estimate above, amine oxidation accounts for 25 tons per year.

In general, the projected emissions are based on conservative assumptions, and actual emissions would probably be significantly lower than those included in Table 4.1-A. Since projected emissions are all less than the "significant level", a BACT determination would not be required. A new source performance standard has not been adopted for carbon regeneration kilns; therefore, specific technology-based standards would not be applicable for these emissions.

Standard permits would be required by the Florida Department of Environmental Regulation for a new source of particulates and sulfur dioxide. The applicable process weight code would limit particulate emissions to approximately 1.6 pounds per hour (assuming 540 pounds per hour dry carbon feed), and fuel oil sulfur content would be limited to 1% by weight.

As the project proceeds, the conceptual information used as a basis for air emission estimates must be supplemented with more specific abatement equipment details for state permit application purposes.

4.2 GROUNDWATER HYDROLOGY

Estech's revised water management plan directly affects the groundwater analysis and impacts previously defined in the EIS. The most significant change affecting ground water is the reduction of deep groundwater withdrawals. Another change is the modification of the initial clay settling area to a sand-clay mix area. It should be understood that the changes in groundwater impacts have been evaluated given the anticipated operational water levels. The impacts associated with inordinately elevated water levels having an extremely low probability of occurrence (i.e., use of current mining areas) are not discussed.

4.2.1 Deep Groundwater Withdrawals

The re-evaluation of the flotation process water requirements and the use of recycle water in the flotation process (possibly treated in a reverse osmosis plant) effectively eliminate the need for deep groundwater input to the flotation process except during low rainfall periods. Deep ground water would be utilized in lieu of recycle water (pretreated, if necessary) when recirculation system water levels drop below operational levels.

The proposed changes in the operation of the recirculation system would cause a reduction in the average annual deep groundwater withdrawals from 10 mgd (Draft EIS p. 63) to an average annual withdrawal of 2 mgd (Table 4.4-D). This reduction in withdrawal rates would decrease the potentiometric-surface drawdown identified in the EIS at the closest property boundary from 2.6 feet (Draft EIS p. 64) to 0.5 feet. The natural water level difference between the shallow groundwater system and the underlying deep groundwater system (Floridan Aquifer) ranges from approximately 80 to 110 feet (Draft EIS p. 61). Therefore, the slight reduction in drawdown resulting from decreased pumping of the deep groundwater system will produce a small reduction in induced leakance from the shallow groundwater system to the deeper system.

4.2.2 Recirculation System

Water in the recirculation system (exclusive of the reservoir) would be maintained at an annual average elevation of approximately 112 feet MSL. For much of the length of the recirculation ditches and during most of the year, the water level within the recirculation system would be at approximately groundwater level. The net losses from the system are estimated to be approximately 800 gpm over the life of the mine.

4.2.3 Reservoir

The configuration of the reservoir (Figure 2-2) is proposed to be modified and an earthen embankment is to be constructed around the reservoir. As a result of engineering refinement, the design size is increased from 200 acres to 210 acres. The operating levels of the water within the reservoir would be maintained at 95 feet MSL, which is approximately the adjacent groundwater level in the area of the reservoir. Thus, due to the absence of a hydraulic gradient between the reservoir and the adjacent ground water, no significant seepage from the reservoir is anticipated.

4.2.4 Initial Settling Area

The introduction of a sand-clay mix to the 480-acre clay settling area would result in a very slight increase in seepage during the initial period of operation. The sand particles, at least initially, allow the material to be more porous and permit water to seep. As the area fills and the sand-clay mix compacts, the seepage rate will approach that of the conventional clay-only storage area originally proposed in the EIS.

4.3 GROUNDWATER QUALITY

Implementation of the zero discharge concept requires recycling of water within the various components of the water management system (initial settling area, sand-clay disposal areas, clear water reservoir, etc.). Since surface water discharge would be eliminated, water quality analysis has focused on the potential migration of chemicals from the site system to ground water.

Although Estech prefers to use deep well water for the amine flotation plant, addition of the deep well source when the site water inventory reaches a certain volume may result in a waste-water discharge. Instead, Estech now proposes to use recycle water in the flotation process. Since the water requirements of the flotation process are quality-specific, it could prove necessary at times to upgrade the quality of the recycled water to be used in the amine flotation circuit. Estech proposes to utilize a water preparation plant employing reverse osmosis technology for this purpose, thereby avoiding the addition of water to the system. Thus, no wastewater discharges would be required to maintain operational levels in the recirculation system.

Because of its high operating costs, the reverse osmosis (R/O) plant would be used only when necessary. Its use would likely occur during the historic four-month rainy season of June, July, August and September, a period when make-up water from deep ground water would not be acceptable in the water budget and therefore not available for the flotation process. Therefore, the discussion provided herein is based on a "worst case" operational level

of 50% annual operating capacity. As discussed in Section 4.1.1, a 50% annual operating capacity would result in operation at the design rate for one-half a year.

4.3.1 Plant Reagents and Scrubber Wastes

The R/O membranes are susceptible to fouling by physical, chemical and biological actions. Recycled water requires pre-treatment upstream of the R/O plant, and some routine membrane cleaning operations are necessary for satisfactory operation.

Assuming 50% annual operating capacity for the R/O plant, the following chemicals would be added to the existing site wastes:

- o filter alum - 110 to 155 tons per year.
- o polyelectrolyte - 1.9 to 3.8 tons per year.
- o 93% sulfuric acid - 254 to 270 tons per year.
- o sodium hexametaphosphate - 16 to 32 tons per year.
- o chlorine - 23 tons per year.
- o sodium hydroxide - 17 to 33 tons per year.
- o membrane enzyme cleaner - small quantities of an enzyme cleaner are used periodically to maintain performance of the membranes. The exact amount of the organic enzyme required annually is presently unknown.
- o 1% formaldehyde solution - when the R/O facility is shut down for extended periods, the membrane assembly blocks are flushed with a dilute formaldehyde solution to prevent biological growth on the membrane. Only small amounts of formaldehyde will be added to the site waste streams.
- o regeneration furnace scrubber solids - approximately 7 tons per year of fuel oil and activated carbon ash compounds.
- o regeneration furnace sulfur emissions - 11 tons per year expressed as sulfur dioxide. Absorbed sulfur dioxide will be converted to sulfite and sulfate compounds.

4.3.2 Other Wastes

The typical phosphate clay waste stream from mining and beneficiation processes is known to contain phosphorus, trace metals and radiochemicals. These substances associate with the solids in the waste stream and are expected to be retained almost entirely in the settled clays, while the supernatant water is drawn off for recirculation. The recirculation water would still contain some

suspended and dissolved solids. The R/O facility would also remove and concentrate these suspended and dissolved solids typically present in the recirculation system water supply. These contaminants do not represent net additions, but instead would only be redistributed:

- o suspended solids - solids present in the pond water supply are removed during pretreatment upstream of the R/O assembly blocks. These solids will be contained in backwash water wastes from the pressure filters and carbon adsorbers and in scrubber water waste.

- o dissolved solids - the reject stream from the R/O assembly blocks contains the concentrated dissolved solids, such as calcium, magnesium, sodium, potassium, and sulfates, that are blocked by the membranes.

4.3.3 Deposition of R/O Contaminants

All wastes from the R/O facility would be pumped initially to the reject water holding pond. Water in the pond is projected to contain the following average composition of dissolved species: sulfate 2850 mg/l; bicarbonate 78 mg/l; calcium 740 mg/l; chloride 54 mg/l; magnesium 211 mg/l; aluminum 42 mg/l; sodium 103 mg/l; fluoride 9.0 mg/l; and organics 5.3 mg/l (may include formaldehyde, enzymes, water treatment polymer).

All waste streams produced in the proposed recycle water preparation plant, except for sanitary waste, would be discharged into the reject water holding pond lined with an impermeable material (Hypalon or equivalent) to prevent seepage. This pond would be approximately 7 feet deep and 56 feet square at the bottom with sloping sides. Total storage volume at the maximum normal working depth of 4 feet would be 16,608 cubic feet and would provide approximately 4.2 hours hydraulic retention time, based upon the estimated 489 gpm total reject water and waste streams flow rate.

After the R/O facility waste water is pumped from the reject pond at 489 gpm, it would be mixed with the high volume (68,000 gpm) clay slurry stream, allowing maximum opportunity for mixing with the suspended clay particles. The clay particles are expected to provide sufficient surface area for adsorption of organic compounds and certain heavy metal species which would remain attached to the clay particles as they consolidate. Ion exchange may also contribute to the removal of dissolved metals.

Secondly, as clay particles settle, a substantial quantity of water is trapped within the interstitial spaces between particles, capturing dissolved species added in the R/O plant or beneficiation process. The sand-clay settling areas thus would serve as partial sinks.

A third sink for R/O plant waste chemicals would be provided in the phosphate rock product. During periods of R/O plant use, dissolved compounds would be distributed throughout the site water

inventory and would be present in process water used for mining and beneficiation. These chemicals would leave the site with the dried product.

R/U plant waste chemicals not removed by the three partial sinks discussed above would remain in solution. During beneficiation R/U chemicals would come into contact with fluorapatite [$CaF_2Ca_3(PO_4)_2$]. The calcium based chemistry will tend to limit the concentration of fluoride, phosphate, and sulfate. The three calcium salts resulting from this contact are all relatively insoluble. The common ion effect of calcium would tend to limit solubility even further. The combined effect of the various sinks and limiting factors would be to reduce the presence of available contaminants in the seepage water. The contaminants present in the seepage water would further be removed or reduced in concentration in the ambient ground water with both time and distance from the source. The mechanisms involved would include absorption, dispersion, dilution and other chemical and physical processes. Thus, adverse effects on the surficial ground water, while not expected to be significant, would be greatest in the vicinity of the recirculation ditches and sand-clay mix disposal areas. The surficial aquifer is neither used nor proposed to be used as a source of drinking water at any location on the mine property.

4.4 SURFACE WATER HYDROLOGY

In order to re-evaluate the surface water hydrology element of the proposed activity, a review of the revised water management plan may be appropriate. The water management system presented in Section 2.0, Description of the Proposed Activity, presents the major components and operation of the system. For purposes of surface water hydrology discussions, a summary of the process which resulted in the determination of 17,000 acre-feet minimum storage is helpful.

4.4.1 Water Balance Development

In an effort to prevent a discharge from the project from the 10,000 acre-feet of storage capacity, Estech considered diverting the excess water into the current mining areas (exclusive of the active dragline cuts). To evaluate this possibility and confirm its feasibility, a step-by-step analysis of water sources, water losses, storage capacities, and mining demands was performed.*

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*It should be noted that the original analyses were performed by various consultants to Estech, Inc. including Ardaman and Associates, Inc., Water and Air Research, Inc. and Sverdrup, Parcel, and Associates, Inc. Pursuant to the U.S. EPA Third Party Procedure, Conservation Consultants, Inc. and their approved subconsultants have evaluated and verified the analyses presented herein.

The recirculation system includes the 480-acre initial settling area, the 210-acre reservoir, the sand-clay mix reclamation areas, the ditch system, and plant water ponds. If the water entering the system exceeds the water leaving, water must be stored within the system. If the available storage is exceeded, water will overflow the system. Conversely, if water leaving the system exceeds water entering the system, water must be removed from storage. If the available storage is depleted, water must be added. Water input sources include rainfall, matrix water, deep well water, shallow well water, and mine cut seepage. Consumers of water include evaporation, sand-clay mix, sand tailings, product and seepage.

Because any water required for make-up in the system can be obtained within the limitations of their consumptive use permit utilizing deep well water, Estech has elected to modify the 210-acre reservoir, which was previously proposed for collecting and storing water skimmed from the East Fork Manatee River, to instead collect excess rainfall runoff. To maximize the storage capacity of this reservoir, an embankment would be constructed around the area in accordance with Chapter 17-9, F.A.C. With the maximum storage level at Elevation 112 feet (MSL), and the normal operating level at Elevation 95 feet (MSL), over 3,500 acre-feet of additional capacity would be available within this reservoir. Approximately 4,000 acre-feet of annual storage would be available within the sand-clay mix reclamation areas. An additional 2,500 acre-feet of storage would be available in the initial settling area. Consequently, the minimum design capacity of the water recirculation system for excess water storage would be 10,000 acre-feet.

There is a large variation in both the makeup required and the amount of overflow from the system resulting from the extremes in rainfall over the mine life. It should be noted that the water balance presented below (Table 4.4-A) is for "worst case" conditions in that the rainfall record utilized in the balance contains a rainfall sequence having a very low probability of exceedance (less than 0.1 percent), and this heavy rainfall sequence has been paired with the mine sequence having the lowest water consumption.

The amount of water consumed in the process during each year of the mine plan varies from a low of 5,325 gpm to a high of 12,468 gpm. Similarly, the amount of rainfall collected within the system will vary from year to year depending on the annual rainfall. Overflow from the system would be at a maximum during those years when the amount of rainfall collected within the system is highest and when water consumed within the system is lowest. The 24-year rainfall record used in the calculations contains a four-year period during which the average rainfall exceeded 70 inches per year. To match this period in the rainfall

Table 4.4-A Water Balance - One-Month Increments - Design Storage of 10,000 Acre-Feet Recirculation System*

Water Source (gpm)	Min.	Ave.	Max.	Water Disposition (gpm)	Min.	Ave.	Max.
Rainfall	0	8,340	454,300	Evaporation	1,737	6,989	11,260
Matrix	1,879	2,360	2,641	Sand-Clay Mix	1,854	4,630	6,910
Deep Well to Flotation	-	0	-	Sand Tailings	-	192	-
Seal Water	-	280	-	Product	-	280	-
Net Mine Cut Seepage	-	654	-	Ditch Seepage**	-	800	-
Initial Storage	-	186	-	Final Storage	-	42	-
Deep Well Makeup	0	1,278	14,579	Overflow	0	165	26,649
Total	-	13,098	-	Total	-	13,098	-

*For purposes of all discussions in this Supplement, the recirculation system consists of the initial 480-acre settling area, the 210-acre reservoir, the sand-clay mix reclamation areas, the ditch system, and the plant water ponds.

**Ditch Seepage includes all seepage from the recirculation system.

record with the period in the mine plan with the lowest consumption, the rainfall record was put in a closed loop. The 24 water balance calculations summarized in Table 4.4-B were made by cycling this rainfall loop through the mine plan starting each time with a different rainfall year while keeping the starting mining year constant. In this way, the four rainfall years with the highest precipitation were eventually matched with the four mining years having the lowest water consumption.

As can be seen by the results presented in Table 4.4-B, an additional storage capacity of about 7,000 (6,620) acre-feet would be required to store all of the excess rainwater contained within the Fort Green rainfall record if the exceptionally heavy events were to occur during the most critical mining sequence, i.e., during that period when water consumption within the system was at its lowest rate. The computer analyses indicate that without additional storage capacity, the system would overflow during approximately thirty days of the mine life.

In addition to the minimum 10,000 acre-feet of storage provided in the revised water circulation system, storage could be provided by diverting excess rainwater into the current mining areas (mining areas exclusive of active dragline cuts). This is the water

Table 4.4-B Summary of Water Balance Calculations for Different Combinations of Mining and Rainfall Sequences

Starting Rainfall Year	Months with Discharges	Total Overflow (Acre-Feet)	Average Deep Well Makeup (GPM)
1956	0	0.	1352.
1957	0	0.	1387.
1958	0	0.	1419.
1959	0	0.	1427.
1960	2	1050.	1487.
1961	4	6374.	1500.
1962	3	4502.	1374.
1963	1	3453.	1307.
1964	0	0.	1219.
1965	0	0.	1122.
1966	0	0.	1146.
1967	0	0.	1125.
1968	1	2839.	1285.
1969	5	6156.	1324.
1970	5	6620.	1278.
1971	3	6491.	1259.
1972	2	4397.	1256.
1973	1	2447.	1143.
1974	1	1898.	1153.
1975	1	1525.	1199.
1976	2	3826.	1337.
1977	2	4203.	1322.
1978	1	1949.	1378.
1979	1	2260.	1352.

Design Storage = 10,000 acre-feet

management alternative now proposed by Estech. Table 4.4-C lists the storage available for excess water at the beginning and end of each year of the mine life including utilization of the current mining areas. Note that this table includes the available storage only in the two most recently completed sand-clay disposal areas. Some additional storage would also be available in the other active disposal areas. Consequently, Table 4.4-C provides a conservative estimate of the amount of storage available.

As shown in the table, the minimum storage available for excess water during the mine life, if the current mining areas are utilized, is approximately 17,000 (16,682) acre-feet (after the first five years), enough to provide the required additional storage. A water balance (based on one-month increments) was

Table 4.4-C Storage Available for Excess Water (in Acre-Feet)

Mine Year	Beginning of Year	End of Year With Mine Areas*
1983	15590	8818
1984	20898	13072
1985	19479	15937
1986	22812	15896
1987	22675	19527
1988	25576	20157
1989	27149	18576
1990	25080	18159
1991	23718	18314
1992	23974	17842
1993	23605	17428
1994	23610	16682
1995	23104	17969
1996	23721	19649
1997	25770	20501
1998	26068	20792
1999	26526	18013
2000	23272	18008
2001	23618	16965
2002	24432	18579
2003	24295	18412
2004	24349	18775
2005	25699	17527
2006	24600	17809

*Includes available storage in the below-grade reservoir, the initial settling area, and the two most recently constructed sand-clay disposal areas. Neglects available storage in other active disposal areas. Assumes sand-clay disposal areas under construction during each mining year not completed until last day of year.

computed for a total storage capacity of approximately 17,000 acre-feet which is shown in Table 4.4-D. As shown, increasing the total storage capacity from 10,000 acre-feet to 17,000 acre feet (or more) reduces the overflow from 165 gpm to zero and decreases the average deep well make-up.

In addition to the removal of input to the river system, the revised water management plan excludes the intake of water from the East Fork Manatee River. This would result in restoring 2. MGD to the hydrology of the Manatee River. In recognition of t

Table 4.4-D Water Balance - One-Month Increments-Design Storage of 17,000 Acre-Feet Recirculation System

Water Source	Average (gpm)	Water Disposition	Average (gpm)
Rainfall	8340	Evaporation	6989
Matrix	2360	Sand-clay Mix	4630
Deep Well to Flotation	0	Sand Tailings	192
Seal Water	280	Product	280
Net Mine Cut Seepage	654	Ditch Seepage	800
Initial Storage	186	Final Storage	42
Deep Well Make-up	1113	Overflow	0
Total	12,933		12,933

fact that the original proposal limited this intake from the river to the periods of high flow (Draft EIS p. 80), the hydrological effect of this revision is expected to be minimal.

4.5 SURFACE WATER QUALITY

The elimination of discharges to the East and North Fork of the Manatee River essentially negates the primary concern of water quality degradation from site effluent. However, as a result of the proposed project changes, potential impacts not previously addressed in the EIS deserve consideration. The placement of sand in the 480-acre initial settling area, the construction of an embankment around the 210-acre reservoir, the possible introduction of a reverse osmosis water treatment facility, and proof testing of the initial settling area constitute four changes which have the potential for affecting surface water quality. In addition, the reclassification of the North Fork and East Fork of the Manatee River imposes water quality considerations not applicable at the time of preparation of the Draft and Final EIS. Specifically, stormwater runoff from the reclaimed sand-clay mix areas was not expected to have an impact on the Class III standards of the receiving waters. This section also addresses the potential for impact when Class I-A standards apply to the receiving streams.

4.5.1 Conversion of Clay Settling Area to Sand-Clay Mix

As a condition of Estech's Development Order granted by the Governor and Cabinet serving as the Land and Water Adjudicatory Commission, Estech is required to employ the sand-clay mix procedure while filling the initial settling area. This operational change nullifies the hypothetical dam break scenario described in the EIS (Draft EIS, Section 4.10).

Since a final design has been proposed for the dam of the initial settling area, it was possible to perform a design-specific analysis of Probability of Failure (P_f). The analysis done for this Supplement was totally site-specific with no reliance on estimates of performance from other areas or other dams. The purposes of the analysis was to determine the effect on dam safety of storing sand-clay mix rather than clay slurry. The results of the analysis indicate that the probability of a shear failure of the initial settling area dam is 1 in 140,000. This probability of failure is essentially the same as that for the clay only. However, it should be noted that operational differences make the probability of failure slightly less likely than a failure of clay only.

Notwithstanding that the risk of failure of the 480-acre settling area embankment is an event of extremely low probability, an analysis of the effect such a failure would have upon the Lake Manatee reservoir was performed. The distribution of the sand-clay mix which would result if failure of the embankment surrounding the intial settling area were to occur has been calculated. The calculations were based upon measured engineering strength properties and percent solids measurements of sand-clay mix pilot plant samples. It has been calculated that even with the area filled to capacity, failure of the embankment would not result in the sand-clay mixture reaching the Lake Manatee Reservoir. Under this hypothetical case, the downstream limit of the spill would be approximately 18,000 feet (3.4 miles) upstream of the beginning of the lake and approximately 65,000 feet upstream of the Lake Manatee dam and intake structure. This indicates that in the unlikely event of a dam failure, the addition of sand to the clay settling area would prevent the contents of the impoundment from reaching the reservoir.

4.5.2 210-Acre Reservoir Embankment

In order to provide 3,500 acre-feet of additional storage capacity with the 210-acre clean water reservoir, an embankment would be constructed around the in-ground impoundment. The potential of a reservoir embankment failure and resulting impact on Lake Manatee was not addressed in the previously completed Environmental Impact Statement. The 210-acre reservoir embankment will be designed to the standards required for the initial settling area, including compliance with the FDER Rules, Chapter 17-9, and including the use of an internal filter drain. The analyses for Probability of Failure (P_f) for this dam was based on the actual performance of phosphate industry dams designed to meet Chapter 17-9. To date, the total experience is more than 1,200 miles-years without a failure. This yields a calculated Starting Point Probability of 7.3×10^{-5}. By the use of internal filter drains as proposed for this reservoir, the P_f for the proposed reservoir dam will be lower than for the historical local performance. The P_f for the 210-acre reservoir dam has therefore been estimated at at 1 in 100,000.

A dam failure could release up to a maximum of 3,500 acre-feet of water, which would amount to about 15% of the normal volume of Lake Manatee. This maximum release assumes loss of all water above grade (2310 acre-feet) and the release of an additional 1200 acre-feet of water through erosion to approximately six feet below grade.

The hypothetical dam break of the clear-water reservoir would result in the release and deposition of sediment in the form of sand-size particles and suspended solids. The impact of sediments would be due to particles entrained from the resrvoir embankment, eroded uplands and scoured Manatee River bed. The sand-sized particles from the breach would be expected to be deposited in close proximity to the Estech property. The safe yield of the Lake Manatee Reservoir would not be reduced. The suspended solids impact would be comparable to that of a 25-year peak flow sediment flush from the river system.

Projected water management practices dictate that only when all other available storage is full will the 210-acre reservoir be allowed to fill to its design capacity. Therefore, the quality of water within the reservoir, subject to release during a dam break, would essentially be that of stormwater accumulated over and above the available storage.

4.5.3 Reverse Osmosis Water Treatment Facility

A potential concern for surface water quality would be the possibility of wastewater, which had accumulated during the recycle of beneficiation and reverse osmosis plant discharges, entering and migrating through the surficial ground water to enter the Manatee River. As discussed in Section 4.3.3, the R/O contaminants present in the recirculation water are expected to be largely removed by the various available contaminants sinks. Therefore, the seepage water entering the surficial ground water is expected to be low in concentrations of these contaminants. The low hydraulic gradients over the site and plans to keep the recirculation system water levels near groundwater levels provide a hydraulic situation which would not promote the rapid movement of contaminents away from the source via the surficial groundwater. Furthermore, the contaminant concentrations would be further reduced by interaction with the surficial aquifer materials and the ambient groundwater, resulting in a decrease in concentration with both time and distance from the source. As the combined result of these factors, no adverse impact on the Manatee River is expected to occur as a result of the R/O facility.

4.5.4 Proof Testing of Initial Settling Area

As a condition of approval, the Florida Govenor and Cabinet, sitting as members of the Land and Water Adjudicatory Commission, requires Estech to proof-test the 480-acre initial settling area with clear water. The concept of proof-testing the clay settling area is to produce stress conditions less than design maximum but great enough to measure with installed instrumentation. The

normal procedure is a slow-to-moderate filling rate accompanied by close observation of instrumentation and physical inspection. Since filling to the maximum level is not required for adequate proof-testing, failure by overtopping is not a concern. The major concern is uncontrolled excessive seepage that could eventually lead to piping and possible embankment failure. Under conditions of proof-testing, the possibility of rapid dam failure is essentially non-existent.

The source of water for the clear water proof-testing would be groundwater withdrawal within the 12.9 MGD limit imposed by the Consumptive Use Permit. Filling to 15 feet would require approximately 181 days at a continuous rate. No flow to the Lake Manatee reservoir would be diverted for filling the settling area. Proof-testing of the settling area would pose no additional hazards to the Lake Manatee dam, even if failure of the settling area during proof-testing occurred.

An October 1979 report by Bromwell Engineering to Manatee County concluded that the existing dam facilities could be operated to safely pass a 100-year storm, but recommended installation of an emergency spillway to accommodate the probable maximum flood (PMF) (Bromwell, 1979). In the case of the 100-year storm, the level inside the reservoir would not exceed elevation 44 MSL, leaving 15,000 acre-feet of storage to the top of the dam, enough to accommodate the total capacity of the Estech settling pond (12,000 acre-feet) without overtopping. The same would apply during the probable maximum flood, provided the emergency spillway had been installed. If the spillway were not in place during the PMF, overtopping of the Lake Manatee dam would occur with no contribution from Estech.

4.5.5 Sand-Clay Mix Runoff

The mining and beneficiation of the Duette Mine site is projected to result in the reclamation of 5,906 acres through the use of sand-clay mix technology. The runoff potential of these soils should range from moderately high to high due to a decrease in surficial permeability (Draft EIS, p. 53). Although runoff potential would be increased over baseline conditions, increased impoundments in lakes and marshes after reclamation would decrease runoff from the reclaimed property by two to three inches per year (Draft EIS, p. 81).

Constituents of the sand-clay runoff which might potentially degrade the quality of the receiving streams below the Class I-A criteria were determined by identifying those criteria affected by the reclassification and eliminating from consideration those constituents not expected to be present in the sand-clay mix in sufficient concentrations to potentially cause water quality violations. The availability of these constituents to the receiving streams was then investigated by examining the mechanisms by which these potential contaminants might be introducted into the streams.

Table 4.5-A summarizes those parameters affected by the classification change from Class III to Class I-A. In the case of aluminum, a criterion exists for Class III waters but not for Class I-A.

Table 4.5-A Parameters Affected by Classification Change

Parameter	F.A.C. 17-3 General Criteria	F.A.C. 17-3 Class I-A	F.A.C. 17-3 Class III
Aluminum	---	---	1.5
Barium	---	1.0	---
Chloride	---	250	---
Fluoride	10.0	1.5	---
Iron	---	0.3	1.0
Nitrogen, Nitrate-N	---	10	---
2, 4 - D	---	0.1	---
2, 4, 5 TP, µg/l	---	10	---
Selenium	---	0.01	0.025
TDS	---	500 monthly avg. 1000 maximum	---

NOTE: o In milligrams/liter unless otherwise noted.
o µg/l = micrograms per liter

The following constituents are not known to be present in sand-clay mix disposal areas in sufficient concentrations to potentially cause a violation of Class I-A standards: selenium; 2, 4 - D; 2, 4, 5 TP; chloride; and nitrate. The remaining parameters of fluoride, iron, total dissolved solids, and barium have been investigated relative to their availability to the receiving streams. To identify this availability, the mechanisms by which these contaminants would reach (or be prevented from reaching) the surface waters were evaluated.

In order of their relative potential for being introduced into the receiving streams, fluoride presents the most significant potential for approaching the Class I-A criterion followed by TDS, iron, and barium. However, several physical characteristics of the mining and reclamation plan reduce potential for impact from these constituents.

As mentioned earlier, the overall runoff from the site is expected to decrease slightly due to the increase in impoundment areas of the reclaimed land. Approximately 538 acres of shallow aquatic environments would be created within the sand-clay reclamation areas. These naturally vegetated systems provide for long-term uptake, degradation, and precipitation of selected elements. In addition, the reclamation of sand-clay areas requires that exterior dikes be graded to approved slopes. It is inherent in this procedure that the exterior dikes be graded over portions of the sand-clay soils. Approximately 21 to 37 percent of the sand-clay soils would be capped with the dike material resulting in reduced exposure of these areas to surface runoff. The reclamation plan also provides for the revegetation of all reclaimed soils as soon as physical stability permits and grading to approved slopes is complete. This revegetation serves to stabilize the surface soils and prevent erosion.

A final feature of the mine plan which would serve to buffer the impact of the constituents on the North and East Forks of the Manatee River is the preservation of a 200-foot wide zone adjacent to the streams. This zone, in addition to its ecological significance, will provide an area of established vegetative cover, humic soils, and microbial communities available for assimilation and biodegradation.

In conclusion, the surface runoff from the reclaimed sand-clay mix areas is not expected to have an adverse affect on the Class I-A waters of the East and North Forks of the Manatee River.

4.6 SOILS

The Duette Mine as originally proposed provided for the disposal of clay wastes within a 480-acre settling area which would ultimately be reclaimed by encouraging dewatering and grading the retaining dike inward over the area. The use of sand in the initial settling area will eliminate this type of soil profile and replace it with an additional 480 acres of a soil classified as a sandy loam. Its physical, agronomic, and engineering properties would not be unlike those expected from the 5,426 acres of sand-clay reclamation proposed for other areas of the mine site.

4.7 RADIOLOGICAL ENVIRONMENT

The waste disposal/reclamation plan for the Duette Mine originally provided for a 480-acre clay waste settling area. The clay waste from pilot plant studies of Duette Mine matrix is reported to exhibit a concentration of radium-226 of between 3.2 to 5.6 pCi/g. This area was predicted to have a total external gamma radiation level of 13.8 μR/hr. The addition of sand tailings (radium-226 concentration between .8 and 1.4 pCi/g) to the initial settling

area in approximately the 2.5 to 1 ratio as proposed for the sand-clay mix reclamation areas, is predicted to yield a gamma radiation level for the area of 8.7 μR/hr. Therefore, it appears the conversion of the 480-acre clay-only settling area to a sand-clay mix will provide a net decrease of 5.1 μR/hr in terrestrial gamma radioactivity (from 13.8 μR/hr to 8.7 μR/hr).

5.0 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

The following discussion of short-term use versus long-term productivity includes, where applicable, an identification of the irreversible or irretrievable commitments of selected resources resulting from the proposed project revisions. Irreversible or irretrievable resource commitments are defined as those resources which would be consumed, depleted, permanently removed, or destroyed. Only those disciplines subject to evaluation within this Supplement are discussed.

5.1 AIR QUALITY

The proposed project revisions will periodically contribute an additional source of air contaminants over the life of the mine. In addition to those sources identified in the EIS, the reverse osmosis facility would primarily contribute NO_x emissions which may impact the air quality over the short term. No long-term impact has been identified.

5.2 GROUNDWATER HYDROLOGY

The withdrawal of ground water would be significantly reduced over those quantities identified in the EIS. There would still be a depression of the potentiometric surface of the Floridan Aquifer and a capturing of surficial ground water from pit seepage over the mine life. At a pumping rate of approximately 2 MGD, more than 15 billion gallons of water would be committed from the Floridan Aquifer over the life of the mine.

5.3 GROUNDWATER QUALITY

The revised project introduces additional contaminants not originally present in the recirculation system. Although most of these constituents are expected to be deposited in several identified contaminant sinks, the possibility exists for some migration with seepage to the adjacent surficial groundwater. The contaminant sinks would result in a possible long-term deposition of various process constituents.

5.4 SURFACE WATER QUALITY

The proposed project essentially eliminates all discharges to surface waters over the life of the mine thereby reducing both the short-term and long-term surface water quality impacts relative to the originally proposed projects. Changing the intial settling area from clay-only to sand-clay mix reduces the potential throughout the mine life for a clay waste spill to impact Lake Manatee.

5.5 SURFACE WATER HYDROLOGY

The short-term use of the river for process water (by off-stream diversion) and as a recipient of discharge water has been eliminated by the proposed project changes. The short-term impoundment of water within the active project areas would prohibit run-off from entering adjacent water courses. The short-term diversion of run-off is not expected to adversely affect the long-term productivity of the riverine systems.

5.6 SOILS

The revised project requires that an area previously designated for 480 acres of clay wastes be utilized for sand-clay mix. This short-term use directly affects the long-term productivity of this limited area. The agronomic and structural attributes of the sand-clay mix would provide long-term benefits not available with clay only.

5.7 RADIATION

The conversion of the clay-only settling area to a sand-clay mix area provides a net decrease in terrestrial gamma radioactivity. In view of the inherent persistency of radioactivity, this revision must be considered to result in a long-term beneficial impact relative to the originally proposed project.

6.0 COMPARISON WITH AREAWIDE EIS RECOMMENDATIONS

A comparison of the project (as originally proposed) with the Areawide EIS Recommendations was presented in the Draft and Final EIS for the Duette Mine. Subsequently, changes in the project have required that the Areawide Recommendations be revisited to determine to what degree these changes may affect the Recommendations.

The following EIS recommendation are affected by the project revisions:

The Areawide EIS recommended that State of Florida and local effluent limitations for any discharges be met. Estech, in an effort to provide "reasonable assurance" that its discharges will meet State of Florida effluent limitations, has revised its water management plan to eliminate all surface water discharge from mine. The extremely low probability of discharge has been determined by recent administrative hearings to qualify as a "zero discharge" facility. The Florida Department of Environmental Regulation has indicated it will provide the required certification for the federal NPDES permit (FDER, 1982).

The Areawide EIS recommended the elimination of conventional above-ground slime disposal areas through development of a mining and reclamation plan whereby the clay wastes and sand-clay mixture would be used for reclamation or some other purpose. Although Estech's original plan was consistent with the areawide recommendations, the use of the initial clay settling area has been further modified to accommodate sand along with the clays. The initial settling area will now provide for the use of the clay as a component of a sand-clay mix.

The Areawide EIS recommended that the requirements of the Southwest Florida Water Management District consumptive use permit requirements be met. Although Estech was bound to the conditions of their Consumptive Use Permit, the project changes provide a further reduction of groundwater withdrawals. This reduced withdrawal is the result of increased utilization of the recycle water through the use of a reverse asmosis treatment facility and increased storage capacity.

Although Estech's original water management plan provided for "capture of 100% of water recovered from slimes", the revised water management plan provides for recovery and recirculation of <u>all</u> process water.

7.0 COORDINATION

7.1 FINAL ENVIRONMENTAL IMPACT STATEMENT DRAFT SUPPLEMENT COORDINATION

The Final Environmental Impact Statement (Final EIS) was published in September 1980 and made available to the public and the Council on Environmental Quality. The Federal Register (Vol. 45, No. 179) dated September 12, 1980, announced the availability of the Final EIS, and a corresponding public notice appeared in local newspapers.

On February 17, 1982, EPA distributed to all citizens, public groups, and governmental agencies a Notice of Intent to prepare a Supplement to the Final EIS to address changes in the proposed project. The Notice of Intent also appeared in the Federal Register (Vol. 47, No. 39) dated February 26, 1982.

The following federal, state, and local agencies, public officials, organizations, and interest groups have been requested to comment on this Draft Supplement.

Federal Agencies

Bureau of Mines
Coast Guard
Corps of Engineers
Council on Environmental Quality
Department of Agriculture
Department of Commerce
Department of Education
Department of Interior
Department of Transportation
Department of Health and Human Services
Soil Conservation Service
Federal Highway Administration
Fish and Wildlife Service
Food and Drug Administration
Forest Service
Geological Survey
National Park Service
Department of Housing and Urban Development
Department of Energy

Members of Congress

Honorable Lawton Chiles
United States Senate

Honorable Paula Hawkins
United States Senate

Honorable Sam Gibbons
U.S. House of Representatives

Honorable Andy P. Ireland
U.S. House of Representatives

Honorable Connie Mack III
U.S. House of Representatives

State of Florida

Honorable D. Robert Graham
Governor
Patrick K. Neal
State Senator
Warren S. Henderson
State Senator
Lawrence F. Shackleford
State Representative
Peggy Simone
State Representative
Thomas E. Danson, Jr.
State Representative
Robert M. Johnson
State Representative
Fred Burrall
State Representative

Department of
Administration
Environmental Regulation
Commission
Game and Freshwater Fish
Commission
Department of Commerce
Department of Health and
Rehabilitative Services
Department of Environmental
Regulation
Department of Community
Affairs
Department of Natural
Resources
Department of Transportation
Department of Agriculture
and Consumer Services

Local and Regional

Manatee County Commission
Polk County Commission
Hillsborough County Commission
Desoto County Commission
Hardee County Commission
Sarasota County Commission
Tampa Bay Regional
Planning Council

Manatee County Department
of Pollution Control
Sarasota County Health
Department
Sarasota County Environ-
mental Control Department
Southwest Florida Water
Management District

Interest Groups

The Fertilizer Institute
Florida Phosphate Council
Florida Audubon Society
Florida Sierra Club
Manasota 88
League of Women Voters
Conservation Council of
Manatee County

Manatee Audubon Society
Florida Defenders of
the Environment
Izaak Walton League of
America, Florida Division
Florida Wildlife
Federation

7.2 CONSULTATION WITH THE U.S. DEPARTMENT OF INTERIOR, U.S. FISH AND WILDLIFE SERVICE

EPA has performed all consultation procedures in accordance with requirements of Section 7 of the Endangered Species Act of 1973, as amended. On February 14, 1980, EPA provided the U.S. Department of the Interior, Fish and Wildlife Service (USF&WS) with a description of the proposed Duette Mine and requested confirmation of the accuracy of the information contained in the Draft EIS provided by the consultant preparing the EIS on behalf of EPA. Subsequently, EPA received a letter from USF&WS issuing a Biological Opinion indicating satisfaction with the information provided in the Draft EIS. The proposed changes to the project would not affect the potential impact on threatened and endangered species on the site and, therefore, would not require additional consultation.

7.3 CONSULTATION WITH THE STATE HISTORIC PRESERVATION OFFICER

EPA has complied with all consultation requirements established by Section 106 of the National Historic Preservation Act of 1966. In an April 29, 1980 letter, EPA provided the Director of the Florida Department of State, Division of Archives, History and Records Management and State Historic Preservation Officer with pertinent sections of the Draft EIS Summary Document and a copy of the Archaeological and Historical Properties Resource Document. This information was provided pursuant to the procedures for consultation and comment promulgated by the Advisory Council on Historic Preservation in 36 CFR Part 800 and 366 CFR Part 63. The State Historic Preservation Officer concurred by signature a finding of "no adverse effect" given the imposition of conditions described in a letter from EPA dated July 12, 1980.

The proposed changes to the project would not affect the conditions required and agreed upon in the letter. Therefore, additional consultation with the State Historic Preservation Officer and provision of further information for compliance with 36 CFR Part 800 and 36 CFR Part 63 would not be necessary.

7.4 COORDINATION WITH THE U.S. DEPARTMENT OF INTERIOR, MINERALS MANAGEMENT SERVICE AND BUREAU OF LAND MANAGEMENT

In response to EPA's February 1982 Notice of Intent to prepare this Supplement, the Department of Interior, Minerals Management Service (MMS) notified EPA in a letter dated May 12, 1982, of the existence of a 40-acre tract of Federally reserved phosphate located within the boundaries of the proposed mine site. The exact location is the NE 1/4 of the NW 1/4 of Section 18, Range 22E, Township 33S. At the time of EIS publication, neither Estech nor EPA was aware of the Federal minerals ownership, and the proposed mine plan described in the EIS indicated that the tract would be mined by Estech. MMS indicated that Estech and the Bureau of Land Management (BLM) should be made aware of the

Federal phosphate ownership of the tract and the need for Estech to meet Competitive Lease Application requirements before mining the subject tract.

EPA advised Estech of the existence of the 40-acre tract, and in a letter dated June 1, 1982, Estech acknowledged the Federal minerals ownership, which was found to be recorded in the 1927 Manatee County lands records. Estech indicated that they would want to mine in the area in question in approximately Year 18 of the mine life and that they would comply with all necessary prior approvals before mining.

The 40-acre tract represents 0.6% of the area to be mined and contains about 10,000 tons of phosphate per acre. Although the value of phosphate is a function of many variables, Estech has estimated the value of the Federally reserved phosphate to be $1.00 to $4.00 per ton.

Bypassing the 40-acre tract would mean the non-recovery by Estech of approximately 400,000 tons of phosphate. This amount is so small relative to the mine reserve that its disposition would have no significant effect on the Duette Mine. If Estech did not obtain the necessary approvals from BLM and the tract were bypassed in the course of Estech's proposed mining operation, it is unlikely that the economics of recovery would allow its later recovery by Estech or any other mining entity.

8.0 LIST OF PREPARERS

The Supplement to the Final Environmental Impact Statement for Estech, Inc., Duette Mine, was prepared for EPA by Conservation Consultants, Inc. (CCI) of Palmetto, Florida using the third party EIS preparation method. The following EPA officials, CCI staff, and subconsultants to CCI participated in preparing this Supplement.

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