CALENDAR YEAR 2003
EMERGENCY OPERATIONS AND WATER MANAGEMENT PLAN

PINEY POINT PHOSPHATES, INC.
PHOSPHOGYPSUM STACK SYSTEM
MANATEE COUNTY, FLORIDA

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Prepared on behalf of

Louis J. Timchak, Jr.
Receiver

by

Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

Rajendra K. Shrestha, P.E.

Nadim F. Fuleihan, Sc.D., P.E.
Florida Registration No. 31953

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RECORD OF REVISIONS

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- SUMMARY -

CALENDAR YEAR 2003
EMERGENCY OPERATIONS AND WATER MANAGEMENT PLAN
Piney Point Phosphates, Inc. Plant

I. Normal Water Management Procedures

- Follow Shaw's operation and maintenance (O&M) manual for normal maintenance of pumps, siphons, spillways, dikes, back-up pumps, back-up generators, etc.
- Keep all designated spray irrigation systems maintained and running.
- Keep all the perimeter dikes and seepage ditches of the stack and cooling ponds well maintained and visible for inspection.

<u>Gypsum Stack Compartments (see Section 4)</u>

- Maintain the perimeter dike crest width equal to or greater than 20 feet at all times.
- Maintain a minimum freeboard of 2.1 feet in the OGS compartments during normal operating conditions, and do not allow the freeboard to be less than 1 foot at any time.
- Maintain a minimum freeboard of 3.2 feet in the NGS compartments during normal operating conditions, and do not allow the freeboard to be less than 2 feet at any time in these compartments, except during emergencies (see below).

<u>Cooling Ponds (see Sections 5 and 6)</u>

- Prior to completion of on-going construction modifications, attempt to maintain the NCP water level at or below Elev. 17.8 to 17.3 feet (NGVD), and do not allow the water level to rise above Elev. 19 feet (NGVD) at any time. Set the DAP Pump to start pumping water out of the NCP when the water level exceeds 17.8 feet (NGVD).
- Once the NCP is modified and converted into a dedicated treatment sludge pond, its maximum design water level will increase to Elev. 27.0 feet (NGVD), but the NCP will then be occluded from the phosphogypsum stack system watershed.
- Attempt to maintain the SCP water level at or below Elev. 14.0 to 12.8 feet (NGVD), and do not allow the water level to rise above Elev. 17 feet (NGVD) except during emergencies (see below).
- Once the NCP is excluded from the process system watershed and the transfer of about 65 acre-feet of sludge from the SCP-N compartment to the NCP has been completed, attempt to maintain the SCP water level at or below Elevation 13.3 to 12.8 feet (NGVD).
- Implement notifications and actions required by the regulatory trigger levels described in Section 7, and the action plan outlined in Section 9.

II. Preparation for Wet Weather (see Section 8)

1. Arrange to have back-up diesel generator(s) and back-up diesel pumps on-site.

2. In case of imminent tropical storm, hurricane alert, or a major wet frontal system, mobilize manpower and equipment, as needed to stop decanting water from the stack compartments to the cooling pond system, if feasible.

3. If the hurricane or major tropical storm is within 400 miles of Tampa, and if possible, lower the NCP water level to Elev. 17.8 feet (NGVD) or less and lower the SCP water level to Elev. 11.0 feet (NGVD)* or less.

4. When the hurricane is imminent (i.e., within 100 miles), and if possible, lower the NCP water level to Elev. 17.4 feet (NGVD) or less and the SCP water level to essentially the pond bottom, i.e., Elev. 10.0 feet (NGVD).**

III. Emergency Water Management Procedures (see Sections 9 and 10)

Trigger levels for initiating emergency discharges of double stage treated aerated water and/or reverse osmosis treated water, i.e., R.O. permeate, shall be adhered to (see Attachment 4) in order to provide reasonable assurance that a catastrophic failure or overtopping of the PPP stack system impoundments will not occur.

The following provisions are applicable only during extreme emergency water conditions. If the wet weather conditions or a storm system or several storms, or a combination thereof, result in depletion of available storage capacity of the phosphogypsum stack system, the following measures or procedures should be followed preferably in sequence, or concurrently, as needed:

1. When the water inventory is high and the weather forecast calls for a storm event that cannot be readily contained within the phosphogypsum stack system available storage volume, the operator shall immediately arrange for a conference call between appropriate parties (Shaw, Receiver, Ardaman, ECT and FDEP) to decide on or formulate a storm-specific, site-specific emergency action plan, as deemed necessary, in an attempt to contain the process water inventory within the system, or within nearby emergency diversion impoundments, and to plan for the controlled discharge of treated water or runoff water resulting from extreme storm events, if necessary.

2. Raise the gypsum stack water levels as much as possible while maintaining no less than 1-foot of freeboard at any time. Make twice per shift inspections of the stack perimeter dikes, toe ditches and the stack in general, and implement maintenance actions as needed.

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* Corresponding water level elevation in the SCP is 13.3 feet (NGVD), once the NCP is excluded from the process system watershed and approximately 65 acre-feet of sludge have been transferred from the SCP-N to the NCP.

** Corresponding water level elevation in the SCP is 11.7 feet (NGVD), once the NCP is excluded from the process system watershed and approximately 65 acre-feet of sludge have been transferred from the SCP-N to the NCP.

3. Allow the water level in the SCP to temporarily surge to Elevation 18.2 feet (NGVD). When the water level exceeds Elevation 17.0 feet (NGVD), the toe seepage collection ditch and perimeter earthen dikes shall be inspected daily for potential maintenance items, and the existing piezometers shall be read weekly.

4. After notifying the FDEP and obtaining their approval, empty as much existing treated water (pH$4.5) as possible from the NCP (once the NCP has been converted to a sludge storage area) into Basin No. 2. Then divert process water into the NCP from the NGS-N or OGS-N compartment, via a siphon or pumping.

5. After notifying the FDEP and obtaining their approval, remove the coffer dam at the north end of Basin No. 2 and empty as much existing water as possible from the treated water aeration ponds (provided the water has a pH greater than or equal to 4.5) into a ditch leading to non-process water Basin No. 2 for storage. Then divert diluted process water from the SCP-N compartment to the aeration ponds via pumping (after closing the water control/outlet structures). If possible, treat the water with lime as it is being transferred.

6. After notifying the FDEP and obtaining their approval, divert diluted process water from the SCP-N compartment, via pumping or siphon, into the ditch leading to non-process water Basin No. 2. Treat the process water with lime as it is being transferred to Basin No. 2, and block the discharge to Outfall 001.

IV. Controlled Discharges During Emergencies (see Section 10)

If a discharge from the process system is inevitable to maintain the integrity of the perimeter dikes and avoid overtopping of the dikes; first notify the FDEP to obtain their approval, then:

(i) Remove the coffer dam at the south end of Basin No. 2 to direct flow towards Outfall 001. Route first stage treated water through Basin No. 2 to Outfall 001 for discharge off property; if possible, add more lime as the water is being diverted to Basin No. 2.

(ii) After notifying the FDEP, allow the controlled discharge of co-mingled runoff and seepage from the stack and cooling pond dike slopes to flow towards Outfall 001 by breaching the Northeast Seepage Ditch at the east end of the non-process ditch leading to Basin No. 2.

(iii) In case of uncontrolled flooding of the site from outside sources, consider turning off some or all of the seepage ditch pumps and allow the diluted seepage co-mingled with runoff to overflow towards Basin No. 2 for discharge off property via Outfall 001.

(iv) Finally, as a last resort, route untreated process water from the SCP-N compartment, via pumping or siphon, through Basin No. 2 to Outfall 001 for discharge off property, with provisions to add lime as the process water is diverted to the basin.

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EMERGENCY OPERATIONS AND WATER MANAGEMENT PLAN
Piney Point Phosphates, Inc.

This operation plan formalizes the phosphogypsum stack system process water management/operating procedures at the Piney Point Phosphates, Inc. (PPP) Plant. It provides written documentation to be used in training appropriate personnel. Operators and inspectors should study it and refer to it, as needed. The operation plan is also intended to improve management oversight and assure compliance with applicable requirements of the Florida Administrative Code, F.A.C., rules administered by the Phosphate Management Group of the Florida Department of Environmental Protection (FDEP), and in particular, applicable operating provisions of Rule 62-673.340(3), 62-672.650, 62-672.750, 62-672.760 and 62-672.780. The emergency operations and water management plan was developed by Ardaman & Associates, Inc. in consultation with the Shaw Group, ECT and the Receiver. Dr. Nadim F. Fuleihan, P.E., has approved the Operation Plan as revised on December 3, 2003.

In spite of the prevailing drought during the 1999 and 2000 calendar years, when PPP filed for bankruptcy and the FDEP and Receiver took charge, and because the plant has been idle and has been subjected to wet weather and extreme rainfall events since 2001, it was not feasible to develop an "action plan" that would quickly place the facility in compliance with all provisions of Rule 62-672, particularly those that require containment or handling of extreme rainfall events. The objective of the "water management plan" and "action plan", therefore, was to minimize the likelihood of uncontrolled discharges from the facility, and to move towards achieving compliance with the rule requirements during the 2004 calendar year. In the meantime, the plan includes emergency provisions for handling, containing, routing and even discharging in a controlled manner runoff resulting from extreme storm events.

1. Overview of Phosphogypsum Stack System

1.1 Gypsum Stacks

The Piney Point Plant began operation in the fall of 1966. The original gypsum stack, designated the old gypsum stack (OGS) on the aerial and topographic maps in Figures 1 and 2, respectively, was constructed on natural ground in 1966 and encompassed an area of about 120 acres. The gypsum stack was laterally expanded northward and eastward in 1979 with the inclusion of an additional 130 acres of land abutting the north and east walls of the original gypsum stack. The expansion, which was activated in 1981, is designated the new gypsum stack (NGS) on Figures 1 and 2. The phosphoric acid plants at PPP are currently idle (and they have been essentially idle since 1992, except for a five month period during 1999 when the plant was activated for a short period of time).

The existing phosphogypsum stack is comprised of the following four compartments that were used in the past for sedimentation of gypsum slurry and for process water storage, cooling and evaporation: (i) a 35-acre north (N) and a 26-acre south (S) compartment atop the old gypsum stack (i.e., OGS-N and OGS-S, respectively); and (ii) a 43-acre north (N) and a 76-acre south (S) compartment atop the new gypsum stack (i.e., NGS-N and NGS-S, respectively). These compartments are currently used for process water storage and evaporation. Current watershed and ponded surface area for the various stack impoundments are summarized in Table 1.

Based on a June 5, 2001 topographic map of the site prepared by I.F. Rooks & Associates, Inc., the crest road elevation had varied from about 78 to 84 feet (NGVD) in the OGS and from about 63 to 68 feet (NGVD) in the NGS expansion, compared to natural ground elevations on the order of 10 to 25 feet (NGVD). During August and September 2001, the Shaw Group raised the low points of the crest of the perimeter dikes of the OGS and NGS to Elevation 80 feet (NGVD) and 64 feet (NGVD), respectively, and adjusted the crest width to a minimum of 20 feet in accordance with Ardaman & Associates, Inc.'s recommendations. In order to further increase the surge storage capacity, the crest level of the OGS-N and OGS-S was raised further to Elevation 85 feet (NGVD) as of April 30, 2002 and June 11, 2002, respectively, in accordance with Ardaman & Associates, Inc.'s recommendations. The extension of the old "gypsum slurry discharge" line was completed on May 17, 2002 to allow for the transfer of water to the raised OGS compartments. The "granddaddy boil" at the toe of the OGS-N was remediated as of June 14, 2002 to improve safety. The latest topographic map of the site (dated September 16, 2002) prepared by I.F. Rooks & Associates, Inc. is presented as Figure 2. The low points along the crest of the NGS perimeter dikes (which had settled since September 2001) were raised once again to Elevation 64 feet (NGVD) in December 2002.

When the plant was in operation, the gypsum slurry used to be pumped onto the gypsum stack at a rate of about 12,000 gallons per minute at a solids content of about 4%. Prior to the plant shutdown, the gypsum slurry was typically pumped to the southwest corner of the NGS-N compartment. After routing the slurry through rim ditches and gravity settling of the gypsum, clarified process water was decanted from the top of the stack into a return water ditch at the toe of the north wall of the OGS-N compartment. The return water was then routed to the south cooling pond (SCP) via a return water ditch.

The gypsum stacks (OGS and NGS) are surrounded by a perimeter seepage collection ditch. A buried toe seepage collection drain also exists under the outer slope along the entire east and south walls of the NGS-S compartment. The water level in the seepage collection ditch is maintained lower than the water table in the adjoining natural ground and, therefore, collects both process water seepage from the gypsum stack and some groundwater seepage from the abutting lands. (The invert of the perforated drain had reportedly been installed 4 to 6 feet higher than intended by the design engineer.) Seepage and runoff collected in the ditch and seepage collected in the toe drain are routed to either the SCP or to the north cooling pond (NCP).

The original gypsum stack starter dikes were constructed of compacted near-surface sands. The NGS expansion starter dikes were constructed of compacted gypsum fill, with a core keyed into the clayey matrix or hardpan stratum to cut-off the surficial deposits of fine sand. Along an approximately 1,400 linear foot long section of the north wall abutting the NGS-N compartment, a soil-bentonite backfill cut-off wall, constructed using the slurry trench technique, was installed where the top of the clayey matrix was too deep to allow keying the gypsum core into the clayey matrix. The gypsum stacks have been raised using the upstream method of construction in conjunction with perimeter rim-ditches.

As part of the longer term water management plan, closure of the top gradient of the NGS-N compartment will be undertaken during the dry season of FY2004 (i.e., between November 2003 and May 2004) to begin the process of reducing the watershed while also providing for additional emergency surge storage capacity for use if the need arises. Closure would consist of constructing a 35-foot deep lined emergency surge pond (LESP) that may either be used to store fresh water or process water, depending on the needs of the facility. The goal is to close at least one of the stack compartments (NGS-N) and hopefully three of the four gypsum stack compartments (NGS-N and both cells of the OGS) during the November 2003 - July 2004 period.

1.2 Cooling Ponds

The cooling pond system is comprised of the south cooling pond (SCP) and the north cooling pond (NCP) which is also referred to as the DAP pond (see Figures 1 and 2). These ponds were constructed in 1966 and their footprints encompass areas of about 70 and 30 acres, respectively. The SCP is divided into 33-acre and 26-acre north and south compartments, respectively. When in operation, return water from the gypsum stack entered the east end of the south compartment (i.e., SCP-S) and was routed via internal partition dikes to the northeast corner of the pond for return to the chemical plant via a 1,000-foot long end section of the return water canal. The north compartment (i.e., SCP-N) was initially used for process water cooling, and then later used for surge storage and evaporation of process water, and for disposal of treatment sludges (spent lime).

As part of a water management action plan for calendar years 2002 and 2003 (see Section 9), the Shaw Group has been double-stage treating the process water and transferring the treated water, after air-stripping it in the aeration ponds, to various facilities for recycling, including the Manatee County Wastewater Treatment Plant, Florida Power & Light, City of Tampa Wastewater Treatment Plant, and Hillsborough County Wastewater Treatment Plant, and for discharge to Bishop's Harbor per the FDEP Emergency Order or for ocean dispersion in the Gulf of Mexico in accordance with the provisions of the EPA permit. The first-stage and second-stage sludge, produced in the process, have so far been deposited in the SCP-N compartment. The process water stored in the SCP-N compartment is, therefore, likely of somewhat better quality than the rest of the process water.

The SCP is an above-grade pond surrounded by a perimeter containment dike constructed of near surface sands and gypsum fill materials. Based on recent water depth soundings performed in August/September 2001 and February 2003, the pond bottom elevation varies between 10 and 14 feet (NGVD) with an average of about 12 feet (NGVD). It is our understanding, however, that significantly more sludge (as much as 125 acre-feet based on visual observations of the sludge-filled pond and November 10, 2003 pond soundings) have been deposited in the SCP-N compartment since February 2003, covering most of the SCP-N compartment and essentially all of the middle canal between the SCP-N and SCP-S compartments. The historical maximum operating water elevation in the SCP was reportedly 20 feet (NGVD), and the normal operating range was between 16 and 18 feet (NGVD). Based on June 5, 2001 and September 16, 2002 topographic maps of the site, the lowest point on the SCP-N dike crest occurs at the northeast corner where the dike is about 100-foot wide and the crest elevation is 22.6 to 23.0 feet (NGVD). The lowest point on the SCP-S dike crest occurs at the southwest corner where the dike is about 65-foot wide and the crest is at Elevation 22.6 to 23.3 feet (NGVD). Based on a recently completed assessment of the perimeter dikes by Ardaman & Associates, Inc. (see Executive Summary in Attachment 2), the maximum normal water level in the SCP-N and SCP-S compartments has been set at Elevation 17.0 feet (NGVD), except during emergencies when the water level may then be allowed to surge to Elevation 18.2 feet (NGVD). When the water level exceeds Elevation 17 feet (NGVD), the toe seepage collection ditch and perimeter earthen dikes shall be inspected daily for potential maintenance items, and the existing piezometers read weekly.

The 21-acre NCP, also known as the DAP pond, was historically used for the storage, cooling and evaporation of process water. The NCP is an above-ground pond surrounded by a perimeter containment dike constructed of compacted near surface sands with an internal compacted gypsum fill core. Based on recent water depth soundings performed in August/September 2001 and February 2003, the pond bottom elevation varies between 13 and 19 feet (NGVD), with an average of about 15.5 feet (NGVD). Based on the June 5, 2001 and September 16, 2002 topographic maps of the site, the lowest dike crest occurs along the north and west dikes and is at Elevation 22.9 to 23.7 feet (NGVD). The historical maximum operating water elevation in the NCP was reportedly 20 feet (NGVD), and the normal operating range was between 17.5 and 19.5 feet (NGVD). To allow for a minimum freeboard distance on the order of 5 feet, the maximum operating water level in the NCP had previously been set at Elevation 18.0 feet (NGVD). Based on the recently completed geotechnical assessment, it is our opinion that a design freeboard on the order of 4 feet is adequate for the NCP. The NCP has performed satisfactorily at pond water levels in excess of 18 feet (NGVD), and has a relatively small fetch enabling it to contain wind surge and wave runup caused by sustained wind speeds in excess of 100 mph within the reduced freeboard distance. Hence, the design water level in the NCP was recently raised from Elevation 18.0 feet (NGVD) to Elevation 19.0 feet (NGVD).

Currently, the crest along the north, south and west perimeter dikes of the NCP is being widened and raised to Elevation 27.0 feet (NGVD) in preparation for installing a soil-bentonite cut-off wall along these alignments. After installation of the cut-off wall, the crest will be raised further to Elevation 30.0 feet (NGVD), and the pond will be converted to a sludge storage area and isolated from the process water system. At this time, all process water pipelines to and from this pond, and other culverts and pipes are being rerouted or removed. One emergency overflow spillway will be provided at the southwest corner of the pond (see Figures 1 and 2), and the design maximum water level for the raised pond will be set at Elevation 27.0 feet (NGVD). This spillway will discharge, when needed, either into the return water canal or into the aeration ponds. Under normal operating conditions, a new pumping system will be used to transfer supernatant water from the NCP to the aeration ponds for ammonia removal prior to discharge.

The north and west walls of the NCP, and the north, west and south walls of the SCP are surrounded by a perimeter seepage collection ditch. Seepage and runoff collected in the ditch are normally returned to the SCP via pump stations at the northeast corner of the SCP-N compartment.

Current watershed and ponded surface area for the individual ponds are summarized in Table 1.

1.3 Current Circulation Flow Path of Process Water, Seepage and Runoff

Attachment 1 (provided by the Shaw Group) lists the various pumps located within the phosphogypsum stack system, that are currently used to recirculate the process water and collected seepage and runoff. The approximate pump locations are shown on Figures 1 and 2.

A system of three large recirculation pumps designated Pond Water Pumps (i.e., Pump System 1 with 3 pumps rated at 5,000 gpm each), located at the north end of the return water canal, currently returns the process water to the top of the stacks, i.e., to any of the four gypsum compartments (see Figure 1). The pumps can be operated either individually or simultaneously, as needed. The pumps can also transfer process water from the return canal to the NCP, if needed. The pipe line to the NCP will, however, be removed and/or rerouted once the NCP is converted to a sludge storage area.

The process water from the NGS compartments (i.e., NGS-N and NGS-S) is decanted, via individual adjustable weir water control structures and a common buried concrete outlet pipe, into the return water canal at the southwest toe of the NGS-N compartment. The process water from the OGS compartments (i.e., OGS-N and OGS-S) is decanted similarly via individual adjustable weir structures and a common buried concrete outlet pipe, into the return water canal at the toe near the mid-point of the OGS-S west wall. The return water canal flows by gravity to the south and then to the west, and finally flows north to the northeast corner of the SCP-N compartment. The water flows from this location into the final 1,000-foot long return water canal via a downstream level control structure, and is then routed towards the Pond Water Pumps at the north end of the canal (see Figures 1 and 2) for recirculation.

In May 2002, the Shaw Group raised the spillway intake structures of the OGS-N and OGS-S compartments. The modifications for the OGS-N compartment consisted of extending the concrete riser structure and re-installing the removable stainless steel slide-gate at a higher elevation (i.e., 3.5 feet higher). As modified, the structure will provide means for draining water from the compartment as long as the water level is greater than about Elevation 78.5 feet (NGVD). Because the modified spillway structure in the OGS-N compartment does not lend itself to allow for activating the spillway at the overall desired range in operating water levels, it would be necessary to supplement the fixed vertical riser decant with a siphon line, an open cut, or a decant pipe installed and operated, when the need arises, in accordance with the provisions of Rule 62-672, F.A.C. It is our understanding that the Shaw Group had installed (in January 2003) a siphon line consisting of a 16-inch diameter HDPE pipe capable of transferring water from the OGS-N compartment to the NGS-N compartment when needed. In addition, a 24-inch diameter HDPE culvert pipe was also installed across the divider dike between the NGS-N and NGS-S compartments (see Figures 1 and 2) in January 2003 for use in decanting water from the NGS-S compartment into the NGS-N compartment when needed.

Slope runoff and seepage collected in the toe ditch, designated by previous owners as the East Seepage Ditch, along the east wall of the NGS-S, north wall of the NGS-N, and the north and west walls of the NCP, as well as the seepage collected along the west wall of the OGS-S compartment flow by gravity in a counterclockwise direction towards the southwest corner of the OGS-S compartment (see Figures 1 and 2). The East Seepage Ditch turns west at this location and then flows north where it is routed, via a culvert, into another north-south trending and parallel seepage collection ditch. The collected slope runoff and seepage in this ditch are pumped into the higher level return water canal by the level-controlled East Seep Ditch pump(s) (i.e., Pump System 4 consisting of a primary pump and a back-up pump rated at 1,100 gpm per pump). If needed, the collected slope runoff and seepage in the East Seepage Ditch at the southwest corner of the NCP can be diverted, via the manually controlled DAP Pump (i.e., Pump 2 rated at 3,500 gpm), either to the NCP or to the new stack compartments, i.e., NGS-N or NGS-S. This pump can also transfer (i.e., withdraw) water from the NCP to the seepage ditch or the NGS compartments.

Once the proposed dike raising and installation of the soil-bentonite cut-off wall are completed, the NCP will be converted to a sludge storage area, and all process water lines to and from this pond would have been removed and/or rerouted. One emergency overflow spillway will be provided at the southwest corner of this pond (see Figures 1 and 2), and will discharge, when needed, either into the return water canal or into the aeration ponds. In addition, a new pumping system will be provided to transfer the Stage II-treated water from this pond to the aeration ponds for ammonia removal prior to discharge. The pumping system will also be capable of transferring the water from this pond back to the treatment system for further treatment, if needed.

A pump, designated Lower Spray Pump (i.e., Pump 5 rated at 1,200 gpm), located at the north end of the East Seepage Ditch, was used until recently to feed an evaporation spray irrigation system located along the seepage ditch and the return canal between the OGS-S compartment and the SCP. This spray system was deactivated once new treated water aeration ponds were constructed in this area and went into operation in February 2003. In case of need, this pump is capable of transferring water from the East Seepage Ditch to the return canal or the OGS-S compartment via the spray irrigation line.

A pump designated Upper Spray Pump (i.e., Pump System 6 consisting of a primary pump and a back-up pump rated at 1,000 gpm each), located in the return canal near the northeast corner of the SCP-N compartment, was also used until recently to feed the spray evaporation system that was deactivated in February 2003. If needed, this pump is capable of transferring water from the return canal to the OGS-S compartment via the spray irrigation line.

Slope runoff and seepage collected along the south walls of the NGS-S and OGS-S compartments and seepage collected by the buried underdrain system along the east and south walls of the NGS-S compartment flow by gravity to the west into the southern leg of the Northeast Seepage Ditch at the southeast corner of the SCP-S compartment. The collected slope runoff and seepage in this ditch continue to flow west by gravity towards the southwest corner of the SCP-S compartment where a small, unnamed pump (rated approximately at 200 gpm per Shaw personnel) lifts part of the collected water into the SCP-S compartment. The purpose of this pump is to maintain the ditch water level lower than the water table in the abutting lands during normal seepage conditions and smaller rainfall events to minimize the potential for seepage escaping from the site. The collected runoff and seepage that are not transferred into the SCP-S by the pump (e.g., during higher rainfall events) continue to flow by gravity to the north and then to the east towards the level-controlled Northeast Seep Ditch pump(s) sump (i.e., Pump System 3 consisting of a primary pump and a back-up pump rated at 1,100 gpm each) at the northeast corner of the SCP-N compartment. A 4-acre triangular area, where the two-stage lime treatment reactors are located, also drains by gravity towards the Northeast Seep Ditch pump sump. The Northeast Seep Ditch pump(s) can transfer the collected water either to the SCP-N compartment or to the return canal.

Impacted surface water runoff from the plant site flows by gravity either towards the south into the Northeast Seep Ditch pump(s) sump or into the East Ditch (located east of the plant site). A pump designed East Ditch Pump (i.e., Pump 7 rated at 2,000 gpm) pumps the collected water in the East Ditch into the 24-inch diameter HDPE pipeline (originating from the Pond Water Pumps) for transfer to the top of the stack compartments.

Runoff from approximately 21 acres of the plant site vicinity had been diverted in August 2002 by the Shaw Group away from the phosphogypsum stack system after cleaning the site, raising the berms along the plant ditches by about 0.8 feet, and routing the runoff using a combination of ditches and pump systems. The runoff diversion was discontinued shortly afterwards, however, because of somewhat elevated ammonia concentrations in the plant ditch runoff diversions. It is our understanding that the Shaw Group is in the process of placing the runoff diversion back into operation once again per FDEP's Emergency Discharge Order. Pump System B, incorporating Plant Site Runoff Diversion Pumps 3 and 4 (rated at 250 gpm each), routes runoff from approximately 4.3-acre area north of the lime treatment reactors to a plant ditch (see Figure 1). The runoff from the remaining 17 acres of the plant site also collects in the same ditch from where the collected runoff is routed towards Outfall 002 using Pump System A (consisting of Plant Site Runoff Diversion Pumps 1 and 2 rated at 700 gpm and 1,500 gpm, respectively). Because the runoff diversion relies in part on pumps having limited capacity, only about 40 acre-feet of otherwise contaminated runoff will likely be "removed" or occluded from the stack system during a normal rainfall year, and about 49 acre-feet during a wet rainfall year (i.e., 65-inch annual rainfall).

Currently, the NCP has a relatively small contributing watershed (30 acres) consisting of its own watershed and the west slope of the NGS-N compartment. If needed, decant water from the NGS-N and NGS-S compartments can be diverted into the NCP by opening the existing culvert at the southeast corner of the NCP (see Figures 1 and 2). However, this method of water transfer will require closing the culvert feeding the return water canal. As mentioned earlier, the NCP can also receive water from the return canal via the Pond Water Pumps or from the East Seepage Ditch via the DAP Pump. Currently, water can be withdrawn from the NCP only via the DAP Pump. However, if the return water canal water level south of the NCP is lower than the NCP water level, the pond water can also potentially be withdrawn via the existing culvert at the southeast corner of the pond. Once the proposed dike raising and installation of the soil-bentonite cut-off wall are completed, the NCP will be converted to a sludge storage area and isolated from the process water system. All existing process water lines to and from this pond will be removed and/or rerouted.

The SCP system, on the other hand, has a very large contributing watershed on the order of 222 acres (approximately 225 acres once the NCP is isolated from the process water system). The SCP (i.e., SCP-N and SCP-S compartments) used to receive, until recently, the runoff from the contributing watershed via the return water canal. The SCP-N and SCP-S compartments both have an adjustable weir water control structure at the west end (see Figures 1 and 2). The control structures can be set either to receive water for storage from the return canal or to discharge water into the return canal via the central canal between the two ponds.

Because the SCP-N compartment and the middle canal between the SCP-N and SCP-S compartments are currently being used to store treatment sludges and are essentially full of treatment sludges, the control structure at the northwest corner of the SCP-S compartment cannot be operated. The SCP-S compartment has, therefore, been temporarily blocked from receiving any runoff from the contributing watershed. The runoff is currently routed directly toward the Pond Water Pumps located at the north end of the return water canal.

1.4 Stormwater Routing and Pump Provisions

As shown on Figures 1 and 2 and as discussed in Section 1.3, the PPP phosphogypsum stack recirculation system relies heavily on a network of ditches, water control structures, culverts and pumps, and the capacity of these hydraulic structures and conveyance systems are likely to be deficient in handling a very large storm event. The adequacy of the process water conveyance ditches and hydraulic structures to circulate the process water stream, if applicable, and to contain or transfer runoff on the watershed resulting from a high intensity or long duration storm (in particular, a storm generating 12 inches of rainfall in 24-hours) was being evaluated in calendar year 2001 by Ardaman & Associates, Inc. as required by Rule 62-672.620(3), but that study is currently on indefinite hold.

The PPP site currently has a 100 KW diesel back-up power system (i.e., a diesel generator), mobilized for the rainy season, to supply the pumps in the event of a power failure, which is a likely occurrence during a storm. In the event of mechanical failure of seepage ditch pumps, back-up pumps are in-place at the location of the East Seep Ditch pump (i.e., at the Pump 4 location) and Northeast Seep Ditch pump (i.e., at the Pump 3 location). The East Seep Ditch back-up pump must be placed in automatic mode manually. The Northeast Seep Ditch back-up pump is currently in the automatic mode and should activate automatically when the water level in the ditch becomes too high. A back-up pump is also available at the Upper Spray Pump location (i.e., at the Pump 6 location). All back-up pumps can be operated simultaneously with the primary pumps, as needed. In addition, the PPP site maintains one portable, diesel back-up pump rated at 3,000 gpm and Shaw had previously mobilized one 10-inch, one 8-inch and one 6-inch, portable, diesel back-up pumps rated at 7000 gpm, 3000 gpm and 1700 gpm, respectively, for use during a power failure or mechanical failure of a pump.

In an attempt to prevent uncontrolled flooding of the southeast portion of the plant site by inflow of stormwater from outside sources into the system near the northwest corner of the NCP (as experienced during tropical storm Gabrielle in September 2001), the Shaw Group had raised the low spots along the outer berm of the East Seepage Ditch near the northwest corner of the NCP. In addition, the Shaw Group had raised and dressed up the low spots along the berm road between the seepage collection ditch north of the SCP north compartment and the non-process water ditch leading to Basin No. 2 (i.e., the non-process water pond).

2. Treated Water and Non-Process Water Ponds

As shown on Figures 1 and 2, three pond systems currently exist outside the limits of the phosphogypsum stack system at the site: (i) the non-process water ditch and ponds along the north and west walls of the SCP (designated Basin No. 1 and Basin No. 2*) that could discharge through the existing 001 Outfall into the Buckeye Road drainage ditch, when needed; (ii) the non-contact water ponds and ditch northeast of the plant site that discharge through the existing 002 Outfall into Piney Point Creek; and (iii) the treated water aeration ponds that can discharge treated process water, when needed, through the existing 003 Outfall into the Buckeye Road drainage ditch. As shown on Figures 1 and 2, the Shaw Group has recently completed (in February 2003) construction of additional ammonia aeration ponds, located between the SCP and OGS-S compartment, to allow for increasing the treated water discharge capacity to Bishop's Harbor via Outfall 003 without causing an increase in nutrient loading.

If needed, surplus process water can be treated via a two-stage lime treatment system. In the past, the first-stage (spent lime) and the second-stage sludge had been deposited in the SCP-N compartment. The final water treatment is designed to be performed in a below-grade pond system (i.e., treated water aeration ponds) located northeast and east of the SCP-N compartment. After detention and aeration, treated water can be discharged via a 12-inch HDPE pipeline to the 003 Outfall into the Buckeye Road drainage ditch. During the 1997-1998 wet season, second-stage treated water was discharged via Outfall 003. In addition, process water from the SCP-N compartment was transferred during the 1997-1998 wet season via siphon to Basin No. 2 where lime slurry was added prior to discharging the water via Outfall 001.

As part of a water management action plan for calendar years 2002 and 2003 (see Section 9), the Shaw Group has been double-stage treating the process water (since April 2002) and transferring the treated water, after air-stripping it in the aeration ponds, to various facilities for recycling, including Manatee County Wastewater Treatment Plant, Florida Power & Light, City of Tampa

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* Basin No. 2 was recently isolated (in July 2003) from Outfall 001 and the non-process water ditch north of the SCP-N compartment using dikes, and is currently being used as a treated water holding pond prior to pumping the treated water to Port Manatee via pipeline for barging and ultimate dispersion in the deep waters of the Gulf of Mexico.

Wastewater Treatment Plant, and Hillsborough County Wastewater Treatment Plant, and for discharge via Outfall 003 to Bishop's Harbor per the FDEP Emergency Order or for ocean dispersion in the Gulf of Mexico in accordance with the provisions of the EPA permit. The first-stage and second-stage sludge, produced in the process, are currently being deposited in the SCP-N compartment. Once the NCP is converted to a sludge storage area, all second-stage sludge generated in the future will be deposited in the NCP. Moreover, as much as 65 acre-feet (105,000 cyd) of sludge are planned to be transferred by dredging from the SCP-N compartment to the NCP.

Basin No. 2 was recently isolated (in July 2003) from Outfall 001 and the non-process water ditch north of the SCP-N compartment using coffer dams, and was recently used as a treated water holding pond prior to pumping the treated water to Port Manatee via pipeline for barging and ultimate dispersion in the deep waters of the Gulf of Mexico.

3. Hydrologic Characteristics of Various Process System Impoundments

Current watershed and ponded surface area for the various process system impoundments, based on a September 16, 2002 topographic map of the site, are summarized in Table 1. Also shown on Table 1 are the estimated watershed areas once the NCP is converted to a sludge storage area and isolated from the process water system. The ponded water surface and surge ratio for an impoundment will actually vary with the pond water level elevation, as depicted on Figures 3 through 8 for the various impoundments. Note that the surge ratio is equivalent to the storm surge height, expressed in feet, resulting from 12 inches of rainfall on the direct watershed or rainfall catchment area. The ponded water surface area and surge ratio versus stage relationships for the South Cooling Pond (SCP), shown on Figure 3, account for the volume of sludge that has accumulated in this cooling pond as of November 10, 2003 based on pond bottom soundings. It is estimated that as much as 125 acre-feet of sludges have been deposited in the SCP-N compartment since February 2003. As much as 65 acre-feet (out of 125 acre-feet) of recently deposited sludge are anticipated to be dredged and transferred from this compartment to the NCP, once the NCP is converted to a sludge storage area. Figure 3A presents the estimated ponded water surface area and surge ratio versus stage relationships for the SCP after transferring approximately 65 acre-feet (out of 125 acre-feet) of recently deposited sludge from the SCP-N compartment to the NCP.

The available surge storage capacity will change each year depending on various closure construction activities that may take place in the gypsum settling compartments, e.g., the anticipated closure of the top gradient of the NGS-N compartment by May 2004. Corresponding information will, therefore, have to be updated annually. The total surge storage capacity for the entire phosphogypsum stack system can be computed by adding the available surge capacity in the cooling ponds to the available surge capacity in each of the gypsum settling compartments. The resulting total available surge storage volume (in acre-feet) can then be compared to the total watershed area (i.e., 457 acres for the existing system and 429 acres after excluding the NCP from the process system) to determine the equivalent surge storage capacity in inches of rainfall on the entire process water system (i.e., available storage volume (acre-feet), divided by the watershed area in acres, times 12 inches per foot of rainfall = available surge storage volume in equivalent inches of rainfall over the entire watershed).

The stage (i.e., water level) versus available surge storage capacity relationships for the cooling ponds (i.e., SCP and NCP) and the various gypsum compartments (i.e., OGS-N, OGS-S, NGS-N and NGS-S) are presented in Figures 9 through 14. The stage versus available surge storage capacity relationship for the South Cooling Pond (SCP), shown on Figure 9, accounts for the volume of sludge that has accumulated in this cooling pond as of November 10, 2003 based on pond bottom soundings. Figure 9A presents the stage versus the estimated available surge storage capacity relationship for the SCP after transferring approximately 65 acre-feet (out of 125 acre-feet) of recently deposited sludge from the SCP-N compartment to the NCP. The available surge storage capacity, expressed in acre-feet, as a function of water level was developed relative to the maximum design water levels presented in Table 1. Using these relationships, the available surge storage capacity, expressed in equivalent inches of rainfall over the corresponding watershed, was also developed for each impoundment as a function of water level elevation. These relationships are also presented graphically on Figures 9 through 14.

4. Operating Water Levels in Stack Compartments

The crest width of the perimeter gypsum dike shall be maintained at all times at no less than 20 feet. In no case shall the water level in a gypsum stack compartment be allowed to rise above the crest of the gypsum dike by constructing windrows atop the gypsum dikes. Moreover, the water level in each compartment shall normally be maintained low enough to provide for 1 foot of freeboard in the OGS compartments, and 2 feet of freeboard in the NGS compartments, in addition to containment of the storm surge caused by 12 inches of rainfall in any 24-hour period. To account for surge ratios greater than unity, the water level in the OGS and NGS compartments shall, therefore, typically be maintained with a minimum freeboard of 2.1 feet and 3.2 feet, respectively (relative to the crest of the outer gypsum dike at the lowest point on the outer gypsum dike). The recommended freeboard has been calculated using a contributing watershed up to 10% greater than the maximum ponded area for the OGS compartments, and up to 20% greater than the maximum ponded area for the NGS compartments (see Table 1), and considering 1 foot of additional freeboard in the OGS, and 2 feet of freeboard in the NGS, based on safety considerations.

At no time shall the freeboard atop the stack be less than 1 foot in the OGS compartments. Moreover, at all times during normal operating conditions, the freeboard shall be maintained at no less than 2 feet in the NGS compartments. During emergency water conditions, the water level in the NGS compartments may be allowed to rise provided at least 1-foot of freeboard is maintained and provided more frequent inspections (e.g., twice per shift) are performed in order to closely monitor conditions of boils, springs and concentrated seepage areas in the ditches and implement any remedial action needed to maintain the stack in a safe operating condition. In other words, based on safety considerations detailed in a CY2001 geotechnical evaluation (see Executive Summary in Attachment 2), approximately 100 acre-feet of surge storage in the north and south compartments of the NGS (i.e., "standby surge capacity" between Elevation 62 and 63 feet, NGVD) shall be maintained at all times for potential use but only during an unplanned emergency and only when an intensive surveillance program is implemented by the operator.

5. Operating Water Levels in Cooling Ponds

Based on the safety, surge and freeboard requirements and normal operating procedures, the following cooling pond system operating water levels and corresponding surge storage capacities have been established.

Cooling Pond Water Level	Corresponding Water Level Elevation, (feet, NGVD)	Ponded Surface Area (acres)	Available Storage Volume Relative to "Design*** Freeboard" Level (acre-feet)	Equivalent Inches of Rainfall Over the Contributing Watershed
North Cooling Pond (NCP)† (Contributing Watershed = 30.3 acres**)				
• Minimum Pond Bottom level	10.0*	0.2*	73.6	29.1
• Average Pond Bottom Level	15.5*	10.9*	53.5	21.2
• Normal Minimum Water Level	17.3	15.7*	30.0	11.9
• Maximum Design Water Level	19.0	21.2**	0	0
South Cooling Pond (SCP) (Contributing Watershed = 222.3 acres**)				
• Minimum Pond Bottom Level	10.0††	3.2††	170.0	9.2
• Average Pond Bottom Level	12.5††	22.5††	137.0	7.4
• Normal Minimum Water Level	12.8	23.9††	130.0	7.0
• Normal Maximum Water Level	17.0	37.4††	0	0
• Maximum Emergency Water Level	18.2	61.1**	<65>	<3.5>

* Estimated based on August/September 2001 pond bottom soundings that were re-verified in February 2003.

** Computed based on the 9/16/2003 topographic map of the site, and February 2003 and November 2003 pond bottom soundings.

*** Defined as the freeboard at the maximum design water level or, in the case of the SCP, freeboard at the recommended normal maximum water level.

† Currently, the crest along the north, south, and west perimeter dikes of the NCP is being widened and raised to Elevation 27.0 feet (NGVD) in preparation for installing a soil-bentonite cut-off wall along these alignments. After installation of the cut-off wall, the crest will be raised further to Elevation 30.0 feet (NGVD), and the pond will be converted to a sludge storage area and isolated from the process system watershed.

†† Estimated based on February 2003 and November 2003 pond bottom soundings.

Note:

- Mean annual 24-hour storm = 4.5 inches.
- 25-year/24-hour storm • 8.5 inches.
- 100-year/24-hour storm • 11.0 inches.

Once the NCP is converted to a sludge storage area and is excluded from the process system watershed, and once as much as 65 acre-feet (out of 125 acre-feet) of recently deposited sludge have been transferred from the SCP-N compartment to the NCP, then the following watershed area and corresponding surge storage capacity at the various operating levels would become applicable for the SCP.

Cooling Pond Water Level	Corresponding Water Level Elevation, (feet, NGVD)	Ponded Surface Area (acres)	Available Storage Volume Relative to "Design** Freeboard" Level (acre-feet)	Equivalent Inches of Rainfall Over the Contributing Watershed
South Cooling Pond (SCP)† (Contributing Watershed = 224.6 acres*)				
• Minimum Pond Bottom Level	10.0	3.2	233.0	12.4
• Average Pond Bottom Level	12.3	32.7	197.0	10.5
• Normal Minimum Water Level	12.8	35.0	180.0	9.6
• Normal Maximum Water Level	17.0	49.4	0	0
• Maximum Emergency Water Level	18.2	61.1	<72.0>	<3.8>

* Computed based on the 9/16/2003 topographic map of the site.
** Defined as the freeboard at the recommended normal maximum water level.
† The operating water levels and other hydrologic characteristics of the SCP shown above would be applicable, once the NCP is converted to a sludge storage area and is excluded from the process system watershed, and once as much as 65 acre-feet of sludge have been transferred from the SCP-N compartment to the NCP.

Note:
- Mean annual 24-hour storm = 4.5 inches.
- 25-year/24-hour storm • 8.5 inches.
- 100-year/24-hour storm • 11.0 inches.

6. Internal Triggers

6.1 North Cooling Pond

Prior to completion of on-going construction modifications, the operator shall attempt to maintain the water level in the NCP at or below Elevation 17.3 feet (NGVD) by diverting water to the SCP or to the NGS-N or NGS-S compartments, if needed, in order to maintain sufficient surge storage capacity for containment of 12 inches of rainfall without infringing on the design freeboard level (i.e., Elevation 19 feet (NGVD)). If not feasible, the operator shall then attempt to maintain the water level at or below Elevation 17.8 feet (NGVD) to have sufficient surge storage capacity for containment of the 25-year/24-hour storm (8.5 inches of rainfall). The DAP Pump shall be set to start pumping water out of the NCP when the water level exceeds 17.8 feet (NGVD) to maintain sufficient surge storage capacity for containment of storm events. Temporary use of the design freeboard of the perimeter earthen dike shall not be allowed under any circumstances due to stability considerations.

Currently, the crest along the north, south, and west perimeter dikes of the NCP is being widened and raised to Elevation 27.0 feet (NGVD) in preparation for installing a soil-bentonite cut-off wall along these alignments. After installation of the cut-off wall, the crest will be raised further to Elevation 30.0 feet (NGVD), and the pond will be converted to a sludge storage area and isolated from the process system watershed. The design maximum water level will then be set at Elevation

27.0 feet (NGVD). The NCP will no longer be available for storage of process water, except during emergencies as outlined in Section 10 below.

6.2 South Cooling Pond

The operator shall attempt to maintain the water level in the SCP at or below Elevation 12.8 feet (NGVD) by diverting water to the gypsum stacks, if needed, in order to maintain sufficient surge storage capacity for containment of about 7 inches of rainfall without infringing on the freeboard level corresponding to the recommended maximum normal water level (i.e., Elevation 17.0 feet (NGVD)) of the perimeter earthen dike. If not feasible, the operator shall then attempt to maintain the water level at or below Elevation 14.0 feet (NGVD) to have sufficient surge storage capacity for containment of at least the mean annual 24-hour storm (5 inches of rainfall).

Once the NCP is excluded from the process system watershed and the transfer of about 65 acre-feet of sludge from the SCP-N compartment to the NCP has been completed, the operator shall attempt to maintain the water level in the SCP at or below Elevation 12.8 feet (NGVD) by diverting water to the gypsum stacks, if needed, in order to maintain sufficient surge storage capacity for containment of about 10 inches of rainfall without infringing on the freeboard level corresponding to the recommended maximum normal water level (i.e., Elevation 17.0 feet (NGVD)) of the perimeter earthen dike. If not feasible, the operator shall then attempt to maintain the water level at or below Elevation 13.3 feet (NGVD) to have sufficient surge storage capacity for containment of the 25-year/24-hour storm (8.5 inches of rainfall).

During emergency water conditions, the water level in the SCP may be allowed to surge above Elevation 17.0 feet (NGVD) to Elevation 18.2 feet (NGVD). When the water level exceeds the maximum normal design water elevation of 17.0 feet (NGVD), the toe seepage collection ditch and perimeter earthen dikes shall be inspected daily for potential maintenance items, and the existing piezometers read weekly.

7. Regulatory Triggers

In addition to the internal triggers, the following regulatory trigger levels shall be adhered to within the cooling pond system.

The water level in gypsum stack compartments shall typically be maintained low enough to provide for containment of the surge caused by 12 inches of rainfall in any 24-hour period while maintaining the minimum recommended design freeboards of 1 foot in the OGS and 2 feet in the NGS. Accordingly, as allowed by Rule 62-672, the regulatory trigger levels in the cooling pond system were computed considering contribution of runoff from the phosphogypsum stack system watershed excluding the gypsum stack top area. The trigger levels are summarized in Table 2 and described below .

– **"Action Plan" Trigger**. The "Action Plan" trigger corresponds to the storage volume required to contain rainfall from a storm generating 12 inches of precipitation in 24 hours. When the threshold "Action Plan" trigger level is exceeded for three consecutive days, the Shaw Group will have to contact the FDEP through the Receiver and present a site-specific action plan for process water inventory management, containment, and/or consumption. Elements of the recommended action plan are outlined in Section 9 below. **The applicable "Action Plan" trigger level for the PPP phosphogypsum stack**

system is set within the cooling pond system (i.e., the NCP and SCP), when the available surge storage capacity in the cooling pond system falls to 252.6 acre-feet (or 224.6 acre-feet in the SCP after converting the NCP to a sludge storage area and excluding it from the process system watershed). Scenario 1 in Figure 15 and Table 2 present the combination of water level elevations in the NCP and SCP that would correspond to the required surge storage capacity.

– **"May Treat" Trigger**. The "May Treat" trigger corresponds to the storage volume required to contain the 25-year/24-year storm event which is equivalent to 8.5 inches of rainfall. When the "May Treat" trigger is exceeded for two consecutive days, the Shaw Group will have to notify the FDEP through the Receiver and begin implementing activities needed for the transfer of water from the system, activating the treatment stations (if not already active), further increasing the available surge storage capacity within the process system or reducing the water volume reporting to the process water system. **The "May Treat" trigger level for the PPP phosphogyspum stack system is set within the cooling pond system, when the available surge storage capacity in the cooling pond system (i.e., the NCP and SCP) falls to 178.9 acre-feet (or 159.1 acre-feet in the SCP after converting the NCP to a sludge storage area and excluding it from the process system watershed)**. Scenario 1 in Figure 15 and Table 2 present the combination of water level elevations in the NCP and SCP that would correspond to the required surge storage capacity.

– **"Must Treat" Trigger**. The "Must Treat" trigger corresponds to the storage volume required to contain one-half of the 25-year/24-hour storm event. When the "Must Treat" level is exceeded, the Shaw Group must notify the FDEP through the Receiver and begin treatment of process water for reuse or discharge, or implementing other FDEP-approved alternative action. **The "Must Treat" trigger for the PPP phosphogypsum stack system is set within the cooling pond system (i.e., the NCP and SCP), when the available surge storage capacity in the cooling pond system falls to 89.5 acre-feet (or 79.5 acre-feet in the SCP after converting the NCP to a sludge storage area and excluding it from the process system watershed)**. Scenario 1 in Figure 15 and Table 2 present the combination of water level elevations in the NCP and SCP that would correspond to the required surge.

If provisions are not made to contain rainfall from a storm generating 12 inches of precipitation in 24 hours in any of the stack compartments in addition to the recommended minimum freeboards, a new set of more stringent regulatory trigger levels (computed by considering runoff from the entire phosphogypsum stack system watershed) would apply. The regulatory trigger levels for this Scenario 2 condition are also summarized in Table 2. Figure 15 and Table 2 present the combination of water level elevations in the NCP and SCP that would correspond to the various trigger levels.

The water levels in the NCP and SCP are currently (i.e., as of November 17, 2003) on the order of 14.0 feet (NGVD) and 16.9 feet (NGVD), respectively, putting the facility within the "MustTreat" regulatory trigger. Under current conditions, one would have to maintain the cooling pond water levels essentially at the minimum pond bottom level (see Section 5) to keep the available surge storage capacity in the cooling pond system near the "Action Plan" trigger level. The situation becomes slightly better after dredging sludge from the SCP and excluding the NCP from the process water system watershed. Because the surge storage capacity in the NCP and SCP is relatively small and the normal water level in the cooling ponds has to be maintained within a relatively narrow range, the facility is likely to remain in the "Action Plan" trigger even when there is adequate storage capacity atop the stacks. Hence, the **site-specific action plan has to rely on pumping excess water from the cooling ponds to the top of the stacks,** if feasible, prior to implementing other elements of the action plan outlined in Section 9.

8. Preparations for Wet Weather Conditions

When the water inventory is high during the rainy season and throughout the hurricane season (i.e., from June through November), the operator shall have all the perimeter dikes of the stack compartments and cooling ponds well maintained in preparation for inspection during high water conditions. The operator shall arrange for back-up diesel generator(s) on-site (if not done already) at the beginning of the rainy season to supply power to the pumps in the event of a power failure, which is a likely occurrence during a storm. The operator shall also have all necessary diesel-powered back-up pumps rented and kept on-site during this time (if not done already). In particular, back-up pumps will be required at the DAP Pump site and the East Ditch Pump site, provided back-up diesel generators are made available to run the existing back-up electric pumps at other locations. (Note that the PPP site maintains one portable, diesel back-up pump rated at 3,000 gpm and the Shaw Group had, in the past, mobilized one 10-inch, one 8-inch and one 6-inch, portable, diesel back-up pumps rated at 7000 gpm, 3000 gpm and 1700 gpm, respectively, for use during a power failure and mechanical failure of a pump.)

Specific actions to be taken in anticipation of an imminent tropical storm, hurricane alert, or a major wet frontal system, shall include: (i) mobilizing manpower and equipment, as needed, to stop decanting of water from the stack compartments to the cooling pond system, if feasible; (ii) raising the berms around the electric substation at the plant site by 3 to 4 feet (using a combination of fill and sand bags) to prevent flooding of the electric substation; (iii) lowering the water level, if possible, to Elevation 17.8 feet (NGVD) or less in the NCP and to Elevation 11.0 feet (NGVD)* or less in the SCP to maintain surge storage capacity for the 25-year/24-hour storm (8.5 inches of rainfall) when the hurricane or major tropical storm is within 400 miles of Tampa; and (iv) lowering the water level, if possible, to Elevation 17.4 feet (NGVD) or less in the NCP and to essentially the pond bottom, i.e., Elevation 10.0 feet (NGVD)** in the SCP to maintain surge storage capacity for the 100-year/24-hour storm (11 inches of rainfall) in the NCP and for about 9 inches of rainfall in the SCP, when the hurricane is imminent, i.e., within 100 miles.

9. Water Management and Action Plan

The site-specific action plan for the PPP phosphogypsum stack system is an integral part of the facility's water management plan and is comprised of the following elements. The related details, based on water balance analyses, were presented in a report dated August 10, 2003 and in a submittal dated December 3, 2003, reproduced herein and included in Attachment 3.

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* Corresponding water level elevation in the SCP is 13.3 feet (NGVD), once the NCP is excluded from the process system watershed and approximately 65 acre-feet (out of 125 acre-feet) of recently deposited sludge have been transferred from the SCP-N to the NCP.

** Corresponding water level elevation in the SCP to maintain surge storage capacity for the 100-year/24-hour storm is 11.7 feet (NGVD), once the NCP is excluded from the process system watershed and approximately 65 acre-feet of sludge have been transferred from the SCP-N to the NCP.

The following action items have already been completed:

- Measures to Improve Safety and Optimize Surge Storage Capacity. In order to improve safety and maintain the optimum surge storage capacity of the system, the Shaw Group has already completed (i.e., during September and October 2001) the following remedial measures recommended by Ardaman & Associates, Inc.: (i) sealing of observed vertical cracks within the NGS north compartment with sluiced gypsum; (ii) installation of graded inverted filter drains at incipient pipe outlets, active boils, and concentrated seepage areas along the perimeter of the gypsum stack system; and (iii) installation of a 14-foot wide upstream blanket of compacted gypsum along the south wall of the SCP. In addition, the "granddaddy boil" at the toe of the OGS-N was remediated as of June 14, 2002 to improve safety.

- Emergency Maintenance. An emergency maintenance plan has been developed by the Shaw Group for implementation of remedial actions when the need arises (e.g., upon the detection of a critical condition and after notifying Ardaman & Associates, Inc. and the FDEP).

- Gypsum Stack Crest Grade Adjustment. Design recommendations for a crest elevation adjustment atop the existing gypsum stack compartments were prepared by Ardaman & Associates, Inc. in August 2001. The recommended crest elevation adjustments included raising the low points of the perimeter gypsum dikes of the OGS and NGS to Elevation 80 feet (NGVD) and 64 feet (NGVD), respectively, while maintaining a minimum crest width of 20 feet. The recommended modifications were completed by the Shaw Group during August and September 2001 and resulted in a total gain of about 140 acre-feet (46 million gallons) of additional normal and emergency surge storage capacity atop the stack compartments. The low points along the crest of the NGS perimeter dikes (which had settled since September 2001) were raised once again to Elevation 64 feet (NGVD) in December 2002.

- Raising OGS North and OGS South Compartment Dikes. Based on results of the CY2001 geotechnical evaluation of the various impoundments within the system, Ardaman & Associates, Inc., in a February 20, 2002 memorandum, recommended raising the perimeter dikes atop the OGS north and south compartments 5 feet. Raising of the OGS north compartment crest level was completed as of April 30, 2002. Raising of the OGS south compartment crest level was completed as of June 11, 2002. By raising the crest of the perimeter dikes of the OGS north and south compartments 5 feet, to Elevation 85 feet (NGVD), the surge storage capacity increased by about 183 acre-feet (60 million gallons) and 86 acre-feet (28 million gallons), respectively.

- Diversion of Runoff from Decontaminated Plant Site. Work associated with decontaminating approximately 21 acres of the plant site vicinity and raising of the berms along the plant ditches by about 0.8 feet in preparation for diverting runoff from the decontaminated plant site away from the process system, had been completed and the runoff diversion started in August 2002. The runoff diversion was discontinued shortly afterwards, however, because of somewhat elevated ammonia concentrations in the plant ditch runoff diversions. It is our understanding that the Shaw Group is in the process of placing the runoff diversion into operation once again per FDEP's Emergency Discharge Order. Because the runoff diversion relies in part on pumps having limited capacity, only about 40 acre-feet (13 million gallons) of otherwise contaminated runoff will likely be "removed" or occluded from the stack system during a normal rainfall year, and about 49 acre-feet (16 million gallons) during a wet rainfall year (i.e., 65-inch annual rainfall).

– <u>Process Water Transfer to CF</u>. This action item involved the transfer of up to 0.3 MGD of untreated process water to the CF Plant City Stack System initially by trucks, and then possibly by rail, for a total of 168 acre-feet (55 million gallons). The transfer of process water by trucks started on September 3, 2002. However, the transfer to CF was suspended on December 19, 2002, after transferring a total of 133.7 acre-feet (43.6 MG) of process water. The transfer was suspended as a result of extreme El-Niño rainfall that occurred throughout Central Florida in December 2002.

– <u>Double-Stage Water Treatment and Transfer to Florida Power & Light</u>. This action plan involved the double-stage lime treatment of process water (to a pH greater than 11) and the transfer of the treated air-stripped, re-acidulated water by trucks to the Florida Power & Light (FP&L) cooling pond for consumptive use. The previously approved action item involved transferring potentially as much as 30 million gallons of double-stage treated air-stripped water to the FP&L facility. The transfer of water started on November 25, 2002 at a rate of less than 0.2 MGD. On December 5, 2002, after transferring a total of only 0.9 million gallons of water, the operation was temporarily suspended because of possible exceedances of water quality criteria specified by FP&L. Since then, this action item has been indefinitely suspended as it is no longer viable because the window of opportunity for transfers to FP&L is no longer there.

The following action items are currently being actively pursued:

– <u>Single-Stage Water Treatment and Transfer to Cargill</u>. This planned action item involves the single-stage treatment of process water (to a pH of 5.5 to 7.0), and the transfer of the treated water to Cargill's Riverview Facility by trucks, at a rate of about 0.1 MGD. The transfer to Cargill began on June 10, 2002. The original plan called for treating and transferring up to 56 acre-feet (18 million gallons) of treated water by December 10, 2002. Cargill has been able to sustain recycling of about 0.1 MGD of the treated water in its system. It is projected that Cargill's Riverview facility will be able to continue receiving about 0.07 MGD of the single-stage treated water for the foreseeable future, i.e., up to about 158 acre-feet (51 million gallons) or more. As of November 17, 2003, a total of 108 acre-feet (35 million gallons) have been transferred to Cargill.

– <u>Double-Stage Water Treatment and Transfer to Manatee County</u>. This action item involves the double-stage lime treatment of process water (to a pH greater than 8.0) and the transfer of the treated water by trucks to the Manatee County wastewater treatment plants for consumptive use. The action item involved initially transferring approximately 3 million gallons of double-stage treated, air-stripped water previously stored in holding ponds at the PPP site, and then up to 21 million gallons of process water after double-stage treatment and aeration, to the Manatee County Wastewater Treatment Plants (i.e., North Plant and Southeast Plant) where it would be diluted and recycled. Transfer of treated water to the North Plant began on March 6, 2002. After a few temporary suspensions attributed to an increase in chemical concentrations associated with reactivation of the lime treatment circuit and/or excessive area wide rainfall, a total of 17.7 million gallons had been transferred as of May 20, 2003, including 14.7 million gallons of treated process water from the phosphogypsum stack system. The transfer of water to Manatee County was suspended once again on May 20, 2003. Negotiations are underway to resume shipments to Manatee County at a rate of 0.1 MGD.

– <u>Double-Stage Water Treatment and Transfer to City of Tampa</u>. This action item also involves the double-stage lime treatment of process water and the transfer of a total of more than 33 million gallons of the treated aerated water (at a rate of 0.15 MGD) by trucks to the City of Tampa wastewater treatment plants for consumptive use. The transfer of water started on February 25, 2003. A total of 27.8 million gallons of treated water have been transferred as of November 17, 2003.

– <u>Double-Stage Water Treatment and Transfer to Hillsborough County</u>. This action item provides for the potential transfer of a total of more than 32 million gallons of the double-stage lime treated aerated water, at an increasing ramped up rate reaching potentially 0.15 MGD, to the Hillsborough County wastewater treatment plants for consumptive use. The transfer of water started on April 16, 2003 at a rate of only about 0.006 MGD. A total of 1.9 million gallons of the treated water have been transferred as of November 17, 2003. The transfer rate has recently increased slightly to about 0.02 MGD.

– <u>Water Treatment for Discharge by Reverse Osmosis</u>. This action item involves the use of reverse osmosis (R.O.) to treat the process water, prior to discharge (or consumptive use) of the R.O. permeate. This action item was implemented in 3 phases. The Phase I R.O. operation was initiated by U.S. Filter on May 21, 2002 and a total of 5 million gallons of process water had been treated as of August 5, 2002*. At times during this start-up period, the R.O. permeate did not meet the target flow or water quality criteria. The R.O. operation, therefore, was improved during Phase II in an attempt to make it a more viable water management alternative. Approximately 70 million gallons of treated process water were discharged during the U.S. Filter Phase II R.O. operation between August 5, 2002 and March 12, 2003 at an average rate of about 0.32 MGD. Approximately 300 million gallons could potentially be treated and discharged by U.S. Filter during Phase III which began on March 13, 2003 and which is scheduled to expire on August 31, 2004. A total of about 115 million gallons have been treated as of November 17, 2003 as part of the U.S. Filter Phase III R.O. operation. As a result of recent improvements and upgrades, U.S. Filter's sustained rate of permeate production is currently on the order of 0.7 MGD.

Additional R.O. capacity is expected to be on-line in late December 2003 through another vendor, Florida Pines (a joint venture between IMC and Mobile Precess). It is expected that Florida Pines will be operating their system for more than 105 days, and that R.O. permeate would be produced at a rate of 0.4 to 0.8 MGD during the Florida Pines contract period, thus consuming potentially as much as 90 million gallons of treated process water discharge.

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* The treated R.O. permeate had been transferred to the Manatee County wastewater treatment plants along with the double-stage lime treated air-stripped water through August 5, 2002.

Concentrated reject from the R.O. operations will continue to be recycled back to the process water system. With the depletion of the ponded water inventory, the reject generation through the R.O. process will ultimately lead to elevated process water concentrations that could reach levels that are no longer treatable by reverse osmosis.

– <u>Double-Stage Water Treatment for Discharge Under FDEP's Emergency Order</u>. As a result of a significant reduction in the system surge storage capacity caused by excessive El-Niño rainfall in December 2002, in conjunction with the reduced consumption of water (i.e., transfers to others) during that period, the FDEP issued a modification to the emergency discharge order that would allow a discharge of more than 0.5 MGD of treated water to Bishop's Harbor. This action item involves the double liming (to a pH >11) and aeration of the process water (to remove most of the ammonia by air-stripping), and the re-acidulation (to a pH of 6.5 to 8.0) and dilution of the treated water with R.O. permeate prior to discharge. The discharge of double-stage treated process water had to be initiated in a timely manner as needed to prevent a spill from the stack system impoundments (see report titled "Recommended Trigger Levels for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System," dated July 17, 2002 and updated January 7, 2003, included in Attachment 4). The discharge of treated process water began on December 26, 2002 and continued through July 16, 2003 after upgrading and expanding the spray aeration system to minimize the nitrogen loading to Bishop Harbor. A total of about 273 million gallons of treated process water had been discharged during this period. The discharge resumed intermittently on September 6, 2003 under a new modification to FDEP's emergency discharge order, and an additional total of 25.4 million gallons of treated water have been discharged as of November 17, 2003. The emergency order imposes a 15-day average total ammonia loading of no more than 308 pounds per day for any discharges to Bishop Harbor.

– <u>Ocean Dispersion of Double-Stage Treated Water</u>. On April 9, 2003, the Environmental Protection Agency (EPA) issued an emergency permit to allow dispersion of treated water from the PPP stack system into the deep waters of the Gulf of Mexico. The permit authorizes the dispersion of up to 534.7 million gallons of double-stage lime treated and aerated process water. Dispersion of the treated water via the barge New York started on July 20, 2003. A second vessel, the Captain H. A. Downing, was added as of October 26, 2003 to supplement the barge New York in order to optimize the rate of ocean dispersion under the EPA emergency permit. As of November 17, 2003, a total of 208 million gallons of treated water have been barged and dispersed into waters of the Gulf of Mexico. The EPA emergency permit is scheduled to expire on November 30, 2003. A request to extend the permit (to allow dispersion of the volumes of treated water previously authorized) was recently denied by EPA.

Other action items which are being actively pursued at this time include: (i) an expanded spray evaporation system to consume process water at a rate in excess of 0.3 MGD; (ii) 9000-ft long soil-bentonite cut-off wall installed around facility to eliminate 0.15 MGD of groundwater intrusion into the stack system seepage collection ditches; and (iii) breakpoint chlorination of the double-stage lime treated aerated water prior to discharge to minimize the nutrient loading to Bishop Harbor.

As part of the longer term water management plan, closure of the top gradient of the NGS-N compartment will be undertaken during the dry season of FY2004 (i.e., between November 2003 and May 2004) to begin the process of reducing the watershed while also providing for additional emergency surge storage capacity for use if the need arises. Closure would consist of constructing a 35-foot deep lined emergency surge pond (LESP) that may either be used to store fresh water or process water, depending on the needs of the facility. The goal is to close at least one of the stack compartments (NGS-N) and hopefully three of the four gypsum stack compartments (NGS-N and both cells of the OGS) during the October 2003 - July 2004 period.

10. Emergency Measures

The recommended trigger levels for initiating emergency discharges of double-stage treated aerated water and/or reverse osmosis treated water (i.e., R.O. permeate), presented in a July 17, 2002 report titled, "Recommended Trigger Levels for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System, Manatee County, Florida" (see Attachment 4), shall be adhered to. The trigger levels consider the fact that such discharges will have to be initiated in time and at sustained rates, if and as needed, in order to provide reasonable assurance that a catastrophic failure or overtopping of the PPP stack system impoundments will not occur.

In spite of timely discharges of treated water based on the recommended trigger levels, if the water inventory remains high and the weather forecast calls for a storm event that cannot be readily contained within the phosphogypsum stack system available storage volume, the operator shall immediately arrange for a conference call between appropriate parties to decide on and formulate a storm-specific site-specific emergency action plan, as deemed necessary, in an attempt to contain, if possible, the process water inventory within the system or within nearby emergency diversion impoundments, and to plan for the controlled discharge of treated water or runoff water resulting from extreme storm events, if necessary. In particular, the Shaw Group shall contact the Receiver and appropriate representatives from Ardaman & Associates, Inc., ECT and FDEP. The telephone numbers can be found in the Contingency Plan prepared by ECT. The project team shall then report the recommended site-specific emergency action plan to the FDEP and discuss the plan with the FDEP prior to implementation.

The following provisions are applicable only during extreme emergency water conditions. If wet weather conditions or a storm system or several storms, or a combination thereof, result in depletion of available storage capacity of the phosphogypsum stack system, the following measures or procedures shall be followed preferably in sequence, or concurrently, as needed:

– **Transfer of Water to Top of Stacks.** Pump process water from the SCP to the top of both the NGS and OGS, utilizing all Pond Water Pumps, to raise the water level atop the stacks as much as possible while maintaining no less than 1 foot of freeboard atop the stacks during such emergencies. More frequent inspections of the gypsum stack perimeter dikes, toe ditches and the stack in general (i.e., twice per shift) shall be performed during high water conditions (as long as personnel safety is not compromised), and maintenance action shall be taken as needed to maintain the stack in a safe operating condition.

– **Emergency Surge in SCP.** Allow the water level in the SCP to temporarily surge to Elevation 18.2 feet (NGVD). When the water level exceeds Elevation 17.0 feet (NGVD), the toe seepage collection ditch and perimeter earthen dikes shall be inspected daily for potential maintenance items, and the existing piezometers shall be read weekly.

– **Transfer of Process Water to NCP**. Notify the FDEP and then empty as much treated water (pH$4.5) as possible from the NCP (once it has been converted to a sludge storage area) into Basin No. 2 via pumping. Unless specifically approved by Ardaman & Associates, Inc. under emergency conditions, the maximum water withdrawal rate shall be limited to about 5,000 gpm (7 MGD), equivalent to a water level drawdown rate of about one foot in a 24-hour period to minimize the potential for an upstream slope failure caused by rapid drawdown.

  Once the transfer of treated water from the NCP has been completed, process water may then be diverted into the NCP from the NGS-N or OGS-N compartment by gravity using a siphon, or by pumping. The volume of process water that can be transferred to the NCP will depend on the water level in the NCP prior to the transfer. Once the proposed dike raising and installation of the soil-bentonite cut-off wall are completed, and the planned 65 acre-feet of sludge have been transferred from the SCP-N compartment to the NCP, a total of about 195 acre-feet of water can be diverted to and stored in the NCP, assuming the water level in the NCP prior to the water transfer is at the current maximum operating level of 19 feet (NGVD).

– **Transfer of Diluted Process Water to Treated Water Aeration Ponds.** Notify the FDEP and obtain approval to empty as much existing water as possible from the treated water aeration ponds (provided the existing water has a pH greater than or equal to 4.5) into a ditch leading to non-process water Basin No. 2, located immediately west of the SCP, for storage. Remove the newly constructed coffer dam at the north end of Basin No. 2 prior to transferring treated water from the aeration ponds to Basin No. 2. Divert diluted process water from the SCP-N compartment to the treated water aeration ponds via pumping (after closing the water control/outlet structure of the aeration ponds), preferably treating the water with lime as it is being transferred.

  Basin No. 2 has a storage capacity of about 17 acre-feet (5.6 million gallons) from the minimum operating level elevation of 5 feet (NGVD) to the maximum water level elevation of 9 feet (NGVD), corresponding to a minimum freeboard of about 3 feet. Sufficient advance notice is required for the timely implementation of all preparatory actions. For example, assuming a total drainable water volume of 5 acre-feet in the aeration ponds, a pump capacity on the order of 1,100 gpm would be required to transfer water from the aeration ponds to Basin No. 2 in 24 hours.

  Additional time is also needed to then transfer diluted process water from the SCP-N compartment to the aeration ponds by pumping. The volume of process water that can be transferred to the aeration ponds will depend on the water level in the ponds prior to the transfer. Considering that the water level is drawn down to about Elevation 9.5 feet (NGVD) in the old triangular aeration ponds and to Elevation 11 feet (NGVD) in the new aeration ponds prior to the transfer, a total of approximately 23 acre-feet (7.5 million gallons) of process water can be diverted to these ponds by impounding water to a tentatively assumed maximum water level elevation of 13 feet (NGVD), corresponding to a minimum freeboard of about 3 feet in the triangular old aeration ponds and 1 foot in the new aeration ponds. The transfer of 23 acre-feet of process water in 24 hours corresponds to a transfer rate of about 5,200 gpm.

Although the use of a temporary unlined diversion impoundment to receive and store emergency discharges may be authorized by the FDEP in accordance with the provisions of Rule 62-672.870(3), any departmental approval should not be construed to limit enforcement action in the event such emergency diversions cause or contribute to a violation of applicable departmental rules.

– **Diversion to Basin No. 2.** Once the treated water aeration ponds and the NCP are filled, divert diluted process water from the SCP-N compartment, via pumping or a siphon, into the ditch leading to non-process water Basin No. 2. If possible, treat the water with lime as it is being diverted. The first stage lime treatment and settling can be done in the ditch with additional settling in Basin No. 2. The treatment with lime could alternatively occur in the lime treatment plant immediately north of the ditch.

Prior to diverting partially treated water to Basin No. 2, the discharge to Outfall 001 at the south end of the basin would have to be blocked (if not already blocked). Assuming that the water level in the basin is at the minimum operating level elevation of about 5 feet (NGVD), a total of about 17 acre-feet of treated process water can be diverted to and stored in Basin No. 2.

Although the use of a temporary unlined diversion impoundment to receive and store emergency discharges may be authorized by the FDEP in accordance with the provisions of Rule 62-672.870(3), any departmental approval should not be construed to limit enforcement action in the event such emergency diversions cause or contribute to a violation of applicable departmental rules.

– **Controlled Discharges.** In the event of an emergency condition where a discharge of partially treated water is inevitable in order to avoid overtopping the perimeter dikes, double-stage treated partially aerated water and then first stage treated water shall be routed through Basin No. 2 to Outfall 001 for discharge off property. If possible, add more lime as the first stage treated water is being diverted. The FDEP shall be notified prior to discharging off property.

If the storage capacity of the system is full and a storm is forthcoming, controlled discharge of runoff water from the stack slopes and cooling pond perimeter dike slopes may be allowed to take place by breaching the Northeast Seepage Ditch at the east end of the ditch leading to Basin No. 2, thus allowing runoff co-mingled with seepage to be diverted towards Outfall 001 for discharge off property. The FDEP shall be notified prior to breaching the ditch containment berms.

If uncontrolled flooding of the site is anticipated, one of the diesel back-up pumps may be set up in the East Seepage Ditch at the northeast corner of the NCP to expedite pumping impacted seepage to the NCP or to the top of the stack during the initial stages of the storm. When the ditches and other at-grade areas start to get flooded and the storage capacity of the existing impoundments are depleted, one may turn off all seepage ditch pumps (e.g., Pumps 2, 3, 4, and 5 in Figures 1 and 2) allowing the now highly diluted seepage commingled with runoff to naturally overflow towards Basin No. 2 for discharge off property via Outfall 001.

Finally, as a last resort and after obtaining FDEP approval, untreated process water shall be routed from the SCP-N compartment (via pumping or siphon) through Basin No. 2 to Outfall 001 for discharge off property, with provisions made to add lime as the water is diverted to the basin.

Although an emergency spillway is authorized by Rule 62-672.870(2) for the controlled release of water during emergencies in order to avoid overtopping of the perimeter earthen dike, the discharge of untreated or partially treated water is not a permitted activity and the FDEP and others must be informed prior to or immediately upon initiation of such discharges (refer to Emergency Contingency Plan prepared by ECT).

Table 1

WATER MANAGEMENT INFORMATION FOR EXISTING PHOSPHOGYPSUM STACK SYSTEM AREAS
Piney Point Phosphates, Inc.

Area Designation	Watershed Area* (acres)	Ponded Area* (acres)	Surge Ratio	Minimum Perimeter Dike Crest Elevation (feet, NGVD)	Operating Water Levels			Emergency Conditions	
					Average Pond Bottom Elevation (feet, NGVD)	"Design" Maximum Water Level (feet, NGVD)	Freeboard at Design Maximum Water Level (feet)	Temporary Emergency Maximum Water Level (feet, NGVD)	Temporary Freeboard During Emergencies (feet)
Old Gypsum Stack (OGS)									
OGS-N	36.8	34.7	1.06	85.0††	N/A	84.0††	**1.0**	84.0	1.0
OGS-S	29.1	25.6	1.14	85.0††	N/A	84.0††	**1.0**	84.0	1.0
New Gypsum Stack (NGS)									
NGS-N	49.1	42.6	1.15	64.0††	N/A	62.0††	**2.0**	63.0	1.0
NGS-S	89.4	75.9	1.18	64.0††	N/A	62.0††	**2.0**	63.0	1.0
North Cooling Pond (NCP)+	30.3 (28.0)++	21.2 (25.8)++	1.43 (1.09)++	22.9 to 23.7 (30.0)++	15.5 (19.0)++	19.0 (27.0)++	**3.9 to 4.7** (3.0)++	19.0 (27.0)++	3.9 (3.0)++
South Cooling Pond (SCP)	222.3 (224.6)++	37.4 (49.4)++	5.94 (4.55)++	22.6 to 23.6*** /22.6 to 23.0****	12.5 (12.3)++	17.0†††	**5.6 to 6.6*** /5.6 to 6.0******	18.2	4.4 to 5.4*** /4.4 to 4.8****
Miscellaneous Ponded Areas Within Sump Areas and Ditches	**	7.6	–	–	varies	varies	varies	–	–
Net Total	457† (429)++†	245.0 (235.8)++	–	–	–	–	–	–	–

* Watershed area and ponded area (corresponding to design maximum water level) are based on the 6/05/01 and 9/16/02 topographic maps of the site.
** Included within the watershed of the south cooling pond (SCP).
*** Occurs at the southwest corner of the SCP-S where the dike is about 65-foot wide.
**** Occurs at the northeast corner of the SCP-N where the dike is about 100-foot wide.
† Includes approximately 17.5 acres of net contributing watershed from the 25-acre plant site.
†† Recently raised to this elevation as recommended by Ardaman & Associates, Inc.
††† Elevation 17.0 feet (NGVD) actually corresponds to the recommended normal maximum water level.
\+ Currently, the crest along the north, south and west perimeter dikes of the NCP is being widened and raised to Elevation 27.0 feet (NGVD) in preparation for installing a soil-bentonite cut-off wall along these alignments. After installation of the cut-off wall, the crest will be raised further to Elevation 30.0 feet (NGVD), and the pond will be converted to a sludge storage area and isolated from the process system watershed.
++ Values between parentheses are for conditions after converting the NCP to a sludge storage area (and excluding it from the process system watershed), and after transferring about 65 acre-feet of sludge from the SCP-N compartment to the NCP.
N/A Not available (or not applicable).

Table 2

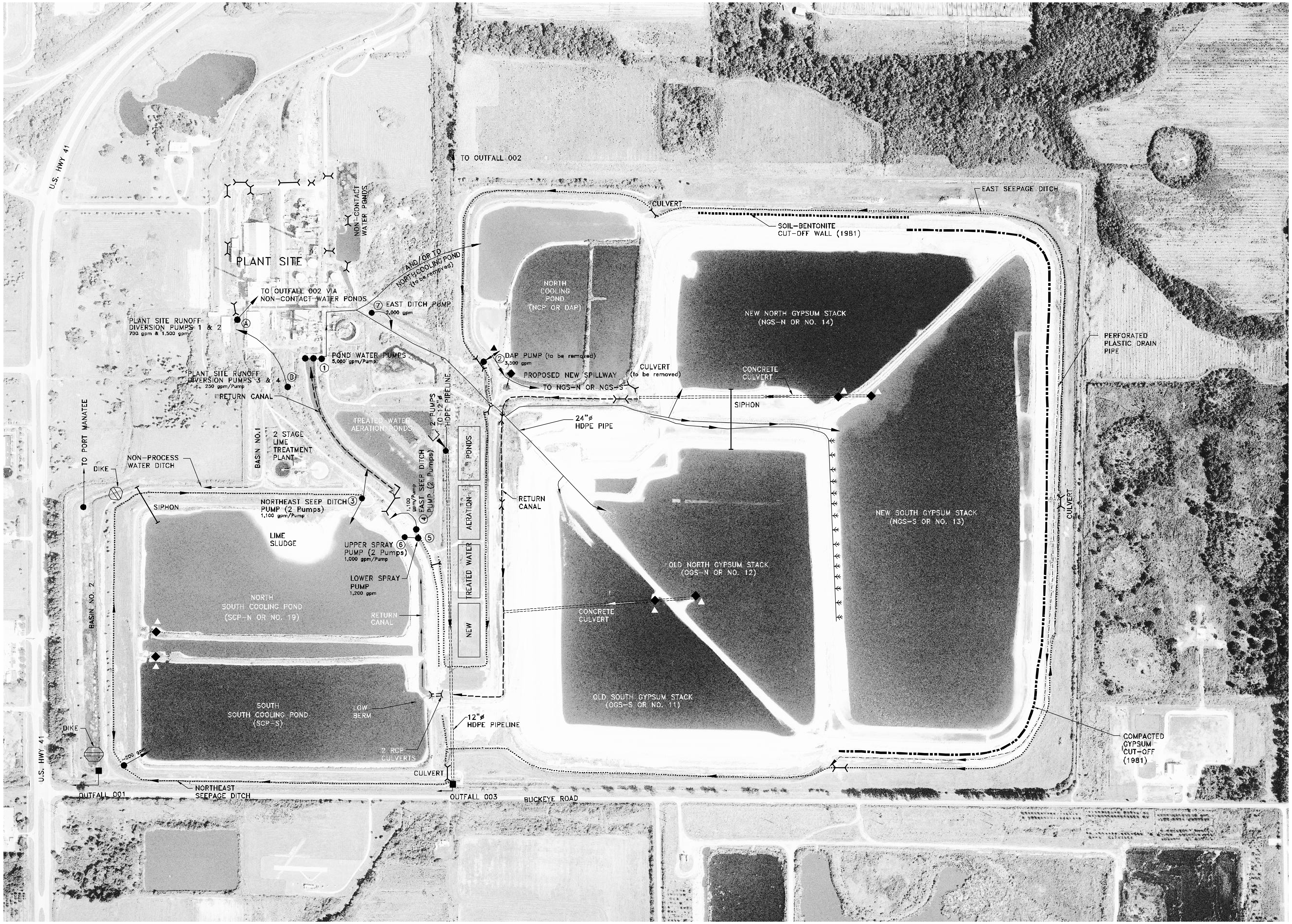
COOLING POND SYSTEM TRIGGER LEVELS
Piney Point Phosphates, Inc.

		Storage Capacity and Water Level in Cooling Pond System					
		"Action Plan"		"May Treat"		"Must Treat"	
Cooling Pond System Direct Watershed Area (acres)		Storage Capacity* (acre-feet)	Water Level (feet, NGVD)	Storage Capacity** (acre-feet)	Water Level (feet, NGVD)	Storage Capacity** (acre-feet)	Water Level (feet, NGVD)
Scenario 1	252.6 (224.6)+	252.6 (224.6)+	See Fig. 15 (10.5)+	178.9 (159.1)+	See Fig. 15 (13.3)+	89.5 (79.5)+	See Fig. 15 (15.1)+
Scenario 2	457.0 (429.0)+	457.0 (429.0)+	See Fig. 15 (not feasible)+	323.7 (303.8)+	See Fig. 15 (not feasible)+	161.9 (151.9)+	See Fig. 15 (13.5)+

* Based on 12 inches of rainfall.
** Based on 8.5 inches of rainfall (i.e., 25-year/24-hour storm).
\+ The values between parentheses are for conditions after converting the NCP to a sludge storage area (and excluding it from the process system watershed). All trigger levels are in the SCP.

Nomenclature:

Scenario 1: Existing condition where the stack compartments have adequate capacity to contain a 12-inch storm in addition to the recommended minimum freeboard (i.e., OGS freeboard $2.1 ft, and NGS freeboard $3.2 ft).
Scenario 2: Condition where the stack compartments do not have adequate capacity to contain a 12-inch storm in addition to the recommended minimum freeboard (i.e., OGS freeboard <2.1 ft, and NGS freeboard <3.2 ft).



N

0 300 600
SCALE: 1"=300'

AERIAL PHOTOGRAPHY BY
I.F. ROOKS & ASSOCIATES, INC.
DATE: SEPTEMBER 16, 2002.

LEGEND

- ● PUMP
- ▲ STAFF GAUGE
- ■ OUTFALL
- ◆ SPILLWAY
- WATER CONTROL STRUCTURE
- SEEPAGE DITCH
- RETURN WATER DITCH
- PROCESS WATER FLOW
- NON-PROCESS WATER FLOW
- BURIED SEEPAGE COLLECTION DRAIN
- CUT-OFF WALL (1981)
- COMPACTED GYPSUM CUT-OFF (1981)
- BURIED LONG CULVERT PIPE
- PIPE OR BOX CULVERT
- SPRAYS

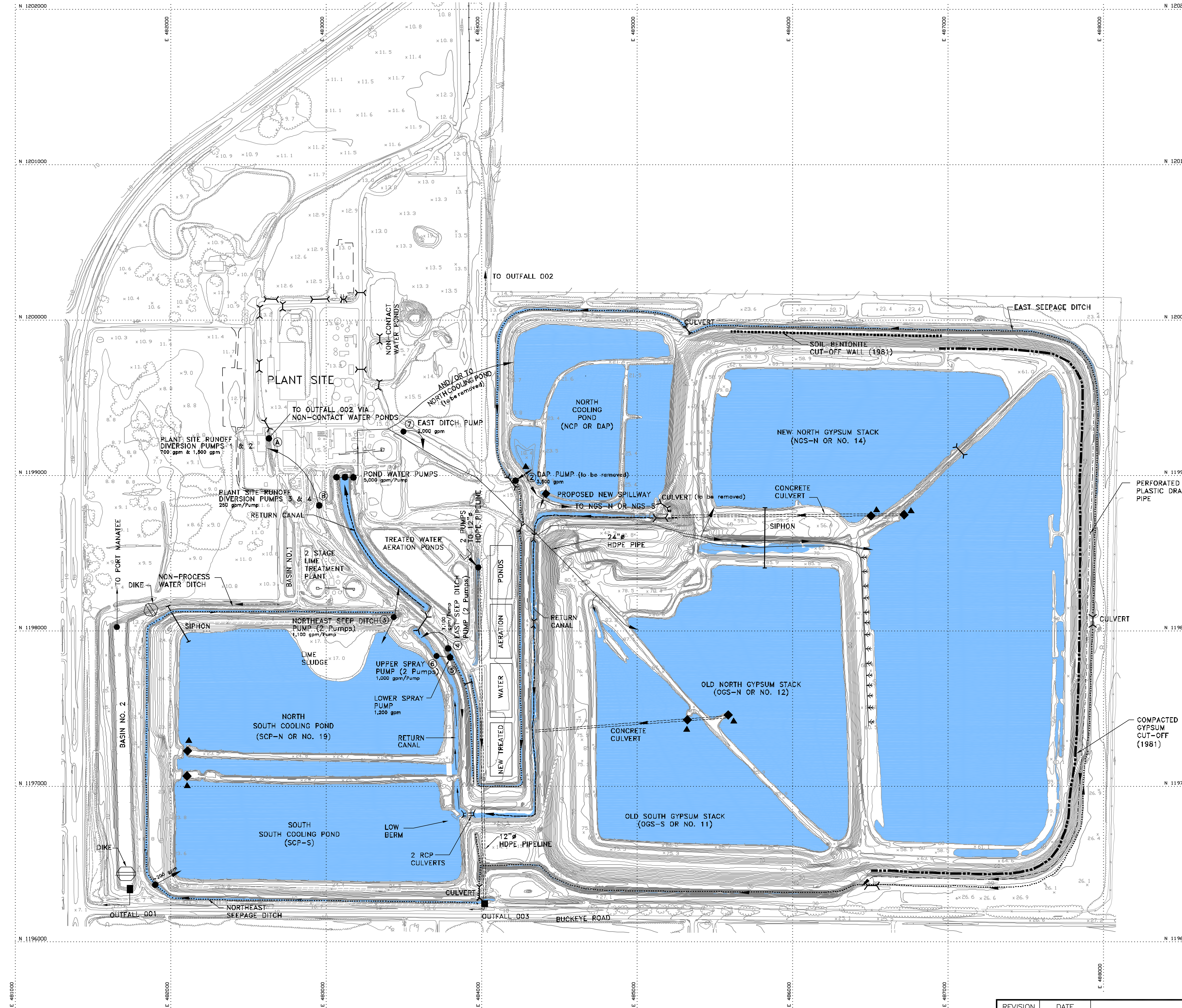
REVISION	DATE	DESCRIPTION
2	10/03/03	UPDATED AERIAL PHOTOGRAPH. REMOVED SPRAYS BETWEEN SCP AND OGS-S. ADDED A CULVERT THROUGH THE PARTITION DIKE BETWEEN NGS-N AND NGS-S. ADDED A SIPHON BETWEEN OGS-N AND NGS-N. ADDED DIKES IN BASIN NO.2
1	07/31/02	ADDED CULVERTS NORTH OF THE PLANT SITE AND ADDED RUNOFF DIVERSION PUMP SYSTEMS A AND B

AERIAL PHOTOGRAPH

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

PHOSPHOGYPSUM STACK SYSTEM
PINEY POINT PHOSPHATES, INC.
MANATEE COUNTY, FLORIDA

DRAWN BY: CD | CHECKED BY: RKS | DATE: 07/23/01
FILE NO. 02-099A | APPROVED BY: | FIGURE: 1



TOPOGRAPHIC CONTOURS (2 FOOT INTERVAL) FROM SEPTEMBER 16, 2002. SURVEY BY I.F. ROOKS & ASSOCIATES, INC.

LEGEND

- PUMP
- STAFF GAUGE
- OUTFALL
- SPILLWAY
- WATER CONTROL STRUCTURE
- SEEPAGE DITCH
- RETURN WATER DITCH
- PROCESS WATER FLOW
- NON-PROCESS WATER FLOW
- BURIED SEEPAGE COLLECTION DRAIN
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- BURIED LONG CULVERT PIPE
- PIPE OR BOX CULVERT
- SPRAYS

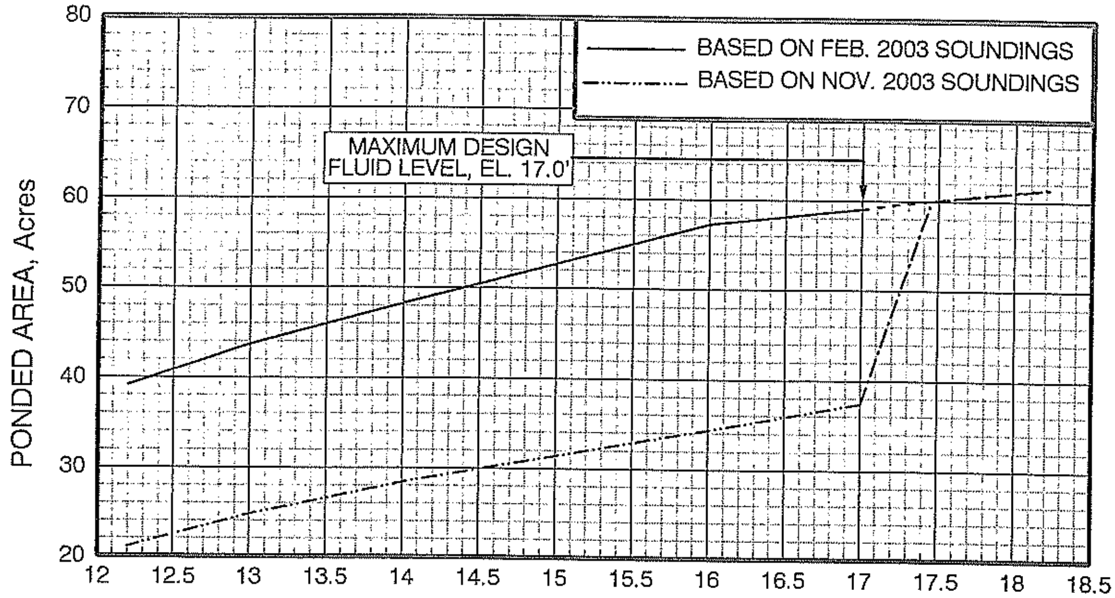
AERIAL PHOTOGRAPH

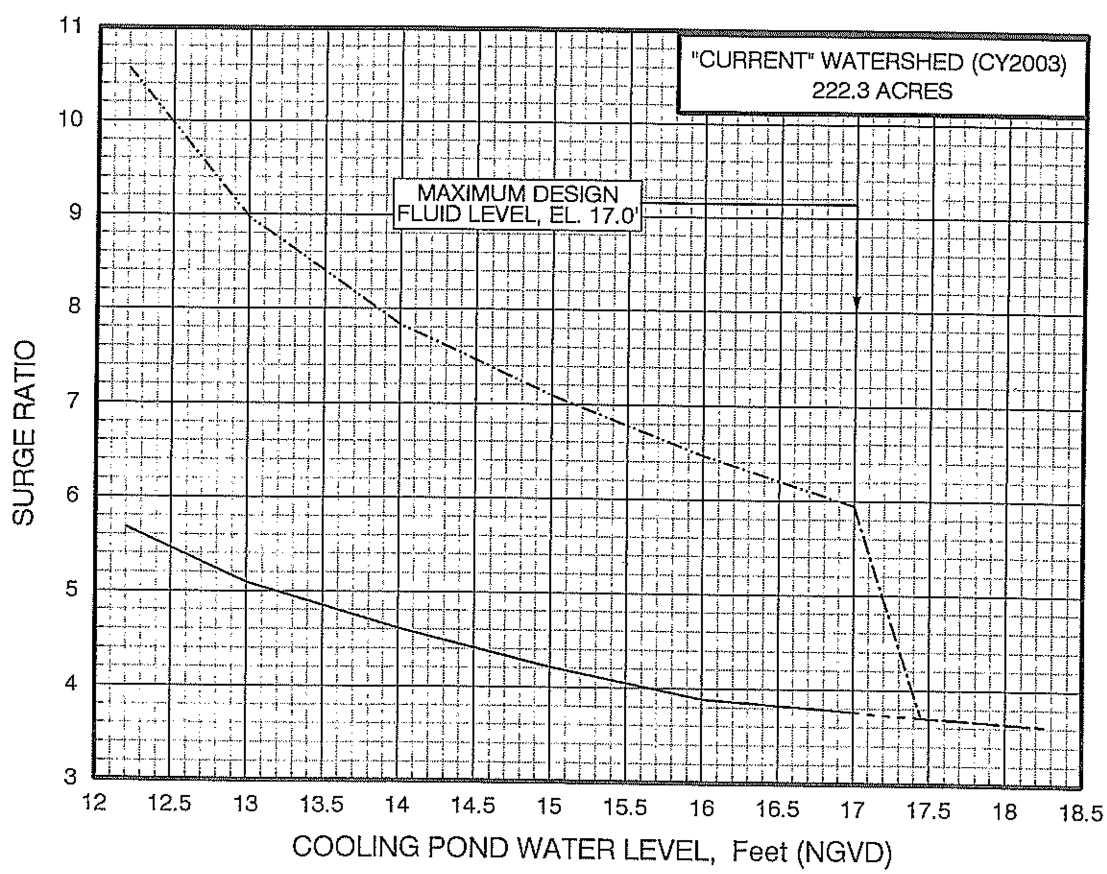
Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

PHOSPHOGYPSUM STACK SYSTEM
PINEY POINT PHOSPHATES, INC.
MANATEE COUNTY, FLORIDA

REVISION	DATE	DESCRIPTION
2	10/03/03	UPDATED AERIAL PHOTOGRAPH. REMOVED SPRAYS BETWEEN SCP AND OGS-S. ADDED A CULVERT THROUGH THE PARTITION DIKE BETWEEN NGS-N AND NGS-S. ADDED A SIPHON BETWEEN OGS-N AND NGS-N. ADDED DIKES IN BASIN NO.2
1	07/31/02	ADDED CULVERTS NORTH OF THE PLANT SITE AND ADDED RUNOFF DIVERSION PUMP SYSTEMS A AND B

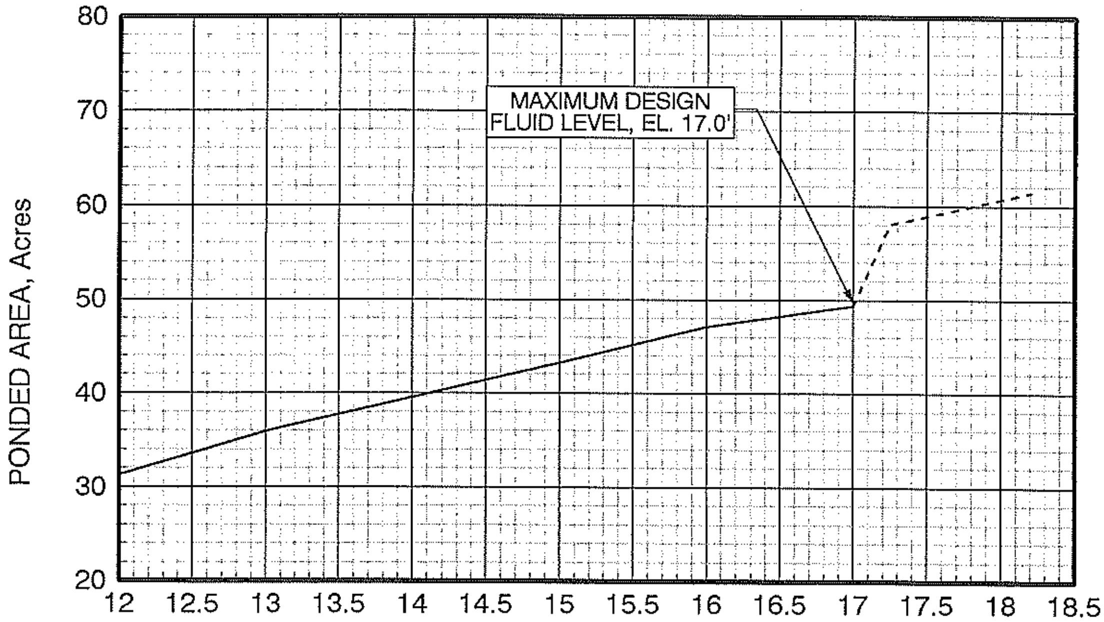
DRAWN BY: CD	CHECKED BY: RKS	DATE: 11/07/01	
FILE NO. 02-099A	APPROVED BY:		FIGURE: 2

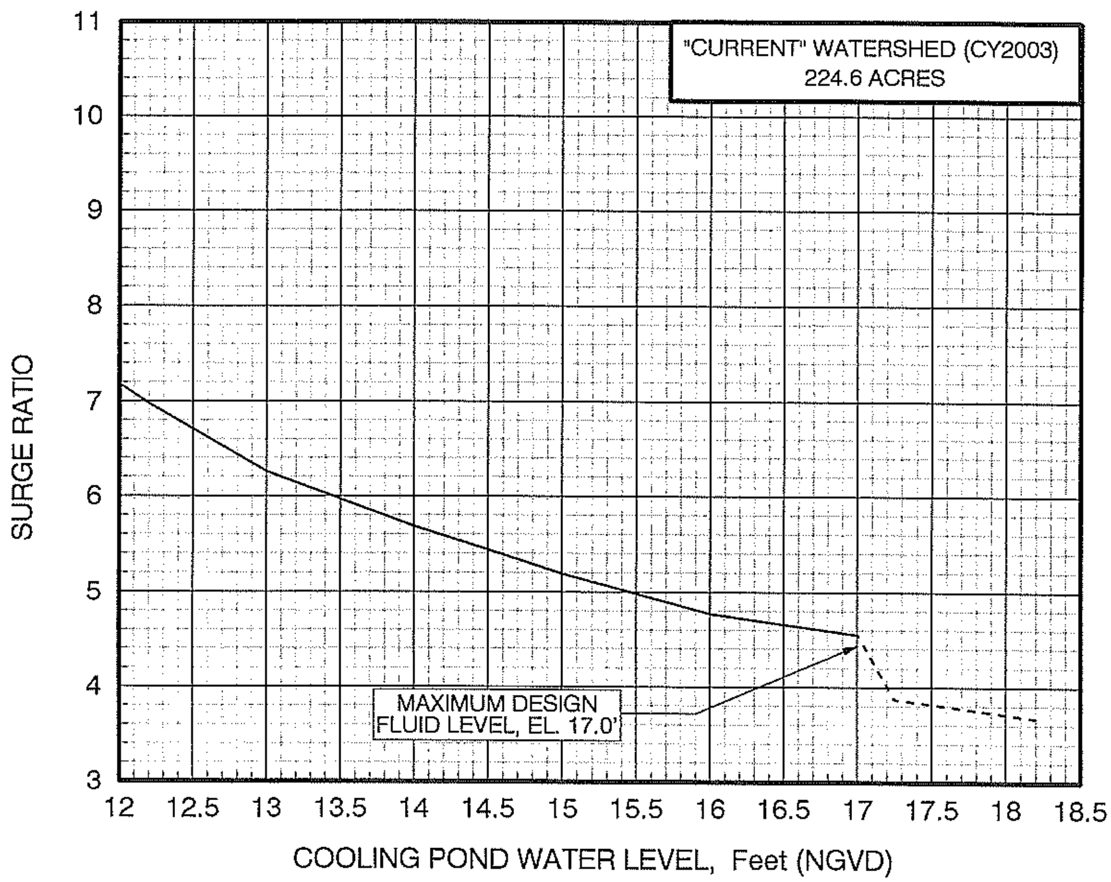




PONDED AREA AND SURGE RATIO OF SOUTH COOLING POND AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

FIGURE 3



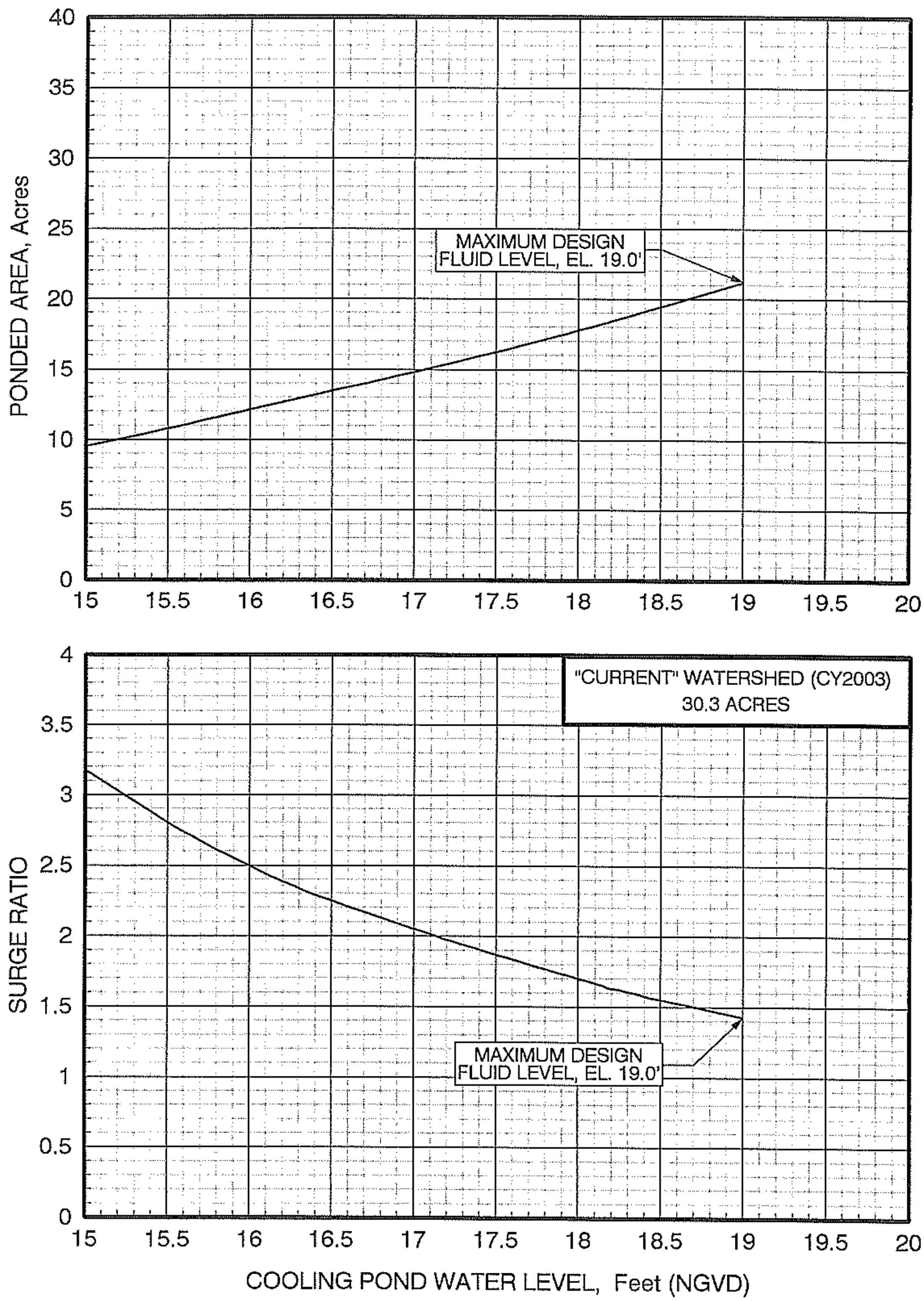


PONDED AREA AND SURGE RATIO OF SOUTH COOLING POND AS A FUNCTION OF OPERATING WATER LEVEL

(After Transferring 105,000 cyd of Sludge to the NCP)

Piney Point Phosphates, Inc.

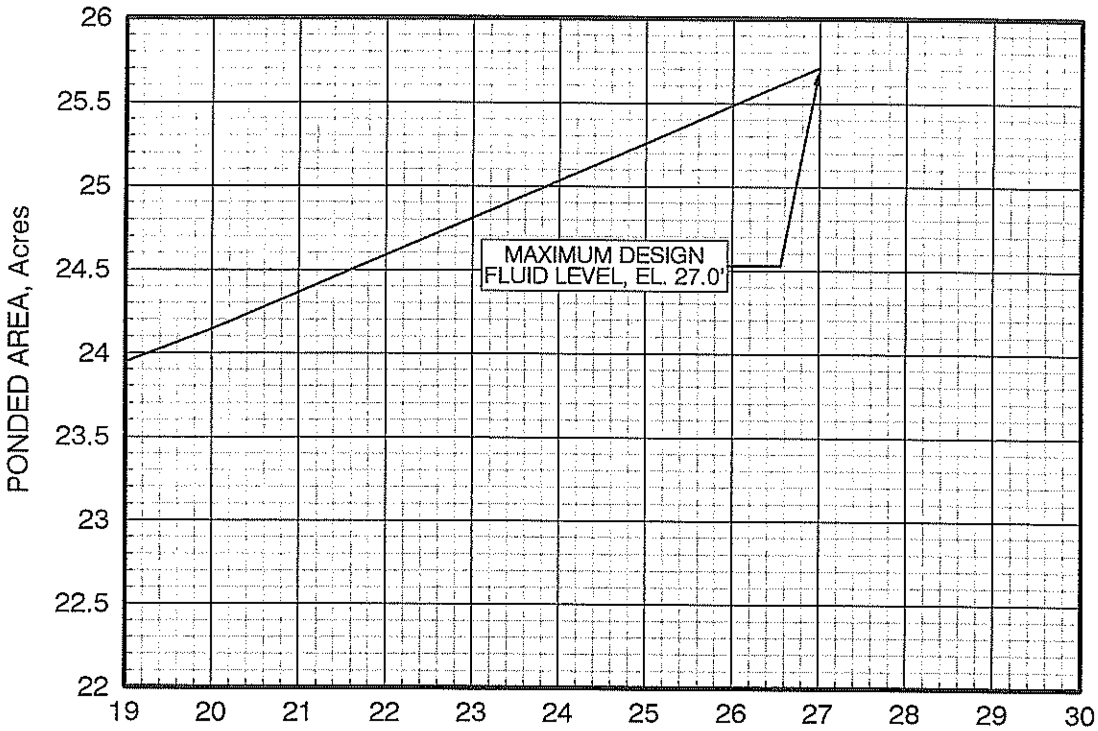
FIGURE 3A

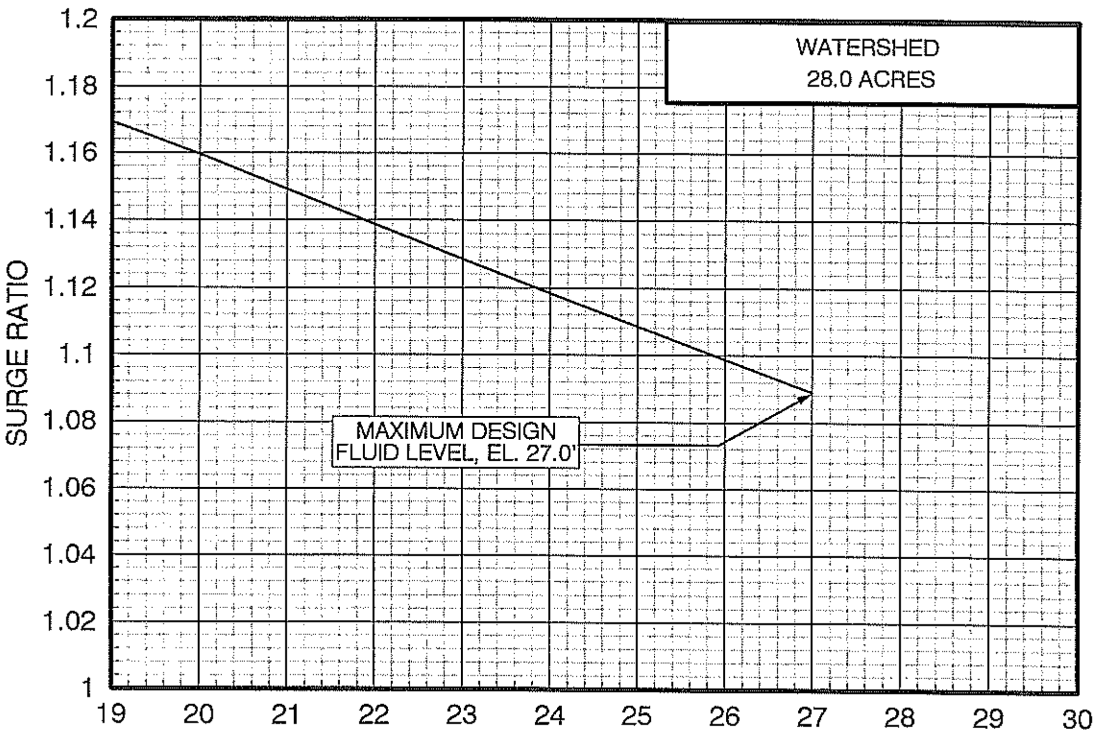


FILE: C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\NCP-A.DRW MH

PONDED AREA AND SURGE RATIO OF NORTH COOLING POND AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

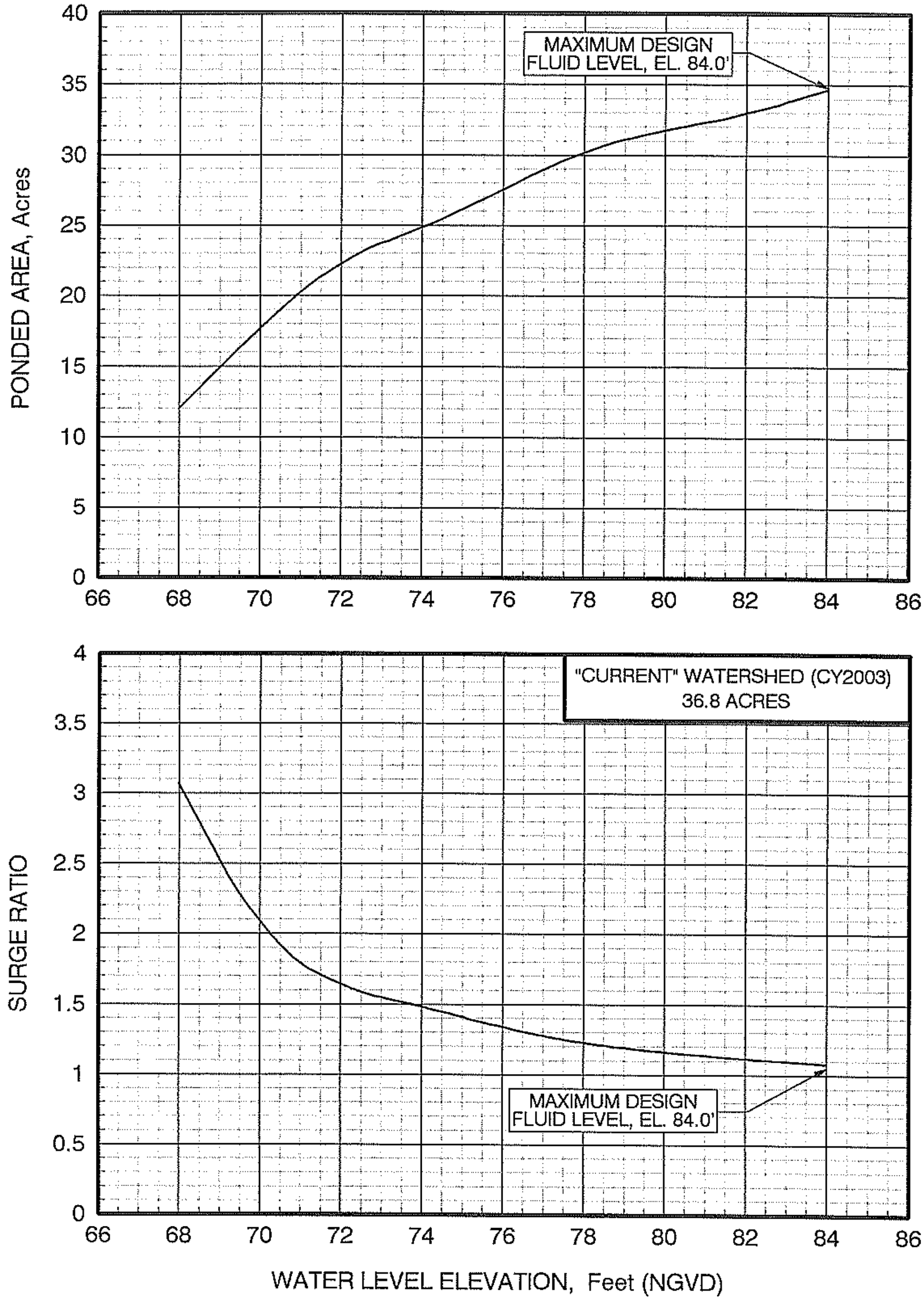
FIGURE 4





PONDED AREA AND SURGE RATIO OF NORTH COOLING POND
AS A FUNCTION OF OPERATING WATER LEVEL
(After Construction Modifications and After Receiving
105,000 cyd of Sludge from the SCP-N Compartment)
Piney Point Phosphates, Inc.

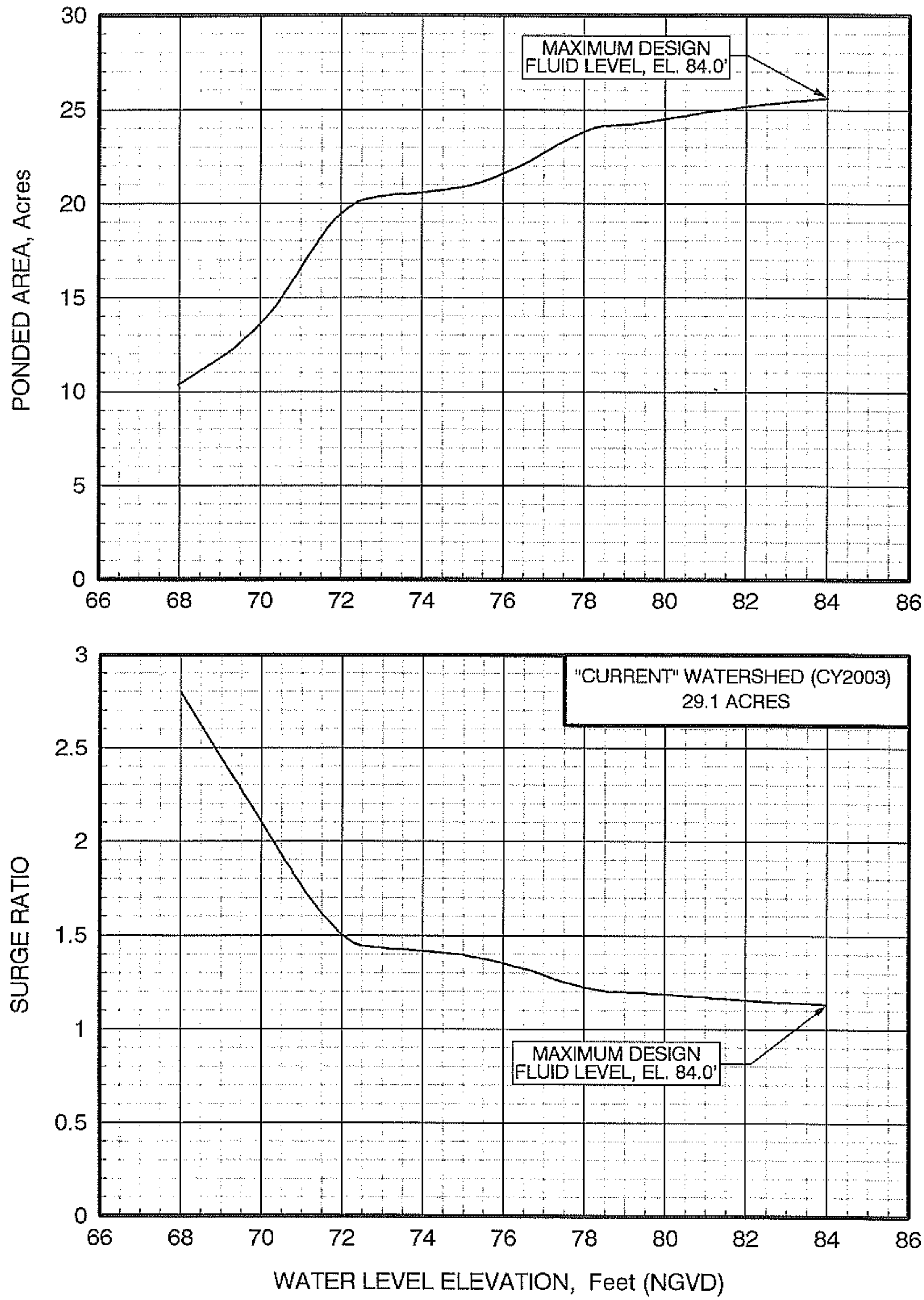
FIGURE 4A



PONDED AREA AND SURGE RATIO OF OLD GYPSUM STACK NORTH COMPARTMENT (OGS-N) AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

FIGURE 5

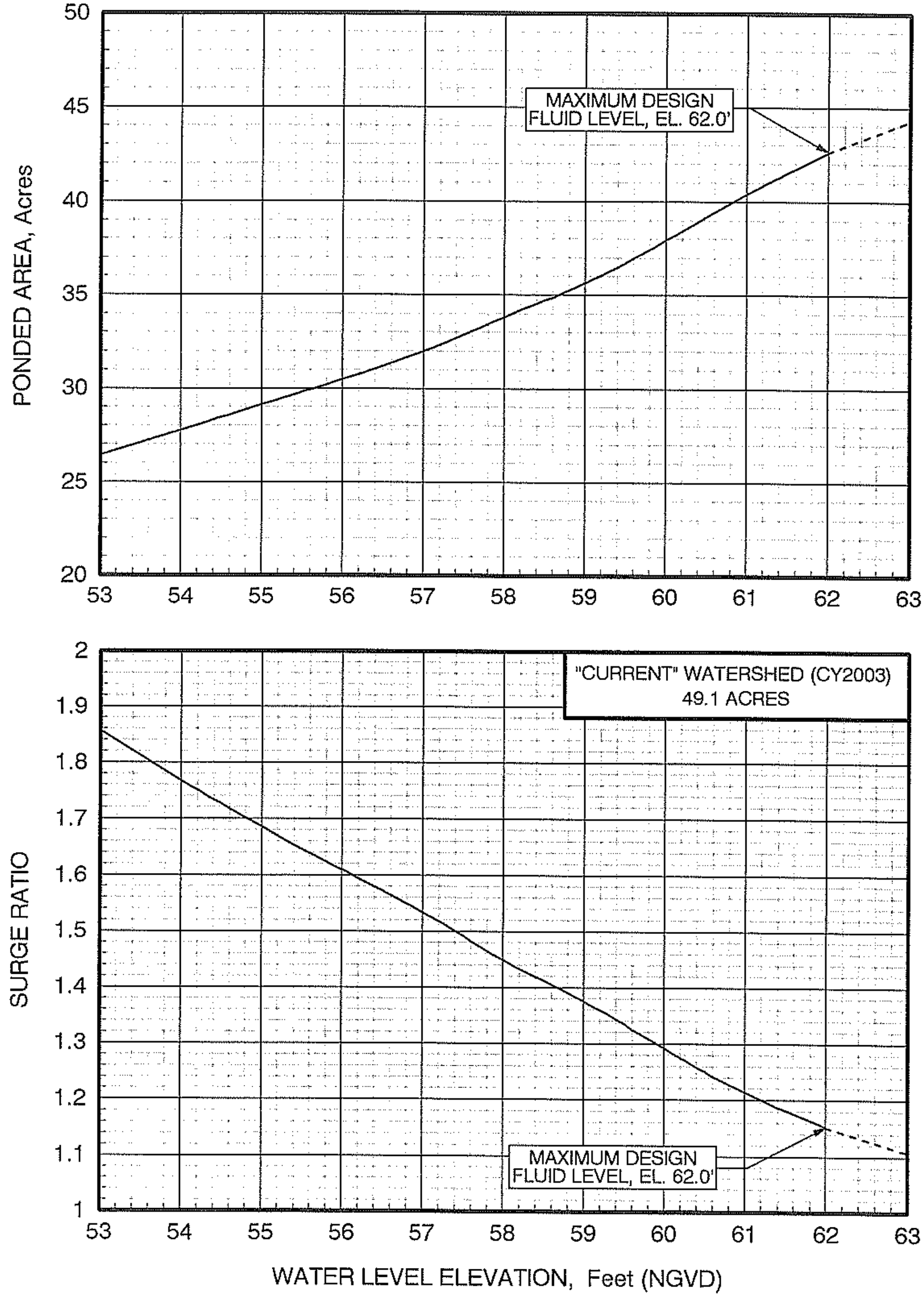
FILE:C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\OGS-N-A.DRW MH



PONDED AREA AND SURGE RATIO OF OLD GYPSUM STACK SOUTH COMPARTMENT (OGS-S) AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

FIGURE 6

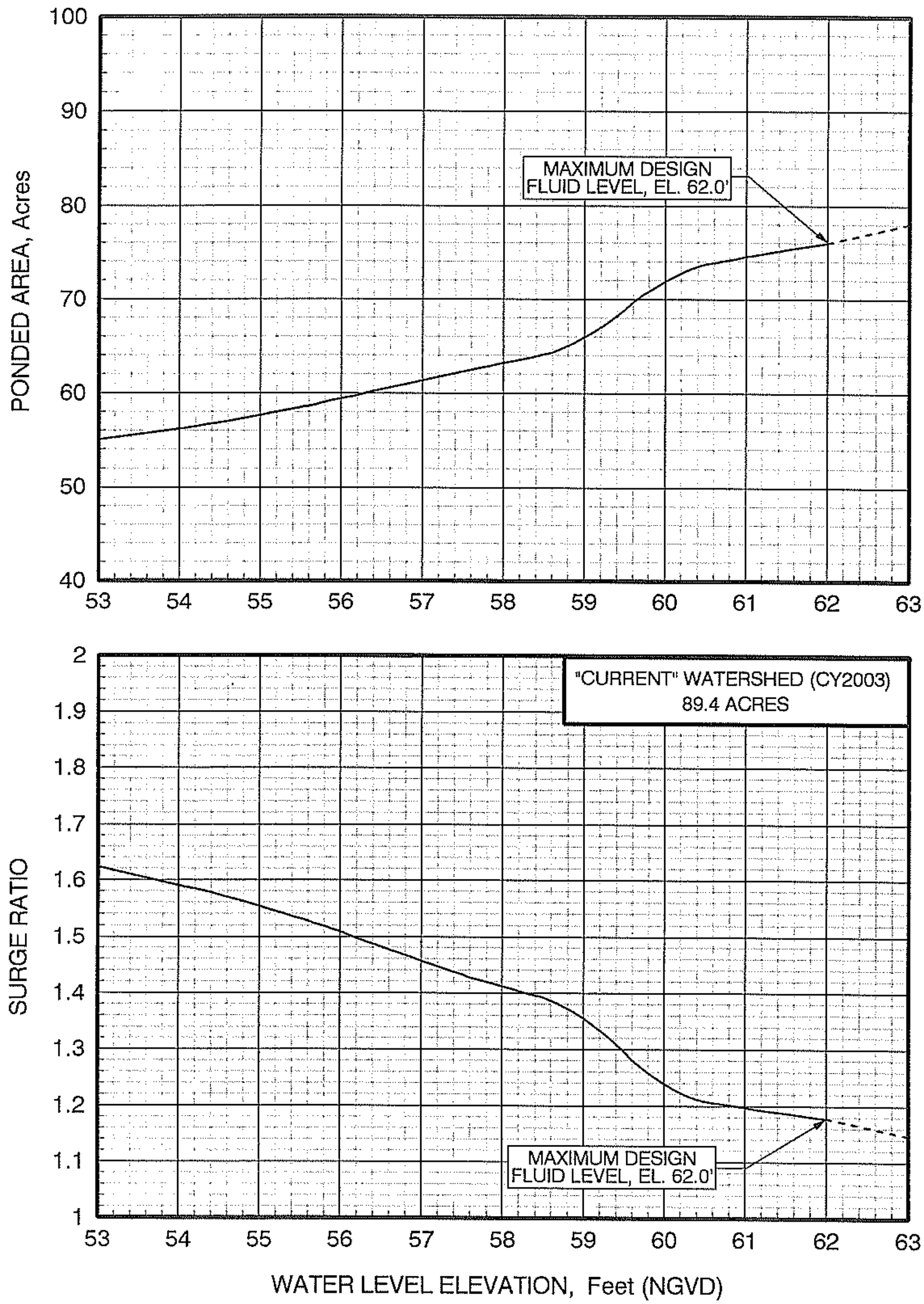
FILE: C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\OGS-S-A.DRW MH



PONDED AREA AND SURGE RATIO OF NEW GYPSUM STACK NORTH COMPARTMENT (NGS-N) AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

FIGURE 7

FILE: C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\NGS-N-A.DRW MH

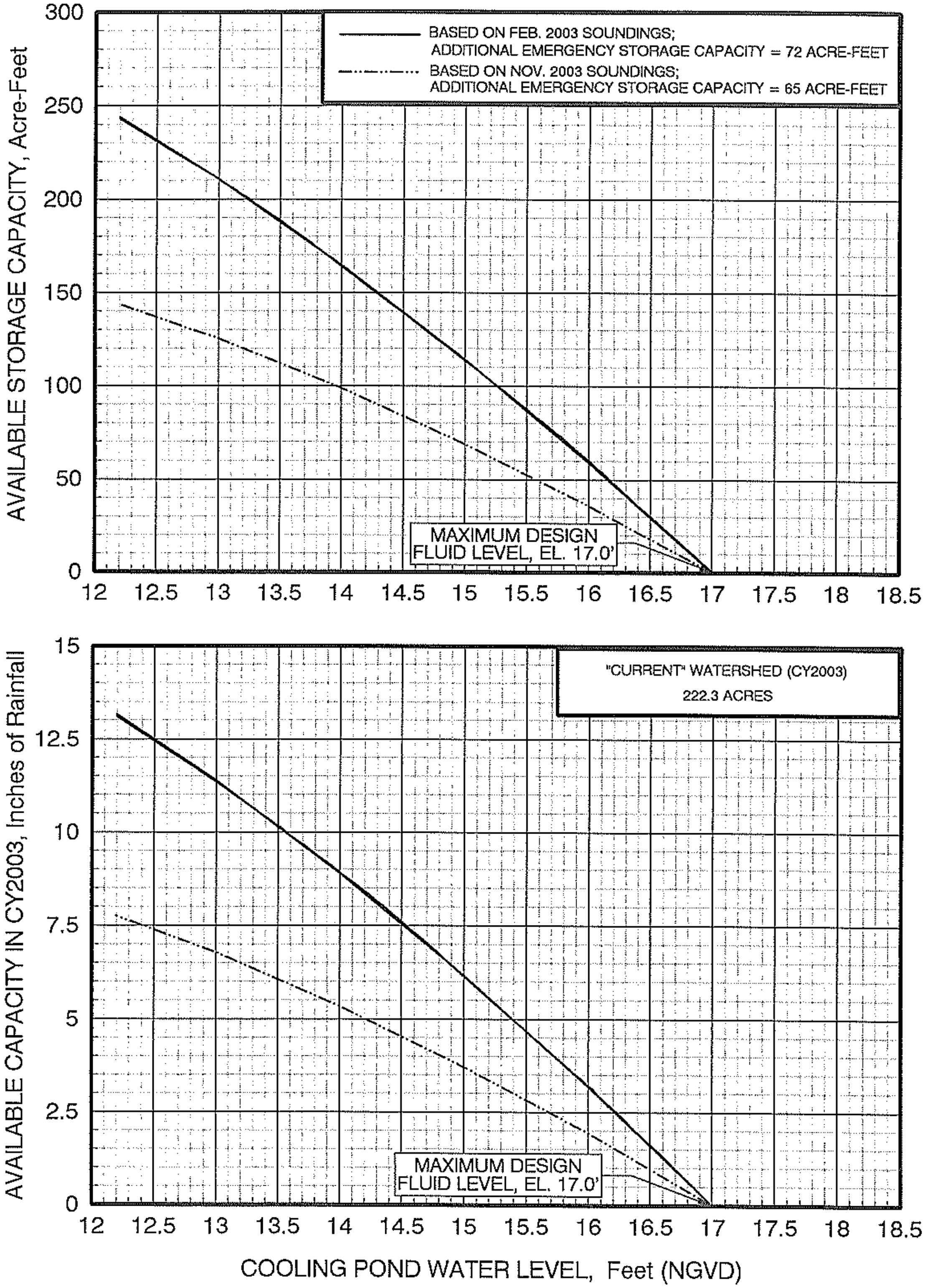


PONDED AREA AND SURGE RATIO OF NEW GYPSUM STACK SOUTH COMPARTMENT (NGS-S) AS A FUNCTION OF OPERATING WATER LEVEL

Piney Point Phosphates, Inc.

FIGURE 8

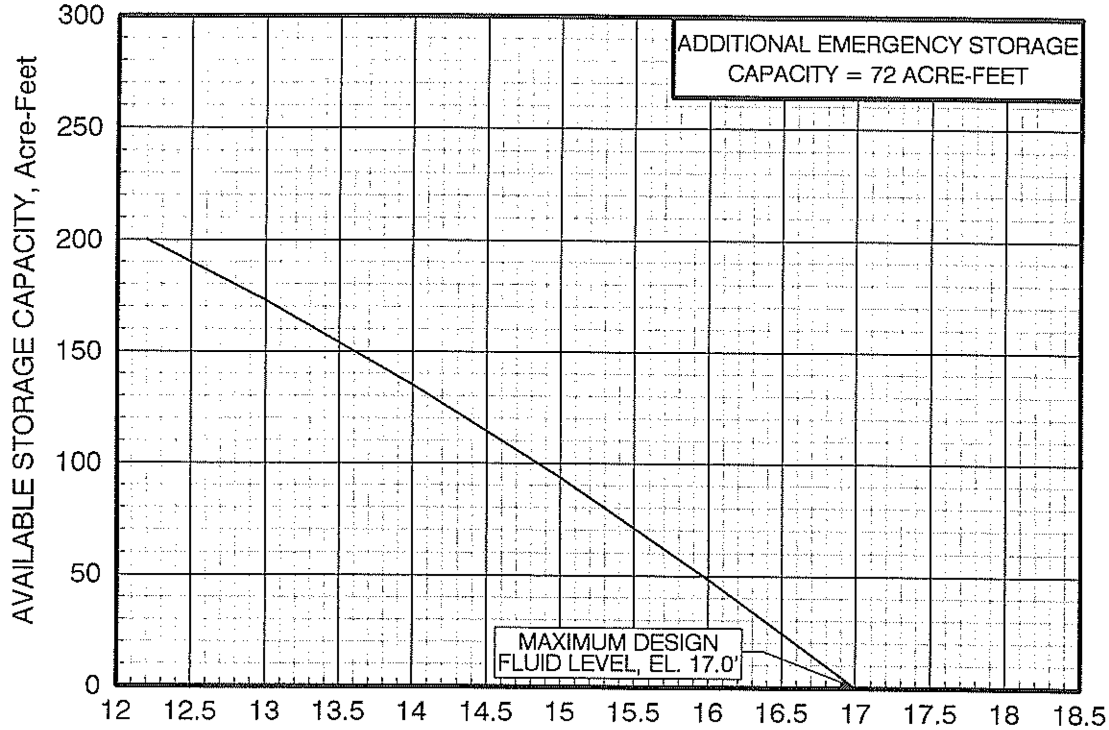
FILE: C:\PROJECTS\02\02-099A-PPP\\WATER MANAGEMENT-2003\FIGURES\NGS-S-A.DRW MH

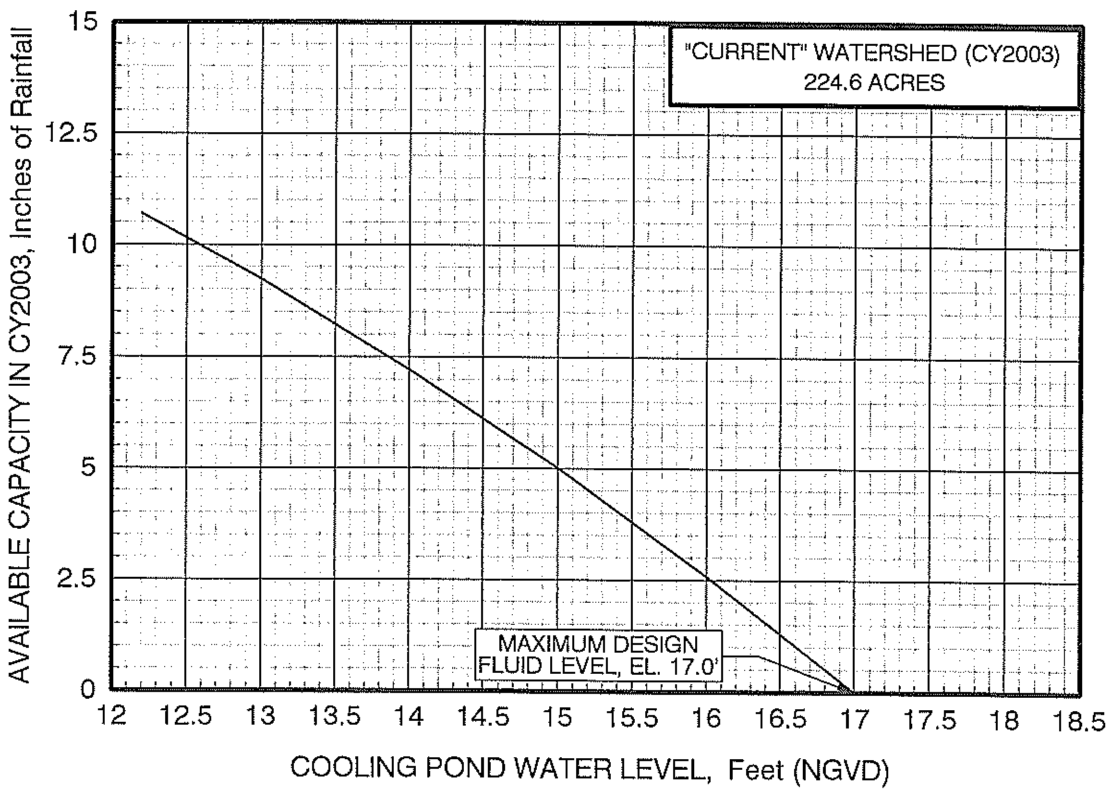


AVAILABLE STORAGE CAPACITY IN SOUTH COOLING POND AS A FUNCTION OF OPERATING WATER LEVEL

Piney Point Phosphates, Inc.

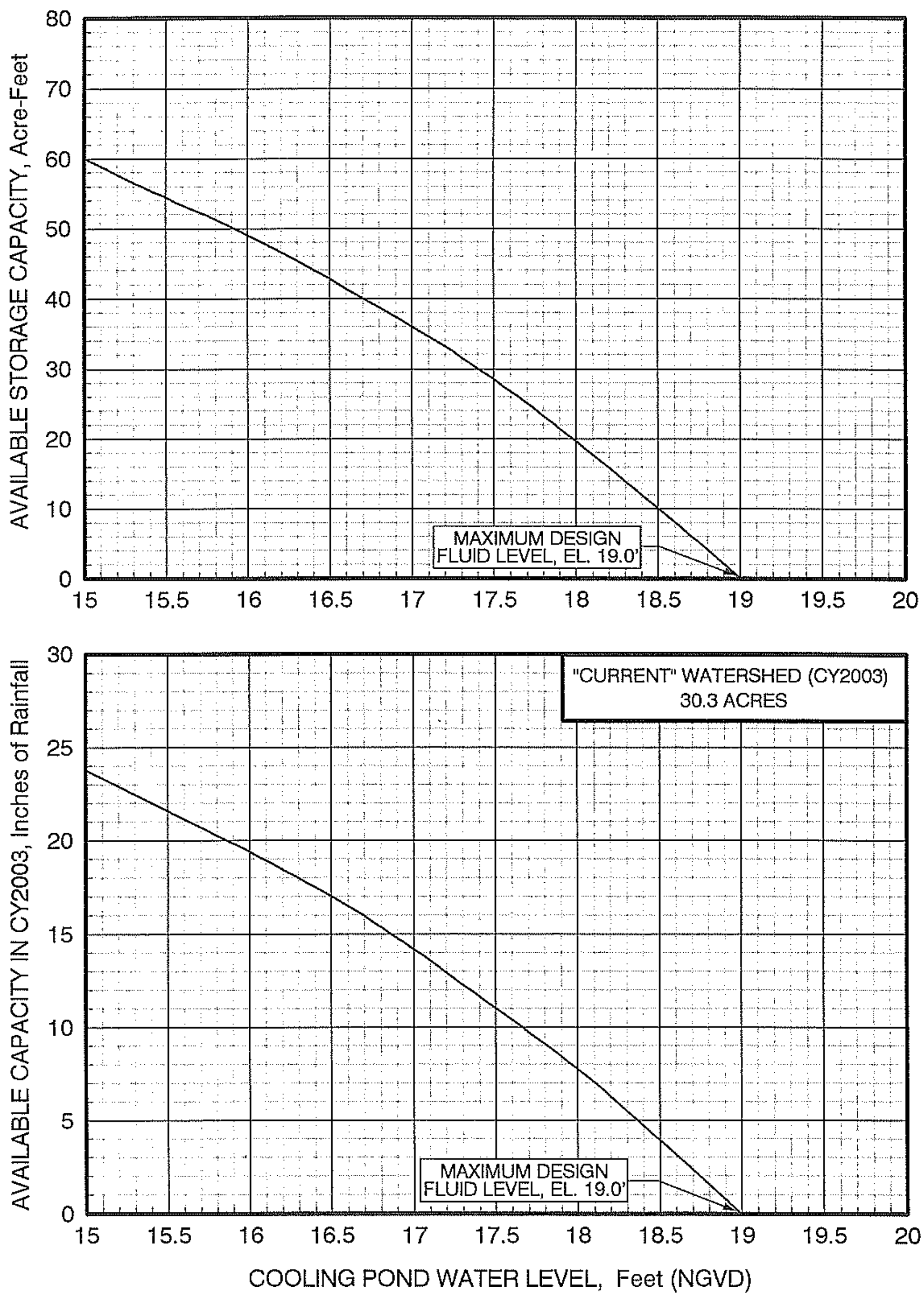
FIGURE 9





AVAILABLE STORAGE CAPACITY IN SOUTH COOLING POND AS A FUNCTION OF OPERATING WATER LEVEL
(After Transferring 105,000 cyd of Sludge to the NCP)
Piney Point Phosphates, Inc.

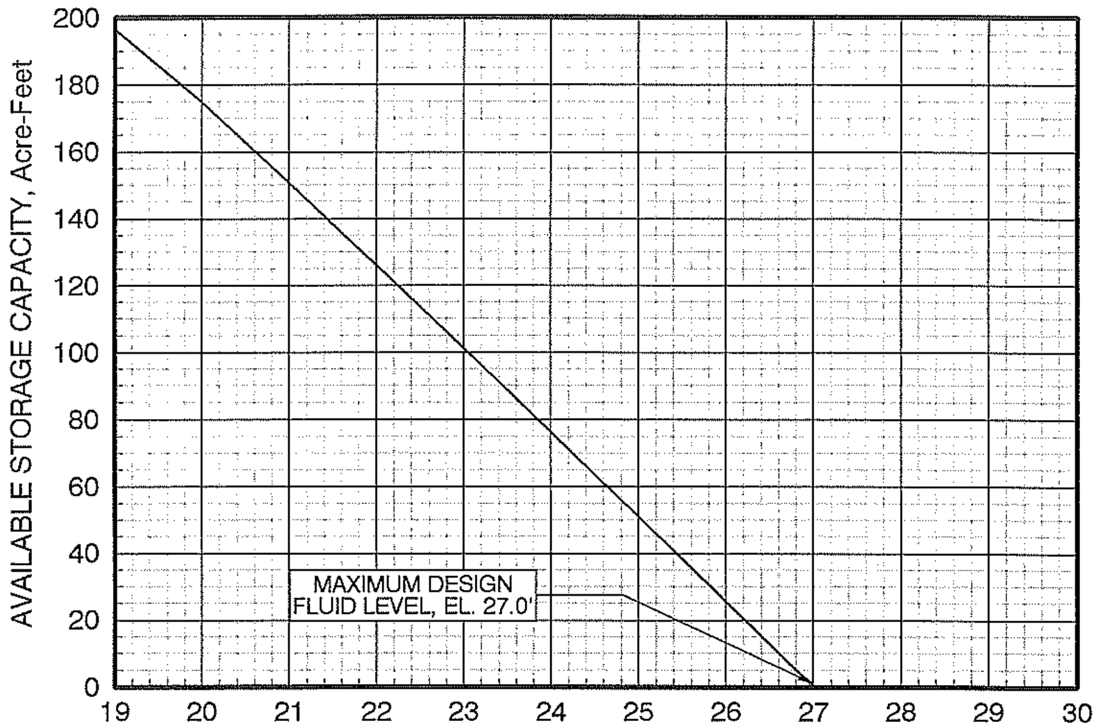
FIGURE 9A

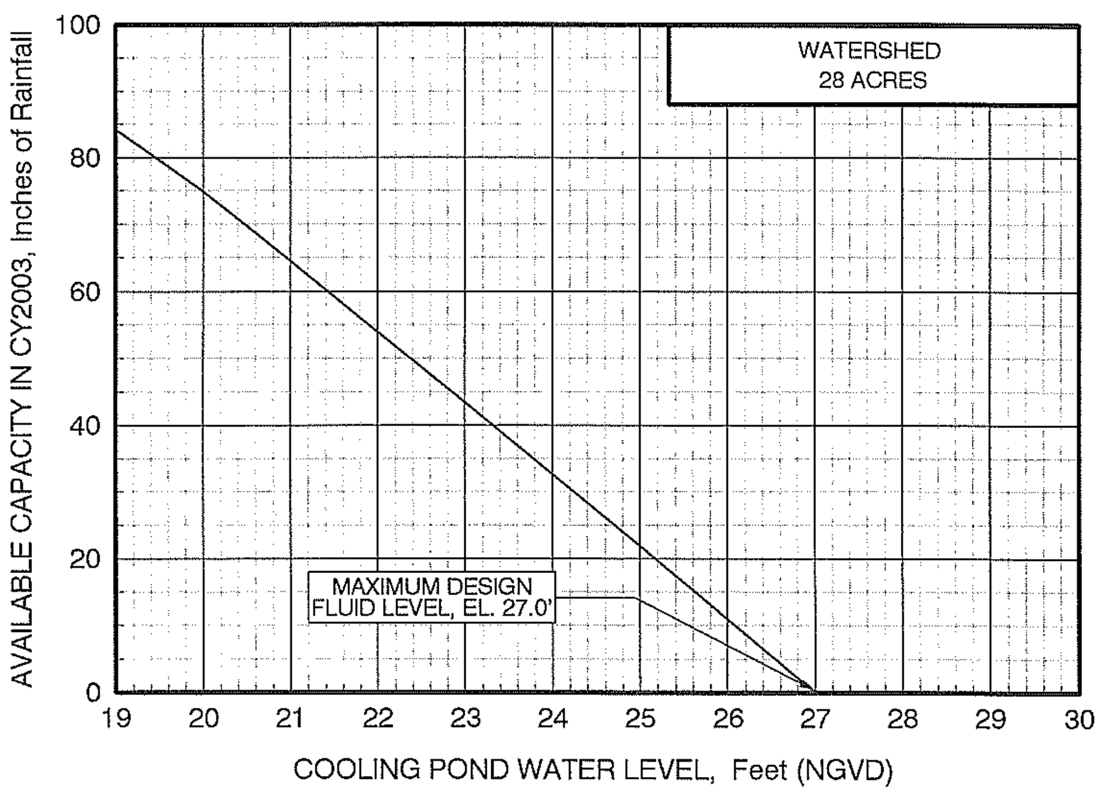


AVAILABLE STORAGE CAPACITY IN NORTH COOLING POND AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

FIGURE 10

FILE: C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\NCP.DRW MH

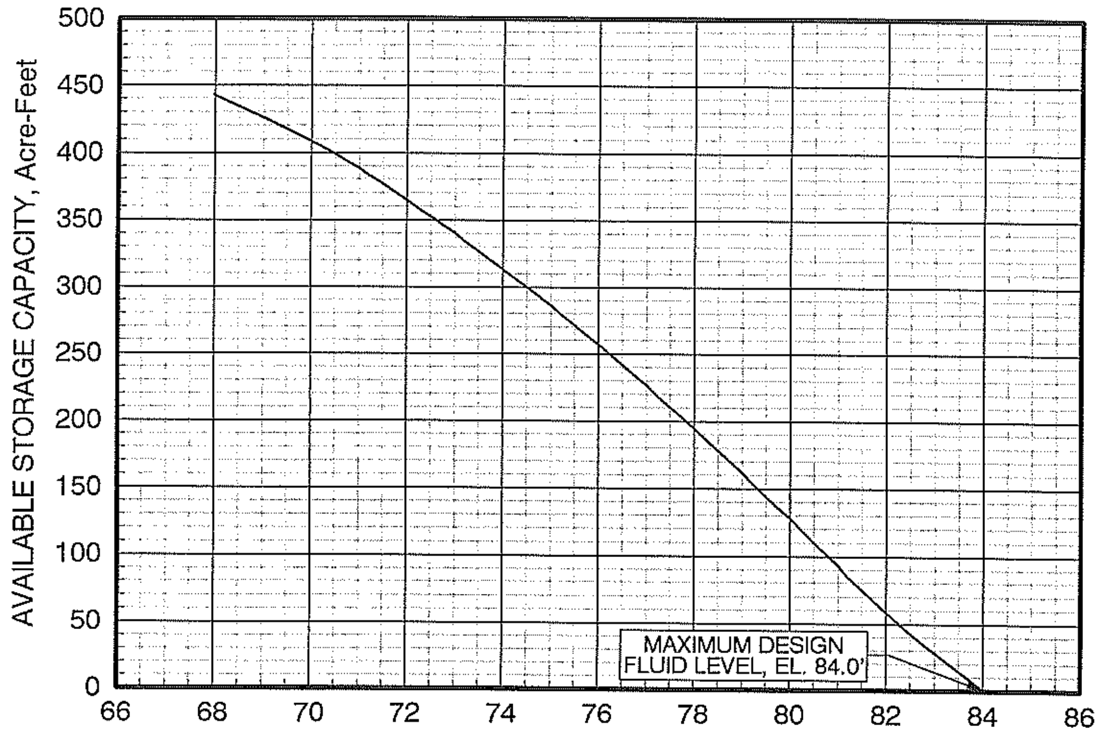


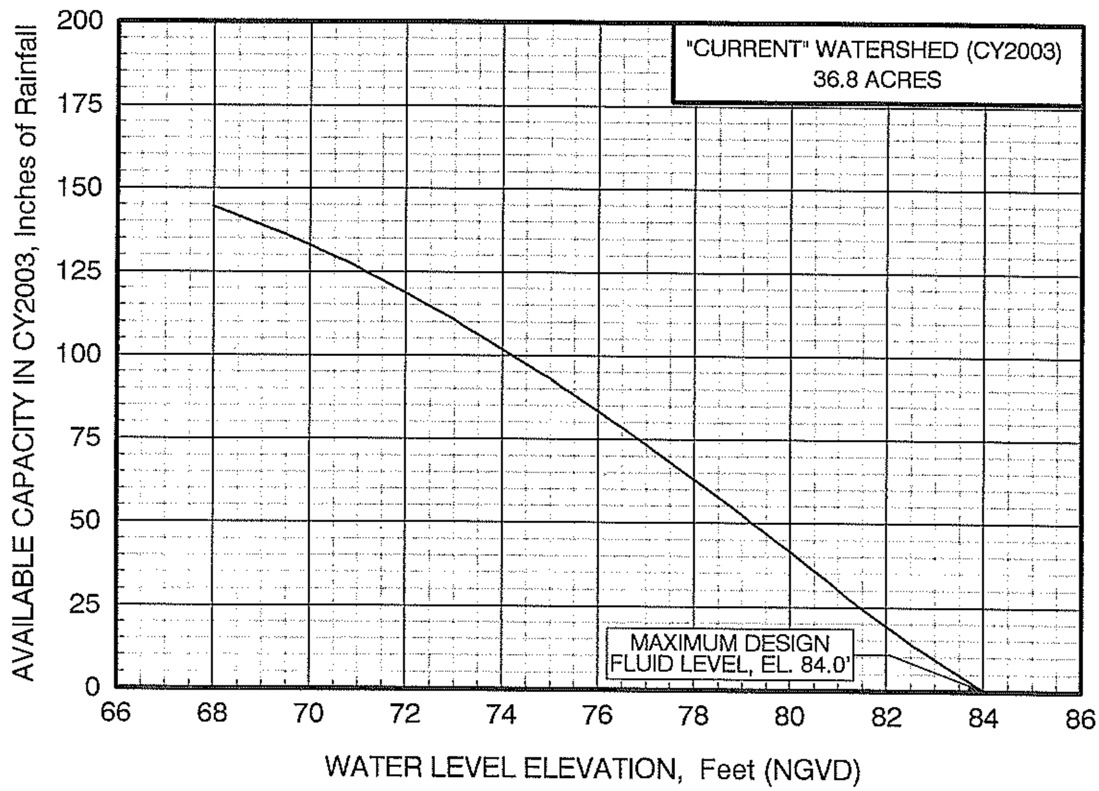


AVAILABLE STORAGE CAPACITY IN NORTH COOLING POND AS A FUNCTION OF OPERATING WATER LEVEL (After Construction Modifications and After Receiving 105,000 cyd of Sludge from the SCP-N Compartment)

Piney Point Phosphates, Inc.

FIGURE 10A

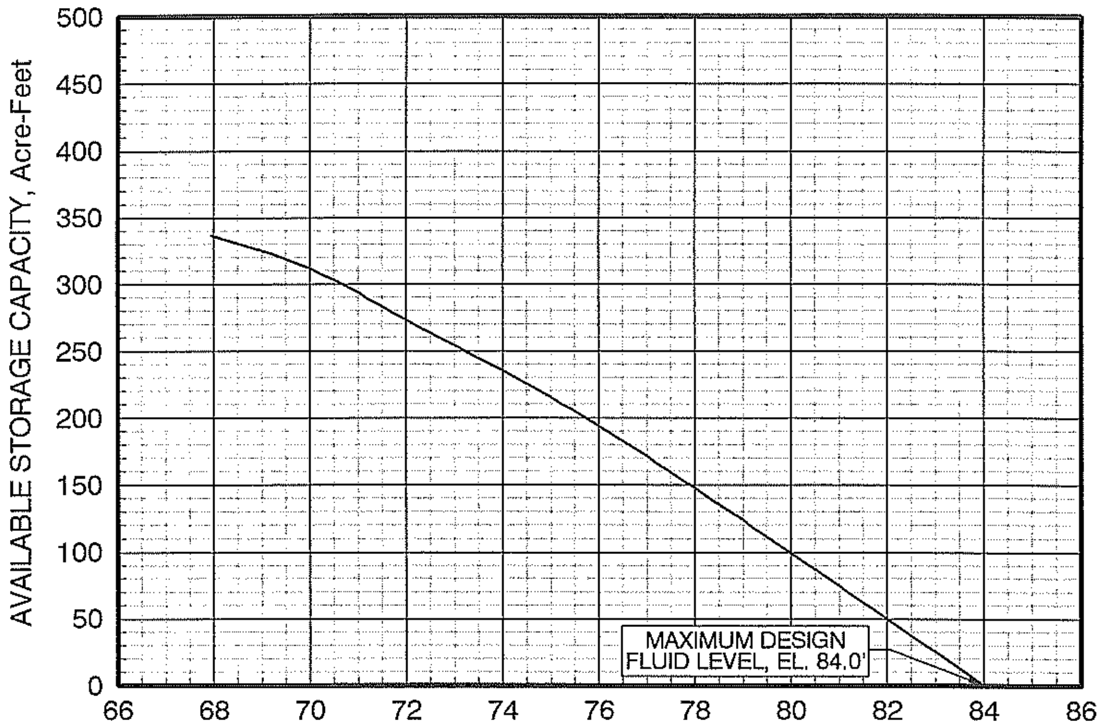


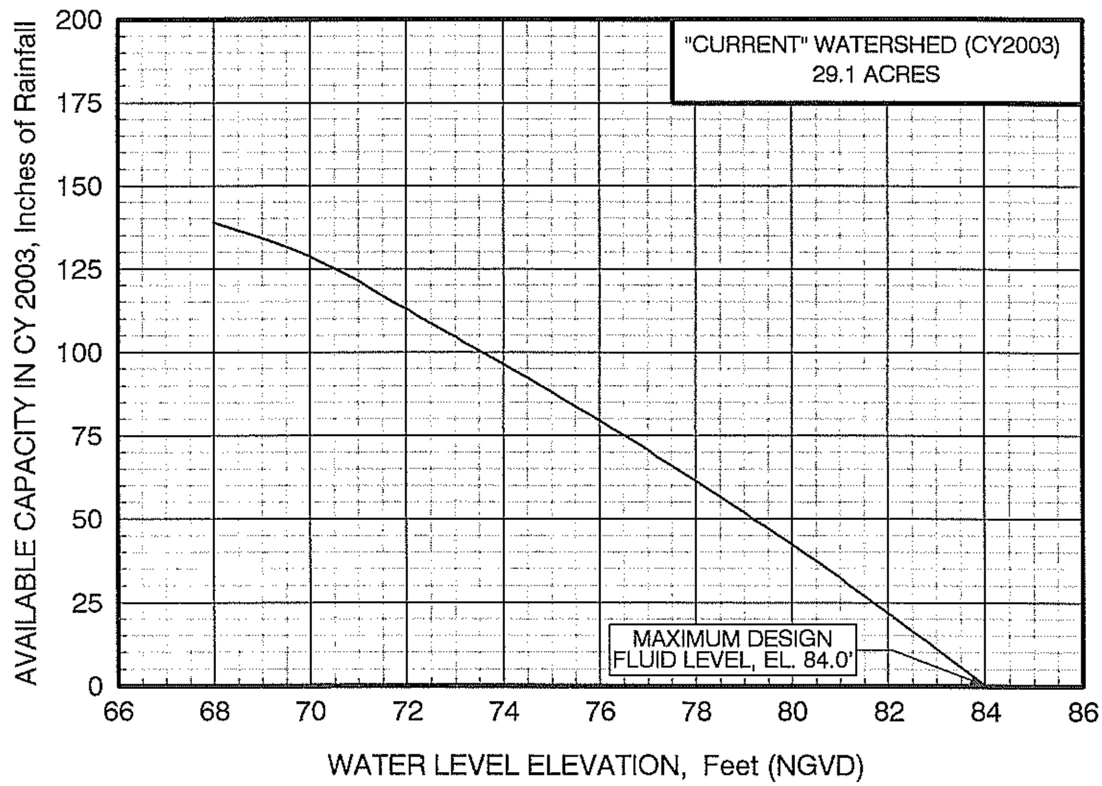


AVAILABLE STORAGE CAPACITY IN OLD GYPSUM STACK NORTH COMPARTMENT (OGS-N) AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

FIGURE 11

FILE: C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\OGS-N.DRW MH



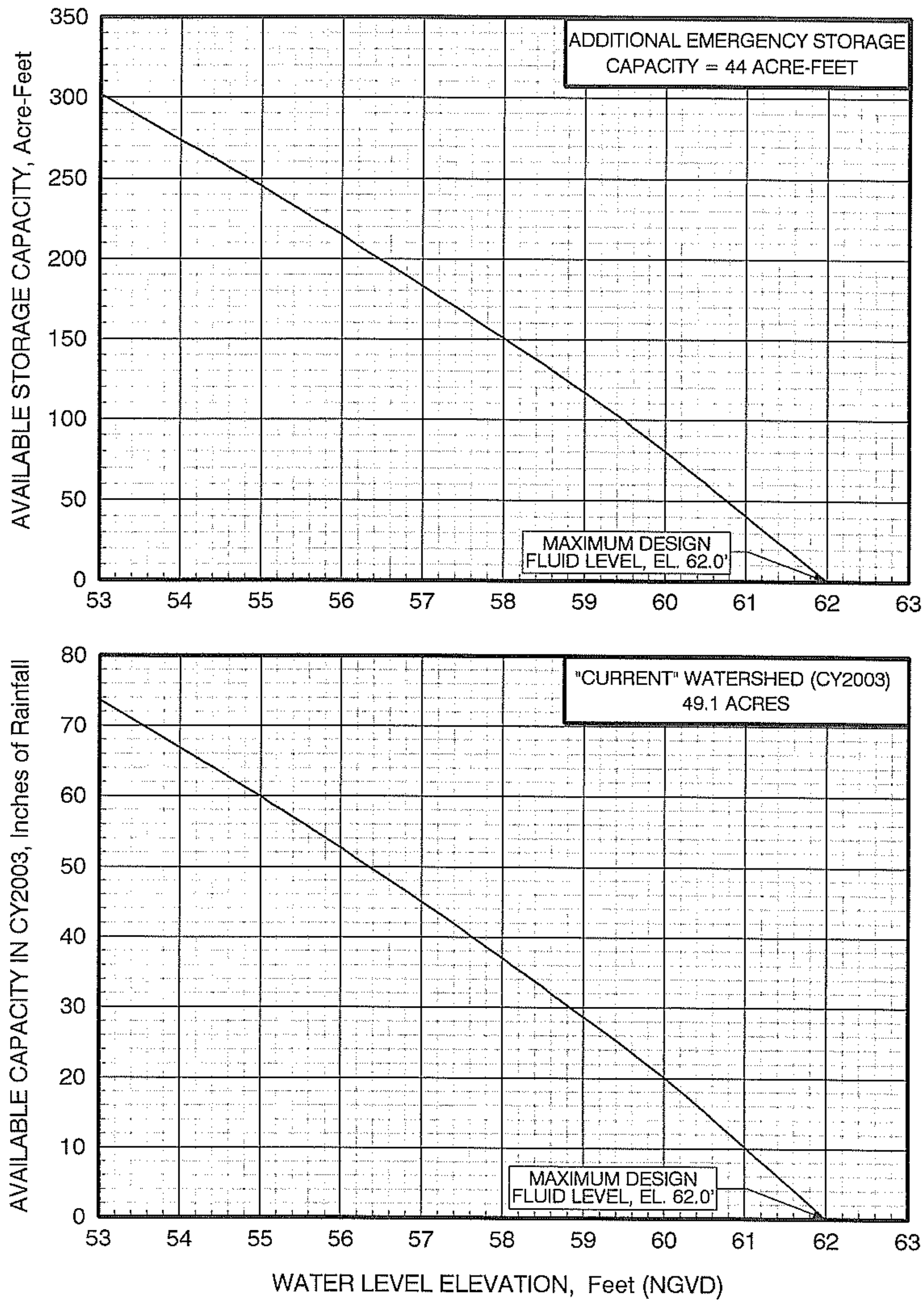


AVAILABLE STORAGE CAPACITY IN OLD GYPSUM STACK SOUTH COMPARTMENT (OGS-S) AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

FIGURE 12

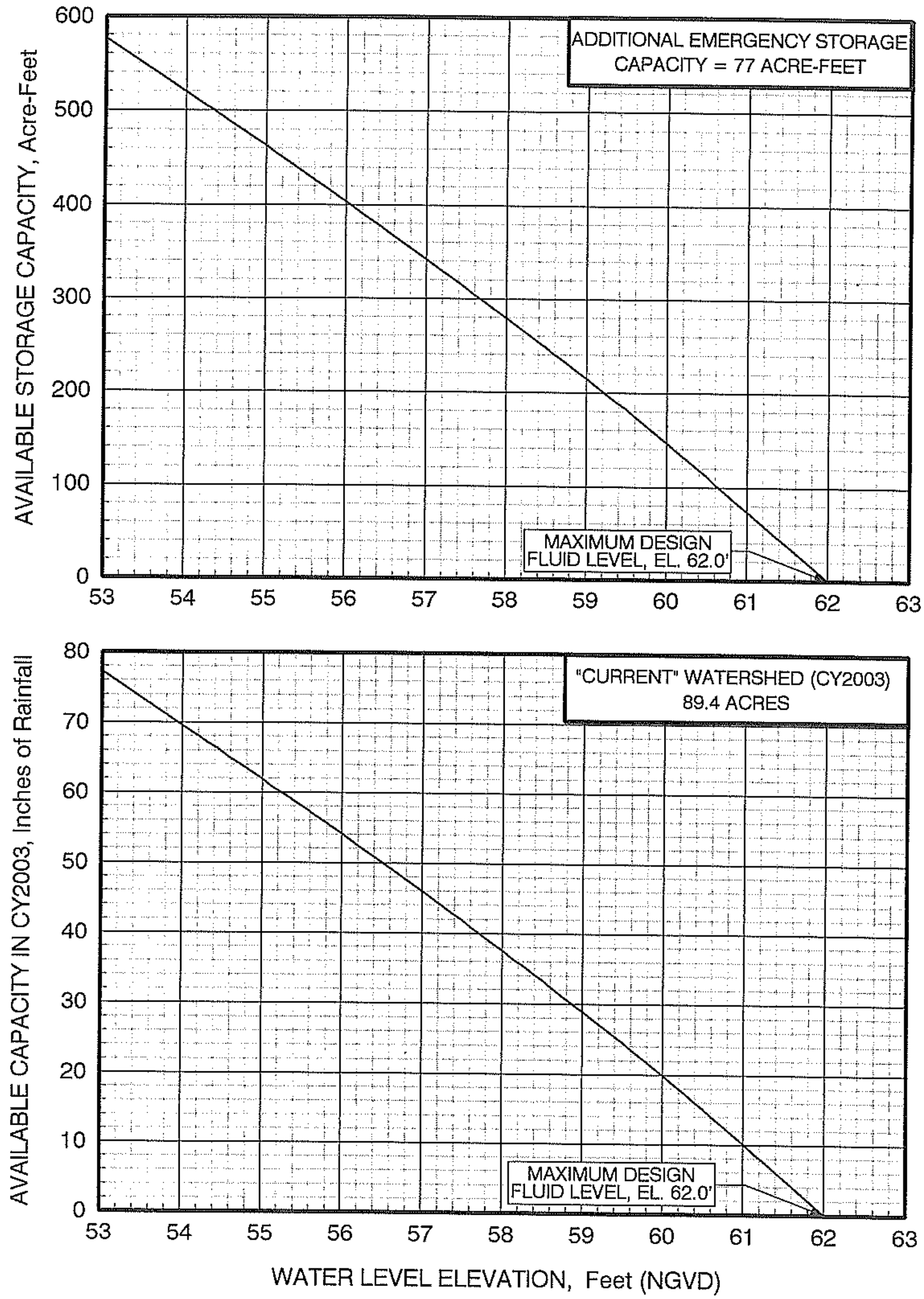
FILE: C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\OGS-S.DRW MH

FILE: C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\NGS-N.DRW MH



AVAILABLE STORAGE CAPACITY IN NEW GYPSUM STACK NORTH COMPARTMENT (NGS-N) AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

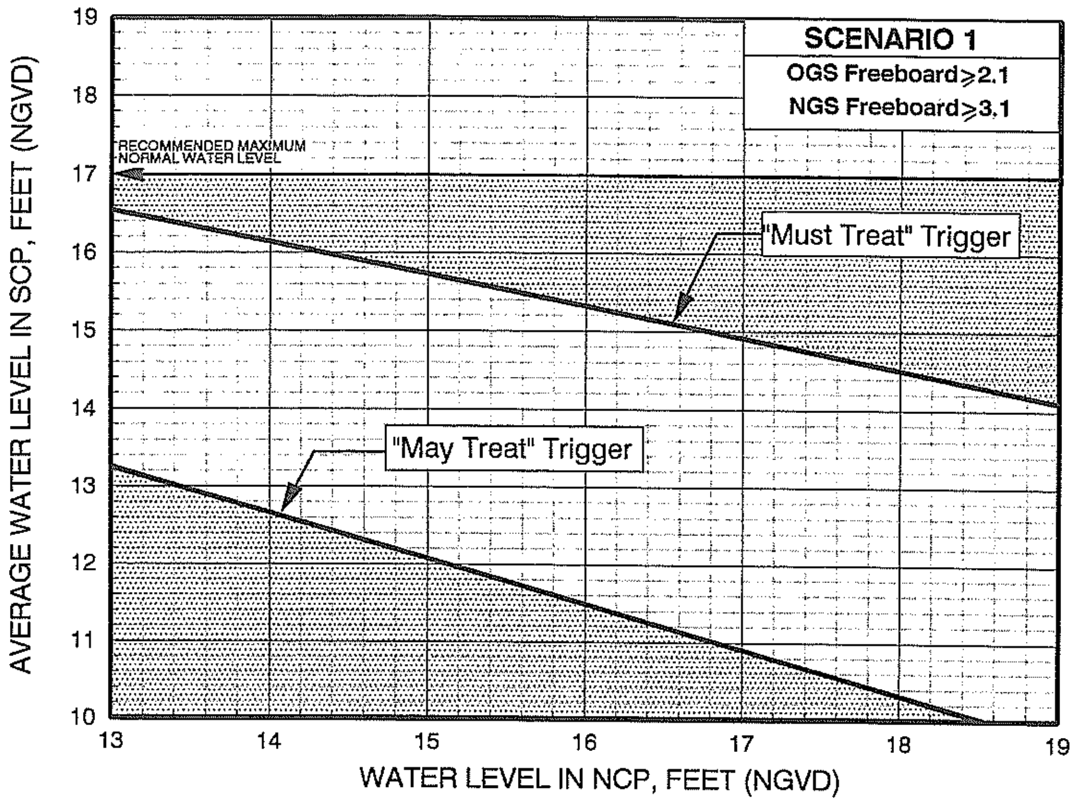
FIGURE 13

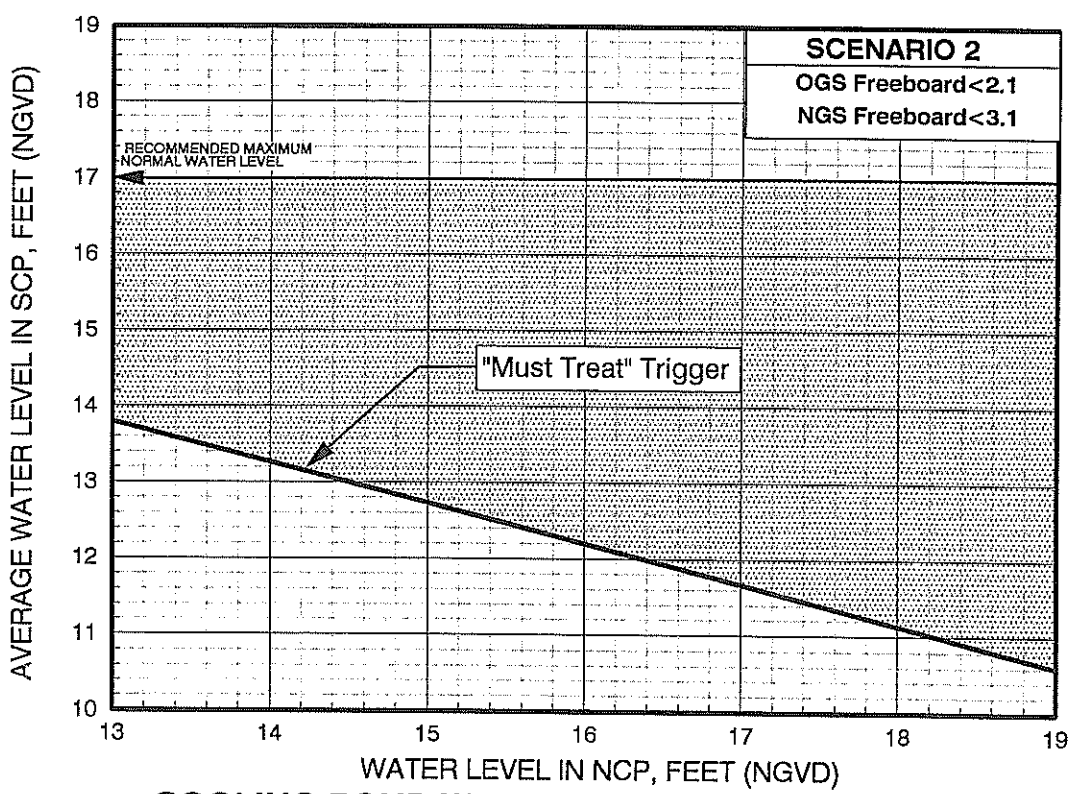


AVAILABLE STORAGE CAPACITY IN NEW GYPSUM STACK SOUTH COMPARTMENT (NGS-S) AS A FUNCTION OF OPERATING WATER LEVEL
Piney Point Phosphates, Inc.

FIGURE 14

FILE: C:\PROJECTS\02\02-099A-PPP\WATER MANAGEMENT-2003\FIGURES\NGS-S.DRW MH





COOLING POND WATER LEVEL COMBINATIONS CORRESPONDING TO REGULATORY TRIGGER LEVELS

(Applicable Prior to Converting the NCP to a Sludge Pond)

Piney Point Phosphates, Inc.

FIGURE 15

Attachment 1

Process Water Pump Inventory

Piney Point Phosphates, Inc.
Process Water Pump Inventory

Map Designation	Common Name	Number of Pumps	HP Rating (per pump)	Estimated Flow Rate (gpm per pump)	Primary Use	Transformer / Motor Control Center Locations
1	Pond Water Pumps	3	400	5000	Move pond water to the gyp ponds (#'s 11, 12, 13, 14). And/Or move water from the Return Canal to the North Cooling Pond (NCP).	None / Main Substation
2	DAP Pump	1	300	3500	Move water from NCP to #13 & #14 gyp ponds. Or move water from East Seep Ditch (ESD) to NCP.	None / Main Substation
3	Northeast Seep Ditch Pumps	2	75	1100	Raise water from NE Seep Ditch to #19 Pond	Double-Liming / Double Liming
4	East Seep Ditch Pumps	2	30	1100	Raise water from ESD to Return Canal .	Double Liming / At pumps
5	Lower Spray Pumps	1	100	1200	Supply lower evaporation sprays from ESD. May be used to raise water from ESD to the Return Canal or #11 Pond (via spray line).	Double Liming / Pole at the NE corner of #19 pond
6	Upper Spray Pumps	2.	75	1000	Supply lower evaporation sprays from Return Canal. May be used to move water from the ESD to the #11 Pond (via spray line).	Double Liming / Pole at the NE corner of #19 pond
7	East Ditch Pump	1	100	2000	Move water from east collection ditch to the gyp ponds (#'s 11, 12, 13, & 14).	Phos-acid plant / 3rd floor of phos-acid plant
8	DAP Sump Pump	1	250	4000	Move water from DAP Plant to DAP Pond.	None / 2nd floor of DAP Plant

Note: All pumps utilize the same meter located in the main substation.

A	Plant Site Runoff Diversion Pumps 1/2	1 1	– –	700 1500	Move clean runoff to Outfall 002
B	Plant Site Runoff Diversion Pumps 3/4	2	–	250	Move clean runoff to Plant Site Ditch 7

Attachment 2

"Executive Summary - Geotechnical Study - Piney Point Phosphates, Inc."
- Dated November 13, 2001

Geotechnical Study - Piney Point Phosphates, Inc.
EXECUTIVE SUMMARY

Ardaman & Associates, Inc. has completed a geotechnical study and evaluation of the above-grade process water impoundment earthen dikes, and the phosphogypsum (gypsum) stack perimeter dikes at the Piney Point Phosphates (PPP) Manatee County plant site. The purposes of the study included: (i) evaluating the current conditions and assessing the safety of the existing cooling pond and gypsum stack system dikes based on site subsurface investigations and engineering analyses; (ii) providing recommendations regarding the continued use of the stack and cooling pond system for storage and management of process water without compromising safety; (iii) establishing recommended maximum operational and emergency water levels within each of the impoundments; and (iv) providing recommendations for remedial measures that can be implemented to increase the surge storage capacity of certain impoundment cells.

Our findings are as follows:

1. As many as sixteen drilling fluid circulation loss zones were encountered in 10 out of 27 Standard Penetration Test (SPT) borings. The losses typically occurred within foundation sands, gypsum, and at the contact between gypsum and soil. Fluid losses are likely indicative of a network of vertical and horizontal open planes and fissures resulting from desiccation and differential settlement of gypsum, and historic piping of more erodible soils at the gypsum/soil interface.

2. Our evaluation of the potential mechanisms for piping or internal erosion of foundation soils beneath the stack and pond system based on historic performance, analytical methods, and a review of borehole and piezometric data, lead us to the opinion that the risk of piping failure resulting from concentrated seepage following fissures or cracks within the gypsum fill and along the gypsum fill/soil interface is high.

3. Three whirlpools observed during the third week of September, 2001 in the north compartment of the new gypsum stack are examples supporting the mechanism of a well-developed system of interconnected cracks leading to a concentrated flow into existing natural and man-made outlets in the foundation soil. The trigger for the increased discharge from the north compartment of the new gypsum stack resulted from a sudden rise in pond water level associated with tropical storm Gabrielle. The leakage from the compartment caused its water level to drop by as much as 0.9 feet in three days.

In order to reduce seepage gradients within the pond and stack foundations, we recommended on September 21, 2001 implementation of the following **immediate water management actions**:

1. Begin actively treating water for discharge.

2. Lower the south cooling pond water level by at least one foot to Elevation 18.2 feet, NGVD. Maintain the water level in the downstream seepage ditch at Elevation 6 to 7 feet, NGVD, until the pond water level is lowered to Elevation 17 feet, NGVD.

3. Lower the north cooling pond water level by 1.7 feet to the previously recommended maximum design elevation of 18.0 feet, NGVD, as soon as possible.

4. Maintain the water level in the new gypsum stack expansion area north compartment no higher than Elevation 60.0 feet, NGVD, until the vertical cracks in the gypsum are isolated or sealed. This restriction resulted in a temporary loss of about 103 acre-feet of storage relative to the maximum potential surge storage capacity. (Hence, as of September 17, 2001, the stack system was capable of containing only three inches of precipitation over its watershed.)

In order to potentially re-gain the 103 acre-feet design storage capacity of the system and improve safety, the following **short-term actions** were recommended and have been (or are currently being) implemented:

1. Seal the observed cracks within the new gypsum stack expansion area impoundment, near the inside slope of its north wall crest, and anywhere else internal cracks may exist. These cracks were to be filled with slurried or sluiced gypsum discharged into the cracks using a dredge or other approved method. The cracks in the new north gypsum stack walls were filled in and covered with sluiced gypsum during the latter part of September, 2001.

2. Install graded inverted filter drains at incipient pipe outlets, active boils, and concentrated seepage areas along the perimeter of the gypsum stack system. The recommended filter drain work was substantially completed as of October 26, 2001.

3. Proof-test performance of the New Gypsum Stack north compartment by slowly filling it to Elevation 63 feet (NGVD) and closely monitoring conditions in the ditches and water levels in piezometers. Immediately attend to any repair work that may become necessary at the higher water levels.

Because conditions at the site are highly conducive to having critical problems (e.g. active boils, springs, etc.) appear at any time in some system components, especially when the water levels are higher than experienced in the past, it would not be prudent nor safe to rely on use of the maximum potential available surge storage capacity because the risk of losing that surge capacity and experiencing safety problems at the higher water levels are too high. As a result, the following **revised water management recommendations** shall be implemented as part of the emergency water management plan:

1. The maximum normal water level in the South Cooling Pond shall be set at Elevation 17 feet (NGVD), except during emergencies when the water level may then be allowed to surge to Elevation 18.2 feet (NGVD). Hence, approximately 68 acre-feet of available storage capacity would have to be transferred from normal surge to emergency surge storage. When the water level exceeds Elevation 17 feet (NGVD), the toe ditch shall be inspected daily for potential maintenance items, and the existing piezometers shall be read weekly.

2. A minimum of 100 acre-feet in the north and south compartments of the New Gypsum Stack shall be considered as potential emergency surge only (i.e., not normal surge) even after repairing all cracks, active boils and springs (including the existing spring at the southeast corner of the south compartment). The facility's action plan should not rely on this emergency storage volume which shall only be considered "standby surge capacity" potentially available for use but only during an unplanned emergency and only when an intensive surveillance

program is implemented by the operator. Hence, at all times during normal operating conditions, the freeboard shall be maintained at no less than 2 feet in the New Gypsum Stack compartments (and at no less than 1 foot in the Old Gypsum Stack compartments).

3. On the other hand, the recently completed geotechnical evaluation has now confirmed that the design freeboard for the North Cooling Pond (DAP Pond) may be reduced from 5 feet to 4 feet, with a corresponding increase in the maximum design water level from Elevation 18 feet (NGVD) to 19 feet (NGVD). This recommendation is being made at this time based on the fact that the North Cooling Pond has recently performed satisfactorily at pond water levels on the order of 19 feet (NGVD), and because the pond has a relatively small fetch enabling it to accommodate the wind surge and wave runup caused by sustained wind speeds in excess of 100 mph within the reduced design freeboard distance of the perimeter earthen dike. As a result of this design revision, the surge storage capacity of the North Cooling Pond will increase by as much as 23 acre-feet.

Intermediate objectives for increasing safe storage capacity within the stack system impoundments that were considered as part of this evaluation include raising the gypsum dikes after implementing seepage control measures to reduce the risk of failure resulting from high concentrated seepage gradients. Such **remedial measures** could potentially include:

1. Development of gypsum beaches along the inside slope of the gypsum dikes atop the new north and south stack compartments, and implementation of a setback of the dike crest to occlude the existing crack systems from wetted or ponded areas. A setback on the order of 170 feet would allow for raising the perimeter gypsum dikes 5 feet without adversely affecting safety by constructing the relocated dikes on a newly formed gypsum beach. In conjunction with this measure, approximately 450,000 cubic yards of dredged and mechanically hauled gypsum would have to be placed and about 400 acre-feet of additional surge storage capacity would then be gained. This alternative was not deemed viable because it would be more cost effective to treat and permanently consume an equivalent quantity of water.

2. Implementation of a setback of the perimeter (outer) gypsum dikes atop the old gypsum stack south compartment and raising the dikes 5 feet. Approximately 100,000 cubic yards of dredged and mechanically hauled gypsum would have to be placed in order to gain about 120 acre-feet of additional surge storage capacity. The cost of this alternative is not significantly less than the cost of treating an equivalent quantity of water for discharge, and hence, this option will not be pursued further at this time.

3. Raising the perimeter dikes atop the old gypsum stack north compartment 5 feet. This measure would provide about 163 acre-feet of additional surge storage capacity and would require mechanical hauling of only 60,000 cubic yards of gypsum. This option ought to be considered and pursued as expeditiously as possible because the storage capacity can be created at about 50% of the cost of treating an equivalent quantity of water. This represents significant short-term savings in light of the budgetary constraints during the current fiscal year (even though treating an equivalent quantity of water would be more cost effective over the long term).

4. In conjunction with any and all of the above measures, construct downstream seepage control systems (such as gravel drains) within the perimeter ditches on as-needed basis, whenever new signs of concentrated seepage effects are detected.

Recommended **Intermediate measures** for decreasing the inventory of process water include:

1. Divert stormwater runoff from the plant site after cleaning up ground surface areas and contaminated ditch bottoms.

2. Increase evaporation of process water by slope wetting on the gypsum stacks.

3. Treat and discharge, or transfer process water.

Long-term objectives that could be considered for potential implementation in a long-term plan, if proven economically viable, could include:

1. Install soil/bentonite or soil/cement cut-off walls, or grout curtains, along the crest of the cooling Pond dikes, and raise the crest elevation of the cooling Pond dikes.

2. Design and construction of an above-grade earthen berm outside of the seepage ditch along the south, east, and north sides of the new gypsum stack, and along the north and west sides of the north cooling Pond, thus increasing the surge capacity of the ditch system. Widen and enlarge the seepage ditches along the north and east sides of the new gypsum stack, in conjunction with building the outer berm, thus increasing its surge capacity.

3. Re-route the northeast seepage ditch flow into the north cooling Pond, and improve the hydraulic capacity of the structures and ditches to increase the efficiency of the return channel system.

Attachment 3

"Rainfall, Water Levels and Water Balance Projections as of June 30, 2003, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida," - dated August 10, 2003.

"Rainfall, Water Levels and Water Balance Projections as of November 30, 2003," - dated December 3, 2003.

Rainfall, Water Levels and Water Balance
Projections as of June 30, 2003

Piney Point Phosphates, Inc.
Stack System
Manatee County, Florida

Ardaman & Associates, Inc.

OFFICES

Orlando, 8008 S. Orange Avenue, Orlando, Florida 32809, Phone (407) 855-3860
Bartow, 1525 Centennial Drive, Bartow, Florida 33830, Phone (863) 533-0858
Cocoa, 1300 N. Cocoa Blvd., Cocoa, Florida 32922, Phone (321) 632-2503
Fort Lauderdale, 3665 Park Central Boulevard North, Pompano Beach, Florida 33064, Phone (954) 969-8788
Fort Myers, 9970 Bavaria Road, Fort Myers, Florida 33913, Phone (239) 768-6600
Miami, 2608 W. 84th Street, Hialeah, Florida 33016, Phone (305) 825-2683
Port Charlotte, 740 Tamiami Trail, Unit 3, Port Charlotte, Florida 33954, Phone (941) 624-3393
Port St. Lucie, 460 Concourse Place NW, Unit 1, Port St. Lucie, Florida 34986, Phone (772) 878-0072
Sarasota, 2500 Bee Ridge Road, Sarasota, Florida 34239, Phone (941) 922-3526
Tallahassee, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (850) 576-6131
Tampa, 3925 Coconut Palm Drive, Suite 115, Tampa, Florida 33619, Phone (813) 620-3389
West Palm Beach, 2511 Westgate Avenue, Suite 10, West Palm Beach, Florida 33409, Phone (561) 687-8200

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

August 10, 2003
File Number 02-099A

Louis J. Timchak, Jr. - Receiver
18810 Place Antibes
Lutz, Florida 33549-5341

Subject: Rainfall, Water Levels and Water Balance Projections as of June 30, 2003, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida

Dear Mr. Timchak:

This report presents the process water status as of June 30, 2003 and the water balance projections through September 2004 for the Piney Point Phosphates, Inc. (PPP) Stack System. The report includes the following sections:

- Rainfall
- Water Levels and Freeboards
- Available Surge Storage Capacity
- Regulatory Trigger Levels
- Completed Action Items
- Surge Storage Capacity Projections Without Planned Actions
- Closure Construction Plan for FY2004
- Surge Storage Capacity Projections with Recommended Actions
- Conclusions and Recommendations

Rainfall

The Piney Point site received as much as 16.5 inches of rainfall attributed to El-Niño during the normally dry month of December 2002, an extreme rainfall event having a 500-year return period. As a result, there was a cumulative rainfall excess of 10.99 inches over normal precipitation during calendar year 2002.

As shown on Figures 1 and 2, the rainfall excess at the site for the month of June 2003 (relative to the historic average for the Bartow weather station) was 6.14 inches above normal. As a result, there is now a cumulative rainfall excess of 4.32 inches for the current calendar year through June 30, 2003.

Excess rainfall from January through June 2003 on the 457-acre watershed of the Piney Point Phosphates stack system contributed 165 acre-feet (54 million gallons) of additional water over and above what would have been collected under normal rainfall conditions.

Water Levels and Freeboards

During most part of calendar year 2003, both the south cooling pond (SCP) and the north cooling pond (NCP) water levels (see Figure 3) remained below the respective maximum design water level elevations of 17.0 feet (NGVD) and 19.0 feet (NGVD). Immediately after the heavy rainfall event of December 31, 2002, both the SCP and NCP water levels temporarily surged and exceeded the respective maximum design water level elevations. Also during the third week of June 2003, the SCP water level temporarily exceeded the maximum design water level elevation, but still remained below the maximum emergency water level elevation of 18.2 feet (NGVD).

8008 S. Orange Avenue (32809), Post Office Box 593003, Orlando, Florida 32859-3003 Phone (407) 855-3860 FAX (407) 859-8121
Offices in: Bartow, Cocoa, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

As shown on Figure 3, the water levels in the old gypsum stack (OGS) compartments during calendar year 2003 corresponded to a reported freeboard ranging from about 0.9 to 5.4 feet. The freeboard in the new gypsum stack (NGS) compartments ranged from a low of 1.2 feet in the south compartment to a high of over 12 feet in the north compartment. The freeboard levels were exhibiting a monotonic increasing trend during calendar year 2003 as the stack system was gradually recovering from the effects of the December 2002 rainfall, but the June 2003 rains caused a decrease of about 2 feet on average in freeboard levels in the various stack compartments. On June 30, 2003, the freeboard levels ranged from 3.1 feet to 10.1 feet in the four stack compartments. Note that the freeboard in the NGS and OGS compartments reflect topographic corrections and the effect of restorations and adjustments to the minimum dike crest elevations. (See Table 1 for the record of adjustments to the available surge storage capacity.)

Available Surge Storage Capacity

The total available surge storage capacity in the stack system (excluding any standby emergency surge storage capacity) was calculated to be 599 acre-feet on June 30, 2003, as determined based on water levels measured by the Shaw Group in the various ponded areas (see Figure 4). The remaining surge capacity is currently equivalent to about 15.8 inches of rainfall over the entire net watershed area of 457 acres. As shown, mainly as a result of the on-going treatment/transfer and treatment/discharge of process water, the available surge capacity is currently within a relatively "safe level," i.e., greater than the surge required to contain the 100-year/24-hour storm event (11.4 inches of rain). As of June 30, 2003, the stack system had recovered from the excess El-Niño rainfall experienced in December 2002, but despite all the consumption options implemented so far, storage levels are essentially similar to last year at the same time (i.e., June 30, 2002).

Approximately 74 acre-feet of emergency surge storage capacity is available in the SCP (above the recommended maximum normal water level elevation of 17 feet, NGVD) for use if the need arises, and a total of 121 acre-feet of emergency surge storage is available in the north and south compartments of the NGS. The maximum potential surge storage capacity that could be made available for use during unplanned emergencies, therefore, equalled 794 acre-feet on June 30, 2003. This emergency storage capacity is equivalent to about 20.8 inches of rainfall over the watershed.

Regulatory Trigger Levels

As a result of the rainfall excess during December 2002, the facility's surge storage capacity decreased from a "safe level" to a critical level below the "must treat" trigger level. With the on-going treatment/transfer and treatment/discharge of process water and based on the total storage currently available throughout the stack system, the available storage capacity has already transitioned from the "must treat" to the "may treat", then to the "action plan" level, and finally into a relatively "safe level" as of the end of March 2003 (see Figure 4). However, because Rule 62-672, F.A.C., requires that the trigger levels be based on the surge storage available in the cooling pond system (and not in the total stack system as depicted on Figure 4), the facility is still technically within the "must treat" trigger (see Figure 5).

Completed Action Items

The following construction projects were completed in CY2002, resulting in additional net gain in "storage":

	Gain in Storage acre-feet	Gain in Storage million gallons
Raise OGS North Compartment Dikes	183	60
Raise OGS South Compartment Dikes	86	28
Total	269	88

The process water consumption-related actions contributed to the transfer or discharge of a total of about 415 acre-feet (135 million gallons) in CY2002 and about 1,022 acre-feet (333 million gallons) so far in CY2003, with as much as 132 acre-feet (43 million gallons) well water input associated with these discharges/transfers†, as follows:

	CY2002 Consumption (MGal)**	CY2003 Consumption (MGal)**	Total Consumption (MGal)**
Transfer Untreated Process Water to CF's Plant City Facility	43.6*	0	43.6*
Transfer Single Stage Treated Water to Cargill's Riverview Plant	17.8	9.7	27.5
Transfer Double Stage Treated Aerated Water to Manatee County	13.5	1.2*	14.7*
Transfer Double Stage Treated Aerated Water to Florida Power & Light	0.9*	0	0.9*
Transfer Double Stage Treated Aerated Water to City of Tampa	-	9.7	9.7
Transfer Double Stage Treated Aerated Water to Hillsborough County	-	0.5	0.5
Treat by Reverse Osmosis (Phases I, II & III) and Discharge	56.6	52.8	109.4
Discharge Double Stage Treated Aerated Water to Bishop's Harbor Under Emergency Discharge Order	2.8	259.2	262.0
Total Discharged/Transferred	135.2	333.1	468.3
Net Well Water Input Associated with Discharges/Transfers†	12.7	30.3	43.0
Net Consumed	122.5	302.8	425.3

* These transfers remain suspended as of 6/30/03.
**MGal = million gallons

Surge Storage Capacity Projections Without Planned Actions

Figures 6 and 7 present surge storage projections for the next 12 months through June 2004 for normal and wet rainfalls (see Table 2), respectively, using the June 30, 2003 surge storage capacity as the starting condition. These surge storage projections account for the already completed construction projects (yielding 88 million gallons in additional storage capacity) and for net process water consumption quantities that have already been realized (425 million gallons), but they do not consider the effect of implementing any of the outstanding planned site-specific action items or planned closure activities.

The surge storage projections were made using the recently recalibrated water balance model† that takes into consideration factors that have recently come to light and operational changes that have recently occurred. In particular, the recalibrated water balance model incorporated the following refinements:

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† See Ardaman & Associates, Inc. reports dated July 18, 2003 titled "Water Balance Calibration, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida" and "Reconciliation of Consumption Quantities with EPA Ocean Dispersion Permit Conditions and with Consumption Needs, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida."

1. A higher rate of seepage inflow into the system than previously assumed based on results of a recently completed hydrogeologic study (up to about 5 million gallons more input when the Buckeye Road drainage ditch is flooded);
2. Reduced spray evaporation losses as a result of partial de-activation of the process water spray system when the additional ammonia aeration ponds were activated in February 2003 (about 13 million gallons reduction in losses);
3. Slightly smaller reduction in contaminated plant watershed area than previously planned (typically about 7 million gallons more rainfall input);
4. Greater measured stack settlement than previously estimated (about 8 million gallons additional "input" from pore water to free water);
5. Refinement in the model to account for reduced ponded area at decreasing water levels and correspondingly reduced rate of evaporation (about 14 million gallons reduction in losses when the inventory is reduced, and conversely, a gain of up to 7 million gallons with wet weather and no action); and
6. Reduced water inventory associated with the December 2002 closure construction activities in the north compartment of the new gypsum stack (about 13 million gallons reduction in storage capacity).

The cumulative effects of the above refinements contributed to a net reduction in water losses of about 19 to 23 million gallons per year for projections without any planned action, and up to 34 to 47 million gallons per year for projections with planned actions relative to the model that had been used previously.

With normal rainfall during the next 12 months, i.e., from July 1, 2003 through June 30, 2004 (see Figure 6), the facility is expected to gain approximately 462 acre-feet (151 million gallons) of water, and hence, in order to simply maintain the "status quo" that existed on June 30, 2003, one would have to consume approximately 462 acre-feet of water during the next 12 months. Consumption in this context includes not only treatment and discharge or transfer of process water but also any provision made to increase the surge storage capacity of the system or to divert runoff away from the system.

If wet rainfall conditions were to prevail, i.e., an annual rainfall quantity on the order of 65 inches during the next 12 months, the facility would be expected to gain about 860 acre-feet (281 million gallons) of water from July 2003 through June 2004 (see Figure 7), necessitating consumption of approximately 398 acre-feet (130 million gallons) more water than required for the normal rainfall scenario.

Closure Construction Plan for FY2004

Because the stack system will continue to have a positive water balance, most actions undertaken will continue to essentially represent recurring costs incurred year after year until such time as the contributing watershed is substantially reduced. In this regard, Ardaman & Associates, Inc. had previously recommended and, as directed by the Receiver, Shaw had initiated closure of the New Gypsum Stack north compartment (NGS-N) during the dry season of FY2003 (i.e., beginning in November 2002) to begin the process of reducing the watershed while also providing for additional emergency surge storage capacity for use if the need arises. The closure plan called for draining, dewatering, grading, and raising the perimeter gypsum dikes by about 18 feet, using gypsum borrowed from within the interior of the NGS-N compartment (to balance cut and fill quantities) so as to construct a 35-foot deep lined emergency surge pond (LESP) that may either be used to store freshwater or process water, depending on the needs of the facility. By raising the perimeter gypsum dikes 18 feet, the NGS-N compartment would be able to store as much as 833 acre-feet (271 million gallons) of water, compared to the prior storage capacity of 382 acre-feet (124 million gallons*). The compartment had been drained and dewatered during November and December 2002 in preparation for closure construction. However, construction work had to be suspended and the area re-flooded in order to contain the December 2002 excess El-Niño rainfall.

Closure construction is expected to resume in October/November 2003. The goal is to close at least one of the stack compartments (NGS-N) and hopefully three of the four gypsum stack compartments (NGS-N and both cells of the OGS) during the October 2003 - May 2004 dry season, depending on whether the site experiences extreme wet weather or normal rainfall. The October/November 2003 deadline for initiating closure is critical from the standpoint of having enough storage capacity available to transfer all water out of the compartments to be closed and into the active compartments or ponds, without compromising safety, during the period when the compartments are scheduled to be dewatered, graded, compacted, and lined, i.e., prior to the 2004 rainy season.

Table 3 summarizes the current storage capacity of the stack compartments and the increased capacities that may be realized by converting these compartments into lined reservoirs.

Surge Storage Capacity Projections with Recommended Actions

Consumption quantities are a function of rainfall and are thus dynamic values which are being periodically revised and updated.

Figure 8 presents previously projected surge storage capacities through September 2004, that were provided in support of the EPA ocean dispersion permit considering wet El-Niño rainfall in CY2003 (about 67 inches of rainfall), extrapolated using normal rainfall (about 53.7 inches) in CY2004 (see Table 2). A net consumption of 2.4 MGD had ultimately been recommended in support of the EPA permit during the months of April through November 2003 (with 2.0 MGD during February and March 2003) for a total net consumption of 700 million gallons from February through November 2003. Both Figure 8 and Table 4 compare and attempt to reconcile the measured available surge storage capacity to the previously projected surge storage capacity through June 2003. As shown, from February through May 2003, the agreement between measured and projected capacities was good primarily because the rainfall deficit (118 million gallons relative to the assumed wet El-Niño rainfall) essentially equaled the consumption deficit (46 million gallons) and the deficit associated with the recently refined water balance model which had not been available when the EPA application was prepared (53 million gallons)**. With the heavy June rainfall, there was no longer a rainfall deficit (6 million gallons only) and, hence, the measured available surge storage capacity became substantially smaller (i.e., about 113 million gallons less) than the previously projected surge storage capacity. As shown, it is not possible any longer to proceed with the planned closure construction unless the rate of consumption is increased significantly above previous recommendations.

As discussed in the July 18, 2003 Ardaman report titled "Water Balance Calibration, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida", there is a quantifiable and significant quantity of fresh well water inputted into the system in conjunction with the consumption of process

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* The current capacity is slightly smaller (on the order of 111 million gallons) as a result of closure construction activities performed in late 2002.

** See Ardaman & Associates, Inc. reports dated July 18, 2003 titled "Water Balance Calibration, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida" and "Reconciliation of Consumption Quantities with EPA Ocean Dispersion Permit Conditions and with Consumption Needs, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida."

water by lime treatment and reverse osmosis. Both the double liming and reverse osmosis treatment processes are currently contributing about 9 to 14% of well water input into the system for each gallon of permeate or double limed aerated water discharged or transferred off-site*. Much of this fresh water input is attributed to pump seal water, lime slurry water, and water used to flush and clean the reverse osmosis membranes. It is, therefore, important that consideration be given to the volume of fresh water that would be inputted into the system in conjunction with the planned discharges and transfers of treated water in order to determine net consumption quantities.

Updated surge storage projections through September 2004 using the recently recalibrated water balance model, various rainfall scenarios, and various target consumption rates are presented in Figures 9, 9A, 10, 10A, 10B and 10C, as summarized below:

Figure	July through Nov '03 Net Consumption Rate (MGD)	Assumed Rainfall Scenario July '03 through June '04	Feasibility of Closing NGS-N	Feasibility of Closing OGS
9	2.4	Wet (65 inches/year)	Yes	No
9A	2.0	Wet (65 inches/year)	Possible	No
10	2.4	Normal (54 inches/year)	Yes	No
10A	2.0	Normal (54 inches/year)	Yes	No
10B	3.0	Normal (54 inches/year)	Yes	Yes
10C	2.7	Normal (54 inches/year)	Yes	Possible

All water balance projections were made using the June 30, 2003 surge storage capacity as the starting condition and assuming: (i) normal rainfall beginning from July through September 2004; and (ii) a net consumption rate of 1.0 MGD from December 2003 through September 2004. Also shown on the figures, for reference purposes, are the "must treat", "may treat" and "action plan" trigger levels as well as Ardaman's recommended "updated trigger levels and early trigger levels for the discharge of treated process water" to Bishop's Harbor in the event of an unforeseen emergency, taking into consideration the fact that such discharges would have to be initiated in time, if and as needed, to prevent a catastrophic failure of the stack system impoundments (see report titled, "Updated Recommended Trigger Levels for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System During an El-Niño Rainfall Year, Manatee County, Florida," dated January 7, 2003).

Figures 11 and 12 present relationships that may be used to determine the required consumption rates for various rainfall scenarios and closure alternatives needed to maintain the minimum surge storage capacity above the trigger level and the early trigger level for discharges to Bishop's Harbor, respectively.

If off-site transfers and discharges of treated water are limited to the previously set target of 2.6 MGD (equivalent to a net consumption of 2.4 MGD) between July 1 and November 30, 2003, then it may be possible to close the NGS-N compartment provided the site does not experience more than 6 to 11 inches of precipitation above normal rainfall between July and November. For this consumption scenario, it will not be possible to close the OGS prior to the 2004 rainy season.

If off-site transfers and discharges of treated water can be sustained at a rate of 3.0 MGD (equivalent to a net consumption of about 2.7 MGD) between July 1 and November 30, 2003, then

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* In addition, the double liming process produces treatment sludges with corresponding solids that are stored in the gypsum stack system and that occupy a volume (previously reserved for process water surge storage) equivalent to approximately 0.7% of the volume of treated water discharged.

closure of the NGS-N, OGS-S and OGS-N compartments might be possible if the site experiences a 4-inch rainfall deficit (Figure 12) or normal rainfall (Figure 11) from July through November 2003. For this consumption scenario, the NGS-N compartment can be closed even if the site experiences 9 to 14 inches of additional precipitation above normal rainfall. The current need for increased consumption is principally attributed to the six-plus inches of above average rainfall received in June, consumption rate deficiencies in April, May and June because of delays in initiating dispersion of treated water in the Gulf of Mexico, as well as additional refinement of the calibrated water balance model used in making projections.

Conclusion and Recommendations

In conclusion, based on conditions that existed as of June 30, 2003, the cumulative off-site treated water transfer rate needs to be increased to a minimum of 3.0 MGD beginning on July 1, 2003 and continuing through November 30. This would allow for closure of three of the four gypsum stack compartments if the site experiences normal rainfall conditions, with provisions to close at least one compartment if the site is subjected to normal rainfall plus 9 to 14 inches of additional precipitation. Unfortunately, during the first two weeks of July (through the 14th), rainfall at the site was approximately 2.1 inches above the normal for that period, and off-site transfers averaged 1.75 MGD only (with a corresponding 1.6 MGD net consumption, after accounting for well water input into the system). The combined effect of these two factors currently requires that at least 3.3 MGD of treated water be removed from the site from mid-July through November (instead of 3.0 MGD). Consumption outlets in addition to the action items currently underway and optimization of the Gulf Dispersion need to be actively pursued. In other words, water needs to be removed from the site **at a minimum rate of 3.3 MGD or better in order not to miss another closure opportunity** during the "dry season".

If you have any questions or need additional clarifications, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Rajendra K. Shrestha, P.E.
Senior Project Manager

8/10/03

Nadim F. Fuleihan, ScD., P.E.
Principal
Florida Registration No. 31953

RKS/NFF/ed

cc: Joseph Bakker, FDEP Bureau of Mines (1)
Phil Coram, FDEP Bureau of Mines (2)
Sam Zamani, FDEP Phosphate Management (1)
Sid Van Landingham, Shaw Environmental, Inc. (2)
Gary Uebelhoer, ECT (1)
Tom Leto, Ardaman & Associates, Inc. (1)

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Table 1

RECORD OF ADJUSTMENTS TO AVAILABLE SURGE STORAGE CAPACITY PINEY POINT PHOSPHATES STACK SYSTEM

Maintain Nominal Freeboard of 1 Foot
Atop Stacks or 5-foot Dike Design Freeboard

April 26, 2001	<268 acre-ft>	Relative to "Methodology" Used by the Piney Point Phosphate Folks

Survey Discrepancies

April 26, 2001	<100 acre-ft>	Guesstimated adjustment from 1993 Topo
June 20, 2001	< 70 acre-ft>	Clemments Spot Elevation Survey (Additional Adjustment)
July 16, 2001	< 74 acre-ft>	Rooks June 5, 2001 Topo Survey (Additional Adjustment)
	<244 acre-ft>	
Nov. 9, 2001	+ 40 acre-ft	Staff Gauge Error
Net	<204 acre-ft>	

Increased Capacity by
Reinforcing Dikes / Adjusting Crest El.

Sept. 3, 2001	+140 acre-ft	Raise / Adjust Gypsum Stack Crest Elevation
Nov. 13, 2001	+ 23 acre-ft	Raise NCP Design Level 1 foot
Apr. 30, 2002	+183 acre-ft	Raise OGS North Compartment Crest to El. 85 feet (NGVD)
Jun. 11, 2002	+ 86 acre-ft	Raise OGS South Compartment Crest to El. 85 feet (NGVD)
	+432 acre-ft	

Loss of "Normal Surge" Because
of Observed Critical Conditions

Sept. 24, 2001	<103> acre-ft	Whirlpools in NGS North Compartment
Oct. 26, 2001	+103 acre-ft	NGS North Compartment Cracks Sealed and Boils Fixed w/Filter Drains
Oct. 26, 2001	<121> acre-ft	For Safety, Move NGS "Normal Surge" to "Emergency Surge"
	<121> acre-ft	Net for NGS
Oct. 26, 2001	< 74> acre-ft	Lower Maximum Normal Level in SCP and Move from Normal Surge to Emergency Surge
	<195> acre-ft	

Table 2

RAINFALL SCENARIOS

Month	Normal Rainfall (inches)	Wet Rainfall Year (inches)	Normal Rainfall with Jan-Mar El-Niño Rainfall (inches)	Wet El-Niño Rainfall Year (inches)
January	2.43	2.93	4.05	4.59
February	2.85	3.43	4.47	5.06
March	3.14	3.78	5.16	5.84
April	2.64	3.18	2.89	3.27
May	4.42	5.32	4.42	5.00
June	7.84	9.44	7.84	8.88
July	8.33	10.03	8.33	9.43
August	7.47	8.99	7.47	8.46
September	7.36	8.86	7.36	8.33
October	3.14	3.78	3.14	3.56
November	1.88	2.26	1.88	2.13
December	2.16	2.60	2.16	2.45
Total	**53.66**	**64.60**	**59.17**	**67.00**

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Table 3
STORAGE CAPACITY IN STACK COMPARTMENTS

Compartment	Current Capacity, MGal	Lined Reservoir Capacity, MGal	Gained Storage, MGal
NGS-N	124	271	+ 147
OGS	287	535	+ 248
SUBTOTAL	411	806	+ 395
NGS-S (OPTIONAL)	298	668	+ 370
TOTAL	709	1474	+ 765

TABLE 4

RECONCILIATION OF MEASURED AND PREVIOUSLY PROJECTED SURGE STORAGE CAPACITIES

RAINFALL, inches

	Jan	Feb-May	Feb-Jun	Jul-Dec
Normal	2.43	13.05	20.89	30.34
Wet	2.93	15.71	25.15	36.52
Wet El-Nino	4.59	23.05	28.05	34.36
Actual	0.11	13.55	27.53	
Rainfall Deficit, Mgal (Actual Vs. Wet El-Nino Over 457 acres)	56	**118**	**6**	

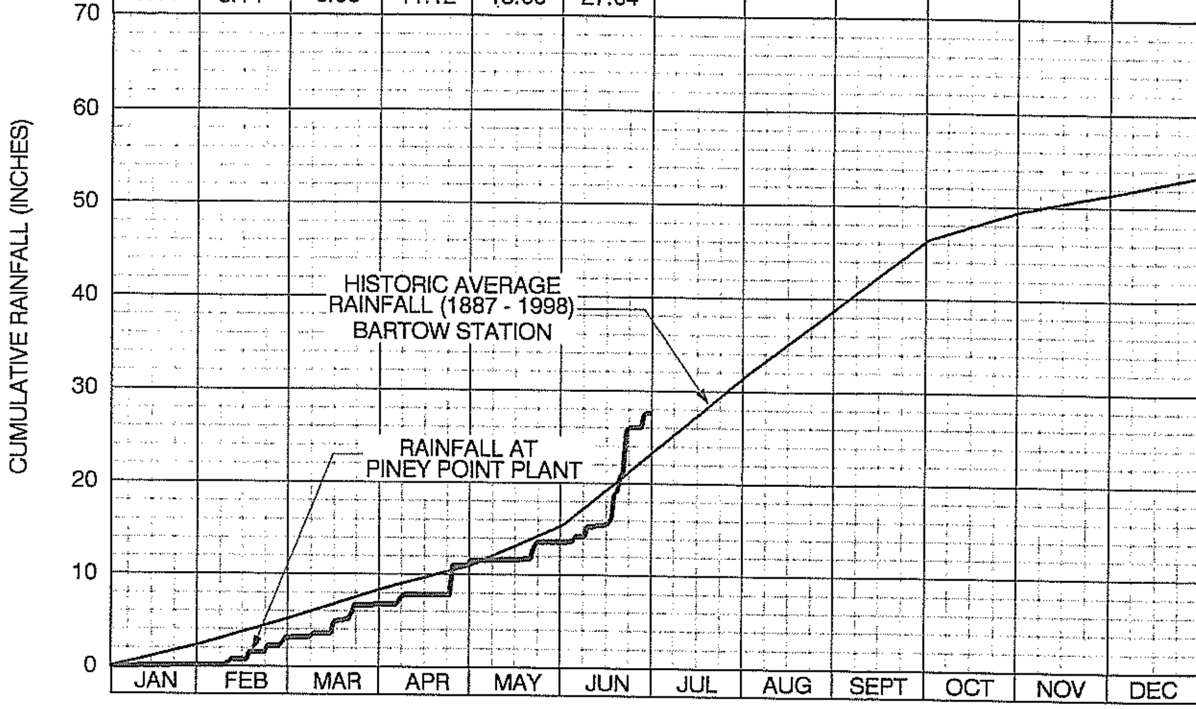
CONSUMPTION, Mgal

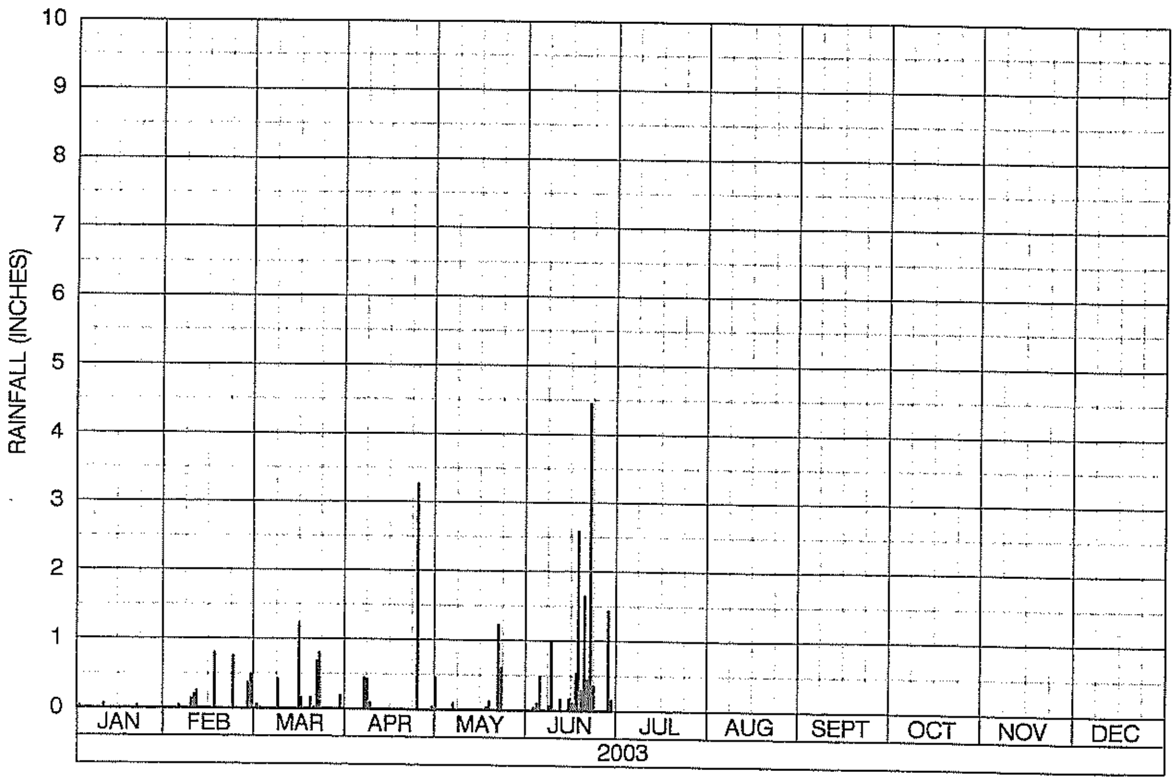
	Feb-May	Feb-Jun
Discharges /Transfers	238.5	296.4
Fresh Water Input	(20.0)	(25.7)
Net Consumption	218.5	270.7
Recommended Consumption (700 Mgal Feb-Nov)	264	336
Consumption Deficit	**46**	**66**

RECONCILIATION, Mgal

	Feb-May	Feb-Jun
Rainfall Deficit, Mgal	118	6
Consumption Deficit, Mgal	(46)	(66)
Model Recalibration (@ 50% of 47Mgal over 4-5 mos)	(23)	(23)
Discrepancy (Measured Vs. Predicted)	(30)	(30)
Actual Vs. EPA Projected Storage	**19**	**(113)**

CUMULATIVE RAINFALL (Inches)												
2.43	5.28	8.42	11.06	15.48	23.32	31.65	39.12	46.48	49.62	51.50	53.66	NORMAL
0.11	3.14	6.86	11.12	13.66	27.64							ACTUAL





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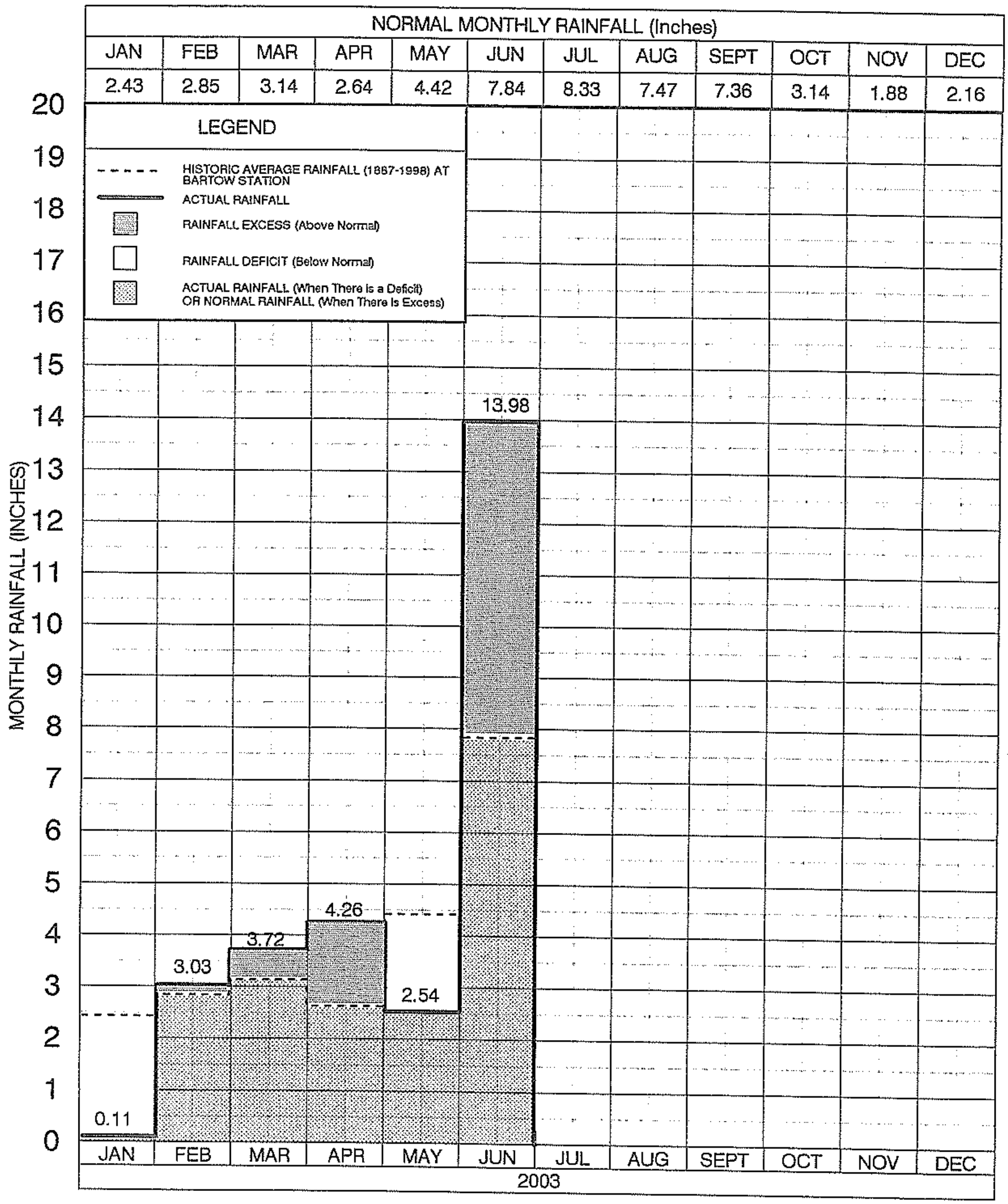
CALENDAR YEAR 2003 RAINFALL
Piney Point Phosphates, Inc.

FIGURE 1



CALENDAR YEAR 2003 MONTHLY RAINFALL HISTOGRAM
Piney Point Phosphates, Inc.

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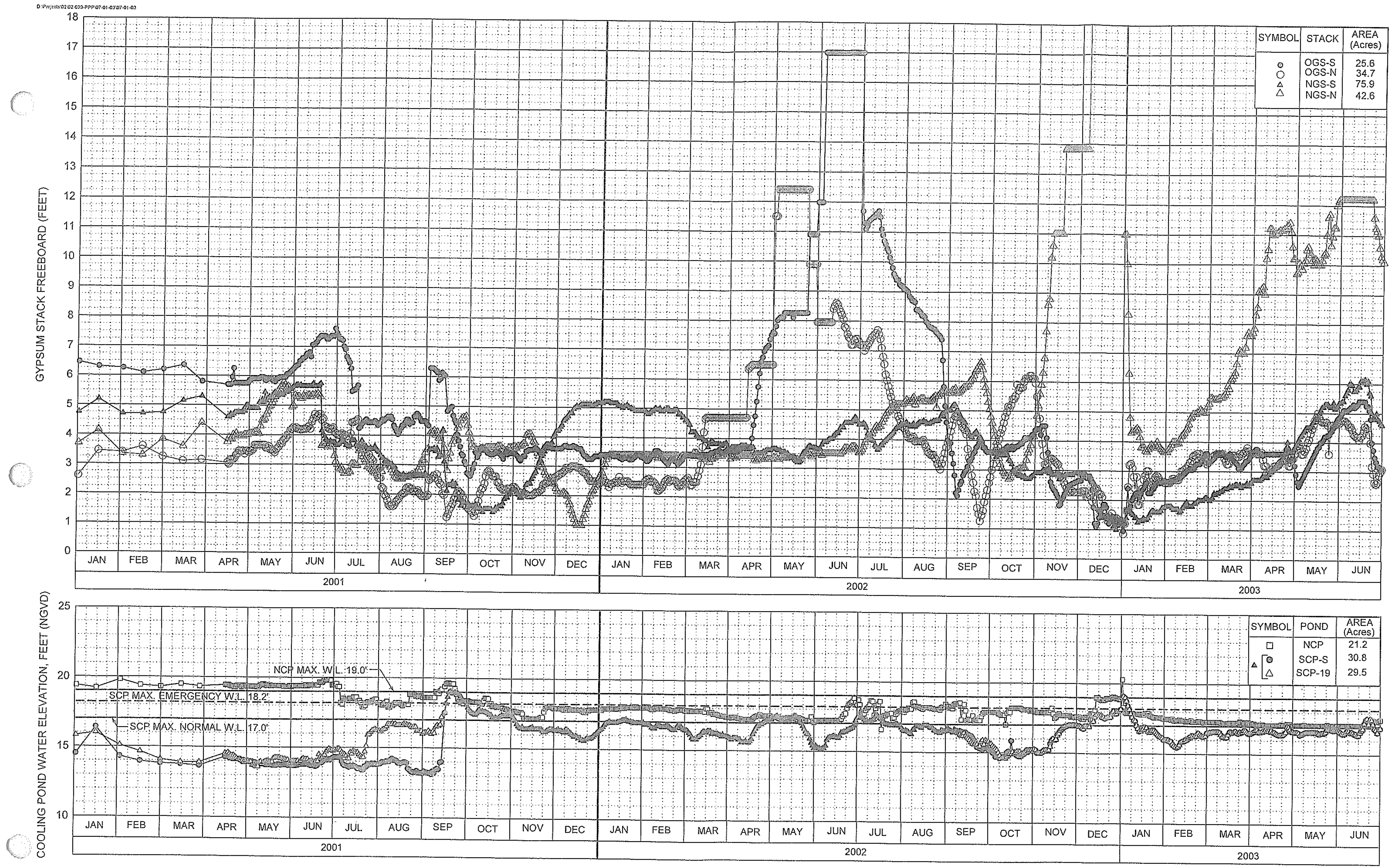
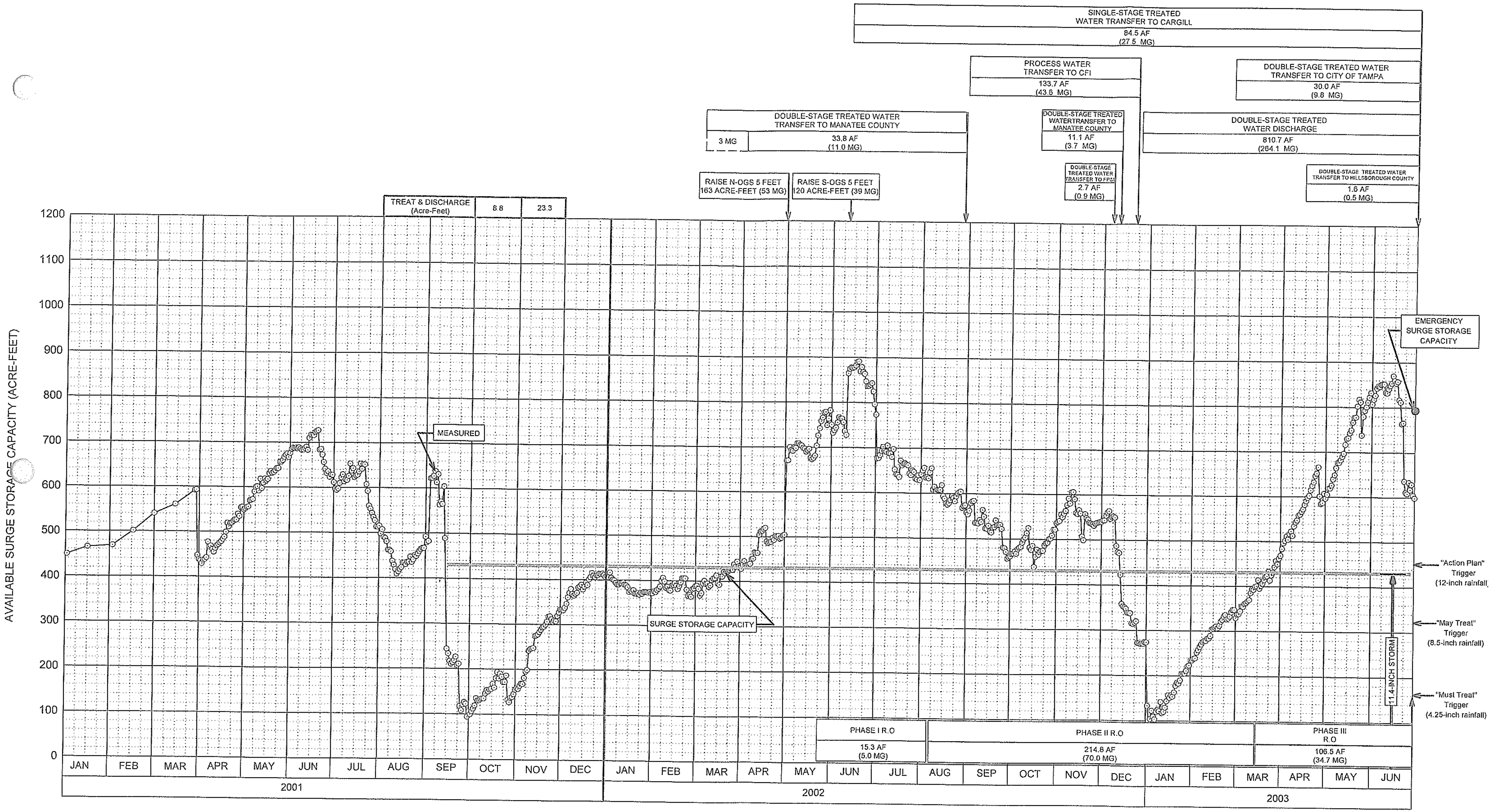
FIGURE 2



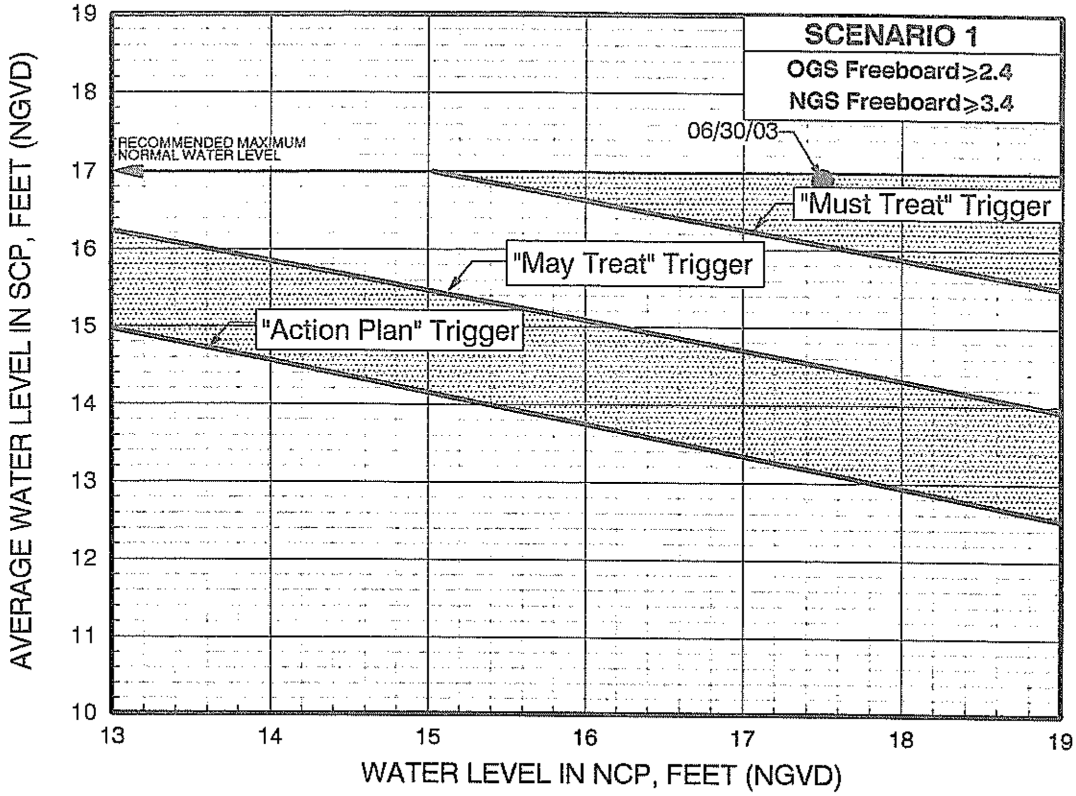
COOLING POND WATER LEVEL AND GYPSUM STACK FREEBOARD
Piney Point Phosphates, Inc.

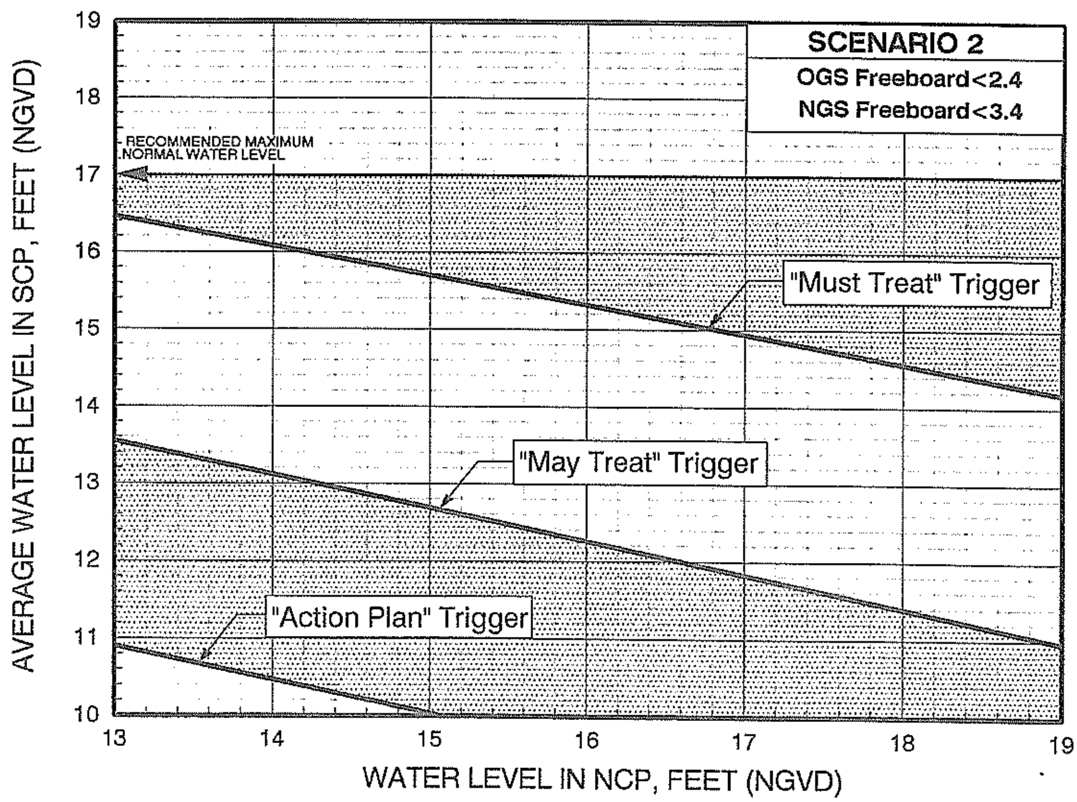
FIGURE 3



AVAILABLE SURGE STORAGE CAPACITY
Piney Point Phosphates, Inc.

FIGURE 4





COOLING POND WATER LEVEL COMBINATIONS CORRESPONDING TO REGULATORY TRIGGER LEVELS

Piney Point Phosphates, Inc.

FIGURE 5

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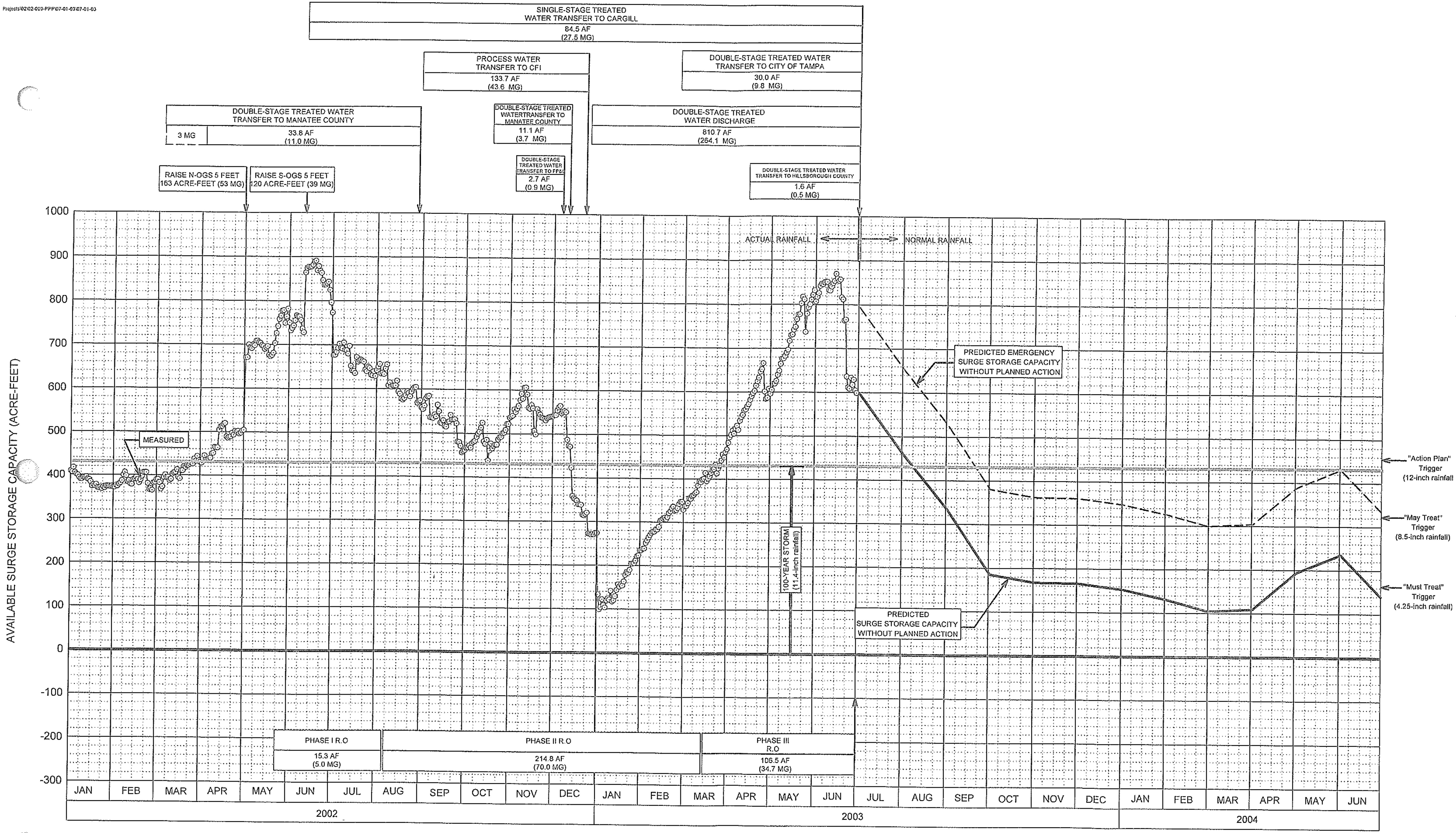
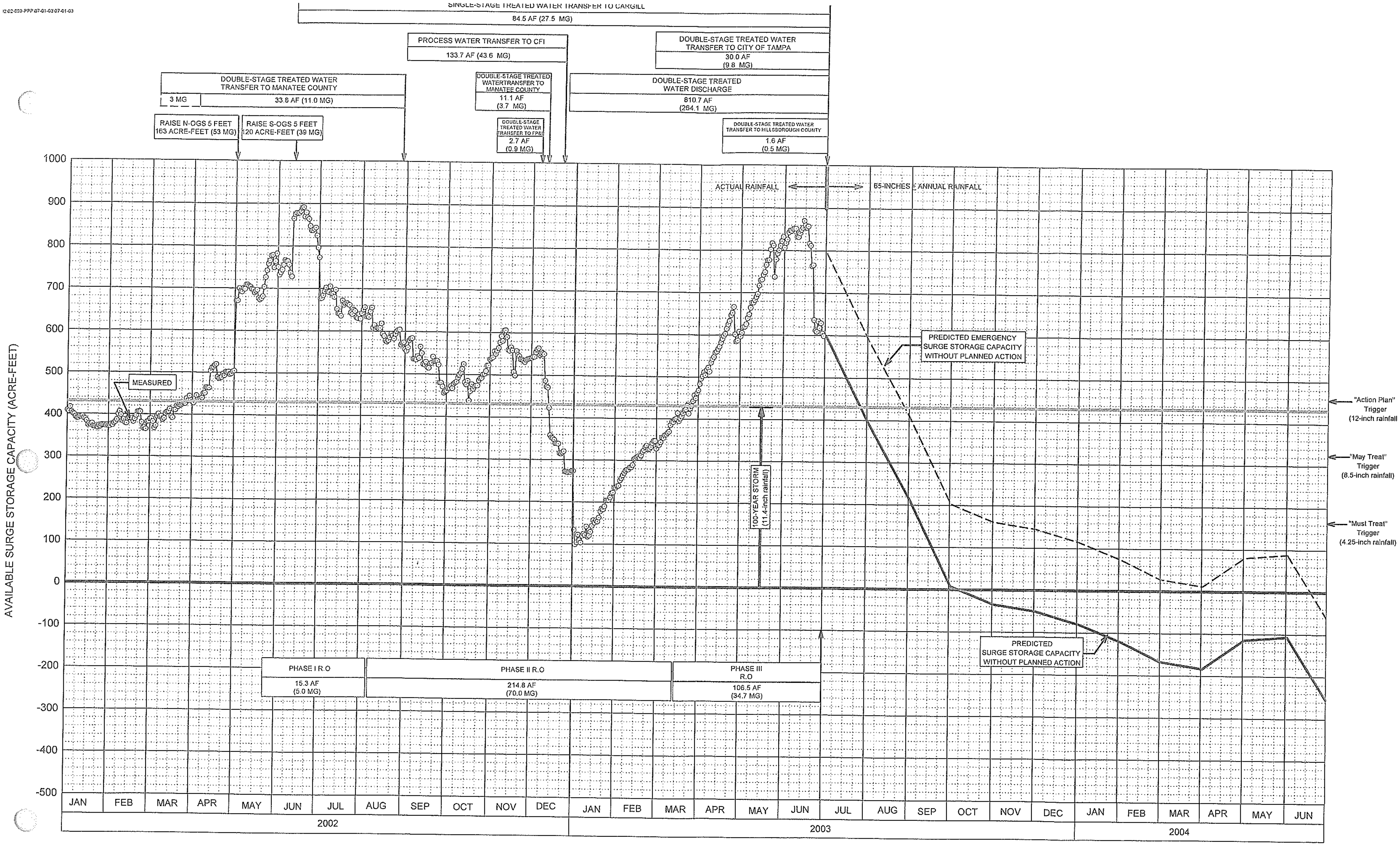


PROJECTED SURGE STORAGE CAPACITY THROUGH JUNE 2004 USING NORMAL RAINFALL WITHOUT PLANNED ACTION

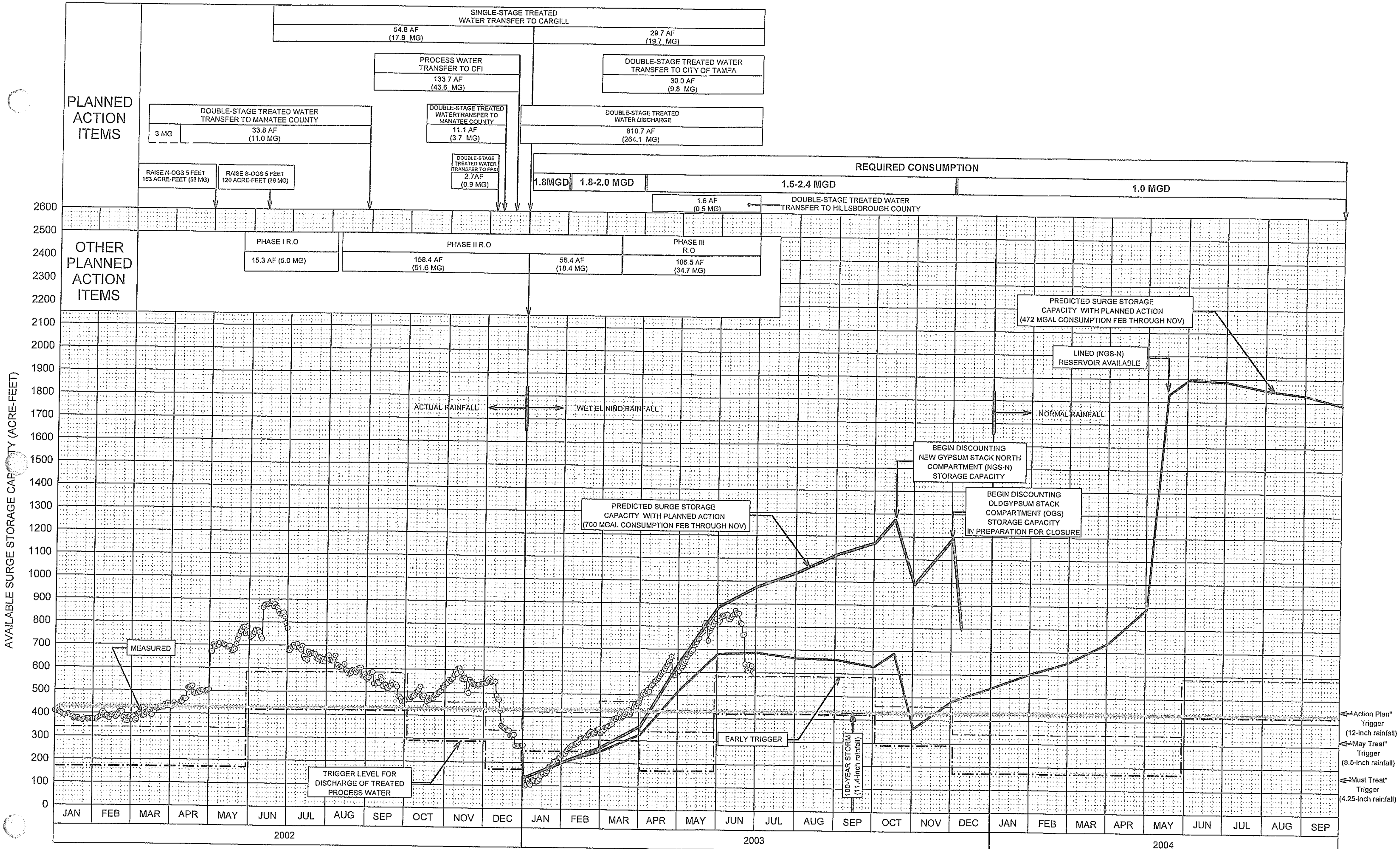
Piney Point Phosphates, Inc.

FIGURE 6



PROJECTED SURGE STORAGE CAPACITY THROUGH JUNE 2004 USING WET RAINFALL YEAR WITHOUT PLANNED ACTION
Piney Point Phosphates, Inc.

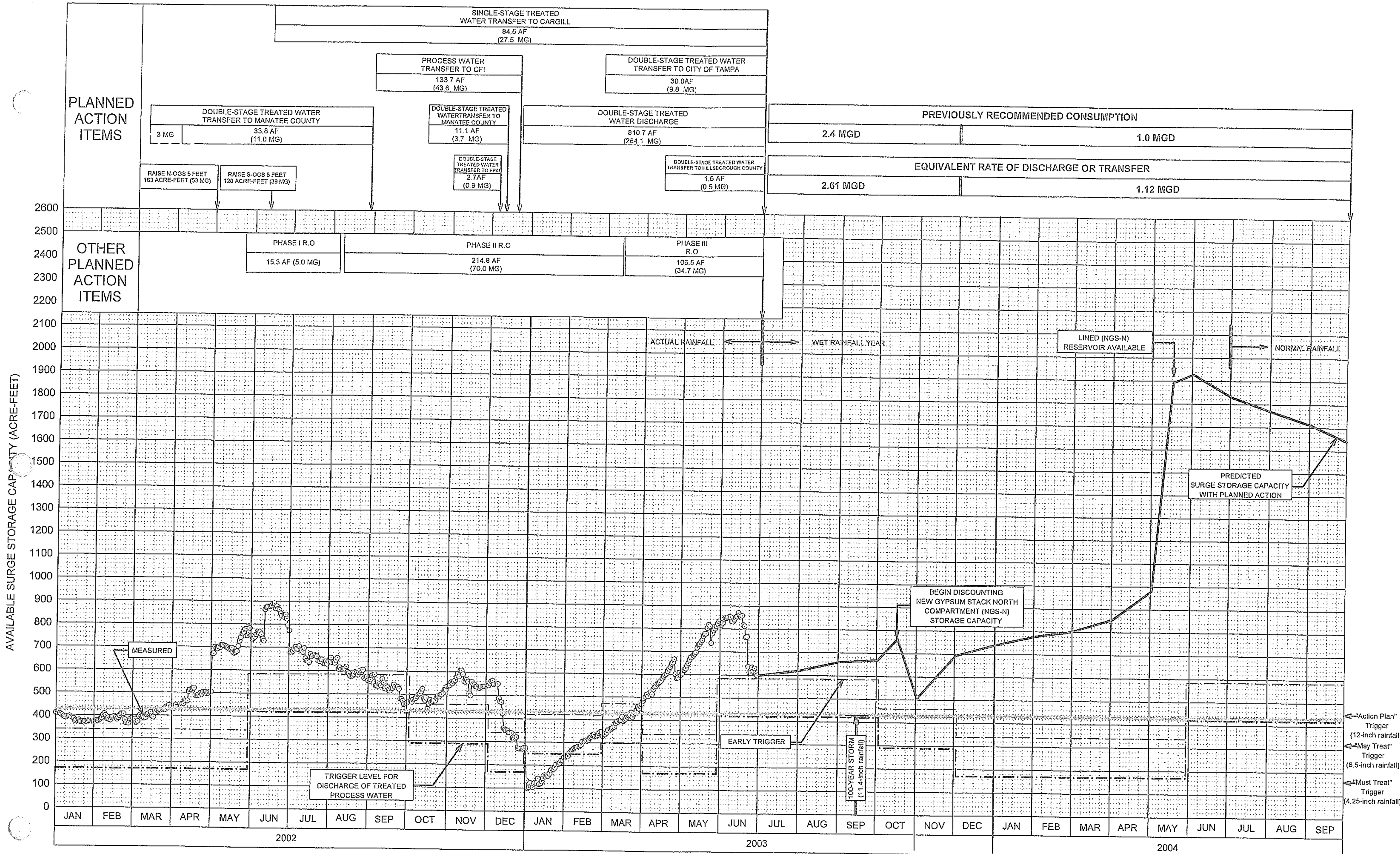
FIGURE 7



PREVIOUSLY PROJECTED SURGE STORAGE CAPACITY CONSISTENT WITH SUBMITTAL TO EPA USING WET EL NIÑO RAINFALL YEAR BEGINNING IN JANUARY 2003 AND NORMAL RAINFALL IN 2004

Piney Point Phosphates, Inc.

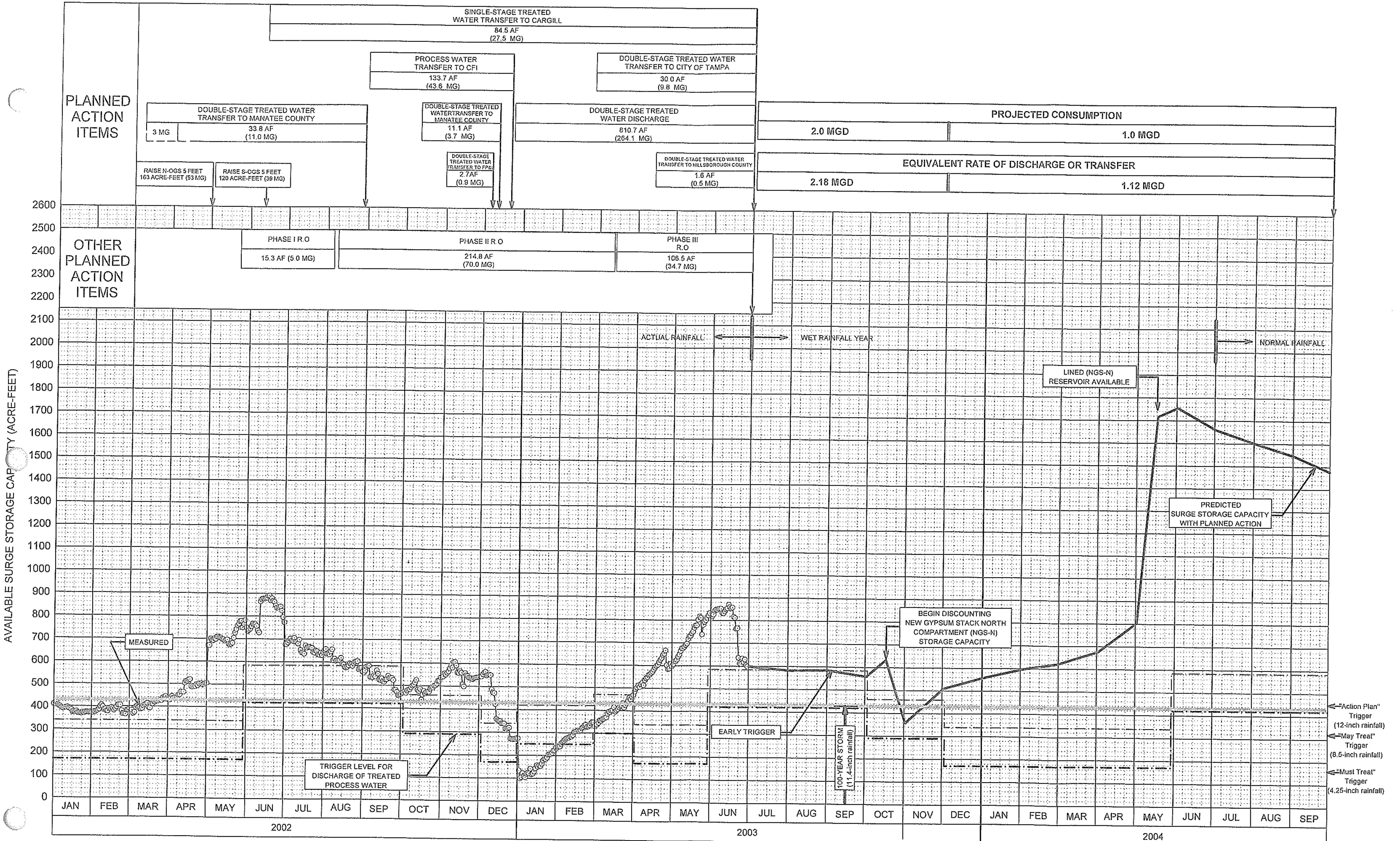
FIGURE 8



PROJECTED SURGE STORAGE CAPACITY WITH 2.4 MGD CONSUMPTION USING WET RAINFALL YEAR BEGINNING IN JULY 2003 AND NORMAL RAINFALL AS OF JULY 2004

Piney Point Phosphates, Inc.

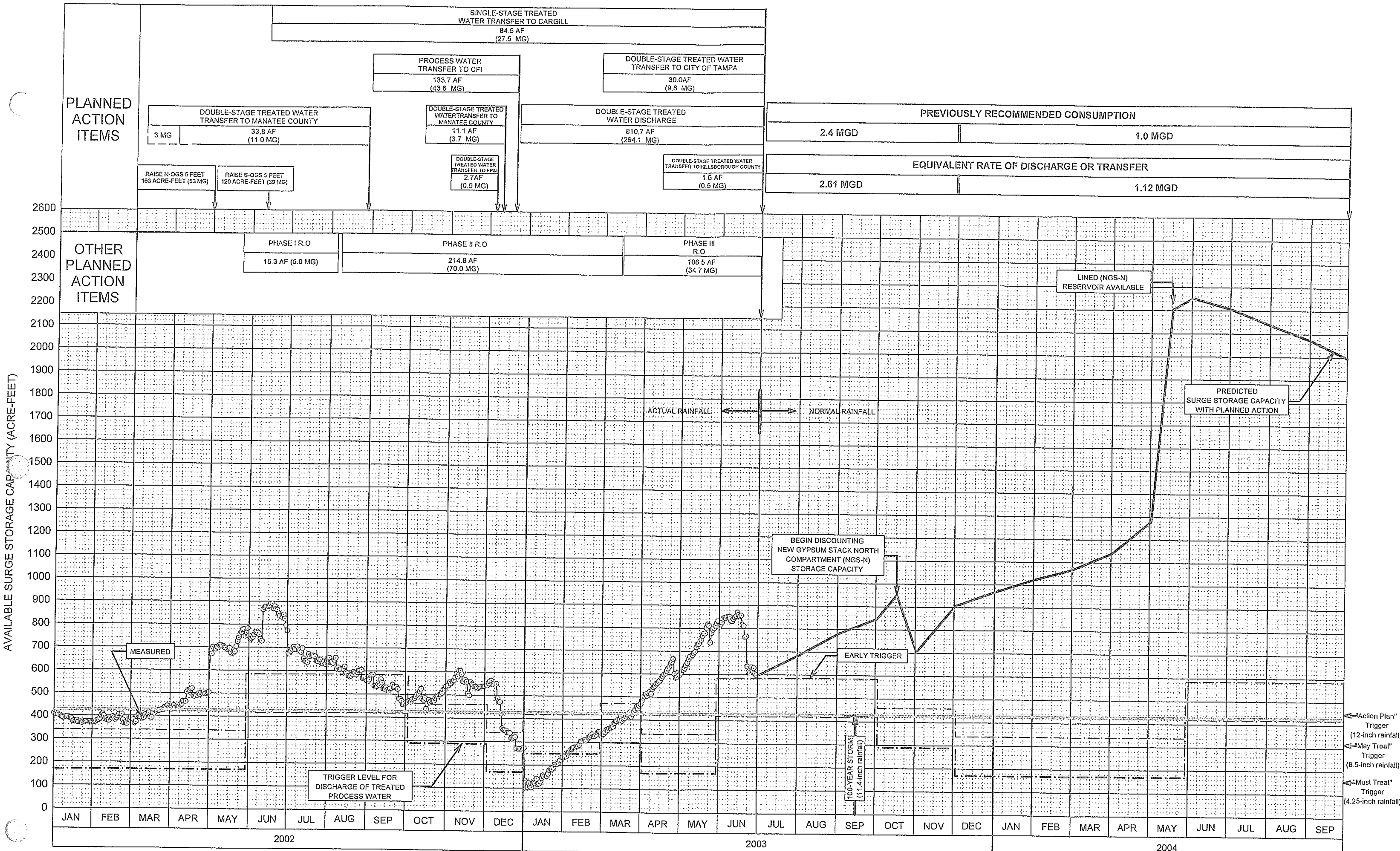
FIGURE 9



PROJECTED SURGE STORAGE CAPACITY WITH 2.0 MGD CONSUMPTION USING WET RAINFALL YEAR BEGINNING IN JULY 2003 AND NORMAL RAINFALL AS OF JULY 2004

Piney Point Phosphates, Inc.

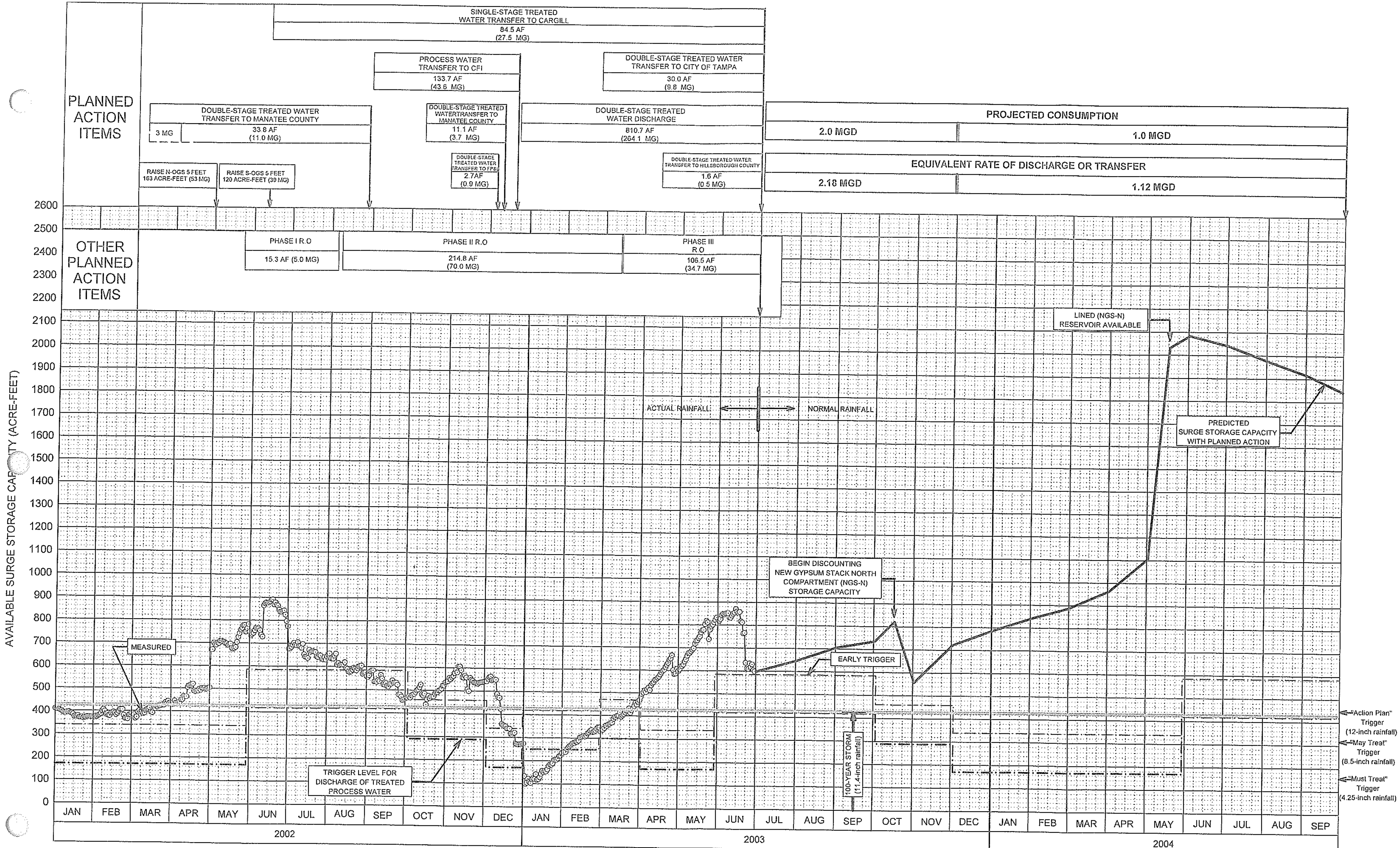
FIGURE 9A



PROJECTED SURGE STORAGE CAPACITY WITH 2.4 MGD CONSUMPTION USING NORMAL RAINFALL

Piney Point Phosphates, Inc.

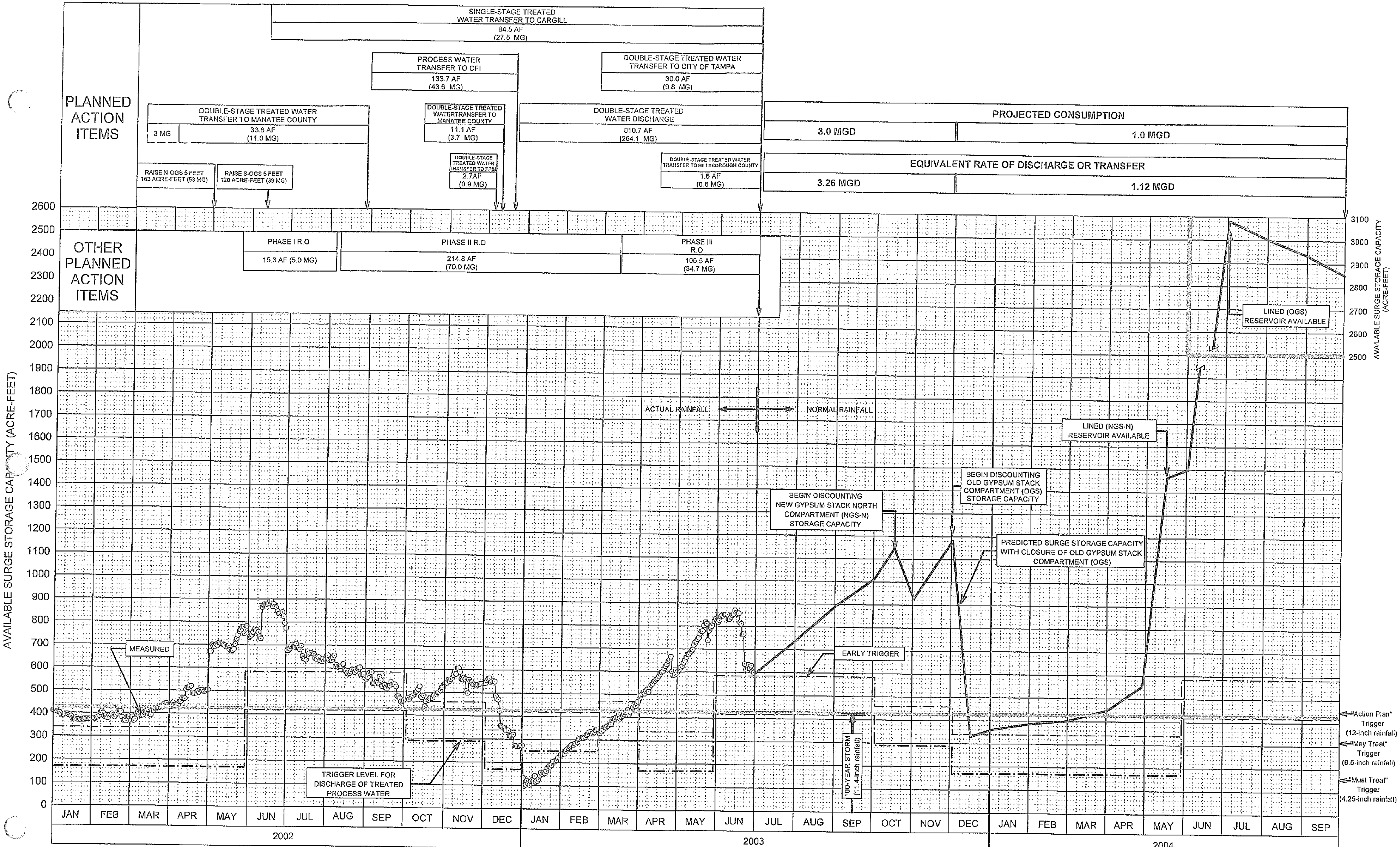
FIGURE 10



PROJECTED SURGE STORAGE CAPACITY WITH 2.0 MGD CONSUMPTION USING NORMAL RAINFALL

Piney Point Phosphates, Inc.

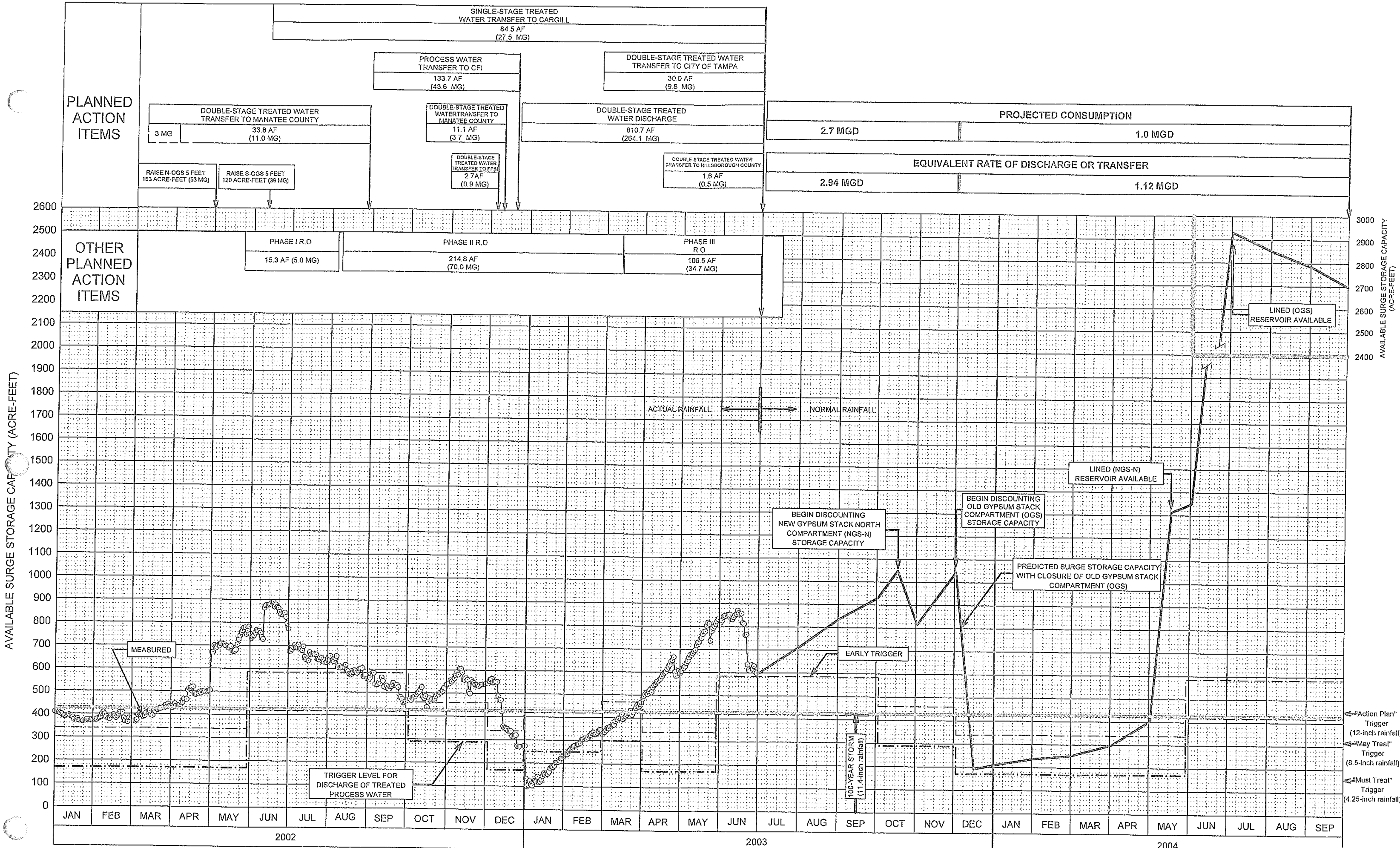
FIGURE 10A



PROJECTED SURGE STORAGE CAPACITY WITH 3.0 MGD CONSUMPTION USING NORMAL RAINFALL

Piney Point Phosphates, Inc.

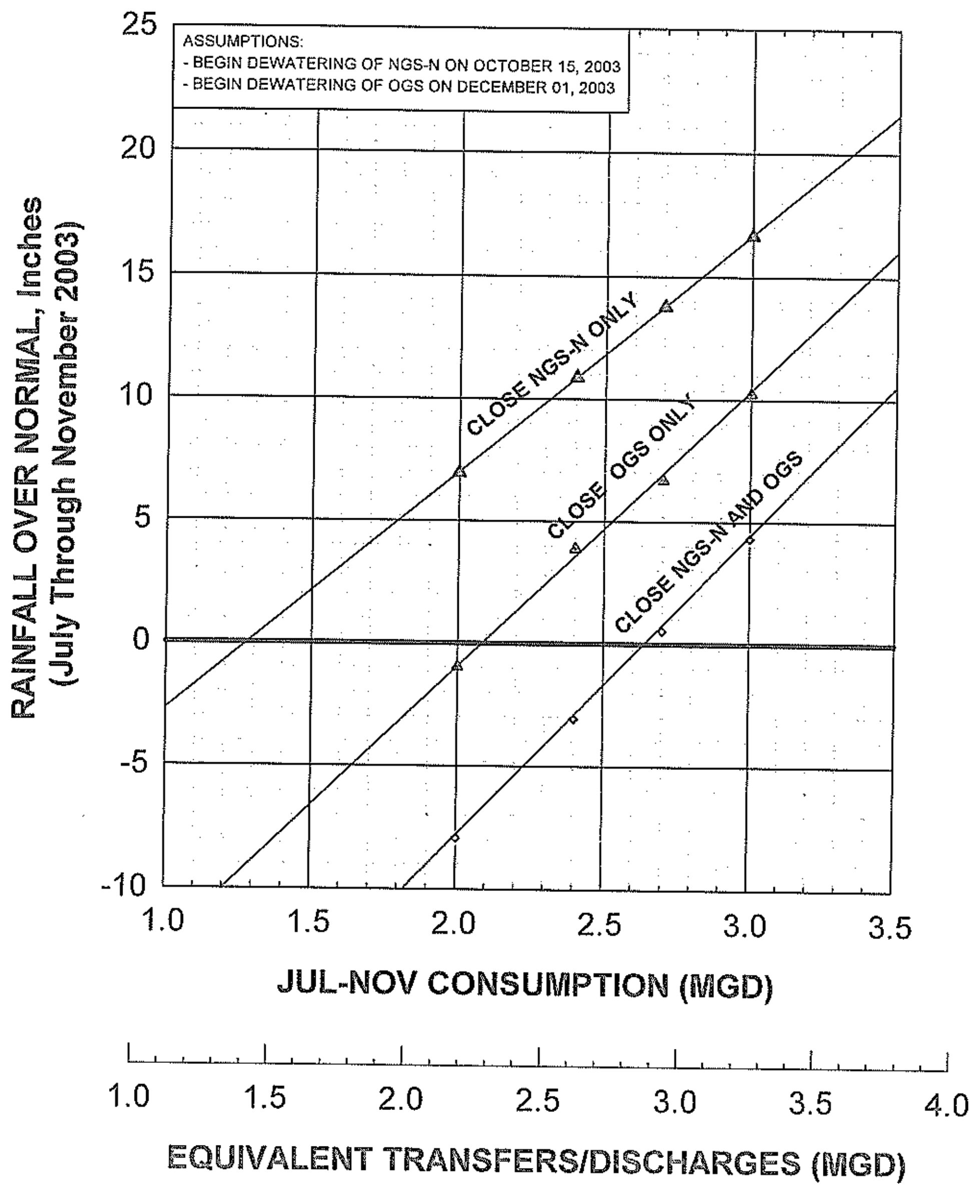
FIGURE 10B



PROJECTED SURGE STORAGE CAPACITY WITH 2.7 MGD CONSUMPTION USING NORMAL RAINFALL

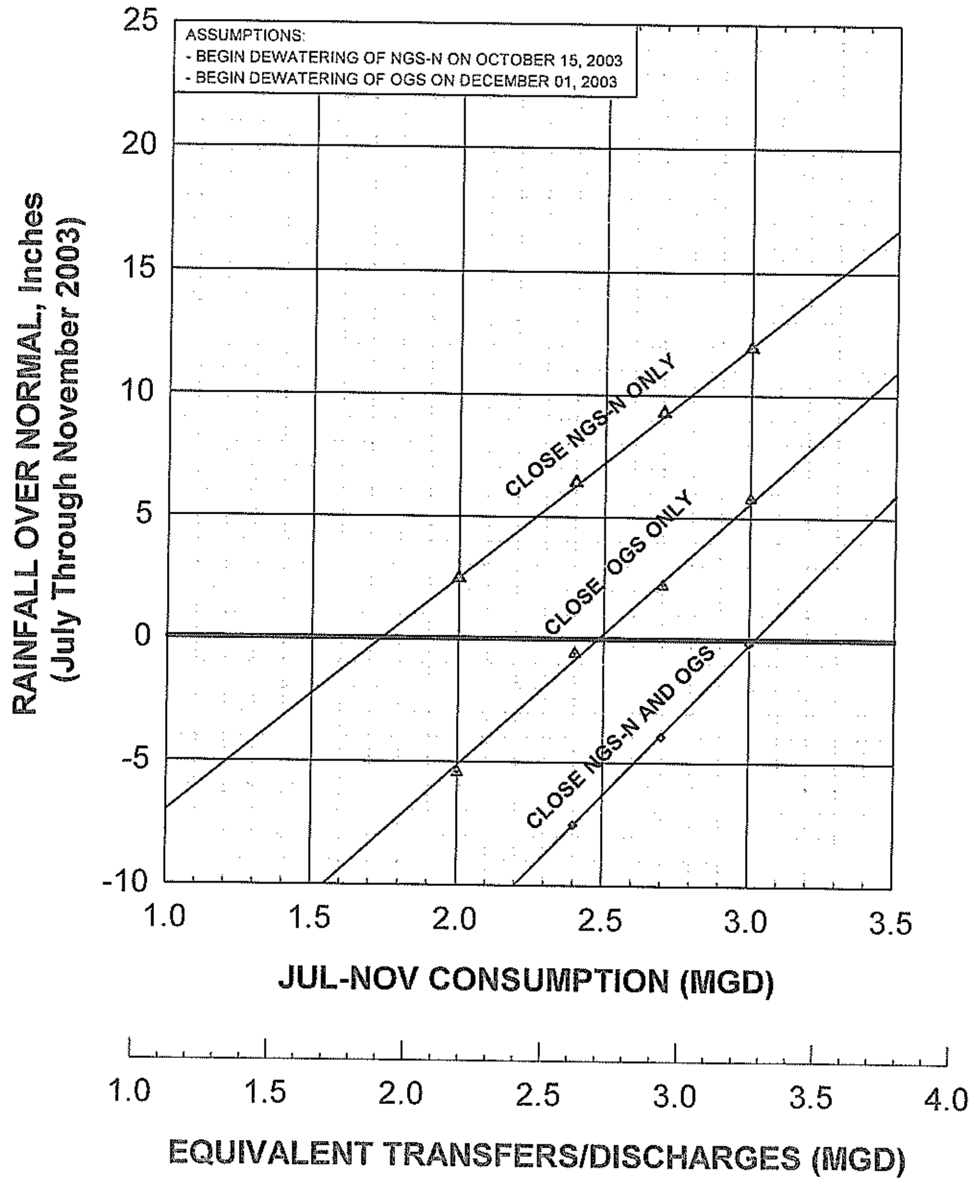
Piney Point Phosphates, Inc.

FIGURE 10C



REQUIRED CONSUMPTION FOR VARIOUS CLOSURE SCENARIOS
TO MAINTAIN THE MINIMUM SURGE STORAGE CAPACITY
AT THE TRIGGER LEVEL
Piney Point Phosphates, Inc.

FIGURE 11



REQUIRED CONSUMPTION FOR VARIOUS CLOSURE SCENARIOS TO MAINTAIN THE MINIMUM SURGE STORAGE CAPACITY AT THE EARLY TRIGGER LEVEL

Piney Point Phosphates, Inc.

FIGURE 12

Rainfall, Water Levels and Water Balance Projections as of November 30, 2003

Piney Point Phosphates, Inc.
Stack System
Manatee County, Florida

Ardaman & Associates, Inc.

OFFICES

Orlando, 8008 S. Orange Avenue, Orlando, Florida 32809, Phone (407) 855-3860
Bartow, 1525 Centennial Drive, Bartow, Florida 33830, Phone (863) 533-0858
Cocoa, 1300 N. Cocoa Blvd., Cocoa, Florida 32922, Phone (321) 632-2503
Fort Lauderdale, 3665 Park Central Boulevard North, Pompano Beach, Florida 33064, Phone (954) 969-8788
Fort Myers, 9970 Bavaria Road, Fort Myers, Florida 33913, Phone (239) 768-6600
Miami, 2608 W. 84th Street, Hialeah, Florida 33016, Phone (305) 825-2683
Port Charlotte, 740 Tamiami Trail, Unit 3, Port Charlotte, Florida 33954, Phone (941) 624-3393
Port St. Lucie, 460 Concourse Place NW, Unit 1, Port St. Lucie, Florida 34986, Phone (772) 878-0072
Sarasota, 2500 Bee Ridge Road, Sarasota, Florida 34239, Phone (941) 922-3526
Tallahassee, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (850) 576-6131
Tampa, 3925 Coconut Palm Drive, Suite 115, Tampa, Florida 33619, Phone (813) 620-3389
West Palm Beach, 2511 Westgate Avenue, Suite 10, West Palm Beach, Florida 33409, Phone (561) 687-8200

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

December 3, 2003
File Number 02-099A

Louis J. Timchak, Jr. - Receiver
18810 Place Antibes
Lutz, Florida 33549-5341

Subject: Rainfall, Water Levels and Water Balance Projections as of November 30, 2003, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida

Dear Mr. Timchak:

This report presents exhibits illustrating the process water status as of November 30, 2003 and water balance projections through September 2004 for the Piney Point Phosphates, Inc. (PPP) Stack System, including:

- Rainfall (Figures 1 and 2)
- Water Levels and Freeboards (Figure 3)
- Available Surge Storage Capacity (Figure 4)
- Surge Storage Capacity Projections Without Planned Actions (Figures 5 and 6)
- Surge Storage Capacity Projections with Recommended Actions (Figures 7 through 9)

The water balance projections are based on the following recommended rates of consumption (i.e., treated water transfers or discharges):

December	3.0 MGD
January	2.5 MGD
February/April	1.5 MGD
May and Beyond	1.0 MGD.

Based on conditions that existed on November 30, 2003, adhering to the currently recommended consumption rates would allow for closure of three of the four gypsum stack compartments (i.e., NGS-N by mid-May 2004 and both OGS compartments by early August to mid-September 2004) if the site experiences up to 5 inches of precipitation above normal rainfall through March 2004. Closure of two of these compartments (NGS-N and OGS-S) could be accomplished even if the site were to experience as much as 15 inches of rainfall above normal during the dry season. Closure of the NGS-N compartment would still be possible even if the site experiences as much as 25 inches of rainfall above normal.

If you have any questions or need additional clarifications, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Rajendra K. Shrestha, P.E.
Senior Project Manager

12/3/03

Nadim F. Fuleihan, ScD., P.E.
Principal
Florida Registration No. 31953

RKS/NFF/ed
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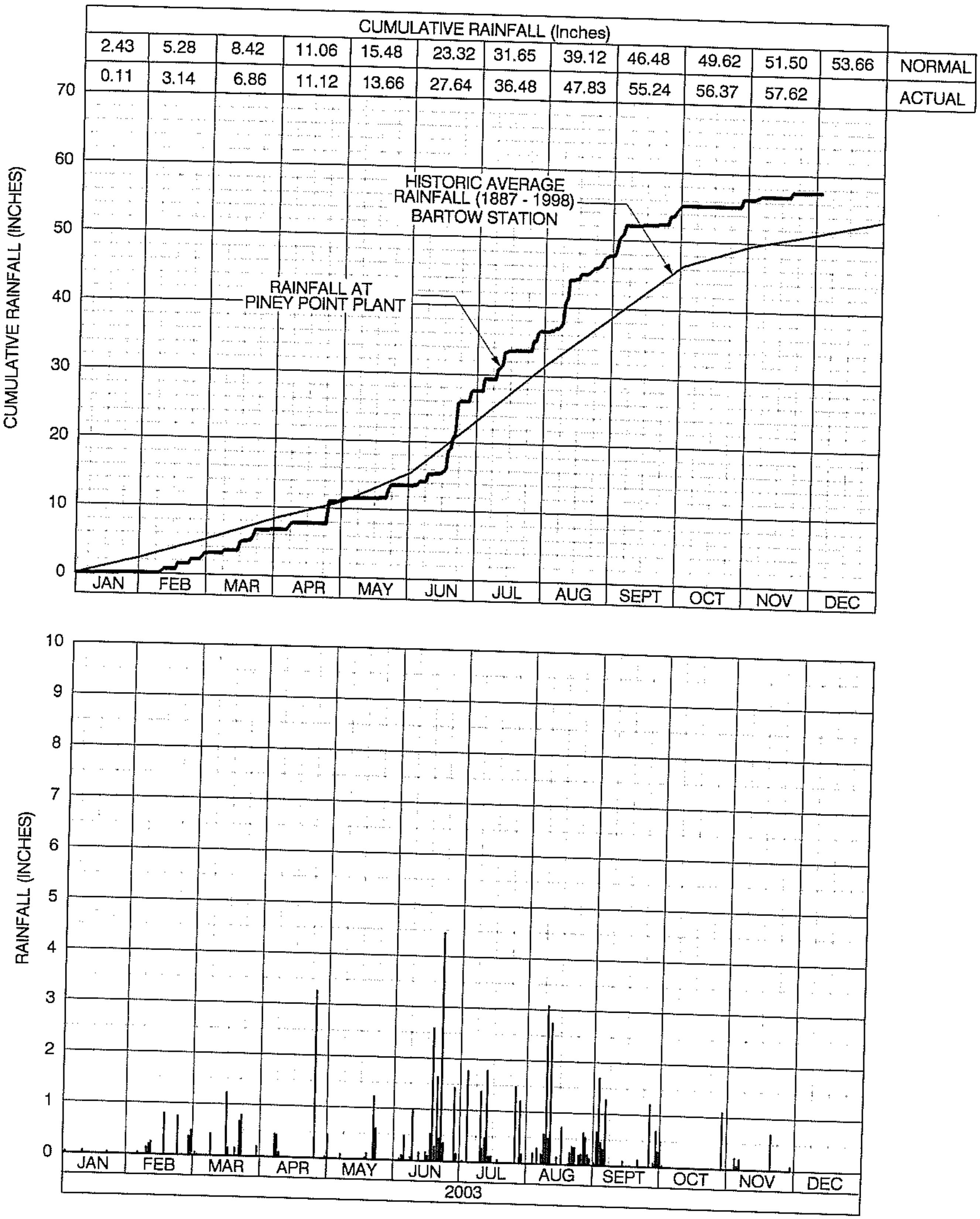
cc: Joseph Bakker, FDEP Bureau of Mines (1)
Phil Coram, FDEP Bureau of Mines (2)
Sam Zamani, FDEP Phosphate Management (1)
Sid Van Landingham, Shaw Environmental, Inc. (2)
Gary Uebelhoer, ECT (1)
Tom Leto, Ardaman & Associates



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
NORMAL	2.43	5.28	8.42	11.06	15.48	23.32	31.65	39.12	46.48	49.62	51.50	53.66
ACTUAL	0.11	3.14	6.86	11.12	13.66	27.64	36.48	47.83	55.24	56.37	57.62	

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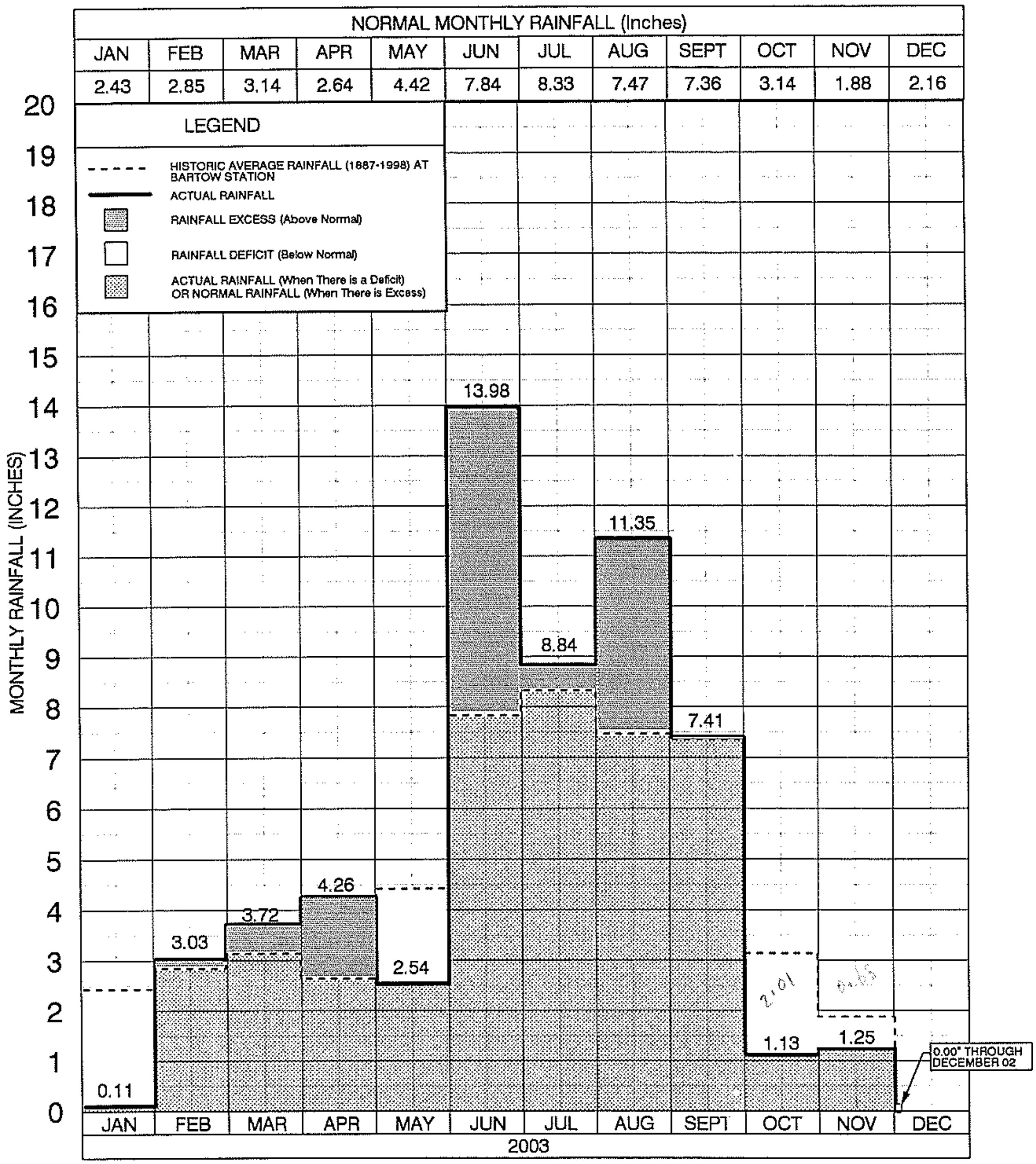
CALENDAR YEAR 2003 RAINFALL
Piney Point Phosphates, Inc.

FIGURE 1



CALENDAR YEAR 2003 MONTHLY RAINFALL HISTOGRAM
Piney Point Phosphates, Inc.

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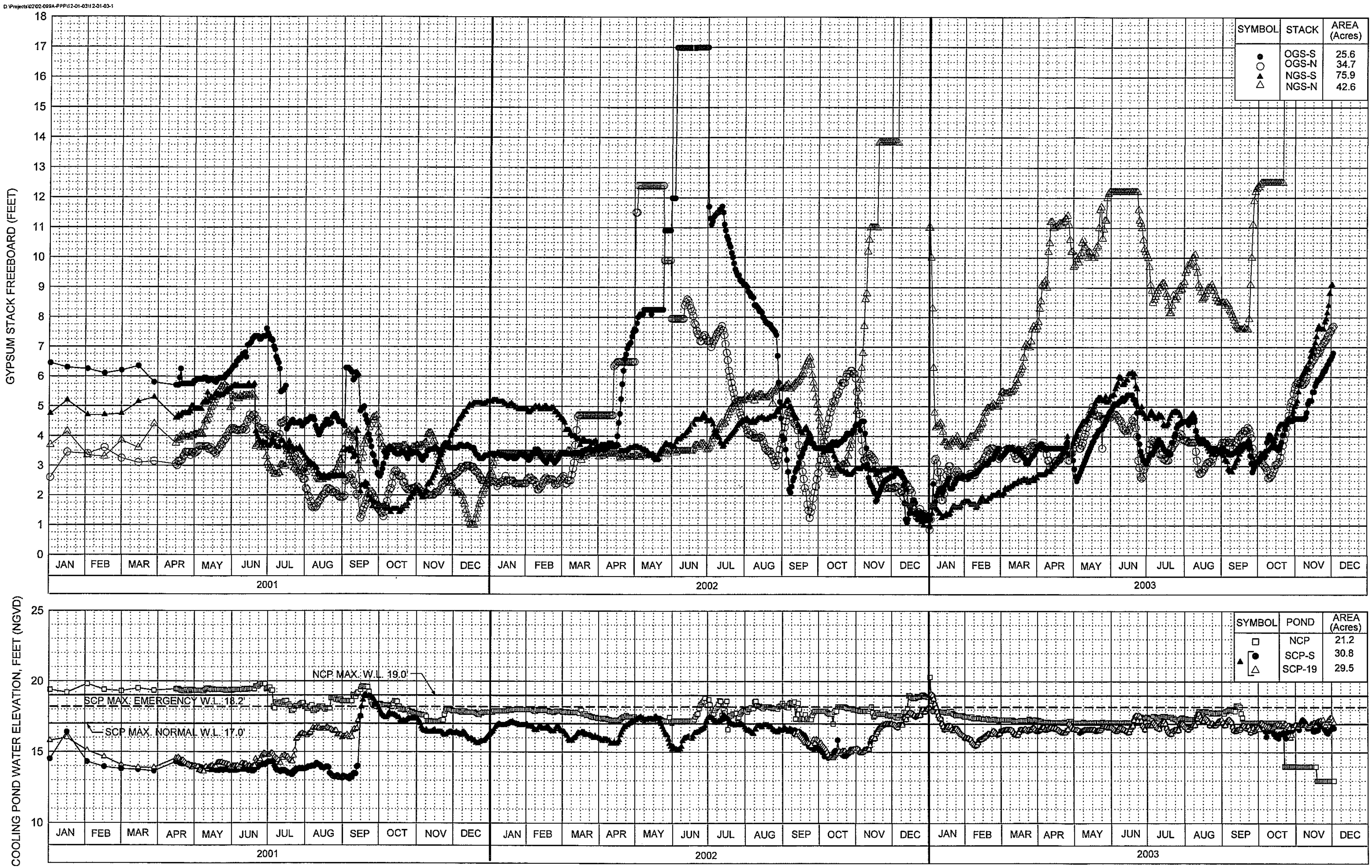
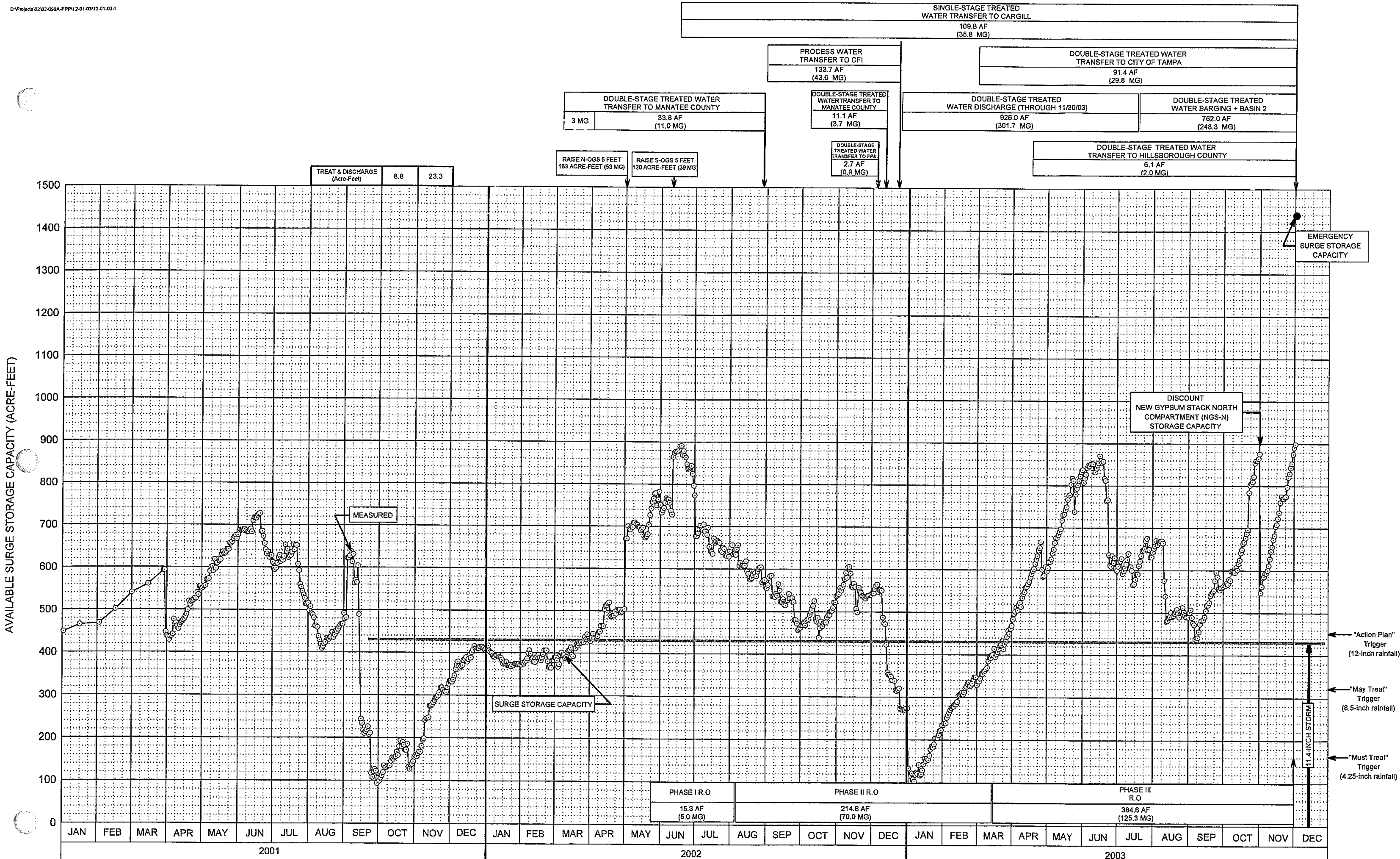
FIGURE 2



COOLING POND WATER LEVEL AND GYPSUM STACK FREEBOARD
Piney Point Phosphates, Inc.

FIGURE 3



AVAILABLE SURGE STORAGE CAPACITY
Piney Point Phosphates, Inc.

FIGURE 4

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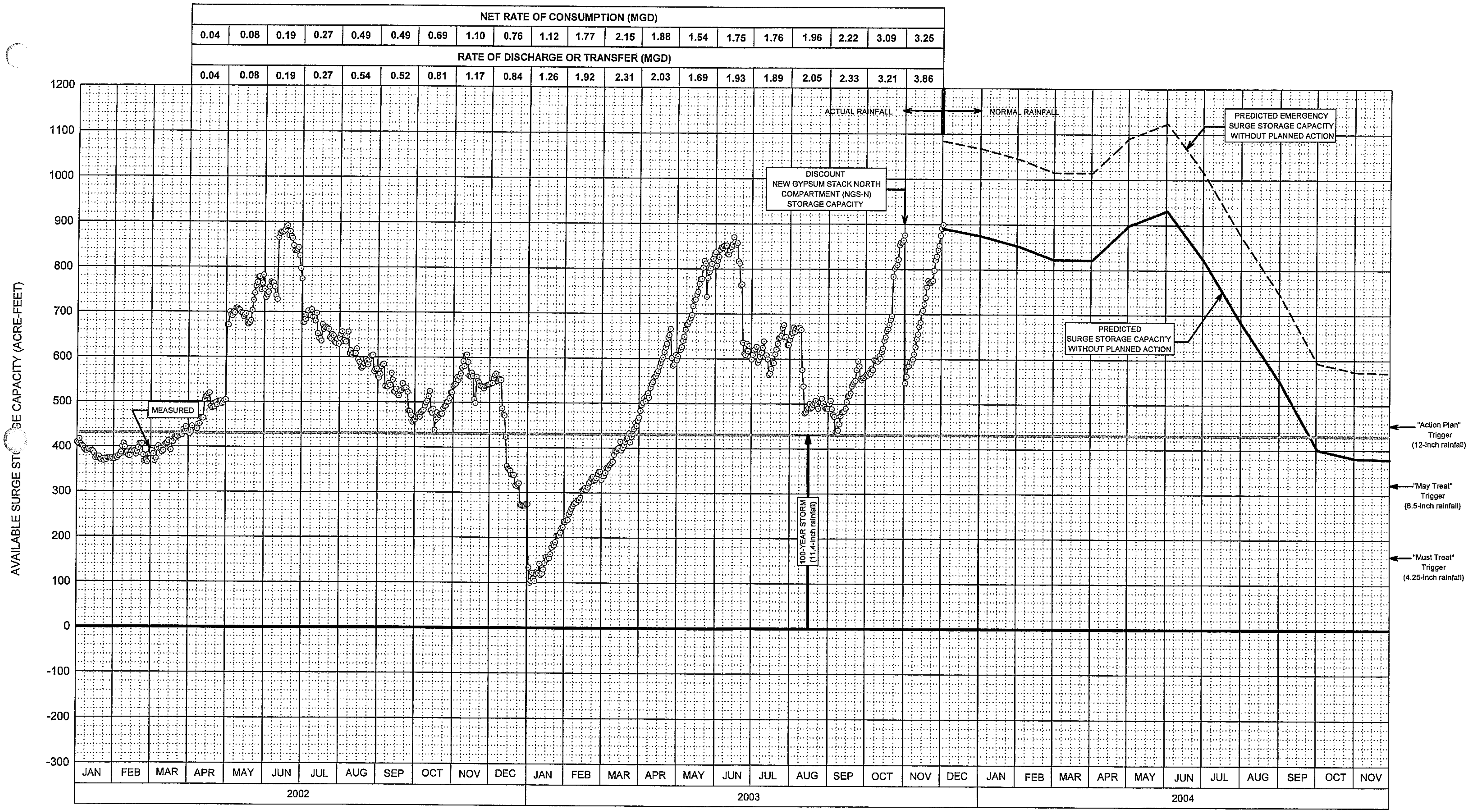
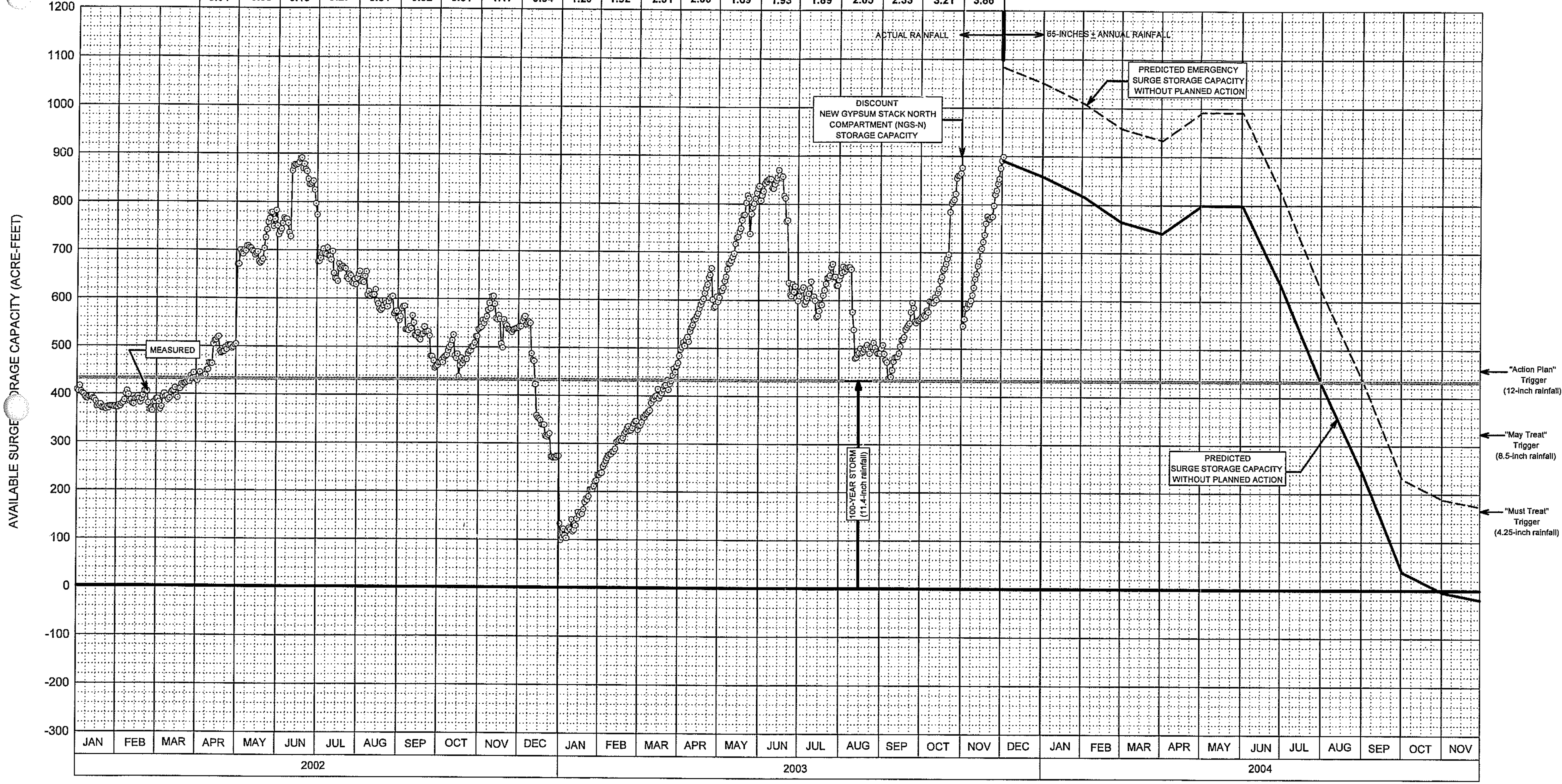


PROJECTED SURGE STORAGE CAPACITY THROUGH NOVEMBER 2004 USING NORMAL RAINFALL WITHOUT PLANNED ACTION
Piney Point Phosphates, Inc.

FIGURE 5

NET RATE OF CONSUMPTION (MGD)																			
0.04	0.08	0.19	0.27	0.49	0.49	0.69	1.10	0.76	1.12	1.77	2.15	1.88	1.54	1.75	1.76	1.96	2.22	3.09	3.25
RATE OF DISCHARGE OR TRANSFER (MGD)																			
0.04	0.08	0.19	0.27	0.54	0.52	0.81	1.17	0.84	1.26	1.92	2.31	2.03	1.69	1.93	1.89	2.05	2.33	3.21	3.86



PROJECTED SURGE STORAGE CAPACITY THROUGH NOVEMBER 2004 USING WET RAINFALL YEAR WITHOUT PLANNED ACTION
Piney Point Phosphates, Inc.

FIGURE 6

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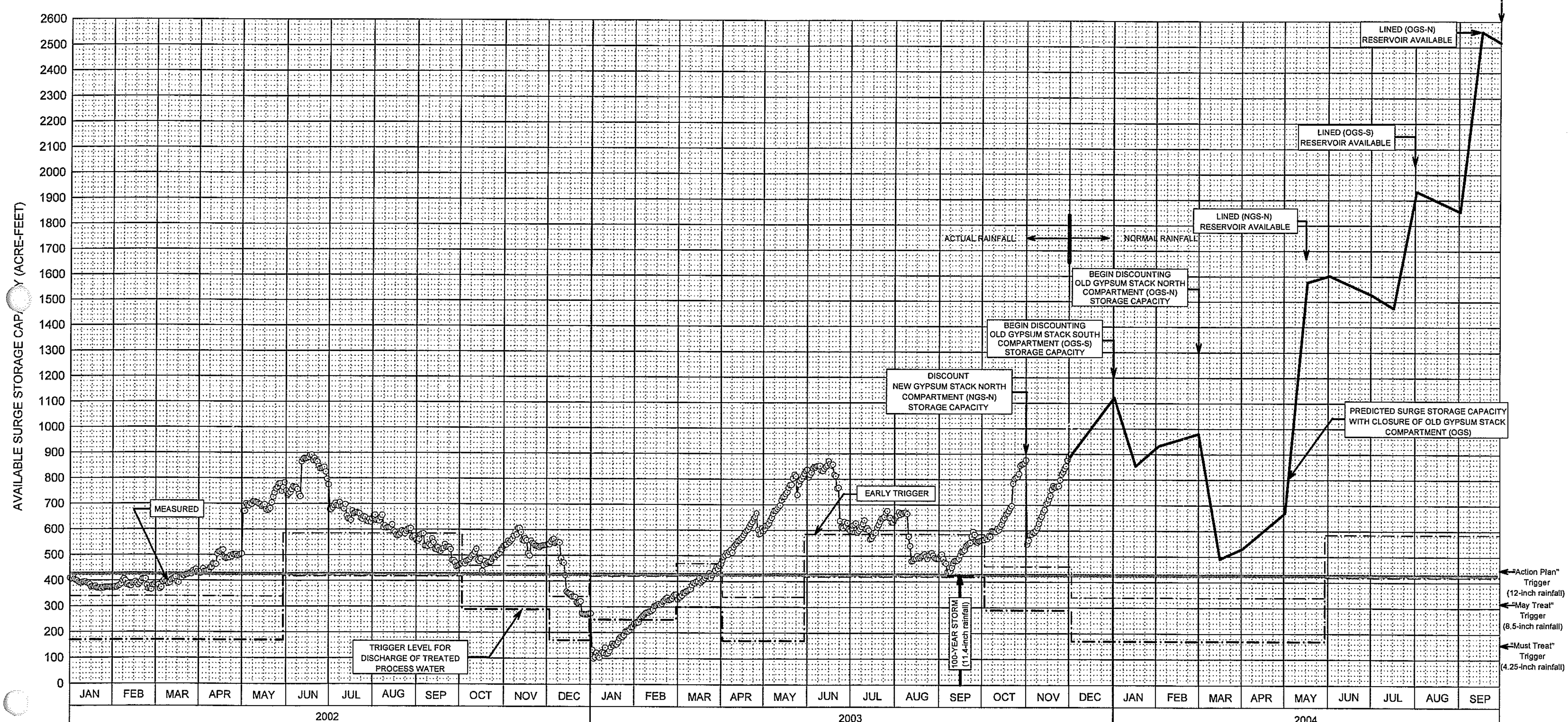
NET RATE OF CONSUMPTION (MGD)																				RECOMMENDED CONSUMPTION (MGD)			
0.04	0.08	0.19	0.27	0.49	0.49	0.69	1.10	0.76	1.12	1.77	2.15	1.88	1.54	1.75	1.76	1.96	2.22	3.09	3.25	2.8	2.3	1.4	0.93

RATE OF DISCHARGE OR TRANSFER (MGD)																				EQUIVALENT RATE OF DISCHARGE OR TRANSFER (MGD)			
0.04	0.08	0.19	0.27	0.54	0.52	0.81	1.17	0.84	1.26	1.92	2.31	2.03	1.69	1.93	1.89	2.05	2.33	3.21	3.86	3.0	2.5	1.5	1.0



PROJECTED SURGE STORAGE CAPACITY WITH RECOMMENDED CONSUMPTION USING NORMAL RAINFALL
Piney Point Phosphates, Inc.

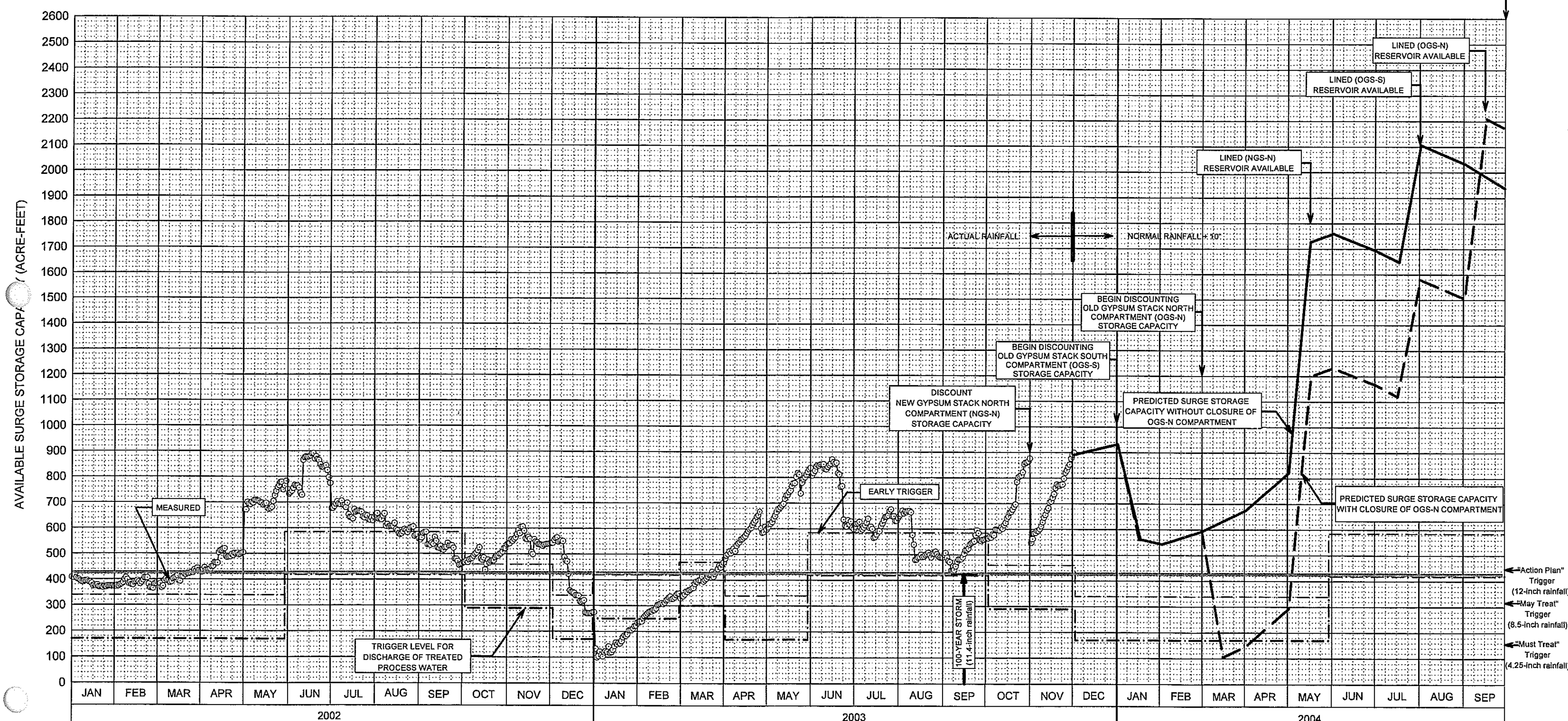
FIGURE 7

NET RATE OF CONSUMPTION (MGD)																			
0.04	0.08	0.19	0.27	0.49	0.49	0.69	1.10	0.76	1.12	1.77	2.15	1.88	1.54	1.75	1.76	1.96	2.22	3.09	3.25

RECOMMENDED CONSUMPTION (MGD)			
2.8	2.3	1.4	0.93

RATE OF DISCHARGE OR TRANSFER (MGD)																			
0.04	0.08	0.19	0.27	0.54	0.52	0.81	1.17	0.84	1.26	1.92	2.31	2.03	1.69	1.93	1.89	2.05	2.33	3.21	3.86

EQUIVALENT RATE OF DISCHARGE OR TRANSFER (MGD)			
3.0	2.5	1.5	1.0



PROJECTED SURGE STORAGE CAPACITY WITH RECOMMENDED CONSUMPTION USING NORMAL RAINFALL+ ADDITIONAL 10" THROUGH JANUARY 2004
Piney Point Phosphates, Inc.

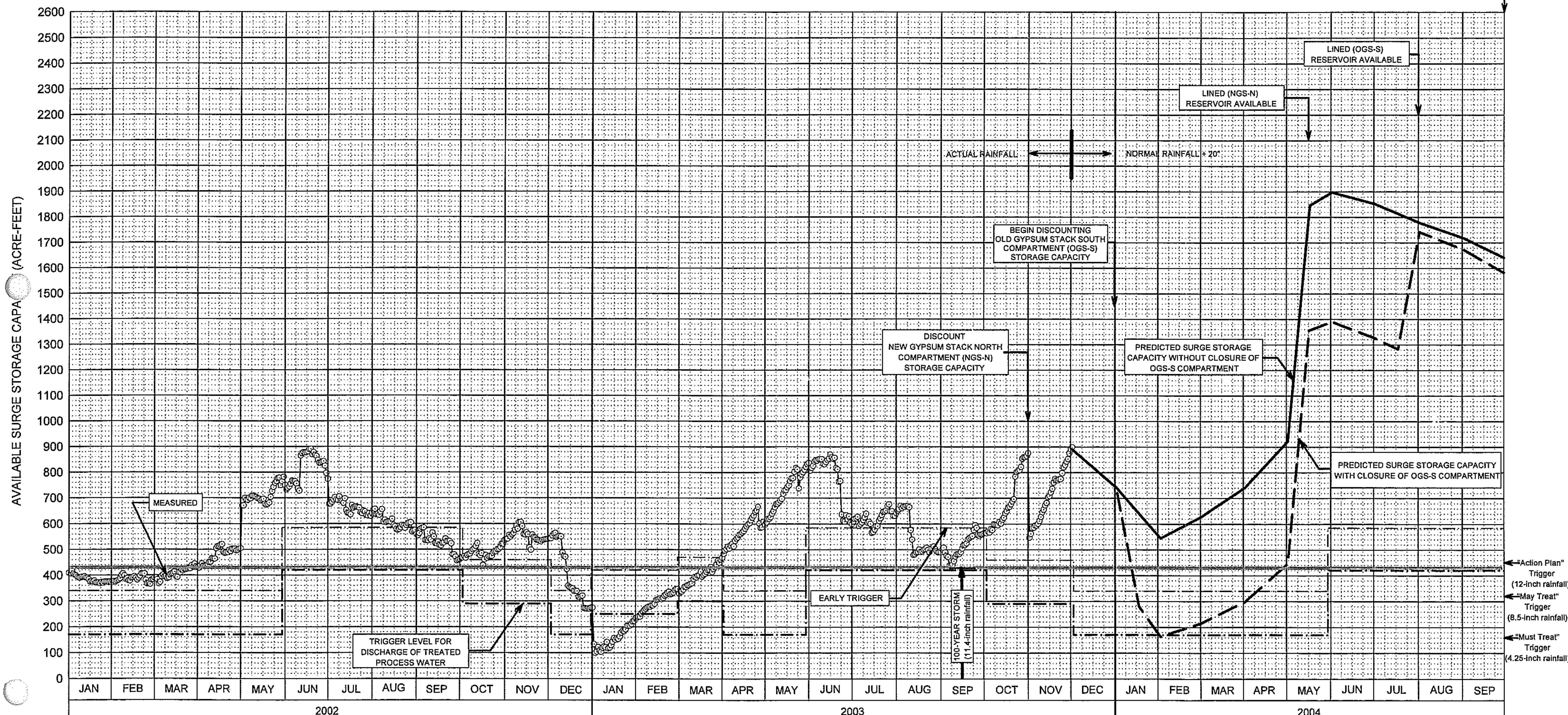
FIGURE 8

NET RATE OF CONSUMPTION (MGD)																			
0.04	0.08	0.19	0.27	0.49	0.49	0.69	1.10	0.76	1.12	1.77	2.15	1.88	1.54	1.75	1.76	1.96	2.22	3.09	3.25

RECOMMENDED CONSUMPTION (MGD)			
2.8	2.3	1.4	0.93

RATE OF DISCHARGE OR TRANSFER (MGD)																			
0.04	0.08	0.19	0.27	0.54	0.52	0.81	1.17	0.84	1.26	1.92	2.31	2.03	1.69	1.93	1.89	2.05	2.33	3.21	3.86

EQUIVALENT RATE OF DISCHARGE OR TRANSFER (MGD)			
3.0	2.5	1.5	1.0



PROJECTED SURGE STORAGE CAPACITY WITH RECOMMENDED CONSUMPTION USING NORMAL RAINFALL + ADDITIONAL 20" THROUGH JANUARY 2004

Piney Point Phosphates, Inc.

FIGURE 9

Attachment 4

"Recommended Trigger Levels for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System, Manatee County, Florida" - dated July 17, 2002.

"Executive Summary - Recommended Trigger Levels for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System, Manatee County, Florida," - dated September 24, 2002.

"Updated Trigger Level Recommendations for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System During an El-Niño Rainfall Year, Manatee County, Florida," - dated January 7, 2003.

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

July 17, 2002
File No. 02-099

Louis J. Timchak, Jr., Receiver
18810 Place Antibes
Lutz, Florida 33549-5341

Subject: Recommended Trigger Levels for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System, Manatee County, Florida

Dear Mr. Timchak:

As requested, Ardaman & Associates, Inc. has completed the probabilistic analyses performed to establish "trigger levels" for the discharge of treated process water in the event of an unforeseen emergency. The analyses took into consideration the fact that such discharges will have to be initiated in time and at sustained rates, if and as needed, in order to provide reasonable assurance that a catastrophic failure or overtopping of the Piney Point Phosphate (PPP) stack system impoundments will not occur.

It is important to distinguish at the outset between a long-term planning strategy and potential shorter term needs during an emergency. Both are important considerations in developing a facility's water management plan. The long-term planning strategy is typically based on monthly water balance projections that are used to assess, review, regularly update, and plan action items and consumption requirements (potentially including controlled discharges of low nutrient treated waters). On the other hand, the trigger for emergency discharges of treated process water addresses extraordinary measures that an operator might have to resort to during an extreme wet weather condition that unexpectedly depletes the storage capacity of the system.

Long-Term Planning Strategy

The long-term planning strategy for the PPP stack system is being formulated and updated regularly based on a monthly process water status report and water balance projections (e.g., see report dated July 10, 2002 titled "Monthly Process Water Status Report for June 2002 and Water Balance Projections through June 2003, Piney Point Phosphates, Inc. Stack System, Manatee County, Florida"). For example, for fiscal year 2003, on-going authorized action items selected to meet consumption requirements currently include: (i) transfer of 55 million gallons of process water to CF's Plant City Stack System; (ii) single-stage treatment of process water to a pH greater than 5.5 and transfer of 18 million gallons of treated process water to Cargill's Riverview facility; (iii) double-stage lime treatment of process water to a pH greater than 8 and transfer of up to 27 million gallons of double-stage treated air-stripped water to the Manatee County Wastewater Treatment Plants, and up to 30 million gallons to Florida Power & Light Company; and (iv) use of reverse osmosis to potentially produce more than 61 to 75 million gallons of high quality treated water (i.e., R.O. permeate) that could either be consumptively used or discharged.

As of July 1, 2002, the normal surge storage capacity of the PPP stack system was on the order of 676 acre-feet, which is equivalent to about 17.7 inches of rainfall over the entire net watershed area of 459 acres. The maximum potential surge storage capacity that could be made available for use during unplanned emergencies equaled 844 acre-feet, which is equivalent to about 22.1 inches of rainfall over the watershed. Note that the 100-year/24-hour storm event at the site could generate up to 11.4 inches of rainfall which would consume as much as 436 acre-feet of the available storage capacity.

8008 S. Orange Avenue (32809), Post Office Box 593003, Orlando, Florida 32859-3003 Phone (407) 855-3860 FAX (407) 859-8121
Offices in: Bartow, Cocoa, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

Assuming normal rainfall from July 2002 through May 2003, the lowest surge storage capacity is currently projected to occur at the end of September 2002 when the remaining normal storage would decrease to 530 acre-feet (equivalent to 13.9 inches of rainfall), and the corresponding emergency surge storage capacity would then be 698 acre-feet (equivalent to 18.2 inches of rainfall). With wet weather, the corresponding surge capacities would be 350 acre-feet and 518 acre-feet, respectively (equivalent to 9.1 and 13.5 inches of rainfall, respectively). Hence, with the currently authorized action items, the system is expected to be capable of safely containing the 100-year/24-hour storm event. Nevertheless, because consumption needs are highly dependent on rainfall, action items and consumption quantities are dynamic variables that ought to be periodically revised and updated.

Trigger for Emergency Discharges

It may not be possible to specify a single trigger for emergency discharges because the trigger level is dependent on many factors, including:

1. The available surge storage capacity of the system which is highly dependent on rainfall, and which cannot be reliably forecast;
2. The month of the year (i.e., rainy season, last two months of hurricane season, dry season, etc.)
3. On-going treatment and transfer/consumption rates. The cumulative rate of consumption of excess water is subject to change over time, and some of the on-going consumption items are wet-weather sensitive which complicates predictions;
4. The confidence level which provides reasonable assurance that there will be no accidental discharges of untreated process water;
5. The availability of end-users for the high quality R.O. permeate and double lime treated aerated water, i.e., is discharge the only viable option?; and
6. The degree to which one is willing to allow the discharge of high nutrient laden treated waters during extreme emergencies. For example, if one were to "prohibit" the discharge of treated water containing ammonia nitrogen concentrations above 10 mg/l, the maximum discharge rate for double lime treated water would then be limited to about 0.5 MGD or less, which is a limitation that could force the initiation of controlled discharges of R.O. water and double limed aerated water much sooner than otherwise required.

Two methods were considered in establishing trigger levels for the discharge of treated water. One of the methods is based on normal rainfall and various design storm events, and the other method is based on statistical /probabilistic analysis of the total rainfall quantity that can occur in any given month.

<u>Design Storm Basis</u>

Rainfall quantities associated with the 100-year/24-hour and 25-year/24-hour storms in the Florida Phosphate District are as follows:

Source-Reference	NOAA & DOT	SWFWMD
100-year/24-hour Storm		
Average Rainfall, inches	11.0	10.5
Range in Phosphate District, inches	10.0 - 12.0	10.0 - 11.0
25-year/24hour Storm		
Average Rainfall, inches	8.5	8.0
Range in Phosphate District, inches	8.0 - 9.5	7.5 - 8.5

The 100-year/24-hour storm event at Piney Point is a storm that produces the equivalent of about 11.4 inches of rainfall in a 24-hour period. Such a storm has a mean return period of 100 years, i.e., it is a rainfall event for which there is a 99% probability that it will not be exceeded during any given year. The 20-year/24-hour storm event is expected to generate approximately 8.0 inches of rainfall in a 24-hour period. There is a 95% probability that such an event will not be exceeded in any given year.

An extreme storm event is perhaps equally likely to occur at any time during 6 months of the year (i.e., during hurricane season, from June through November). Hence, the odds of having a 100-year/24-hour storm event during any given month through the hurricane season are on the order of 1 in 600 (i.e., 1/100 x 1/6 or ≈ 0.17%). On the other hand, the odds of getting the same rainfall quantity of 11.4 inches in any 3 to 4-day period (100-year/72-hour to 100-year/96-hour storm) is approximately six times greater, i.e., about 1% per month. Similarly, the probability of getting more than 8 inches of rainfall in any 3 to 4-day period during the hurricane season is 5% per month. In other words, there is a 99% confidence level that the site will not be subjected to a storm generating more than 11.4 inches of rainfall in any 3 to 4-day period during any given month; and a 95% confidence level that a storm resulting in more than 8 inches of rainfall in a 3 to 4-day period will not occur during any given month.

During the rainy season (June through September), the average long-term monthly precipitation for the Bartow NOAA weather station, based on a 112-year period of record, is 7.75 inches per month. During the last two months of the hurricane season (i.e., October and November), the long-term average monthly precipitation is much lower, i.e., about 2.51 inches per month. For simplicity, if one were to assume that the occurrence of the long-term average monthly rainfall is deterministic and that the storm event is the only probabilistic variable, then one would be able to derive the following probabilistic estimates:

Season (Month)	Gross Average Monthly Rainfall (inches)	Precipitation from Design Storm (inches)	Combined Total Monthly Precipitation (inches)	Confidence Level for Not Exceeding Total Monthly Precipitation (%)
Rainy Season (June through Sept.)	7.75	11.4 (100-year) 8.0 (20-year)	19.15 15.75	99 95
Last 2 Months of Hurricane Season (Oct. and Nov.)	2.51	11.4 (100-year) 8.0 (20-year)	13.91 10.51	99 95

In order to provide reasonable assurance that an accidental spill will not occur at the same confidence levels reported above, one would need to have sufficient surge capacity to contain the precipitation as it occurs, and one would also have to recover the lost surge storage capacity within a period of one month. Considering that there is approximately 168 acre-feet of emergency surge storage capacity (equivalent to about 4.39 inches of rainfall over the watershed), and that one should be able to rely on at least 85% of the theoretical monthly evaporation and evapotranspiration losses during extreme wet-weather conditions (equivalent to a net consumption quantity, inclusive of seepage inflow, on the order of 3.77 inches/month and 1.90 inches/month during the rainy season and during the last two months of the hurricane season, respectively), then the following net minimum monthly storage requirements need to be maintained to avoid an accidental spill:

Season (Month)	Minimum Monthly Rainfall Storage Requirement (inches)	Required Normal Surge Storage Capacity (acre-feet)	Confidence Level that Accidental Spill will not occur (%)
Rainy Season (June through Sept.)	11.0 7.6	421 291	99 95
Last 2 Months of Hurricane Season (Oct. and Nov.)	7.6 4.2	291 161	99 95

Probabilistic Analysis of Monthly Rainfall

Historic monthly and annual rainfall data for Bartow were utilized to estimate the likelihood of occurrence of extreme rainfall quantities in any given month. The total monthly rainfall is approximately normally distributed. The normal distribution is often adopted, particularly in humid areas (where the mean is high), since monthly rainfall represents in effect the sum of many individual daily contributions and, in accordance with the Central Limit Theorem, the distribution of the sum of many random events approaches a Normal or Gaussian distribution. The lognormal distribution also generally provides a good fit to the monthly rainfall data. The lognormal distribution is a result of multiplicative mechanisms acting on a number of factors and is frequently used in hydrologic studies to model monthly rainfall since such events often occur due to the joint action of many meteorological (atmospheric pressure, relative humidity, etc.) and geographical factors. Whereas the normal distribution is most frequently used in practice to model monthly rainfall in a given hydrologic basin and provides an excellent fit to the data in the region about the mean, the lognormal distribution often provides a better fit at the tail end, where very extreme rainfall events may occur.

The following statistical estimators were derived from the 112-year period of record of monthly rainfall for the Bartow NOAA weather station:

	Monthly Rainfall (inches)	
Season (Month)	Gross Average	Standard Deviation
Rainy Season (June through Sept.)	7.75	3.38
Last 2 Months of Hurricane Season (Oct. and Nov.)	2.51	1.99
Dry Season (Dec. through May)	2.94	2.29

The following probabilistic estimates were derived using the lognormal distribution fitted to the monthly rainfall data:

Season (Month)	Average Maximum Measured Monthly Precipitation (inches)	Extreme Monthly Precipitation (inches)	Confidence Level for Not Exceeding Extreme Monthly Precipitation (%)
Rainy Season (June through Sept.)	18.74	18.81 14.20	99 95
Last 2 Months of Hurricane Season (Oct. and Nov.)	9.98	9.94 6.20	99 95
Dry Season (Dec. through May)	11.24	11.50 7.22	99 95

A comparison of the above values to values derived from the design storm based method reveals that the design storm basis yields somewhat higher rainfall quantities (during the rainy season and through the hurricane season) than derived from the probabilistic analysis of monthly rainfall data. Hence, the design storm method was adopted for use during the rainy season and the last two months of the hurricane season. During the dry season, considering that the emergency surge storage capacity is equivalent to about 4.39 inches of rainfall, and that one should be able to rely on at least 85% of the theoretical monthly evaporative losses (equivalent to a net consumption quantity on the order of 2.57 inches/month), then the following net minimum monthly storage requirements need to be maintained:

Season (Month)	Minimum Monthly Rainfall Storage Requirement (inches)	Required Normal Surge Storage Capacity (acre-feet)	Confidence Level that Accidental Spill will not occur (%)
Dry Season (Dec. through May)	4.5 0.25	173 9.5	99 95

Controlling Trigger Levels

Based on evaluation of the combined results from the two probabilistic methods used, the following minimum normal monthly storage requirements need to be maintained within the Piney Point Phosphate stack system impoundments:

Season (Month)	Required Minimum Normal Surge Storage Capacity (acre-feet)	Required Consumption Rate if All Surge Capacity is Consumed (MGD)	Confidence Level that Accidental Spill will not Occur (%)
Rainy Season (June through Sept.)	421 291	4.5 3.1	99 95
Last 2 Months of Hurricane Season (Oct. and Nov.)	291 161	3.1 1.7	99 95
Dry Season (Dec. through May)	173 9.5	1.9 0.1	99 95

Figures 1 and 2 present the corresponding trigger level relationships for initiating discharges of treated process water at specified rates in order to prevent an accidental spill at the 95% and 99% confidence levels, respectively.

Recommendations

It is recommended that the trigger levels for initiating emergency discharges of treated process water be determined at the 99% confidence level in order to provide reasonable assurance that an accidental spill will not occur (see Figure 2). When the normal surge storage capacity drops below 421 acre-ft at any time during the rainy season (e.g., as a result of a 6.7-inch storm that decreases the normal surge storage capacity that existed on July 1, 2002 from 676 acre-ft to 421 acre-ft), discharges of treated process water may then have to be initiated at prescribed rates so as to recover the 421 acre-ft normal capacity within a period of one month, i.e., as needed to preclude having an accidental spill at the 99% confidence level.

During the months of June through September, if the remaining normal surge storage capacity is partially depleted to the following specific values, the following total consumption rates (including consumption associated with on-going action items relying on treatment and transfers) would then be required (see Figure 2):

Remaining Normal Surge Storage Capacity (acre-ft)	Total Required Consumption Rate (MGD)
421	0
400	0.2
300	1.3
200	2.4
100	3.5

Note that the relationships in Figure 2 and the values tabulated above represent the cumulative rate of consumption required, including consumption associated with on-going water management action items. Figure 3 is a reproduction of Figure 2 with the added superimposition of four vertical axes representing treat and discharge requirements for various assumed on-going water management action item consumption rates of 0, 0.5, 1.0 and 1.5 MGD, respectively. Basically, each superimposed axis represents a shift in the vertical axis equivalent to the cumulative consumption rate of on-going water management action items. Projected nitrogen concentrations in the discharge based on the capacity of the double-stage treatment plant and the network of spray nozzles used to air-strip the ammonia are indicated adjacent to the superimposed treat and discharge axes.

Considering that the cumulative consumption rate of "on-going" action items (including transfers of treated water to Manatee County and to Cargill's Riverview Facility) is currently on the order of 0.3 MGD, the discharge of treated process water will have to be initiated as soon as the normal surge storage capacity drops below 395 acre-ft. With the forthcoming transfers to CF's Plant City stack system and Florida Power & Light and TECO, the cumulative rate of consumption is projected to increase to about 0.5 MGD. Under those conditions, if an extreme rainfall event happens to drop the normal surge storage capacity to levels below 300 to 200 acre-ft, the discharge of treated process water would then have to be initiated at rates as high as 0.7 to 1.8 MGD. The discharge rates of double-stage treated water (in excess of 0.5 MGD) would likely be associated with elevated nutrient loadings, i.e., the discharge is likely to have ammonia nitrogen concentrations on the order of 40 to 600 mg/l.

In order to minimize the potential cumulative impacts to Bishop's Harbor and Tampa Bay, it may be prudent to consider initiating the discharge of low nutrient R.O. water (having a nitrogen concentration less than 2 mg/l) and even double-stage treated fully aerated water (having a nitrogen concentration less than 10 mg/l) sooner than otherwise required so as to reduce the likelihood of potentially being forced to discharge water containing much more elevated nutrient concentrations.

The methodology that can be used to select such early discharge triggers to minimize the likelihood of being forced to discharge higher nutrient loadings to the Bay is illustrated on Figure 4. Considering that the normal surge storage capacity in the PPP stack system on July 1, 2002 was on the order of 676 acre-ft and that, with normal rainfall, the remaining normal surge storage capacity is not expected to drop below about 570 acre-ft by September 1, 2002, it is projected that the normal system surge capacity would still remain above 134 to 240 acre-ft during the rainy season even after occurrence of the 100-year/24-hour storm event (which would deplete as much as 436 acre-feet of storage). Hence, it is highly unlikely that the remaining normal surge storage capacity would drop below about 150 acre-feet, i.e., the lower limit selected for determining equivalent early discharges in Figure 4.

Since the cumulative consumption rate of "on-going" water management action items is currently on the order of 0.3 MGD (i.e., less than the 0.5 MGD assumed in Figure 4), discharges of treated water would have to be initiated as soon as possible (i.e., because the normal surge storage capacity is currently less than 700 acre-feet), at a rate equivalent to or in excess of 0.5 MGD. As soon as the additional forthcoming transfers begin during July, the cumulative rate of consumption of on-going action items is expected to increase to 0.5 MGD or more. Under this scenario, the discharge of treated process water would need to be initiated when the normal surge storage capacity drops below about 550 acre-ft. Assuming that early discharge involves double stage treated aerated water, and the discharge rate is limited to 0.5 MGD (as illustrated on Figure 4), the nitrogen concentration in the discharge would probably remain below 10 mg/l.

In order to further protect the Bay and minimize the discharge of nutrient-laden water to the greatest practical extent, it may be prudent to initiate the discharge of R.O. permeate (having nitrogen concentrations less than 2 mg/l), blended with a small amount of well water, as soon as U.S. Filter's Phase II reverse osmosis expansion begins production later this month (i.e., after allowing for a short period of experimentation, calibration and monitoring). Assuming that the Phase II R.O. produces permeate at a sustained rate of 0.5 MGD and other water management items "consume" another 0.5 MGD, then there would likely not be a discharge of any higher nutrient-laden water to the Bay (see Figure 2). It is rather unfortunate that a valuable resource (R.O. permeate) has to be discharged and wasted within a water use caution area, but there are reportedly no viable end-users in close proximity to the site, and discharge of most of the water produced may be the only practical recourse.

In my professional opinion, the above recommendations are responsive to the immediate needs of the facility. If you have any questions or need additional information or clarifications, please contact the undersigned.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Nadim F. Fuleihan, Sc.D., P.E.
Florida Registration No. 31953
Principal

NFF/elb
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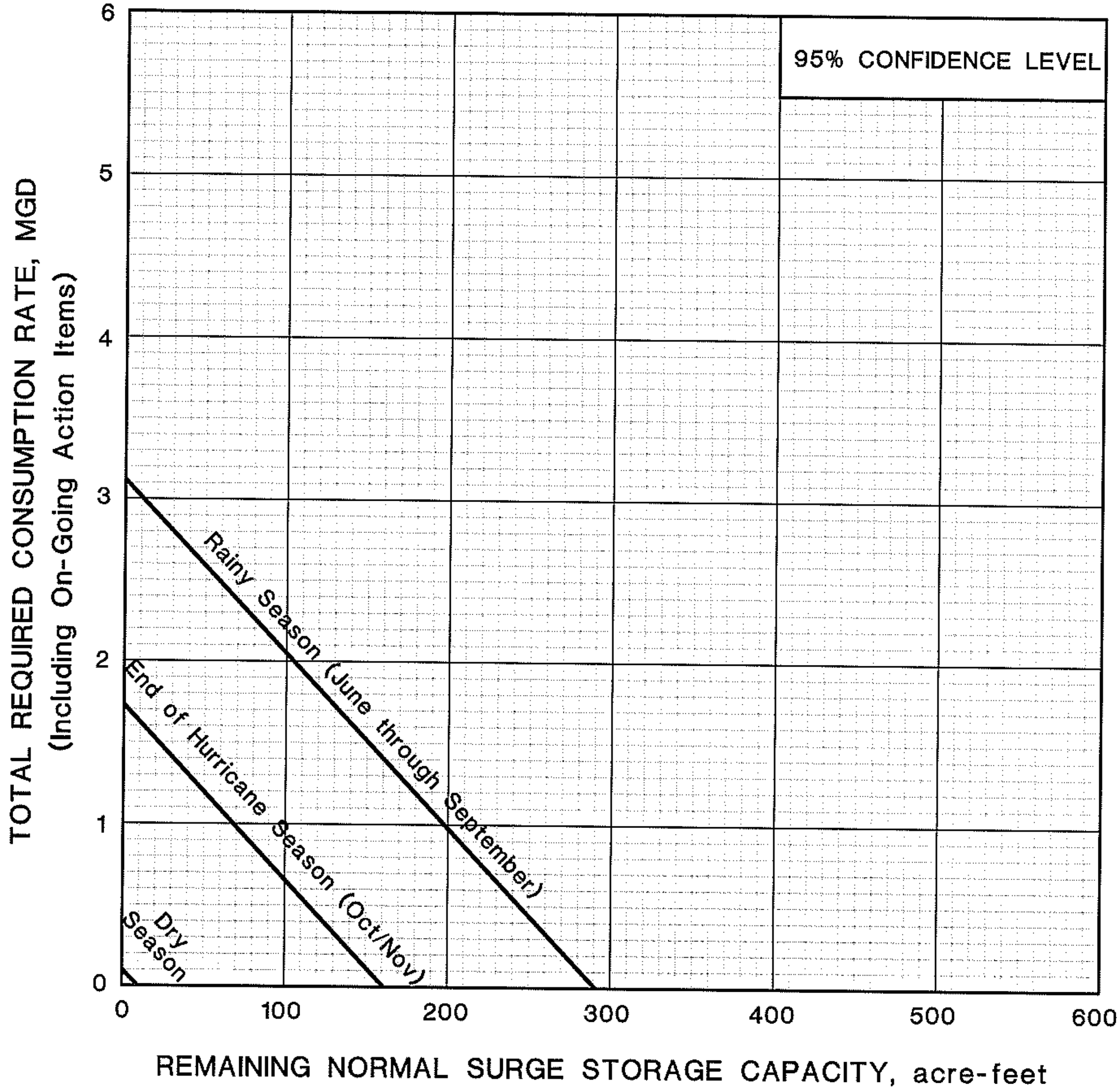
cc: Joseph Baker, FDEP - Bureau of Mines
Phil Coram, FDEP - Bureau of Mines
Sam Zamani, FDEP - Phosphate Management
Gary Uebelhoer, ECT
Sid Van Landingham, The Shaw Group
Tom Leto, Ardaman & Assoc.



TRIGGER LEVELS FOR INITIATING
DISCHARGES OF TREATED PROCESS WATER TO PREVENT
AN ACCIDENTAL SPILL AT THE 95% CONFIDENCE LEVEL

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

PINEY POINT PHOSPHATES, INC.
PHOSPHOGYPSUM STACK SYSTEM
MANATEE COUNTY, FLORIDA

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FILE NO. 02-099	APPROVED BY:	FIGURE: 1

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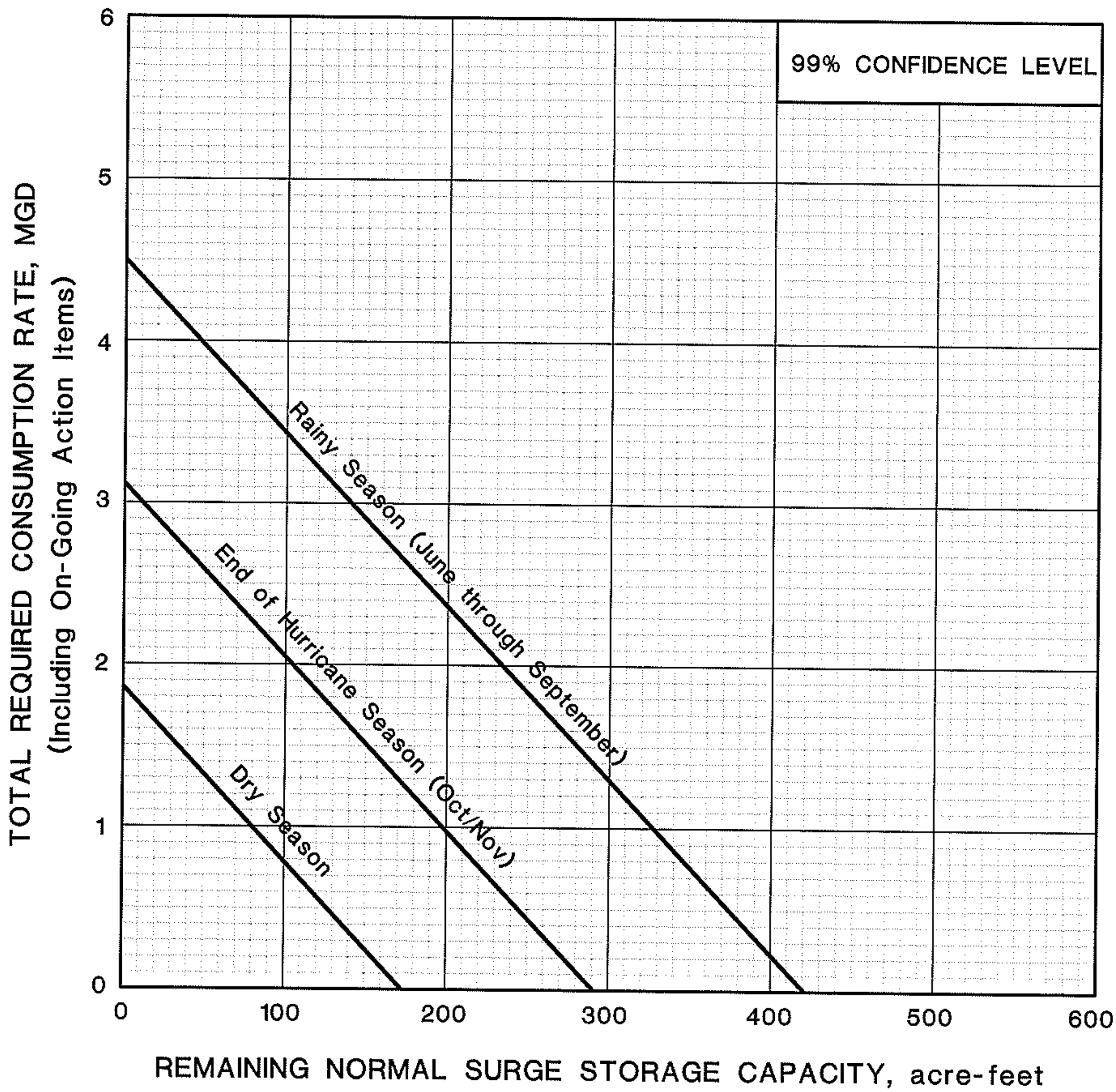

TRIGGER LEVELS FOR INITIATING
DISCHARGES OF TREATED PROCESS WATER TO PREVENT
AN ACCIDENTAL SPILL AT THE 99% CONFIDENCE LEVEL

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

PINEY POINT PHOSPHATES, INC.
PHOSPHOGYPSUM STACK SYSTEM
MANATEE COUNTY, FLORIDA

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FILE NO. 02-099	APPROVED BY:	FIGURE: 2

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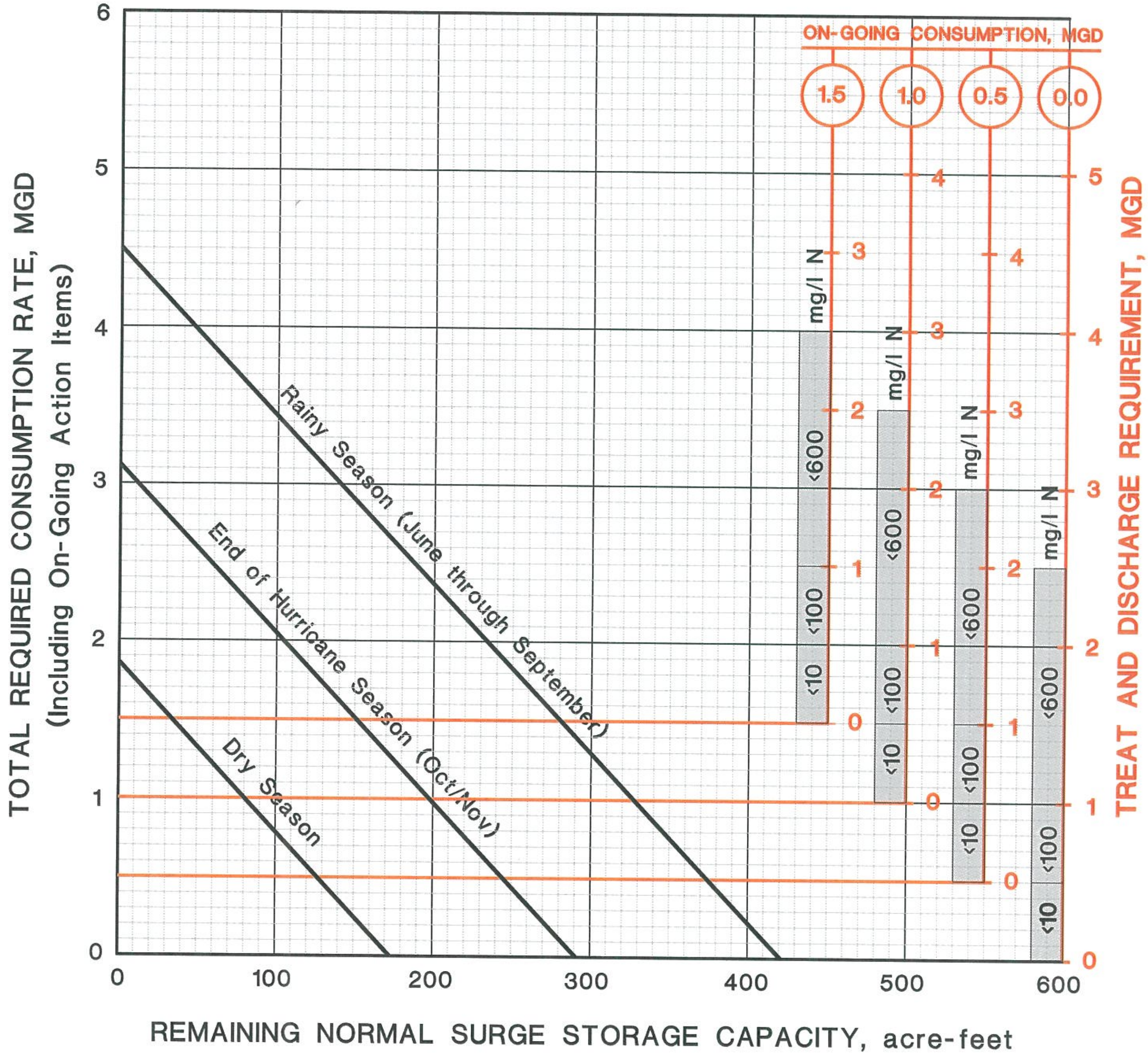
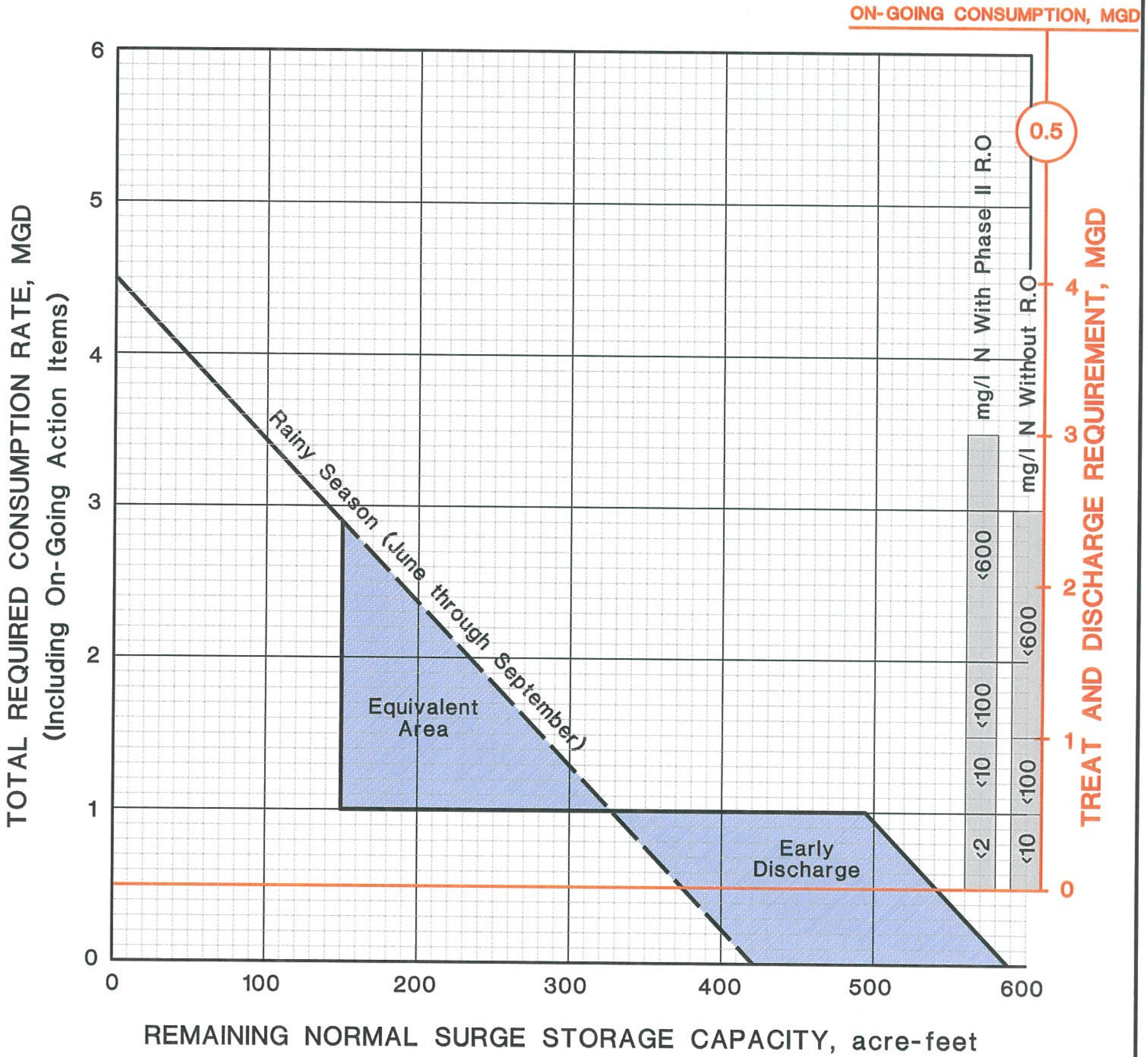


RECOMMENDED TRIGGER LEVELS FOR INITIATING DISCHARGES OF TREATED PROCESS WATER TO PREVENT AN ACCIDENTAL SPILL AT THE 99% CONFIDENCE LEVEL

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

PINEY POINT PHOSPHATES, INC.
PHOSPHOGYPSUM STACK SYSTEM
MANATEE COUNTY, FLORIDA

DRAWN BY: MH	CHECKED BY: MH	DATE: 07/09/02
FILE NO. 02-099	APPROVED BY:	FIGURE: 3



METHODOLOGY FOR SELECTION OF EARLY DISCHARGE TRIGGERS TO MINIMIZE THE LIKELIHOOD OF HIGH NUTRIENT LOADINGS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

PINEY POINT PHOSPHATES, INC.
PHOSPHOGYPSUM STACK SYSTEM
MANATEE COUNTY, FLORIDA

DRAWN BY: MH	CHECKED BY: MH	DATE: 07/09/02
FILE NO. 02-099	APPROVED BY:	FIGURE: 4

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September 24, 2002
File No. 02-099

Louis J. Timchak, Jr., Receiver
18810 Place Antibes
Lutz, Florida 33549-5341

Subject: Executive Summary - Recommended Trigger Levels for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System, Manatee County, Florida.

Dear Mr. Timchak:

This memorandum summarizes the recommended emergency trigger levels for discharge of treated process water from the Piney Point Phosphates, Inc. stack system, based on the results of analyses and evaluations presented in an Ardaman & Associates, Inc. report dated July 17, 2002.

The trigger levels for initiating emergency discharges of treated process water and the discharge rates required to prevent an accidental spill at the 99% confidence level are dependent on the remaining surge storage capacity in the system and on the season, as indicated below:

Total Required Consumption Rate, MGD (Including On-Going Action Items)	Remaining Normal Surge Storage Capacity, acre-feet		
	Rainy Season (June through Sept.)	End of Hurricane Season (Oct./Nov.)	Dry Season
0+	420*	290*	170*
0.5	370	250	130
1.0	330	200	80
1.5	280	150	35
2.0	235	105	--
2.5	190	60	--
3.0	140	10	--
3.5	95	--	--
4.0	45	--	--

*Emergency Trigger

The consumption rates tabulated above represent the cumulative rate of consumption required, including consumption associated with "on-going" water management action items. Considering that the cumulative consumption rate of "on-going" action items (including reverse osmosis) is expected to range from 0.3 to 1.0 MGD, the discharge of double-stage lime treated fully aerated process water will have to be initiated when the normal surge storage capacity during the rainy season drops to levels below 390 to 330 acre-feet, respectively. (During October and November, the corresponding triggers are 265 and 200 acre-feet, respectively; and during the dry season, the corresponding triggers equal 145 and 130 acre-feet, respectively.)

In order to minimize the potential cumulative impacts to Bishop's Harbor and Tampa Bay, it would be prudent to initiate the discharge of low nutrient reverse osmosis (R.O.) permeate (having a nitrogen concentration less than 2 mg/l), and even double-stage treated fully aerated water (having a nitrogen concentration less than 10 mg/l), sooner than otherwise required so as to reduce the likelihood of potentially being forced to discharge water containing much more elevated nutrient concentrations. The corresponding early trigger levels and recommended consumption rates are as follows:

Total Required Consumption Rate, MGD (Including On-Going Action Items)	Remaining Normal Surge Storage Capacity, acre-feet		
	Rainy Season (June through Sept.)	End of Hurricane Season (Oct./Nov.)	Dry Season
0+	585*	460*	340*
0.5	540	420	300
1.0	330 - 500	200 - 380	80 - 260
>1.0 (see table above)	<330	<200	<80

*Early Trigger

Since some action items are wet weather sensitive and others are subject to production rate uncertainties, it is recommended that only "on-going" action items and "on-going" consumption rates at any given time be considered in determining the required discharge rates for the treated process water. The early triggers consider that R.O. permeate and effluent from double-stage fully aerated lime treatment of process water could be generated at combined rates of 1.0 MGD (i.e., about 0.5 MGD for the double-stage treated water, and 0.5 MGD for the R.O. permeate).

I trust that this executive summary clarifies our recommendations for initiating early discharges of treated process water from the Piney Point Phosphates, Inc. stack system.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Nadim F. Fuleihan, ScD., P.E.
Principal
Florida Registration No. 31953

NFF/elb
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cc: Joseph Bakker, FDEP-Bureau of Mines
Phil Coram, FDEP - Bureau of Mines
Sam Zamani, FDEP - Phosphate Management
Gary Uebelhoer ECT
Sid Van Landingham, The Shaw Group
Tom Leto, Ardaman & Associates, Inc.

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

January 7, 2003
File Number 02-099

Louis J. Timchak, Jr., Receiver
18810 Place Antibes
Lutz, Florida 33549-5341

Subject: Updated Trigger Level Recommendations for Discharge of Treated Process Water at Piney Point Phosphates, Inc. Phosphogypsum Stack System During an El-Niño Rainfall Year, Manatee County, Florida.

Dear Mr. Timchak:

This memorandum updates the recommended emergency trigger levels for discharge of treated process water from the Piney Point Phosphates, Inc. stack system taking into consideration an El-Niño rainfall year. The results are based on analyses and evaluations similar to those previously presented in Ardaman & Associates, Inc. reports dated July 17 and September 24, 2002.

The trigger levels for initiating emergency discharges of treated process water and the discharge rates required to prevent an accidental spill at the 99% confidence level are dependent on the remaining surge storage capacity in the system and on the season, as indicated below:

Total Required Consumption Rate, MGD (Including On-Going Action Items)	Remaining Normal Surge Storage Capacity, acre-feet				
	Rainy Season (June through Sept.)	End of Hurricane Season (Oct./Nov.)	"Dry Season"		
			"Extreme" El-Niño (March)	Average El-Niño (Jan-March)	Normal Dry Season
0+	420*	290*	300*	250*	170*
0.5	370	250	260	210	130
1.0	330	200	210	160	80
1.5	280	150	160	110	35
2.0	235	105	115	65	--
2.5	190	60	70	20	--
3.0	140	10	20	--	--
3.5	95	--	--	--	--
4.0	45	--	--	--	--

*Emergency Trigger

The trigger levels for the "rainy season", "end of hurricane season" and "normal dry season" correspond to those derived for a normal rainfall year as previously documented in the July 17 and September 24, 2002 submittals. The "dry season" trigger level for average El-Niño conditions is based on the statistics of historic El-Niño monthly rainfalls during January, February and March (of calendar years 1915, 1919, 1941, 1958, 1966, 1969, 1973, 1983, 1987, 1992 and 1998). The corresponding emergency trigger level is essentially equivalent to the surge required to contain normal monthly rainfall during the dry season in addition to the 50-year/24-hour storm event (i.e., a storm that produces 10 inches of precipitation).

The "dry season" extreme El-Niño trigger is based on the statistics of the wettest historic El-Niño month of March. Note that El-Niño does not typically produce much higher than normal rainfall during April and May, and that the statistics of the 14 historic El-Niños during December (of calendar years 1914, 1918, 1940, 1941, 1957, 1963, 1965, 1972, 1982, 1986, 1987, 1991, 1994 and 1997) were not as critical as those documented for the months of January, February and March. A comparison of the statistical mean and standard deviation of monthly rainfall values for the Bartow NOAA station is presented below.

Month	Average ±1 SD All Rainfall Years (inches)	Average ±1 SD El-Niño Rainfall Years (inches)	Maximum Recorded During El-Niño Year (inches)
December	2.16 ± 1.98	2.94 ± 2.52	10.70*
January	2.43 ± 1.99	4.05 ± 2.10	6.98
February	2.85 ± 2.08	4.47 ± 2.50	9.15
March	3.14 ± 2.36	5.16 ± 2.75	10.25
April	2.64 ± 2.05	2.89 ± 2.30	6.89
May	4.42 ± 3.25	2.63 ± 1.88	5.93

*14.75 and 15.57 inches recorded at Plant City and Tampa, respectively, in 1997.

The consumption rates tabulated on the preceding page represent the cumulative rate of consumption required, including consumption associated with "on-going" water management action items. Considering that the cumulative consumption rate of "on-going" action items (including reverse osmosis) is currently expected to range from 0.3 to 0.5 MGD only, the discharge of double-stage lime treated fully aerated process water will have to be initiated when the normal surge storage capacity during an El-Niño "dry season" drops to levels below 275 to 205 acre-feet.

In order to minimize the potential cumulative impacts to Bishop's Harbor and Tampa Bay, it would be prudent to initiate the discharge of double-stage treated fully aerated water (having a nitrogen concentration typically less than 10 to 20 mg/l), sooner than otherwise required so as to reduce the likelihood of potentially being forced to discharge water containing much more elevated nutrient concentrations. The corresponding early trigger levels and recommended consumption rates are as follows:

Total Required Consumption Rate, MGD (Including On-Going Action Items)	Remaining Normal Surge Storage Capacity, acre-feet				
			"Dry Season"		
	Rainy Season (June through Sept.)	End of Hurricane Season (Oct./Nov.)	"Extreme" El-Niño (March)	Average El-Niño (Jan-March)	Normal Dry Season
0+	585*	460*	470*	420*	340*
0.5	540	420	430	380	300
1.0	330 - 500	200 - 380	210-390	160-340	80 - 260
>1.0 (see table above)	<330	<200	<210	<160	<80

*Early Trigger

Since some action items are wet weather sensitive and others are subject to production rate uncertainties, it is recommended that only "on-going" action items and "on-going" consumption rates at any given time be considered in determining the required discharge rates for the treated process water.

Considering that the normal surge storage capacity on January 6, 2003 was 103 acre-feet only, there is currently a need to consume process water at a rate no less than 1.6 MGD ("Average El-Niño") and preferably as high as 2.2 MGD ("Extreme El-Niño"), particularly since a moderate El-Niño is apparently digging its heels and NOAA is currently forecasting a 20 to 30% increased probability for above normal rainfall through April 2003.

I trust that this submittal clarifies our recommendations for initiating early discharges of treated process water from the Piney Point Phosphates, Inc. stack system.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

1/7/03

Nadim F. Fuleihan, ScD., P.E.
Principal
Florida Registration No. 31953

NFF/ed

cc: Joseph Bakker, FDEP-Bureau of Mines
Phil Coram, FDEP - Bureau of Mines
Sam Zamani, FDEP - Phosphate Management
Gary Uebelhoer ECT
Sid Van Landingham, The Shaw Group
Tom Leto, Ardaman & Associates, Inc.

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