STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

PEACE RIVER/MANASOTA REGIONAL WATER SUPPLY AUTHORITY, Petitioner, and LEE COUNTY, Intervenor, vs. IMC PHOSPHATES COMPANY and DEPARTMENT OF ENVIRONMENTAL PROTECTION, Respondents.	Case Nos. 03-0791 03-0792 03-0804 03-0805 03-1610 04-1062

RECOMMENDED ORDER

Robert E. Meale, Administrative Law Judge of the Division of Administrative Hearings, conducted the final hearing in Tampa, Florida, on May 10-14, May 17-22, May 24-27, June 1-5, June 7-12, June 14-19, June 21-26, July 10, and July 12-13, 2004.

APPEARANCES

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STATEMENT OF THE ISSUES

The issues are whether IMC Phosphates Company is entitled to an environmental resource permit for phosphate mining and reclamation on the Ona-Ft. Green extension tract, approval of its conceptual reclamation plan for the Ona-Ft. Green extension tract, and modification of its existing wetland resource permit for the Ft. Green Mine to reconfigure clay settling areas, relocate mitigation wetlands, and extend the reclamation schedule.

PRELIMINARY STATEMENT

I. DOAH Case No. 03-0791 (Peace River/Manasota Regional Water Supply Authority)

With respect to DOAH Case No. 03-0791, Petitioner Peace River/Manasota Regional Water Supply Authority filed its Petition for Administrative Hearing on February 11, 2003. The petition challenges the proposed agency actions to issue an environmental resource permit, approve a conceptual reclamation plan, and modify a wetland resource permit. Petitioner Peace River/Manasota Regional Water Supply Authority pleaded standing based on Section 120.569, Florida Statutes.

As to the proposed environmental resource permit, Count One alleges that, individually and cumulatively, Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed activities would not harm the water resources; would be consistent with the overall objectives of the Southwest Florida Water Management District and Respondent Department of Environmental Protection; would not violate State water quality standards; would not be contrary to the public interest; would not adversely affect the public health, safety or welfare or the property of others; would not adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats; would not adversely affect navigation or the flow of water or cause harmful erosion or shoaling; would not adversely affect the fishing or recreation values or marine productivity in the vicinity of the proposed activity; would not adversely affect significant historical and archaeological resources; would not cause adverse water quantity impacts to receiving waters and adjacent lands; would not cause adverse flooding to onsite or offsite property; would not cause adverse impacts to existing surface water storage and conveyance capabilities; would not adversely impact the value of functions provided to fish, wildlife, and listed species, including aquatic- and wetland-dependent species, [by wetlands,] other surface waters, and other water-related resources of the Southwest Florida Water Management District; would not adversely affect the quality of receiving waters; would not cause adverse secondary impacts to the water resources; would not adversely impact the maintenance of surface water or groundwater levels or surface water flows; would not adversely affect a work of the Southwest Florida Water Management District; would be capable, based on generally accepted engineering and scientific principles, of performing effectively and functioning as proposed; would be conducted by an entity with the financial, legal, and administrative capability of ensuring that the proposed activities would be undertaken in accordance with the conditions of the permit; and would not cause unacceptable cumulative impacts upon wetlands and other surface waters.

Count One alleges that the proposed agency action to issue the environmental resource permit violates Chapters 120 and 373, Florida Statutes, and Florida Administrative Code Chapters 28, 62-330, 62-343, 40D-1, and 40D-4.

As to the proposed conceptual reclamation plan, Count Two alleges that Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed reclamation activities would use good quality topsoils and, where topsoils would not be used, would use a growing medium suitable for the targeted vegetative communities; would restore wetlands at least acre-for-acre and type-for-type; would design wetlands to maximize beneficial drainage, provide aquatic and wetlands habitat, and maintain downstream water quality by preventing erosion and providing nutrient uptake; would result in all waters on or leaving the property meeting all applicable water quality standards; would restore the original drainage to the greatest extent practicable; would observe watershed boundaries in restoring drainage; would restore watersheds within their pre-mining boundaries; would restore and revegetate all wetland areas in accordance with the best available technology; would reclaim clay disposal methods on the Ona Mine as expeditiously as possible; would dispose of all waste clays at the Ona Mine in a manner that reduces the volume needed for disposal; would dispose of all waste clays at the Ona Mine in a manner that minimizes the time that waste disposal sites are required, reduces the impact on drainage and pre-mining topography, and considers post-reclamation land use potential; and would be completed timely.

Count Two alleges that the proposed agency action to approve the conceptual reclamation plan violates Chapters 120, 211, 378, and 403, Florida Statutes, and Florida Administrative Code Chapters 28, 62-4, 62-110, and 62C-16.

As to the proposed wetland resource permit modification, Count Three alleges that Respondent IMC Phosphates Company, individually and cumulatively, has failed to provide reasonable assurances that the proposed activities would not be contrary to the public interest, would not violate water quality standards, and would not discharge, emit, or cause pollution.

Count Three alleges that the proposed agency action to modify the wetland resource permit violates Chapters 120 and 403, Florida Statutes, and Florida Administrative Code Chapters 28, 62-4, 62-110, 62-302, and 62-312.

II. DOAH Case No. 03-0792 (Charlotte County)

With respect to DOAH Case No. 03-0792, Petitioner Charlotte County filed its Petition for Administrative Hearing on February 11, 2003. The petition, which was verified by an affidavit signed by county representative Elliot Kampert, challenges the proposed agency actions to issue an environmental resource permit, approve a conceptual reclamation plan, and modify a wetland resource permit. Petitioner Charlotte County pleaded standing based on Sections 120.569 and 403.412(5), Florida Statutes.

As to the proposed permit, plan approval, and permit modification, the petition alleges that the respondents entered into a Team Permitting Agreement, pursuant to an Ecosystem Management Process. The petition alleges that the implementation of the Team Permitting Agreement fails to meet all applicable criteria, so as to provide a net ecosystem benefit to the ecosystem, as compared to the benefit to the ecosystem that would result from the application of the conventional permitting criteria; entry into the Team Permitting Agreement interferes with the obligations of Respondent Department of Environmental Protection under federally delegated or approved programs; the implementation of the Team Permitting Agreement fails to reduce the overall risks to human health and the environment, as compared to the reductions of these risks that would result from the application of conventional permitting criteria; Respondent IMC Phosphates Company has failed to certify to Respondent Department of Environmental Protection that it has adopted sufficient internal environmental management systems or alternative internal controls to implement the Team Permitting Agreement; and the Team Permitting Agreement fails to improve the integration between land use planning and regulation and fails to achieve positive environmental results in an efficient and cost-effective manner.

The petition alleges that the proposed permit, plan approval, and permit modification violate Chapters 120, 211, 373, 378, and 403, Florida Statutes; Florida Administrative Code Chapters 28, 62-4, 62-110, 62-302, 62-312, 62-330, 62-343, 62C-16, 40D-1 (as adopted by Florida Administrative Code Rule 62-330.200(3)), and 40D-4 (as adopted by Florida Administrative Code Rule 62-330.200(3)); and the Basis of Review for Environmental Resource Permits (as adopted by Florida Administrative Code Rule 62-330.200(3)).

As to the proposed environmental resource permit, Count I alleges that, individually and cumulatively, Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed activities would not cause adverse water quantity impacts to receiving waters and adjacent lands; would not cause adverse flooding to onsite or offsite property; would not cause adverse impacts to existing surface water storage and conveyance capabilities; would not adversely affect the functions provided to fish, wildlife, and listed species, including aquatic- and wetland-dependent species, by wetlands, other surface waters, and other water-related resources of the Southwest Florida Water Management District; would not adversely affect the quality of the receiving waters through violations of applicable water quality standards; would not cause adverse secondary impacts to water resources; would not adversely impact the maintenance of surface water or groundwater levels or surface water flows established pursuant to Section 373.042, Florida Statutes; would not adversely impact a work of the Southwest Florida Water Management District, pursuant to Section 373.086, Florida Statutes; would be capable, based on generally accepted engineering and scientific principles, of performing effectively and functioning as proposed; would be conducted by an entity with the financial, legal, and administrative capability of ensuring that the proposed activities would be undertaken in accordance with the conditions of the permit; would comply with all applicable basin or geographic criteria; would not be contrary to the public interest; would not adversely affect the public health, safety, or welfare or the property of others; would not adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats; would not adversely affect navigation or the flow of water or cause harmful erosion or shoaling; would not adversely affect the fishing or recreation values or marine productivity in the vicinity of the proposed activities; would not be of a permanent nature; would not adversely affect significant historical or archaeological resources; would not adversely affect the current condition and relative value of functions being performed in areas that would be affected by the proposed activities; would not be harmful to the water resources of the Southwest Florida Water Management District; and would be consistent with the objectives of the Southwest Florida Water Management District. Count I also alleges that Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed activities would not cause adverse cumulative impacts to wetlands and other surface waters; the proposed activities would be subject to permitting conditions that would assure compliance with all applicable permitting criteria during the life of the proposed activities; and Respondent IMC Phosphates Company has undivided ownership, leasehold, or other legal control of the Ona Mine.

Count I alleges that the proposed agency action to issue the environmental resource permit violates Chapters 120 and 373, Florida Statutes; Florida Administrative Code Chapters 28, 62-330, 62-343, 40D-1 (as adopted by Florida Administrative Code Rule 62-330.200(3)), and 40D-4 (as adopted by Florida Administrative Code Rule 62-330.200(3)); and the Basis of Review for Environmental Resource Permits (as adopted by Florida Administrative Code Rule 62-330.200(3)).

As to the proposed conceptual reclamation plan, Count II alleges that Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed reclamation activities would reclaim all lands in a neat, clean manner by removing or adequately burying all debris, litter, and junked equipment or materials; would leave any mined boulders distinctly visible or buried to a depth of at least four feet; would remove all temporary buildings, pipelines, and other manmade structures, except for those sound structures compatible with reclamation goals; would achieve post-reclamation land uses and landforms best suited to enhance the recovery of the land into mature sites with high potential for the targeted uses; would result in post-reclamation slopes of no more than four feet horizontal to one foot vertical to enhance slope stabilization and promote public safety; would mulch and contour to enhance the stabilization of continuous slopes; would repair and stabilize any washes or rills that develop after revegetation, but before final release, so as to eliminate further erosion; would require Respondent IMC Phosphates Company to inform Respondent Department of Environmental Protection of the nature and amount of strata to be mined that is unsuitable for general reclamation due to the potential hazard that they pose to public health and safety; would replace in the mine cut, beneath all other backfill material, any mined strata that are unsuitable for general reclamation due to the potential hazard that they pose to public health and safety; would use good quality topsoils, especially in areas of reclamation by natural succession, and, where topsoils would not be used, would use a suitable growing medium for the targeted vegetative communities; would restore wetlands at least acre-for-acre and type-for-type; would design wetlands and other waterbodies to be consistent with health and safety practices, maximize beneficial drainage, provide aquatic and wetlands habitat, and maintain downstream water quality by preventing erosion and providing nutrient uptake; would design waterbodies to incorporate a variety of emergent habitats, a balance between deep and shallow water, fluctuating water levels, high ratios of shoreline to surface area, and a variety of shoreline slopes; would assure that at least 25 percent of the high water surface area for each waterbody would consist of an annual zone of water fluctuation to encourage emergent and transition zone vegetation; if the preceding requirement were unmet, would construct additional wetlands adjacent and hydrologically connected to the noncompliant waterbody; would assure that at least 20 percent of the lower water surface for each waterbody would consist of a zone between the annual low waterline and six feet below the annual low waterline, so as to provide fish bedding areas and submerged vegetation zones; would construct, for each waterbody, a perimeter vegetative greenbelt consisting of indigenous trees and shrubs, plus groundcover, that is at least 120 feet wide and sloped no greater than 30 feet horizontal to one foot vertical or an earthen berm of sufficient size to retain at least the first inch of runoff and setback sufficiently so as to comply with Florida Administrative Code Rule 62C-16.0051(5); would result in all waters of the State leaving the Ona Mine meeting all applicable water quality standards; would result in all waters within reclaimed wetlands or waterbodies maintaining sufficient quality to allow recreation or support fish and wildlife; would eliminate the risk of flooding of lands not controlled by Respondent IMC Phosphates Company due to silting or damming of stream channels, channelization, slumping or sliding of debris, uncontrolled erosion, or intentional spoiling or diking; would restore the original drainage to the greatest extent possible; would observe watershed boundaries in restoring drainage and restore watersheds within their pre-mining boundaries; would restore temporary roads at least to grade, where their existence interferes with drainage; would reclaim clay disposal areas at the Ona Mine as expeditiously as possible; would use experimental methods to speed reclamation; would dispose of all waste clays at the Ona Mine in a manner that reduces the volume needed for disposal; would achieve long-term stabilization of retention dikes and dams; would dispose of all waste clays at the Ona Mine in a manner that minimizes the time that waste disposal sites are required, reduces the impact on drainage and pre-mining topography, and considers post-reclamation land use potential; would preclude the permanent spoiling of sand tailings above natural grade, unless required for regulatory or environmental purposes; would assign the highest priority to the use of sand tailings for backfilling mine cuts, accelerating the thickening of waste clays, or enhancing soil by mixing with surface clays on clay storage areas at the Ona Mine; would incorporate a revegetation plan for the Ona Mine that would achieve permanent revegetation, minimize soil erosion, conceal the effects of surface mining, and recognize the requirements for appropriate fish and wildlife habitat; would identify the species of grasses, shrubs, trees, and aquatic and wetlands vegetation to be planted, the spacing of the plantings, and any program necessary for treating the soils to prepare them for revegetation; would establish groundcover for one year after planting over 80 percent of all upland areas on the Ona Mine, excluding roads, groves, or row crops; would restrict bare areas on the Ona Mine to not more than one-quarter acre; would establish upland forested areas on the Ona Mine that resembled pre-mining conditions where practical and consistent with proposed land uses; would revegetate at least ten percent of the upland area of the Ona Mine as upland forested areas with a variety of indigenous hardwoods and conifers; would protect upland forested areas from grazing, mowing, or other adverse land uses to allow their establishment; would require a stand density of 200 trees per acre after one year of planting to constitute reforestation; would restore and revegetate all wetland areas on the Ona Mine in accordance with the best available technology; would require a groundcover of at least 50 percent after one year of planting to constitute herbaceous wetlands and would protect them from grazing, mowing, or other adverse land uses for three years after planting to allow their establishment; would require a stand density of 200 trees per acre after one year of planting to constitute wooded wetlands and would protect them from grazing, mowing, or other adverse land uses for five years or until the trees are at least ten feet tall; would require the use of indigenous species in the replanting of trees; would offset lost fish and wildlife values; would incorporate special programs to restore, enhance, or reclaim habitats, especially for endangered or threatened species; would specify Wildlife

Areas within the Ona Mine and plan for their reclamation and management; would develop a time schedule to the completion of reclamation, including an estimate of the completion of the removal of phosphate rock would be complete and the acreage to be mined each calendar year, the completion of other mining operations in the area and a description of such operations, the commencement and completion of waste disposal, the commencement and completion of contouring, and the commencement and completion of revegetation; would complete waste disposal as soon as practical after mining has occurred when disposal would take place at the Ona Mine; would complete waste disposal as soon as practical when waste disposal would not take place at the Ona Mine; would contour all areas not later than 18 months after the end of the calendar year in which they would be mined or 18 months after an area is capable of contouring, when additional mining operations, such as waste disposal, would occur; would contour all unmined, but disturbed, areas not later than the end of the year following the year in which mining operations would end on such lands; would revegetate the Ona Mine as soon as practical after each area is contoured, but not later than six months after contouring is required to be completed; would complete the reclamation and restoration of the Ona Mine within two years of the actual completion of mining operations, exclusive of the growing season required to ensure the growing of the vegetation and except for the use of sand-clay mix or other innovative technology; would not discharge, emit, or cause unlawful pollution, based on plans, test results, the installation of pollution control equipment, or other information; and would be subject to permitting conditions that would assure compliance with all applicable permitting criteria during the life of the proposed activities.

Count II alleges that the proposed agency action to approve the conceptual reclamation plan violates Chapters 120, 211, 378, and 403, Florida Statutes, and Florida Administrative Code Chapters 28, 62-4, 62-110, and 62C-16.

As to the proposed wetland resource permit modification, Count III alleges that Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed activities would not violate water quality standards; would not be contrary to the public interest; would not adversely affect the public health, safety, or welfare or the property of others; would not adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats; would not adversely affect navigation or the flow of water or cause harmful erosion or shoaling; would not adversely affect the fishing or recreation values or marine productivity in the vicinity of the proposed activities; would not be of a permanent nature; would not adversely affect significant historical or archaeological resources; would not adversely affect the current condition and relative value of functions being performed in areas that would be affected by the proposed activities; and would not discharge, emit, or cause unlawful pollution, based on plans, test results, the installation of pollution control equipment, or other information.

Count III alleges that the proposed agency action to modify the wetland resource permit violates Chapters 120 and 403, Florida Statutes, and Florida Administrative Code Chapters 28, 62-4, 62-110, 62-302, and 62-312.

III. DOAH Case No. 03-0804 (Alan R. Behrens)

With respect to DOAH Case No. 03-0804, Petitioner Alan R. Behrens filed his Petition for Formal Hearing on January 18, 2003. The unverified petition challenges the proposed agency actions to issue an environmental resource permit and approve a conceptual reclamation plan. Petitioner Alan R. Behrens pleaded standing based on Sections 120.569 and 40[3].412(5), Florida Statutes.

The petition alleges that Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed activities would not cause adverse water quantity impacts to the receiving waters and adjacent lands; would not cause adverse flooding to onsite or offsite property; would not cause adverse impacts to existing surface water storage and conveyance capabilities; would not adversely impact the value of functions provided to fish, wildlife, and listed species by wetlands and other surface waters; would not adversely affect the quality of receiving waters so as to cause violations of water quality standards; would not cause adverse secondary impacts to the water resources; would not adversely impact the maintenance of surface water and groundwater levels or flows; would not cause adverse impacts to projects undertaken by other regulatory entities; would not perform or function as proposed; would not be conducted by an entity with the financial, legal, and administrative capability of ensuring that the proposed activity would be undertaken in accordance with the conditions of the permit; would not adversely affect the public health, safety, or welfare of the property of others; would not adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats; would not adversely affect navigation or the flow of water or cause harmful erosion or shoaling; would not adversely affect fishing or recreation values or marine productivity in the vicinity of the proposed activity; would not be of a permanent nature; would not adversely affect significant historical and archaeological resources; would not strip-mine mature and complex wetlands; would not strip-mine wetlands already degraded by Respondent IMC Phosphates Company; would not disturb wetlands in areas where they add significant value; would not strip-mine wetlands containing rare habitat; would not result in the loss of wetland functions for an extended period of time; would not mine wetlands that contain habitat uniquely dependent on the soil and existing topography and hydrology; would not adversely impact adjacent wetland functions; would not result in adverse cumulative impacts to the wetlands and habitat of the surrounding area; would not strip-mine mature and sustainable wildlife habitat; would not contribute to the "poor quality" wildlife habitat proposed for mining; would not strip-mine rare wildlife habitat; would not result in the loss of wildlife habitat for an extended period of time; would not adversely impact adjacent wildlife habitat; would not result in adverse cumulative impacts to the habitat of the surrounding area; would not cause severe hydrological disturbance for an extended period of time; would not permanently disturb the hydrology; would not result in surface water or groundwater violations; would not result in adverse cumulative impacts to the water quality of the surrounding area; would not disturb water quality for an extended period of time; would not maintain or improve the pre-mining biological functions; would be compatible with surrounding environmental resources; would result in reclamation that would be sustainable or protected in the long term; would result in reclamation that would be successfully constructed;

would not destroy valuable historical or archaeological resources; and would satisfy the requirements contained in the Basis for Recommending Whether or Not an Area Proposed for Mining is Permittable. The petition also alleges that Respondent IMC Phosphates Company has failed to provide reasonable assurances that it has a history of regulatory compliance and financial responsibility.

The petition alleges that the proposed agency actions to issue the environmental resource permit and approve the conceptual reclamation plan violate Chapters 120, 187, 253, 258, 373, 380, and 403, Florida Statutes; Sections 373.016, 373.413, 373.414, 373.429, 373.430, 403.087, 403.088, and 40[3].412(4), Florida Statutes; Florida Administrative Code Chapters 27, 28, 39, 62, 62-4, 62-110, 62-302, 62-330, 62-343, 62-520, 62-522, 62-550, 40D-1, and 40D-4; and the Basis of Review for Environmental Resource Permits Sections 3.1.1, 3.2.3, 3.2.4, 3.2.2.1, 3.2.2.2, 3.2.2.4, 3.2.4.5, 3.2.7, 3.3.8, 3.3.7.6, 3.3.1.1, 3.3.1.2, 3.3.2.2, 3.3.3.1, 3.3.2.1.1, 4.4, 4.6, 4.7, 4.8, 6.1, 6.2, 6.3, 6.4.1, 6.4.2, 6.5, 6.6, and 6.8.

IV. DOAH Case No. 03-0805 (DeSoto Citizens Against Pollution, Inc.)

With respect to DOAH Case No. 03-0805, Petitioner DeSoto Citizens Against Pollution, Inc., filed its Petition for Formal Hearing on January 18, 2003. The unverified petition challenges the proposed agency actions to issue an environmental resource permit and approve a conceptual reclamation plan. Petitioner DeSoto Citizens Against Pollution, Inc., pleaded standing based on Sections 120.569 and 403.412(5), Florida Statutes.

The petition alleges that Respondent IMC Phosphates Company failed to provide reasonable assurances that the proposed activities, individually or cumulatively, would not harm the water resources of the Southwest Florida Water Management District or Respondent Department of Environmental Protection; would be consistent with the overall objectives of the Southwest Florida Water Management District or Respondent Department of Environmental Protection; would not be contrary to the public interest; would not be a danger to public health or safety; would not cause pollution, as defined in Section 403.031(7), Florida Statutes; would not cause adverse water quality or quantity impacts to receiving waters and adjacent lands; would not cause adverse flooding to onsite or offsite property; would not cause adverse impacts to a work of the Southwest Florida Water Management District; would not adversely impact the value of functions provided to fish, wildlife, and listed species, including aquatic- and wetland-dependent species, by wetlands, surface waters, and other water-related resources; and would not cause impacts that could not be offset by mitigation. The petition alleges that Respondent IMC Phosphates Company failed to provide reasonable assurances that the proposed activities would not discharge, emit, or cause unlawful pollution, based on plans, tests results, the installation of pollution control equipment, or other information; would perform effectively and function as proposed; and would be conducted by an entity with the financial, legal, and administrative capability of ensuring that the proposed activities would be done in accordance with the conditions of the permit. The petition also alleges that Respondent IMC Phosphates Company has not complied with the procedural requirements for an environmental resource permit, has violated rules of Respondent Department of Environmental Protection at other installations, has not obtained the required proprietary authorizations to conduct the proposed activities in the waterways that are sovereign submerged land, and has knowingly made a false statement or representation in its application materials.

The petition alleges that the proposed agency actions to issue the environmental resource permit and approve the conceptual reclamation plan violate Chapters 120, 187, 253, 258, 373, 38[0], and 403, Florida Statutes; Sections 187.201, 258.42, 373.016, 373.413, 373.414, 373.429, 373.430, 380.23, 403.087, and 403.088, Florida Statutes; Florida Administrative Code Chapters 27, 28, 39, 62, 62-4, 62-110, 62-302, 62-330, 62-343, 62-520, 62-522, 62-550, 40D-1, and 40D-4; and the Basis of

Review for Environmental Resource Permits Sections 3.1.1, 3.2.3, 3.2.4, 3.2.2.1, 3.2.2.2, 3.2.2.4, 3.2.4.5, 3.2.7, 3.3.8, 3.3.7.6, 3.3.1.1, 3.3.2.2, 3.3.3.1, 3.3.2.1.1, 4.4, 4.6, 4.7, 4.8, 6.1, 6.2, 6.3, 6.4.1, 6.4.2, 6.5, 6.7, and 6.8.

V. Consolidation and Other Activities

On March 4, 2003, Respondent Department of Environmental Protection transmitted these four cases to the Division of Administrative Hearings for the purpose of conducting a formal hearing.

On March 6, 2003, Hardee County filed a Petition for Administrative Hearing, which became DOAH Case No. 03-0806. As noted below, Hardee County later dismissed this case, so its allegations are omitted from this Recommended Order.

On March 10, 2003, Respondent Department of Environmental Protection filed a motion to consolidate the five cases. On March 12, 2003, the Administrative Law Judge entered an Order consolidating the five cases. On March 17, 2003, the Administrative Law Judge entered a Notice of Hearing, setting the final hearing to start on September 29, 2003, as requested by the respondents.

VI. DOAH Case No. 03-1610 (DeSoto Citizens Against Pollution, Inc., and Alan R. Behrens)

With respect to DOAH Case No. 03-1610, Petitioners DeSoto Citizens Against Pollution, Inc., and Alan Behrens filed their unverified Amended Petition for Formal Hearing on March 28, 2003. On April 24, 2003, Respondent Department of Environmental Protection transmitted this case to the Division of Administrative Hearings for the purpose of conducting a formal hearing.

The petition challenges the proposed agency action to modify a wetland resource permit. Petitioners DeSoto Citizens Against Pollution, Inc., and Alan Behrens pleaded standing based on Sections 120.569 and 402.412(5), Florida Statutes.

The allegations are identical to those contained in the petition of DeSoto Citizens Against Pollution, Inc., in DOAH Case No. 03-0805.

On May 12, 2003, Petitioners DeSoto Citizens Against Pollution, Inc., and Alan Behrens filed a motion to consolidate DOAH Case No. 03-1610 with the other five cases. On June 17, 2003, the Administrative Law Judge entered an order consolidating the six cases.

VII. Intervention of Lee County

On July 31, 2003, Intervenor Lee County filed a Petition to Intervene. The verified petition challenges the proposed agency actions to issue an environmental resource permit, approve a conceptual reclamation plan, and modify a wetland resource permit. Intervenor Lee County pleaded standing based on Sections 120.569 and 403.412(5), Florida Statutes.

The petition alleges that Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed activities would not adversely affect the timing and volume of water flow into, and water quality of, the receiving waters of Charlotte Harbor; would not destroy or disturb the surface waters, wetlands, and waters of the Charlotte Harbor estuary; would not adversely affect the aquatic plants, fish, and wildlife of the Charlotte Harbor estuary; would not adversely affect the public health, safety, or welfare or the property of Lee County citizens, residents, or visitors; and would not impair, pollute, or otherwise injure the water and other natural resources of the State.

The petition alleges that the proposed agency actions violate Chapters 373 and 403, Florida Statutes, and Florida Administrative Code Sections 40D-4.302(b) and 62-330.200(3)(e).

VIII. Continuances, Revisions to Proposed Mining and Reclamation, and Other Activities

On August 11, 2003, Hardee County filed a Notice of Voluntary Dismissal with Prejudice. On August 15, 2003, the Administrative Law Judge entered an order granting Intervenor Lee County leave to intervene.

On August 14, 2003, Petitioners Peace River/Manasota Regional Water Supply Authority and Charlotte County filed separate motions to continue the final hearing, primarily due to difficulties in completing discovery concerning the Ona Mine, which, as then proposed, comprised a 20,675-acre mining operation. On August 18, 2003, Petitioner DeSoto Citizens Against Pollution, Inc., filed a motion to continue the final hearing, primarily due to difficulties that arose from the departure of Hardee County and the failure of other entities to participate in the final hearing. On August 19, 2003, Petitioners Peace River/Manasota Regional Water Supply Authority and Charlotte County filed separate supplements to their motions to continue, citing the recent request of Respondent IMC Phosphates Company for variances from the Class III dissolved oxygen standards applicable to certain waterbodies that Respondent IMC Phosphates Company had proposed to reclaim.

On August 19, 2003, the Administrative Law Judge entered an order denying the request for a continuance of Petitioner DeSoto Citizens Against Pollution, Inc. On September 4, 2003, the Administrative Law Judge entered an order continuing the start of the hearing until October 7, 2003, but leaving the scheduled conclusion of the hearing unchanged.

On September 15, 2003, Respondent Department of Environmental Protection issued a final order in Charlotte County et al. v. IMC Phosphates Company and Department of Environmental Protection, 2003 WL 21801942, 4 ER FALR 42 (DOAH Case No. 02-4134). The Final Order denied the application of

IMC Phosphates Company for an environmental resource permit to mine phosphate at the Altman tract.

On September 19, 2003, Respondent IMC Phosphates Company reversed its earlier opposition to requests for any continuance and filed a motion to continue the final hearing, primarily to allow the parties to explore settlement options and complete discovery. However, during a telephone hearing on the motion, Respondents IMC Phosphates Company and Department of Environmental Protection explained that they needed the continuance because the recent final order required them to revise their evidentiary presentations. Several petitioners opposed the request of the respondents for a short continuance, but did not oppose a longer continuance. The Administrative Law Judge denied the shorter continuance sought by the respondents, but allowed Respondent IMC Phosphates Company time to determine whether it would agree to a longer continuance. After Respondent IMC Phosphates Company agreed to the longer continuance, the Administrative Law Judge entered an order rescheduling the start of the final hearing to February 23, 2004.

In the meantime, the request of Respondent IMC Phosphates Company for a variance had generated 69 challenges and requests for formal hearings, which the Administrative Law Judge set for final hearing, starting December 15, 2003. However, on

November 14, 2003, Respondent IMC Phosphates Company filed a notice of its withdrawal of a request for a variance, thus mooting these 69 cases. In the same pleading, Respondent IMC Phosphates Company, joined by Petitioners Peace River/Manasota Regional Water Supply Authority and Charlotte County, requested a continuance of the final hearing to May 2004, primarily due to the reassessment being conducted by Respondent Department of Environmental Protection as to its proposed agency actions on the environmental resource permit, conceptual reclamation plan, and wetland resource permit modification.

On December 2, 2003, the Administrative Law Judge entered an order granting the request for a continuance and scheduling the final hearing to start on May 10, 2004.

By Stipulation filed March 16, 2004, the parties acknowledged that Respondent IMC Phosphates Company had revised its applications for an environmental resources permit, conceptual reclamation plan, and wetland resource permit modification, and, on February 27, 2004, Respondent Department of Environmental Protection had issued new proposed agency actions with a new point of entry. As discussed below, the most evident revision was a reduction of the proposed Ona Mine from 20,675 acres to 4197 acres and its redesignation as the Ona-Ft. Green extension tract.

The parties stipulated that Petitioners Peace River/Manasota Regional Water Supply Authority, Charlotte County, Alan R. Behrens, and DeSoto Citizens Against Pollution, Inc., could stand by their earlier allegations, which apply in all respects to the new proposed agency actions. The Administrative Law Judge never entered an order accepting the Stipulation, but accepts it now.

IX. DOAH Case No. 04-1062 (Sarasota County)

On March 19, 2004, Petitioner Sarasota County filed an unverified Petition for Administrative Hearing, thus commencing DOAH Case No. 04-1062. The petition challenges the recently revised proposed agency actions to issue an environmental resource permit, approve a conceptual reclamation plan, and modify a wetland resource permit. Petitioner Sarasota County pleaded standing based on Section 120.569, Florida Statutes.

The petition alleges that Respondent IMC Phosphates Company has failed to provide reasonable assurances that the proposed activities, individually and cumulatively, would not harm the water resources; would not be inconsistent with the objectives of the Southwest Florida Water Management District and Respondent Department of Environmental Protection; would not violate water quality standards; would not be contrary to the public interest; would not adversely affect the public health, safety, or welfare or the property of others; would not discharge, emit, or cause pollution; would not adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats; would not adversely affect the fishing or recreational values or marine productivity in the vicinity of the proposed activity; would not adversely affect navigation or the flow of water or cause harmful erosion or shoaling; would not adversely affect significant historical or archaeological resources; would not cause adverse water quantity impacts to receiving waters and adjacent lands; would not cause adverse flooding to offsite properties; would not cause adverse impacts to existing surface water storage and conveyance capabilities; would preserve, restore, or protect drainage patterns or watersheds; would not adversely impact the value and functions provided to water quality, fish and wildlife, and listed species, including aquatic- and wetland-dependent species, [by wetlands], other surface waters, and other related resources of the Southwest Florida Water Management District; would not adversely affect the quality of receiving waters; would not cause adverse secondary impacts to the water resources; would not adversely affect the maintenance of surface water or groundwater levels or surface water flows; would not adversely affect the works of the Southwest Florida Water Management District; would be capable, based on generally accepted engineering and scientific principles, of performing effectively and functioning as proposed; would be conducted by an entity with the financial, legal, and administrative capability of ensuring that the proposed activities would be undertaken in accordance with the conditions of the permit; would not cause unacceptable cumulative impacts on wetlands and other surface waters; and would otherwise satisfy all applicable rules.

The petition alleges that the proposed agency actions violate the Basis of Review for Environmental Resource Permit Applications, as adopted by Respondent Department of Environmental Protection; Chapters 120, 211, 373, 378, and 403, Florida Statutes; and Florida Administrative Code Chapters 28, 62-4, 62-110, 62-302, 62-312, 62-330, 62-343, 40D-1, and 40D-4.

On May 17, 2004, Petitioner Sarasota County filed a pleading verifying its petition. If leave is required to effectuate this verification, and the Administrative Law Judge does not believe that such leave is required, he now grants Petitioner Sarasota County leave to verify its petition, as of May 17, 2004.

X. Consolidation and Stipulations

On March 24, 2004, Respondent Department of Environmental Protection filed a Motion to Consolidate DOAH Case No. 04-1062 with the other five cases. On March 29, 2004, the

Administrative Law Judge entered an order consolidating the cases.

The parties filed stipulations during and after the final hearing. The Administrative Law Judge accepts all of these stipulations and incorporates the facts contained in these stipulations, as appropriate, into the Findings of Fact.

XI. Witnesses and Proposed Recommended Orders

Petitioner Charlotte County called 11 witnesses: Kevin Irwin, William Cox, Lewis Carter, Ryan Barnett, Phillip Davis, John Loper, Frederick Koonce, Thomas Fraser, Kris DeLaney, William Dunson, and Anthony Janicki. Petitioner Peace River/Manasota Regional Water Supply Authority called four witnesses: Henrik Sorensen, Patrick Lehman, Charles Courtney, and Brian Winchester.

Respondent IMC Phosphates Company called 13 witnesses: Deidre Allen, Gary Ubbelhoer, Doreen Donovan, Douglas Durbin, Joseph Schuster, Nancy Bissett, J. Godley, John Kiefer, Andre Clewell, Ron Concoby, George Williams, John Garlanger, and Mark Ross. Respondent Department of Environmental Protection called eight witnesses: Janet Llewellyn, Bud Cates, Richard Cantrell, Christine Keenan, Stephen Partney, Barbara Owens, James Price, and Kevin Laridge.

Volumes 1-79 of the transcript were filed on July 19, 2004, and volume 80 was filed on August 11, 2004. Petitioners Peace

River/Manasota Regional Water Supply Authority and Charlotte County/Lee County and Respondents IMC Phosphates Company and Department of Environmental Protection filed proposed recommended orders on August 31, 2004.

References in this Recommended Order to witnesses as, for instance, "IMC hydrologist Dr. John Garlanger" mean only that IMC called the witness. References to "Charlotte County and the Authority" are generally intended to include all petitioners and Intervenor Lee County.

FINDINGS OF FACT

I. Parties, Phosphate Mining, and Physiography

1. Respondent IMC Phosphates Company, a Delaware general partnership authorized to do business in Florida (IMC), has applied to Respondent Department of Environmental Protection (DEP, which shall include predecessor agencies) for an environmental resource permit (ERP) to mine phosphate rock at the Ona-Ft. Green extension tract (OFG), approval of a conceptual reclamation plan (CRP) to reclaim the mined land at OFG, and modification of a previously issued wetland resource permit (WRP) to relocate and shrink clay-settling areas (CSAs), relocate mitigation wetlands, and extend the reclamation schedule at the Ft. Green Mine, which is an existing mine that is immediately west and north of OFG.

2. Except for the submerged bottom of Horse Creek, which is sovereign submerged land, IMC owns all of the land on which OFG will be located, except for a 1.8-acre parcel owned by Valerie Roberts in Section 16, which is described below with the other sections forming OFG. IMC is negotiating with Ms. Roberts to purchase her land, and she has authorized IMC to pursue mining permits for the entire parcel, including her land.

3. IMC Global, Inc., owns 80 percent of IMC. IMC Phosphates MP Inc., a Delaware corporation, is the managing general partner of IMC. As a successor to International Mining and Chemical Corporation, IMC has been in business for over 100 years. IMC is the largest producer of phosphate in the world. References in this Recommended Order to phosphate mining companies include all forms of business organizations.

4. At present, IMC is operating four phosphate mines in Florida. The largest is the Four Corners Mine, which extends into Hillsborough, Polk, Manatee, and Hardee counties and three river basins. IMC also operates the Hopewell Mine in Hillsborough County, the Kingsford Mine in Hillsborough and Polk counties, and the Ft. Green Mine.

5. Petitioner Charlotte County is located south of Sarasota and DeSoto counties and west of Glades County. The majority of Charlotte Harbor lies within Charlotte County. Charlotte Harbor is a tidal estuary at the mouths of the Peace

and Myakka rivers. An Outstanding Florida Water and an Aquatic Preserve, Charlotte Harbor provides critical habitat for a variety of species. Charlotte Harbor is now an estuary of national significance under the U.S. National Estuary Program. Directly or indirectly, Charlotte Harbor supports 124,000 jobs and generates $6.8 billion in sales annually.

6. To protect this unique natural resource, Charlotte County has adopted a local government comprehensive plan directing residential densities away from Charlotte Harbor. Charlotte County has also expended over $100 million in sanitary sewer capital expenditures for, among other things, the protection of Charlotte Harbor, such as by replacing private residential septic tanks with central sewer.

7. Charlotte County's opposition to phosphate mining and reclamation in the Peace River basin is based on concerns about reduced river flows, reduced abundance and diversity of fish species, the loss of wetlands and first-order streams, and degraded water quality.

8. Petitioner Peace River/Manasota Regional Water Supply Authority (Authority) is an agency authorized by Section 373.196(2), Florida Statutes, and created by interlocal agreement among Charlotte, Sarasota, DeSoto, and Manatee counties. The purpose of the Authority is to supply potable water to several suppliers in southwest Florida.

9. Relying exclusively on the Peace River as its source of raw water, the Authority withdraws water from the Peace River two miles downstream of the point that Horse Creek empties into the Peace River. This point is about midway between Arcadia and Charlotte Harbor. As discussed below, the Authority's permit to withdraw water from the Peace River is dependent upon flows at a point upstream of the confluence of Horse Creek and the Peace River. The Authority's current water use permit expires in 2016.

10. From its water treatment plant, which is located near the withdrawal point, the Authority pumps finished water to Charlotte, Sarasota, and DeSoto counties and the City of North Port. Approximately 250,000 persons rely on these suppliers, and, thus, the Authority, for their potable water. At present, the Authority is obligated to supply 18 million gallons per day (mgd), but anticipates demand to increase to 32 mgd by 2015.

11. Petitioner Sarasota County (Sarasota County) owns and operates a water utility system, which currently supplies 24 mgd of potable water to 125,000 persons. Sarasota County obtains potable water from its wellfields, Manatee County, and the Authority, from which it may take up to 3.6 mgd.

12. By 2017, Sarasota County plans to take 13.7 mgd of potable water from the Authority, partly to offset anticipated reductions in the amount of potable water presently being

supplied by Manatee County. By 2017, the Authority will supply over half of Sarasota County's potable water.

13. Sarasota County also shares Charlotte County's concerns about the overall environmental integrity of Charlotte Harbor, a small part of which is in Sarasota County.

14. Intervenor Lee County (Lee County) is immediately south of Charlotte County. Nearly half of Charlotte Harbor lies within Lee County. Tourism produced an estimated $1.8 billion to Lee County's economy in 2002. Tourists are attracted to Lee County in part due to the high quality of Charlotte Harbor and its unique chain of barrier islands, passes, sounds, and bays that are integral to local fishing and boating.

15. Lee County shares Charlotte County's concerns about the overall environmental integrity of Charlotte Harbor. Lee County is concerned about, among other things, degraded water quality from the discharge of turbid water, increased pollutant loads to the Peace River and Charlotte Harbor, adversely affected freshwater flows in the Peace River, and the consequences of the phosphate mining industry's inability to restore secondary tributaries, which provide base flow and environmental benefits to Charlotte Harbor.

16. Petitioner Alan R. Behrens (Behrens) resides in Wimauma, Florida, which is in Hillsborough County. He has owned

two five-acre tracts along Horse Creek since 1985 and owns a 2.5-acre lot in DeSoto County that fronts Horse Creek for 100-200 feet. The Horse Creek property is 10-15 miles downstream from OFG.

17. Behrens has canoed the entire main stem of Horse Creek from the Peace River to OFG. On May 9, 2004, Behrens canoed up Stream 4w, which is a tributary of Horse Creek on OFG and is described in detail below.

18. Behrens is a founder of Petitioner DeSoto Citizens Against Pollution, Inc. (DCAP), which was incorporated in 1990 as a Florida not-for-profit corporation and has operated in that status continuously since that time. DCAP's purpose is to protect fish, wildlife, and air and water resources; promote public health and safety; increase public awareness of potential environmental hazards; and discourage activities that may be adverse to public health or the environment.

19. DCAP has 52 members, of whom 27 reside in Hardee County, 23 reside in DeSoto County, and two reside in Sarasota County. A substantial number of DCAP's members use Horse Creek for swimming, boating, canoeing, and fossil hunting. At least nine DCAP members own property abutting Horse Creek. Behrens and many DCAP members use wells on their property for potable water.

20. Behrens and DCAP members are concerned that the clay-settling areas described below will increase flooding, the project will adverse affect the timing and volume of the flow and degrade the water quality of Horse Creek, the project will destroy wildlife habitat that--even if reclaimed--will be lost for many years, and the project will cause spills that will destroy fish and wildlife and adversely affect the ability of Behrens and DCAP to enjoy Horse Creek.

21. OFG is in northwest Hardee County, about one-half mile east of the Manatee County line. OFG is about six miles south-southeast of the Four Corners, where Hardee, Manatee, Polk, and Hillsborough counties meet. OFG is about 35 miles east of Bradenton, 12 miles west of Wauchula, several miles south of State Road 62, and 2000 feet north of State Road 64. OFG represents the southernmost extent of phosphate mining in the Peace River basin to date.

22. A nonrenewable resource for which no synthetic substitutes exist, phosphate is an essential nutrient and a major component of manufactured fertilizer. Less important uses of phosphate are for animal feed, soft drinks, and cosmetics. Mining phosphate rock and processing it into phosphoric acid or phosphorus make possible high-yield agriculture, which, by producing more food crop on less land, may reduce worldwide

pressure to convert native habitat to improved agricultural land uses.

23. Phosphate is available in limited quantities. Three-quarters of the recoverable phosphate rock in the United States is found in Florida, mostly in discrete deposits ranging from north-central Florida to Charlotte Harbor. Ten to fifteen million years ago, when peninsular Florida was submerged marine bottom, dead marine organisms accumulated as bone and shell on the ocean floor. These accumulations formed the Bone Valley Formation, which, as the seas withdrew and the peninsula emerged, occupies the lower part of the surficial aquifer at the site of OFG.

24. Briefly, the main elements of the proposed activities in these cases, roughly in the order in which they will take place, are relocating wildlife; constructing a ditch and berm system around the area to be mined; removing topsoil from certain donor areas; removing the overburden and depositing it in rows of spoil within the mine cut; removing the underlying phosphate matrix and slurrying it to a nearby beneficiation plant at the Ft. Green Mine for processing to separate the phosphate rock from the sand and clay tailings; slurrying the clay tailings from the beneficiation plant to two CSAs at the southern end of the Ft. Green Mine; slurrying the sand tailings from the beneficiation plant back to the mine cut to backfill

the excavation; applying topsoil to certain areas or green manuring areas for which topsoil is unavailable; applying muck to certain areas; contouring the reclaimed land to replicate pre-mining topography; analyzing the post-reclamation hydrology; reclaiming wetlands, streams, and uplands on the reclaimed landscape of OFG; maintaining and monitoring the reclaimed wetlands, streams, and uplands until DEP releases IMC from its ongoing reclamation obligations; correcting any problems in reclaimed areas; and removing the ditch and berm system and reconnecting the reclaimed mined area to the areas adjoining it.

25. In the Findings of Fact, this Recommended Order uses "reclaim" to describe the process by which, post-mining, IMC and its reclamation scientists will construct wetlands, other surface waters, and wetlands at OFG. Likewise, in the Findings of Fact, this Recommended Order uses reclamation and mitigation interchangeably. In the Conclusions of Law, this Recommended Order discusses distinctions in these terms.

26. IMC plans to use multiple draglines to dig a series of long, linear trenches in the mined areas of OFG. Each dragline will first remove overburden and place it in piles parallel to the trench being excavated. After removing the overburden, each dragline will remove the phosphate matrix, which consists of phosphate rock, sand, and clay, and deposit it in shallow depressions.

27. Adding water from the mine recirculation system to the phosphate matrix, IMC will slurry the phosphate matrix to the Ft. Green beneficiation plant, which is about 12 miles from OFG. At the beneficiation plant, the phosphate rock will be separated from the sand and clay tailings, again using water from the mine recirculation system.

28. After recovering the phosphate rock, IMC will slurry the sand tailings, which do not retain water, from the Ft. Green beneficiation plant to OFG for backfilling into the mined trenches with the overburden.

29. Not used in the reclamation at OFG, the clay tailings, which retain water for an extensive period of time, will be slurried to the CSAs O-1 and O-2 on the Ft. Green Mine. CSAs O-1 and O-2 are the subject of the WRP, which is discussed below. The volume of the clay leaving the beneficiation plant is greater than the clay in situ, pre-mining, because the slurrying process has saturated the clay. The CSAs provide a place to store the saturated clay while it drains and decreases in volume.

30. The clay-settling process takes a long time, extended by IMC's intention to fill the CSAs by stages to make the most efficient use of the areas designated for the settling of clay. By stage-filling the CSAs, IMC will initially install the clay to a considerable height, using an embankment of approximately

50-60 feet. The water that separates from the clay will then drain across the sloped CSA until it enters the mine recirculation system for reuse. The remaining clay will dry and consolidate. After refilling each CSA approximately three times over about ten years, IMC will allow the clay to settle and consolidate a final time. When the clay has consolidated sufficiently to support agricultural equipment, IMC will regrade the area, reduce the side slopes, and remove the embankments, leaving the CSAs at a finished elevation 20-25 feet above the surrounding grade.

31. Given the ongoing nature of IMC's phosphate mining operations, it is likely that some sand and clay tailings from OFG will go elsewhere, rather than return to the OFG mine cuts and CSAs O-1 and O-2, and that some sand and clay tailings from non-OFG mining operations will go to the OFG mine cuts and CSAs O-1 and O-2. However, these facts are irrelevant to the issues raised in these cases, except for consideration of IMC's sand-tailings budget, which is discussed below.

32. Phosphate mining and reclamation practices have changed dramatically in the past 40 years. Although mining operations and reclamation practices are discussed below in detail, one development in mining and one development in reclamation bear emphasis due to the resulting reductions in water losses to the drainage basin.

33. As explained below, mining operations are dependent upon large volumes of water, which flow through the mine recirculation system. Before 1963, phosphate mining pumped roughly 3000 gallons of water for each ton of mined phosphate rock. By the mid-1970s through 1990, the industry had reduced its groundwater consumption to 1500 gallons per ton of mined rock. From 1991 to 1999, the industry again reduced its groundwater consumption from 1200 gallons per ton to 650 gallons per ton, partly by achieving a 97 percent rate of water-recycling in the mine recirculation system.

34. During roughly the same period, phosphate reclamation activities have expanded considerably. Prior to July 1, 1975, reclamation of mined land was voluntary, encouraged only by the availability of state funds to offset reclamation costs. Today, post-mining reclamation is required by law. As a consequence, post-mining reclamation 30 years ago was relatively modest in scope and intensity.

35. One important development in reclamation practices is the phosphate mining industry's transition from early reclamation techniques that relied on relatively inexpensive contouring of the overburden that remained in the mine cuts following the extraction of the phosphate ore. These reclamation practices--aptly called Land-and-Lakes reclamation--yielded post-reclamation excavations, such as reclaimed lakes or

deep marshes, that, compared to pre-mining conditions, retained considerable volumes of surface water. The resulting increase in surface water area, compared to pre-mining surface water area, meant substantial loss of water from the drainage basin due to increased evapotranspiration.

36. More recent reclamation practices, such as those proposed for OFG, feature more extensive backfilling of the mine cuts with tailings to restore pre-mining topography. The result is that less water is lost to evapotranspiration by retention in newly created lakes and deep marshes and more is timely held and passed by the natural drainage conveyances through detention, attenuation, runoff, and base flow--eventually entering the main basin river in volumes, rates, and times (relative to storm events) comparable to pre-mining conditions.

37. Located near the western divide of the Peace River basin, OFG is near a topographical high point marking the divides among five drainage basins. From north to south, the four other basins are drained by the Alafia River, Little Manatee River, Manatee River, and Myakka River. OFG is located toward the bottom of an escarpment where the Polk Uplands descends into the DeSoto Plain.

38. OFG is located almost entirely within a portion of the Horse Creek basin or sub-basin within the Peace River basin. This Recommended Order shall refer to the drainage basins that

form the larger Peace River basin as sub-basins. A small portion of the western edge of OFG is within the West Fork Horse Creek (West Fork) sub-basin, and a small portion of the eastern edge of OFG is within the Brushy Creek sub-basin. OFG is toward the upper end of the Horse Creek sub-basin.

39. The West Fork and Brushy Creek sub-basins within OFG contain no streams or stream segments and only, between them, about a half dozen wetlands of one-half acre in size or greater. Obviously, as separate sub-basins, these two areas on OFG are relatively far from Horse Creek.

40. West Fork joins Horse Creek a couple of hundred feet south of OFG and just north of State Road 64. Brushy Creek joins Horse Creek six miles southeast of OFG. Horse Creek joins the Peace River at Ft. Ogden, about 40 miles south of OFG and 15 miles northeast of the mouth of the Peace River at Charlotte Harbor.

41. The Peace River basin comprises about 2350 square miles and extends from its headwater lakes in north Polk County to Charlotte Harbor. By comparison, the Horse Creek sub-basin comprises about 241 square miles, or roughly ten percent of the Peace River basin. At Charlotte Harbor, the average flow of the Peace River is about 1700 cubic feet per second (cfs). By comparison, Horse Creek, at its confluence with the Peace River, flows at an average rate of about 170 cfs--again ten percent of

the average rate of flow of the Peace River. West Fork, at its confluence with Horse Creek, flows at an average rate of about 10 cfs. The largest tributary on OFG flows at an average rate of about 0.75 cfs.

42. Forming a little south of Four Corners, Horse Creek is one of five major tributaries of the Peace River. An ecological backbone of this region of Florida, Horse Creek is the only long-term, reliable flowing water system between the Manatee River on the west and Peace River on the east. OFG occupies the upper reaches of Horse Creek.

43. Horse Creek is in good condition, notwithstanding 100 years of nearby cattle ranching. Most of Horse Creek is Class III waters, although a segment near the Peace River is Class I waters.

44. Horse Creek is a moderately incised stream at OFG, especially over its southern two-thirds running through the mine site. Over the little more than three miles that Horse Creek flows through OFG, the streambed drops from nearly 120 feet National Geodetic Vertical Datum (NGVD) at the north end to about 75 feet NGVD at the south end.

45. Within OFG, the valley that Horse Creek occupies is also relatively well-defined. The northern half of the streambed of Horse Creek within OFG is mostly around 100 feet NGVD. The highest adjacent elevations on OFG are about 120 feet

NGVD. At least partly for this reason, most of the tributary streams, except in the flat northern portion of OFG, are also well-incised.

46. OFG extends about 4 1/2 miles north to south, and ranges from 2/3 to 2 1/2 miles from east to west, for a total area of about 6 1/2 square miles. Lying entirely within Township 34 South, Range 23 East, OFG, from its northernmost border, occupies three sections, which are, from north to south: Sections 4, 9, and 16. Immediately west of the southern half of Section 9, OFG occupies most of the southern half of Section 8. Immediately west of Section 16, OFG occupies Section 17, as well as, immediately south of Section 17, all of Section 20 and most of the northern half of Section 29. OFG also extends to parts of four other sections: Sections 10 and 15 east of Sections 9 and 16, respectively, and Sections 18 and 19, west of Sections 17 and 20, respectively.

47. The existing surface waters and nearly all of the existing wetlands are on the two columns of sections running north and south: on the east, Sections 4, 9, and 16 and, on the west, Sections 17, 20, the south part of Section 8, and the north part of Section 29. The northernmost extent of OFG, which consists of Section 4 and the north half of Section 9, is known as the Panhandle.

48. Horse Creek enters OFG at the southwest corner of the Panhandle, at a point midway along the west border of Section 9. The stream flows south through the approximate center of OFG for about 1 1/2 miles until it leaves OFG for a very short distance at the southwest corner of Section 16, as it crosses a corner of property owned by the Carlton-Smith family (Carlton cutout). Horse Creek re-enters OFG at the northeast corner of Section 20 and runs just inside the eastern border of Section 20 and the portion of Section 29 within OFG. Horse Creek leaves OFG near the midpoint of the east border of Section 29.

49. Numerous tributary streams enter Horse Creek within OFG, from the east and west sides of the creek. IMC and DEP have assigned to each of these streams or stream segments a number, followed by a letter to indicate if the stream or stream segment enters Horse Creek from the east or west.

50. To the west of Horse Creek, proceeding from south to north, the streams are 0w, 1w, 2w, 3w, 4w, 5w, 6w, 7w, 8w, and 9w. To the east of Horse Creek, proceeding from south to north, the streams are 12e, 11e, 10e, 5e, 9e, 4e, 8e, 7e, 6e, 2e, 3e, and the Stream 1e series, consisting of Streams (sometimes referred to as stream segments) 1ee, 1ed, 1ec, 1eb, and 1ef. All of the streams join Horse Creek on OFG except Stream 2e, which joins Horse Creek a few hundred feet upstream of the point at which Horse Creek enters OFG, and Stream 7w, which empties

into a backwater swamp (G185/G186) that, in turn, empties into either Horse Creek or the lower end of Stream 6w immediately before it empties into Horse Creek.

51. The alphanumeric designation of the backwater swamp in the preceding paragraph is based on the Map F-2 series, which assign such a designation to each existing wetland community and then identifies the wetland community. For example, the backwater swamp consists of a wet prairie (G185) surrounded by a mixed wetland hardwoods (G186). If a wetland consists of more than one wetland community, this Recommended Order will refer to it either as a wetland complex with its lowest-numbered wetland community--here, wetland complex G185--or the combination of wetland communities--here, G185/G186.

52. Reclaimed wetlands are identified by Figure 13A5-1, which assigns each wetland an alphanumeric designation and identifies its community. The letter indicates if the reclaimed wetland is east ("E") or west ("W") of Horse Creek.

53. Table 13A5-1 2AI identifies each reclaimed wetland by its alphanumeric designation, community, acreage, and status as connected, isolated, or isolated and ephemeral. Table 13A5-1 2AI identifies 110 wetlands to be reclaimed. The largest wetland is E003, which is a 23.8-acre mixed wetland hardwoods that constitutes the riparian wetland of the Stream 1e series. The next largest is W003, which is a 20.7-acre wet prairie at

the headwaters of Stream 9w. Only three other reclaimed wetlands will be at least ten acres: E018, an 11.3-acre wet prairie fringe on the east side of Section 4; E020, an 11.5-acre freshwater marsh at the center of E018; and W039, an 11.2-acre bay swamp at the headwater of Stream 1w. Thirteen reclaimed wetlands are at least five acres, but less than ten acres, and 30 reclaimed wetlands are less than one acre. Table 13A5-1 2AI identifies 44 reclaimed ephemeral wetlands totaling 101 acres.

54. Reclaimed uplands are identified by Map I-2. Although the scales of Map I-2 (one inch equals about 820.5 feet) and the Map F-2 series (one inch equals about 833.3 feet) are larger than the scales of nearly all of the other maps and figures in these cases, acreages derived from these maps for uplands and existing wetlands are very rough approximations and do not approach in accuracy the acreages derived from Table 13A5-1 2AI for reclaimed wetlands.

55. These maps and figures omit one stream segment to be reclaimed. IMC and DEP restricted the designation scheme to streams and stream segments that had once been natural systems, thus excluding artificially created waterways, such as those created by agricultural ditches cut into swales to drain upslope wetlands and uplands. During the hearing, older aerial photographs revealed that, under this scheme, the parties had omitted one stream segment, which they designated Stream 3e′.

Stream 3e′ is northeast of Stream 3e, from which it is separated by a wetland (G133/G134/G135/G136).

56. Besides the streams, two other areas within OFG require early identification due to their prominence in these cases. The northerly area is the Heart-Shaped Wetland (G138/G139/G140/G141/G143/G143A), which is the large wetland in Section 4 into which the Streams 1e series and Stream 3e empty.

57. The other area of heightened importance is in the center of OFG in Sections 17 and 16 and is called the East Lobe, Central Lobe, and West Lobe or, collectively, the Lobes. Dominated by large bayhead headwaters (West Lobe--G197; Central Lobe--G179; East Lobe--G178), the Lobes and the streams connecting them to Horse Creek are entirely within the no-mine area. The West and Central Lobes connect to the west bank of Horse Creek by Streams 6w and 8w, respectively. The East Lobe connects to the east bank of Horse Creek by Stream 9e. The no-mine areas of the West and East Lobes are much larger than the no-mine area of the Central Lobe, and the East Lobe contains a large area of uplands extending east of, and supporting, the large bayhead.

58. Most OFG wetlands are connected or contiguous, and many of these wetlands are riparian wetlands within the 100-year floodplain of Horse Creek or a floodplain of one of the tributaries of Horse Creek. (As used in this Recommended Order,

the floodplain of Horse Creek runs roughly parallel to the banks of Horse Creek and excludes any portion of the floodplain more directly associated with Horse Creek's tributaries or their connected wetlands.) All or nearly all of the isolated wetlands on OFG are ephemeral and permanent, except in very low rainfall periods.

59. The scale of mining is large. The phosphate matrix, which contains the phosphate rock, is overlaid by a layer of sand and clay overburden, which, with topsoil, is projected to range from 20-40 feet, averaging 27 feet, in thickness. The phosphate matrix is projected to range from 25-35 feet, averaging closer to 25 feet, in thickness, although as much as four feet of the matrix may consist of interburden, such as sand, clay, limerock, or gravelly materials.

60. Thus, mining will remove, on average, 52 feet of the earth's surface. In no area will mining extend deeper than the top of the limey clay bed, which is the confining layer dividing the surficial aquifer from the intermediate aquifer, of which the limey clay bed is a part. (Technically, the matrix is part of the confining layer, but it provides so little confinement that it is easier to consider it part of the surficial aquifer. A consequence of this fact is that the removal of the matrix does not increase the rate of deep recharge, at least where the matrix is replaced with cast overburden.)

61. At OFG, the thickness of the surficial aquifer varies from 65-70 feet at the basin divide to 50 feet or less at the riparian wetlands and averages 55 feet. Beneath the intermediate aquifer, which is about 300 feet thick at OFG, lies the Floridan Aquifer.

62. IMC projects OFG to yield 24 million tons of phosphate rock, 26 million tons of clay tailings, and 68 million tons of sand tailings. IMC projects that the no-mine areas, which are discussed below, will result in five million tons of phosphate rock reserves remaining in the ground post-mining.

63. The scale of the environmental impact of mining is correspondingly large. Mining removes all flora and fauna, all the topography, soils, and upper geology, in the path of the electric dragline, which, as long as a football field (including one end zone), removes the uplands, wetlands, streams, and soils covering the matrix. At the depths at which mining will take place, IMC will be removing the entire surficial aquifer.

II. Applications, ERP, CRP Approval, and WRP Modification

A. Preliminary Matters

64. These cases involve permits and an approval of the phosphate mining and reclamation processes. These cases do not involve the processes by which IMC transforms phosphate into end products, mostly fertilizer. With one exception, these cases do not involve the processes by which IMC separates the phosphate

ore from the sand and clay (i.e., the beneficiation process). (The exception is that IMC is seeking to extend by ten years the life of the Ft. Green beneficiation plant to separate the phosphate from the matrix slurried from OFG.) These other post-mining processes, which are separately permitted, are not directly involved in these cases because IMC will slurry the phosphate matrix mined from OFG to the existing Ft. Green beneficiation plant, which is already permitted and operating. Even though the WRP modification will authorize the relocating of already-permitted CSAs at the Ft. Green Mine, the WRP modification will not authorize the design or construction of the embankments that retain the water within these CSAs while they are essentially clay ponds. DEP will separately permit the construction and operation of CSAs O-1 and O-2.

B. Application and Proposed Agency Action

65. On April 24, 2000, IMC filed a Consolidated Development Application for an ERP to mine phosphate from the proposed 20,675-acre Ona Mine, approval of the CRP for the Ona Mine following the completion of mining, and modification to the existing WRP for the Ft. Green Mine to install three CSAs in the area of the Ft. Green Mine immediately west of the Ona Mine and extend the life of the Ft. Green beneficiation plant by ten years to process the matrix from the Ona Mine.

66. On January 17, 2003, DEP issued an Intent to Issue an ERP and proposed approval of the CRP. Petitioners in several of the above-styled cases challenged this proposed agency action, and the parties embarked upon an energetic prehearing process of preparation, including extensive discovery and prehearing telephone conferences with the Administrative Law Judge, in anticipation of a final hearing in the fall of 2003.

67. IMC and DEP entered into a Team Permitting Agreement, pursuant to 1996 legislation creating the concept of Ecosystem Management. The Team Permitting Agreement incorporates the concept of "net ecosystem benefit," but, on its face, is not binding on IMC. The obvious purpose of the Team Permitting Agreement was to induce the permitting agencies (i.e., DEP, Florida Fish and Wildlife Conservation Commission (FWC), Southwest Florida Water Management District (SWFWMD), two regional planning councils, the Florida Department of Community Affairs, the Florida Department of Transportation (DOT), Hardee County, DeSoto County, and the U.S. Army Corps of Engineers) to use a common development application and coordinate, to the greatest practical extent, their respective reviews of the proposed activities of IMC.

68. Three weeks prior to the start of the final hearing, on September 15, 2003, DEP issued the Final Order in Charlotte County et al. v. IMC Phosphates Company and Department of

Environmental Protection, 2003 WL 21801924, 4 ER FALR 42 (Altman Final Order). The Altman Final Order denies IMC's application for a WRP/ERP and disapproves IMC's proposed CRP for the Altman tract, which is a short distance northwest of OFG. Although the final and recommended orders are detailed and complex, the Altman Final Order essentially concludes that IMC's CRP was inconsistent with applicable law because its basic reclamation concept was "to replace an existing system of high-quality wetlands . . . with a deep freshwater marsh."

69. On the same date of the Altman Final Order, DEP Deputy Secretary Allan Bedwell ordered DEP's Bureau of Mine Reclamation (BMR) to re-examine IMC's application for an ERP and request for approval of the CRP for the Ona Mine to assure consistency between the proposed agency action approving the ERP, CRP, and WRP modification and the Altman Final Order. The Bedwell memorandum specifically directs BMR to verify IMC's classification and characterization of the extent and quality of wetlands on the site; verify that IMC's proposed reclamation activities, including its proposed control of nuisance or exotic species, "maintain or improve the water quality and function" of the biological systems present at the site prior to mining; and verify that IMC meets the financial assurance requirements of law. The memorandum concludes by directing BMR to modify any proposed agency action, if necessary.

70. By memorandum dated January 5, 2004, Richard Cantrell and Janet Llewellyn, Deputy Directors of DEP's Division of Water Management Resources, responded to the memorandum from Deputy Secretary Bedwell. With respect to IMC's classification and characterization of wetlands, the January 5 memorandum states that DEP staff had conducted additional review of available aerial photographs, reviewed field notes from previous field inspections, conducted new field inspections, and received comments from IMC and Charlotte County. To describe better onsite habitats and communities, DEP staff had also revised the DOT Florida Land Use, Cover, and Forms Classification System (FLUCFCS) for use at OFG. The FLUCFCS codes are a three-digit numbering system to classify and identify individual vegetative communities or land uses.

71. With respect to the ability of the proposed reclamation to maintain or improve the water quality and function of biological systems, the January 5 memorandum states that Deputy Directors Cantrell and Llewellyn had recommended to IMC that it consider phasing the mining on Ona, so that it could apply its experience in reclaiming OFG to the remainder of the original Ona Mine; preserving additional onsite natural stream channels and proposing more detailed reclamation plans for mined streams; preserving additional onsite bay-dominated wetland systems; providing additional assurances that upgradient

sand/scrub areas will continue to support hydrologically, through seepage, preserved and restored bayheads; providing a plan to control nuisance and exotic species in the uplands, which, if infested, would degrade adjacent wetlands post-mining; and providing assurances that groundwater flows to Horse Creek and its preserved tributaries will be maintained during mining and post-reclamation.

72. With respect to financial responsibility, the January 5 memorandum states that Deputy Directors Cantrell and Llewellyn had advised IMC that it must provide its financial responsibility for the mitigation of all wetlands authorized to be mined, rather than providing its financial responsibility on a phased basis, as it had previously proposed.

73. On January 30, 2004, IMC filed a voluminous amendment to the Consolidated Development Application in a package known as the January submittal. The most evident change made by the January submittal is the reduction of the Ona Mine to OFG, which was the westernmost one-fifth of the original Ona Mine.

74. The introduction to the January submittal highlights the changes that IMC made to the original application. The introduction explains that IMC has employed a revised mapping protocol to ensure that all waters of the State, including wetlands delineated by Florida Administrative Code Rule

62-340.300 and other surface waters delineated by Florida Administrative Code Rule 62-340.600, are classified as wetlands or water, pursuant to the modified FLUCFCS codes.

75. Rejecting the nomenclature of the January 5 memorandum regarding the phasing of mining at the Ona site, the introduction to the January submittal identifies OFG as a 4197-acre, "free-standing" mining tract, not in any way "coupled to or dependent on the development of the remainder of the Ona Tract," from which it was taken. The introduction explains that "free-standing" means that OFG is a "complete mining, reclamation, and mitigation proposal" and that the OFG ERP will be "for a single-phase project."

76. The introduction to the January submittal notes that IMC has enlarged the no-mine area to include "nearly all of the natural stream channel tributaries to Horse Creek present in the portions of the Parcel that have not been converted to improved pasture." The amendments thus avoid disturbing four additional natural stream segments. The introduction explains that IMC considered a series of factors in determining whether to mine a stream segment: "stream segments length, the existing land cover adjacent to the stream and its watershed, the complexity of the channel geometry[,] and historical agricultural impacts." The introduction adds that IMC has added a "state-of-the-art" stream restoration plan for mined natural streams.

77. The introduction to the January submittal states that IMC responded in two ways to the suggestions about bay swamps in the January 5 memorandum. First, IMC modified the conventional mapping protocol for bay swamps. Rather than require that the canopy of the subject community be dominated by loblolly bay, sweetbay, red bay, and swamp bay trees, as prescribed by the FLUCFCS codes, IMC designated as bayheads "depressional, seepage-driven forested headwater wetlands, surrounded, at least in part, by moderately to well drained upland soils, with a defined outlet connection to waterways such that the 'bay head' soils are perennially moist but infrequently inundated." This new mapping protocol did not require the presence of bay trees in the canopy.

78. Second, IMC enlarged the no-mine areas to avoid disturbing all but nine percent of existing bay swamps at OFG, totaling less than ten acres. IMC based its mine/no-mine decisions for particular bayheads on analysis of the hydrological, water quality, and relative functional value provided by these communities to fish and wildlife. The introduction concludes that IMC has also developed detailed plans to mitigate for the few mined bayheads.

79. The introduction to the January submittal states that IMC has added new protections for the sand/scrub areas upgradient from, and providing seepage into, the bayheads in the

West and East Lobes. First, IMC will avoid mining certain of these areas, presumably adjacent to the East Lobe. Second, IMC will employ special mining techniques and schedules to reclaim these upland areas quickly and effectively. Additionally, the introduction notes that IMC is proposing to:

> 1. align the dragline "cut patterns" such that the spoil piles will be aligned with the groundwater seepage path where feasible or, where not feasible, to grade the spoil piles prior to backfilling the mine voids with sand so as not to impede post-reclamation groundwater flow;
> 2. accelerate the sand backfilling schedule of the mined voids adjacent to avoided "bay heads" to one year following mining disturbance; and
> 3. create a reclaimed stratigraphy that results in post-reclamation seasonal high and normal water table elevations and hydraulic conductivities in the seepage slopes that will provide the hydrologic support required to sustain these communities.

80. As explained in a later section of the introduction to the January submittal, "stratigraphy" refers to the soil layers or horizons, which are described in detail below. The introduction states: "The majority of the overburden will be placed at depths below the surface soil horizons. As a result, the surface soils will either be comprised of translocated surface soils or a loose mixture of 'green manure organics,' overburden, and sand that both resembles the native soils and provides a suitable growing medium for the targeted vegetative

communities." The introduction adds that, at final grade, sand tailings will always overlie overburden by at least 15 inches. The introduction asserts that the overburden underlying the backfilled sand tailings will be "comprised of and have properties which are similar to B horizons (subsoils) and C horizons (substratums) of native Florida soils."

81. The introduction to the January submittal identifies a Habitat Management Plan (also known as the Site Habitat Management Plan) that, with the Conservation Easement and Easement Management Plan discussed below, will guide the revegetation of upland natural systems, control nuisance and exotic species in uplands, and manage all potential listed species that may be present, whether or not observed, in areas to be mined. The introduction also mentions habitat enhancements "to relocate Florida mice" and to manage gopher tortoises. The introduction concludes with IMC's undertaking to ensure that exotic/nuisance cover does not exceed ten percent in all reclaimed wetlands and to provide a 300-foot buffer around wetlands where cogongrass--a highly invasive nuisance exotic described in more detail below--will not exceed five percent coverage.

82. The introduction to the January submittal notes that the proposed activities will maintain groundwater flows to Horse Creek and tributaries in the no-mine areas during mining and

post-reclamation. The introduction again mentions IMC's commitment, where feasible, to align spoil piles with groundwater flow and, where not feasible, grade spoil piles before backfilling so as to add a thicker band of sand to these areas. The introduction also cites the ditch and berm system as a means to maintain groundwater seepage during mining.

83. The introduction to the January submittal states that IMC will meet its financial-responsibility requirements for the entire cost of wetland-mitigation at OFG.

84. The January submittal contains a discussion of community-mapping protocol. IMC's methodology for mapping bay swamps is discussed above. The most common vegetative communities and land uses are described in the following paragraphs.

85. Improved pasture is actively grazed pasture dominated by cultivated pasture grasses, such as bahiagrass, but may support native grasses. Improved pasture may contain sporadic shrubs and trees.

86. Pine flatwoods occupy flat topography on relatively poorly drained, acidic soils low in nutrients. The overstory is discontinuous with areas of dense, species-rich undergrowth or groundcover. Longleaf pine and slash pine predominate. Pine flatwoods require frequent fires, which are carried by grasses, and the pines' thick bark helps prevent fire damage to the

trees. At one time, about three-quarters of Florida was covered by pine flatwoods.

87. Palmetto prairies typically represent the undergrowth of pine flatwoods. Once the trees are removed, such as by timbering, the resulting community is a palmetto prairie, which is characterized by an often-dense cover of saw palmettos with no or scattered pines or oaks.

88. Occupying dry, sandy, well-drained sites, sand live oak communities feature a predominance of sand live oaks and often succeed in relatively well-drained pine flatwoods after the removal of the pines, conversion to palmetto prairie, and suppression of fire. Sand live oak may also occupy xeric oak communities. Moister soils may support live oak communities, which also may succeed pine flatwoods after the removal of the pines, conversion to palmetto prairie, and suppression of fire.

89. Hardwood-conifer mixed is a blend of hardwoods and pines with trees of both categories forming one-third to two-thirds of the cover. Hardwoods are often laurel oak and live oak, and pines are often slash pine, longleaf pine, and sand pine. The midstory is typically occupied by younger individuals of the overstory communities and wax myrtle. If sufficient light reaches the ground, groundcover may exist.

90. Temperate hardwoods are often a forested uplands transition to a wetland. Temperate hardwoods are usually

dominated by laurel oak, but other canopy species may include cabbage palm, slash pine, live oak, and water oak. Mixed hardwoods is a similar community, except that water oak is predominant in the canopy.

91. Two of the three most prevalent forested wetlands on OFG are bay swamps, which have been discussed, and hydric oak forest, which, because of their location in the Horse Creek floodplain, will not be mined. At DEP's request, IMC remapped some of the floodplain that was uplands (and already in the no-mine area) to hydric oak forest.

92. The other prevalent forested wetlands on OFG is mixed wetland hardwoods, which consists of a variety of hardwood species, such as the canopy species of red maple, laurel oak, live oak, sweetbay, and American elm. Slash pines may occur, but may not constitute more than one-third of the canopy. Suitable shrubs include primrose willow, wax myrtle, and buttonbush. Ferns are often present as groundcover. Often immediately downgradient of bay swamps, mixed wetland hardwoods are typically in the hydric floodplains of small streams.

93. Transitioning between uplands, such as palmetto prairies, and the wetter soils hosting bay swamps and mixed wetland hardwoods, wetland forested mixed communities (also known as wetland mixed hardwood-coniferous) often occupy wet prairies from which fire has been suppressed for at least 20

years and, as such, "are largely or entirely an artifact of land use practices during the past sixty years or so that have allowed the conversion of wet prairies . . . to this cover type." The canopy of wetland forested mixed is slash pine, laurel oaks, live oaks, and other hardwoods that tolerate or prefer wetter soils.

94. Wet prairies are a dense, species-rich herbaceous wetland, usually dominated by grasses. Wet prairies occupy soil that is frequently wet, but only briefly and shallowly inundated. Similar to freshwater marshes, but with shorter hydroperiods, wet prairies often fringe marshes, and their border will shift in accordance with rainfall levels over several years.

95. Freshwater marshes consist predominantly of emergent aquatic herbs growing in shallow ponds or sloughs. Typical marsh herbs include pickerelweed, maidencane, and beakrushes. Hydroperiod and water depth drive the presence of species in different locations within a freshwater marsh. Marshes may be isolated or may occupy a slough in which their water flow is unidirectional. Heavily grazed or drained marshes may suffer dominance of primrose willow. Abundant softweed may indicate ditching, and soft rush, which cattle avoid, may indicate heavy grazing.

96. Shrub marshes succeed stillwater freshwater marshes from which fire has been excluded. Shrub marshes form after agricultural ditching or culverted fill-road building. Common shrub species include buttonbush, southern willow, and primrose willow. Hydric trees, such as red maple and swamp tupelo, may occupy the edges of shrub marshes.

97. IMC supplemented the January submittal with submittals dated February 26 and 27, 2004. Collectively, these are known as the February submittal. The February submittal is much less-extensive than the January submittal, although it includes substantive changes.

98. After examining the January and February submittals, on February 27, 2004, DEP issued a Revised Notice of Intent to Issue an ERP for OFG, approved a revised CRP for OFG, and issued a revised WRP modification for the Ft. Green Mine, which now authorizes two CSAs--O-1 and O-2--that have the effect of relocating the previously approved CSAs farther away from Horse Creek and reducing their size due to the reduced scale of OFG as compared to the original Ona Mine; reconfiguring certain mitigation wetlands, necessitated by the relocation of CSAs O-1 and O-2, with a net addition of 2.7 acres of herbaceous wetland area; and changing the reclamation schedule to conform to the already-approved CRP for the Ft. Green Mine.

99. IMC supplemented the January and February submittals with submittals dated March 30, April 18, and April 21, 2004. These submittals, which are known as the Composite submittal, are much less-extensive than the February submittal. DEP expressly incorporated the February submittal into the ERP, CRP approval, and WRP modification dated February 27, 2004. DEP has impliedly incorporated the changes in the Composite submittal into the ERP, CRP approval, and WRP modification. Thus, this Recommended Order uses the latest version of these documents when discussing the relevant permit or approval.

100. The March 30, 2004, submittal updates the following maps, figures, and tables: Map F-2 (to correct legend), Map I-2 (to correct the post-reclamation vegetation in the vicinity of Streams 3e, 1w, 2w, 3w, and 4w), Figures 13A5-1 and 13B-8 (to reflect changes to Map I-2), Tables 12A1-1 and 13A1-1 (revised land uses in several stream locations), and Tables 13A5-1, 345A-1, and 26O-1 (to reflect above changes). The March 30, 2004, submittal also includes the Draft Study Plan for Burrowing Owls and Amphibians and revised Tables A and B for the Financial Responsibility section of the ERP.

101. No material revisions are included in the submittals after March 30, 2004. Submittals after March 30, 2004, include financial responsibility forms, including a draft escrow agreement, and updated information on the temporary wetland

crossing at the point that Stream 2e forms at the downstream end of the Heart-Shaped Wetland. The last item, dated April 20, 2004, is a revision of Figure 13B-8, but solely for the purpose of showing that the Heart-Shaped Wetland remains connected to Stream 2e, despite the temporary presence of a crossing. This is the last revision to the CDA prior to the commencement of the hearing.

102. During the hearing, IMC submitted modifications of the mining and reclamation activities, and DEP agreed to all of these modifications. During the hearing, DEP proposed modifications of the mining and reclamation activities, and IMC agreed to all of these modifications. These modifications, such as identifying the annual hydroperiod of bay swamps as 8-11 months and the final changes to post-reclamation topography, are identified in this Recommended Order and incorporated into all references to the ERP or CRP approval.

103. In general, the ERP addresses wetlands, surface waters, and species dependent upon either, and the CRP addresses uplands and species dependent exclusively upon uplands. Later sections of the Recommended Order will discuss the ERP, the CRP approval, and the WRP modification. All of the maps, figures, and tables incorporated into the ERP, CRP approval, or WRP modification are contained in the CDA.

C. <u>Overview of Mined Areas, No-Mine Areas, and Reclaimed Areas</u>

104. The ERP permits IMC to mine 3477 acres and requires IMC to reclaim 3477 acres. The ERP recognizes that IMC will not mine 721 acres, which is about 17 percent of the 4197-acre site. (Most acreage figures are rounded-off in this Recommended Order, so totals may not always appear accurate.) Although various exhibits and witnesses sometimes refer to the no-mine area as the preserved area, this label is true only insofar as IMC will "preserve" the area from mining. However, post-reclamation, the area is not preserved. After the property reverts to the Carlton-Smith family, it will return to its historical agricultural uses, subject to a Conservation Easement that is discussed below.

105. Table 12A1-1 is the Mine Wide Land Use Analysis. Table 12A1-1 identifies, by acreage, each use or community presently at OFG, such acreage proposed to be mined, and such acreage proposed to be reclaimed. When not listed separately, this Recommended Order combines all non-forested wetlands, including mostly herbaceous wetlands and shrub marshes, into the category of herbaceous wetlands. Shrub marshes presently account for only 4.7 acres at OFG and will account for only 10.3 acres, post-reclamation.

106. Ignoring 35 acres that presently are barren or in transportation or urban uses, the present uses or communities of OFG are agricultural (2146 acres), upland forests (904 acres), rangeland (510 acres), forested wetlands (380 acres), herbaceous wetlands (208 acres), and open water (15 acres).

107. Nearly all of the existing agricultural uses are improved pasture (1942 acres); the only other use of significance is 165 acres of citrus. Well over half of the area to be mined is agricultural. Over half of the area to be mined is improved pasture (1776 acres, or about 51 percent of the mined area). Adding the citrus groves, woodland pasture, and insignificant other agricultural uses to the area to be mined, the total of agricultural uses to be mined is 1976 acres, or 57 percent of the mined area.

108. The two most prevalent upland forest communities presently at OFG are sand live oak and pine flatwoods; the next largest community, hardwood-conifer mixed, accounts for about half of the size of sand live oak or pine flatwoods. These upland forests contribute about one-fifth of the area to be mined (731 acres, or 21 percent of the mined area). Cumulatively, then, agricultural land and upland forests constitute 78 percent of the mined area.

109. For all practical purposes, all of the rangeland presently at OFG is palmetto prairie. This unimproved rangeland

contributes a little less to the mining area that do upland forests; mining will consume 475 acres of rangeland, which is 14 percent of the mined area. Cumulatively, then, agricultural land, upland forests, and native rangeland will constitute 92 percent of the mined area. The addition of the remaining upland uses--25 acres of roads, 5 acres of barren spoil areas, and one acre of residential--results in a total of 3213 acres, or still 92 percent, of the 3477 acres to be mined.

110. This leaves eight percent of the mined area, or 264 acres, as wetlands and other surface waters. As noted above, the wetlands are divided into forested and herbaceous wetlands.

111. Forested wetlands will contribute 82 acres, or about two percent, of the mined area. Nearly all of the forested wetlands presently at OFG are divided almost equally among mixed wetland hardwoods, hydric oak forests, and bay swamps. Bay swamps total 104 acres. In terms of the forested wetlands present at OFG, mining will consume mostly mixed wetland hardwoods, of which 43 acres, or 36 percent of those present at OFG, will be mined. Mining will eliminate only nine acres, or nine percent, of bay swamps and six acres, or six percent, or hydric oak forests. Mining will eliminate a large percentage--67 percent--of hydric pine flatwoods present at OFG, but this is 12 acres of the 18 existing acres of this wetland forest community.

112. Herbaceous wetlands will contribute 168 acres, or about five percent, of the mined area. Nearly all of the herbaceous wetland communities are wet prairies (108 acres) and freshwater marshes (81 acres). Mining will eliminate 95 acres, or 88 percent, of the wet prairie present at OFG, and 67 acres, or 83 percent, of the freshwater marshes present at OFG.

113. IMC will mine 13.5 acres of open water, which consists primarily of cattle ponds and ditches. The only natural water habitat is natural streams, which total 2.2 acres. IMC will mine 0.9 acres of natural streams.

114. Also incorporated into the ERP, Table 13A1-5, provides another measure of the impact of mining upon natural streams. According to Table 13A1-5, IMC will mine 2.8 acres of the 25.6 acres of natural streams. As noted in Table 13A1-5, reclamation of streams, which is discussed in detail below, is based on length, not acreage, and, under the circumstances, a linear measure is superior to an areal measure.

115. Table 12A1-1 also provides the acreage of reclaimed community that IMC will construct. These habitats or uses are listed in the order of the size of the area to be reclaimed, starting with the largest.

116. For agriculture, IMC will reclaim 1769 acres after mining 1976 acres. Adding the 170 acres of agriculture in the

no-mine area, agricultural uses will total, post-reclamation, 1939 acres.

117. For upland forest, IMC will reclaim 1055 acres after mining 731 acres. Adding the 173 acres of upland forest in the no-mine area, upland forest habitat will total, post-reclamation, 1227 acres.

118. For rangeland, IMC will reclaim 323 acres after mining 475 acres. Adding the 35 acres of rangeland in the no-mine area, rangeland will total, post-reclamation, 358 acres.

119. For herbaceous wetlands, IMC will reclaim 217 acres after mining 168 acres. Adding the 39 acres of herbaceous wetlands in the no-mine area, herbaceous wetlands will total, post-reclamation, 256 acres.

120. For forested wetlands, IMC will reclaim 106 acres after mining 82 acres. Adding the 298 acres of forested wetlands in the no-mine area, forested wetlands will total, post-reclamation, 404 acres.

D. ERP

121. ERP Specific Condition 3 requires IMC to provide to DEP for its approval the form of financial responsibility that IMC chooses to use to secure performance of its mitigation costs. IMC may not work in any wetland or surface water until DEP has approved the method by which IMC has demonstrated financial responsibility. DEP shall release the security for

each individual wetland that has been released by BMR, pursuant to Specific Condition 17.

122. The escrow agreement is a two-party contract between IMC and J.P. Morgan Trust Company, as escrow agent. The escrow agreement acknowledges that IMC will transfer cash or securities to the escrow agent in the stated amount, representing IMC's obligations to perform ERP mitigation plus the ten percent add-on noted in the Conclusions of Law. If IMC fails to comply with the ERP or Section 3.3.7 of the SWFWMD Basis of Review, the escrow agent is authorized to make payments to DEP, upon receipt of DEP's written certification of IMC's default. The escrow agreement may be amended only by an instrument signed by IMC, DEP, and the escrow agent.

123. ERP Specific Condition 3 requires IMC to calculate the amount of the security based on Table B, which is the Wetland Mitigation Financial Summary. Table B lists each forested and wetland community from Table 12A1-1, the acreage for each community, and the unit costs per acre of mitigation. The acreage figures are the acreage figures on Table 12A1-1.

124. The unit costs per acre are as follows with the FLUCFCS codes in parentheses: herbaceous (641, 643)--$7304; forested bay wetland (611)--$11,692; other forested wetland (613, 617, 619, 630)--$11,347; shrub (646)--$8780; hydric

palmetto prairie (648)--$9231; and (hydric) pine flatwoods (625)--$10,568.

125. Table B also shows 10,141 feet of streams to be reclaimed at a cost per foot of $37, stream macroinvertebrate sampling at a total cost of $48,100, and water quality/quantity monitoring at a cost of $293,000.

126. Adding the costs of wetland and stream reclamation, sampling, and monitoring, plus ten percent, Table B calculates the mitigation liability of IMC as $3,865,569. IMC has agreed to increase this amount for the reclamation of Stream 3e′.

127. ERP Specific Condition 4 requires IMC to submit to BMR annual narrative reports, including the actual or projected start date, a description of the work completed since the last annual report, a description of the work anticipated for the next year, and the results of any pre-mining surveys of wildlife and endangered or threatened species conducted during the preceding year. The reports must describe any problems encountered and solutions implemented.

128. ERP Specific Condition 5 requires IMC to submit to BMR annual hydrology reports. Relative to initial planting, IMC shall submit to BMR vegetative statistic reports in year 1, year 2, year 3, year 5, and every two years after year 5, IMC must submit to BMR vegetation statistic reports.

129. ERP Specific Condition 6 addresses water quality in wetlands or other surface waters adjacent to, or downstream of, any site preparation, mining, or reclamation activities. Specific Condition 6.a requires, prior to any clearing or mining, IMC to sever the areas to be disturbed from adjacent wetlands. IMC severs or isolates the mining area when it constructs the ditch and berm adjacent to, but upland of, the adjacent wetlands not to be mined.

130. Figure 14E-1 portrays the elements of the ditch and berm system as all outside of the no-mine area (or OFG property line, where applicable). In the illustration, from the mine cut toward the no-mine area (or OFG property line), IMC will construct the ditch, the 15-foot wide berm, the monitoring wells, and the silt fence.

131. ERP Specific Condition 6.b requires the ditch and berm system to remain in place until IMC has completed mining and reclamation, monitoring indicates that no violation of "State Water Quality Standards" are expected, and DEP has determined that "the restored wetlands are adequately stabilized and sufficiently acclimated to ambient hydrological conditions." DEP's decision to allow the removal of the ditch and berm system shall be based on a site inspection and water quality monitoring data. Upon removal of the ditch and berm system, the area that had been within the ditch and berm system shall be restored to

grade and revegetated according to the methods and criteria set forth in Specific Condition 14.

132. ERP Specific Condition 6.c requires IMC to use best management practices for turbidity and erosion control to prevent siltation and turbid discharges in excess of State water quality standards, under Chapter 62-302, Florida Administrative Code. Specific Condition 6.d requires IMC daily to inspect and maintain its turbidity-control devices. If the berm impounds water above grade, IMC must daily visually inspect the integrity and stability of the embankment.

133. ERP Specific Condition 7 requires that IMC implement a baseline monitoring program for surface water and groundwater and continue the program through the end of the mine life. The data from this program shall be included in the annual narrative reports described in Specific Condition 4. The locations of the sampling sites are depicted on Map D-4.

134. ERP Specific Condition 7.a identifies three monitoring stations, which are in Horse Creek just upstream of the stream's entrance onto OFG (and possibly just upstream of the offsite confluence of Stream 2e with Horse Creek), in Horse Creek at State Road 64, and in West Fork a short distance upstream of its confluence with Horse Creek. Before and during mining, IMC must monthly monitor 18 parameters, including temperature, pH, dissolved oxygen, total suspended solids,

conductivity, turbidity, color, total phosphorous, ammonia, nitrate/nitrite, and chlorophyll a. During mining, IMC must semi-annually monitor 11 additional parameters, including alkalinity, biological oxygen demand, chloride, and iron.

135. ERP Specific Condition 7.b identifies one monitoring station, which is at the junction of Stream 6w and Horse Creek. Before and during mining, IMC must monthly monitor ten parameters, including temperature, pH, dissolved oxygen, total suspended solids, conductivity, and color. During mining operations, IMC must semi-annually monitor the same 11 additional parameters described in Specific Condition 7.a.

136. ERP Specific Condition 7.c identifies two clusters of monitoring wells, one located near the offsite confluence of Stream 2e with Horse Creek and one located near the collecting station on West Fork near its junction with Horse Creek. During mining operations, IMC must semi-annually monitor 23 parameters, including pH, temperature, conductivity, alkalinity, total phosphorous, color, turbidity, chloride, iron, and nitrate/nitrite.

137. ERP Specific Condition 8 requires IMC immediately to cease all work contributing to turbidity violations of "State Water Quality Standards established pursuant to Chapter 62-302, F.A.C." Specific Condition 8 requires IMC to stabilize all exposed soils contributing to the violation, modify work

procedures that were responsible for the violation, repair existing turbidity-control devices, and install more such devices. Specific Condition 8 requires IMC to notify BMR within 24 hours of the detection of any turbidity violation.

138. ERP Specific Condition 9 requires IMC to report all unauthorized releases or spills of wastewater or stormwater in excess of 1000 gallons per incident to BMR, as soon as practicable, but not later than 24 hours after detection.

139. ERP Specific Condition 10 addresses water levels and flows in wetlands and other surface waters adjacent to, and downstream of, any site preparation, mining, and reclamation activities. Prior to any clearing or mining activities adjacent to no-mine wetlands and other surface waters, Specific Condition 10.a requires IMC to install monitoring wells and staff gauges and commence monitoring water levels, as required by ERP Monitoring Required, which is a part of the ERP that is discussed below. IMC shall monitor water levels in each of the no-mine streams at the point that it intercepts the 100-year floodplain of Horse Creek.

140. ERP Specific Condition 10.a provides:

> During mining, recharge ditches adjacent to no-mine areas shall be charged with water or recharge wells shall be installed to maintain base flows and/or minimize stress to the vegetation in the preservation areas. Water levels in the recharge ditches shall be maintained at levels sufficient to

> support the normal seasonal water level fluctuations in the wetlands as determined from the baseline monitoring included in Table MR-1.

141. Under ERP Specific Condition 10.a, prior to any clearing or mine activities, IMC must install monitoring wells and staff gauges and monitor water levels, as specified in the ERP Monitoring Required. IMC must daily monitor water levels in each of the no-mine streams at the point of its interception with the 100-year floodplain of Horse Creek. During mining, IMC shall charge recharge ditches with water or install recharge wells to maintain base flows and minimize stress to vegetation in no-mine areas. IMC must maintain water levels in the recharge ditches at levels sufficient to support the normal seasonal water level fluctuations in the wetlands, as determined from the baseline monitoring included in Table MR-1, which is described below. IMC must daily check the water levels in the recharge ditches, record this information in logs, and make these logs available to BMR during its quarterly inspections. IMC shall monthly inspect the water levels in adjacent no-mine wetlands and notify BMR in writing if these wetlands show signs of stress. If adjacent no-mine wetlands become stressed, upon DEP's approval, IMC will take additional actions, such as altering mining and reclamation procedures, modifying the

recharge ditch, providing additional sources of water, and conducting additional monitoring.

142. During the hearing, IMC hydrologist and engineer Dr. John Garlanger testified: "[IMC] will install a recharge well system along the preserved areas." (Tr., p. 2800) The parties treated recharge wells as a part of the ditch and berm system, both at the hearing and in their proposed recommended orders (DEP, paragraph 75; Charlotte County, paragraph 575; and IMC, paragraph 339.) However, Specific Condition 10.a imposes no such obligation upon IMC, nor does any other provision in the ERP or the CDA.

143. The above-quoted provision of Specific Condition 10.a identifies recharge wells as an alternative. The other option in Specific Condition 10.a is to charge the ditches with water. This condition is confusing because it poses, as alternative requirements, one option of a specific effect--i.e., recharged ditches--and the other option of a means of achieving that effect--i.e., recharge wells. The objective is sufficient water in the ditch. The means of charging the ditch would appear to be limited to direct rainfall, pumping water from the mine cuts, diverting water from the mine recirculation system, or pumping water from the intermediate or Floridan aquifer through recharge wells; at least the first two of these charging options are already incorporated into the OFG ditch and berm system.

144. Confirming that recharge wells are optional is Figure 14E-1, which labels the recharge well depicted at the bottom of the ditch as "Alternate--Recharge Well." Figure 14E-1 illustrates a pump forcing the water from the bottom of the deeper mine cut to the bottom of the recharge ditch. (Figure 14E-1 also illustrates that--in order, running from the mine cut toward the no-mine area (or OFG property line)--the ditch, the 15-foot wide berm, the monitoring wells, and the silt fence will all be located outside of the no-mine area (or within OFG).)

145. ERP Specific Condition 10.b prohibits reductions in downstream flows from the project area that will cause water quality violations in Horse Creek or the degradation of natural systems. IMC shall monitor surface water levels continuously at the above-described points at State Road 64 and West Fork and monthly near the above-described junction of Stream 2e and Horse Creek. IMC shall monitor monthly at the above-described clusters of monitoring well locations and at piezometers located across Section 9 from the no-mine area into the uplands to the east, in the West Lobe and the adjacent uplands to the west, in the East Lobe and the adjacent uplands to the east, and in Horse Creek about one-quarter mile from the southern border of OFG. IMC shall daily monitor rainfalls at a rain gauge near the junction of Stream 2e and Horse Creek. IMC shall report the

results of the monitoring in the reports required in Specific Condition 4.

146. ERP Specific Condition 11 requires IMC to obtain authorization from FWC before relocating gopher tortoises or disturbing their burrows. ERP Specific Condition 11 also requires IMC to relocate gopher frogs and other commensals to FWC-approved sites before clearing. At the time of the hearing, FWC had not yet approved IMC's plan to relocate gopher tortoises, but this approval was expected shortly.

147. ERP Specific Condition 12 requires IMC to complete mining, filling, and reclamation activities generally in accordance with the schedule stated in this condition. Specific Condition 12.a prohibits IMC from commencing severance or site preparation more than six months prior to mining, except as approved by DEP for directly transferring topsoil or muck to a contoured mitigation site. IMC must complete final grading, including muck placement, not later than 18 months after the completion of mining operations, which include the backfilling of sand tailings. IMC must conduct its hydrological assessment in the first year after contouring.

148. ERP Specific Condition 12.a provides a timetable for work in wetlands and other surface waters. IMC may not commence severance or site preparation more than six months prior to mining. IMC shall complete final grading, including muck

placement, not more than 18 months after the completion of mining operations, including backfilling with sand tailings. IMC shall complete Phase A planting, which is of species that tolerate a wide range of water levels, not more than six months after final grading or 12 months after muck placement. IMC shall conduct the hydrological assessment in the initial year after coutouring. IMC shall complete Phase B planting, which is of species that tolerate a narrower range of water levels, within 12 months after the hydrological assessment and Phase C planting, which is shade-adapted groundcover and shrubs, as well as additional trees and shrubs required to meet the density requirements of ERP Specific Condition 21 [sic; probably should be ERP Specific Condition 16], at least two years prior to release of forested wetlands.

149. ERP Specific Condition 12.b provides that IMC shall clear, contour, revegetate, and reconnect wetlands and watersheds as shown in Tables 3AI-6A and 3AI-10A, Maps H-1, H-9, and I-6, and Figures 13B-8, 13A5-1, and CL-1.

150. Table 3AI-6A lists each reclaimed wetland by number, the last year in which it will be disturbed, the last year in which it will be mined, the year in which grading will be completed, the year in which revegetation will be completed, and the number of years between mining or disturbance and reclamation and revegetation. The span of years between mining

or disturbance and reclamation ranges from three (two wetlands) to eight (six wetlands).

151. Table 3AI-10A is the Reclamation Schedule Summary. The table identifies four reclamation units in the Horse Creek sub-basin, one reclamation unit in the West Fork sub-basin, and one reclamation unit in the Brushy Creek sub-basin. For each reclamation unit, Table 3AI-10A shows the period of mining, period of mine operations, period for contouring, and period for revegetation. These years are relative: mining runs four years, mine operations run seven or eight years (starting one year after mining starts), contouring runs seven or eight years (starting within one year of the end of mining), and revegetation runs five or six years (starting one year after the start of contouring).

152. Map H-1 is the Mine Plan. Map H-1 assumes four draglines will operate in OFG for five years of active mining. IMC's tentative plan is first to mine the west side of OFG, which is nearer the Ft. Green Mine at which the draglines are presumably deployed at present, and then to mine adjacent mining blocks. For instance, IMC would mine the northwest corner of Section 4 in Year 1, the southwest corner of Section 4 in Year 2, the northeast corner of Section 4 in Year 3, and the southeast corner of Section 4 in Year 4 before removing the dragline south of Section 4 to mine an unmined area in Year 5.

153. Map H-1 depicts the ditch and berm system running continuously along the edge of the no-mine area from the north end of OFG, south along the no-mine borders that trace the east and west edges of the 100-year floodplain of Horse Creek, to their southern termini. On the east floodplain, the ditch and berm system turns east at the northwest corner of Section 21, near the Carlton cutout, runs to the easternmost extent of OFG, turns north to the northeast corner of Section 4, and runs to the northwest corner of Section 4, where the ditch and berm system ends. On the west floodplain, the ditch and berm system runs to the southernmost extent of OFG near its confluence with West Fork, turns west and north, as it traces the border of OFG along Sections 29, 20, and 19, where it ends at a point about one-quarter mile from the northern boundary of Section 19.

154. For the areas closest to the no-mine area, Map H-1 also depicts the direction of the mine cuts and, inferentially, the spoil piles. These cuts and piles are generally perpendicular to the direction of Horse Creek.

155. Figure 2AI-24 displays the locations of the six reclamation units identified in Table 3AI-10A. The West Fork and Brushy Creek reclamation units occupy the sub-basins bearing their names, so they are at the western and eastern edges, respectively, of OFG. The HC(1) reclamation unit is almost all of Section 4. According to Table 3AI-10A, IMC will mine this

reclamation unit from 2006-09, contour it from 2009-15, and revegetate it from 2010-15. Combining the information from Map H-1 for the Stream 1e series, all of it but Stream 1ee, which is the most-downstream stream, will be mined in the first year of the sequence, and Stream 1ee will be mined in the second year. However, Stream 1ee will be disrupted longer because a 200 foot-wide dragline access corridor runs across it, just upstream of the Heart-Shaped Wetland, as shown on Map H-1 and Figure RAI 514-1.

156. Map H-9 is the Tailing Fill Schedule. The tailings are the sand tailings; the clay tailings, which are called waste clays, are deposited in the CSAs. Sand tailings are backfilled into mine cuts starting in year 3, and the process is completed in year 7. Map H-9 reproduces the blocks shown on Map H-1, except for one change in Section 20, and adds two years to each block. An explanatory note on Map H-9 states that IMC will backfill and grade the upland areas immediately west of the West Lobe and east of the East Lobe with sand tailings within one year of mining.

157. Map I-6 is the Post-Reclamation Streams. This Recommended Order addresses streams in detail below. As already noted, at the hearing, DEP identified Stream 3e′ as another stream eligible for restoration under the eligibility criterion

used in these cases, and IMC has agreed to restore this stream and add it to Map I-6.

158. Figure 13B-8 is the Post-Reclamation Connection Status of the reclaimed wetlands. A map, Figure 13B-8 depicts connected wetlands, isolated wetlands, isolated wetlands that are ephemeral, and cattle ponds. Figure 13A5-1 is the Identification of Created Wetlands. Also a map, Figure 13A5-1 assigns numbers to each reclaimed wetland and identifies the habitat to be reclaimed. These two figures provide a good basis for comparing the reclaimed wetlands to the existing wetlands by type, location, size, and proximity to streams.

159. These two figures confirm the removal of cattle ponds to points considerable distances from Horse Creek, streams, riparian wetlands, or even most isolated wetlands. Thirteen cattle ponds totaling 7.6 acres will be reclaimed on OFG. Generally, these cattle ponds are located as far away as possible from the 100-year floodplain of Horse Creek. Except for the cattle ponds and three connected reclaimed wetlands that drain to the West Fork or Brushy Creek, all of the connected reclaimed wetlands will be connected to Horse Creek, usually by streams, but in several cases directly to the 100-year floodplain of Horse Creek.

160. Connected reclaimed wetlands include the headwater and intermittent wetlands of the Stream 1e series

(E003/E006/E007/E008/E009/E013/E015/E016), the headwater wetlands of Stream 3e (E022/E023/E024), and the headwater wetlands of Stream 3e′ (E018/E019/E020). The decision at the hearing to reclaim Stream 3e′ is not reflected on Figure 13A5-1 or 13B-8, which depicts as isolated the large wetland to the northeast of the headwater wetland of Stream 3e.

161. The Stream 1e series reclaimed wetlands complex totals 44.9 acres. The Stream 1e series existing wetlands complex covers a smaller area, perhaps 10 fewer acres. However, the reclaimed wetlands will be somewhat simpler. IMC will reclaim one freshwater marsh (E006) where five presently exist (G108, G115, G125, G126, and G129). IMC will replace two gum swamps (G123 and G121) and two wetland forested mixed (G102 and G132) with the predominant mixed wetland hardwoods (E003). IMC will replace one of the freshwater marshes with hydric oak forest. Just west of the riparian corridor, IMC will replace a wet prairie (G119) with a little hydric flatwoods (G119A) with another freshwater marsh (E014) and will mine a small wet prairie (G028) to the east of the corridor and not replace it with any wetland. On the plus side, IMC will add two very small bayheads (E008--0.7 acres and E013--0.7 acres) to the west side of the corridor and will relocate and expand a large hydric flatwoods (G107) that is beside a small unreclaimed community--a hydric woodland pasture (G105).

162. The reclamation of the headwater of Stream 3e better re-creates the existing wetlands, in size and type of community. The only change is the conversion of a shrub marsh (G134) in the center of the wetland to a freshwater marsh (E023), essentially enlarging the freshwater marsh (G135) presently in the center of this wetland. The size of the existing and reclaimed wetlands associated with the riparian corridor of Stream 3e and its headwater wetland appear to be the same.

163. The reclamation of the headwater of Stream 3e′ provides a more complicated complex of wetland communities than presently exists at that location. The ditch (G019) will be replaced with a natural stream, whose riparian corridor is not depicted due to the fact that IMC agreed to reclaim Stream 3e′ at the hearing; however, the reclaimed wetland corridor undoubtedly will be more functional than the present ditch. Presently, the headwater wetland is a large freshwater marsh (G016) fringed by mixed wetland hardwoods (G014) and a wet prairie (G105). A cattle pond (G017) is in the wet prairie, and another cattle pond is at the point where Stream 3e′ forms. The north side of this wetland is heavily ditched. The reclaimed headwater wetland, which will be about the same size as the present wetland, will consist of an interior shrub marsh (E019) and freshwater marsh (E020) and a wet prairie fringe (E018). A

replacement cattle pond (E026) is moved farther away from the headwater wetland.

164. Reclamation around the Heart-Shaped Wetland results in a more complicated array of wetlands than presently exists. Three ephemeral wet prairies (E021, E026, and E031) will be reclaimed north and west of the Heart-Shaped Wetland and Stream 2e where no wetland exists presently. An isolated freshwater marsh (E034) will be reclaimed south of the Heart-Shaped Wetland where no wetland exists today. Two ephemeral wet prairies (E026 and E037) totaling 4.5 acres will be reclaimed south and east of Stream 2e, close to the no-mine area surrounding Streams 6e and 7e, again where no wetland exists presently. However, IMC will not reclaim a hydric flatwoods (G157) connected to the south border of the headwater wetland of Stream 8e.

165. Reclamation will relocate the headwater wet prairie of Stream 9w closer to Horse Creek. Mining two wet prairies (G047 and G048) and reclaiming them with a single wet prairie of at least the same size (W003--20.7 acres), IMC will also reclaim the downstream portion of Stream 9w with a mixed wetland hardwoods and add a gum swamp (W005--2.4 acres) at the end of Stream 9w, as it enters the no-mine corridor of Horse Creek. IMC will also reclaim an ephemeral wet prairie (W002) just north of the reclaimed segment of Stream 9w.

166. Across Horse Creek from its junction with Stream 9w, IMC will mine the eastern half of a roughly five-acre bayhead (G166), reclaiming the mined part of the bayhead with a mixed wetland hardwoods (E048--6.0 acres). However, where no wetlands presently exist, IMC will reclaim an ephemeral wet prairie (E044) and a larger wetland consisting of a freshwater marsh (E047--9.0 acres) fringed by an ephemeral wet prairie (E046--7.1 acres).

167. In RAI-173 in the CDA, IMC explains that no-mine lines initially ran through some wetlands due to the limited level of detail available in the small scale maps used at the time. IMC representatives have discussed each such bifurcation with DEP biologist Christine Keenan, and IMC made adjustments that satisfied DEP, obviously not eliminating all of the bifurcated wetlands. Alluding to the impracticability of eliminating all bifurcated wetlands, IMC notes in its response to the request for additional information: "A small feature protruding into a mining area is one of the more difficult features to effectively mine around. It requires significant extra distance of ditch and berm systems, which both increases costs and results in greater losses of phosphate ore recovery."

168. Subject to two exceptions, the southernmost extent of reclaimed ephemeral wetlands will be close to the Lobes, especially the West and Central Lobes. Eight such wetlands

(W021, W015, W017/W018, W019/W020, W012, W013, W016 and W011) will be west of Horse Creek, and three such wetlands will be east of Horse Creek (E057, E061, and E053). (Although the headwater wetland of Stream 7w, W012 is depicted as ephemeral in Figure 13B-8.) Most of these wetlands will be wet prairies. Three of these reclaimed ephemeral wetlands appear to be in the location of existing wetlands (G093/G094, G091/G092, and G090), and the existing wetlands are freshwater marshes fringed with wet prairies, except that the smallest, G090, is a wet prairie.

169. The last reclaimed wetland on the east side of Horse Creek is just north of the Carlton cutout. In reclaiming Stream 5e, IMC will reclaim a small bayhead (E063--1.3 acres) in the middle of the stream's OFG segment. This replaces a wet prairie/hydric oak forest (G204/G205) in the same location and of the same size.

170. On the other side of Horse Creek and to the south of Stream 5e, IMC will reclaim the headwater wetlands of Streams 5w, 4w, 3w, and 2w.

171. The headwater wetland of Stream 5w is a long freshwater marsh (G210) with a small shrub marsh (G207) that drains an elaborate array of agricultural ditches to the west. These ditches shifted some of the drainage that historically entered Stream 4w into Stream 5w. Reclaiming the stream with a wider wetland forested mixed corridor, as it will do for Streams

4w, 3w, and 2w, IMC will expand the headwater wetland by reclaiming a long freshwater marsh (W024--7.9 acres) fringed on its upgradient side by a small wet prairie (W023--2.2 acres). IMC will also remove a cattle pond (G209) presently abutting the center of the freshwater marsh.

172. IMC will reclaim an ephemeral wet prairie (W026) between Streams 5w and 4w, relatively close to the Horse Creek floodplain. Except for a very small ephemeral wet prairie just west of the headwater wetland of Stream 4w and an ephemeral, largely mixed wetland hardwoods reclaimed in the West Fork sub-basin (W041/W042/W043), W026 is the southernmost reclaimed ephemeral wetland on OFG.

173. The pattern of the reclamation of Streams 4w, 3w, and 2w is otherwise identical: each reclaimed stream, in a reclaimed wetland forested mixed corridor, will receive water from reclaimed freshwater marshes of 3.5 to 5.1 acres in size. Presently, Stream 4w has no headwater marsh, instead receiving water from the elaborate ditching scheme described in connection with Stream 5w. Streams 3w and 2w presently receive water from small headwater wetlands, although Stream 2w also receives water from an agricultural ditch.

174. The last major reclamation on the west side of Horse Creek relates to Stream 1w. Alone of all the streams, Stream 1w is an agricultural ditch throughout its length, except for a

short segment just upstream from the no-mine area. However, alone of all the streams at OFG, Stream 1w drains a primarily seepage-supported wetland. This well-defined headwater wetland complex comprises, from upstream to downstream, a cattle pond (G505), freshwater marsh (G506), mixed wetland hardwoods (G507), bay swamp (G513), wetland forested mixed (G512), wet prairie (G514), hydric oak forest (G511), and ditch (G512A). Reclaimed, this headwater will be the largest reclaimed bay swamp (W0399-1.2 acres).

175. In addition to the two small bay swamps in the wetland corridor of Stream 1e series, the small bay swamp in Stream 5e, and the Stream 1w headwater bay swamp, the only other bay swamp to be reclaimed on OFG will be a part of a wetland (W037/W036) that will be in the center of Section 19 and drain into the West Fork. The bay swamp component of this wetland will be 4.4 acres and will replace a similarly sized wetland (H008/H009/H009A) with a smaller bay swamp core.

176. Map CL-1 is the Reclamation Schedule. This map identifies the year in which specific areas within OFG will be reclaimed. With two exceptions, Map CL-1 tracks Map H-9, which is the Tailing Fill Schedule, by identifying the same blocks and adding two years to each of them.

177. One exception may be due to the February 19, 2004, and February 26, 2004, revisions of Map H-9. The latter

revision changed the year of backfilling part of northwestern Section 20 from year 7 to year 5. Map CL-1 tracks the older version of Map H-9 and provides for reclamation of this area within Section 20 for year 9, not year 7. This means that part of the northwestern Section 20 would remain backfilled, but not revegetated, for four years. This may be an oversight in Map CL-1 because it was last revised January 22, 2004.

178. The other exception concerns the uplands immediately east of the East Lobe. Map H-9 provides for sand tailings for the northern half of this area in year 6 and for the southern half of this area in year 5, but Map CL-1 provides for both areas to be reclaimed in year 7, so the southern half would remain backfilled, but not revegetated, for two years. This may be intentional, as ERP Specific Condition 12.d requires that IMC backfill and contour the two areas upslope of the bayheads in the West and East Lobes within one year after the completion of mining, but nothing in the ERP requires expedited revegetation of these upland areas.

179. ERP Specific Condition 12.b requires IMC to include mining and reclamation schedule updates in the annual reclamation report that it files, pursuant to Chapter 62C-16, Florida Administrative Code. Specific Condition 12.b warns that "significant changes" to these schedules may require a permit modification.

180. ERP Specific Condition 12.c states, in its entirety: "Mine cuts shall be oriented in the direction of ground water flow, generally perpendicular to Horse Creek as shown on Map H-1." The introduction to the January submittal, witnesses, and parties agree that IMC is required to orient the spoil piles in the direction of groundwater only to the extent practicable, so the unconditional language of ERP Special Condition 12.c is inadvertent.

181. ERP Specific Condition 12.d provides that sand tailings placement and final contouring shall be completed within one year after the completion of mining, as shown on Map H-9, in the two areas upslope from the unmined bayheads (G178 and G197), which are in the East and West Lobes.

182. ERP Specific Condition 13 addresses the construction, removal, and revegetation of the pipeline corridor shown on Figure RAI 514-1. This figure depicts a narrow "Mine Access Corridor (Pipelines, Road, Powerlines)" passing at the point that Stream 2e forms at the downgradient end of the Heart-Shaped Wetland. Specific Condition 13 contains seven subsections governing the pipeline corridor to minimize its impact on the wetlands and other surface waters that it crosses.

183. Figure RAI 514-1 also depicts a 200-foot wide "Dragline Walkpath Corridor" that crosses Stream 1ee and Stream 3e within 100 feet of the Heart-Shaped Wetland. No conditions

attach to the construction, operation, removal, and reclamation of this area because, unlike the pipeline corridor as it crosses Stream 2e, all of this portion of the dragline corridor will be mined.

184. ERP Specific Condition 14 states that IMC shall restore as mitigation 322 acres of wetlands, as shown in Maps I-1, I-2, I-3, and I-6; Figure 13A5-1; and the post-reclamation cross-sections.

185. Map I-1 is the Post Reclamation Topo. IMC updated this map with several limited changes at the end of the hearing, and DEP accepted the new Map I-1. Comparing Map I-1 with Map C-1, which is the Existing Topography, the post-mining topography substantially replicates the pre-mining topography, although Table 26M-1 reveals a lowering of some of the highest pre-mining elevations, including the highest elevation by eight feet.

186. Maps I-2 and I-3 are, respectively, Post Reclamation Vegetation and Post Reclamation Soils. As noted above, Specific Condition 14 references these maps, but only in connection with the restoration of 322 acres of wetlands. Maps I-2 and I-3 cover all of OFG, so they cover wetlands and other surface waters, which are properly the subject of an ERP, and uplands, which are properly the subject of a CRP approval.

187. Naturally, the ERP does not incorporate the all of Maps I-2 and I-3 because they include all of the uplands. Unfortunately, as discussed in the next section, the CRP approval likewise fails to obligate IMC to reclaim the uplands in accordance with Map I-2 and the upland soils in accordance with Map I-3. This omission is inadvertent, so the Recommended Order will assume that IMC will reclaim the uplands as depicted in Map I-2 and the upland soils as depicted in Map I-3. Although the upland portions of Maps I-2 and I-3 should be discussed in the next section, they will be discussed in this section because the CRP approval fails to incorporate them and discussing both maps in one place allows for a more coherent presentation.

188. Map I-2 is the Post Reclamation Vegetation. Map I-2 depicts the post-reclamation upland and wetland vegetation on OFG. This map reveals wide edges of roughly one-quarter to one-half mile of reclaimed improved pasture on the east and west edges of OFG. The core of OFG is Horse Creek and its 100-year floodplain, which are always within, but do not always define, the no-mine area. Between the no-mine area and the reclaimed improved pasture are the reclaimed wetlands described above and larger area of reclaimed uplands described below. Map I-2 and Map F-1, which is Pre Mining Vegetation, allow a comparison, by

community, location, and area, of reclaimed uplands with existing uplands.

189. In broad overview, IMC will reclaim everything in Section 4 outside the Heart-Shaped Wetland, which is the northernmost extent of the no-mine area, and Stream 2e. From the point that Horse Creek enters OFG, IMC will reclaim a broad area between the no-mine area and reclaimed improved pasture, south to the Carlton cutout. From this point, reclamation will be limited to the west side of Horse Creek, and the area between the no-mine area and reclaimed improved pasture will narrow progressively for the remaining 1 1/2 miles that Horse Creek runs in OFG.

190. The width of the core, or no-mine area, is generally about 750 feet, but widens considerably at different points. Where Horse Creek enters OFG, the no-mine area is approximately 1750 feet wide, but narrows south of Stream 8e to about 750 feet. From the Central Lobe to the East Lobe, the no-mine area expands to nearly 4000 feet across. Except for another expansion at the West Lobe, the width of the no-mine area south of the Lobes remains at about 750 feet until Horse Creek exits OFG.

191. The riparian wetlands of Horse Creek, which are within the no-mine area, are mixed wetland hardwoods for the

first mile that Horse Creek flows in OFG and hydric oak forest for the remainder of Horse Creek's passage through OFG.

192. The width of the non-pasture uplands adjacent to the no-mine area also varies. In describing the width of these upland areas between the no-mine area and the reclaimed improved pasture, this Recommended Order will include the reclaimed wetlands described above. These wetland areas are small, except for the headwater wet prairie of Stream 9w, the headwater freshwater marshes of Streams 5w, 4w, 3w, and 2w, and a few isolated wetlands.

193. On both sides of Stream 2e, IMC will reclaim a band of hardwood conifer mixed of about one-half mile in width. At present, this area is occupied by a smaller area of hardwood conifer mixed and nearly a one-half mile wide band of pine flatwoods or, to the south, pine flatwoods and sand live oak.

194. East of Streams 6e, 7e, and 8e, IMC will reclaim a band 1500-3000 feet wide of hardwood conifer mixed, shrub and brushland, and sand live oak, between the no-mine area and the reclaimed improved pasture. This replaces a broader area of pine flatwoods, sand live oak, palmetto prairie, and xeric oak.

195. From Stream 8e south, IMC will reclaim uplands on both sides of Horse Creek. At this point, the reclaimed area between the no-mine area and the reclaimed improved pastures measures about 1750 feet wide on the west of Horse Creek and

about 2000 feet wide on the east of Horse Creek. Including the no-mine area in the center, these reclaimed areas average about one-mile wide south to the Lobes.

196. From Stream 8e south to the East Lobe, IMC will reclaim largely hardwood conifer mixed. This replaces a large citrus grove, a larger area of improved pasture, and three smaller areas of palmetto prairie.

197. On the west side of Horse Creek, the vegetation is more varied, both at present and as reclaimed. North of Stream 9w, IMC will reclaim a large palmetto prairie, a sizeable area of sand live oak, and a small area of temperate hardwood. South of Stream 9w, IMC will reclaim a large area of hardwood conifer mixed, areas of pine flatwoods, sand live oak, and palmetto prairie, and a small area of temperate hardwood. The uplands surrounding Stream 9w presently consist of improved pasture along the downstream half of the conveyance and palmetto prairie and sand live oak along and near its upstream reach. South of Stream 9w are a large area of improved pasture, pine flatwoods, and sand live oak and two smaller areas of palmetto prairie.

198. The combination of no-mine area and reclaimed area, exclusive of reclaimed improved pasture, attains its greatest width--about 10,000 feet--from the western edge of the West Lobe to the eastern edge of the East Lobe, although this includes a 1000-foot strip of improved pasture between the bayhead in the

East Lobe and sand live oak east of the bayhead. This area narrows to less than 6000 feet, just north of the Carlton cutout. South of this point, at which the reclaimed upland habitat will be found only on the west side of Horse Creek, the total width of the no-mine area and reclaimed area east of the reclaimed improved pasture tapers down from a little over 3000 feet to less than 1500 feet at the south end of OFG.

199. Map I-2 also discloses the communities or habitats that will exist, post-reclamation, on OFG. These communities or habitats include those that will be in the no-mine area and those that will be reclaimed.

200. At present, the West Lobe is mostly bayhead, wet prairie, and wetland forested mixed with smaller areas of hydric woodland pasture and shrub marsh. The West Lobe also includes upland communities of palmetto prairie, temperate hardwoods, and pine flatwoods. A large wet prairie extends from the northwest corner of the West Lobe. IMC will reclaim this wet prairie as improved pasture with a small strip of hardwood-conifer mixed. To the west of the West Lobe is a small strip of improved pasture and a large area of hardwood-conifer mixed. IMC will reclaim the improved pasture with hardwood-conifer mixed and sand live oak and most of the hardwood-conifer mixed with sand live oak. The areas surrounding the no-mine area associated

with Stream 6w are currently improved pasture; IMC will reclaim these areas as hardwood-conifer mixed.

201. The Central Lobe is mostly bayhead with small areas of wetland forested mixed and wet prairie. Palmetto prairie is also within the Central Lobe, nearer to Horse Creek. IMC will reclaim the areas around the Central Lobe and Stream 7w with hardwood-conifer mixed and some palmetto prairie. At present, the Central Lobe and Stream 7w are surrounded by palmetto prairie and some pine flatwoods with an area of sand live oak to the northwest of the Central Lobe.

202. Unlike the no-mine areas forming the West and Central Lobes, which incorporate insubstantial areas of uplands, the no-mine area forming the East Lobe, like the no-mine area around Streams 6e, 7e, and 8e, incorporates a substantial area of uplands. Upgradient of the large bayhead forming the western half of the East Lobe is the 1000-foot strip of improved pasture, and upgradient of the pasture is a large sand live oak area. IMC will mine the eastern half of this sand live oak area and reclaim it as xeric oak. IMC will mine a small wet prairie presently at the southern tip of the bayhead in the East Lobe and reclaim the area as hardwood-conifer mixed.

203. From the East Lobe south to the Carlton cutout, the reclaimed uplands will consist of a long area of temperate hardwoods abutting the no-mine area and a wider area of

hardwood-conifer mixed abutting the temperate hardwoods. This area is presently improved pasture.

204. On the west side of Horse Creek, south of the Carlton cutout, the area outside the no-mine area is presently improved pasture, except for a large palmetto prairie around and south of the headwater wetland of Stream 1w. Between the no-mine area and reclaimed improved pasture, IMC will reclaim palmetto prairie and a small area of hardwood-conifer mixed between the headwater wetlands of Streams 5w and 3w.

205. Map I-3 is the Post Reclamation Soils. The legend classifies the soils by "[moderately well-drained]--greater than 30"; "[poorly drained]--greater than 30"; "[poorly drained]--less than 30"; "[poorly drained]--stream"; "[very poorly drained]--muck"; and "[very poorly drained--mineral depression]." The references to "30" are the thicknesses, in inches, of sand tailings over overburden.

206. Maps E-1 and E-2 are, respectively, Detailed Existing Soils and General Existing Soils. Comparisons between these two maps, on the one hand, and Map I-3, on the other hand, reveal specifics of the soil-reclamation process.

207. The most distinctive feature of soils present at OFG is the thin band of Felda Fine Sand, Frequently Flooded, that runs down the center of OFG. As always, this reinforces the most distinctive feature of OFG--Horse Creek. However, the

Felda Fine Sand extends beyond the Horse Creek floodplains to Stream 2e, the Stream 1e series, and the headwater wetland of Stream 5w. All of these soils are in the no-mine area except at the Stream 1e series and headwater wetland of Stream 5w. A closely related soil underlies the floodplain of the lower end of Stream 6w, which is also in the no-mine area. These are the only locations on OFG with these soils.

208. The Felda Fine Sand is a "poorly drained soil having layers of loamy and/or spodic materials underlying sandy surfaces at least 20 inches thick on streams terraces and floodplains." Exclusive of the loamy or spodic materials, Map I-3 shows that IMC will reclaim the drainage characteristics of this type of soil at the Stream 1e series, but not at the headwater wetland of Stream 5w. IMC will also reclaim this type of soil at Streams 9w, 5w, 4w, 3w, 2w, and 1w.

209. Another distinctive soil, pre-mining, is "moderately well to excessively drained soils having layers of loamy and/or spodic materials underlying sandy surfaces greater than 30 inches thick on gentle upland slopes and rises." Except for a couple of areas at the eastern end of the East Lobe, these soils presently are all outside of the no-mine area. IMC will reclaim these soils, generally in the areas previously described as sand live oak or xeric oak, as well as in a long band along the southern border of the slough associated with Stream 9w and a

large area on the west sides of Sections 29 and 20. These areas correspond reasonably well in area and location to the existing soils with the same drainage characteristics.

210. The two most poorly drained soils, pre-mining, are "very poorly drained to poorly drained mineral soils in depressions" and "very poorly drained soils with organic surfaces on low gradient seepage slopes." The latter are exclusively mucky soils, and the former range from mucky fine sand to fine sand. Most of the mucky soils are in the no-mine area, such as in each of the Lobes and along Streams 6e and 7e. IMC will not reclaim with similar soils the three areas with these mucky soils that are outside the no-mine area.

211. The mucky fine soils are more widely distributed outside the no-mine area. The only significant areas of fine mucky sand presently at OFG underlie the Heart-Shaped Wetland, the headwater wetland of Stream 8e, and parts of the West Lobe. IMC will reclaim these mucky fine soils generally in accordance with their present areas and locations. The most significant reductions in area are from the slough of Stream 9w and the northeast corner of Section 4.

212. Except for another category of poorly drained soil and four small areas of a somewhat poorly drained soil--all within the no-mine area--the remaining soil is "poorly drained soils having layers of loamy and/or spodic materials underlying

sandy surfaces predominantly greater than 30 inches thick primarily on gently sloping uplands." The reclaimed counterpart of this poorly drained soil occupies the largest part of OFG, post-reclamation. This represents a substantial expansion of coverage of this type of soil, mostly at the expense of "poorly drained soils having layers of loamy and/or spodic materials underlying sand surfaces less than 30 inches thick primarily on gently sloping uplands."

213. Map I-6 is the Post Reclamation Streams. These are addressed below. Figure 13A5-1 is the Identification of Created Wetlands. These wetlands have already been discussed.

214. ERP Specific Condition 14 states that IMC shall reclaim wetlands in accordance with the schedule contained in Table 3AI-6A, which has been discussed. Specific Condition 14 lists various requirements applicable to the wetlands that IMC will create.

215. ERP Specific Condition 14.a requires IMC to remove "suitable topsoil" prior to mining wetlands. IMC must time the clearing of topsoil donor sites and reclaiming of other sites so that it optimizes the opportunities for the direct transfer of topsoil, without any intervening storage time. If IMC must remove wetland topsoil more than six months before it will be spread at a reclamation site, IMC must store the topsoil in such a way as to minimize oxidation and colonization by nuisance

species. Specific Condition 14.a encourages IMC to relocate any endangered or threatened plant species to appropriate mitigation sites.

216. ERP Specific Condition 14.b requires IMC to grade reclaimed forested wetland areas after backfilling them with sand tailings and/or overburden and cap them with "several inches of wetland topsoil." IMC shall use direct transfer of topsoil and live materials, such as stumps, shrubs, and small trees, where feasible. However, Specific Condition 14.b states in boldface: "All reclaimed bay swamps shall receive several inches of muck directly transferred from forested wetlands approved for mining." Specific Condition 14.b provides that wetland topsoil should be reasonably free of nuisance and exotic plant species before application to wetland mitigation areas.

217. ERP Specific Condition 14.c requires IMC to grade reclaimed herbaceous and shrub marsh wetland areas after backfilling them with sand tailings and/or overburden and cap them with "several inches of wetland topsoil when available." Specific Condition 14.c provides that wetland topsoil should be reasonably free of nuisance and exotic plant species before application to wetland mitigation areas.

218. ERP Specific Condition 14.d requires IMC to design marshes and wet prairies "to maintain the diversity of community types that existed prior to mining in order to support a wide

range of wildlife species including birds, reptiles, and amphibians." Specific Condition 14.d requires IMC to reclaim marshes and wet prairies with variations in hydroperiod and slope "to provide the greatest diversity of available habitat," with marsh hydroperiods ranging from ephemeral through permanently flooded. Specifying a range of slope values, Specific Condition 14.d adds that most marshes shall have slopes gradual enough to support wide transition zones with a diversity of vegetation.

219. ERP Specific Condition 14.d provides that IMC shall construct ephemeral marshes and wet prairies as identified in Figure 13B-8, which, discussed above, addresses the status of individual wetlands as connected, isolated, or isolated and ephemeral. Although not incorporated into the ERP, Table 13A1-4 indicates that IMC will mine 27 of the 29 ephemeral wetlands or 22 of the 27 acres of ephemeral wetlands, but will reclaim 44 ephemeral wetlands totaling 101 acres, as indicated on Table 13A5-1 2AI discussed above.

220. ERP Specific Condition 14.e provides that at least half of all herbaceous and shrub marshes shall be rim mulched with several inches of wet prairie, pine flatwoods, or palmetto prairie topsoil, and IMC shall use direct transfer, where feasible.

221. ERP Specific Condition 14.f requires IMC to use "several inches" of wet prairie, hydric pine flatwoods, or hydric palmetto prairie topsoil for all wet prairie and hydric palmetto prairie areas, and IMC shall use direct transfer, where feasible. However, instead of topsoiling, IMC may use "[o]ther innovative methods" that are likely to produce the same diversity of wet prairie forbs and grasses.

222. ERP Specific Condition 14.g requires IMC to construct, in forested wetlands, hummocks several inches above the wet-season high water line. The hummocks shall be 8-12 feet long and 3-6 feet wide. To increase habitat heterogeneity, IMC shall place brushpiles, logs, and tree stumps in the reclaimed area, which it shall roughly grade in some areas.

223. ERP Specific Condition 14.h requires IMC to construct streams in accordance with the Stream Restoration Plan. Specific Condition 14.h also requires IMC to employ an experienced stream restoration scientist, subject to BMR approval, to provide project oversight and conduct regular inspections during construction and planting.

224. First appearing in the January submittal, the Stream Restoration Plan is a design document that specifies, in detail, the physical characteristics of each reclaimed stream. For each reclaimed stream or stream segment, the Stream Restoration Plan provides detailed information of physical structure; channel

planform or shape; hydrologic characteristics in terms of such factors as storage, conveyance, and attenuation; geomorphic characteristics such as the substrate and floodplain soil types and the effects of flows upon these materials; vegetation along the stream corridor, including the addition of snags and debris dams to re-create natural microhabitats; construction supervision; and monitoring.

225. The Stream Restoration Plan focuses upon the design of the basin, reach, and microhabitat of each reclaimed stream. For microhabitat, the Stream Restoration Plan promises that:

> the ecology of most of the reaches is expected to be improved through reclamation. For all reaches except 1e and 3e (which are wholly situated in generally native land cover), the forested riparian zone will be substantially increased since improved pasture adjacent to the stream channels will [be] replaced with forested canopy.

226. Acknowledging the importance of small headwater streams to the overall integrity of a large watershed, the Stream Restoration Plan recognizes the hydrological and biological functions of the tributaries and their riparian wetlands--namely, flood conveyance, attenuation, and storage and aquatic and wetland habitat.

227. Among other things, the Stream Restoration Plan repeatedly stresses the importance of achieving "rapid closure of the riparian canopies." In addition to providing habitat, a

riparian canopy reduces solar heating of the stream, thus lowering the water temperature and minimizing weedy vegetation on the stream banks. Among the effects of lowering the water temperature is lowering the amount of water lost to evaporation. The installation of trees along and sometimes within the reclaimed channels will facilitate the rapid development of root systems to stabilize the substrate and provide submerged root structure, which is an important microhabitat for macroinvertebrates and fish. Mature trees in the floodplain also provide additional attenuation.

228. In addition to serving as a design document to govern the reclamation of mined streams on OFG, the Stream Restoration Plan is also a descriptive document, detailing the relevant characteristics of the streams presently at OFG. The Stream Restoration Plan uses several classifications that are useful in analyzing streams and their functions. These classifications include the Rosgen classification of stream shape (the Rosgen classification of bottom sediment is irrelevant because all existing and reclaimed streams at OFG have sandy bottoms), the Strahler convention of stream orders, the duration of flow, and the channel morphology.

229. The Rosgen classification of stream shape divides the streams at OFG into type E and type C. Type E streams are well-incised and hydraulically efficient; their width-to-depth ratios

are less than 12:1. Shallower and wider than type E streams, as these values relate to each other, type C streams at OFG are often associated with small wetland riparian zones and depressions, which are absent from type E streams at OFG.

230. The Strahler convention classifies streams based on their relative location in the upstream order of conveyances with the most-upstream streams classified as first-order streams. Except for Stream 2e and the Stream 1e series downstream of Streams 1eb and 1ef, all of the tributary streams on OFG are first-order streams, meaning essentially that they are the most upstream channelized conveyance receiving runoff or groundwater flow. Streams 2e, 1ec, 1ed, and 1ee are second-order streams, meaning that they receive flow from at least two first-order streams.

231. In terms of flow, perennial streams receive groundwater flow throughout the year in most years, ephemeral streams flow sporadically in response to rain and typically lack groundwater inputs, and intermittent streams flow during the wet season in response to groundwater and rain inputs and during the dry season sporadically in response to rain inputs only. Most, if not all, of the tributary streams on OFG are intermittent. However, almost all of the streams cease to flow due to low rainfall and overflow their banks due to very high rainfall.

Even Horse Creek dried up at State Road 64 during the low-rain conditions in 2000.

232. In terms of morphology, all streams at OFG are either in uninterrupted channels or interrupted channels. Interrupted channels mean that the stream passes through flow-through marshes and swamps.

233. Describing the existing streams in a slightly larger setting, the Stream Restoration Plan divides them into three groups, based on channel morphology and the vegetation and land uses adjacent to the channel. First, Streams 3e and 1e series are "surrounded by native habitat used for low-intensity cattle grazing. These are type C streams with a more diffuse riparian canopy and associated wetlands along the stream channel." Second, the portions of Streams 5e, 1w, 2w, 3w, 4w, 5w, 7w, and 9w within the floodplain forest of Horse Creek are type E streams with oaks and palmettos along, and often crowding, the channel. Third, the portions of the same eight streams that are outside of the floodplain forest of Horse Creek are type E streams, devoid of riparian vegetation and degraded by agricultural land uses, such as improved pasture and cattle grazing.

234. The Stream Restoration Plan describes the Stream 1e series as follows:

> Reach 1e provides drainage for a series of interconnected flow-through wetlands punctuated by five relatively short stream segments. The segments represent a total of some 2,039 linear feet of channel. They have shallow, sandy banks with little vegetation in the stream channel. A wide riparian canopy of slash pine, laurel oak, dahoon holly and wax myrtle is present along most of this reach. The palmetto edge of the floodplain varies in width, but is generally more than 100 feet from either bank, suggesting frequent inundation. The channel substrate is sandy except where near a swamp, where it becomes increasingly more organic.
>
> Each flow-through wetland occurs in shallow depressions which overflow into C-type channels that are typically several hundred feet long. Key components of this conveyance type include the lip elevation at which wetland flow enters the channel and the elevation at which the streams dissipate their discharge to the downstream flow-through wetland. Most of the stream segments in this conveyance system appear to be in good geomorphic condition. Most of these channels typically have wetland and/or upland hardwood trees in the riparian zone with little understory.

235. The Stream Restoration Plan reports that the channel of Stream 3e is in good geomorphic condition. The upper part of the channel flows through a scattered open canopy of trees with herbaceous cover in the riparian zone. The lower part of the channel mostly flows through treeless banks lined with palmettos. The channel has vegetation in it where it is exposed to sunlight.

236. In other respects, Stream 3e is like Stream 1e series, except that the channel is uninterrupted and shorter. The length of Stream 3e is 611-630 feet. Stream 1eb is 486 feet, Stream 1ef is 223 feet, Stream 1ec is 315 feet, Stream 1ed is 283 feet, and Stream 1ee is 732 feet. The 2039-foot length of the Stream 1e series is exclusive of the system's headwater and flow-through wetlands. The Stream 1e series has the most linear feet of any tributary stream on OFG.

237. In addition to the Stream 1e series and Stream 3e, the only other stream on the east side of Horse Creek to be mined is Stream 5e, which is an agriculturally disturbed stream with a narrow riparian canopy. The Stream Restoration Plan states that the lower portion of Stream 5e, which is within OFG, is in better condition than the upper portion, which is frequented by cattle and leads to a cattle pond and agriculturally altered wetland. However, in contrast to the Stream 1e series and Streams 6e, 7e, and 8e, Stream 5e is isolated in a vast monocommunity of improved pasture.

238. The streams on the west side of Horse Creek have all been impacted by agricultural practices, mostly cattle ranching, ditching streams, sloughs, and other wetlands, and excavating cattle ponds in wetlands. The only streams entirely in the no-mine area on the west side of Horse Creek are Streams 8w and 6w, which are part of the Central and West Lobes, respectively.

239. Relative to their surrounding communities, the streams on the west side of Horse Creek fall into three groups. Streams 6w and 8w are integrated into diverse communities of uplands and wetlands. Like Stream 5e, Streams 5w, 4w, 3w, and 2w are lonely departures from the monocommunity of improved pasture and, thus, attractors of thirsty or hot cattle. All of these streams have been impacted, to varying degrees, by ditching, which, with cattle disturbances, has led to unstable banks and erosion. Functionally, Streams 9w, 7w, and 1w are between these two groups.

240. As a stream, Stream 9w is surrounded by improved pasture; however, it drains a large wet prairie surrounded by large areas of palmetto prairie to the south and west and sand live oak to the north and east. Prior to agricultural disturbance, Stream 9w was much higher functioning, at least with respect to flood conveyance, attenuation, and storage. At one time, this stream led upgradient to a long slough. After the slough was ditched to hasten drainage, the channel of Stream 9w suffered from excessive hydraulic forces, resulting in bank instability and a curious channel formation that fits the type E stream, even though the valley slope is consistent with other type C streams at OFG. Stream 9w is the second-shortest stream on OFG at 472 feet.

241. Draining the smallest area of all tributaries on OFG (30 acres), Stream 7w lies between a large palmetto prairie to the north and improved pasture to the south. Stream 7w is the shortest stream on OFG at 456 feet. Stream 7w's upper section is characterized by unstable banks vegetated by pasture grasses.

242. Stream 1w runs from Horse Creek through improved pasture, but enters a large palmetto prairie before draining a wetland that includes a relatively small bayhead. The upper half and extreme lower portions are in good condition with appropriate vegetation, but the channel is eroded in areas where it runs through pasture. IMC will reclaim the headwater wetland of Stream 1w with a large bayhead.

243. ERP Specific Condition 14.i requires IMC to survey the final contours of each mitigation wetland to the precision of a one-foot contour. Within 60 days of final grading, IMC shall submit to BMR, for its approval, a topographic map and representative cross sections for each wetland and extending at least 200 feet into the adjacent uplands. IMC must also submit surveyed profiles and cross sections for all reclaimed streams. All topographic maps must meet the minimum technical standards of Chapter 472, Florida Statutes.

244. ERP Specific Condition 14.j states that IMC shall assess the hydrology of the modeled wetlands through the installation of monitoring wells and staff gauges at mutually

agreed-upon sites in these reclaimed wetlands. For at least two years after the final contouring of each wetland, IMC shall monitor the hydrology for the parameters listed in Table MR-2, which is described below. IMC shall submit the analysis to BMR within 30 days of its completion. If BMR does not approve the hydrology, IMC shall have 60 days to submit a remedial plan.

245. ERP Specific Condition 14.k requires that freshwater marsh and ephemeral marsh vegetation shall develop from direct placement of donor topsoil or planting of herbaceous marsh species in the densities and numbers specified in the Freshwater Marsh and Wet Prairie/Ephemeral Marsh planting tables, so as to meet the requirements of ERP Specific Condition 16. Both tables require plantings on three-foot centers, or 4840 plants per acre, and specify suitable water levels for each species. The Freshwater Marsh planting table lists 22 approved species, and the Wet Prairie/Ephemeral Marsh planting table lists 35 approved species. ERP Specific Condition 14.l requires IMC to plant the uplands surrounding wet prairies with collected native grass seed, such as creeping bluestem, sand cordgrass, blue maidencane, bluestem, lovegrass, and eastern gamma grass, to prevent invasion by non-native or range grasses.

246. ERP Specific Condition 14.m provides that IMC shall develop shrub marsh vegetation by directly placing donor topsoil at the location of the reclaimed shrub marsh and planting

herbaceous and shrub marsh species in the densities and numbers specified in the Shrub Marsh planting table, so as to meet the requirements of ERP Specific Condition 16. The Shrub Marsh planting table requires IMC to plant herbaceous species on three-foot centers, or 4840 plants per acre, and shrub species at an average density of 900 plants per acre. The planting table lists 18 approved species and requires IMC to plant at least five different shrub species. The planting table also specifies suitable water levels.

247. ERP Specific Condition 14.n provides that IMC shall plant forested wetlands in the densities, species richness, and dominance specified in the Bay swamp/Gumswamp/Hydric Oak Forest/Wet Pine Flatwoods/Mixed Wetland Hardwood/Mixed Forest Swamp, "as appropriate for each community type" to meet the requirements of ERP Specific Condition 16. IMC shall plant appropriate species based on the design elevations, hydrology monitoring, and mitigation goals.

248. ERP Specific Condition 14.o provides that IMC shall plant shade-tolerant herbaceous species after establishing suitable shade, by year 7, in hardwood swamps, mixed forest swamps, and bay and gum swamps. Specific Condition 14.o states: "At least 5 of the species listed in the Tables in n above and others like goldenclub . . . and swamp lily . . . shall be

planted." The items listed in Specific Condition 14.n, however, are communities, not species.

249. ERP Specific Condition 15 requires IMC to implement a monitoring and maintenance program to promote the survivorship and growth of desirable species in all mitigation areas. ERP Specific Condition 15.a requires IMC to conduct "quarterly or semi-annual" inspections of wetlands for nuisance and exotic species. IMC shall control these species by herbicide, fire, hydrological, or mechanical means "to limit cover of nuisance species to less than ten (10) percent and to remove exotic species when present in each created wetland." IMC must annually use manual or chemical treatment of nuisance and exotic species when their cover in any area of at least one acre is greater than ten percent or any exotic species are present. IMC must use manual or chemical treatment if cogongrass covers more than five percent within 300 feet of any reclaimed wetland.

250. ERP Specific Condition 15.b allows IMC to control water levels with outflow control structures and pumps, as needed to enhance the survivorship and growth of sensitive taxa. However, IMC must remove all water management structures at least two years prior to requesting release.

251. ERP Specific Condition 15.c requires IMC to make supplemental tree and shrub plantings, pursuant to Specific Condition 14, when tree/shrub densities fall below those

required in ERP Specific Condition 16. Specific Condition 15.d requires IMC to make supplemental herbaceous plantings, pursuant to ERP Specific Condition 14, when cover by a "diversity of non-nuisance, non-exotic wetland species as listed in Chapter 62-340.450, F.A.C.," falls below that required in ERP Specific Condition 16.

252. ERP Specific Condition 16 provides the conditions for DEP to release IMC of further obligation for reclaimed wetlands. DEP shall release the 105 acres of reclaimed forested wetlands and 217 acres of herbaceous wetlands when IMC has constructed them in accordance with the ERP requirements; IMC has not intervened, for two consecutive years (absent BMR approval), by irrigating, dewatering, or replanting desirable vegetation; and the remaining requirements of ERP Specific Condition 16 have been met. IMC must indicate in its annual narrative, which is required by Specific Condition 5, the start date for the non-intervention period.

253. ERP Specific Condition 16.A requires that the water quality meet Class III standards, as described in Florida Administrative Code Chapter 62-302.

254. ERP Specific Condition 16.B addresses water quantity. ERP Specific Condition 16.B.1 requires each created wetland to have hydroperiods and inundation depths sufficient to support wetland vegetation and within the range of conditions occurring

in the reference wetlands of the same community for the same period, based on the monitoring data developed in accordance with ERP Specific Condition 14.j. Tributary wetlands must have seasonal flow patterns similar to specified reference wetlands for the same period.

255. ERP Specific Condition 16.B.2 states that IMC modeled 24 representative reclaimed wetlands that IMC has modeled during the application process to predict subsurface conditions after excavation and backfilling. Figure 13-3 depicts these modeled wetlands, which are within 13 wetland complexes, and the proposed transects.

256. All of the modeling transects are aligned east-west, which is the direction of groundflow. As discussed in detail below, the primary hydrological model used by Dr. Garlanger requires an input for the length of the upland in terms of the distance from the basin divide to the riparian wetland. Therefore, the transects probably must run in the direction of groundwater flow. Absent an ability to model the hydroperiod and inundation depth of a wetland across a sand tailings valley and cast overburden plateau--i.e., in a north-south direction--multiple east-west transects in wetlands with long north-south dimensions would better reveal whether the wetland design were adequately accounting for the alternating pattern of sand tailings valleys and cast overburden plateaus.

257. For all the areas for which Map H-1 provides probable orientations of spoil piles--basically, for present purposes, everywhere but Section 4--the spoil piles are oriented in the same alignment as the transects, so the transects will not cross the sand tailing valleys/cast overburden peaks. In other words, each of the transects will run along the portion of each wetland for which the relative depths of sand tailings and cast overburden remain constant, avoiding the potentially more problematic situation of alternating rows of sand tailing valley and cast overburden peak. As noted below, the north-south dimension of W039 assures that one cast overburden spoil pile and part of another will underlie W039. The north-south dimensions of W003 and E046/E047 also are long enough to guarantee significant alterations in geology.

258. ERP Specific Condition 16.B.2 requires that, prior to the construction of the modeled 24 wetlands, IMC shall reassess and, if necessary, modify their design. The modifications shall be based on the targeted hydroperiods and inundation depths set forth in Table 1, which is described below, and updated analysis from an "integrated surface and ground water model that has been calibrated to actual field conditions at the location of the wetland to be constructed." Lastly, ERP Specific Condition 16.B.2 requires IMC to use a similarly calibrated model to design the other reclaimed wetland, so that they achieve the

targeted hydroperiods and inundation depths set forth in Table 1.

259. For the 24 modeled wetlands, Table 1 identifies eight types of wetland community, prescribes hydroperiods and inundation depths for each wetland habitat, and projects a hydroperiod for each of the 24 modeled wetlands. As amended at the hearing for bay swamp hydroperiods, the hydroperiods and inundation depths for the wetland communities are: bay swamps--8-11 months with inundation depths of 0-6 inches; gum swamps--3-12 months with inundation depths of 0-12 inches; mixed wetland hardwoods and wetland forested mix--3-9 months with inundation depths of 0-6 inches; hydric pine flatwoods--1.5-4.5 months with inundation depths of 0-6 inches; freshwater marshes--7-12 months with inundation depths of 6-30 inches; wet prairies--2-8 months with inundation depths of 0-6 inches; and shrub marshes--7-12 months with inundation depths of 6-24 inches.

260. The 24 reclaimed wetlands to be modeled include three bay swamps: W039, which is the headwater wetland of Stream 1w; E008, which is a small part of the wetland into which Streams 1eb and 1ef drain; and E063, which is a small bay swamp in the middle of Stream 5e. The only other bay swamps to be reclaimed are E007, which is a small part of the wetland into which Stream 1ec drains, and W036, which is in the center of Section 19 and drains offsite into West Fork.

261. The only other modeled wetlands that are part of the riparian wetlands of Stream 1e series are E007 and E009, which are near E008 and are the only hydric pine flatwoods to be modeled. The only other hydric pine flatwoods to be reclaimed is E015, which is also part of the riparian wetlands of Stream 1e series.

262. Other modeled wetlands of particular importance are W003, which will be a large wet prairie wetland serving as the headwater wetland of Stream 9w; W031, which will be the freshwater marsh serving as the headwater wetland of Stream 3w; E018, E046, and E057, which are wet prairie fringes; E018, E042, E046, and E057, which are ephemeral wetlands (E042 is the only modeled ephemeral wet prairie that is not a fringe wetland); and all of the connected wetlands of Streams 3e and 3e′: E024, which is a wetland forested mix that is the riparian wetland along Stream 3e; E023, which is a freshwater marsh immediately upstream of E024; E022, which is a mixed wetland hardwoods joining the upstream side of E023; E018, which is a wet prairie fringing the headwater wetland of Stream 3e′; E019, which is a shrub marsh (the only modeled shrub marsh) fringed by E018; and E020, which is a freshwater marsh joining E019 and also fringed by E018.

263. ERP Specific Condition 16.B.3 states the IMC shall monitor the 24 modeled wetlands, as prescribed by ERP Monitoring Required Section D and Table MR-2, which are discussed below.

264. ERP Specific Condition 16.B.4 requires that the ephemeral wetlands shall remain inundated no more than eight months per year during a normal water year, which is between the 20th and 80th percentiles of historical record in terms of total rainfall and major storm occurrence.

265. ERP Specific Conditions 16.C.1 and 2 apply to all mitigation areas within the scope of the ERP. Specific Condition 16.C.1 requires that non-nuisance, non-exotic wetland species listed in Florida Administrative Code Rule 62-340.450 cover at least 80 percent of the groundcover or attain the range of values documented in specific reference wetlands of the target community. Desirable groundcover plant species must be reproducing naturally.

266. ERP Specific Condition 16.C.2 provides that nuisance vegetation species, such as cattail, primrose willow, and climbing hemp vine, shall cover less than 10 percent of the total wetland area. Invasive exotic species, such as melaleuca, Chinese tallow, and Brazilian pepper, shall not be considered as an acceptable component of the vegetative community.

267. For herbaceous marshes, ERP Specific Condition 16.C requires that native species typical of the reference marshes

dominate the cover and that they be distributed in zonation patterns similar to reference marshes. Species richness and dominance regimes shall be within the range of values documented within the reference marshes.

268. For wet prairies, ERP Specific Condition 16.C requires that native species typical of the reference wet prairies dominate the cover. Species richness and dominance regimes shall be within the range of values documented within the reference wet prairies. Range grasses, such as bahiagrass and Bermuda grass, shall cover, in total, less than 10 percent of the wet prairie.

269. For shrub marshes, ERP Specific Condition 16.C requires that native species typical of the reference shrub marshes dominate the cover. Carolina willow and wax myrtle shall cover, in total, less than 30 percent of the marsh.

270. For all forested wetlands, ERP Specific Condition 16.C.1 provides that the forested canopy shall have an average of at least 400 live trees per acre that are at least 12 feet tall, except for cabbage palms, which shall have a leaf, including the stalk, that is at least three feet long. In the alternative, the forested canopy shall meet or exceed the range of canopy and sub-canopy tree densities in specified reference wetlands. No area greater than an acre shall have less than 200

trees per acre. Hydric pine flatwoods shall average 50 trees per acre.

271. For all forested wetlands, ERP Specific Condition 16.C.2 provides that the shrub layer shall average at least 100 shrubs per acre or shall meet or exceed the range of shrub densities in specified reference wetlands. Early successional species, such as Carolina willow, saltbush, and wax myrtle, do not count in meeting this density requirement, but the monitoring reports shall include such species. Hydric pine flatwoods shall have an average density of 350 shrubs per acre, and the primary species shall be typical of hydric pine flatwoods, such as saw palmetto, gallberry, and fetterbush.

272. For all forested wetlands, ERP Specific Condition 16.C.3 states that the canopy and shrub strata shall each have the species richness values and dominance regimes within the range of values in specified reference wetlands/floodplains of the target community. Canopy and shrub measurements are limited to those indigenous species that will contribute to the appropriate strata of the mature forested wetlands/floodplains. Up to half of the trees and shrubs in the upper transitional zone may consist of appropriate upland and facultative species, as found in specified reference wetlands. Desirable canopy and shrub species shall be reproducing naturally.

273. For all forested wetlands, ERP Specific Condition 16.C.4 provides that herbaceous vegetation shall have the species richness values and dominance regimes within the range of values in specified reference wetlands/floodplains of the target community. In making this evaluation, DEP shall consider the relative age of the mitigation site, as compared to specified reference wetlands.

274. ERP Specific Condition 16.D.1 requires that all stream banks be stable, subject to normal erosion and deposition zones, as evidenced by the conformance of the stream with the applicable Rosgen type C or E, as described in the appropriate reference streams.

275. ERP Specific Condition 16.D.2 requires that the physical characteristics of the reclaimed stream conform to its design. ERP Specific Condition 16.D.3 requires that tree roots, log jams, snags, and other instream structure shall be present at desirable intervals along the reclaimed stream.

276. ERP Specific Condition 16.D.4 provides that species diversity and richness of the macroinvertebrate community shall be within the range of values documented in the reference streams or reported values of similar streams systems in central Florida. Also, all functional feeding guilds of macroinvertebrates found in the reference streams shall be present in the reclaimed streams. In the alternative, IMC may

show that the reclaimed stream has met the minimum thresholds for the "good" classification in DEP's Stream Condition Index for macroinvertebrates and habitat quality.

277. ERP Specific Condition 16.E provides that, throughout OFG, at least 105 acres of reclaimed forested wetlands and 217 acres of reclaimed herbaceous wetlands shall be determined to be wetlands or other surface waters. IMC shall achieve the minimum acreage for each wetland, as indicated on Map I-2 and associated figures and tables. However, IMC may make minor changes in the size, shape, or location of individual reclaimed wetlands, subject to BMR's approval.

278. ERP Specific Condition 17 provides that DEP shall release IMC from further obligation regarding mitigation when ERP Specific Condition 16 has been met. IMC initiates the release procedure by notifying DEP that IMC believes the mitigation is ready for release, but this notice may not be earlier than two years after the completion of mitigation. DEP must respond within 120 days. ERP Specific Condition 17.d provides: "[DEP] may release the mitigation wetlands based on a visual evaluation, notwithstanding that all the requirements of Specific Condition 16 have not been met."

279. ERP Specific Condition 18 applies to the surface water management system. The system must conform to the plans, specifications, and performance criteria approved by the ERP.

280. ERP Specific Condition 19 requires IMC clearly to identify all no-mine areas in the field within two years of the issuance of the ERP.

281. ERP Specific Condition 20 states that BMR will review the ERP at the end of the first five-year term after its issuance and at the end of each succeeding five-year term, if any. The purpose of the review is to determine compliance with general and specific conditions, including monitoring requirements. BMR staff shall quarterly inspect the mine for compliance with these requirements.

282. ERP Specific Condition 21 requires IMC to provide a phased Conservation Easement, in favor of DEP, on 525 acres of OFG, as depicted on Figure F-6. Figure F-6 shows two easement areas. Phase A, which is 372 acres, corresponds to the 100-year floodplain of Horse Creek. Phase A is in the no-mine area. Phase B, which is 153 acres, is a wider band running along both banks of the northernmost 1 1/2 miles of Horse Creek and mostly on only the west bank for the southernmost 2 miles of Horse Creek. Phase B consists of part of the reclaimed area. The corridor covered by both phases of the Conservation Easement is generally not wider than 1000 feet and thus does not capture all of the non-improved pasture upland communities reclaimed on either side of Horse Creek and described above.

283. IMC is required to grant the Conservation Easement on the Phase A lands within six months of the issuance of the ERP. IMC is required to grant the Conservation Easement on the Phase B lands within six months of the release by DEP of IMC from further obligations regarding reclamation and mitigation.

284. ERP Specific Condition 21 incorporates the Conservation Easement and Easement Management Plan. The Conservation Easement implicitly acknowledges the fact that IMC is contractually obligated to convey OFG back to the Carlton-Smith family, after IMC has been released from further obligations regarding reclamation and mitigation. Thus, post-mining, OFG will return to its historic agricultural uses--mostly, cattle ranching. The restrictions and encumbrances included in the Conservation Easement are designed to provide some protection to the wetlands, streams, and uplands within the Phase A and Phase B areas.

285. Granted to the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida, for which DEP serves as an agent, the Conservation Easement allows IMC and its successors, including the Carlton-Smith family, to use the encumbered property for cattle ranching, but only to the extent consistent with "sustainable native range management practices." These sustainable native range management practices require, among other things, the natural renewal of the grazing capacity

of the land by allowing native grasses and other native forage species to regenerate. The Easement Management Plan contemplates prescribed burns of portions of the corridor. The Conservation Easement also allows IMC and its successors, upon obtaining the necessary permits, to construct a commodious 200-foot wide accessway across the encumbered property for a road, pipelines, draglines, and/or utilities.

286. ERP Specific Condition 22 requires IMC to enhance 80 acres of existing pastureland within several areas of the Horse Creek floodplain, as indicated on Figure F-5, which is Habitat Enhancements. Most of the depicted enhancement areas are on OFG, but two of them are a short distance from OFG.

287. ERP Specific Condition 22 requires IMC to plant 100 longleaf pines and/or oaks per acre within several sites, covering 80 acres of existing pastureland, adjacent to the 100-year floodplain of Horse Creek. Most of the sites are on the west bank of Horse Creek, mostly south of the Lobes, but a couple of sites are on the east bank in the vicinity of the East Lobe. ERP Specific Condition 23 requires that IMC plant these areas within one year of the issuance of the ERP and that the overall survival rate be at least 80 percent, as of the time of the release of the last mitigation parcel.

288. ERP Specific Condition 23 requires IMC to enhance existing xeric and scrub habitats within areas designated as ACI

(Area of Conservation Interest)-2, ACI-4, and ACI-6, as depicted on Figure F-5. Specific Condition 23 states that IMC shall enhance the wildlife habitat of these areas by performing controlled burns, cutting overgrown trees, planting desirable species, and controlling nuisance and exotic species. Specific Condition 23 obligates IMC to complete these enhancements within three years of the issuance of the ERP.

289. ACI-2 is about 1 1/2 miles west-southwest of the southern end of OFG, between State Road 64 and the West Fork. ACI-2 consists of about 60 acres of overgrown xeric habitat, featuring 40 acres of sand scrub, predominantly sand live oak. Gopher tortoises occupy ACI-2 at a density of about 1.6 reptiles per acre. Florida mice occupy ACI-2 at a density of 0.4 rodents per acre, meaning that only 15-25 Florida mice may occupy ACI-2. By fence-posting overgrown sand pine and sand live oak and conducting a prescribed burn, IMC will reduce the heavy canopy existing on ACI-2 and enhance the suitability of ACI-2 for gopher tortoises and Florida mice. IMC will also apply herbicides to nuisance exotic species, such as bahiagrass, after which IMC will direct seed the flatwoods on the site with suitable vegetative species. Following this work, IMC may relocate Florida mice from OFG to ACI-2, upon approval from the FWC.

290. ACI-6 is about one mile east of the southern end of OFG. ACI-6 consists of about 421 acres of a mixture of open land and overgrown oak scrub. Gopher tortoises occupy ACI-6 at densities ranging from 0.7 to 1.8 animals per acre. After fence-posting overgrown oaks and sand pine, conducting prescribed burns, installing fencing to exclude cattle and feral hogs, applying herbicide to kill exotic species, and direct seeding appropriate vegetation, IMC may relocate Florida mice from OFG to ACI-6, upon approval from FWC.

291. ACI-4 consists of about 82 acres at the eastern end of the East Lobe and is within the no-mine area. The western end of ACI-4 slopes to the west through a bahia pasture before it enters a large bay swamp at the western end of the East Lobe. This area has been impacted by partial clearing and the depositing of animal carcasses--the latter practice yielding the name assigned to this area, the "boneyard" scrub. ACI-4 is dominated by mature scrub oaks. Gopher tortoises occupy ACI-4 at the rate of 0.85 terrestrial turtles per acre, and gopher frogs frequent the mouths of tortoise burrows at the site, although no signs of Florida mice exist. After conducting enhancement activities similar to those to be conducted on the other ACIs, IMC intends to create and maintain more suitable habitat for Florida mice. Specific Condition 23 states that IMC shall enhance 25 acres of pasture on ACI-4 by planting 100

longleaf pines and/or oak trees, and IMC shall manage these areas to achieve an overall survival rate of 80 percent through release of the final reclamation parcel.

292. ERP Specific Condition 24 notes that IMC has committed to initiate the management and evaluation of amphibians, including the Florida gopher frog, and shall adhere to the management plans outlined in the IMC Minewide Gopher Tortoise and Burrow Conceptual Management Plan that FWC has examined, but not yet approved. IMC shall expend at least $30,000 to compare amphibian use of reclaimed and unmined wetlands. IMC shall include progress reports as to this study with its annual narrative reports required under Specific Condition 4.

293. ERP Specific Condition 25 incorporates Tables 2AI-1 and 2AI-2 to provide assurance that IMC has sufficient sand tailings for the timely reclamation of wetlands contemplated in the ERP. Table 2AI-1 is the IMC Overall Sand Balance. Table 2AI-2 is the [OFG] Sand Balance.

294. Table 2AI-1 shows the sand tailings production of IMC's Four Corners and Ft. Green mines from 2004-2014 and assumes an initial mining year of 2006 for OFG. For each of these 11 years, Four Corners produces 27,000,000 tons of sand tailings. For the first seven of these years, Ft. Green produces 17,000,000 tons of sand tailings. During these 11

years, IMC needs anywhere from 13,300,000 to 54,900,000 tons of sand tailings to meet all of its reclamation obligations. The closest that IMC will come to exhausting its sand tailings stockpile will be in year 6 of the OFG mining operation (2011, if OFG mining starts in 2006). For this and the following year, the sand tailings stockpile will total 300,000 tons. By this time, IMC's requirements for sand tailings begin to taper off, so that, by the final year on the schedule (2014), the sand tailings stockpile increases to 20,600,000 tons. Table 2AI-2 shows that IMC can meet its reclamation obligations for the Ft. Green Mine and OFG without using any stockpiled sand tailings.

295. The next section of the ERP is Monitoring Required. The designations for this section start with a letter. As its name suggests, ERP Monitoring Required describes the monitoring program. The presence of monitoring does not imply the presence of standards or criteria applicable to what is monitored or the presence of a remedy or sanction for noncompliance with any standard or criterion. The existence of this section of the ERP does not mean that other sections of the ERP may impose monitoring requirements, applicable standards and criteria, and remedies or sanctions for noncompliance.

296. ERP Monitoring Required A.1 requires IMC to submit annual narrative reports to BMR detailing the progress of the

restoration program identified in ERP Specific Condition 4. As required in ERP Specific Condition 5, IMC shall submit to BMR hydrology reports annually and vegetation reports annually for the first three years and every other year thereafter, until release.

297. At least 60 days prior to sampling, ERP Monitoring Required A.2 requires IMC to submit, for agency approval, vegetation, hydrology, and macroinvertebrate monitoring plans detailing sampling techniques and locations. ERP Monitoring Required A.3 requires IMC to include in its annual hydrology reports the daily rainfall amounts for the Ft. Green and OFG gauges shown on Map D-4.

298. ERP Monitoring Required A.4 states that, if BMR determines that restoration efforts are not trending toward achievement of the release conditions set forth in ERP Specific Condition 16, IMC shall have 30 days from notification to submit proposed corrective actions. IMC shall implement corrective actions within 90 days of their approval.

299. ERP Monitoring Required B states that data compiled in the CDA will be the primary source of reference wetland information. IMC shall then collect additional stage and hydroperiod data from the modeled wetlands. Within one year of the issuance of the ERP, IMC shall submit to BMR, for approval,

a proposed sampling plan, including locations, frequencies, and vegetation, hydrology, and macroinvertebrate sampling methods.

300. ERP Monitoring Required B provides that IMC shall select several wetlands of each community and submit them to BMR for approval. It appears that this process has already been completed, and DEP should updated ERP Monitoring Required B by incorporating into the ERP Figure RF-1, which, although not presently incorporated into the ERP, identifies 26 reference wetlands on OFG and nine reference wetlands on the original Ona Mine to the east of OFG. These reference wetlands include the most important components of the Lobes, the Heart-Shaped Wetland, Stream 2e's riparian wetlands, several wetlands in the Stream 1e series, the headwater wetland of Stream 3e, isolated wetlands south and east of the headwater wetland of Stream 3e, parts of the headwater wetland of Stream 1w, and the riparian and headwater wetlands of Stream 8e. As noted below, the riparian and headwater wetlands of Stream 8e, which are selected as reference wetlands, are moderate functioning, but the riparian and headwater wetlands of Stream 7e, which are not selected as reference wetlands, are high and very high functioning.

301. ERP Monitoring Required C is Compliance Monitoring. Monitoring Required C.1 provides that IMC shall submit water quality data with the annual narrative reports submitted

pursuant to ERP Specific Condition 7. All monitoring reports must include specified information, such as the dates of sampling and analysis and a map showing sampling locations.

302. ERP Monitoring Required C.2 states that IMC shall submit hydrology data with its annual narrative reports. ERP Monitoring Required C.3 states that IMC shall monitor water levels in wetlands in no-mine areas in accordance with Table MR-1, which is described below.

303. ERP Monitoring Required C.4 notes that IMC shall measure and report surface water flows in accordance with ERP Specific Condition 10. IMC must include in its reports to BMR all U.S. Geologic Service data collected at State Road 64 and State Road 72, which is south of State Road 64, and rainfall data collected by the U.S. Geologic Service, Southwest Florida Water Management District, and IMC. The annual hydrographs for Horse Creek at State Road 64 and State Road 72 "should" be similar. IMC must obtain and report hydrological data from 30 days after the issuance of the ERP until three years after the hydrological reconnection of the last reclaimed area upstream of a water level monitoring location. Within 60 days of the receipt of such data, BMR shall notify IMC of any changes to mining or reclamation that are necessary, and IMC shall have 60 days to respond to this notice.

304. ERP Monitoring Required C.5 grants IMC a 50-meter temporary mixing zone adjacent to construction and in waters of the state; provided, however, this mixing zone is in effect only during the construction of the pipeline crossing just downstream of the Heart-Shaped Wetland. IMC must halt construction if monitoring reveals that turbidity at the site is more than 29 NTUs above upstream locations.

305. ERP Monitoring Required C.6 states: "Compliance Monitoring Summary--See Table MR-1." Table MR-1 is discussed below, in connection with Table MR-2.

306. ERP Monitoring Required D is Release Criteria Monitoring. Applying to vegetation, Monitoring Required D.1 provides that IMC shall conduct all monitoring of herbaceous vegetation during or immediately after the summer growing season. Monitoring Required D.1 requires the reports to include a description of collection methods and location maps. IMC must report data separately for individual wetlands. IMC must report separate density and cover information for trees, shrubs, and groundcover, as well as information about any supplemental planting.

307. Applying to water quantity, ERP Monitoring Required D.2 provides that IMC shall submit water quantity data with its annual narrative reports, as required in ERP Specific

Condition 4. IMC shall collect onsite daily rainfall data at OFG.

308. ERP Monitoring Required D.3 requires: "Soils, macroinvertebrates and stream channel integrity/morphology shall be monitored as described in Table MR-2." ERP Monitoring Required D.4 states: "Release Monitoring Criteria Summary--See Table MR-2."

309. Tables MR-1 and MR-2 refer to the monitoring required for compliance and release, respectively. The identification of these tables as "summaries" and the vague references to them in ERP Monitoring Required C.6 and D.4 suggest that the tables do not contain any performance standards and may imply that, except for the asterisked notes in Table MR-1, they summarize all of the performance standards and criteria contained in the ERP.

310. If summaries, the tables should not introduce new elements, but they do just that with respect to the methods, sampling schemes, and frequency of monitoring. For water quantity monitoring, for instance, Table MR-2's promise of weekly readings of monitoring wells and piezometers for part of the year conflicts with the monthly reading required in ERP Specific Condition 10.b. If summaries of performance standards and criteria, the tables should capture all of the compliance and release criteria, but they do not. For water quality, for example, Table MR-2, which is limited to five parameters,

potentially conflicts with ERP Specific Condition 16.A's broad assurance of compliance with Class III water quality standards, which encompass a broad range of parameters, including iron. For water quantity, Table MR-2 also omits the enforceable streamflow criteria of ERP Specific Condition 10.b. For soil, Table MR-2 includes one parameter--litter accumulation--for which no corresponding criterion exists and includes substrate--for which important criteria exist as to the depths of sand tailings, topsoil, green manure, and muck--but omits any release criteria. Addressing two of the most important parts of the ERP--monitoring and performance criteria--these tables must be interpreted as subordinate to the remainder of the ERP, so that if they conflict with another ERP provision, the other ERP provision controls, but if they add a requirement not elsewhere found in the ERP, the requirement applies to the proposed activities.

311. Table MR-1 is the Compliance Monitoring Criteria Summary. Table MR-1 identifies two monitoring parameters: water quality and water quantity. Asterisked notes state that the Table MR-1 requirements for water quality are in addition to those set forth in Specific Condition 7, which are discussed above, and the Table MR-1 requirements for water quantity are in addition to those set forth in Specific Condition 10.b, which are discussed above.

312. For water quality, Table MR-1 addresses only turbidity. The compliance criterion is the Class III standard. The "proposed methods" are for IMC to monitor water, at mid-depth, 50 meters upstream and downstream from the point of severance and reconnection of each wetland. The frequency of monitoring is daily during severance or reconnection or during pipeline corridor construction or removal. The duration of monitoring is at least one wet season prior to mining, during mining, and through contouring.

313. For water quantity, Table MR-1 addresses water levels, flow, hydrographs, soil moisture, and plant stress. The compliance criteria are soils sufficiently moist to support wetland vegetation and prevent oxidation and water levels in recharge ditches sufficient to simulate normal seasonal fluctuations of water in adjacent wetlands and other surface waters. The "proposed methods" are for IMC to install staff gauges, monitoring wells, piezometers, and flow meters in recharge ditches and wetlands in the no-mine area and at the point that the 100-year floodplain of Horse Creek intercepts the unmined portions of Streams 2e, 6e, 7e, 8e, 9e, 6w, and 8w. The frequency of monitoring is to check rainfall and recharge ditches daily, staff gauges in streams "continuously," and monitoring wells and piezometers weekly. The duration of

monitoring is at least one wet season prior to mining, during mining, and through contouring.

314. Table MR-2 is the Release Monitoring Criteria Summary. Table MR-2 identifies five monitoring parameters: water quality, water quantity, stream channel integrity and morphology, soils, and vegetation.

315. For water quality, Table MR-2 addresses dissolved oxygen, turbidity, temperature, pH, conductivity, and, for all streams, all of the parameters in ERP Specific Condition 7.a. The compliance criteria are Class III standards. The locations are at or near the connection of wetlands in the no-mine area and at or near vegetative transects in streams and representative wetlands. The frequency is monthly from May to October prior to the reconnection to wetlands in the no-mine area and monthly from May through October of the year prior to the release request. The duration of monitoring is at least two years after the completion of contouring.

316. For water quantity, Table MR-2 addresses water levels, flow, hydroperiod, rainfall, and hydrographs. The release criteria are values within the range of values documented in specified reference wetlands for each community type and, for hydroperiods and water levels, within the range of values predicted by modeling. The "proposed methods" are the same instruments identified for water quantity in Table MR-1.

The locations for sampling are at or near the connection to wetlands in the no-mine area and at representative locations, including the deepest depths, of several representative wetlands of each community type. The frequency of monitoring is to check rainfall daily, staff gauges in streams "continuously," monitoring wells and piezometers weekly from May through October and monthly from November through April, and flow at sufficiently frequent intervals to generate rating curves for the streams. The duration of monitoring is at least two years after the completion of contouring.

317. For stream channel integrity and morphology, Table MR-2 addresses channel stability and erosion, channel sinuosity channel profile, and cross sections. The release criteria are: "Stable channel and banks, no significant erosion, or bank undercutting, stream morphology within the range of values appropriate for the designed stream type (Rosgen C or E)." The location of sampling is over the entire channel length and representative cross sections. The frequency of monitoring for channel stability and erosion is after "significant" rain events for at least the first two years after contouring. The frequency of monitoring for channel sinuosity, channel profiles, and cross sections is years 2, 5, and 10.

318. For soils, Table MR-2 addresses substrate description, litter accumulation, and compaction, but lists no release criteria.

319. For vegetation, Table MR-2 addresses the species list and percent cover, FLUCFCS Level III map, percent bare ground and open water, nuisance species cover, upland species cover, tree density, shrub density, tree height, tree breast height diameter starting in year 5, and fruit and seedlings (starting in year 7). The release criteria are 400 trees per acre that are 12 feet tall, 100 shrubs per acre, species richness and diversity within the range of reference forested and herbaceous wetlands, 80 percent groundcover, and less than ten percent nuisance species. The location of sampling is randomly selected sites along several transects across each wetland, and the frequency of monitoring is years 1, 2, 3, 5, and every other year through the year prior to release.

320. For macroinvertebrates, Table MR-2 addresses the number and identity of each taxon, diversity, functional feeding guilds, and the DEP Stream Condition Index. The release criteria are: "Species diversity, richness within range of reference wetlands, all functional feeding guilds or qualify as 'good' or better in the SCI." The location of sampling is in at least one representative 100-meter reach in each stream, and the

frequency is at least twice yearly for at least the year prior to the release request for a stream.

E. CRP

321. The introductory CRP narrative describes IMC's plans to reclaim uplands, but does not impose any obligations upon IMC. Instead, the narrative introduces the reclamation project and summarizes the provisions of the general and specific conditions of the CRP.

322. The failure to incorporate Map I-2, whose wetlands were incorporated by the ERP, and Map I-3 is material. CRP General Conditions 8, 9, and 10, discussed below, impose upon IMC certain requirements when reclaiming certain communities, but do not themselves impose the requirement of reclaiming these communities. The same is true for CRP Specific Condition 8. The only subcondition mentioning Map I-2 is Specific Condition 8.c, which alludes to Map I-2 while imposing upon IMC the reclamation technique of backfilling at least 15 inches of sand tailings upon those areas to be reclaimed as temperate hardwoods, live oak, and hardwood-conifer mixed. If this indirect reference imposes upon IMC the obligation of reclaiming these three upland forests pursuant to their depiction on Map I-2, it is odd that Specific Conditions 8.a and 8.b fail even to mention Map I-2 in their discussion of the sand tailing and topsoil requirements for reclaimed pine flatwoods and sand live

oak and xeric oak, especially when these three upland forest communities account for over 400 acres of reclaimed uplands, according to Table 12A1-1, which is also not incorporated into the CRP.

323. The narrative portion of the CRP states that IMC's reclamation plan is to create 1769 acres of pasture, 50 acres of herbaceous, shrub, and mixed rangeland, 273 acres of palmetto prairie, 194 acres of pine flatwoods, 33 acres of xeric oak, 43 acres of temperate hardwood forest, 39 acres of live oak forest, 196 acres of sand live oak forest, and 550 acres of hardwood-conifer mixed forest. The CRP notes that most of the communities in the no-mine area, enhanced areas, and reclaimed communities will form part of a "larger mosaic of diverse upland and wetland habitat associated with Horse Creek and will serve as important wildlife corridors."

324. The failure of the CRP approval to incorporate Map I-2 is an oversight. In the introduction to the January submittal, IMC proposed to reclaim the uplands, by community and area, as enumerated in Table 12A1-1, and, by community and location, as depicted on Map I-2. The failure to incorporate Map I-3 is probably an oversight, based on the second CRP narrative quoted below.

325. The CRP narrative states that IMC has developed a Habitat Management Plan (HMP), which includes detailed pre-

mining wildlife surveys and relocation programs. The narrative states that IMC will relocate, disturb the habitat of, and reclaim habitat for Florida mice, gopher tortoises, gopher frogs, and other commensals, pursuant to approvals from FWC. The narrative reports that IMC's Indigo Snake Management Plan has already received approval from the required agencies. Also, IMC will spend at least $30,000 to fund research on the potential of relocating burrowing owls onto reclaimed landscapes and at least $30,000 to analyze amphibian use of natural and reclaimed wetlands. However, the ERP and CRP approval incorporate only parts of the HMP.

326. The CRP narrative adds:

> In addition to wetlands, a significant portion of the reclamation plan will focus on wildlife habitat through the creation of a diversity of upland habitat types adjacent to the Horse Creek corridor. This will provide a contiguous corridor averaging half a mile wide. IMC has committed to reclaim significant areas of pine flatwoods, palmetto prairie, sand live oak, and other upland habitats well beyond what is required by existing reclamation rules. This will be accomplished mainly through topsoiling and planting of a diversity of native species including shrubs and groundcover species. The use of exotic forage grasses will be minimized and native grass species will be emphasized in the groundcover of reclaimed upland habitat areas. A diversity of shrubs will also be planted in reclaimed upland forest areas. In addition, most of the mitigation wetlands will be created with diverse upland habitats surrounding them,

> resulting in enhanced wildlife and water quality functions.

327. The CRP narrative addresses reclaimed soils:

> Special emphasis has also been placed on improving post reclamation soils. . . . Emphasis has been placed on restoring soils to more closely mimic native soils and existing soil horizons by making greater use of native topsoil and incorporating a greater percentage of sand at the surface. Green manure will be incorporated into surface soils where native topsoil is not used. In most cases, existing overburden spoil piles will be graded down and then capped with several feet of sand tailings. The thickness of the sand layer will be determined based on the targeted reclaimed land use with some wetlands requiring additional overburden to restore appropriate hydrology.

328. The CRP narrative acknowledges that IMC has developed an Integrated Site Habitat Management Plan that includes plans for the reclamation of uplands, control of nuisance and exotic species in uplands, and management of all listed species. The CRP narrative asserts that IMC will reclaim and manage over 1378 acres of uplands, such as by removing cogongrass and maintaining it to less than 10 percent coverage, except less than 5 percent coverage within 300 feet of wetlands. The CRP narrative mentions that IMC has "volunteered" the Conservation Easement and Easement Management Plan to encumber not less than 525 acres associated with Horse Creek.

329. CRP General Condition 7 states: "[IMC] is encouraged to implement the Integrated Habitat Network (IHN) concept (where possible) when establishing reclaimed upland and wetland forested areas." As overlaid on OFG, the IHN, which is developed by DEP, is depicted in Figure 12-5. The IHN covers almost all of the no-mine area; the floodplains and headwater wetlands of the Stream 1e series, Stream 3e, and Stream 3e′; much of the non-pasture reclaimed uplands; and a large area of reclaimed improved pasture south and west of the reclaimed sand live oak area immediately west of the West Lobe.

330. The backbone of the IHN is the network of rivers and streams, with their floodplains, that provide multifunctional habitat for wildlife. As noted in the introduction to the January submittal, the HMP helps implement the portion of the IHN located at OFG. Although only selectively incorporated into the ERP and CRP approval, the HMP describes IMC's overall plan for reclaiming OFG.

331. The stated goal of the HMP is "to maintain or improve the biological functions of the wetlands and uplands . . . as an integrated component of the mining and reclamation plans." The HMP adds: "By preserving and managing the highest quality habitats on [OFG], these reserves will serve as source populations to recolonize the remainder of the site following completion of reclamation." Overall, the reclamation plan and

HMP try to restore a functional interrelationship of uplands, wetlands, and surface water to replace the reduced functions that result from the agricultural alterations to uplands, wetlands, and most of the surface water, leaving large areas of a patchwork fragmentation of habitats.

332. The HMP covers habitat management prior to land clearing, species-specific management techniques immediately prior to land clearing, species-specific management techniques during mining, habitat management in no-mine areas, reclamation goals for habitat, reclaimed habitat management after release, and, in the second part of the HMP, specific actions for each listed wildlife and plant species.

333. Prior to land clearing, IMC will engage in little active habitat management, apart from surveys, as the Carlton-Smith family continues its agricultural uses of the land, which it is entitled to do under its contract with IMC. Immediately prior to land clearing, IMC will relocate each species, after obtaining the necessary permits, either by capture or, for the more mobile species, controlled burns or directional clearing to encourage wildlife migration into an adjoining refuge area. For listed bird species, IMC will protect their nesting areas or restrict land clearing to non-nesting season.

334. During mining, aquatic- and wetland-dependent species will continue to have access to Horse Creek and its riparian

wetlands, which are never isolated by the ditch and berm system. The only permitted direct disturbance of the no-mine area is outside Horse Creek's direct floodplain. During mining, the vast water recirculation system will provide incidental, temporary habitat for many aquatic- or wetland-dependent species.

335. The second part of the HMP identifies management techniques for specific listed species of vertebrates. The HMP states that no listed plants exist on OFG. The HMP addresses 15 listed species observed on OFG and nine listed species that could potentially use OFG. The HMP mistakenly lists the Florida panther in the latter category, rather than the former category, but the error is harmless given the limited use of OFG by the Florida panther and the apparent lack of a breeding population north of the Caloosahatchee River. The following paragraphs describe the HMP's treatment of several listed species using OFG.

336. Noting that the American alligator, which is a species of special concern, occupies freshwater habitats throughout Florida, plenty of such habitats exist around the mining areas, and the alligator is mobile, IMC expects that the American alligator will move out of the way of mining activities, so no management measures will be used for alligators. Presumably well-served by former Land-and-Lakes

reclamation and an opportunistic inhabitant of deep wetland reclamation, alligator management is of no importance in these cases.

337. The HMP reports two possible observations on OFG of the Florida panther, which is an endangered species. There is no doubt about one of these observations. On the other hand, there is no doubt that OFG is far from prime panther habitat. Thus, IMC will check for panther signs during pre-clearing surveys and anticipates that the unmined floodplains that are part of the IHM will maintain suitable habitat--presumably, for travel.

338. IMC has already mapped the distribution on OFG of the gopher tortoise, which prefers well-drained, sandy soils characteristic of xeric and mesic habitats. IMC has already prepared a management plan for gopher tortoises, which are a species of special concern, and, upon DEP approval, will engage in several measures to reduce mortality due to mining activities, including, upon receipt of an FWC permit, relocating gopher tortoises, as well as other commensal species found in or near the tortoises' burrows, to appropriate locations, including one or more of the above-described ACIs.

339. The Sherman's fox squirrel, which is a species of special concern, prefers sandhill communities and woodland pastures, and many of these squirrels use suitable areas of OFG.

They are mobile, and, during mining operations, they will move to the no-mine areas adjacent to Horse Creek. Prior to land clearing, IMC will survey each area, and, if it finds active nests, these areas will be avoided until the young squirrels have left the nests, pursuant to FWC requirements.

340. The Florida Mouse, which is a species of special concern, inhabits sand pine scrub and other xeric communities and is a commensal of the gopher tortoise. Prior to land clearing of suitable Florida Mouse habitat, IMC will conduct live-trapping. If any such mice are captured, IMC will relocate them to a suitable relocation site, such as to ACI-2, ACI-4, or ACI-6 or to xeric or pine flatwoods/dry prairie habitat that will be reclaimed on OFG. IMC will employ similar procedures for the Florida gopher frog, which is another commensal of the gopher tortoise. A species of special concern, the Florida gopher frog will also be the subject, with other amphibians, of research regarding use of reclaimed habitats and funded by IMC with at least $30,000.

341. The Audubon's crested caracara, which is a threatened species, prefers dry prairie with scattered marshes and improved pasture. They typically nest in cabbage palms or live oak trees. Observers have seen a pair of caracaras on OFG, but attempts to locate a nest onsite have been unsuccessful. Prior to clearing cabbage palms, IMC will again survey the area for

nests. If IMC finds a nest onsite or within 1500 feet of OFG, it will develop an FWC-approved management plan. The post-reclamation palmetto prairie and pine flatwoods are good caracara habitat.

342. One of the few listed species whose habitat needs have been well-served by agricultural conversions to improved pasture, the burrowing owl occupies numerous areas on OFG. IMC intends to schedule land clearing in areas with active burrows during non-nesting season, but, if this is impossible, IMC will attempt to empty the burrow prior to clearing the land. Additionally, IMC will spend at least $30,000 to fund research to improve the technology to relocate onto reclaimed land burrowing owls, which are a species of special concern.

343. Although IMC found on OFG no nests of sandhill cranes, which are threatened, or little blue herons, which are a species of special concern, sandhill cranes nest in reclaimed wetlands on the Ft. Green Mine, and IMC expects sandhill cranes to nest in the reclaimed wetlands at OFG. Prior to mining, IMC will survey marshes for sandhill crane and little blue heron nests, and, if it finds any, it will disturb those areas in non-nesting season.

344. Wood storks, which are endangered, use OFG for foraging, but IMC found no evidence of wood stork rookeries on or nearby OFG. The nearest known active rookery is 22 miles

from OFG. Prior to landclearing during wood stork nesting season, IMC will survey each wetland with the potential to support stork nesting sites. If IMC finds any nests, it will follow the latest guidelines from FWC or U.S. Fish and Wildlife Service for protecting the site.

345. For the white ibis, snowy egret, and tricolored heron, which are species of special concern, IMC will survey those wetlands that are suitable nesting site prior to landclearing. If any active nests are found, IMC will schedule landclearing during non-nesting season.

346. CRP General Condition 8 provides that groundcover in all upland forests shall include one or more of the following native plants: fruit-bearing shrubs, low-growing legumes, native grasses, and sedges. CRP General Condition 9 provides that IMC shall use native grasses and shrubs when reclaiming grasslands and shrub and brushlands.

347. CRP General Condition 10 provides that IMC shall incorporate clumps of trees in reclaimed improved pasture so that each ten acres has "some trees." CRP General Condition 11 states that IMC shall make "every effort" to control nuisance and exotic species within the mine.

348. CRP Specific Condition 1 is ERP Specific Condition 22. CRP Specific Condition 2 is ERP Specific Condition 23. CRP Specific Condition 3 is ERP Specific Condition 11.

349. CRP Specific Condition 4 is for IMC to obtain authorization from the FWC to trap and relocate Florida mice. Specific Condition 4 requires the trapping and relocation of Florida mice prior to clearing areas inhabited by them.

350. CRP Specific Condition 5 requires IMC to make "every effort" to relocate listed plant species to suitable reclamation sites when such species are encountered prior to or during land clearing.

351. CRP Specific Condition 6 is ERP Specific Condition 12.c. CRP Specific Condition 7 is ERP Specific Condition 12.d.

352. CRP Specific Condition 8.a provides:

> Areas designated as pine flatwoods . . . and palmetto prairie shall be reclaimed by placing a minimum layer of fifteen (15) inches of sand tailings over the overburden and topsoiling with three (3) to six (6) inches of direct transferred or stockpiled native topsoils from pine flatwoods or palmetto prairie areas as that topsoil is available and feasible to move. Feasible means of good quality, relatively free of nuisance/exotics species, and within 1.5 miles of the receiver site. If topsoil is not available or feasible to move, a green manure crop will be seeded and disked in after it has matured before applying a flatwoods or palmetto prairie native ground cover seed mix to this site. In flatwoods, longleaf pine . . . or slash pine . . . shall be planted in the appropriate areas to achieve densities between 25 and 75 trees per acre. In flatwoods and palmetto prairie, shrubs typical of central Florida flatwoods and palmetto prairies will be recruited from the topsoiling, planting, and/or seeding to achieve a minimum average

> density of 300 shrubs per acre. The total vegetation covered by hydric flatwoods will be greater than 80 percent, in mesic flatwoods and palmetto prairies will be greater than 60 percent, and in scrubby flatwoods, greater than 40 percent.

353. CRP Specific Condition 8.b provides:

> Areas designated as sand live oak or xeric oak scrub . . . shall be reclaimed by placing several feet of sand tailings over the overburden and topsoiling with three (3) to six (6) inches of direct transferred or stockpiled native topsoil from scrubby flatwoods or scrub areas. Feasible means of good quality, relatively free of nuisance/exotics species, and within 1.5 miles of the receiver site. If topsoil is not available or feasible to move, a green manure crop will be seeded and disked in after it has matured before applying a scrubby flatwoods or scrubby native ground cover seed mix to this site. Trees and shrubs typical of central Florida scrubs will be recruited from the topsoil, planted, and/or seeded to achieve a minimum density of 600 plants per acre. Vegetative cover in these areas will be greater than 40 percent.

354. CRP Specific Condition 8.c provides:

> Other upland forest areas, including [temperate hardwoods, live oak, and hardwood-conifer mixed], shall be reclaimed, as illustrated by Map I-2, by placing a minimum layer of fifteen (15) inches of sand tailings over the overburden, capping the area with approximately three (3) inches of overburden and disking the surface to reduce compaction of the upper soil layer prior to revegetation. Other uplands shall be revegetated with a native ground cover, planted with trees to achieve a density of 200 plants per acre, and planted with shrubs to achieve a density of 200 shrubs per acre.

355. CRP Specific Condition 8.d provides that IMC shall incorporate native grass species into the groundcover of all reclaimed uplands. CRP Specific Condition 8.e allows IMC to use bahia grass, Bermuda grass, and exotic grass species as groundcover in native habitats only in "limited amounts" needed for "initial stabilization in areas highly prone to erosion." When using these grasses, IMC must maintain them to prevent their proliferation.

356. CRP Specific Condition 9 is ERP Specific Condition 19. CRP Specific Condition 10 is ERP Specific Condition 21.

357. CRP Specific Condition 11 resembles ERP Specific Condition 11, but requires more of IMC. CRP Specific Condition 11 states that IMC "has committed" to initiate the management and evaluation of amphibians, including the Florida gopher frog, and shall adhere to the provisions of the IMC Minewide Gopher Tortoise and Burrow Conceptual Management Plan. IMC shall pay at least $30,000 to conduct a study of amphibian use of reclaimed and unmined wetlands. IMC shall report its progress in the annual narrative reports that it must file, pursuant to Florida Administrative Code Rule 62C-16.0091.

358. CRP Specific Condition 12 contains similar provisions for the burrowing owl.

359. Related to ERP Specific Condition 15.a, CRP Specific Condition 13 requires IMC to make "every effort" to control

cogongrass by eradicating it prior to mining, removing it after it colonizes spoil piles during mining, inspecting donor topsoil sites to prevent infestation by it, and regularly treating it on reclaimed sites to maintain coverage below 10 percent, or 5 percent within 300 feet of any reclaimed wetland.

F. WRP

360. The WRP at issue is for the Ft. Green Mine, not OFG. The basic purpose of the WRP is to permit IMC to dispose of the clay tailings extracted from OFG in CSAs O-1 and O-2, which are located at the southern end of the Ft. Green Mine. In an unchallenged action, DEP, on March 20, 2001, approved a requested modification of the CRP approval for the Ft. Green Mine to permit the changes sought in these cases for the Ft. Green Mine WRP. Thus, the WRP modification sought in these cases is merely a conforming modification.

361. Normally, a WRP/ERP would take precedence over a CRP approval because mining may not start without a WRP/ERP, but may start without a CRP approval. In the unusual situation at the Ft. Green Mine, where the mining has been completed, the analysis of the WRP modification is limited to, primarily, the sufficiency of the changes in mitigation to offset the already-completed mining and, secondarily, the relevant impacts of the mitigation itself.

362. DEP issued the WRP on May 1, 1995. This permit allowed IMC to mine 524.6 acres of wetlands at the Ft. Green Mine. On February 3, 1997, DEP issued an ERP to allow IMC to disturb 1.39 acres of surface water for a utility corridor. Following the receipt of a request by IMC for a major modification of the WRP to permit the mining of 7.6 acres of wetlands, DEP consolidated this request, the utility-corridor ERP, and the original WRP into a new WRP issued July 28, 1999. After a modification to the new WRP in 2000 that is irrelevant to the present cases and other irrelevant permitting activity, IMC has requested the modification that is at issue in these cases.

363. Because this WRP modification follows the completion of mining and the near-completion of backfilling of sand tailings into the mine cuts, a denial would not spare the wetlands and other surface waters from the impacts of mining. Rather, a denial would leave the Ft. Green Mine with greater impacts and less mitigation. In simplest terms, a denial would harm the water resources of the District.

364. Strengthening the already-approved mitigation and diminishing the impacts of the already-approved CSAs, this WRP modification will authorize IMC to reduce the size of the two CSAs (O-1 and O-2) in the southern end of the Ft. Green Mine and relocate them farther from Horse Creek; to relocate several

reclaimed wetlands in the vicinity of CSAs O-1 and O-2 and expand their area by 2.7 acres with minor changes to some sub-basin boundaries; and to modify the reclamation schedule to conform to a modification already approved without challenge for the Ft. Green Mine CRP.

365. The record demonstrates that the reduction in size and relocation of the CSAs away from Horse Creek will reduce the hydrological and biological impacts from those already permitted. The record demonstrates that the expansion of the area of reclaimed wetlands will add mitigation to offset the hydrological and biological impacts from already-completed mining activities. The record demonstrates that the relocation of the reclaimed wetlands and modification of the reclamation schedule will not affect the impacts or mitigation.

III. Other Mitigation/Reclamation Projects

A. Introduction

366. The formation of wetlands vegetation, according to IMC biologist Dr. Andre Clewell, is a function of topography, hydrology, soils, and physical environment--to which should be added time. The formation of soils, according to Charlotte County soil expert Lewis Carter, is a function of parent material, time, relief, vegetation, and climate. Hydrology is dependent upon, among other things, topography, soils, geology, vegetation, and climate. Successful reclamation must thus

account for the complex interdependency of the dynamic processes involving vegetation, soil, and hydrology.

367. Although actual reclamation follows a clear order--geology, soils, contouring, and planting--the order of the design process is not so clear. Presumably, in designing a reclamation plan, the biologist, soil scientist, and hydrologist would each prefer to have the final--as in last and authoritative--word.

368. In general, the comparison of older mitigation sites to newer mitigation sites requires caution due to two factors, which somewhat counterbalance each other. The vegetation of the older sites has had longer to establish itself. The importance of this factor varies based on the type of vegetation. Groundcover establishes more quickly than shrubs, and shrubs establish more quickly than trees, but groundcover that requires protection from the tree canopy may not be able to colonize an area until the trees are well-established.

369. Soils take a longer time to recover, generally longer than the timeframes involved in phosphate mining reclamation in Florida. The soils present in Hardee County took 5000 to 10,000 years to form. The A horizon, or topsoil layer, at OFG formed over 300-500 years. However, if the soil and hydrology are suitable at a reclaimed site, an A horizon may start to reform in as little as 10 years, but, even under ideal conditions, it

will take several hundred years to reform to the extent and condition in existence prior to mining. The mucky soils underlying bay swamps form at the rate of about one inch per 1000 years.

370. Offsetting the advantage of age for vegetation and soils, the older reclamation sites may suffer from less advanced designs and construction techniques. Newer sites benefit from advances in science and technology that have enabled phosphate mining companies to design and implement reclamation projects that more successfully replace the functions of the natural systems and communities lost to mining. Some of these advances have resulted in dramatic, sudden improvements in reclamation.

371. The assessment of past reclamation projects must account, not only for the age of each project, but also the willingness of the phosphate mining company at the time to employ the then-available science and technology. The ratio of the cost of reclamation to projected revenues depends on the variables of specific mitigation expenses, mining expenses, and the value of the phosphate rock. These economic factors operate against the backdrop of a dynamic regulatory environment. In these cases, for example, IMC's willingness to reduce its mining impacts and expand its mitigation was a direct result of the Altman Final Order and DEP's decision to revisit its earlier decision to permit the Ona Mine.

B. Uplands

372. The uplands at OFG are more amenable to successful reclamation than the wetlands or streams at OFG. Uplands provide crucial functions. Certain uplands, such as those that provide seepage to wetlands or prime recharge to deep aquifers, provide hydrological functions as complex as the hydrological functions of many wetlands. Certain uplands provide irreplaceable habitat. Certain uplands vegetation is as vulnerable to climactic or anthropogenic disturbance as any wetlands vegetation. However, for the most part, the functions of uplands are not as complex or important as the functions of wetlands and other surface waters, when examined from the perspective of the water resources of the District, and these functions are more easily reclaimed.

373. Over 77 percent of OFG and over 90 percent of the uplands at OFG are agricultural (2146 acres) or pine flatwoods, palmetto prairie, or sand live oak (1120 acres). (As noted above, palmetto prairie and sand live oak share many attributes of pine flatwoods, which they often succeed.) In terms of function, tolerance to ranges of hydrology and soils, and robustness of post-reclamation vegetation, these 3266 acres of uplands communities will be easier to reclaim than all of the proposed streams and wetlands, except for deep marshes, although pine flatwoods and palmetto prairies present the greatest

difficulties in uplands reclamation due to their soil and hydrological requirements, including access to the post-reclamation water table.

374. Impacts to uplands include the disappearance--even temporarily--of critical habitat for listed species, the susceptibility of uplands to post-disturbance nuisance exotics, and, for upland forested communities, the relatively long period required for restoration of the canopy. However, these impacts can be offset in most cases. Management plans can mitigate the temporary or permanent loss of specific upland habitat, depending on the availability of habitat and the robustness and abundance of the species requiring the habitat.

375. Absent the presence of rare uplands habitat and/or rare species requiring the habitat, a greater problem with uplands reclamation is controlling nuisance exotics. Various grass species, including Bahia, Bermuda, torpedo, centipede, Natal, and cogon, impede progress in the development of a healthy uplands community. One of the world's ten worst weeds, cogongrass is limited to uplands, although it may extend into the higher parts of wet prairies and drier areas within forested wetlands. Although nuisance and exotic species may invade undisturbed areas, the removal of existing upland vegetation exacerbates the problem by removing native competitors and stimulating unwanted germination. However, ongoing maintenance,

through a combination of herbicides, manual removal, and fire, controls the nuisance exotics long enough that the native vegetation can colonize the disturbed area.

376. Upland forested communities require protection from grazing and mowing to permit their establishment. Canopy development takes years for any upland forested community and, for slower-growing xeric systems, at least a decade. The timely restoration of an appropriate fire regime is also important for the health of many upland communities.

377. Not surprisingly, the record demonstrates the successful reclamation of uplands at several mitigation sites. In recent years, reclamation scientists have restored uplands structure of uplands by restoring the understory and midstory. Uplands restoration has improved with the introduction of new, more effective reclamation techniques, such as topsoiling and seeding. Until 1987, for instance, restoration biologists did not know that wiregrass--a key component of the understory of pine flatwoods--produced seeds. This knowledge has assisted in the reclamation of a proper understory of pine flatwoods.

378. The favorable prognosis of uplands reclamation means that extensive areas of OFG uplands may be mined. Their functions will be substantially replaced, in a reasonable period of time, upon the establishment of the reclaimed upland community, although the destruction of xeric communities means

their absence for relatively long periods of time and the destruction of uplands providing seepage support to wetlands requires the close-tolerance hydrology and soils associated with the most difficult wetlands reclamation.

379. Approved in 1989 and amended in 1994, constructed by 1986, and released in 1994, Best of the West (NP-SWB(1D)) was targeted for 15-18 acres of xeric habitat. Best of the West was constructed on sand tailings overlaying overburden, although this site exhibits some stunted vegetative growth where the sand tailings may not be very thick and the roots of trees may have encountered the hardened overburden. FWC assisted the phosphate mining company in designing the reclamation plan for this site, which has resulted in the successful reclamation of 10 acres of xeric habitat.

380. The CDA provides some background on Best of the West. The West Noralyn Xeric Scrub Reclamation (N-5), which was constructed by 1986, contained "mulched overburden plots" and 60 acres of unmined scrub. Containing a total of 462 acres of reclaimed and unmined land, Noralyn was the first attempt to create a large-scale xeric community. About 120 acres of Noralyn received 12 inches of donor topsoil from a comparable xeric community. Due to a lack of representation in the donor site, supplemental plantings of longleaf pine, sand pine, and rosemary followed. The overall project has been "moderately

successful," but the 18 acres that yielded "exceptional results" were dubbed "Best of the West." Best of the West thus illustrates a recurrent feature of much reclamation activity, in which successful projects are actually small parts of the original project area, the rest of which is substantially less successful.

381. The CDA states that, in January 2000, IMC initiated a land management program for Noralyn that includes herbicide applications and prescribed burns. After herbicide was applied to kill cogongrass, IMC conducted the first burn in March 2001. Noralyn is now being managed for four to five families of Florida scrub jays, a listed species. Four Eastern Indigo snakes, 225 gopher tortoises, numerous gopher frogs, and 119 Florida mice have been relocated to Noralyn.

382. Approved in 1988, constructed in 1991, and released in 1992, Hardee Lakes topsoil (FG-PC(1A)) has a 7.9-acre uplands component that was topsoiled with one inch over overburden. Despite receiving no maintenance, the site displays few weeds or nuisance exotics, although cogongrass has invaded the site. The reclaimed site displays saw palmetto, gallberry clumps, creeping bluestem grass, and, in topsoiled areas, flowering milkwood. The site includes an ecotone between pine flatwoods and a wet prairie, which developed due to the appropriate slope and soil.

383. The CDA identifies two one-acre demonstration projects with Hardee Lakes topsoil. The Ft. Green-Hardee Lakes Pine Flatwoods Project, a topsoiled site, has achieved a lower ratio of saw palmetto to pines than is presently typically of fire-suppressed communities and is more typical of historic Florida pine flatwoods. The Ft. Green-Hardee Lakes Palmetto Prairie Site, also topsoiled, has been successfully revegetated with saw palmettos and other appropriate species.

384. An interesting uplands reclamation site, for its different use of soils, is the Bald Mountain complex (KC-LB(2) and LB(4)), which is a 180-acre site. In a reclamation project approved in 1989 and 1996, constructed in 1993, and released in 1994 and 2002, IMC backfilled the Bald Mountain site with sand tailings down to 40 feet, capped the sand tailings with six inches of overburden, and then mixed the soils. Nearby, Little Bald Mountain received only sand tailings. Scrub were planted on both locations, but Bald Mountain also received sandhill plantings.

385. Bald Mountain contains suitable sandhill species, such as sandhill buckwheat, although natal grass has been a problem. Natal grass is an invasive grass that colonizes quickly and often requires manual removal.

386. Little Bald Mountain contains appropriate understory grasses, including short-leaved rosemary, an endangered species;

Gopher apple, an important wildlife food; and Ashe's [savory] mint, a listed species. The rosemary and mint are reseeding themselves. The site also contains several large palmettos that were started from seed.

387. Approved in 1996, constructed in 2000, and not yet released, Ft. Green/Horse Creek Xeric (FG-HC(3 & 5)) is a 99-acre uplands site reclaimed as xeric oak. IMC backfilled at least six feet of sand tailings over the overburden and then added topsoil over the sand. Already, this site, which is in the nearby Ft. Green Mine, has developed all levels of structure in the appropriate ecosystem, although, according to the CDA, it received irrigation "frequently" from an irrigation system at the start of the project. The site includes denser vegetation, such as shrub palmetto, grasses, and forbs. The direct transfer of topsoil has added species diversity, such as a Florida spruce and a listed orchid. The site also contains a small number of longleaf pines. IMC has hand-removed natal grass at this site, but has lately been using a new selective herbicide. According to the CDA, though, the presence of invasive exotics throughout the site is limited to 0.4 percent.

388. One of the best upland reclamation sites is MU 15E Topsoil (FCL-LMR(6)), which was approved and constructed in 2002 and has not been released. This is a 30-acre topsoiled site in which IMC transferred topsoil carefully: if topsoil was taken

from a depression on the donor site, the topsoil was placed in a depression in the receiving site. This site already displays a rich diverse plant palette with hardly any weedy or exotic species. In this site, palmetto and wet prairies slope down to a flatwoods marsh. This site also contains a reclaimed ephemeral wet prairie--possibly the only known ephemeral wet prairie ever reclaimed after phosphate mining.

389. With modest efforts regarding soils and possibly more strenuous efforts regarding nuisance exotics, the reclamation of uplands is relatively easily attained, provided the sites can be protected for the longer timeframes necessary to establish upland forests and especially upland xeric communities and an appropriately shallow water table is reclaimed for pine flatwoods and palmetto prairies.

C. <u>Wetlands</u>

390. Wetlands reclamation is generally more difficult than uplands reclamation. Successful wetlands reclamation typically requires better command of post-reclamation topography, hydrology, soils, and physical environment. Material deviations in these parameters reduce, or eliminate, many wetlands functions, such as floodplain communication, nutrient sequestration, floodwater attenuation, ecotone transitions, and habitat diversification. The loss of such functions may result

in immediate problems with water quality, water quantity, and habitat.

391. Given the greater difficulty in successful wetlands reclamation, experience in wetlands reclamation is, not surprisingly, more mixed than the generally favorable experience in uplands reclamation. The greater difficulty in, and more guarded prognosis of, wetlands reclamation, as compared to uplands reclamation, means that the disturbance of wetlands demands closer analysis of the functions of the wetlands proposed to be mined, the functions of the wetlands proposed to be reclaimed, and the reclaimed soils, hydrology, topography, and physical environment on which the reclamation scientists will rely in reclaiming wetlands functions.

392. The most important factor in wetlands reclamation is hydrology. Wetlands with less rigorous hydrological needs, especially if they also tolerate deeper water over longer periods of time, reclaim much more easily than wetlands with more precise hydrological needs, especially if they require shallower water over shorter periods of time. The phosphate mining industry has repeatedly reclaimed marshes and cypress swamps that are inundated deeply and for extended periods of time, but has had a much harder time reclaiming shallower wetlands requiring shorter hydroperiods or shallower water

levels. The two most difficult wetlands of this type to reclaim are bay swamps and wet prairies.

393. Among herbaceous wetlands, deep marshes are the easiest to reclaim. Often a target of Land-and-Lakes reclamation, deep marshes also are the result of reclamation projects that failed to create targeted shallower wetlands. Charlotte County ecologist Kevin Irwin noted that deep marshes are easier to reclaim than forested wetlands, for which the post-reclamation hydrology must be more precise. Similarly, a freshwater marsh, which tolerates 6-30 inches of water from 7-12 months annually, is easier to reclaim that a wet prairie, which tolerates 0-6 inches of water from 2-8 months annually. Among forested wetlands, bayheads or bay swamps, as defined in these cases as seepage forested wetlands, are harder to reclaim than mixed wetland hardwoods, as IMC biologist Dr. Douglas Durbin testified--likely, again, due to the requirement of more precise post-reclamation hydrology.

394. Accordingly, the parties do not dispute the ability of the phosphate mining industry to reclaim deep marsh habitat, including freshwater marshes and shrub marshes, as well as deep swamps--principally cypress swamps. Like wet prairies, which sometimes fringe deep marshes, deep marshes provide habitat, supply food, attenuate floodwaters, and improve water quality. Deep marshes may host large numbers of different plant species.

However, like lakes, deep marshes remove larger amounts of water from the watershed, as compared to shallower wetlands with shorter hydroperiods, due to evapotranspiration. The reclamation projects known as Morrow Swamp, Ag East, 8.4-acre Wetland, and 84(5) trace a short history of the reclamation of deep-marsh habitat.

395. Permitted in 1980, constructed in 1982, and released in 1984, 150-acre Morrow Swamp represents a prototype, second-generation wetlands reclamation project. According to the CDA, Morrow Swamp is from an era in which reclamation did not attempt to restore topography: "This ecosystem included the reclamation of 150 acres of wetland (freshwater marsh, hardwood swamp, and open water) and 216 acres of contiguous uplands. The reclamation site was originally pine flatwoods and rangeland before it was mined in 1978 and 1979." Designed and built before reclamation scientists concentrated on soils, the hydrological connection between Morrow Swamp and Payne Creek, into which Morrow Swamp releases water, is a concrete structure in a berm that leads to a swale that empties into Payne Creek. Morrow Swamp reveals one obvious shortcoming of mechanical outflow devices, at least if they depend on ongoing maintenance, because vegetation and sedimentation in the infrequently maintained outflow device have blocked the flow of water and contributed to water levels deeper than designed.

396. The reclamation scientists pushed the row-plantings of trees in Morrow Swamp in an effort to understand the relationship of vegetation and hydroperiod. In doing so, they killed thousands of trees, such as the cypress trees that Authority ecologist, Brian Winchester, found that grew to 6-8 inches in diameter and suddenly died. This tree mortality was likely due to problems with water depths and hydroperiods, as suggested by the healthier cypress trees lining the shallower fringe of the marsh.

397. Morrow Swamp operates as a basin with a perched water table atop compacted, relatively impermeable overburden. Beneath the dry overburden is moist soil, so there is no groundwater connection between the marsh and the surficial aquifer. According to Mr. Carter, sand is 15 times more permeable than overburden.

398. Morrow Swamp presents numerous shortcomings, but not to alligators, who find ample food and habitat in and about the deep marsh. More importantly, the emergent-zone vegetation within Morrow Swamp is sequestering nutrients and thus providing water-quality functions. Unfortunately, the deeper water supports only floating vegetation, which is much less efficient at sequestering nutrients, and less diverse than the shallower emergent vegetation, so the excessive depths of Morrow Swamp limit its water-quality functions. Although short of a model

wetlands reclamation project, Morrow Swamp was an important milestone in the development of wetlands reclamation techniques and clearly functions as a deep shrub marsh today.

399. Permitted in 1985, constructed in 1986, and released in 2002, 214-acre Ag East (PC-SP(1C)) was built on the knowledge acquired from Morrow Swamp. At Ag East, which is just northeast of Morrow Swamp, the reclamation scientists, planting a large variety of trees, focused on water levels and hydroperiods. The reclamation scientists engineered a wetland system with less open water than Morrow Swamp. They also inoculated the surface with a layer of organic mulch material 2-4 inches thick.

400. However, the design of Ag East again incorporated mechanical devices to control water levels. A weir at one corner of Ag East contains boards; by removing or adding boards, reclamation scientists could control the water depths behind the weir. The deep marsh within Ag East is excessively deep with an excessively long hydroperiod.

401. In certain respects, Ag East has functioned better than Morrow Swamp, although there is some question as to vegetative mix establishing the site and the associated functions that the vegetation will provide. Again, though, Ag East features a functioning deep marsh. One clear shortcoming of Ag East was the failure to create appropriate upland habitat, such as pine flatwoods, around the wetlands, so that wetland

species could find appropriate uplands habitat for breeding, nesting, or feeding. The CDA notes the availability of quarterly water quality monitoring data, over a five-year period, for pH, dissolved oxygen, conductance, and total phosphorus, among other parameters, but the results are not contained in this record.

402. Permitted in 1983, constructed by 1986, and released in 1995, 8.4-Acre Wetland (FG-83(1)), which was targeted for 8.4 acres of wetland forested mixed, represents an early use of topsoil, which was a good seed source for herbaceous species and helped increase the effective depth of overburden. As noted above, shallower overburden discourages tree growth past a certain stage. However, 8.4-Acre Wetland also uses a water-control weir to control water depths on the reclaimed wetland.

403. Despite its smaller size than Morrow Swamp or Ag East, 8.4-Acre Wetland was a more ambitious project hydrologically, as it attempted to replace a seepage wetland with a seepage wetland that would receive water from the surrounding uplands. Unlike Morrow Swamp and Ag East, 8.4-Acre Wetland was designed to reclaim only forested wetlands, not forested wetlands and marsh wetlands.

404. Unfortunately, 8.4-Acre Wetland did not re-create a seepage wetland due to excessively deep water and excessively long hydroperiods. Emphasizing instead the creation of

microtopography, the reclamation scientists added sand-tailings hummocks within the deeper marsh, effectively lowering the water table under the mound, and planted wetland herbaceous and forested species that could not tolerate the wetter conditions around the hummock. The evidence is conflicting as to the success of these hummock plantings, but the idea was sound. Parts of 8.4-Acre Wetland are at least half infested with cattails, and sizeable areas within 8.4-Acre Wetland are reclaimed marsh, not swamp--despite the attempt of the reclamation scientists to reclaim forested wetlands only.

405. Permitted in 1985, constructed by 1987, and released in 1998, 84(5) (FG-84(5)) was targeted for 17.1 acres of wetland forested mixed and 2.3 acres of freshwater marsh. This site is notable for its soil characteristics. After two soil borings, Mr. Carter could not find a water table in the first 80 inches beneath the surface. However, he found an A horizon, but the CDA notes that this site received 18 inches of donor topsoil.

406. Even more recent reclamation projects have tended to yield deep marshes. Permitted in 1997, constructed in 2002, and not yet released, 198-acre P-20 (FG-HC(9)) exists behind the berm that remains from the ditch and berm system that existed during mining. The sole outlet of the marsh is a discharge pipe, which, presently clogged with vegetation, appears to be contributing to excessively high water depths and excessively

long hydroperiods, resulting in an abrupt transition from marsh to uplands without the zonal wetlands associated with natural transitions from marsh to uplands. Water in the marsh spreads into the surrounding uplands, which are planted with upland trees. The berm also prevents natural communication between the marsh and the floodplain of Horse Creek, which is a short distance to the west of P-20.

407. In the reclamation projects described above, more often than not, the reclamation scientists reclaimed deep marshes while targeting shallower wetland systems or at least shallower marshes or swamps. By the mid-1980s, wetlands reclamation scientists were addressing more closely hydrology, vegetation, topsoil, and surrounding upland design, and DEP was imposing post-reclamation monitoring requirements on the phosphate mining companies.

408. One common feature of most of these deep-marsh reclamations is their reliance upon artificial drainage outlets. Inadequate or nonexistent maintenance of these outlets causes excessive water depths for excessive periods. Additionally, reliance on artificial drainage outlets betrays the choice not to attempt more sophisticated design and more precise contouring of the post-reclamation landscape. Improvements in the design and execution of contouring could produce relief from the deep-marsh tendencies of reclamation practices in at least three

ways: by flattening the slopes of the edges of the marshes to encourage the formation of more emergent vegetation and wet prairie fringes; introducing a more irregular microtopography in the submerged bottom, including hummocks, to develop greater habitat diversity; and engineering and grading more closely the topographical outlets of marshes, instead of relying on manmade drainage devices that required more maintenance than they received, to better reproduce pre-mining drainage features and access effectively the reclaimed water table.

409. After 8.4-Acre Wetland, reclamation scientists produced, in addition to the P-20s, other marshes with better fringes, so as to support wet prairie fringes, but the most, and evidently only, successful example of shallow-wetland reclamation over an extensive area is PC-SP(2D) (SP-2D).

410. Permitted in 1988, constructed in 1992, and released in 1998 (wetlands), SP(2D) comprises 97 acres of forested and herbaceous wetlands. According to Mr. Winchester, SP-2D exhibits a more natural hydroperiod than the other reclaimed wetlands that he studied. Mr. Winchester visited SP-2D during the dry season, and the shallow wetland was appropriately dry, even though other reclaimed wetlands at the time were inappropriately wet. Mr. Winchester also found less than ten percent coverage by exotic vegetation. Wet prairie fringes deeper marsh at SP-2D, rather than forming larger areas of

isolated or connected wet prairie, but this wetland achieves extensive shallow-water areas.

411. According to Authority ecologist Charles Courtney, the marsh of SP-2D appears fairly healthy and contains appropriate vegetation. SP-2D contains sawgrass and forbs, including maidencane and duck potato. Crayfish occupy the wet prairie fringe and are eaten by white ibis and otter.

412. The marsh zonation found at SP-2D is partly a result of appropriate soil reclamation. Mr. Carter found good communication between the shallow marsh at SP(2D) and the surficial aquifer. In the wet season, Mr. Carter found the water table at eight inches above grade, demonstrating that the dry conditions found by Mr. Winchester during the dry season did not extend inappropriately into the wet season. Mr. Carter determined that the first four inches of the wetland is mulched topsoil overlying at least four feet of sand tailings. The subsurface soils were appropriately saturated.

413. Permitted in 2002, constructed in 2003, and not yet released, 1.3-acre FCL-NRM(1) (Regional Tract O, ACOE #362) also contains wet prairie vegetation, but the value of this site, for present purposes, is limited by two factors: its age and its use of a technique not proposed for OFG. Regional Tract O, ACOE #362, is a new site that showcases the success--one year after planting--of the technique of cutting wet prairie sod at a donor

site and laying it at the recipient site. Sod-cutting is a good technique, earlier used at Morrow Swamp, but is more expensive than the topsoil transfer proposed for OFG.

414. The reclamation of forested wetlands has improved in recent years. To some extent, the history of forested-wetlands reclamation tracks the path of herbaceous-wetlands reclamation: deeper water for longer periods followed by instances of shallower water for shorter periods.

415. Early in the forested-wetlands reclamation process, reclamation scientists and phosphate mining companies favored cypress trees due to their tolerance of a wider range of water depths and hydroperiods than other wetland trees. However, cypress trees do not occur naturally in the forested wetlands being mined in this part of Florida. Over time, reclamation scientists deemphasized the number of species of wetland trees and emphasized instead species that corresponded to those in comparable forested wetlands.

416. Herbaceous and forested wetlands present different reclamation challenges due to the time each type of wetland requires for revegetation. An herbaceous wetland takes 1-2 years to revegetate, but a forested wetland may take 1-2 decades to gain "really good structure," as Dr. Clewell testified. In addition to taking longer to establish than herbaceous wetlands, forested wetlands require two stages of plantings because the

groundcover cannot be added until 4-5 years after planting the trees, so that the trees provide sufficient cover for the appropriate groundcover to grow.

417. The hydrological requirements of different forested wetlands vary. IMC will be reclaiming mostly mixed wetland hardwoods (44 acres), bay swamps and wetland forested mix (each 18 acres), and hydric pine flatwoods (15 acres). All of these communities require water depths equal to those required by wet prairies. Hydric pine flatwoods have a very short hydroperiod--shorter even than the wet prairie. Bay swamps have a long hydroperiod, comparable to that of the freshwater marsh. And mixed wetland hardwoods and wetland forested mix have hydroperiods roughly equal to that of the wet prairie. The dryness required by mixed wetland hardwoods, wetland forested mix, and especially hydric pine flatwoods make them difficult to reclaim.

418. At first glance, the longer hydroperiod of the bay swamp would seem to make it easier to reclaim, among forested wetlands, but two factors make the bay swamp the most difficult of forested wetlands to reclaim. First, as defined in these cases, the bay swamp provides a critical seepage function, which is hard to create because of its reliance on a precise reclamation of topography, hydrology, and soils, at least with respect to the soil-drainage characteristics. Second, the mucky

soils of the bay swamps are difficult to reclaim, given their slow rate of formation, as noted above. Thus, even without the requirement of the dominance of bay trees within the bay swamp, as defined in these cases, bay swamps are very difficult to reclaim, as reclamation experience bears out.

419. An early reclaimed forested wetland is 4.9-acre Bay Swamp (BF-1), which was created on land that had been cleared, but at least large portions of it were never mined, so, except possibly for a disturbed A horizon, the pre-mining soils and site hydrology were intact. Permitted under a predecessor program in 1979, constructed by 1980, and released in 1982, Bay Swamp earned restrained praise from the Authority as, with Dogleg Branch, one of the two highest-functioning reclamation sites. This praise is quickly conditioned with the warning that Bay Swamp did not reclaim as a bay swamp, but as another type of forested wetland, albeit a relatively high functioning one. For all these reasons, Bay Swamp is of limited relevance in evaluating the success of forested wetlands reclamation projects. However, in commenting upon Bay Swamp, the CDA offers some insight into the evolution of reclamation design standards and objectives and the optimism of reclamation scientists when it notes the difficulty of establishing loblolly bay-dominated swamps, "apparent[ly because they require] perennially moist, or wet, soil that is not inundated. Heretofore, these moisture

conditions have not been specified as an objective in reclamation design. If these moisture conditions were targeted for reclamation, loblolly bay swamp creation would likely become routine."

420. Another candidate for a reclaimed bay swamp is Lake Branch Crossing (BF-ASP(2A)). Permitted in 1993 and modified in 1997, constructed in 1996, and not yet released, 13.4-acre Lake Branch Crossing contains numerous sweet bays, loblolly bays, and black gums. However, this site was replanted with 4000 trees in mid-2002, and over one-quarter of these trees are displaying signs of stress, so they may not survive. Lake Branch Crossing is bound by a berm with culverts, which may not share a common elevation. Lake Branch Crossing is another excessively deep wetland with an excessively long hydroperiod. Although Lake Branch Crossing exhibits some seepage, it derives its water from a nearby CSA with a much-higher elevation and thus does not compare to the seepage systems to be reclaimed at OFG.

421. The final candidate for a reclaimed bay swamp is Hardee Lakes (FG-PC(1A)), which is a 76-acre wetland forested mixed at the top of the Payne Creek floodplain. Permitted in 1989 and modified in 1994, constructed by 1991, and released in 2000, Hardee Lakes (which is not Hardee Lakes topsoil--the uplands site described above) contains a narrow seepage slope between the berm along the edge of a reclaimed lake and the

natural Payne Creek floodplain. Although Hardee Lakes contains some bay trees and operates as a seepage wetland, the setting is inapt for present purposes, given the narrow slope descending from the nearby reclaimed lake, which provides the water for the seepage system. Like Lake Branch Crossing, Hardee Lakes presents an unrealistically easy exercise in the reclamation of a seepage slope and is therefore irrelevant to these cases. At OFG, broader seepage slopes will receive much of their water from upgradient groundwater that is not derived from a lake or other surface water, so the reclamation scientists must reclaim more accurately the topography, hydrology, and soils, again, at least with respect to soil-drainage characteristics.

422. Reclamation scientists monitored Hardee Lakes following reclamation. Besides the seepage slope described in the preceding paragraph, Hardee Lakes contains shallower wetlands, including productive wet prairie and mixed wetland hardwoods that are growing without the need of hummocks, but these areas appear to be more isolated than extensive.

423. As IMC restoration ecologist John Kiefer noted, shallow swamps are better than deep swamps. Again, the tendency toward deeper reclaimed systems, even recently, has plagued reclaimed forested wetlands, such as Lake Branch Crossing, as it has plagued reclaimed herbaceous wetlands.

424. Permitted in 1992 and modified in 1998, constructed in 2002, and not yet released, North Bradley (KC-HP(3) and PD-HP(1B)) was reclaimed for 12 acres of wetland hardwood forest, 21 acres of wetland conifer forest, and 87 acres of herbaceous marsh. North Bradley suffers from poor communication with its water table, as evidenced by Mr. Carter's discovery of a perched water table under the marshes and an excessively deep water table, at 48 inches, under the forested wetlands, as compared to a water table at 40 inches under the uplands. Although the marsh is present, the forested wetland is largely absent.

425. The SP(2D) of forested reclamation projects is Dogleg Branch (L-SP(12A)). The 19.8-acre wetland component of Dogleg was targeted exclusively for wetland hardwood forest. Another 83 acres of Dogleg was reclaimed as upland hardwood forests. Permitted in 1983, constructed by 1984, and released in 1991 (uplands) and 1996 (wetlands), Dogleg's hydrology is better, as one reclaimed area reveals seepage from a mesic area sheetflowing into the stream channel, which was also reclaimed and is discussed in the following section. Due to its proximity to the reclaimed wetlands, this mesic area was probably part of the reclaimed uplands.

426. According to the CDA, Dogleg received transfers of its own mulch and received several phases of tree plantings over

several years. The CDA notes that Dogleg was the first forested wetland mitigation project under Florida's dredge and fill rules. Trees were established in part by the transplanting of rooted tree stumps. Forest herbs and shrubs and mature cabbage palms were transplanted from nearby donor sites.

427. Despite these and other efforts, according to the CDA, "design flaws attributable to a lack of prior restoration experience required costly mid-course corrections." Due to high tree mortality, trees had to be replanted over 11 years. The CDA concludes that the problem was a depressed water table due to nearby ongoing mining operations--if Dogleg had a ditch and berm system, it certainly did not have recharge wells. Following mining, according to the July 1995 semi-annual report, over 30 acres of mine pits immediately east and north of the unmined headwaters of Dogleg were filled with sand tailings, which then released "[c]onsiderable in-bank storage of ground water from this sand[, which] has seeped ever since through Dogleg Preserve and into the replacement stream."

428. Prior to the cessation of mining, though, Dogleg suffered dehydration. According to the CDA, due to the drawdown, the topsoil dried out, and the overburden, on which the topsoil had been placed, hardened in the dry season, retarding root extension. The actual soil conditions are described in greatest detail in the July 1995 semi-annual

report, which states that 12 inches of topsoil overlaid the "overburden fill," which was "clayey sand." Repeated and persistent replanting of trees, seedlings, and saplings eventually succeeded in establishing an appropriate wetland forest, which, given the prevalence of hardwoods, would constitute the successful reclamation of a mixed wetland hardwoods community, given the negligible representation of cypress trees and other conifers at the site. As reclaimed, Dogleg hosts 24 different species of wetland trees, including all that occur on OFG. Dogleg's forested wetlands are functioning well, although the reclaimed uplands have a major cogongrass infestation.

429. Permitted in 1985, constructed by 1987, and released in 1998, 19.4-acre FG-84(5) (84(5)) was targeted almost entirely for wetland forested mixed, and small areas within 84(5) have achieved this objective. However, reclamation scientists planted so many cypress trees that their dominance today precludes the application of the wetland forested mixed label to the overall wetland. Nonetheless, 84(5) is a relatively high-functioning forested wetland community today.

430. Engineered to contain hummocks, 84(5) also featured the use of transferred topsoil overlying cast overburden to a depth of at least six feet. Despite the presence of the topsoil layer, the proximity of the cast overburden to the surface,

without an intervening sand layer, may have discouraged the formation of an appropriate water table. Although drawing on a lake, 84(5) displayed, in one soil boring during the middle of the wet season, no water table--not even a perched one--through the first 80 inches below grade. A small strip of saturated soil existed at the surface, but the highly compacted and impermeable overburden prevented communication between the wetland and the surficial aquifer. The slopes of 84(5) are also excessively steep.

431. Substantial efforts are required to reclaim the shallow herbaceous wetlands and forested wetlands to be reclaimed at OFG. Deeper marshes and swamps require less effort to reclaim, although they develop more often than targeted when the reclamation scientists overshoot the mark as to hydrology. For shallow wetland systems, which are more important to reclaim, the failures far outnumber the successes, even today, so considerable caution is required in mining high-functioning shallow wetland systems and considerable effort is required in their reclamation. No bay swamps have been reclaimed, except under atypical conditions.

D. Streams

432. The successful reclamation of streams has also proven elusive to reclamation scientists and the phosphate mining industry. Although only one reclamation of a high-functioning,

extensive shallow herbaceous wetland exists, fringe and small-scale shallow wetlands have been reclaimed. The difference between the reclamation of shallow herbaceous wetlands and streams is that reclamation scientists have benefited from 25 years of trial and error in engineering shallow wetlands.

433. No similar history exists in the engineering of streams. Only nine stream-reclamation sites are identified in these cases, and, as DEP contends, only one of these sites is successful: Dogleg Branch. And even Dogleg Branch fails to access its floodplain properly and probably never will. The biggest difference between shallow wetlands reclamation and stream reclamation is that, until OFG, the phosphate mining industry has not intensively designed stream-reclamation projects, so IMC and its reclamation scientists have little experience on which to draw.

434. A wetlands-reclamation practice, as found in a Florida Institute of Phosphate Research study described by Mr. Irwin, has been to reclaim wetlands downslope from their pre-mining location. Concentrating reclaimed wetlands downslope facilitates the re-creation of supporting hydrology. For OFG, IMC proposes to relocate wetlands downslope--probably to good effect, given the reversion of OFG to cattle ranching, post-reclamation.

435. However, an adverse aspect of this practice has been the mining of upslope, lower-order tributaries and their replacement with downslope deeper marshes. Although difficult to quantify, this and similar reclamation practices have resulted in the destruction, by phosphate mining, of many lower-order streams and their permanent loss to the watershed and ecosystem.

436. When attempting to reclaim streams, rather than convert them to downslope marshes, the phosphate mining industry and reclamation scientists have enjoyed little success. Two reasons likely explain this poor record: the complexity of the functions of a lower-order stream system, including its riparian wetlands and floodplain, and an excessive reliance on the ability of streams, post-reclamation, to self-organize.

437. The importance inherent in the stream, its riparian wetlands, and its floodplain, as a functional unit, is reflected in the decision of IMC to extend the no-mine area to Horse Creek and its 100-year floodplain. Dr. Durbin accurately observes that IMC and its 100-year floodplain are, respectively, the first and second most important natural resources present at OFG. Horse Creek's tributaries and their floodplains are important for many of the same reasons.

438. Relying upon reclaimed systems to self-organize is an essential element of effective reclamation. Natural and

anthropogenic forces shape all of the natural systems present at OFG, and these forces will shape the reclaimed systems. Good reclamation engineering accounts for the dynamic nature of these reclaimed systems by establishing initial conditions, such as natural outfalls instead of weirs and culverts, that can evolve productively in response to the forces to which they are subject and eventually become high functioning, self-sustaining ecosystems.

439. On the continuum between intensively engineered reclamation projects and reclamation projects that rely on self-organization, stream-reclamation projects in the phosphate mining industry have so heavily emphasized the latter approach over the former that they may be said to have reclaimed streams incidentally. That is, reclamation scientists have reclaimed streams by contouring valleys so that the erosive process of flowing water would form a stream channel over time: often, a long time.

440. At DEP's urging after the issuance of the Altman Final Order, IMC has introduced a much more intensively engineered stream-reclamation effort in its Stream Restoration Plan. The main problem in assessing the likelihood of the success of the highly engineered Stream Restoration Plan is its novelty. On the one hand, the incidental reclamation of streams typically has been so slow in restoring functions that a more

intensively engineered plan could generate quick gains, at least in the replacement of the functions of low-functioning stream systems, such as those that have been substantially altered by agricultural uses.

441. On the other hand, the Stream Restoration Plan has little success--and no engineered success--on which to build, and misdesigned elements could take longer to correct than the undesigned elements in an incidentally reclaimed stream. Thus, when the uncertainties of successful stream reclamation are combined with the complex functions of lower-order tributaries, their riparian wetlands, and their floodplains, the higher-functioning streams at OFG are less attractive candidates for mining and reclamation than even the shallow wetlands discussed above.

442. Horse Creek's tributaries are not necessarily low-functioning due to their status as intermittently flowing, lower-order streams. Even intermittently flowing, lower-order streams, such as all of the tributaries of Horse Creek, restrict the erosion of sediment into higher-order streams, uptake nutrients, maintain appropriate pH levels, and provide useful habitat for macrobenthic communities, macroinvertebrates, amphibians, and small fish. Intermittently flowing lower-order streams attenuate floodwaters by diverting floodwaters into the streams' floodplains, thus reducing peak flows, extending the

duration that floodwater is detained upstream, and increasing groundwater recharge and, thus, streamflow. Intermittently flowing lower-order streams also supply energy for higher-order streams and the organisms associated with these stream systems, as organic material from vegetation, algae, and fungi in the lower-order streams eventually is flushed downstream to serve as food sources to downstream organisms.

443. The functions of streams, including intermittently flowing lower-order streams, become even more complex and difficult to replace when considered in relation to the functions of the riparian forested wetlands associated with many lower-order streams, such as the Stream 1e series. The riparian forested wetlands provide additional attenuation of floodwaters, as the trees impede the flow of floodwater more than would ground-hugging herbaceous vegetation. Mature trees lining the stream provide a canopy that can cool the waters in the warmer months (thus reducing water loss to evaporation), provide downstream food in the form of leaf litter in the seasonal loss of leaves, shield interior water and habitats from the effects of wind, provide habitat for feeding and hiding for wildlife, and protect the channel from the impact of cattle (thus reducing the damage from the production of waste and turbidity and destruction of the channel and vegetation).

444. The riparian forested wetlands are important in the sequestration of nutrients. If accompanied by flow-through wetland systems, such as those present in the Stream 1e series, riparian forested wetlands display a complex interrelationship between the roots and soils that contributes to improved water quality, among other things. The riparian forested wetlands also provide microhabitats whose detail and design would defy the restoration efforts of even the most dedicated of stream-restoration specialists, of whom IMC's stream-restoration scientist, John Kiefer, is one.

445. For some of the stream-restoration projects, DEP explicitly permitted or approved the reclamation of a stream. For other such projects, DEP, at best, implicitly permitted or approved the reclamation of a stream.

446. Four of the projects are tributaries to the South Prong Alafia River and are in close proximity to each other. From upstream to downstream, they are Dogleg Branch, whose forested wetland component has been discussed above; Lizard Branch (IMC-L-SP(10)); Jamerson Junior (IMC-L-CFB(1)); and Hall's Branch (BP-L-SPA(1)). Hall's Branch is about 4-5 miles upstream from the confluence of the South Prong Alafia River and North Prong Alafia River. All four of these reclaimed streams are now part of the Alafia River State Park.

447. As noted above, Dogleg, a 19.8-acre wetland hardwood forest and 83-acre upland hardwood forest, was constructed in 1984 and is the oldest of these four reclamation sites adjoining the South Prong Alafia River. Next oldest is Hall's Branch, which was permitted as a 3.8-acre wetland hardwood forest in 1982, constructed by 1985, and released in 1996. Next oldest is Jamerson Junior, which was permitted as a 4.3-acre wetland forested mixed in 1984, constructed in 1986, and released in 1996. Ten years younger than the others is Lizard Branch, which was permitted in 1983 and modified in 1991, constructed in 1994, and released in 1996; some question exists as to its target community, but it was probably a swamp.

448. The reclaimed stream at Dogleg Branch is part of a second-order stream, although the CDA reports that Dogleg Branch was a first-order stream. Pre-mining, Dogleg Branch and Lizard Branch joined prior to emptying into South Prong Alafia River. Portions of the record suggest that the reclaimed stream lies between unmined stream segments upstream and downstream, although one exhibit, cited below, implies that the mining captured the point at which the stream started. The CDA and the July 1995 semi-annual report state that the headwaters of Dogleg were unmined or preserved. The CDA adds, with more detail than the other sources, that the headwater and first 600 feet of the stream were unmined, and the next 1000 feet, down to the

forested riparian corridor of South Prong Alafia River, was mined. Due to its detail, the CDA version is credited, as is the July 1995 semi-annual report: the headwaters of Dogleg Branch are unmined.

449. The July 1995 semi-annual report states that the stream-reclamation component of Dogleg Branch required persistence, as did its forested wetlands component. In 1987, one year after the filling of the mine cuts with sand tailings, as described above, it was necessary to cut a new channel, because the gradient of the old reclaimed channel was too shallow and forced water to back up in the unmined headwaters.

450. Reflective of the age of the reclaimed stream, the understory vegetative species associated with Dogleg Branch are more successional, having replaced the lower-functioning pioneer vegetative species that first predominated after reclamation. As a stream-reclamation project, Dogleg Branch has achieved close to the same success that it has achieved as a reclaimed wetlands forest or that SP(2D) has achieved as an extensive herbaceous shallow water wetland. The slope of Dogleg Branch's reclaimed channel is steeper than the slopes of its unmined channels, and the reclaimed segment, which functions well vertically within the banks of the channel, does not access its floodplain properly, largely due to its entrenched nature. Due to the entrenchment underway, it is unlikely that the reclaimed

segment of Dogleg Branch will ever communicate with its floodplain, as its unmined segments do.

451. Entrenchment is a measure of channel incision--specifically, the width of the floodprone area, at a water level at twice bankfull, divided by the bankfull width. Entrenchment may cause excessive erosion, which may result in adverse downstream conditions, such as turbidity and lost habitat. Proceeding perpendicular to the flow of the water, entrenchment extends the channel into the riparian wetlands or uplands alongside the stream, dewatering any nearby wetlands and disturbing the local hydrology. Especially if entrenchment is associated with head-cutting, which operates up the streambed, the resulting erosion deepens the channel sufficiently that the water in major storm events can no longer enter its floodplain, but rushes instead downstream.

452. Although the failure of Dogleg Branch to access its floodplain would not affect macroinvertebrates, which do not use the floodplains, the failure of the reclaimed stream to access its floodplain harms fish, which cannot access the floodplain during high water levels to forage, spawn, and escape predators or high water volumes, and reduces valuable aquatic-upland ecotones. This failure also reduces the ability of the stream to attenuate floodwaters. By chance, Charlotte County's stream-restoration expert Frederick Koonce visited Dogleg Branch

shortly after a June 2003 storm event and saw the water from the stream enter the floodplains adjacent to the unmined segments of Dogleg Branch, but not the reclaimed segment.

453. The less-rigorous approach of incidental stream restoration, at least in the mid-1990s, is evident the summer 1994 semi-annual report on Dogleg Branch, in which Dr. Clewell provides a detailed discussion of the biological aspects of the reclamation of this site. Implying that the incidental stream element of the Dogleg reclamation project may be nine years younger than provided in the parties' stipulation, Dr. Clewell writes:

> The temporary land use area was abandoned and reclaimed during the autumn of 1993. The perimeter canal was filled and the access road removed between Dogleg marsh and the unmined tip of original Dogleg Branch. Within a few days of a site inspection on December 2, 1993, final grading and revegetation had been completed, and water was discharging from Dogleg marsh into unmined Dogleg Branch for the first time ever. The water was free of turbidity. The entire connection had been sodded with bahiagrass turf.

454. Dogleg Branch enjoys good water quality. On the two days that Charlotte County water quality scientist William Dunson tested its waters, in October 2003 and March 2004, the reclaimed Dogleg Branch had dissolved oxygen of 6.8 and 8.6 mg/l, iron of 325 and 212 ug/l, manganese of 41 and 22 ug/l, and aluminum of 160 and 132 ug/l. The Class III water standard for

dissolved oxygen is 5 mg/l, except that daily and seasonal fluctuations above 5 mg/l must be maintained. The Class III water standard for iron is no more than 1.0 mg/l (or 1000 ug/l). There are no Class III water standards for manganese and aluminum. Dogleg Branch also passed chronic toxicity testing for reproductivity and malformation.

455. However, Dogleg Branch is distinguishable from at least one of the OFG streams. Dogleg Branch is a much less complex restoration project because reclamation scientists did not need to re-create headwaters, the first 600 feet of stream downstream of the headwaters, or flow-through wetlands. Also, the mined segment of Dogleg was much shorter than the mined segment of the Stream 1e series: 1000 feet versus 2039 feet for the Stream 1e series.

456. Betraying an emphasis on forested wetlands to the exclusion of streams, Dr. Clewell places Hall's Branch a close second to Dogleg among stream-reclamation projects. However, DEP properly did not add a second stream to its list of successful stream-reclamation projects. Reclaimed Hall's Branch is not close to performing the functions of reclaimed Dogleg Branch, and, because of the large gap between Dogleg and all of the other reclaimed streams, it is irrelevant which of them occupies second place.

457. The most visible shortcoming of the reclaimed stream at Hall's Branch is its color. Parts of the water in the reclaimed stream within Hall's Branch are highly discolored with iron flocculent leaching from the surrounding mesic forest and shrub communities. Mr. Dunson's water quality tests in reclaimed Hall's Branch, in October 2003 and March 2004, revealed iron levels of 117,000 ug/l and 4025 ug/l, which are 117 times and 4 times the Class III water standard. Dissolved oxygen was also well below Class III standards at 1.5 mg/l and 2.1 mg/l. Manganese was 1880 ug/l and 392 ug/l, and aluminum was 226 ug/l and 35 ug/l. Like Dogleg Branch, Hall's Branch also passed chronic toxicity tests for reproductivity and malformation.

458. The hydrological connection between the surficial aquifer and the reclaimed stream at Hall's Branch is probably interrupted. Mr. Carter, who did not visit Dogleg Branch, inspected Hall's Branch and found the water table 12 inches below the surface. A soil sample reveals overburden with a layer of topsoil. The CDA seems to indicate that part of Hall's Branch was backfilled with sand tailings of an unspecified depth and part of it was merely contoured overburden--a pattern suggestive of that planned for OFG. The CDA states that trees were planted in mulched areas. The reclaimed forest is dominated by cypress, not the targeted wetland hardwoods.

459. Jamerson Junior is a 4.3-acre reclamation site permitted as a wetland forested mixed community in 1984, constructed by late 1985, and released in early 1996. Part of the reclaimed stream is a second-order stream.

460. Like Hall's Branch, Jamerson Junior also shows signs of orange-colored water leaching in to the stream from the nearby mesic zone. However, the water quality in Jamerson Junior is closer to the water quality in Dogleg Branch than Hall's Branch. Mr. Dunson's iron readings, in October 2003 and March 2004, were 583 ug/l and 195 ug/l, which are within Class III standards. Dissolved oxygen was slightly higher than at Dogleg Branch: 7.0 mg/l and 8.0 mg/l. Manganese was 136 ug/l and 21 ug/l, and aluminum was 391 ug/l and 101 ug/l. However, Jamerson Junior failed chronic toxicity testing for reproductivity, but passed for malformation. This is the only stream that IMC also tested for toxicity, and IMC obtained similar results, according to Dr. Durbin.

461. Soil samples reveal a highly variable soil structure underlying Jamerson Junior. Subsequent reclamation work on the stream required the addition of material to change the elevation of the stream bed and possibly to change the drainage characteristics of the original backfilled material.

462. On the day that Mr. Carter visited Jamerson Junior on August 14, 2003, he found the stream flowing. During the wet

season, the water table should normally be expressed in the stream. Presenting a more interrupted relationship between the surficial aquifer and the stream than at Hall's Branch, Jamerson Junior displays no connection between the stream bed and water table, at least to a depth of 40 inches. A soil boring revealed water immediately underneath the stream bed, but, at about 15 inches beneath the bottom of the bed, the soil dried to moist; at 40 inches, Mr. Carter found the water table under the stream.

463. Likewise, the Jamerson Junior channel was poorly integrated with the surrounding wetlands and uplands. At the banks of the stream, Mr. Carter did not find the water table within 80 inches of the surface, which is additional evidence of a discontinuity between the water table and the stream. Much of the reclaimed forested areas are mesic, not hydric. The reclaimed floodplains are narrower than the floodplains in the unmined adjacent area, and the slope of the reclaimed channel is steeper than the slope of the unmined channel. The reclaimed uplands are infested with cogongrass, although less than is present at Dogleg.

464. Lizard Branch is a 6-acre reclamation site permitted as a swamp community in 1983 and modified in 1991, constructed by 1994, and released in 1996. Few of the planted gums and maples are surviving. The uplands surrounding the reclaimed area are infested with cogongrass, which has penetrated the

shallower wetlands. Lizard Branch is one of the lowest-functioning forested wetlands.

465. Lizard Branch joins Jamerson Junior as one of only two of six reclaimed stream sites to fail chronic toxicity testing for reproduction, although it passed for malformation. Lizard Branch had the highest two dissolved oxygen readings of all six sites tested by Mr. Dunson: 12.6 mg/l and 7.1 mg/l. Its iron levels were 547 ug/l and 352 ug/l. Manganese was second lowest, behind only Dogleg Branch, at 71 ug/l and 30 ug/l. Aluminum was second highest at 445 ug/l and 45 ug/l.

466. Lizard Branch is an interesting, recent reclamation site for several reasons. Lizard Branch represents a relatively recent instance of the destruction of a stream without its re-creation and either the failure of the incidental reclamation of a stream or the subsequent permission by DEP to allow the permanent elimination of the stream.

467. Mr. Winchester testified that he could not even find a stream at Lizard Branch. Charlotte County ichthyologist Thomas Fraser treated Lizard Branch as a stream, but grouped it with marshes in his analysis, apparently due to the lack of channel formation. The fact is that, despite any effort to reclaim a stream, little, if any, stream structure is present at Lizard Branch.

468. However, a stream once flowed over the reclaimed portion of Lizard Branch. In the summer 1994 semi-annual report, Dr. Clewell notes that Brewster Phosphate received a dredge and fill permit in 1983 to dredge and fill the "headwaters of two streams, Dogleg Branch and Lizard Branch" in connection with the mining at Lonesome Mine. Dr. Clewell adds:

> The permit was issued with the stipulation that the streams and their attendant riverine forest would be restored on adjacent physically reclaimed lands, concomitant with mining. The permit further stipulated that restoration would be monitored and that semi-annual reports documenting progress in vegetational restoration would be submitted to [DEP.]

469. In the report, Dr. Clewell notes that reporting on Lizard Branch has been "discontinued" and DEP issued a new permit in 1991. The 1991 permit modification is not part of this record, but the result was the elimination of a stream, or at least any signs of a stream ten years after construction.

470. Three of the remaining reclaimed-stream projects were built at about the same time as Lizard Branch project. For only one of these projects did the reclamation scientists explicitly target a stream.

471. Permitted in 1985 and subject to a consent order in 1996, constructed in 1991-92 and 1995, and not yet released, 9.6-acre Tadpole Wetland (H-SPA(1)) was targeted to be about one-third wetland forested mix and two-thirds freshwater marsh.

Much cogongrass has infested Tadpole, whose stream enters the Alafia River floodplain and leads to a ditch that runs the remainder of the distance to a point close to the Alafia River.

472. Tadpole's water passed chronic toxicity testing for reproductivity and malformation. However, its water violated Class III standards for dissolved oxygen, with readings of 2.8 mg/l and 2.1 mg/l, and for iron, with readings of 11,300 ug/l and 1100 ug/l. Manganese levels were 166 ug/l and 20 ug/l, and aluminum levels were 660 ug/l--the single highest reading among the four reclaimed streams tested--and 95 ug/l.

473. Permitted in 1985, constructed by 1996, and not yet released, Pickle Wetland (H-SPA(1)) is a 34-acre site, 0.8 acres of which was to be reclaimed as stream. A deep marsh that requires treatment of its nuisance exotics, such as cattails and primrose willow, Pickle is just northeast of Tadpole and a few miles north of Morrow Swamp and Ag East. Pickle's stream is surrounded by uplands.

474. Pickle is the only reclaimed stream of six tested to fail chronic toxicity testing for malformation, although it passed for reproductivity. Pickle has the lowest dissolved oxygen of the six reclaimed streams tested by Mr. Dunson: 0.8 mg/l and 1.2 mg/l. Its iron levels violated Class III standards in October 2003, with a level of 4230 ug/l, but passed in March

2004, with a level of 786 ug/l. Manganese was 127 ug/l and 72 ug/l, and aluminum was 107 ug/l and less than 5 ug/l.

475. Permitted in 1991, constructed in 1995, and not yet released, Trib A ((BF-ASP(2A)) is a 120-acre site to be reclaimed as a wetland forested mix, but it includes a slough that empties into an unmined channel with streamflow. To the extent that a reclaimed stream channel is discernible on Trib A, nine years after the completion of its reclamation, the channel is much more steeply sloped than the adjacent unmined channel--steeper than the two percent slope, beyond which sandy stream bottoms begin to erode. Not surprisingly, the reclaimed channel has begun to head cut and entrench. In an adjacent unmined area, a stream exists within a floodplain with a very flat slope. In the mined area, the reclaimed floodplain is steeper, suggestive of impeded communication between the reclaimed stream and its floodplain.

476. The groundwater communication at Trib A is almost as interrupted as it was at Jamerson Junior. At Trib A, the uppermost 20 inches of soil was saturated, at the time of Mr. Carter's site inspection. Beneath a moist soil layer, the water table occurred at 40-50 inches deep. Parts of Trib A were topsoiled, but the next layer down was originally from an area below the C horizon. However, the soil-formation process is underway.

477. Permitted in 1995, constructed by 1998, and not yet released, 17.6-acre File 20-2B and 70-3 Dinosaur Wetland (FG-GSB(7)) was reclaimed as a freshwater marsh. Dinosaur is due south of Morrow Swamp and is a headwater wetland. The site is still undergoing treatment for cattails. The record describes little, if anything, about the status of this stream.

478. The last two stream-reclamation reclamations were built at least five years after the last pair. Again, DEP and the phosphate mining company identified a stream as a target for only one of the projects.

479. Permitted in 1989, 1992, and 1998, constructed in 1999, and not yet released, South Bradley (KC-HP(1A) is a 171-acre site, 1.7 acres of which was to be reclaimed as stream.

480. South Bradley is just north of Pickle. The channel is steeply incised and deep at points. The channel runs through forested and unforested areas. Charlotte County ichthyologist Thomas Fraser found iron flocculent in South Bradley and no fish within this area of the reclaimed stream, but three species of fish in a nearby area.

481. Permitted in 1999, constructed by 2003, and not yet released, MU R Wetland H (KC-HB(1)) is a 4.8-acre site to be reclaimed as wetland hardwood forest. Monitoring has not yet begun for this site. Although a tailwater system receiving water from a ditch running to a lake, rather than a natural

stream, the channel that has formed in MU R Wetland H does not join the existing downstream channel; the two channels are offset by 75-100 feet. Also, the reclaimed floodplain of MU R Wetland H is more steeply sloped than the floodplain of the adjacent unmined area. The slope of the reclaimed channel is steeper than the slope of the unmined channel, and, due to poor design parameters, the new channel is headcutting into the floodplain, which does not appear to be communicating appropriately with the stream. Combining a more steeply sloped reclaimed floodplain with a headcutting reclaimed stream means, among other things, substantially less communication between the stream and its floodplain.

482. The hydrology of MU Wetland H appears to have been ineffectively reclaimed. In the forested wetland a short distance from the stream, the soil remained unsaturated until 80 inches deep. Closer to the stream, the soil was saturated at a depth of 18-20 inches, but the underlying overburden remained dry to a depth of 70 inches, indicating again a failure to reclaim the water table at appropriate depths.

483. As with all of the almost countless reclamation sites on which the parties' expert witnesses copiously opined, MU R Wetland H is not well-developed in the record in terms of pre-mining conditions, design elements, construction techniques, and post-reclamation conditions. However, the dislocated stream

that has formed within this reclaimed wetland stream reinforces the principle that even incidental stream reclamation requires some engineering.

484. The excessive reliance upon a contoured valley to self-organize into a stream, as noted above, has impeded the progress of the science of stream restoration, as applied to mined land in Florida. This factor is unique to streams and does not apply to uplands and wetlands. However, another factor has impeded progress in reclaiming successful systems--whether uplands, wetlands, or streams. This factor is undue emphasis on the identity of post-reclamation vegetation, as compared to pre-mining or reference vegetation, at the expense of function.

485. Charlotte County and the Authority stressed the process of the identification of vegetative species, at the expense of undertaking complex functional analysis and attempting to situate reclaimed systems in the process of energy consumption and production. In part, their cases relied on showing that past reclamation projects, as well as that proposed for OFG, do not replicate pre-mining or reference-site vegetation. An undue emphasis on species identity suffers from two major flaws.

486. First, as Dr. Clewell and Ms. Keenan testified, reclaimed sites undergo stages of colonization, and, during early stages, less-desirable species, such as Carolina willow

and wax myrtle, may predominate at more-desirable canopy-forming species succeed them. Ms. Keenan added that the life expectancy of Carolina willow, in this part of Florida, is about 25 years, and no reclaimed site older than 15 years is dominated by Carolina willow.

487. Second, any measure of species identity risks the elevation of replication over function, as DEP has already recognized. A criterion of replication, for example, discredits a reclaimed site with a lower species-identity score because it has been colonized by a greater share of more-desirable species than occupy the reference site.

488. DEP has wisely discontinued the practice of assessing reclamation success in partial reliance upon the Morisita's Index. This index measures the identity of species between two sites or the same site pre-mining and post-reclamation, as a criterion of successful wetlands reclamation. In a similar vein, DEP has recently recognized that vegetative analysis cannot preemption functional analysis, especially as to streams. This recognition is evidenced by a report entitled, "Riparian Wetland Mitigation: Development of Assessment Methods, Success Criteria and Mitigation Guidelines," which was managed by Ms. Keenan, revised May 10, 2001, and filed with the U.S. Environmental Protection Agency Grants Management Office (Riparian Wetland Mitigation).

489. Riparian Wetland Mitigation notes the unsatisfactory history of stream reclamation projects with their emphasis on vegetation to the exclusion of stream hydrology and geomorphology. Riparian Wetland Mitigation states:

> The more recent methods [of stream restoration] recognize that streams are not simply water conveyance structures, but are complex systems dependent on a variety of hydrological, morphological, and biological characteristics. It is now recognized that in order to successfully restore or create a stream, hydrology, geology and morphology must be considered in the design.

490. Noting the increasing extent to which the phosphate mining industry is applying for permits to mine more and larger stream systems and reclaim them on mined land, Riparian Wetland Mitigation frankly admits:

> The success criteria included in permits issued by the Department for these newly created streams have been based primarily on vegetational characteristics as is typical of most permits requiring wetland mitigation. However, vegetation alone is a poor indicator of stream function and community health. The results of regular permit compliance inspections of existing stream mitigation projects . . . have suggested that for several projects, although existing riparian vegetation was meeting or trending toward meeting permit requirements, problems existed with site hydrology and habitat quality of the stream channel itself.

491. DEP thus adopted a rapid bioassessment method known as BioRecon, which tests macroinvertebrates, and added two other

components: habitat assessment and physical/chemical characterization. DEP then performed "BioRecon, habitat assessment, and physical/chemical sampling" on eight reclaimed streams. Of the eight sites sampled, "only one passed the BioRecon and Habitat Assessment." (It is unclear whether Riparian Wetland Mitigation intends to imply that this site--obviously, Dogleg Branch--also passed the physical/chemical composition, but it probably did.) DEP then tested smaller, unmined streams and confirmed that they, too, could pass BioRecon and Habitat Assessment.

492. Riparian Wetland Mitigation states that DEP will collect data from comparable unmined streams and attempt to relate geomorphological, hydrological, and biological data to develop more refined criteria by which to assess proposed stream-reclamation projects. When DEP issues these criteria, the likelihood of success of a specific stream-reclamation project will be easier to assess. Until then, the assessment of a specific stream-reclamation project remains more difficult, in the context of past reclamation projects that have reduced or even eliminated important functions of streams.

493. Although DEP's new guidelines for stream restoration will mark a transition from a predominantly vegetative to a multi-variable analysis of stream function, even a predominantly vegetative analysis of stream function is superior to IMC's

analysis of streams predominantly from the perspective of flood control, as set forth in the CDA prior to the Altman Final Order. In a remarkably candid admission of the difficulty of reclaiming the many functions of unaltered stream systems, including their riparian wetlands and floodplains, IMC, in its response to RAI-102 in the CDA, states:

> Although it is impossible in a reasonable amount of time to expect to restore the functionality of the creek systems and associated uplands which historically occurred on the One site and are proposed for mining, it is reasonable to conclude that the reclamation plan restores the primary functions of the watershed[:] i.e. the capture, storage, distribution, and release of precipitation.

494. IMC's subsequent discussion in RAI-102 emphasizes the efficacy of mitigation, from a biological perspective, but only as to stream systems whose pre-mining condition is substantially altered. For relatively unaltered systems, IMC's message remains that the reclamation of functions, besides water quantity, within a reasonable period of time is "impossible."

E. Summary of Findings on Past Mitigation/Reclamation

495. Any attempt at assessing past reclamation projects is impeded by the general lack of data presently available, for each reclamation site, describing pre-mining hydrological, topographical, soil, and geological conditions; the functions of pre-mining communities; reclamation techniques; post-reclamation

hydrological, topographical, soil, and geological conditions; and the functions, as they have evolved over time, of reclaimed communities.

496. For post-reclamation water tables, the auger and shovel work of one or two men substitutes for several years of weekly piezometer readings in the wet season and monthly piezometer readings in the dry season--correlated to daily rainfall data collected at the same site. For post-reclamation water quality, a few preliminary toxicity and a few dozen water quality readings--some under less than optimal conditions--substitute for systematic water-quality testing of a broad range of parameters, again over years. For post-reclamation soils, one soil scientists finds an A horizon and concludes substantial formation has taken place within 10 years; another finds an A horizon--never the same one at the same place--and concludes topsoil transfer; and both are probably correct. Absent better data, reliable analysis is difficult because a wide variety of factors may have contributed to the successes of SP(2D) and Dogleg and the failures of too many other sites to list.

497. Even so, a few facts emerge. IMC can reclaim extensive areas of uplands, deep marshes, and cypress swamps, although difficulties remain with each of these types of reclamation projects. With greater difficulty, IMC can reclaim pine flatwoods and palmetto prairies. With even greater

difficulty, IMC can also reclaim forested wetlands, except bay swamps.

498. Far more difficult to reclaim than the communities mentioned in the preceding paragraph are extensive shallow wetlands, seepage bayheads, and streams. Any finding of present ability to reclaim these systems must uneasily account for the numerous failures littering the landscape, the failure ever to reclaim successfully a bayhead as bay swamps typically occur in the landscape, and the unsettling fact that nearly all reclamation successes of shallow wetlands are small patches--almost always far smaller than designed. Any finding of present ability to reclaim these systems must rely heavily on SP(2D) and Dogleg Branch and the design of the current reclamation plan.

499. The probability of the successful reclamation of any community, but especially extensive shallow wetlands, seepage bayheads, and streams, requires careful analysis of each community proposed to be mined and each community proposed to be reclaimed. For each such community, it is necessary to assess its ultimate functions of consuming and producing energy within a robust, sustainable ecosystem.

IV. Additional Features of OFG, Mining, and Reclamation

A. Introduction

500. The preceding sections detail the ERP, CRP approval, and WRP modification and other mitigation sites involving the

reclamation of uplands, wetlands, and streams. This section adds information concerning OFG in its pre-mining condition, the proposed mining operations, and the proposed reclamation.

B. OFG

501. IMC adequately mapped the vegetative communities at OFG. As Doreen Donovan, IMC's wetlands biologist testified, trained persons using the FLUCFCS system of classifying vegetative communities tend to fall into one of two categories: lumpers or splitters. Scale dictates FLUCFCS code in many cases. Where one biologist may designate a larger, more varied area with one code, another biologist may designate the same area with several codes.

502. The purpose of FLUCFCS coding dictates the scale. Subordinating vegetative-identity analysis to functional analysis undermines the arguments of Charlotte County and the Authority for an unrealistic level of precision in this exercise.

503. The discrepancies in vegetative mapping noted by Mr. Erwin were insignificant. Many were the product of scaling differences, as noted in the preceding paragraph. Some were the product of distinctions without much, or any, difference, given the context and extent of the proposed activities. For present purposes, absent demonstrated differences in wildlife utilization, groundwater movement, or soil, distinctions

between, for example, xeric oak and sand live oak on ten acres are essentially irrelevant. In total area, as compared to the 4197 acres of OFG, the claimed discrepancies did not rise to the level of noteworthy.

504. As for the wetlands at OFG, DEP's acknowledged expert in wetlands identification, Deputy Director Cantrell, personally visited OFG and confirmed the accuracy of the wetlands determinations made three years earlier in December 2000 when DEP issued a Binding Wetland Jurisdictional Determination, which remains valid through December 2005. Deputy Director Cantrell noted minor omissions that might total a couple of acres, but these are insignificant, again given the scale of the proposed activity.

505. The sole material flaw in IMC's mapping of OFG is in the omission of floodplains of the tributaries from Map C-3, although Dr. Garlanger's hydrological analysis, described below, adequately considered the storage and conveyance characteristics of these floodplains. Proper analysis of the tributaries' functions, besides flood control, and proposals to reclaim them is impeded by IMC's failure to depict graphically the 2.3-, 25-, and 100-year floodplains. The record suggests that BMR may have waived any requirement for maps of the floodplains except for those of Horse Creek, but the record does not suggest that, if BMR actually waived this requirement, it thus insulated the CDA

from scrutiny with respect to all the information that would have been contained in floodplain maps or assured IMC of favorable analysis of this missing information.

506. Charlotte County hydrologist John Loper prepared floodplain maps, which are Charlotte County Exhibits 1762 (mean annual floodplain), 1763 (25-year floodplain), and 1764 (100-year floodplain). These are credited as accurate depictions of the floodplains of the tributaries of Horse Creek. Mr. Loper's maps reveal little difference between the 25- and 100-year floodplains over much of OFG, including the Panhandle. The two floodplains of Stream 3e are slightly different, but the two floodplains of the Stream 1e series are less noticeably different.

507. Focusing on the 25-year floodplain, the only wide, lengthy floodplain outside of the no-mine area is the floodplain along the Stream 1e series, which is the widest band of floodplain outside the no-mine area. At places, the floodplain of the Stream 1e series is as wide as the corresponding floodplain of Horse Creek. Even at its narrowest, which is along Stream 1ee, the floodplain of the Stream 1e series is as wide as that of Stream 2e and wider than that of Stream 3e.

508. No 25-year floodplain runs along ditched Stream 3e′. The only other portions of the 25-year floodplain contiguous to the floodplain of Horse Creek, but outside the no-mine area, are

the large wet prairie at the head of Stream 9w, the large wet prairie at the head of Stream 5w, and the headwater wetlands of Streams 1w-4w. As already noted and discussed in more detail below, all of these wetland systems, including the headwaters of Streams 1w and 3e, are lower-functioning than the wetland system associated with the Stream 1e series.

509. As noted above, over half of the area to be mined is agricultural and another quarter of the area to be mined is uplands consisting largely of sand live oak, pine flatwoods, and palmetto prairie. Accordingly, OFG is characterized by native flatwoods soils, which exhibit high infiltration rates, but restricted percolation due to underlying hardpan or loamy horizons. About one-fifth of the soils at OFG are xeric soils. The wet season water table in the wetter areas will be 0-2 feet below grade and in the uplands over 3 feet below grade.

510. Nothing in the record suggests that IMC will have much difficulty in reclaiming agricultural land or sand live oak communities. Nothing in the record suggests that any of the sand live oak that will be mined is atypically valuable habitat. As noted above, the pine flatwoods and palmetto prairie are more difficult to reclaim, but the pine flatwoods and palmetto prairie at OFG are not atypical instances of these common upland habitats. Some of these communities have been stressed by the lack of fire, so that hardwoods, such as oaks, have become

sufficiently established as to resist thinning by fire. Lack of fire has also resulted in overgrown vegetation in more xeric areas.

511. Among forested wetlands, IMC will mine 43 acres of mixed wetland hardwoods, 12 acres of hydric pine flatwoods, 9 acres of bay swamps, and 6 acres of hydric oak forests. Among herbaceous wetlands, IMC will mine 95 acres of wet prairie and 67 acres of freshwater marsh.

512. Map F-3 depicts these wetlands with color-coding for ranges of wetlands values, under the Wetland Rapid Assessment Procedure (WRAP), which is used by the U.S. Army Corps of Engineers. Following a weeklong investigation of wetlands at the Ona Mine, as well as other IMC mines in the vicinity, the U.S. Army Corps of Engineers expressly approved revisions to WRAP to accommodate local conditions at OFG. DEP used a different assessment procedure, but WRAP remains useful for general indications of wetlands function.

513. The WRAP scoring scale runs from 0-1, with 1.0 a perfect score. For ease of reading, the following sections shall identify wetlands scoring below 0.31 as very low functioning, wetlands scoring from 0.31 to 0.5 as low functioning, wetlands scoring from 0.51 to 0.7 as moderate functioning, wetlands scoring from 0.71-0.8 as high functioning,

wetlands scoring from 0.81-0.9 as very high functioning, and wetlands scoring from 0.91-1.0 as the highest functioning.

514. The asymmetry of the labeling scheme is to allow differentiation among the wetlands in the highest three categories, which, at OFG, are disproportionately represented, as compared to the lowest three categories. The purpose of these descriptors is only to differentiate relative values.

515. As already discussed, the Map F-2 series identifies existing wetlands alphanumerically and by community, and Map I-2 similarly identifies all post-reclamation communities. In contrast to all reclaimed wetlands, which, as already noted, start with an "E" or "W," all existing wetlands start with a "G" or "H."

516. The ease with which freshwater marshes are reclaimed obviates the necessity of extensively analyzing the condition of marshes presently at OFG, absent evidence of atypical habitat value.

517. In general, the wetland corridor of Horse Creek, as defined by the no-mine area, ranges in quality from very high functioning in Section 29, which is the southernmost end of Horse Creek in OFG, to high functioning north of Section 29. However, narrow fringes of this corridor north of Section 29 are low functioning.

518. Starting from the south, in Section 29, three wetlands are outside of the no-mine area: H031/H032/H033/H034, the G005 wetland complex, and a fringe of the wetlands running adjacent to Horse Creek--the western edges of G262, G266, and G259A are outside of the no-mine area.

519. H031 is the largest part of the H031 complex and is mixed wetland hardwoods. H032 is a small freshwater marsh, and H033 is a hydric oak forest of the same size. H034 is a slightly larger wet prairie. H033 is low functioning. The remainder are high functioning. IMC will reclaim the same communities, as an ephemeral wetland complex. Pre-mining and post-reclamation, this wetland drains into West Fork Horse Creek.

520. Considerably larger than H031, the G505 wetland complex is the headwater wetland of Stream 1w. G512 is the largest component of the G505 wetland complex and is wetland forested mixed. G513 is the next largest component and is a bay swamp. G514 is a fringe wet prairie. Slightly larger than G514, G511 is hydric oak forest. G507 is mixed wetland hardwoods, G506 is a small freshwater marsh, and G505 is a cattle pond. The mixed wetland hardwoods and fringe wet prairie are very high functioning, the bay swamp is high functioning, and the remaining wetlands are moderate functioning. IMC will reclaim the G505 wetland complex as a single bay swamp.

521. G262 and G266 are wet prairie and hydric rangeland, respectively. G259A is mixed wetland hardwoods. The wet prairie and hydric rangeland are moderate functioning, and the mixed wetland hardwoods is very high functioning. IMC will reclaim these wetlands as wet prairie.

522. Section 20 contains the headwater wetlands of Streams 2w, 3w, 4w, and 5w. These are mostly marshes, and they are all low to moderate functioning. These systems have been heavily impacted by agricultural uses. IMC will reclaim these as headwater systems, mostly marshes. IMC will also create one small and one medium ephemeral wet prairie near the headwater wetland of Stream 4w.

523. Section 19, which drains to West Fork Horse Creek, contains three wet prairies (H002, H005, and H006) and a complex consisting of a bayhead (H009A) surrounded by a mixed wetland hardwoods (H009), which is fringed by a small wet prairie (H008). These wetlands are all low to moderate functioning. IMC will reclaim the H008 complex with a bay swamp buffered by a temperate hardwood, and it will restore a cattle pond at the site of the H002 complex. The reclaimed bay swamp will drain to West Fork Horse Creek.

524. Section 18 contains a very low functioning, small wet prairie (H056), which is the only wetland in one of the three lowest ranges of WRAP scores outside of the wetland corridor of

Horse Creek. Section 18 also contains a small part of a large wetland that is mostly in Section 17. The latter wetland is addressed in the discussion of wetlands in Section 17.

525. Section 17 contains the West and Central Lobes. The entire Central Lobe is in the no-mine area, but a large wet prairie (G188) abuts the wetlands in the no-mine area of the West Lobe. IMC will reclaim this wet prairie, which is low functioning, as improved pasture, with a strip of hardwood conifer mixed.

526. Several wetlands unassociated with the West and Central Lobes are outside the no-mine area, but on either side of Stream 6w, which leads to the West Lobe. G183, which is the headwater wetland of Stream 7w, is a freshwater marsh, which is moderate functioning. IMC will not reclaim the existing portion of Stream 7w upstream of the no-mine area, so the connected headwater marsh will be reclaimed as an ephemeral wet prairie.

527. South of Stream 7w is a group of four small wetlands: G089, G090, G091/G092, and G093/G094. G089 and G090 are very small wet prairies. G091 and G093 are freshwater marshes, and G092 and G094 are wet prairie fringes. G090 is low functioning, and G089 and G091 are moderate functioning. G093 is very high functioning, and G094 is high functioning. Even the maps on the February submittal CD are unclear, but it appears that G089 and G090 will be reclaimed as ephemeral wet prairies. IMC will

reclaim G091 as a small freshwater marsh fringed by a large mixed wetland hardwood and G093 as a large freshwater marsh fringed on the east by a small mixed wetland hardwood. The last version of Figure 13B-8 depicts the small freshwater marsh as isolated, but the large freshwater marsh as ephemeral. IMC will also create two small ephemeral wet prairies due south of the West Lobe and one small ephemeral wet prairie just east of the north end of the West Lobe.

528. About one mile west of Horse Creek is a large wet prairie surrounding a smaller freshwater marsh that has been ditched for agricultural purposes. Part of this wet prairie extends into Section 18. The portion of this system in Section 18 is low functioning; the rest of it is moderate functioning. IMC will reclaim this entire area as improved pasture, except for replacing a single cattle pond.

529. Section 16 spans Horse Creek, but mostly covers an area east of the stream, including the East Lobe. The only wetland outside the no-mine area on the west side of Horse Creek is G076/G077, a freshwater marsh fringed by a wet prairie. This small wetland is moderate functioning, and IMC will reclaim it as an ephemeral wet prairie.

530. East of Horse Creek lies Stream 5e and its flow-through wetland, G204/G205. Predominantly a wet prairie, G204 is low functioning. IMC will reclaim it as a bay swamp.

531. A small fringe wet prairie (G177) lies at the south end of the East Lobe, outside of the no-mine area, but it is low functioning, and IMC will reclaim it as hardwood-conifer mixed.

532. A mixed wetland hardwood (G096), which is moderate functioning, fringed by a wet prairie (G097), which is low functioning, lie just north of where the no-mine area of the East Lobe joins the main no-mine area along Horse Creek. IMC will reclaim this wetland as a freshwater marsh fringed on the east by a wet prairie, and this wetland will be connected to the wetlands of the Horse Creek corridor.

533. A freshwater marsh (G058) lies outside the no-mine area just north of the northeast tip of the East Lobe. This wetland is moderate functioning. IMC will reclaim this site as improved pasture, but will create a small ephemeral wet prairie just to the west of G058 and a larger freshwater marsh to the west of the created wet prairie.

534. Section 8 contains two large areas of wet prairie (G048 and G047) at the head of Stream 9w. These wet prairies are moderate functioning, as are a couple of small wet prairies in Section 8 at the western boundary of OFG. IMC will reclaim these areas mostly as improved pasture, although it will create a large, connected wet prairie over the southeastern part of G048, but extending farther to the south and east. This reclaimed wet prairie will form the headwater wetland of

reclaimed Stream 9w, which, as already mentioned, will be shortened from its current length.

535. The only other wetland in Section 8 and outside the no-mine area is a freshwater marsh (G052). This marsh is high functioning. IMC will reclaim this site with a marsh and wet prairie.

536. Like Section 16, Section 9 spans both sides of Horse Creek. On the west side of Horse Creek is mixed wetland hardwoods (G055) fringed by hydric woodland pasture (G054). The mixed wetland hardwoods is high functioning, and the hydric woodland pasture is moderate functioning. IMC will reclaim this site with a gum swamp fringed by temperate hardwoods upland.

537. On the east side of Horse Creek, a small wet prairie (G167) is outside the no-mine area. This very high functioning wet prairie is connected to a large bay swamp (G166) to the north. The bay swamp, which is high functioning, lies partly within and partly outside the no-mine area and is connected to the wetland corridor of Horse Creek. Although high functioning, G166 is overdrained by a tile drain system that drains the citrus grove immediately upland and east of G166. Two mixed wetland hardwoods, which are outside the no-mine area, fringe the bay swamp; they are high functioning. IMC will reclaim a gum swamp for the wet prairie and all mixed wetland hardwoods for the east side of the bay swamp.

538. Just north of the bay swamp that straddles the no-mine boundary is a much smaller bay swamp (G163) fringed by mixed wetland hardwoods (G164) that also straddle the no-mine boundary. Also connected to the wetland corridor of Horse Creek, these wetlands are very high functioning, and IMC will reclaim them with pine flatwoods.

539. Between these two bay swamps straddling the no-mine boundary and the headwater wetland of Stream 8e is a small wet prairie (G041), which is moderate functioning and outside the no-mine area. IMC will reclaim this site with another ephemeral wet prairie.

540. At the southern tip of the headwater wetland of Stream 8e is hydric flatwoods (G157), which is moderate functioning. IMC will reclaim this connected wetland with sand pine flatwoods. A smaller hydric woodland pasture (G154) also connects to another section of hydric flatwoods, which is in the no-mine area between the headwater wetlands of Streams 8e and 7e. The hydric woodland pasture is moderate functioning, and IMC will replace it with hardwood-conifer mixed, although IMC will reclaim a somewhat larger area of mixed wetland hardwoods just north of the present site of the hydric woodland pasture, where no wetland presently exists.

541. The remaining wetlands outside the no-mine area in Section 9 are six isolated wet prairies. They are small

wetlands, except for G039/G040, which is a wet prairie fringing a cattle pond, and G039, which is at the eastern boundary of OFG. However, they are all high functioning, even the wet prairie fringing the cattle pond. In this general area, IMC reclaims three ephemeral wet prairies, much closer to the no-mine area than the sites of the six isolated wet prairies, and a small freshwater marsh fringed by a community that is not listed in the legend in Map I-2. Interestingly, IMC also reclaims a large area of shrub and brushland and larger area of sand live oak, again closer to the no-mine area than the sites of some of the six isolated wet prairies. The remainder of the area will be reclaimed as improved pasture.

542. Section 4 contains no-mine area in its southeast corner: Stream 2e and the Heart-Shaped Wetland. Almost all of the wetlands outside the no-mine area in Section 4 are in the top three scoring categories of functioning.

543. Of the six wetlands complexes on OFG that are, in whole or in part, highest functioning, four of them are in Section 4. The two highest functioning wetlands outside Section 4 are in the no-mine area, and one of the highest functioning wetlands in Section 4 is in the Heart-Shaped Wetland. Three of the highest functioning wetlands are thus to be mined.

544. Outside of Section 4, there are 14 wetlands or wetlands complexes outside the no-mine area that are in the

second- and third-highest scoring categories. These are the mixed wetland hardwoods (H031) in Section 29; a small piece of mixed wetland hardwoods (G259A) straddling the no-mine boundary in Section 29; the bay swamp and mixed wetland hardwoods to the north in the headwater wetland of Stream 1w, which straddles Sections 29 and 20; the freshwater marsh partly fringed by wet prairie (G093) south of Stream 6w in Section 17; the freshwater marsh (G052) connected to Stream 9w and straddling Sections 17 and 8; the mixed wetland hardwoods flow-through wetland (G055) in Stream 9w and straddling Sections 8 and 9; the two bisected bay swamps (G166 and G163) and their mixed wetland hardwoods fringes in Section 9; and the six isolated wet prairies in the northeast corner of Section 9.

545. In Section 4, there are only nine wetlands or wetlands complexes outside the no-mine area that are not in the second- or third-highest scoring categories, and all but two of them--a very small wet prairie fringe (G006) and half of a larger hydric woodland pasture (G105)--are at least moderate functioning.

546. The wetlands in Section 4 fall into three categories: connected to the Stream 1e series, connected to Streams 3e and 3e′, and isolated.

547. The long connected wetland of Stream 1e is mixed wetland hardwoods (G110). This wetland is high functioning,

except for the headwater wetland of Stream 1ef, which is highest functioning. A narrow strip of wetland forested mixed (G132) runs along Stream 1ee. This wetland is moderate functioning.

548. Proceeding from south to north, upstream the Stream 1e series, a freshwater marsh (G129) immediately upstream of Stream 1ee is high functioning, as is a smaller freshwater marsh (G125) immediately upstream of Stream 1ed. Two gum swamps (G123 and G121) in the flow-through wetland at the head of Stream 1ed are very high functioning, as is a freshwater marsh (G126) in the same wetland complex.

549. Just downstream of Stream 1ef is a small freshwater marsh (G115) that is high functioning. Part of the mixed wetland hardwoods abutting this marsh to the east is very high functioning. Just upstream of Stream 1eb is the largest wetland complex of the Stream 1e series wetlands system. The largest communities forming this complex are hydric flatwoods (G107) and mixed wetland hardwoods (G110). The mixed wetland hardwoods envelope a small freshwater marsh (G108) and are fringed on the north by a strip of wetland forested mixed (G102). At the northernmost end of this complex is hydric woodland pasture. All of these communities are high functioning except the hydric woodland pasture, which is moderate functioning, and the hydric flatwoods and half of the marsh, which are very high functioning.

550. Working back downstream, IMC will reclaim the mixed wetland hardwoods of the stream corridor, neglecting to replace the complexity provided by the three of the four flow-through marshes (G108, G125, and G129), the larger headwater marsh (G126), and the two gum swamps. IMC will also neglect to replace even the wetland function of the large hydric flatwoods (G107) and smaller hydric woodland pasture, as these sites are reclaimed as upland communities: pine flatwoods and temperate hardwoods, respectively. However, IMC will add complexity by adding a small marsh abutting the temperate hardwoods, two small bay swamps along the west side of the upper end of the Stream 1e series, a band of hydric flatwoods on both sides of part of the upper stream and a thicker area of hydric flatwoods east of Stream 1ed, a moderately sized area of hydric palmetto prairie within the thicker area of hydric flatwoods, and a thickened wetland corridor--mixed wetland hardwood--along Stream 1ee.

551. The long connected wetland of Stream 3e (G137), which is wetland forested mixed, connects to a headwater or flow-through wetland, whose southern component (G136) is also wetland forested mixed. These wetlands are moderate functioning. The remainder of the wetland upstream of Stream 3e is marsh (G135), wet prairie (G134), and mixed wetland hardwoods (G133); they are all high functioning.

552. The narrow wetland corridor of Stream 3e′ is high functioning. The headwater wetland of Stream 3e′ is a freshwater marsh (G016) fringed on the south by wet prairie (G015) and the north by mixed wetland hardwoods (G014). The mixed wetland hardwoods is moderate functioning; the marsh and wet prairie are high functioning.

553. Working downstream along Streams 3e and 3e′, IMC will reclaim a large freshwater marsh/shrub marsh complex, fringed by wet prairie, at the site of the large headwater wetland of Stream 3e′. In place of the ditch, where IMC will restore Stream 3e′, IMC will probably reclaim mixed wetland hardwoods. (At present, Map I-2 shows improved pasture, but that was before IMC agreed to reclaim Stream 3e′.) IMC will reclaim the wetland complex between Stream 3e′ and 3e with the same vegetative communities, except that it will eliminate some of the present system's complexity by replacing the wet prairie with freshwater marsh. Although Map I-2 inadvertently omits any reclaimed wetland community along Stream 3e, Figure 13A5-1 shows reclaimed wetland forested mixed.

554. There are four isolated wetlands in the vicinity of Stream 1e series. At the northern boundary of OFG is a small wet prairie (G027), which is high functioning. Just west of Stream 1ec is a small hydric flatwoods (G118), which is moderate

functioning. Just south of this hydric flatwoods is a larger wet prairie (G119) with a small area of hydric flatwoods (G119A), which are both high functioning. Just east of Stream 1ec is a small wet prairie (G028), which is high functioning, even though it is ditched.

555. IMC will reclaim the high-functioning wet prairie (G027) with a freshwater marsh, the small, moderate-functioning hydric flatwoods (G118) with hydric flatwoods and possibly part of one of the bay swamps, the high-functioning wet prairie/hydric flatwoods (G119) with rangeland abutting a freshwater marsh, and the small, high functioning wet prairie (G028) also with the upland community of rangeland.

556. There are four isolated wetlands south and east of Streams 3e and 3e′. The two largest are freshwater marshes (G024 and G021) fringed by wet prairies (G023 and G022, respectively). These are all highest functioning, except that G023 is high functioning. The two smaller wetlands are wet prairies (G025 and G026), which are both very high functioning.

557. IMC will reclaim all four of these wetlands at their present sites with the same communities, except that IMC will replace one very high functioning wet prairie (G026) with improved pasture.

558. North of the headwater wetland of Stream 3e′ are five isolated wetlands. The largest is a large freshwater marsh

(G004) at the northeast corner of OFG. A wet prairie (G005) fringes the southern edge of this wetland complex, which is ditched. The marsh is high functioning, but the wet prairie is moderate functioning. Two smaller ditched marshes (G008 and G010) lie southwest of this large complex; they are moderate functioning. A small mixed wetland hardwoods (G007) fringed by a narrow wet prairie (G006), which are north of the two marshes, are moderate and low functioning, respectively. The final isolated wetland is a freshwater marsh (G012) fringed by wet prairie (G011) and connected by ditch to the G014 wetland complex. The marsh is high functioning, and the wet prairie fringe is moderate functioning.

559. IMC will reclaim improved pasture at the sites of four of these five wetlands. At the site of the large freshwater marsh (G004), IMC will reclaim a freshwater marsh, which will be fringed by wetland forested mixed. The wetland forested mixed will be fringed by hydric oak forest, which will be fringed by palmetto prairie.

560. IMC will mine 10,566 linear feet of streams, reclaiming 10,919 linear feet. The current condition of these streams has already been adequately addressed, largely by Mr. Kiefer's assessment in the Stream Reclamation Plan, described above.

561. All the tributaries are Class III waters, although, as Deputy Director Cantrell testified, they might not meet all Class III water standards. In fact, it is unlikely, given the level of agricultural alteration, for these tributaries, both within and without the no-mine area, to meet all Class III standards. As Deputy Director Cantrell testified, the unditched streams are the Stream 1e series, Stream 3e, and Stream 5e, although upstream of OFG, Stream 5e and its headwater wetlands have suffered extensive agricultural impacts. With the exception of the Stream 1e series and probably Stream 3e, elevated levels of turbidity and nutrients and reduced levels of dissolved oxygen are to be expected in the water of the tributaries on OFG due to the extensive ensuing erosion and low-flowing characteristics of these streams.

C. Mining

1. Ditch and Berm System

562. Six months prior to the commencement of mining of each block, IMC will construct a ditch and berm system between the block and the adjoining no-mine area. The ditch and berm system captures the stormwater runoff that would otherwise leave the mine site and releases the groundwater that would otherwise remain at the mine site. The phosphate mining industry began using ditch and berm systems during mining in the late 1980s and early 1990s.

563. IMC has designed the ditch and berm system to capture the water from the 25-year, 24-hour storm event with several feet of freeboard. For storms not in excess of the design storm, the ditch, which runs between the berm and the mine cut, will carry water around the perimeter of the mining block.

564. During periods of high rainfall, IMC will pump the water in the ditch into the mine recirculation system to prevent unintended discharges. When the mine recirculation system reaches its capacity, it releases excess water into Horse Creek upstream of OFG at two outfalls that have already received National Pollutant Discharge Elimination System (NPDES) permits for use with the Ft. Green beneficiation plant.

565. Maintained during all phases of mining operations, ditch and berm systems have effectively protected water quality during mining operations. The only indication in this record of a breach of a ditch and berm system has been one designed to meet older, more relaxed standards.

566. The other function of the ditch and berm system is to dewater the mine site and restore the water table to nearby wetlands in the no-mine area. The removal of the water from the surficial aquifer at the mine cut effectively lowers the water table by, typically, 52 feet, which is the average depth of the excavation at OFG. Lowering the water table in the mine cut by any sizeable amount creates a powerful gradient, which draws

more water from the unmined, adjacent surficial aquifer to fill the void of the removed water. Unchecked, this process would fill the mine cut with water so as to prevent mining operations and empty nearby wetlands of water so as to deprive them of their normal water levels and hydroperiods. To prevent these diversions of the unmined surficial aquifer from taking place, pumps send the groundwater entering the mine cut into the mine recirculation system and ditch.

567. To maintain adequate groundwater flow from the ditch into unmined wetlands, the ditch must maintain adequate water levels. While constructing the ditch and berm system, IMC will construct monitoring wells between the ditch and the wetland or surface water, which will indicate when groundwater flows are less than the pre-mining flows, for which IMC will have already collected the data.

568. Varying permeabilities of adjacent soils or inadequate maintenance of the ditch may cause the system to fail to maintain the proper hydration of nearby unmined wetlands. Due to failures of its ditch and berm system, IMC has several times dewatered nearby wetlands. Recent failures occurred at the East Fork Manatee River in November or December 1999, the North Fork of the Manatee River in March 2000, and two more recent failures at the Ft. Green Mine.

569. To maintain the ditch and berm system, an inspector will daily drive a vehicle along the top of the berm to check the berm and the water level in ditch. However, recharge wells are also necessary to ensure that the ditch and berm system prevents the dehydration of unmined wetlands is recharge wells.

570. Recharge wells would reduce the frequency and extent of wetland drawdowns. Strategically located throughout the length of the ditch, recharge wells would be drilled into the bottom of the ditch to the intermediate or Floridan aquifer. By this means, recharge wells actively maintain appropriate water levels in the ditches and prevent drawdowns. IMC has several alternative sources for the water for these recharge wells: the water pumped from the surficial aquifer during the dewatering of the mine, the groundwater that has returned to areas already backfilled with sand tailings, or the water from the mine recirculation system, provided it is filtered.

571. Notwithstanding testimony to the contrary, neither the CRP approval nor the ERP requires IMC to install recharge wells. These documents fail to impose upon IMC any specific action, if the monitoring wells reveal reduced or eliminated groundwater flows into the wetlands and surface waters. Both documents acknowledge the possibility that IMC may need to install recharge wells to recharge the ditch.

572. In his testimony, Dr. Garlanger recommended the installation of floats on the top of each recharge well to allow the inspector visually checking the ditch and berm readily to check each recharge well at the same time. Clearly, the presence of floats atop recharge wells would allow early identification and repair of malfunctioning recharge wells, prior to the loss of water from the ditch and the dehydration of nearby unmined wetlands.

2. Mine Recirculation System

573. In addition to recycling the water used in mining operations, the mine recirculation system draws on sources deeper than the surficial aquifer, as well as rain. Water leaves the mine recirculation system through evapotranspiration and surface runoff. When water leaves the system as runoff, during or after major storm events, it does so through NPDES outfalls, and the high water volumes associated with the storm generally assure that any contaminants in the discharged water are sufficiently diluted.

3. Sand Tailings Budget

574. For OFG, IMC has presented a reasonable sand tailings budget. Dr. Garlanger, whose expertise in geotechnical matters finds no match on the opposing side, has opined that the supply is ample.

575. Charlotte County and the Authority have challenged the adequacy of the sand tailings budget. In part, Charlotte County and the Authority base their challenge to the sand tailings budget in part on an earlier comment by Dr. Garlanger concerning changing volumes of sand tailings, but he adequately explained that their reliance was misplaced.

576. As noted above, the sand tailings budget at OFG requires sand from the Four Corners and Ft. Green mines. Conjuring up images of a sand Ponzi scheme, Charlotte County and the Authority seem to argue, in part, that there are not enough sand tailings, and DEP has allowed phosphate mining companies that have run out of nearby sand to substitute a Land-and-Lakes reclamation for the more sand-intensive reclamation that had originally been permitted and approved. OFG is early enough in the post Land-and-Lakes reclamation era that, if sand tailings from post-reclamation excavations are being moved around, OFG will get them. The obligation imposed upon IMC to obtain sand tailings backfill is not contingent upon feasibility; IMC must backfill the mine cuts with sand. The possibility that DEP would allow OFG to abandon one of the central tenets of this reclamation project by substituting Land-and-Lakes reclamation for topographic replication is inconceivable.

D. Reclamation

1. BMR Reclamation Guidelines

577. BMR program administrator James (Bud) Cates supervises reclamation by the phosphate mining industry. Mr. Cates and Janine L. Callahan, also of BMR, prepared a document entitled, "Guidelines for the Reclamation, Management, and Disposition of Lands within the Southern Phosphate District of Florida" (Reclamation Guidelines). The document is dated August 2002. Although it is marked, "draft," Reclamation Guidelines is a revision of the first draft, which was prepared in 1993. The Administrative Law Judge commends the authors and DEP for the close attention to detail that has resisted finalization for nine years, but it would be imprudent to disregard the second draft while awaiting the next novennial revision, especially when DEP offered it as an exhibit (DEP Exhibit 37).

578. Consistent with an emphasis on functional analysis and the creation of vegetative, hydrologic, and soils conditions that facilitate self-organization, Reclamation Guidelines defines "reclamation" as:

> the attempt to identify and replace those components/parameters of a community, resulting in the creation of a functional natural community analog. Emphasis is placed on the creation of functional soil, hydrology, and floral precursors that serve as the basis for food-web development.

> Because of the ecological need for fully functional communities, analogs are typically designed on a whole habitat basis rather than being designed around the specific needs of one or two species. These analogs are designed to incorporate a maximum initial diversity potential, based upon the premise that with proper management, the initial input will yield, over time, maximum ultimate diversity. Reclamation plans for and the activities used to create these replacement communities will be guided by existing knowledge of earthmoving, soils, hydrology, vegetation, general ecology, and wildlife management. Data in every applicable field should be constantly collected and used to increase knowledge and improve the results of the reclamation of natural community analogs.

579. Focusing on specific reclamation techniques for soils, Reclamation Guidelines adds:

> The use of Topsoil/Vegetative Inoculum (T/VI) is extremely important to the introduction of organic matter, soil microbes, mycorrhizae, and plant propagules. These factors are critical to the creation of a living soil precursor. The T/VI is also the best known source of plant propagules that will provide the diversity inherent in a given community. Therefore, to the extent of material availability and economic feasibility, T/VI is recommended for use in the replacement of natural community analogs. The goal should be a three to six inch average depth with a minimum depth of no less than one inch over the base of sand, overburden, or sand/overburden mixture. Where T/VI availability problems occur, an artificially created topsoil precursor may be used in combination with all available T/VI or as a replacement for T/VI. Topsoil precursor may be created by incorporating a mixture of overburden, clay, and organics (hay mulch,

wood chips, manure, green manure, or combinations thereof). All artificially created topsoil precursors should contain an organic portion and should be treated with microbial and mycorrhizal inoculum.

580. For Sandhill, which has the least burdensome requirements among the three habitats most analogous to sand live oak (sand pine scrub, xeric oak scrub, and sandhill), Reclamation Guidelines notes that the objective is to concentrate a "deep layer of well-drained sands around/upon a topographic high to prove an area of rapid, positive infiltration and positive down-gradient seepage." The reclaimed sandhill habitat is adapted to excessively drained sands and requires "substantial depth to water table (although not as excessive or deep as scrub)." For soils, Reclamation Guidelines offers two options: six to eight feet of sand tailings covered with a layer of T/VI from a suitable donor scrub or eight to ten feet of sand tailings covered with a minimum four inch layer of artificially created topsoil precursor. For sand pine scrub and xeric oak scrub, the soil requirements are the same, except that the first option is for sand tailings eight to ten feet deep, not six to eight feet deep.

581. As already noted, CRP Specific Condition 8.b requires IMC to reclaim sand live oak and xeric oak scrub with "several feet" of sand tailings and three to six inches of topsoiling from donor scrub or, if topsoiling is not feasible, the seeding

and disking of a green manure crop. (Although omitted, the feasibility condition presumably qualifies the topsoiling requirement because Specific Condition 8.b defines "feasible.")

582. For Pine Flatwoods and Dry Prairie, Reclamation Guidelines notes that the objective is to locate these communities on moderately to poorly drained soils, so that the depth to the water table is moderate to shallow. Most vegetation of these two communities is adapted to predominantly sand soils. For soils, Reclamation Guidelines offers two options: two to four feet of sand tailings covered with a layer of T/VI from a suitable donor flatwoods/dry prairie area or two to four feet of sand tailings covered with a minimum four inch layer of artificially created topsoil precursor.

583. As already noted, CRP Specific Condition 8.a requires IMC to reclaim pine flatwoods and dry prairie with a minimum of 15 inches of sand tailings and three to six inches of transferred or stockpiled topsoil, if feasible, or, if not, the seeding and disking of a green manure crop.

584. For Wetland Mixed Forest, Reclamation Guidelines notes that this community will occupy the outer limit of the floodplain down to the stream channel and the forested edge of deeper marshes. Likely to receive runoff from major storm events, Wetland Mixed Forest should be designed to contain and slow runoff while maintaining sufficient water for wetland

viability. For soils, Reclamation Guidelines offers three options: decompacted overburden to a depth below the dry season water table overlying by a layer of T/VI from an appropriate donor site, two to three feet of sand tailings under a layer of T/VI, or either overburden or two to three feet of sand tailings covered by a minimum of four inches of artificially created topsoil precursor.

585. As already noted, ERP Specific Condition 14.b requires IMC to reclaim all forested wetlands by backfilling with sand tailings or overburden to an unspecified depth under "several inches of wetland topsoil," if feasible. However, for bay swamps, Specific Condition 14.b adds in boldface: "All reclaimed bay swamps shall receive several inches of muck directly transferred from forested wetland approved for mining."

586. Reclamation Guidelines treats Bay Swamp (and Cypress Swamp) separately from other forested wetlands. Noting that Bay Swamps are in areas of significant surficial seepage or high average groundwater elevation, Reclamation Guidelines states that Bay Swamps require sufficient seepage to remain saturated or a deep organic profile at and below the average water table elevation. For soils, Reclamation Guidelines states: "Bay swamps require the placement of one to three feet of organic muck as a depressed lens. The muck should be obtained from a suitable donor wetland."

587. For Non-Forested Wetland, which includes wet prairies and freshwater marshes, Reclamation Guidelines is of value more to identify why the phosphate mining industry and DEP have overseen the routine reclamation of deeper wetlands, but not shallower wetlands. Treating these two very different communities under the same category, Reclamation Guidelines states: "All of the sub-categories may be constructed on overburden, with the exception of sand pond." Although the overburden option for reclaimed forested wetlands seems a stretch, given repeated problems of mature tree growth into overburden relatively close to grade, the overburden option for reclaimed wet prairie, other than fringing deeper marshes when properly sloped, can no longer merit serious consideration, given only one successful, extensive shallow-wetland reclamation site--SP(2D), whose reclaimed soil is four inches of mulched topsoil overlying four feet of sand tailings.

588. However, consistent with its Reclamation Guidelines, DEP did not differentiate between wet prairies and deep marshes in the soil-reclamation requirements contained in the ERP. ERP Specific Condition 14.c allows backfilling with sand tailings or overburden and requires only "several inches of wetlands topsoils when available."

589. Tellingly, Reclamation Guidelines divides aquatic systems into two categories: shallow (less than six feet deep)

and deep. Shallow systems comprise swamps, marshes, sloughs, and ponds, but not streams. Nowhere does Reclamation Guidelines explicitly address the reclamation of streams.

590. Comparing the soil-reclamation requirements that DEP has imposed on IMC in the CRP approval and ERP to the soil-reclamation specifications stated in BMR's Reclamation Guidelines, material discrepancies emerge as to the depth of sand tailings underlying four upland communities.

591. If IMC transfers topsoil, sand live oak communities require at least six feet of sand tailings, not "several" feet; if IMC uses green manure, sand live oak communities require at least eight feet of sand tailings. Regardless whether topsoiled or green manured, xeric oak scrub communities require at least eight feet of sand tailings, not "several" feet. Regardless whether topsoiled or green manured, pine flatwoods and palmetto prairie require at least two feet of sand tailings, not 15 inches.

592. There is a material discrepancy between the ERP and Reclamation Guidelines as to bay swamps. Reclamation Guidelines specifies one to three feet of organic muck for reclaimed Bay Swamps. ERP Specific Condition 14.b requires only "several inches of muck." Given the poor record reclaiming bay swamps, DEP, in forming this condition, is not relying on any

experience-based knowledge that it has acquired, or, if it is, it did not add this information to the present record.

593. There is no discrepancy as to wet prairies, but this is clearly due to a shortcoming in Reclamation Guidelines, at least as to non-fringe wet prairies. Under Reclamation Guidelines, wet prairies, at best, will continue to reclaim only as fringes, and only then if the edges of deeper wetlands have shallow slopes. Given the otherwise-uniform failure to reclaim extensive shallow wetlands, the actual soil regime at SP(2D) of four feet of sand tailings under four inches of topsoil must set the minimum soil criteria for wet prairie.

2. Geology and Soils

594. For purposes of this Recommended Order, soils occur predominantly in the first two meters of the earth's surface. Below that depth, geologic characteristics predominate, so this Recommended Order refers to these deeper structures as geology.

595. Post-reclamation, all of the soil and the top 45-50 feet of the geology are a product of IMC's reclamation activities. The post-reclamation geologic characteristics follow from the mining process, which deposits overburden within the mine cut in two locations. Most of the overburden is deposited in spoil piles within the cut. Some of the overburden is piled against the sides of the mine cut to reduce the seepage

of water from the surrounding surficial aquifer into the cut. Both types of overburden are sometimes called "cast overburden."

596. At OFG, prior to backfilling, the creation of cast overburden spoil piles will either leave alternating bands of sand tailings valleys and cast overburden spoil piles, each 330 feet wide, or each 165 feet wide; the record is not entirely clear on this point. The scenario with the greater hydrological impact is that each valley and the base of each spoil pile is 330 feet wide, but, even under this scenario, relatively little backfilled area would have less than five feet of sand tailings. If each sand tailings valley is 330 feet and each cast overburden spoil pile is also 330 feet at its base, the profile of each cast overburden spoil pile would appear to be a two-dimensional pyramid with its top cut off just below midpoint along its two slopes.

597. The sides of the spoil piles of cast overburden are not perpendicular to the surface, but are sloped at about 1.5:1, according to Dr. Garlanger. Rounding off the depth of the mine cut to 50 feet, this 33-degree slope would travel 50 feet vertically at the point at which it had traveled 75 feet horizontally. Matching this slope with another on the other side of the spoil pile, 150 feet of the 330-foot wide overburden spoil pile would be consumed by the sloped sides, and 180 feet would be a plateau, at a constant elevation of 50 feet above the

bottom of the mine pit. Adding 7.5 feet on either side of the plateau gains a depth of 5 feet, so the width of overburden under less than five feet of sand tailings would be 195 feet.

598. Under the less-favorable scenario, for a 660-foot wide band of reclaimed geology, without regard to topsoil additions, the sand tailings, for the above-described 660-foot slice, will be at least 10 feet deep for a distance of 450 feet, or 68 percent of the reclaimed area, and will be at least 5 feet deep for a distance of 475 feet, or 72 percent of the reclaimed area. Adding the U-turns at the end of the rows would add only a little more area to the 28 percent of the reclaimed area with an overburden plateau within five feet of the surface.

599. If the cast overburden spoil piles fill only half of each 330-foot wide cut, then the overburden plateaus would be much narrower. Each sand valley of 165 feet would abut a 33-degree slope that would again run 75 feet horizontal while climbing 50 feet vertical. Two of these slopes would consume 150 feet horizontal, leaving an overburden plateau of only 15 feet, leaving much less land with an overburden plateau within five feet of the surface.

600. The shaping of the overburden that precedes the backfilling, the backfilling of sand tailings, and the transfer of topsoil are aided by substantial technological improvements in earthmoving equipment in recent years. Most importantly,

earthmoving equipment has incorporated global positioning systems, so that they can now grade material to a tolerance of two centimeters, as compared to tolerances of six inches and one foot not long ago. This achievement permits the reclamation scientists to supervise backfilling more closely so as to replicate the design topography, which is a necessary, although not sufficient, condition of successful establishment of targeted hydroperiods and inundation levels.

601. IMC soil scientist Joseph Schuster and Mr. Carter both presented detailed, well-documented testimony and are both competent soil scientists. They start from the same point, which is that pedogenesis, or soil formation, is a function of five factors: parent material, relief, climate, vegetation, and time. From there, they travel separate paths in their analysis and conclusions concerning the soil aspects of IMC's reclamation plan.

602. In the successful reclamation of soils, Mr. Schuster highlights the creation of appropriate drainage characteristics, and Mr. Carter highlights the creation of appropriate soil horizons, although both experts acknowledge the importance of both these factors, and others, in soil formation and function. Their reasoning seemed mostly to be a question of differing emphases, although their conclusions were mutually exclusive.

603. As already noted, the A horizon is the topsoil layer. (A mucky wetland may have an O horizon.) There is some variability among horizons--for example, the C horizon, which is described below, may occur immediately beneath the A horizon, especially in sandy material. But, for this part of Florida, typically, the E horizon forms under the A horizon. The E horizon is a leaching zone, through which rainwater transmits substances from the A horizon down to the B horizon, which is the accumulation zone beneath the E horizon. Florida typically has two types of B horizons: the Bh (or spodic) horizon, which is composed of loamy or spodic materials, and the Bt (or argyllic) horizon, which is composed of clayey materials.

604. The spodic horizon is a mineral soil horizon containing aluminum and organic carbon, and possibly iron, which formed in a much colder climate, probably at least 10,000 years ago. Spodic horizons typically occur in the top two feet of the soil profile. Although spodic horizons may occur as deep as 40 feet, they occur at OFG within 20 inches of the surface, sometimes within only 10 inches. Beneath the B horizons is the C horizon, which is the parent material for pedogenesis.

605. For the most part, Mr. Schuster's emphasis on reclaiming appropriate drainage is credited as the single most important factor in reclamation, and his seven drainage categories are ample for guiding the reclamation of the drainage

characteristics of soils. More reclamation failures may necessitate the implementation of one of Mr. Carter's suggestions to carefully restore the soil horizons within the top two meters of the mine cut, as it is backfilled, or to use more clayey soils, such as those from drained CSAs, to add more nutrient-retaining capacity to the B and C horizons than nutrient-poor sand tailings provide.

606. Mr. Carter's soil cores from reclamation sites, which reveal overburden close to the surface, presented stark contrasts to soil cores of native soils in the area, although drainage concerns outweigh pedogenic concerns. Mr. Carter correctly points out that, from a soils perspective, pre-mining overburden is not post-reclamation overburden. From a mining perspective, what lies above the unmined phosphate ore is overburden, and what lies in the ground, post-reclamation, is also overburden, which, to a certain depth, is dominated by characteristics of the B horizon and underlying C horizon.

607. However, in a 52-foot deep phosphate mine, as opposed to typical road construction, which Mr. Schuster unpersuasively offered as a comparable, the overburden is ultimately dominated by geologic material from below the C horizon. From a soils perspective, what lies in the unmined ground are soil horizons that took many years to form, and what lies in the ground, post-reclamation, is nothing but an admixture of former soil horizons

and geologic material that normally resides a little deeper in the earth's crust. As Mr. Carter notes, the result, post-reclamation, is less like soil and more like unconsolidated soil material with little horizonization even several years after reclamation, and, if an overburden layer is present close to the surface, it typically is tightly compacted.

608. Soil horizons are not an incidental or random characteristic of undisturbed soils; soil horizons are an important component in the formation and functioning of soil. Mr. Schuster himself disclaims reliance upon overburden epipedons--which are organically influenced horizons typically above the B horizon--in the restoration of native ecosystems, although he does not object to the presence of such epipedons in agricultural restoration. If sand were displaced by overburden in the area of the E horizon, the E horizon will be unable to contribute to the formation of the B horizon, as it must, especially after the comprehensive disturbance of all soil horizons contemplated at OFG.

609. Mr. Schuster's disclaimer bodes ill for the ERP provisions allowing overburden as an alternative to sand tailings for forested and herbaceous wetlands. However, Mr. Schuster's disdain for cast overburden near the surface is well-founded. His emphasis on drainage over soil horizons, including even overburden epipedons, may find support at Dogleg,

which, according to the CDA, suffered the loss of its 12-inch topsoil layer due to oxidization and was left with overburden of a "clayey sand" texture that may have been more permeable than typical, less permeable overburden. This loss appears to have taken place over sufficient time that other conditions may have commenced to form an A horizon. However, when adjacent mining ended and the water table re-established itself, the reclaimed trees began to survive.

610. Mr. Schuster accounts for the importance of pedogenesis, in addition to drainage characteristics, by identifying the topsoil/green manure, sand, and overburden as analogs of soil horizons. Certainly, the topsoil/green manure is a functional analog, and its thickness is not much of a variable. Sand tailings provide an appropriate texture for an A horizon. But the variability of the depths of sand tailings limits the force of Mr. Schuster's argument for functional analogs. For all wetland communities, overburden may occur at depths of only several inches, and, for pine flatwoods and palmetto prairies, overburden may occur at depths of 15 inches. Or sand tailings may be over 50 feet deep, atop a clay confining layer, not overburden.

611. Setting aside the problem with the variability of depths of sand tailings, it is possible to treat sand tailings as a functional E horizon, through which materials will leach

from the A horizon and into the B horizon, which is the zone of accumulation. However difficult it may be to cast the sand tailings in the role of a B horizon, it is impossible to cast them in the role of a C horizon. Ignoring the considerable amount of geologic material contained in cast overburden and possible textural issues, Mr. Schuster plausibly offers overburden as good B and C horizon material because of its higher clay or spodic content.

612. Thus, the apparent impairment of pedogenesis may not be as extensive as first appears, provided overburden remains below the A and E horizons. Still, mining and reclamation, at least as designed for OFG, mean the loss of some soil functions for extensive periods of time, but proper reclamation of drainage characteristics and hydrology sufficiently mitigate these losses of function.

613. Even Mr. Schuster's emphasis on drainage is not unconditional, as he relies on the application of topsoil or the implementation of a green-manure process to provide an immediate A horizon and accelerate the process by which the A horizon continues to form. Endorsed by Mr. Carter as a good idea to increase organic material and loosen the structure of the topsoil, green manure is the process by which a quick-growing cover crop is planted on the finished surface, post-reclamation. The crop is then disked into the soil to provide a quick

infusion of nitrogen and organic matter. This approach has not previously been used in reclamation following phosphate mining, but it has been used in other applications and is effective. Post-reclamation, fire too will pump nutrients into the A horizon.

614. Herbaceous wetlands, with their shallower roots, ought to be adequately served by Mr. Schuster's focus on the drainage characteristics of reclaimed soils.

615. Forested wetlands present a different challenge due to their deeper root systems. Past reclamation of forested wetlands has experienced tree loss after several years of growth, possibly indicative of a problem with root development beyond a certain depth. Perhaps the roots cannot penetrate the overburden or cannot find the necessary nourishment, after penetrating the overburden; however, it is at least as likely, given the record of reclamation, that the mitigation site suffered from a poorly reclaimed water table, so that, for example, the water table was too high for too long, perched, or even too low for too long.

616. Given the repeated problems with establishing appropriate water tables, post-reclamation, this factor looms as a likely explanation for tree die-off. However, Mr. Schuster's emphasis on drainage characteristics over pedogenic conditions carries more weight as to herbaceous wetlands and xeric

habitats, where sandy soils predominate to relative great depths, and somewhat less weight as to forested wetlands.

617. Mr. Schuster's emphasis on drainage over pedogenesis carries even less weight as to pine flatwoods and palmetto prairies, which are less tolerant to the disturbance of the spodic horizon in reclaimed soils. Obviously, overburden presents different textures and drainage characteristics than do native flatwoods soils. However, pine flatwoods and palmetto prairies are more dependent upon higher water tables than more xeric upland communities, so, again, past problems in reclaiming these upland communities again likely involve the failure to create an appropriate water table, post-reclamation.

618. Differences between Mr. Schuster and Mr. Carter were harder to reconcile regarding the role of pH in soil. Mr. Schuster and Mr. Carter reached different results in field tests of soil pH. However, Mr. Schuster's testimony is credited that most ecosystems tolerate a wide range of pH, and the most important soil characteristic remains its drainage characteristics.

3. Hydrology

a. Introduction

619. Removing and replacing the topography, soils, and geology, including the surficial aquifer, to a depth of 52 feet, under nearly 3500 acres of land necessitates hydrological

analysis. Hydrological analysis is necessary to support three sets of projections: the streamflows of Horse Creek, downstream of OFG, during mining and after reclamation; hydroperiods and inundation depths of reclaimed wetlands, as the wetlands created in the reclaimed topography and soils fill and empty with water based on inputs and outputs from runoff and groundwater, inputs from rainfall, and outputs from evapotranspiration; and peak discharges from OFG, during mining and after reclamation.

620. All hydrological analysis must account for the water budget, which balances the inputs and outputs of water. The elements of the water budget are rainfall, runoff, percolation (or infiltration), evapotranspiration, deep recharge (the recharge of the deeper aquifers), and groundwater outflow.

621. Rainfall is the most important factor because it is the sole means by which water enters the system. Equal to the total of the outputs, annual rainfall is a large number, typically measuring in this part of Florida in excess of 50 inches.

622. Rainfall is also a variable number in two respects. It varies from year to year. For the Peace River basin, annual rainfall from 1933 to 2002 has ranged from 35.89 inches to 74.5 inches with an average of 52.4 inches. However, rainfall in the Peace River basin has varied over eras. From 1933 to 1962, average annual rainfall was 55.48 inches. From 1962 to 2002,

average annual rainfall was 51.02 inches. For the Peace River basin, the average annual rainfall has decreased about 4 1/2 inches in the past four decades when compared to the preceding three decades. Especially over shorter time intervals, rainfall also varies considerably from location to location within a relatively small area.

623. Subject to these variabilities, especially the distance of the rainfall gauge to the location for which the water budget is constructed, rainfall is easily measured by rainfall gauges. Measurement means straightforward collection of data without elaborate modeling, calculation, or simulation.

624. After rainfall, the most important element in the water budget is evapotranspiration, which is the combined effect of evaporation of water from soil, plant surfaces, wetlands, and open water and transpiration of water through vegetative processes. In this part of Florida, evapotranspiration releases about 75 percent of the rainfall back into the atmosphere, which, by convention, counts as a loss to the system.

625. Unlike rainfall, evapotranspiration typically cannot be measured, except that the maximum evaporation, which is a pan containing water in the direct sun, is subject to direct measurement. Hydrologists have measured evapotranspiration from irrigated golf courses at 58-62 inches annually, and Dr. Garlanger has measured evapotranspiration from reclaimed

CSAs at 39-41 inches annually, although both of these measurements may have been somewhat indirect.

626. However, hydrologists widely recognize ranges of evapotranspiration for this part of Florida for different land uses. Annual rates of evapotranspiration for open water is 49-1 inches, for riparian wetlands is 47-49 inches, and for isolated wetlands is 43-44 inches. The annual evapotranspiration for pine flatwoods is 37-39 inches and for xeric uplands is 34-36 inches. Impervious surface, such as pavement or a roof, produces only 8-10 inches annually--absent weeds, all evaporation.

627. In addition to land use, the amount of water available controls the amount of evapotranspiration. Elevations of the water table will affect evapotranspiration. Thus, hydrologists often measure potential and actual evapotranspiration.

628. Anthropogenic impacts may increase or decrease evapotranspiration. Net additions of impervious surface, such as parking lots, roads, and rooftops, increase runoff and decrease evapotranspiration. Net additions of open water, such as lakes, ponds, and streams, decrease runoff and increase evapotranspiration.

629. At the other end of the spectrum, deep recharge removes very little water at OFG. Even during mining, when the

impacts would be greatest due to high withdrawals, the increase to deep recharge is 30-60 gallons per minute--insignificant as compared to the average recharge rate in the Peace River basin of 190,000 gallons per minute. In fact, according to RAI-192 in the CDA, rainfall, not deepwell water, is the primary source of water for the mine recirculation system.

630. Deep recharge is typically one inch annually, although Charlotte County hydrologist Phillip Davis, in one of his scenarios, claimed that 2.5 inches of water annually would enter the intermediate aquifer from the surficial aquifer. This range of values for deep recharge is within the specified ranges for most types of evapotranspiration. Deep recharge cannot be directly measured. The record does not suggest much variability in deep recharge, which is controlled by the elevation of the water table and potentiometric surface of the Florida Aquifer, in undisturbed geologic systems in this part of Florida. Although the replacement of part of the confining layer between the surficial and intermediate aquifers could affect deep recharge, the potential impact at OFG appears to be very small due to the permeability of the matrix layer and impermeability of the clay bed beneath it.

631. However, historic anthropogenic disturbances may have increased deep recharge. All groundwater withdrawals induce recharge, at least of the surficial aquifer. Withdrawals from

the deeper aquifers, such as those taken by the phosphate mining industry prior to expanded recycling, could have caused increased rates of deep recharge, depending on the confining layers above the Floridan Aquifer within the area influenced by the withdrawals. To the extent that the effect of these deep withdrawals extended to the surficial aquifer, evapotranspiration and streamflow would have been reduced.

632. Groundwater outflow has been measured in this area by Bill Lewelling of the U.S. Geologic Service. (Mr. Lewelling seems to have measured groundwater outflow indirectly by measuring chloride concentrations at different locations.) He found a range of 1.7-17.9 inches annually with an average of 9.2 inches annually. An important component of groundwater outflow, infiltration depends on soil type and antecedent saturation, so it is variable in terms of location and climate. However, it appears to vary within a relatively narrow range at OFG, pre-mining.

633. One combination of water-budget elements that may be measured easily is streamflow, which, as noted above, is a combination of the runoff and groundwater outflow reaching the stream. Streamflow equals rainfall minus evapotranspiration minus deep recharge minus the change in uplands storage. For the purposes of Dr. Garlanger's analysis, uplands are everything, including wetlands, above riparian wetlands, and

riparian wetlands are the area adjacent to a stream channel that remain perennially wet and are typically within the 25-year floodplain.

634. Streamflow is not variable like rainfall as to location because the river or stream is fixed and so is the location of the gauge, but streamflow is highly variable as to volume, even from year to year. For Horse Creek at State Road 64, for example, annual streamflow from 1977 to 2001 has averaged 9.7 inches, but has ranged from one inch to 17 inches.

635. For the Peace River at Arcadia, annual streamflow from 1950-1962 was 13.25 inches or 1334 cfs. From 1963 to 2002, average streamflow at the same location was 8.78 inches or 884 cfs. The SWFWMD has not yet set minimum flows and levels for the Peace River, but is presently in the process of setting these values.

636. In these cases, streamflow is most often calculated to compare a model's output in streamflow to measured values for the same period of time, to determine streamflow for locations without a streamflow gauge, or to determine streamflow for locations with a streamflow gauge, but after changes in land use, such as the construction of a ditch and berm system or post-mining reclamation.

637. Another combination of water-budget elements that can be measured, although with more difficulty than streamflow, is

the water table. Most water table data are fairly recent, dating from the early 1990s. Mr. Davis testified that the water table data available for OFG were the most limited that he had ever encountered.

638. Varying daily, the water table is the top of the surficial aquifer. The elevation of a non-perched water table, at any given time, is ultimately driven by all of the elements of the water budget, but is immediately reflective of surficial aquifer inputs and outputs and hydraulic conductivity.

639. Hydraulic conductivity is the ability of a porous medium to transmit a specific fluid under a unit hydraulic gradient, so it is highly dependent on the physical properties of the medium through which the fluid is transmitted. Although hydraulic conductivity exists in the horizontal and vertical planes, this Recommended Order considers only horizontal hydraulic conductivity.

640. Hydraulic conductivity is an important hydrological factor that can be measured, at least horizontally, although with difficulty. Hydraulic conductivity varies by location due to the variations in permeability of the geological structure through which the groundwater is passing. The hydraulic conductivity of sand tailings is about 38 feet per day, and the hydraulic conductivity of cast overburden is about one foot per day. Native soils are typically somewhere in between these two

extremes. In one area, the matrix, pre-mining, had a permeability of 5-15 feet per day.

641. IMC's assurances concerning streamflow, wetlands hydroperiod and inundation depths, and peak discharges must be assessed against three different backdrops. At one extreme, at least based on the present record, phosphate mining and reclamation, as distinguished from other phases of phosphate processing, have not caused adverse flooding; the sole example of flooding from a failed ditch and berm system--designed to meet more relaxed standards--occurred at the Kingsford Mine on January 1, 2003, and no serious environmental damage occurred. At the other extreme, reclamation after phosphate mining has routinely failed to reclaim targeted hydroperiods and inundation depths for shallower wetlands and many forested wetlands.

642. In between these two extremes, although closer, at least recently, to the industry's flooding experience, is streamflow. Historic impacts to the Peace River are considered below, but an example of the minimal impact on streamflow of recent mining is found in the last 15 years' mining of the upper reaches Horse Creek. During this period, the streamflow of Horse Creek at State Road 64 has remained unchanged. The record does not support Mr. Davis's suggestion that high volumes of groundwater pumping and high volumes of NPDES discharges artificially added streamflow during this period.

643. Resolution of the hydrological evidence in these cases requires close examination of the testimony of Dr. Garlanger, who addressed all three areas for IMC; Mr. Davis, who addressed streamflow and wetland hydroperiods and inundation depths for Charlotte County; and Mr. Loper, who addressed peak discharges for Charlotte County. All three of these witnesses are highly competent and patiently and thoroughly explained their hydrological analyses.

644. Mr. Loper proved adept at finding flaws in IMC's analyses of peak discharges. Dr. Garlanger and his staff several times refined their work, even during the hearing, to incorporate Mr. Loper's findings. Differences remained between Mr. Loper and Dr. Garlanger, and, although it is possible that Mr. Loper is correct on these remaining points, Dr. Garlanger successfully discounted the importance of Mr. Loper's objections in projecting peak discharges. Examining the evidence in the backdrop of a record almost devoid of failures that have resulted in flooding, it proved impossible not to credit Dr. Garlanger's assurances about peak discharges.

645. Mr. Davis was less successful in finding flaws in IMC's analysis of streamflow, or at least in finding material flaws. As detailed below, his theory attributing to phosphate mining a greater share of historic reductions in the streamflow of the Peace River seems less likely than Dr. Garlanger's theory

attributing a lesser share of these historic reductions to phosphate mining. Mr. Davis substituted an integrated simulation model for Dr. Garlanger's uplands model and spreadsheet. The advantages of Mr. Davis's model emerged to a greater extent in simulating wetlands hydroperiods and inundation depths, not in simulating streamflows. This is discussed in detail below.

646. The conflict between Mr. Davis and Dr. Garlanger over the ability to reclaim targeted hydroperiods and inundation depths has proved very difficult to resolve. Dr. Garlanger has vast experience in the phosphate mining industry and thus a clear advantage in projecting, as he has since 1974 at several hundreds of projects, peak discharges and streamflow. But this experience is no advantage as to projecting wetland hydroperiods and inundation depths. Dr. Garlanger did not state that he has projected hydroperiods and inundation depths for 30 years at several hundreds of projects. If he has done so, he has contributed to the numerous failures, described above, of reclaiming shallow wetlands. More likely, the phosphate mining industry has infrequently targeted shallow wetlands for reclamation, so Dr. Garlanger does not have extensive experience in creating the necessary hydroperiods and inundation depths for shallow wetlands.

647. The reclamation of specific hydroperiods and inundation depths for shallow wetlands is likely a fairly recent development, perhaps due to the relaxed restoration expectations of earlier eras or the inability of earthmoving equipment to execute fine specifications in finished topography. In the CDA discussion of Bay Swamp, noted above, the author admits that reclamation historically has not attempted to reclaim the kind of interface necessary between shallow wetlands and the water table to support bay swamps.

648. The parties' understandable, but unrealistic, pursuit of findings that all previous shallow-wetland reclamations of any size have failed or succeeded may have discouraged testimony candidly analyzing what hydrologists have learned from the limited successes and the many failures. Especially unfortunate is the omission of any discussion of the success of Dogleg, where, according to the CDA material, persistent replanting of trees over many years in soils with prominent, but perhaps atypically permeable, cast overburden profiles eventually succeeded, after the completion of nearby mining allowed the water table to reestablish itself. The record does not even indicate if Dogleg mining took place behind a ditch and berm system, nor does it adequately describe the texture of the overburden on which the topsoil rested.

649. In addition to different levels of confidence attaching to the demonstrated ability of the phosphate mining industry to avoid adverse flooding and significant reductions in streamflow, on the one hand, and the routine inability of the phosphate mining industry to re-create the hydroperiods and inundation depths required for shallow wetlands, another point of differentiation exists between Dr. Garlanger's streamflow projections and his hydroperiod and inundation depth projections. Although he uses the same uplands model and similar wetlands models for both tasks, certain characteristics of his relatively simple modeling do not work as well in projecting hydroperiods and inundation depths as they do in projecting streamflows.

650. Accurate projections of streamflow, at a discrete point downstream of the 4197 acres constituting OFG, are amenable to averaging, smoothing out input values, and substituting assumed values for calculated values. Accurate projections of hydroperiods and inundation depths require precise analysis of reclaimed wetlands--few over 10 acres, most less than a couple of acres--distributed over the 3477 acres of OFG to be mined. For each wetland, precision means daily accuracy to within a few inches of elevation of topography and water table and no more than a few feet of hydraulic conductivity.

651. Streamflow projections, which have worked in the recent past, will continue to work, whether each projection within an area is accurate or any errors within an analyzed area offset errors in other areas, so that, notwithstanding flow discharge curves, small discrepancies in projected streamflow average out over longer periods of time. Hydroperiod and inundation depth projections, which may have been attempted, if at all, only rarely in the past, must be accurate over very small areas for very specific time intervals. Also, streamflow projections are less sensitive to misallocations between runoff and groundwater flow than are projections of shallow wetland hydroperiod and inundation depth.

652. The record suggests that reclaiming short wetland hydroperiods and shallow inundation depths places new and more difficult demands upon the phosphate mining industry and its reclamation scientists. Although long accustomed to producing projects that did not flood and at least recently accustomed to producing projects that did not reduce streamflow, the phosphate mining industry and its reclamation scientists are only now acclimating to newer regulatory expectations that they produce projects that reliably reclaim shallow wetlands by re-creating functional relationships between these wetland systems and surface runoff and groundwater flow.

b. Streamflow

653. Streamflow in Horse Creek downstream of OFG and the Peace River is reduced during mining because the ditch and berm system captures all of the runoff, at least up to the capacity of the ditch and berm system. The ditch and berm system is designed to handle the 25-year, 24-hour storm event, although additional, unspecified freeboard is built into the system.

654. The capacity of the ditch and berm system may be exceeded by more intense storms or perhaps even lesser storms, unless the 25-year storm design accounts for antecedent water levels, which may be higher in systems with recharge wells than in systems without the recharge wells. In any event in which the capacity of the ditch and berm system is exceeded, IMC pumps the water through the mine recirculation system and releases it through one of two NPDES outfalls upstream at Horse Creek.

655. Because the ditch and berm system captures all of the runoff, under normal conditions, the reduction in streamflow after reclamation is generally less than the reduction in streamflow during mining. The removal of the ditch and berm system allows runoff again to contribute to streamflow.

656. To analyze the impacts upon streamflow, Dr. Garlanger first performed a simplified water budget analysis at three locations: Horse Creek at State Road 72 (near Arcadia), the Peace River at Ft. Ogden (where the Authority withdraws its raw

water--downstream of the confluence of Horse Creek and the Peace River), and the point at which the Peace River empties into Charlotte Harbor. Although Dr. Garlanger used uplands exclusively for this simplified exercise in constructing a conceptual water budget, adding the riparian wetlands would not substantially change the result because the wetlands runoff and evapotranspiration would be higher, but the wetlands groundwater outflow would be lower. Either way, Dr. Garlanger's analysis, which is sometimes called an analytic model, was merely a prelude to more sophisticated modeling.

657. For his during-mining analysis, Dr. Garlanger assumed that the ditch and berm system would capture all the runoff from the 5.4 square miles of the Horse Creek sub-basin behind the ditch and berm system. In sequential mining, the ditch and berm system would not capture all of the 5.4 square miles at once. But, assuming the worst-case scenario, Dr. Garlanger assumed the capture of the runoff from entire sub-basin for a period of 25 years.

658. Initially, Dr. Garlanger also assumed that the ditch and berm system would likewise not release any base flow. This is an unrealistic scenario because, as noted above, one of the two purposes of the ditch and berm system is to permit base flow into wetlands and streams. Later, Dr. Garlanger alternatively assumed that the ditch and berm system would release all of the

base flow. If the ditch and berm system is equipped with recharge wells, it is reasonable to expect that the system will release all of the base flow.

659. Calculating that the Horse Creek sub-basin upstream of State Road 64 is 39.5 square miles, Dr. Garlanger divided the average streamflow of 29.1 cfs at State Road 64 by the area of the sub-basin and determined that each square mile contributed 0.74 cfs of streamflow. Multiplying this number by the 5.4 miles captured by the ditch and berm system, Dr. Garlanger determined that, during mining, the ditch and berm system would reduce streamflow by 4 cfs, if it removed all base flow (and runoff). This very worst-case scenario would generate the following reductions in streamflow: in Horse Creek at State Road 72, 2.3 percent; in the Peace River at Ft. Ogden, 0.3 percent; and in the Peace River at Charlotte Harbor, 0.2 percent.

660. Dr. Garlanger then calculated the reduction in streamflow in the probable scenario in which the ditch and berm system, with recharge wells, operates properly and releases the base flow, while still retaining all the runoff. Relying principally upon Mr. Lewelling's report on groundwater outflow in various locations within the Horse Creek sub-basin, Dr. Garlanger calculated that the capture rate would decrease from 0.74 cfs per square mile to 0.28 cfs per square mile.

661. Applying a capture rate of 0.28 cfs per square mile times 5.4 miles, the reduction in streamflow, during mining, is more realistically 1.5 cfs. This means that, under the simplified analytic model, the ditch and berm system would reduce streamflow in Horse Creek at State Road 72 by less than one percent, in the Peace River at Ft. Ogden by .13 percent, and in the Peace River at Charlotte Harbor by .09 percent. These figures would represent the same reduction in streamflow caused by a decrease in average annual rainfall of 0.01 inches.

662. Although, as discussed below, Dr. Garlanger also undertook more sophisticated modeling of streamflow during mining, this is a good point at which to address three of Mr. Davis's objections to Dr. Garlanger's during-mining analysis because these objections are more conceptual in nature and are not directed to Dr. Garlanger's model. Mr. Davis contended that the unmined wetlands would become dehydrated because: 1) the ditch and berm system would deprive them of surface flow or runoff from the areas behind the ditch and berm system; 2) the ditch and berm system would deprive them of adequate base flow or groundwater; and 3) water in the ditch would be lost to evapotranspiration.

663. These objections are more applicable to a ditch and berm system without recharge wells. If the only source of water to rehydrate the wetlands is the groundwater running into the

mine and rainfall directly on the area behind the berm, the loss of runoff into the area behind the berm and the loss of water to increased evaporation would require additional analysis to assure that adequate water remained to recharge the downstream wetlands through groundwater inputs. However, the recharge wells add additional water, probably from the deeper aquifers, so that adequate water can be supplied the downstream wetlands through groundwater inputs. To the extent that intercepted surface flow reduces water levels in the unmined wetlands, IMC can offset this loss by pumping more water into the ditch and increasing groundwater inputs into these wetlands. Mr. Davis's additional objection about additional evapotranspiration from the riparian wetlands assumes the condition that he claims will not occur--adequate hydration of the riparian wetlands--so it is impossible to credit this concern.

664. Dr. Garlanger next analyzed streamflow by applying a simulation model. More sophisticated than the analytic model discussed in the preceding paragraphs, the uplands portion of this modeling also aided Dr. Garlanger's analysis of the hydroperiods and inundation depths of the wetlands in the no-mine area and the reclaimed wetlands, which are discussed in the next subsection. Dr. Garlanger's simulation model calculates site-specific groundwater outflows based on day-to-day hydrological conditions. Unlike the analytic model, which

examined the effect on streamflow only during mining, the simulation model determines streamflow contributions from OFG without any mining disturbance for a 25-year period into the future, during mining, and after reclamation for the same 25-year period used in the no-mining analysis.

665. The modeling proceeded in two stages. First, Dr. Garlanger modeled uplands. Then, inserting the groundwater and runoff outputs from the uplands model into a streamflow model, Dr. Garlanger modeled the riparian system to determine its contributions to streamflow at a point just downstream of OFG. Thus, rainfall is the only addition of water into the uplands system, but rainfall, groundwater outflow from the uplands into the riparian wetlands, and runoff from the uplands into the riparian wetlands are the additions of water into the riparian system.

666. The uplands model is the Hydrological Evaluation of Landfill Performance (HELP) model. Developed for use in analyzing groundwater movement in landfills, HELP generally calculates groundwater outflow based on the hydraulic conductivity of the surficial aquifer divided by the square of the distance from the riparian wetland to the basin divide.

667. In 2001, Dr. Garlanger modified the HELP model (HELPm). The modification multiplies the output from HELP by the square of the maximum height of the water table above the

confining layer at the basin divide minus the square of the minimum height of the water table above the confining layer at the riparian wetlands. The only variable in HELPm is the maximum height of the water table above the confining layer; all other values, including those set forth above for HELP, are fixed.

668. The modification improved the HELP model by allowing Dr. Garlanger, among other things, to reduce the extent to which the model is constrained by enabling him to input more realistic hydraulic conductivities. Using HELP, unmodified, Dr. Garlanger had had to input unrealistically high values for hydraulic conductivity.

669. Hydraulic conductivity is either measured in the field or assumed. To simulate OFG without any mining for 25 years into the future, Dr. Garlanger had to obtain an input for hydraulic conductivity. Based on collected data from near the Panhandle as to daily fluctuations in the water table over a two-year period and sub-surface soil composition, as well as other information, Dr. Garlanger determined an average weighted hydraulic conductivity for OFG, pre-mining, of 19 feet per day with a low of 10 feet per day. Dr. Garlanger settled on an initial average weighted hydraulic conductivity of 15 feet per day for the surficial aquifer, but also identified a low-end average of 10 feet per day.

670. As noted above, the contribution of an area of land to streamflow is dependent upon rainfall, evapotranspiration, deep recharge, and the change in storage, which is driven by the elevation of the water table (i.e., the top of the surficial aquifer) as it changes from day to day. Focusing on the vertical components of the water budget, HELPm calculates daily changes in storage, based on water table levels, so as to permit projections of runoff and groundwater outflow from the uplands.

671. For rainfall, Dr. Garlanger relied upon the records of the Wauchula gauge, which is about 10 miles northeast from OFG. Rainfall data for this gauge go back to 1933, although to supplement some missing months, Dr. Garlanger relied on the Ft. Green gauge, which is closer to OFG, but does not go as far back as the Wauchula gauge. To supplement this information on the volume of rainfall, Dr. Garlanger added inputs on the frequency and rate of rainfall.

672. For this calculation, Dr. Garlanger only used rainfall data for the period from 1978 to 2002 because the U.S. Geologic Service has collected streamflow data for Horse Creek at State Road 64 only as far back as 1978. Similar streamflow data for Horse Creek downstream at State Road 72 and for the Peace River go further back. Dr. Garlanger selected this timeframe so he could compare the model output of predicted streamflow to actual streamflow.

673. HELPm calculates evapotranspiration, typically the largest source of water loss, on a daily basis. Dr. Garlanger calibrated evapotranspiration in his simulation by comparing HELPm calculations against average annual values for evapotranspiration for riparian wetlands, uplands, and wetlands in uplands, so as to permit the calculation of an average value of evapotranspiration for the Horse Creek basin above State Road 64. Calibration is the process by which a hydrologist modifies the data inputs to the model based on measured data in order to produce a better match between observed and predicted data.

674. Using generally accepted evapotranspiration values and the standard water-budget formula, Dr. Garlanger calculated average annual evapotranspiration for the Horse Creek basin above State Road 64 of 40.3 inches. He determined the following annual average evapotranspiration rates: riparian wetlands--47.5 inches; depressional wetlands--44 inches; seepage wetlands--47.5 inches; well-drained uplands--34.5 inches; and other uplands--39 inches. Using this information, Dr. Garlanger then found the appropriate average annual evapotranspiration for the OFG uplands that he was modeling, and he reran the model five or six times until it produced outputs for uplands evapotranspiration consistent with this value.

675. For uplands runoff, Dr. Garlanger turned to a well-recognized methodology for estimating the storage available in

the uppermost foot of soil, as infiltration is an important factor in determining runoff. For groundwater outflow, Dr. Garlanger uses the one available equation, which is derived from Darcy's Law.

676. Dr. Garlanger then ran his model for the no-mining, during-mining, and after-reclamation options, and he validated the model. In validation, the hydrologist confirms the model's outputs to measured data. In these exercises, Dr. Garlanger compared the predicted groundwater outflows with the empirical values published by Mr. Lewelling and predicted groundwater levels with those measured by IMC near the Panhandle.

677. Dr. Garlanger ran the model with hydraulic conductivities of 10-15 feet per day and drainage times of 5-12 days. He eventually settled on an average hydraulic conductivity of 10 feet per day and an average drainage time of 12 days. Using these values, Dr. Garlanger validated his output by projecting streamflow from the entire 39.5-square mile area upstream of State Road 64, for which data exist. He found that the model produced a reasonable prediction of the flow duration curve.

678. Dr. Garlanger then validated the output by comparing predicted and measured cumulative streamflow from 1978 through 1987, during which time mining in the Horse Creek basin was insignificant. He found a very good matchup between actual data

and his model's predictions. Validating the output for average daily and average annual streamflow against actual data, Dr. Garlanger again found that the model performed acceptably.

679. Dr. Garlanger then was prepared to model the 5.4 square-mile area for impact on Horse Creek streamflow at State Road 64 for 25 years without mining, during mining, and for 25 years after reclamation. For during-mining conditions, Dr. Garlanger assumed that the ditch and berm system would capture all of the runoff and none of the groundwater.

680. For post-reclamation conditions, Dr. Garlanger assumed that the cast overburden spoil piles would be parallel to the flow of groundwater or, where that is not practicable, that the top of the spoil piles would be shaved by progressive amounts, ranging from five feet at the groundwater (or basin) divide progressively to 15 feet at the riparian wetland. This is vital to his calculations because of the vast difference in hydraulic conductivity of cast overburden spoil piles as compared to sand tailings. When oriented perpendicular to groundwater flow and unshaved, these spoil piles would act as underground dams, blocking the flow of groundwater.

681. Dr. Garlanger modeled streamflow, in Horse Creek at State Road 64, which is just downstream of the confluence of Horse Creek and West Fork Horse Creek, under two scenarios: hydraulic conductivity of ten feet per day and drainage time of

12 days and hydraulic conductivity of fifteen feet per day and drainage time of five days. For post-reclamation hydraulic conductivity, Dr. Garlanger used 12 feet per day.

682. With the higher streamflow reductions resulting from the lower hydraulic conductivities, Dr. Garlanger projected streamflow reductions, during mining, from 1.07-2.41 cfs and, after reclamation, from 0.10-0.14 cfs. These are average annual values.

683. Generating a flow duration curve for Horse Creek at State Road 64 and using the more adverse data from the lower hydraulic conductivity value, Dr. Garlanger found a slight decrease, during mining, in flow during low-flow conditions, reflecting the mining of the Panhandle tributaries that contributed to groundwater outflow. Generating a stage duration curve, to depict the elevation of the water in the stream during the low-flow condition, Dr. Garlanger demonstrated that the difference is about three inches.

684. After reclamation, as compared to pre-mining conditions, Dr. Garlanger determined that the average flow is decreased by 0.1 cfs, probably due to increased evapotranspiration from the additional reclaimed wetlands. This generates no discernible difference in the two flow duration curves for Horse Creek at State Road 64.

685. Dr. Garlanger thus reasonably concluded that mining would not adversely affect the flow of Horse Creek at State Road 64 or dehydrate wetlands in the no-mine area. He concluded that, after reclamation, the impact would be de minimis as a decrease of 0.1 cfs is beyond the ability to measure flows.

686. Farther downstream, at State Road 72, which is downstream of the confluence of Brushy Creek and Horse Creek, Dr. Garlanger calculated projected streamflow reductions, during mining, from 1.2-2.8 cfs and, after reclamation, from 0.12-0.16 cfs, which are too small to measure. Likewise, there are no discernible differences in the flow duration curves at State Road 72.

687. Downstream of the confluence of Horse Creek and the Peace River, at Ft. Ogden, Dr. Garlanger calculated that the reduction in streamflow caused by mining at OFG would be equivalent to the reduction caused by a decrease of 0.01 inches of rainfall in the Peace River basin.

688. Mr. Davis voiced many objections to Dr. Garlanger's streamflow calculations based on his reliance on HELPm. These objections are addressed at the end of the next section.

689. Mr. Davis also voiced objections to Dr. Garlanger's calculations based on his understatement of the impact of phosphate mining on streamflow. As already noted, Dr. Garlanger made the better case on this issue.

690. Distinguishing between the two rainfall eras in the Peace River basin--1933-1962 and 1969-1998--Dr. Garlanger reported that the measured average streamflow of the Peace River in the latter era was about 4.33 inches lower than the average streamflow of the Peace River in the former era. Finding that decreased average rainfall reduced streamflow by 3.75 inches per year, Dr. Garlanger calculates that the remaining 0.58 inches per year reduction in streamflow was largely due to an increase in deep recharge from 3.37 inches annually in the earlier era to 6.3 inches annually in the latter era.

691. Anthropogenic changes in the Peace River basin have had opposing effects on streamflow. Urbanization, which causes increases in impervious surface, have increased runoff at the expense of evapotranspiration, thus increasing streamflow--although certain demands of urbanization, such as groundwater pumping for potable water and industrial uses, will increase deep recharge, thus decreasing streamflow. Groundwater withdrawals by agriculture, industrial, utilities, and phosphate mining, net of the returns of these waters, have increased deep recharge, which, as just noted, decreases streamflow. Historically, phosphate mining's profligate use of deep groundwater also released much of the water back to streamflow, although the industry's historic predilection for Land-and-Lakes

reclamation increased evapotranspiration and thus reduced streamflow.

692. Converting inches of streamflow to cfs, Dr. Garlanger makes a good case that the streamflow of the Peace River is down about 500 cfs, mostly due to reduced rainfall amounts. About 50 cfs of that reduction is due to anthropogenic effects, and 5-15 cfs of man-caused reductions in the streamflow of the Peace River are due to phosphate mining.

693. By contrast, Mr. Davis unconvincingly attributed a three-inch reduction in streamflow at the South Prong Alafia River to phosphate mining. This reduction in streamflow may be explained by Mr. Davis's failure to apply a lower and more reasonable streamflow assumption, absent mining; a lower and more likely rainfall amount; and a higher and more likely evapotranspiration rate.

c. Wetland Hydroperiods and Inundation Depths

694. In making his groundwater calculations, Dr. Garlanger attempted to predict the behavior of the surficial aquifer, post-reclamation, and the ability of runoff and the water table to support the hydroperiods and inundation depths of the wetlands in the no-mine area and reclaimed wetlands. For this phase of his hydrological work, Dr. Garlanger again used the HELPm for the uplands and a long-term simulation model for the depressional wetlands in the uplands. The long-term simulation

model is very similar to the streamflow model used for the riparian-wetland component of the streamflow modeling.

695. Notwithstanding the replacement of the present geology with its more limited vertical permeability with wide bands of sand tailings down to the clay confining layer, Dr. Garlanger believes that deep recharge will remain unchanged by mining and reclamation because groundwater levels will return to their pre-mining elevations.

696. To analyze the ability of the post-reclamation water table to support the reclaimed wetlands, Dr. Garlanger took 12 wetland cross-sections and projected fluctuations in water table and hydroperiod. These are presumably the 13 wetland complexes identified in Figure 13-3, described above.

697. Dr. Garlanger testified about one modeled reclaimed wetland in detail--a freshwater marsh fringed by a wet prairie. This is E046/E047, which is a combined 16.1-acre wetland that is upgradient from E048, which is six-acre mixed wetland hardwoods that will replace the east half of a bay swamp (G166) and mixed wetland hardwoods fringes (G166B and G166C).

698. Dr. Garlanger performs an iterative process based on a post-reclamation topographic map that starts with substantially pre-mining topography. Identifying the HELPm inputs, Dr. Garlanger takes the length of the upland to the riparian system and the assumed hydraulic conductivity based on

the relative depths of sand tailings and cast overburden, and he then runs HELPm to determine the daily upland runoff and groundwater outflow. Dr. Garlanger then calculates the maximum height of the water table above the confining layer at any point downgradient from the basin divide to the riparian wetland.

699. To input hydraulic conductivity, Dr. Garlanger testified that he obtains a value "based on the spoil piles and the depth that the spoil pile will be cut down to adjacent to the preserved area." (Tr, p. 2993)

700. Applying the output to a wetlands model that is similar to the streamflow model, Dr. Garlanger then engages in an iterative process in which he adjusts and readjusts the post-reclamation topography to produce the proper elevation of the bottom of each modeled wetland for the hydroperiod that is stipulated for the vegetative community to be created in that location. Besides changing the bottom slope of each seepage wetland, the major adjustments for each wetland are narrowing its outlet or lowering its bottom elevation to extend its hydroperiod and deepen its inundation depth or broadening its outlet or raising its bottom elevation to shorten its hydroperiod and make its bottom elevation more shallow.

701. Dr. Garlanger modeled the iterative process by continuing it late into the hearing, as he and IMC surveyor, Ted Smith, produced a "final" post-reclamation topographic map at

the end of the hearing. Actually, even this map is not final, as Dr. Garlanger testified that he and Mr. Smith will produce the final topographic map, for wetlands, after the area is mined, photographed, backfilled, and graded, at which time they will know the location and direction of the cast overburden spoil piles. Dr. Garlanger will then use a calibrated model to account for actual in situ conditions. Due to the flatness of OFG, it is possible, even at this late stage, to regrade the sand tailings, if necessary for hydrological purposes.

702. Monitoring wells will produce substantial data on the hydraulic conductivity of the no-mine area, as well as the hydroperiods of existing wetlands and the frequency with which seepage wetlands release water. Dr. Garlanger and IMC employees will also measure the hydraulic conductivity of the sand tailings and overburden in the reclaimed areas, also to assist their preparation of the final topographic map.

703. As noted above, ERP Specific Condition 16.B.2 requires IMC to model 24 reclaimed wetlands to demonstrate successful water table re-creation and hydroperiod and inundation depth reclamation. Dr. Garlanger applied his models to confirm that, for each of the 24 modeled wetlands, the design topography and hydrology would produce the targeted hydroperiod and inundation depth.

704. Mr. Davis modeled three reclaimed bay swamps. Bay swamps are the hardest wetlands for which to reclaim an appropriate water table due to their long hydroperiod, shallow inundation depths, and seepage characteristics. As noted above, no successful reclamation of bay swamps has ever taken place, except under circumstances inapplicable to OFG.

705. The three reclaimed bay swamps are: E008, a 0.7-acre bay swamp abutting the west side of the Stream 1e series; E063, a 1.3-acre flow-through bay swamp in Stream 5e; and W039, an 11.2-acre bayhead from which Stream 1w will flow. W039 is a very large reclaimed wetland. After the 20.7-acre wet prairie (W003) to be reclaimed at the headwaters of Stream 9w and the 23.8-acre mixed wetland hardwoods (E003) lining the Stream 1e series, W039 is the largest reclaimed wetland at OFG, along with E018/E020, which are the isolated wet prairie fringe and freshwater marsh on the east side of Section 4.

706. Mr. Davis testified as a witness in surrebuttal, which was necessitated by a late change by IMC in post-reclamation topography for these three bay swamps. Mr. Davis implied that he understood these three bay swamps better than he did the other reclaimed wetland systems. The fact is that he did understand these three reclaimed bay swamps better than he did any other reclaimed wetlands. Prior to testifying, at the order of the Administrative Law Judge, Mr. Davis and

Dr. Garlanger conferred so that Mr. Davis, in preparing to respond to the "final" post-reclamation topography, would clarify any uncertainty about how Dr. Garlanger was modeling these wetlands and projecting their hydroperiods and inundation depths.

707. Mr. Davis identified Dr. Garlanger's topographical changes to these three bay swamps. For E008, Dr. Garlanger lowered the west end of the wetland by 0.5 feet, extended a 114-foot contour up the channel, just east of an existing 115-foot contour, and possibly adjusted the slope. For E063, Dr. Garlanger lowered the bottom elevation by one foot, so that it can now store 0.3 feet of water, given its overflow popoff elevation. And for W039, Dr. Garlanger removed a slope and flattened the bottom, so that it can store 0.3 feet of water.

708. From Dr. Garlanger's spreadsheets, Mr. Davis found the values for runoff, groundwater, and rainfall entering each wetland.

709. Mr. Davis found that E008 received only 10 percent of its water from runoff, more of its water from rainfall, but most of its water from groundwater inflow. Noting that E008 abuts a reclaimed xeric area, Mr. Davis recalled a 6:1 ratio of groundwater inflow to runoff inflow. Mr. Davis explained that E008 loses most of its water to runoff. Mr. Davis found that the groundwater input for this wetland was consistent with the

testimony of biologists, such as Deputy Director Cantrell, that bay swamps are primarily groundwater-driven systems, but questioned the absence of groundwater outflow to the adjacent, down-gradient riparian wetland (E003).

710. For E063, however, Mr. Davis found that inputs from runoff, a more important source of water for this wetland, were about the same as inputs from groundwater. Although he did not testify to this fact, E063 is an unusual reclaimed bay swamp because it is the only one that will serve as a flow-through wetland, situated, as it is, in the middle of Stream 5e. This would seem to explain the larger role of surface water inputs than is typical of bay swamps adjacent to uplands.

711. For W039, Mr. Davis found a small percentage of surface water and larger percentages of groundwater and rainfall as water sources for this wetland. Rainfall inputs would be greater due to the large area of the wetland, according to Mr. Davis. As a headwater wetland abutting uplands, W039 would be expected to have a higher input ratio, than E063, of water from groundwater versus runoff. Mr. Davis noted that W039 lost about half of its water to evapotranspiration, which would also make sense given its large surface area, and half to runoff, which would make sense given its status as a headwater wetland for Stream 1w.

712. Mr. Davis then ran his MIKE SHE model to predict the hydroperiod for each wetland. This model is described in more detail at the end of this subsection. In simulating the hydrology of the reclaimed OFG, Mr. Davis assumed that the overburden spoil piles would be parallel to the direction of groundwater flow and eliminated any differential depressional storage, but he continued to assume two inches of depressional storage. (These assumptions are also discussed in connection with the MIKE SHE model.)

713. Mr. Davis found that the 11.2-acre W039 will have a perfect hydroperiod. Its inundation hydroperiod will range from 8.6 months to 11.0 months, from bottom to top. Its saturation hydroperiod, which is water measured to a depth of 0.5 foot below the bottom of the wetland, will range from 8.8 months to 11.1 months, from bottom to top. Mr. Davis found that the 1.3-acre E063 will have a hydroperiod of 11.9 months, which is 0.9 months too long. Mr. Davis found that the 0.7-acre E008 will have a hydroperiod of 2.7 months for inundation and 4.6 months for saturation, which is about four months too short.

714. Crediting Mr. Davis's testimony, IMC's successful reclamation of an 11.2-acre bay swamp, dependent upon upland surface water and groundwater inputs, would be an unprecedented success. As discussed below, Mr. Davis's depressional assumption is not credited, so the hydroperiod of E063 would be

shorter than the 11.9 months that he has calculated. Also, this reclaimed system will be a seepage system that would not permit the build-up of much standing water, so, even crediting Mr. Davis's calculations, Dr. Garlanger has achieved the proper hydrology for its reclamation too.

715. It is more difficult to resolve the conflict in simulated hydroperiods for E008. E008 is a more complicated wetland to model because it is part of a reclaimed complex consisting of nine reclaimed wetlands. No other wetland complex to be reclaimed at OFG approaches this number of different communities in a single complex. Except for E018, which, although 30.7 acres, is a much simpler wetland system because it is an isolated complex of three wetlands, no other wetland complex to be reclaimed at OFG comes close to the area of the Stream 1e series' wetlands complex, which totals 35.1 acres, or over 10 percent of the wetlands to be reclaimed at OFG. Mr. Davis's unjustified depressional assumption generates excessively wet conditions, but, for E008, he found its hydroperiod to be too short by at least 3.4 months. And, of course, E008 is the difficult-to-reclaim bay swamp.

716. The two models invite comparisons at this point. Mr. Davis's model, MIKE SHE, enjoys wide usage for calculating streamflows, hydroperiods, and inundation depths, as it has been used in these cases. MIKE SHE has been used successfully in

large-scale settings. On the other hand, HELP was designed for calculating water levels in landfills. For calculating the uplands component of streamflow and hydroperiod, HELPm is used by Dr. Garlanger alone. The author of HELP's routine for lateral drainage and the subroutine for unsaturated vertical flow, Bruce McEnroe, pointed out that this model could accommodate only a regular, homogenous drainage layer, as would be found in a landfill, and could not accommodate the irregular, heterogeneous aquifer layer, which Dr. Garlanger was modeling. Mr. McEnroe also explained that the downstream boundary condition of HELP, which is free drainage, does not resemble the actual downstream boundary condition, in which groundwater cannot typically drain freely, and this limitation applies equally to the pre-mining and post-reclamation scenarios.

717. Mr. McEnroe also found a mathematical error, but Dr. Garlanger later showed that it would alter results inconsequentially. Complaining about Dr. Garlanger's failure to provide comment lines in his source code, where he modified HELP, Mr. McEnroe emphasized that the model, as modified and used by Dr. Garlanger, really was no longer the HELP model.

718. Counterposed to Mr. McEnroe's testimony was the testimony of Mark Ross, an associate professor of civil and environmental engineering at the University of South Florida College of Engineering. Professor Ross has 20 years' experience

in hydrological modeling and has worked with the Florida Institute of Phosphate Research model that Mr. Davis helped develop, but which no longer is supported or in much use. Professor Ross conducted a peer review of the HELPm model, spending 20-30 hours in the process, exclusive of time spent discussing the model with Dr. Garlanger.

719. Professor Ross endorsed Dr. Garlanger's use of a single value of .75 for evapotranspiration in riparian wetlands and his use of a weighted hydraulic conductivity. Professor Ross acknowledged that more complex models were available, but correctly opined that the simplest model was best if it could accommodate all of the available data. Although the emphasis in his testimony was on streamflow, Professor Ross addressed wetlands and their hydroperiods sufficiently to assure that his opinion of the sufficiency of the HELPm model covered both tasks.

720. The interplay between the complexity of the model and availability of data emerged more clearly with the testimony of Authority hydrologist Henrik Sorensen, who developed code for the MIKE SHE model. Successful applications of this model range from the Danube River to Kuala Lampur to South Florida. The Danube River project was the construction of a dam, and hydrologists ran MIKE SHE to project the impact of the diverted streamflow on riparian wetlands. The Kuala Lampur project was

the construction of a new city, and hydrologists ran MIKE SHE to project the impact of vastly changing land uses on the water level in the peat wetlands. South Florida projects have included a number of analyses of wetlands impacts of proposed activities. At Lake Tohopekaliga, hydrologists used MIKE SHE to project the effects on the water table and nearby wetlands of a 6-7 foot drawdown of the lake to remove muck.

721. Unlike HELPm, MIKE SHE is an integrated model, meaning that all of its components are contained in a single model. Significant for present purposes, MIKE SHE integrates surface water and groundwater analysis in a single model, so as to facilitate the modeling of the interaction between a stream and surficial aquifer. This is especially important for simulating interactions between the surface and shallow water tables.

722. MIKE SHE is a physically based model, meaning that it is based on equations derived from the laws of nature. In using HELPm and the spreadsheet models for streamflow and hydroperiod, Dr. Garlanger of course relies on laws of nature, but also relies on conceptualizations to link equation-driven outputs. As Mr. Sorensen explained, MIKE SHE is based on differential equations, so that it is dynamic as to time and space, but Dr. Garlanger's models are based on analytic equations, so they are limited to state-to-state solutions. The conceptualizations

that link outputs and essentially integrate Dr. Garlanger's pairs of models are only as good as the conceptualizer, who, in the case of Dr. Garlanger, is very good, but conceptualizations can become so pervasive that the model loses its reliability and adds little or nothing to a conceptual exercise using an analytic model.

723. Unlike MIKE SHE, HELPm is a lump-parameter model, which necessitates the input of average hydraulic conductivities, evapotranspiration rates, and leaf area indexes over relatively large areas and, in the case of evapotranspiration rates, sometimes at the expense of their calculation. Constraining a model, by inputting, rather than calculating, values to force results within an expected range, may resemble validation, but when the inputs become unrealistic, as Dr. Garlanger's hydraulic conductivity values were before he modified HELP, the model's credibility is impaired, not enhanced, by the process. Conceptualizations can eventually constrain modeled simulations so as to undermine confidence in the model's outputs.

724. Unlike HELPm, MIKE SHE is spatially distributed, so that different land use types may be distributed throughout the model. HELPm may input different land uses for different basins, but MIKE SHE allows the user to input different land uses for different cells, each of the user's choice as to size.

725. As noted by Mr. McEnroe, HELP was developed to simulate a shallow system running to a drain, and it remains well-suited for this task. In tracking the water table, HELPm assumes a constant thickness of the drainage layer, which reflects the design of landfills, not natural systems. As IMC contends, the post-reclamation geology will be far simpler than the pre-mining geology at OFG, but even the post-reclamation hydrology is far more complex than that of a landfill.

726. With a 35:1 ratio of hydraulic conductivities, the surficial aquifer must negotiate the 330-foot wide valleys of sand tailings separated from 180-foot wide plateaus by 33-degree overburden slopes. Overburden peaks would have been simpler than overburden plateaus because the effective depth of sand tailings would have been at least five feet over nearly all of the mined area; as already noted, these overburden plateaus mean that, exclusive of shavings and toppings, overburden at less than five feet finished depth occupies about 28 percent of the surface of the mined area. This geology is much more complicated than the uniform geology of a landfill, especially when trying to project the surface water and groundwater inputs and outputs of shallow wetlands and streams, some of which will span several phases of this unusual geology.

727. Unlike HELPm, MIKE SHE is used for its designed purpose when used for projecting streamflow and wetlands

hydroperiods and inundation depths. It is widely used, peer-reviewed and supported with two or three updates annually.

728. Mr. Sorensen made an interesting point when he opined that HELPm does a good job with average flows. This explains HELPm's reliability in calculating streamflows. Notwithstanding the calculation of peak discharge curves, accurate streamflow calculations--at least in this part of Florida--tolerate calculations based on average conditions and approximations much better than do accurate calculations of hydroperiod and inundation depths, especially concerning shallow wetlands in wetland complexes.

729. MIKE SHE is not without its shortcomings, at least as applied in these cases. For his MIKE SHE simulation, Mr. Davis did not simulate first- and second-order streams, perched groundwater flow (i.e., interflow), or shallow concentrated overland flow, and, despite the model's sophistication, he still had to perform conceptualizations, such as of drainage.

730. Mr. Davis's first two post-reclamation runs, prior to his final run of the three bay swamps, suffered from faulty assumptions. First, he assumed depressions and differential depressions based on a settling that Dr. Garlanger, with geotechnical engineering experience that Mr. Davis lacks, testified convincingly would not occur. Second, Mr. Davis

assumed that the spoil piles would be oriented perpendicular to the direction of groundwater flow.

731. Mr. Davis likely knew that IMC had agreed on December 23, 2003, to orient the mine cuts parallel to the direction of groundwater flow, to the extent practicable. Mr. Davis modeled the perpendicular scenario presumably due to the vagueness of the assurance, set forth only in the introduction to the January submittal, and thus unenforceable, that IMC would grade or shave the tops of overburden plateaus of spoil piles running perpendicular to groundflow. When performing his modeling, Mr. Davis could not have known of Dr. Garlanger's recommendation, as contained in a letter dated April 29, 2004--less than two weeks prior to the start of the final hearing--that IMC shave 5-15 feet off any perpendicular cast overburden spoil piles or that IMC would accept Dr. Garlanger's recommendation during the final hearing.

732. As agreed to by IMC during the hearing, it will bulldoze any spoil piles oriented perpendicular to the direction of groundwater flow from 5-15 feet: the cut would allow five feet of sand tailings nearest the groundwater divide and would progressively deepen to allow 15 feet of sand tailings nearest the stream. For an average width of overburden of 195 feet with five feet thickness of sand tailings, which is the width calculated above under the less-favorable hydrological scenario

with regard to the bases of the sand tailings valleys and cast overburden plateaus, Dr. Garlanger calculated a hydraulic conductivity of seven feet per day.

733. Mr. Davis assumed that IMC would not be able to orient the spoil piles parallel to groundwater flow, but nothing indicates that the proper orientation of these piles will be impracticable over significant areas of land. If a turn of the dragline near Horse Creek leaves a relatively short area of spoil perpendicular to groundwater flow and if IMC will shave this area as it does rows, shaving the pile down 15 feet would substantially improve water table/shallow wetland interaction over the portion of the mined area that is left with an overburden plateau. Conceptualizing the contingency of a spoil pile blocking groundwater flow close to Horse Creek, such as from the U-turn of the dragline at the end of a row, the bulldozing of that spoil pile down to an effective 15-foot depth would leave a depth of at least 15 feet of sand tailings running 1095 feet, as measured alongside of Horse Creek out to a point at which the spoil piles would again run parallel to groundwater flow. If all of the spoil piles turned at Horse Creek and assuming that IMC will cut down the cast overburden piled against the sides of the mine cuts, for the distance equal to the distance between the edge of the no-mine area to the start of the curve, sand tailings would be at least 15 feet deep.

734. The real problem with MIKE SHE, as applied at OFG, is its sophistication. Mr. Sorensen admitted that he had not reviewed the data available for this part of Florida, but claimed that he knew, based on his work in South Florida, that sufficient data existed to run the MIKE SHE model. This is highly unlikely. In addition to Mr. Davis's observation about the lack of data, the record reveals a slimmer universe of data than Mr. Sorensen imagined to exist.

735. Measured values for the hydraulic conductivity of pre-mined or post-reclaimed areas are largely unavailable. For specific reclamation sites, little data exist of pre-mining and post-reclamation soil textures, water tables, and wetland hydroperiods and stage elevations.

736. By volume, the two most critical inputs are rainfall and evapotranspiration, which must be calculated or assumed because, for practical purposes, it cannot be directly measured. A major determinant of evapotranspiration is the water table elevation. The critical inputs of rainfall and water table elevations illustrate the shortcomings of the data for these cases.

737. Rainfall records in the general area cover a long period of time, except that collection points are usually far enough away from the site to be analyzed as to raise the probability of significant daily fluctuations, which average out

over time. MIKE SHE inputs rainfall spatially and hourly while HELPm inputs a single daily value. Without regard to any particular application, MIKE SHE is the superior model on this point, but its superiority is wasted when the data of hourly rainfall for individual cells are unavailable and values, often based on much longer intervals at much greater distances, must be interpolated.

738. Records for most surficial aquifer monitoring wells in the area date back only to the early 1990s and are fairly spotty as to locations. MIKE SHE inputs spatially distributed groundwater elevations, while HELPm inputs a single value. If, as Mr. Davis testified, multiple inputs of water table elevations, for which direct OFG data are unavailable, must rely on a hydrologist's knowledge of surficial aquifer responses, MIKE SHE would share the same tendency of HELPm--at least for this variable--of relying on external guidance to produce its output.

739. By contrast, the scientists studying the Danube River had lacked the resources for many years to do much more than collect data, so the data for the Danube MIKE SHE simulation was much richer than the data available at OFG. In such data-rich environments, MIKE SHE is the superior model for wetland hydroperiods and inundation depths. The question in these cases is whether, given the limitations of the OFG data and HELPm in

simulating hydroperiods and inundation depths, IMC has still provided reasonable assurance of the reclamation of functional hydroperiods and inundation depths for reclaimed wetlands.

740. IMC's case as to reclaimed hydroperiods and inundation depths is undermined by certain aspects of the use of HELPm in these cases. The scientific method, which lends confidence to analysis-driven conclusions to the extent that others can reproduce the analytic process, is poorly served by computer code that is modified without notation and modeling results that no one can reproduce due to the repeated intervention of the modeler, applying his touch and feel to the simulation. Only at the end of nearly eight weeks of hearing and a conference between Dr. Garlanger and Mr. Davis could Mr. Davis finally gain sufficient understanding of Dr. Garlanger's modeling process to make a meaningful comparison between his conclusions and Dr. Garlanger's conclusions for the hydroperiods and inundation depths of three wetlands.

741. When applied to project streamflow, with its relative amenability to average inputs, and when applied to projecting the hydroperiods and inundation depths of deeper and more isolated wetlands, HELPm, as used by Dr. Garlanger, who, as an experienced and highly competent hydrologist, can adjust and re-adjust inputs and outputs, produces reasonable assurance. However, Mr. Davis's analysis of Dr. Garlanger's work and other

factors preclude a finding that Dr. Garlanger has provided reasonable assurance that IMC will reclaim a functional hydroperiod and inundation depths for E008.

742. The finding in the preceding paragraph implies no similar rejection of Dr. Garlanger's modeling of the other wetlands. Most of the modeled reclaimed wetlands are isolated and do not present the challenge of simulating complex interactions among them, where an error in modeling an upgradient wetland will cause an error in modeling a downgradient wetland. A couple of the modeled reclaimed wetlands are headwater wetlands, which Dr. Garlanger has demonstrated his ability to model in W039. Outside of the Stream 1e series, the only wetlands similar in location to E008, as attached to a riparian system, will be E040, E048, E054 complex, and W044, of which only E048 is to be modeled.

743. Mr. Davis also addressed E048 in surrebuttal. A wetland forested mixed, E048 will replace a high-functioning bay swamp abutting, or a part of, the riparian wetlands of Horse Creek. Mr. Davis admitted that he could agree with Dr. Garlanger's analysis of inputs into E048 from isolated reclaimed wetlands upgradient of E048, so that he could agree with Dr. Garlanger's projected hydroperiod for this reclaimed wetland. However, Mr. Davis explained that E008 is located in the flatter Panhandle, but that E048, as well as the other

reclaimed wetlands listed in the preceding paragraph, are located in areas characterized by steeper grades and more xeric conditions, which support Dr. Garlanger's emphasis on groundwater inputs over surface water inputs.

d. Peak Discharges

744. During mining, the ditch and berm system prevents adverse flooding. If it operates as intended, the ditch and berm system delays the release of runoff from OFG by re-routing it through one of the NPDES outfalls. This decreases peak discharge downstream of OFG. Presumably, IMC will operate the recharge wells in anticipation of storm events--allowing the water levels to lower in advance of storms and maintaining higher water levels in advance of drier periods--so as not to raise the possibility of flooding by way of accelerated discharges through the NPDES outfalls.

745. Failure of the ditch and berm system is highly improbable. The sole failure reported in this record did not involve a system as engineered as the one proposed for OFG, according to Dr. Garlanger.

746. Another possible source of flooding during mining arises from the designed blockage of flow from unmined areas. IMC plans a single, elevated pipeline crossing across Stream 2e, and Dr. Garlanger explained that the design of the culvert, as

part of this temporary crossing, will not result in adverse flooding during mining.

747. Similar design work by Dr. Garlanger will be necessitated, if DEP issues a Final Order incorporating the recommendation below that the Stream 1e series and its 25-year floodplain also be placed in the no-mine area. The riparian wetlands for the Stream 1e series are narrowest along Stream 1ee, so this may be the location that DEP determines for the dragline walkpath corridor, if DEP determines that IMC may maintain a dragline crossing anywhere along the Stream 1e series.

748. The sole issue, during mining, involving peak discharges is a legal question, which is whether IMC's ditch and berm system has the capacity to accommodate the design storm. As noted below, the design storm is the 25-year storm, if the ditch and berm system is an open drainage system, and the design storm is the 100-year storm, if the ditch and berm system is a closed drainage system. The capacity of the proposed ditch and berm system is designed to accommodate the 25-year storm, but not the 100-year storm.

749. The facts necessary to determine if the ditch and berm system is open or closed are set forth above. In its Final Order, DEP must characterize a system that is closed in the sense of the availability of a passive discharge outfall, but

open in the sense that, with the intervention of pumps--assuming the availability of electricity during a major storm or alternative sources of power--excessive volumes of water may be moved to an NPDES outfall. This is a minor issue because, even if DEP determines that the ditch and berm is a closed system, IMC may easily heighten the berm as necessary to accommodate the 100-year storm.

750. Post-reclamation, many of the changes that IMC will make to OFG will reduce peak discharges. The agricultural alterations that ditched and drained wetlands accelerated drainage and increased peak discharges downstream, as compared to pre-existing natural drainage rates and peak discharge volumes. The removal of these ditches, the net addition of 24 acres of forested wetlands and 48 acres of herbaceous wetlands, the addition of sinuosity and in-stream structure to the reclaimed streams, and the redesigning of the banks of the reclaimed streams so as to permit communication between the reclaimed streams and their floodplains will attenuate floodwaters, slow the rate of runoff, increase temporary storage, and ultimately reduce peak discharges from their present values.

751. Dr. Garlanger modeled peak discharges using the Channel Hydrologic Analysis Networking (CHAN) model, which is a widely accepted model to simulate peak discharges. As already

noted, Mr. Loper found several inconsistencies and flaws in earlier modeling, but Dr. Garlanger, undeterred, re-ran the CHAN simulations, incorporating Mr. Loper's findings, as Dr. Garlanger deemed necessary.

752. The bottom line is that, post-reclamation, very small increases in peak discharges will occur at the Carlton cutout and would occur at some property immediately downstream of the point at which Horse Creek leaves OFG. The owners of the Carlton cutout consented to the very minor flooding of their pasture land, and IMC, of course, has no objection to the very minor flooding of its downstream property. Even absent these consents, the very limited extent and frequency of flooding, given the prevailing agricultural uses in the area, could not be characterized as adverse.

753. Among the points raised by Mr. Loper was the absence of mapping of any floodplain besides the 100-year floodplain of Horse Creek. The omission of other floodplains is of environmental or biological importance, but not direct hydrological importance. If for no other reason than that IMC will replicate pre-mining topography, especially at the lower elevations, there will be no loss of floodplain storage.

4. Water Quality

754. Water quality violations characterize past efforts to reclaim streams, other than Dogleg Branch, but the good water

quality at Dogleg Branch means that the phosphate mining industry can reclaim streams and maintain water quality, post-reclamation. The intensive engineering in IMC's Stream Restoration Plan raises the prospect of successfully reclaimed water quality, especially among the simpler, more altered stream systems to be reclaimed.

755. There is little doubt that, during mining, few impacts to water quality take place. The ditch and berm systems in place during the upstream mining in the Horse Creek sub-basin have permitted no degradation of water quality.

756. Given the present condition of most of the tributaries and extensive agricultural alterations of most of OFG, successful reclamation may be expected to result in certain changes to water quality, among already-altered tributaries, at least once the reclaimed communities have established themselves. Successful reclamation of these streams and their channels should lower turbidity, by replacing their incised, unstable stream channels and banks with stable channels and banks. The addition of riffles and structure to the stream bed should raise dissolved oxygen levels in these streams. Excluding cattle from these streams, by placing cattle ponds away from Horse Creek and vegetatively screening Horse Creek and the tributaries, should lower adverse impacts, such as turbidity, due to cattle damage to the banks, and nutrient

loading, due to cattle waste discharges. Phosphorus is sometimes temporarily higher after mining, but this may be merely a trophic surge. Water temperature will cool with the addition of forested riparian wetlands, once the canopy develops, where none presently exists. However, none of these effects can be anticipated with the reclamation of the relatively pristine Stream 1e series.

757. Other reclamation activities may also be anticipated to improve water quality. These activities include adding net wetlands area, replacing low-functioning wetlands with wetlands with the potential to achieve high-functioning levels, concentrating wetlands more around streams, adding supportive uplands, and otherwise increasing storage and slowing runoff. These activities will raise the level of natural filtration, compared to the natural filtration presently performed at OFG.

E. Wildlife Management and Habitat

758. The wildlife management plans are reasonable accommodations of wildlife that presently use OFG, based on the frequency of the usage by each species and the degree of protection afforded certain species. It is important that IMC update wildlife utilization information for the period that elapses between the site visits and the commencement of mining; wildlife usage by some species, especially the Audubon crested caracara, was discovered shortly before the hearing and, if

later found to be more intense, will require more intensive wildlife management plans. Likewise, DEP will need confirmation of FWC's approval of IMC's gopher tortoise relocation plan. Always of especial concern is the Florida panther. Obviously, the accommodations necessary for one or two male Florida panthers visiting OFG are far less intensive than those necessary if a breeding pair had established themselves at the site.

759. Ms. Keenan testified that the ERP/CRP approval should have incorporated the entire Habitat Management Plan. Although the ERP and CRP approval would be strengthened by the incorporation of the Habitat Management Plan, and DEP may elect to do so in its Final Order, the provisions actually incorporated adequately address wildlife management concerns.

760. The evidence fails to establish that OFG, which has been logged over the years, presently supports red cockaded woodpeckers. Clearly, as is the case with the Audubon's crested caracara, IMC is committed to develop, prior to mining, appropriate management plans that meet the needs of whatever species are found using OFG between the hearing and the start of mining.

761. In general, the reclamation of OFG will improve the value of the area for wildlife habitat. The concentration of reclaimed wetlands reduces induced edge by 36 miles. Induced

edges artificially increase predation and decrease the function of the upland/wetland interface for those aquatic- or wetland-dependent species that rely on adjacent uplands during parts of their life cycle.

762. The increased breadth of the riparian wetlands, which has been detailed above, also improves wildlife utilization and habitat values by discourage cattle from using the streams and adjacent wetlands. IMC's reclamation plan slightly increases the area of cattle ponds and locates them farther away from sensitive wetlands and streams.

763. IMC's reclamation plan also serves the often-overlooked needs of amphibians. The creation of isolated and ephemeral wetlands, which will not receive floodwaters from Horse Creek or its tributaries in most storm events, will enable these amphibians to develop sustainable populations and flourish. At present, two factors have led to artificially high levels of predation of these amphibians by small fish. Ditching of formerly isolated wetlands and the proximity of still-isolated wetlands to tributaries and their connected wetlands--so as to allow runoff to connect the two systems during storm events--allow small fish to enter the habitat of the amphibians and prey upon them at artificially high rates.

F. <u>Mitigation/Reclamation--Financial Responsibility</u>

764. IMC has never defaulted on any of its reclamation or mitigation responsibilities. Its mitigation cost estimates are ample to cover the listed expenses of the proposed wetlands mitigation, with two exceptions. For reasons set forth in the Conclusions of Law, IMC is not required to post financial security at this time for any CRP reclamation, such as the reclamation of uplands not relied upon by aquatic- and wetlands-dependent species, that is not also ERP mitigation. However, the listed expenses omit two important items of ERP mitigation.

765. First, the listed expenses omit Dr. Garlanger's fees for final engineering work on wetlands hydroperiods and inundation depths after backfilling has been completed. This is an expense covered under reclamation, as well as mitigation, pursuant to Chapter 378, Part III, and Chapter 373, Part IV, Florida Statutes, respectively.

766. Second, the listed expenses omit the cost of acquiring sand tailings, transporting them to the mine cut, and contouring them. For the reasons discussed in the Conclusions of Law, the cost of obtaining and transporting the sand tailings is not required under reclamation, pursuant to Chapter 378, Part III, Florida Statutes, but is required under mitigation under Chapter 373, Part IV, Florida Statutes.

767. Charlotte County contends that the cost of obtaining, transporting, and contouring sand tailings is $35,588 per acre, according to Mr. Irwin. This represents $10,588 per acre, as Mr. Irwin's "best guesstimate" for earthmoving, which seems to include the stripping and preserving of the A and B horizons, and $25,000 per acre for the shaping of wetland reclamation units. This testimony includes items for which financial security is not required, such as preserving the A and B horizons, and excludes the third-party cost of acquiring sufficient sand tailings to backfill the OFG mine cuts to the post-reclamation topography and transporting these sand tailings to OFG. The record supplies no information on these costs.

CONCLUSIONS OF LAW

I. Jurisdiction and Standing

768. The Division of Administrative Hearings has jurisdiction over the subject matter. §§ 120.569 and 120.57(1), Fla. Stat.

769. Section 403.412(5) and (6), Florida Statutes, provides:

> (5) In any administrative, licensing, or other proceedings authorized by law for the protection of the air, water, or other natural resources of the state from pollution, impairment, or destruction, the Department of Legal Affairs, a political subdivision or municipality of the state, or a citizen of the state shall have standing to intervene as a party on the filing of a

verified pleading asserting that the activity, conduct, or product to be licensed or permitted has or will have the effect of impairing, polluting, or otherwise injuring the air, water, or other natural resources of the state. As used in this section and as it relates to citizens, the term "intervene" means to join an ongoing s. 120.569 or s. 120.57 proceeding; this section does not authorize a citizen to institute, initiate, petition for, or request a proceeding under s. 120.569 or s. 120.57. Nothing herein limits or prohibits a citizen whose substantial interests will be determined or affected by a proposed agency action from initiating a formal administrative proceeding under s. 120.569 or s. 120.57. A citizen's substantial interests will be considered to be determined or affected if the party demonstrates it may suffer an injury in fact which is of sufficient immediacy and is of the type and nature intended to be protected by this chapter. No demonstration of special injury different in kind from the general public at large is required. A sufficient demonstration of a substantial interest may be made by a petitioner who establishes that the proposed activity, conduct, or product to be licensed or permitted affects the petitioner's use or enjoyment of air, water, or natural resources protected by this chapter.

(6) Any Florida corporation not for profit which has at least 25 current members residing within the county where the activity is proposed, and which was formed for the purpose of the protection of the environment, fish and wildlife resources, and protection of air and water quality, may initiate a hearing pursuant to s. 120.569 or s. 120.57, provided that the Florida corporation not for profit was formed at least 1 year prior to the date of the filing of the application for a permit, license, or authorization that is the subject of the notice of proposed agency action.

770. DCAP satisfies the requirements of Section 403.412(6), Florida Statutes. Section 403.412(6), Florida Statutes, allows certain not-for-profit corporations to initiate an administrative hearing. This subsection does not require the filing of a verified petition, nor, oddly, is it, on its face, explicitly limited to environmental hearings. DCAP's petition meets the requirements of Section 403.412(6), Florida Statutes, and raises the kinds of environmental issues addressed generally in Section 403.412, Florida Statutes.

771. Lee County satisfies the requirements of Section 403.412(5), Florida Statutes. Section 403.412(5), Florida Statutes, requires the filing of a verified petition, and Lee County did so. Lee County's petition alleges that the proposed activities will impact the water and natural resources, as provided by Section 403.412(5), Florida Statutes. Lee County has sought to intervene in an existing administrative proceeding, as explicitly authorized to do by the statute.

772. By negative implication, the statutory language of Section 403.412(5), Florida Statutes, limiting citizens to intervention, not initiation, does not apply to counties. This means that a county may commence an administrative proceeding and claim standing under Section 403.412(5), Florida Statutes. A county has standing to initiate an administrative proceeding

if its petition is verified and the hearing involves the environmental issues described in the statute.

773. Charlotte County verified its petition by the affidavit signed by Mr. Kampert. Sarasota County verified its petition by pleading filed May 17, 2004. Charlotte County and Sarasota County therefore also have standing under Section 403.412(5), Florida Statutes.

774. The alternative means of proving standing is under Section 120.569(1), Florida Statutes. Section 120.569(1), Florida Statutes, provides standing for any person "whose substantial interests are determined by an agency." This is the only means available for Behrens and the Authority to establish standing.

775. Adopting the two-part test announced in Agrico Chemical Co. v. Department of Environmental Regulation, 406 So. 2d 478, 482 (Fla. 2d DCA 1981), rev. denied 415 So. 2d 1359 (Fla. 1982), Section 403.412(5), Florida Statutes, explains that "substantial interest" standing requires a party to show that "it may suffer an injury in fact which is of sufficient immediacy and is of the type and nature intended to be protected by this chapter." Section 403.412(5), Florida Statutes, explains further: "A sufficient demonstration of a substantial interest [is] that the proposed activity . . . affects the

petitioner's use or enjoyment of air, water, or natural resources protected by this chapter."

776. Behrens, DCAP, Charlotte County, Lee County, and Sarasota County have proved standing under Section 120.569(1), Florida Statutes. If the activity extends to the mining and reclamation of the Stream 1e series, it will injure the natural resources on which each of these parties depends for use, enjoyment, environmental health, and ecological function, and the permitting and approval regimes at issue in these cases are intended to protect these interests. As to Sarasota County, this finding is based on the small part of Charlotte Harbor that falls within its jurisdiction.

777. Considered under Section 120.569(1), Florida Statutes, the Authority's standing is based on the impact, if any, of OFG, during mining or post-reclamation, on the streamflow of the Peace River. The concern of the Authority is the availability of sufficient volumes of treatable water to allow continued withdrawals. However, the evidence fails to establish more than negligible impacts to flow during mining or post-reclamation. The Authority thus lacks standing to participate in these cases.

778. Additionally, no party has standing under Section 120.569(1), Florida Statutes, to challenge the WRP modification because it does not result in net relevant impacts, as compared

to the proposed activities at the Ft. Green Mine for which IMC already holds a permit. Only parties with standing under Section 403.412, Florida Statutes, may challenge the WRP modification. Behrens thus lacks standing to challenge the WRP modification.

779. Lastly, no party has standing to challenge whether IMC paid the proper permitting fee. No party has a substantial interest in whether DEP collects this fee. The collection of this fee is not within the scope of Section 403.412(5), Florida Statutes. It does not appear that DCAP has tried to raise this issue, but, if it has, it lacks standing under any interpretation of Section 403.412(6), Florida Statutes, that limits standing under this section to issues linked to the corporation's purpose of protecting the environmental, fish and wildlife resources, and air and water quality or of the type described in Section 403.412(5), Florida Statutes. Additionally, whether IMC paid the proper permitting fee is not a basis for denial of the ERP, CRP approval, or WRP modification.

II. Burden of Proof and Standard of Proof

780. IMC has the burden of proving its entitlement to the ERP, CRP approval, and WRP modification by a preponderance of the evidence. Department of Transportation v. J. W. C. Company, Inc., 396 So. 2d 778 (Fla. 1st DCA 1981).

781. As provided in Section 373.414(1), Florida Statutes, which is quoted below, the standard of proof is reasonable assurance, which means a "substantial likelihood that the project will be successfully implemented." Metropolitan Dade County v. Coscan Florida, Inc., 609 So. 2d, 644, 648 (Fla. 3d DCA 1992). Although Section 373.414, Florida Statutes, applies to activities in wetlands and other surface waters, the language, also quoted below, in Section 373.413(1), Florida Statutes, "to assure" that the proposed activity complies with the statutes and rules governing stormwater management systems and will not be harmful to the water resources of the district also means reasonable assurance. The overlapping of tasks between reclamation under Chapter 378, Part III, Florida Statutes, and mitigation under Chapter 373, Part IV, Florida Statutes, suggests the use of the same evidentiary standard to assess the adequacy of IMC's reclamation plan under Chapter 378, Part III, Florida Statutes.

782. In their proposed recommended orders, IMC and DEP seek "deference to agency interpretation." The extent of deference to the agency's legal interpretations is unimportant because, as between the Administrative Law Judge and the agency, DEP will have the final word on the many legal questions in these cases that are within its substantive jurisdiction, pursuant to Section 120.57(1)(l), Florida Statutes.

783. The more important question requires the identification of the roles of the Administrative Law Judge and DEP in making determinations about mitigation and whether mitigation offsets relevant impacts. Ultimately, these cases are about the adequacy of mitigation.

784. Three dredge-and-fill cases describe the role of the Administrative Law Judge and DEP in mitigation cases. In <u>1800 Atlantic Developers v. Department of Environmental Regulation</u>, 552 So. 2d 946 (Fla. 1st DCA 1989) (per curiam), the agency denied the application for a permit to build a jetty and fill shallow marine waters, among other things. The agency and the applicant repeatedly tried to agree upon mitigative conditions. At the hearing, the agency and applicant added nine additional, unwritten mitigative conditions, which finally resulted in the agency's approval of the proposed project. In entering a recommended order of denial, the hearing officer declined to consider the nine mitigative conditions because of their lack of specificity and reliance upon post-issuance drawings that "placed beyond the scrutiny of others" critical features of the proposed project.

785. In its Final Order, the agency expressed its inability to disturb the factfinding of the hearing officer as to the inadequacy of mitigation. The Final Order denied the permit application with leave for the applicant to refile.

786. In its opinion, the 1800 Atlantic court emphasized two statutory requirements. Section 403.918(2)(b), Florida Statutes (1985), provided that the agency shall consider mitigation proposed by, or acceptable to, an applicant, if the application would otherwise be denied. This language is now in Section 373.414(1)(b), Florida Statutes, as cited below. Section 493.92, Florida Statutes (1985), provided that a permit denial shall contain an explanation of the changes necessary for the permit to be granted. This language is now in Section 373.414(9), Florida Statutes, as cited below.

787. From these statutes, the 1800 Atlantic court concluded: "Absolute prohibition of dredge and filling activity, therefore, should be the rare exception in cases of extreme damage to the environment that cannot be avoided or mitigated under any circumstances." 552 So. 2d at 954. Substituting "more than de minimis" for "extreme damage," for which the current statutory authority would be unclear, the message of 1800 Atlantic is that mitigation typically should be available to offset the relevant impacts of proposed activities. In remanding the case back to the agency, the 1800 Atlantic court reversed the agency's order because it failed to explain the changes necessary for the permit to issue.

788. The 1800 Atlantic court explained that the agency had improperly disclaimed the ability to revise the findings of the

hearing officer as to the inadequacy of mitigation. The court held that the agency, not the hearing officer, is responsible for determining the adequacy of mitigation. The court explained the respective roles of the agency and hearing officer:

> It is the responsibility of DER, not the hearing officer, to establish mitigative measures acceptable to it under the statute. DER, not the hearing officer, has the statutory responsibility to define mitigative measures that would be sufficient to offset the perceived adverse effects of the dredging and filling contemplated by the project in accord with the statutory criteria for determining public interest. As the hearing officer's function was only that of a fact finder, it was the hearing officer's function to make findings of fact regarding disputed factual issues underlying the conditions set by DER and the implementation of and compliance with the mitigative conditions set by DER. The hearing officer was not vested with the power to review DER's discretion in setting acceptable mitigative conditions in the sense of passing on their sufficiency to meet the statutory criteria.

552 So. 2d at 955.

789. Characterizing the mitigative conditions agreed to by DER and the applicant as "conclusions of law," the 1800 Atlantic court held that the agency's deference to the hearing officer's findings as to the inadequacy of mitigation violated Section 403.918(2)(b), Florida Statutes (1985). The court added: "If DER agreed that the additional conditions were so lacking in detailed specifications that it could not issue the permit, the

proper course of action under the statutory procedure was for DER to communicate these deficiencies to 1800 Atlantic and allow the applicant to submit more detailed specifications." 552 So. 2d at 956. The agency's failure to follow this process violated the applicant's right to a "further opportunity to modify its application for permit to meet DER's objections, as required by the statute." Id.

790. In Collier Development Corp. v. Department of Environmental Regulation, 592 So. 2d 1107 (Fla. 2d DCA 1991) (per curiam), the applicant presented a second flushing study in its rebuttal case. The hearing officer adjourned the hearing for three weeks so the opposing parties could digest the new information. However, the hearing officer later declined to admit the new flushing study as an improper attempt to make a substantive amendment to the application, and she determined that, under 1800 Atlantic, she lacked the jurisdiction to enter any findings as to mitigation. DER remanded the case to the hearing officer to enter findings on the second flushing study, but the hearing officer declined the remand. Ordering the hearing officer to accept the remand, the court quoted with approval DER's interpretation of the effect of 1800 Atlantic: "DER [must] make the final agency decision on the findings of fact made by the hearing officer. The hearing officer has the

duty to resolve any factual disputes on mitigation." 592 So. 2d at 1109.

791. In Save Anna Maria, Inc. v. Department of Transportation, 700 So. 2d 113 (Fla. 2d DCA 1997), the court, noting 1800 Atlantic, upheld the decision of DEP that the seagrass mitigation was adequate. The Save Anna Maria court characterized the hearing officer's contrary findings as conclusions of law. The court explained that DEP did not reject the hearing officer's findings on mitigation, but instead re-balanced them to determine that the applicant had provided adequate mitigation. Although the court omitted any mention of its earlier decision in Collier Development, the holding of Save Anna Maria is consistent with the holding of Collier Development in its recognition that the hearing officer is responsible for factfinding as to subordinate factual disputes involving mitigation, but the balancing of factors and ultimate decision as to the adequacy of mitigation is an issue of law for the agency.

III. ERP

A. Statutes, Rules, and Legal Issues

792. Section 373.413(1), Florida Statutes, provides:

> Except for the exemptions set forth herein, the governing board or the department may require such permits and impose such reasonable conditions as are necessary to assure that the construction or alteration

> of any stormwater management system, dam, impoundment, reservoir, appurtenant work, or works will comply with the provisions of this part and applicable rules promulgated thereto and will not be harmful to the water resources of the district. The department or the governing board may delineate areas within the district wherein permits may be required.

793. Section 373.403(10), Florida Statutes, defines a "stormwater management system" as:

> a system which is designed and constructed or implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, overdrainage, environmental degradation, and water pollution or otherwise affect the quantity and quality of discharges from the system.

794. Adding additional requirements for proposed activities in wetlands or other surface waters, Section 373.414(1), (6), (8), and (9), Florida Statutes, provides, in relevant part:

> (1) As part of an applicant's demonstration that an activity regulated under this part will not be harmful to the water resources or will not be inconsistent with the overall objectives of the district, the governing board or the department shall require the applicant to provide reasonable assurance that state water quality standards applicable to waters as defined in s. 403.031(13) will not be violated and reasonable assurance that such activity in, on, or over surface waters or wetlands, as delineated in s. 373.421(1), is not contrary to the public interest. However, if such an activity significantly degrades or is within an Outstanding Florida Water, as provided by department rule, the

applicant must provide reasonable assurance that the proposed activity will be clearly in the public interest.

(a) In determining whether an activity, which is in, on, or over surface waters or wetlands, as delineated in s. 373.421(1), and is regulated under this part, is not contrary to the public interest or is clearly in the public interest, the governing board or the department shall consider and balance the following criteria:

1. Whether the activity will adversely affect the public health, safety, or welfare or the property of others;

2. Whether the activity will adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats;

3. Whether the activity will adversely affect navigation or the flow of water or cause harmful erosion or shoaling;

4. Whether the activity will adversely affect the fishing or recreational values or marine productivity in the vicinity of the activity;

5. Whether the activity will be of a temporary or permanent nature;

6. Whether the activity will adversely affect or will enhance significant historical and archaeological resources under the provisions of s. 267.061; and

7. The current condition and relative value of functions being performed by areas affected by the proposed activity.

(b) If the applicant is unable to otherwise meet the criteria set forth in this subsection, the governing board or the department, in deciding to grant or deny a permit, shall consider measures proposed by or acceptable to the applicant to mitigate adverse effects that may be caused by the regulated activity. Such measures may include, but are not limited to, onsite mitigation, offsite mitigation, offsite regional mitigation, and the purchase of mitigation credits from mitigation banks permitted under s. 373.4136. It shall be the responsibility of the applicant to choose the form of mitigation. The mitigation must offset the adverse effects caused by the regulated activity.

* * *

3. If the applicant is unable to meet water quality standards because existing ambient water quality does not meet standards, the governing board or the department shall consider mitigation measures proposed by or acceptable to the applicant that cause net improvement of the water quality in the receiving body of water for those parameters which do not meet standards.

* * *

(6)(b) Wetlands reclamation activities for phosphate and heavy minerals mining undertaken pursuant to chapter 378 shall be considered appropriate mitigation for this part if they maintain or improve the water quality and the function of the biological systems present at the site prior to the commencement of mining activities.

* * *

(8)(a) The governing board or the department, in deciding whether to grant or deny a permit for an activity regulated under this part shall consider the cumulative impacts upon surface water and wetlands, as delineated in s. 373.421(1), within the same drainage basin as defined in s. 373.403(9), of:

1. The activity for which the permit is sought.

2. Projects which are existing or activities regulated under this part which are under construction or projects for which permits or determinations pursuant to s. 373.421 or s. 403.914 have been sought. [Footnote omitted.]

3. Activities which are under review, approved, or vested pursuant to s. 380.06, or other activities regulated under this part which may reasonably be expected to be located within surface waters or wetlands, as delineated in s. 373.421(1), in the same drainage basin as defined in s. 373.403(9),

> based upon the comprehensive plans, adopted pursuant to chapter 163, of the local governments having jurisdiction over the activities, or applicable land use restrictions and regulations.
>
> (b) If an applicant proposes mitigation within the same drainage basin as the adverse impacts to be mitigated, and if the mitigation offsets these adverse impacts, the governing board and department shall consider the regulated activity to meet the cumulative impact requirements of paragraph (a). However, this paragraph may not be construed to prohibit mitigation outside the drainage basin which offsets the adverse impacts within the drainage basin.
>
> (9) . . . Such rules [to be adopted by DEP and the districts] shall include a provision requiring that a notice of intent to deny or a permit denial based upon this section shall contain an explanation of the reasons for such denial and an explanation, in general terms, of what changes, if any, are necessary to address such reasons for denial. . . . Such rules may require submission of proof of financial responsibility which may include the posting of a bond or other form of surety prior to the commencement of construction to provide reasonable assurance that any activity permitted pursuant to this section, including any mitigation for such permitted activity, will be completed in accordance with the terms and conditions of the permit once the construction is commenced. . . .

795. DEP has adopted many of the rules of the SWFWMD, in whose jurisdiction OFG is located. Florida Administrative Code Rule 62-330.200(3) provides, in relevant part:

> The following rules are adopted by reference for application by the Department within the geographical jurisdiction of the Southwest Florida Water Management District as set forth in Section 373.069, F.S.;

(a) Sections 40D-1.102, 40D-1.107, 40D-1.602(3), 40D-1.602(6), 40D-1.604, 40D-1.6105, and 40D-1.907, F.A.C.;

(b) Chapter 40D-4, F.A.C., except Sections 40D-4.031, 40D-4.042, 40D-4.091, 40D-4.101, 40D-4.201, 40D-4.321, 40D-4.331, 40D-4.341 and 40D-4.351, F.A.C.;

(c) Chapter 40D-40, F.A.C., except Sections 40D-40.031, 40D-40.043, 40D-40.112, 40D-40.321, 40D-40.331, 40D-40.341, 40D-40.351 and 40D-40.381, F.A.C.;

(d) Chapter 40D-45, F.A.C., except Sections 40D-45.321, 40D-45.331 and 40D-45.351, F.A.C.; and

(e) Sections 1.7 through 1.7[.]41 of Chapter 1, Chapters 4, 5, 6, and 7, and Chapter 3 (Environmental) of the document entitled "Basis of Review for Environmental Resource Permit Applications within the Southwest Florida Water Management District, 1995, including Appendices 2, 5 and 6, except as provided in subparagraphs 1. through 2.

1. Subsection 3.2.2: The second paragraph is amended to read: "In evaluating whether an applicant has provided reasonable assurances under subsection 3.2.2, de minimis effects shall not be considered adverse for the purposes of this subsection."

2. Subsection 3.2.2: The last paragraph is amended to read: "The need for a wildlife survey will depend upon the likelihood that the site is used by listed species, considering site characteristics and the range and habitat needs of such species, and whether the proposed system will impact that use such that the criteria in subsection 3.2.2-3.2.2.3 and subsection 3.2.7 will not be met. In assessing the likelihood of use of a site by listed species, the Department will consult scientific literature, such as "Closing the Gaps in Florida's Wildlife Conservation System' (Fish and Wildlife Conservation Commission, 1994) and the Florida Natural Areas Inventory Survey methodologies

> employed to inventory the site must provide reasonable assurances regarding the presence or absence of the subject listed species."

796. Florida Administrative Code Rule 40D-4.301, which applies to surface water management systems, and Rule 40D-4.302, which applies to activities in wetlands or other surface waters, are among those adopted by DEP.

797. IMC and Charlotte County each relied on Rule 40D-4.301. IMC cited Florida Administrative Code Rule 40D-4.301(1)(g), which requires reasonable assurance that the proposed system will not adversely impact surface water flows established pursuant to Section 373.042, Florida Statutes. As noted above, SWFWMD has not yet set minimum flows for the Peace River, so IMC argued that any mining impacts on the Peace River's flows could not properly be considered in these cases. For its part, Charlotte County cited Florida Administrative Code Rule 40D-4.301(1)(h), which requires reasonable assurance that the proposed system will not adversely impact a work of the District. As defined elsewhere, a "work of the District" probably includes Horse Creek.

798. However, Florida Administrative Code Rule 40D-4.301(3) provides: "The standards and criteria contained in the Basis of Review . . . shall determine whether the reasonable assurances required by subsection 40D-4.301(1) and Section 40D-4.302, F.A.C., have been provided." The sole remaining provision of

Florida Administrative Code Rule 40D-4.301 is subsection (2), which provides: "If the applicant is unable to meet water quality standards because existing ambient water quality does not meet standards, the applicant shall comply with the requirements set forth in Section 3.2.4.5 of the Basis of Review."

799. Basis of Review (BOR) Section 3.1.0 cites the functions of wetlands and other surface waters and emphasizes the District goal of no net loss of the functions of wetlands or the functions of other surface waters. BOR Section 3.1.0 states:

> Wetlands are important components of the water resource because they often serve as spawning, nursery and feeding habitats for many species of fish and wildlife, and because they often provide important flood storage, nutrient cycling, detrital production, recreational and water quality functions. Other surface waters such as lakes, ponds, reservoirs, other impoundments, streams, rivers and estuaries also often provide such functions, and in addition may provide flood conveyance, navigation and water supply functions to the public. Not all wetlands or other surface waters provide all of these functions, nor do they provide them to the same extent. A wide array of biological, physical and chemical factors affect the functioning of any wetland or other surface water community. Maintenance of water quality standards in applicable wetlands and other surface waters is critical to their ability to provide many of these functions.

> It is the intent of the Governing Board that the criteria in subsections 3.2 through 3.3.8 be implemented in a manner which achieves a programmatic goal and a project permitting goal of no net loss of wetlands or other surface water functions. This goal shall not include projects that are exempt by statute or rule or which are authorized by a noticed general permit. Unless exempted by statute or rule, permits are required for the construction, alteration, operation, maintenance, abandonment and removal of systems so that the District can conserve the beneficial functions of these communities. The term "systems" includes areas of dredging or filling, as those terms are defined in s. 373.403(13) and (14), F.S.

800. Again stressing the importance of conserving the functions of wetlands, BOR Section 3.1.1 lists the relevant impacts under the ERP permitting regime. BOR Section 3.1.1 states:

> The District addresses the conservation of these beneficial functions in the permitting process by requiring applicants to provide reasonable assurance that the following conditions for issuance of permits, set forth in Sections 40D-4.301 (Conditions for Issuance) and 40D-4.302 (Additional Conditions for Issuance), F.A.C., are met. Applicants must provide reasonable assurance that:
>
> (a) a regulated activity will not adversely impact the value of functions provided to fish, wildlife and listed species, including aquatic and wetland dependent species, by wetlands and other surface waters and other water related resources of the District. (paragraph 40D-4.301(1)(d), F.A.C.) (see subsection 3.2.2);
>
> (b) a regulated activity located in, on, or over wetlands or other surface waters,

will not be contrary to the public interest, or if such an activity significantly degrades or is located within an Outstanding Florida Water, that the regulated activity will be clearly in the public interest (see subsection 3.2.3);

(c) a regulated activity will not adversely affect the quality of receiving waters such that the water quality standards set forth in Chapters 62-3, 62-4, 62-302, 62-520, 62-522 and 62-550, F.A.C., including any antidegradation provisions of Sections 62-4.242(1)(a) and (b), 62-4.242(2) and (3), and 62-302.300 and any special standards for Outstanding Florida Waters and Outstanding National Resource Waters set forth in sections 62-4.242(2) and (3), F.A.C., will be violated (paragraph 40D-4.301(1)(e), F.A.C.);

* * *

(f) a regulated activity will not cause adverse secondary impacts to the water resources (paragraph 40D-4.301(1)(f), F.A.C.) (see subsection 3.2.7); [and]

(g) a regulated activity will not cause adverse cumulative impacts upon wetlands and other surface waters, as delineated pursuant to the methodology authorized by subsection 373.421(1), F.S. (paragraph 40D-4.302(1)(b), F.A.C.) (see subsection 3.2.8).

801. BOR Section 3.2 explains that compliance with BOR Section 3.1.1 requires compliance with BOR Sections 3.2-3.3.8.6, which are the environmental criteria. BOR Chapter 4 contains supplemental water quantity criteria, and BOR Chapter 5 contains supplemental water quality criteria.

802. After identifying the relevant impacts, the first step is to determine if the applicant has eliminated or reduced all adverse impacts. BOR Section 3.2.1 provides:

> The degree of impact to wetland and other surface water functions caused by a proposed system, whether the impact to these functions can be mitigated and the practicability of design modifications for the site, as well as alignment alternatives for a proposed linear system, which could eliminate or reduce impacts to these functions, are all factors in determining whether an application will be approved by the District. Design modifications to reduce or eliminate adverse impacts must be explored as described in 3.2.1.1. Any adverse impacts remaining after practicable design modifications have been implemented may be offset by mitigation as described in subsections 3.3 through 3.3.8. An applicant may propose mitigation, or the District may suggest mitigation, to offset the adverse impacts which would cause the system to fail to meet the conditions for issuance. To receive District approval, a system cannot cause a net adverse impact on wetland functions and other surface water functions which is not offset by mitigation.

803. BOR Section 3.2.1.1 adds:

> Except as provided in 3.2.1.2, if the proposed system will result in adverse impacts to wetland functions and other surface water functions such that it does not meet the requirements of sections 3.2.2 through 3.2.3.7, then the District in determining whether to grant or deny a permit shall consider whether the applicant has implemented practicable design modifications to reduce or eliminate such adverse impacts.
>
> If, after first taking into consideration the factors listed in subsection 3.2.3.2 the District determines that an applicant's proposed system can be modified in a practicable manner that would eliminate or reduce adverse impacts to wetland functions and other surface water functions, and if

> the applicant refuses to modify the system accordingly, mitigation shall not be approved. The term "modification" shall not be construed as including the alternative of not implementing the system in some form, nor shall it be construed as requiring a project that is significantly different in type or function. A proposed modification which is not technically capable of being done, is not economically viable, or which adversely affects public safety through the endangerment of lives or property is not considered "practicable." A proposed modification need not remove all economic value of the property in order to be considered not "practicable." Conversely, a modification need not provide the highest and best use of the property to be "practicable." In determining whether a proposed modification is practicable, consideration shall be given to the cost of the modification compared to the environmental benefit it achieves.

804. BOR Section 3.2.1.3 provides that the District must deny the application if all of the modifications to the design of the system and the mitigation does not result in a permittable system.

805. With the bracketed provisions representing the above-mentioned revisions that DEP made to the SWFWMD BOR, BOR Section 3.2.2 provides:

> Pursuant to paragraph 3.1.1(a), an applicant must provide reasonable assurance that a regulated activity will not impact the values of wetlands, other surface waters and other water related resources of the District, so as to cause adverse impacts to:
>
> (a) the abundance and diversity of fish, wildlife and listed species; and

(b) the habitat of fish, wildlife and listed species.

[In evaluating whether an applicant has provided reasonable assurances under subsection 3.2.2, de minimis effects shall not be considered adverse for the purposes of this subsection.]

*   *   *

[The need for a wildlife survey will depend upon the likelihood that the site is used by listed species, considering site characteristics and the range and habitat needs of such species, and whether the proposed system will impact that use such that the criteria in subsection 3.2.2-3.2.2.3 and subsection 3.2.7 will not be met. In assessing the likelihood of use of a site by listed species, the Department will consult scientific literature, such as "Closing the Gaps in Florida's Wildlife Conservation System' (Fish and Wildlife Conservation Commission, 1994) and the Florida Natural Areas Inventory Survey methodologies employed to inventory the site must provide reasonable assurances regarding the presence or absence of the subject listed species.]

806. BOR Section 3.2.2.3 provides:

The assessment of impacts expected as a result of proposed activities on the values of functions will be based on a review of pertinent scientific literature, ecologic and hydrologic information, and field inspection. When assessing the value of functions that any wetland or other surface water provides to fish, wildlife, and listed species, the factors which the District will consider include:

(a) condition - this factor addresses whether the wetland or other surface water is in a high quality state or has been the subject of past alterations in hydrology, water quality, or vegetative composition. However, areas impacted by activities in violation of a District or Department rule, order or permit adopted or issued pursuant to Chapter 373, or Part VIII, Chapter 403 F.S. (1984, as amended), will be evaluated as if the activity had not occurred.

(b) hydrologic connection - this factor addresses the nature and degree of connection which may provide benefits to water resources through detrital export, base flow maintenance, water quality enhancement or the provision of nursery habitat.

(c) uniqueness - this factor addresses the relative rarity of the wetland or other surface water and its floral and faunal components in relation to the surrounding regional landscape.

(d) location - this factor addresses the location of the wetland or other surface water in relation to its surroundings.

(e) fish and wildlife utilization - this factor addresses use of the wetland or other surface water for resting, feeding, breeding, nesting or denning by fish and wildlife, particularly those which are listed species.

807. BOR Section 3.2.2.4 states:

Pursuant to paragraph 3.1.1(a), an applicant must provide reasonable assurance that the regulated activity will not change the hydroperiod of a wetland or other surface water, so as to adversely affect wetland functions or other surface water functions as follows:

(a) Whenever portions of a system, such as constructed basins, structures, stormwater ponds, canals, and ditches, could have the effect of reducing the depth, duration or frequency of inundation or saturation in a wetland or other surface water, the applicant must perform an

> analysis of the drawdown in water levels or diversion of water flows resulting from such activities and provide reasonable assurance that these drawdowns or diversions will not adversely impact the functions that wetlands and other surface waters provide to fish and wildlife and listed species.
>
> (b) Increasing the depth, duration, or frequency of inundation through changing the rate or method of discharge of water to wetlands or other surface waters or by impounding water in wetlands or other surface waters must also be addressed to prevent adverse effects to functions that wetlands and other surface waters provide to fish and wildlife and listed species. Different types of wetlands respond differently to increased depth, duration, or frequency of inundation. Therefore, the applicant must provide reasonable assurance that activities that have the potential to increase discharge or water levels will not adversely affect the functioning of the specific wetland or other surface water subject to the increased discharge or water level.
>
> (c) Whenever portions of a system could have the effect of altering water levels in wetlands or other surface waters, applicants shall be required to monitor the wetland or other surface waters to demonstrate that such alteration has not resulted in adverse impacts, or to calibrate the system to prevent adverse impacts. Monitoring parameters, methods, schedules, and reporting requirements shall be specified in permit conditions.

808. BOR Section 3.2.3 restates the public interest test set forth in Section 373.414(1), Florida Statutes.

809. Addressing the public health, safety, or welfare and the property of others, BOR Section 3.2.3.1 provides, in relevant part:

> In reviewing and balancing the criterion regarding public health, safety, welfare and the property of others in paragraph 3.2.3(a), the District will evaluate whether the regulated activity located in, on, or over wetlands or other surface waters will cause:
>
> * * *
>
> (c) flooding or alleviate existing flooding on the property of others. There is at least a neutral factor in the public interest balance with respect to the potential for causing or alleviating flooding problems if the applicant meets the water quantity criteria in Chapter Four.
>
> (d) environmental impacts to the property of others. For example, construction of a ditch that results in drawdown impacts to a wetland on an adjacent property would be an environmental impact to the property of others. The District will not consider impacts to property values.

810. Addressing water quantity, BOR Section 3.2.3.3 states, in relevant part:

> In reviewing and balancing the criterion on navigation, erosion, and shoaling in paragraph 3.2.3(c), the District will evaluate whether the regulated activity located in, on or over wetlands or other surface waters will:
>
> * * *
>
> (c) significantly impact or enhance water flow. Applicants must address obstructions to sheet flow by assessing the need for structures which minimize the obstruction such as culverts or spreader swales in fill areas. Compliance with the water quality [sic; this reads "quantity" in current version of SWFWMD BOR] found in subsection 3.2.2.4 shall be an important consideration in addressing this criterion.

811. Addressing fisheries, recreation, and marine productivity, BOR Section 3.2.3.4 provides, in relevant part:

> In reviewing and balancing the criterion regarding fishing or recreational values and marine productivity in paragraph 3.2.3(d), the District will evaluate whether the regulated activity in, on, or over wetlands or other surface waters will cause:
>
> (a) adverse effects to sport or commercial fisheries or marine productivity. Examples of activities which may adversely affect fisheries or marine productivity are the elimination or degradation of fish nursery habitat, change in ambient water temperature, change in normal salinity regime, reduction in detrital export, change in nutrient levels or other adverse affects on populations of native aquatic organisms.
>
> * * *
>
> Wetlands and other surface waters may provide recreational uses such as boating, fishing, swimming, skiing, hunting and birdwatching. An example of potential adverse effects to recreational uses is the construction of a traversing work, such as a road crossing a waterway, which could impact the current use of the waterway for waterskiing and boating.

812. Addressing the duration of the impacts, BOR Section 3.2.3.5 provides:

> When evaluating the other criteria in subsection 3.2.3, the District will consider the frequency and duration of the impacts caused by the proposed activity. Temporary impacts will be considered less harmful than permanent impacts of the same nature and extent.

813. Addressing the condition and functional value of the wetlands and other surface waters to be impacted by a proposed activity, BOR Section 3.2.3.7 provides:

> When evaluating other criteria in subsection 3.2.3, the District will consider the current condition and relative value of the functions performed by wetlands and other surface waters affected by the proposed regulated activity. Wetlands and other surface waters which have had their hydrology, water quality or vegetative composition permanently impacted due to past legal alterations or occurrences, such as infestation with exotic species usually provide lower habitat value to fish and wildlife. However, if the wetland or other surface water is currently degraded, but is still providing some beneficial functions, consideration will be given to whether the regulated activity will further reduce or eliminate those functions. The District will also evaluate the predicted ability of the wetlands or other surface waters to maintain their current functions as part of the proposed system once it is developed. Where previous impacts to a wetland or other surface water are temporary in nature, consideration will be given to the inherent functions of these areas, relative to seasonal hydrologic changes, and expected vegetative regeneration and projected habitat functions if the use of the subject property were to remain unchanged. When evaluating impacts to mitigation sites which have not reached success pursuant to 3.3.6, the District shall consider the functions that the mitigation site was intended to offset, and any additional delay or reduction in offsetting those functions that may be caused by impacting the mitigation site. Previous construction or alteration undertaken in violation of Chapter 373, F.S., or District rule, order or permit will not be considered as having

> diminished the condition and relative value
> of a wetland or other surface water.

814. BOR Section 3.2.4 requires the applicant to provide reasonable assurance that the proposed activity will not violate applicable water quality standards, both in the short term and long term. BOR Section 3.2.4.1 requires an applicant to address short-term water quality considerations by providing turbidity barriers during dewatering and construction in or adjacent to wetlands or other surface waters, stabilizing newly created slopes or surfaces in or adjacent to wetlands or other surface waters, preventing the release of petrochemicals into wetlands or other surface waters, controlling discharge from spoil disposal sites, and preventing any discharge or release of pollutants during construction or alteration that will violate water quality standards. BOR Section 3.2.4.2 requires an applicant to address long-term water quality considerations, such as preventing any discharge or release of pollutants from the system that will violate water quality standards.

815. BOR Section 3.2.4.5 provides, for sites not currently meeting water quality standards, that an applicant must comply with BOR Sections 3.2.4.1, 3.2.4.2, and 3.2.4.3 and, for non-compliant parameters, demonstrate that the proposed activity will not contribute to the existing violation. If the proposed

activity will contribute to the existing violation, an applicant may propose mitigation, as described in subsection 3.3.1.4.

816. BOR Section 3.2.7 requires the applicant to provide reasonable assurance that the proposed activity will not cause adverse secondary impacts to the water resource. BOR Section 3.2.7(a) notes that the impacts of groundwater withdrawals on wetland and other surface waters shall not be considered secondary impacts because these impacts will be considered in a separate permit process.

817. BOR Section 3.2.8 requires the applicant to provide reasonable assurance that the proposed activity will not cause cumulative impacts to the wetlands and other surface waters in the same basin, but no cumulative impacts exist if adequate mitigation is provided in the same basin. BOR Appendix 6 identifies the basin as the Peace River basin, not the Horse Creek sub-basin.

818. BOR Section 3.3 covers mitigation:

> Protection of wetlands and other surface waters is preferred to destruction and mitigation due to the temporal loss of ecological value and uncertainty regarding the ability to recreate certain functions associated with these features. Mitigation will be approved only after the applicant has complied with the requirements of subsection 3.2.1 regarding practicable modifications to reduce or eliminate adverse impacts. However, any mitigation proposal submitted for review by an

> applicant shall be reviewed concurrently with the analysis of any modifications pursuant to subsection 3.2.1. This section establishes criteria to be followed in evaluating mitigation proposals.
>
> Mitigation as described in sections 3.3-3.3.8 is required only to offset the adverse impacts to the functions identified in sections 3.2-3.2.8.2 caused by regulated activities. In certain cases, mitigation cannot offset impacts sufficiently to yield a permittable project. Such causes often include activities which significantly degrade Outstanding Florida Waters, adversely impact habitat for listed species, or adversely impact those wetlands or other surface waters not likely to be successfully recreated.

* * *

819. Also adopted by DEP, BOR Section 1.7.24 defines "mitigation" as:

> An action or series of actions to offset the adverse impacts that would otherwise cause a regulated activity to fail to meet the criteria set forth in 3.1.1 through 3.3.6. Mitigation usually consists of restoration, enhancement, creation, preservation, or a combination thereof.

820. BOR Section 1.7.4 defines "creation" as the "establishment of new wetlands or surface waters by conversion of other land forms." BOR Section 1.7.33 defines "restoration" as converting "to historic condition those wetlands, surface waters, or uplands which currently exist as a land form which differs from the historic condition."

821. BOR Section 3.3.1.1 states:

> In general, mitigation is best accomplished through creation, restoration, enhancement, or preservation of ecological communities similar to those being impacted. However, when the area proposed to be impacted is degraded, compared to its historic condition, mitigation is best accomplished through creation, restoration, enhancement or preservation of the ecological community which was historically present. Mitigation involving other ecological communities is acceptable if impacts are offset and the applicant demonstrates that greater improvement in ecological value will result.

822. BOR Section 3.3.1.4 provides:

> In instances where an applicant is unable to meet water quality standards because existing ambient water quality does not meet standards and the system will contribute to this existing condition, mitigation for water quality impacts can consist of water quality enhancement. In these cases, the applicant must implement mitigation measures that will cause net improvement of the water quality in the receiving waters for those parameters which do not meet standards. (See 373.414(1)(16)[sic], F.S.)

823. BOR Section 3.3.1.6 provides: "Mitigation for certain mining activities shall be in accordance with subsection 373.414(6), F.S." BOR Section 3.3.1.8 provides that the District will consider on a case-by-case basis "innovative mitigation proposals" that deviate from the requirements of BOR Sections 3.3 through 3.3.6.

824. BOR Section 3.3.2 sets mitigation ratio guidelines and states that actual ratios "needed to offset adverse impacts may

be higher or lower based on a consideration of the factors listed in subsections 3.3.2.1 and 3.3.2.2." BOR Section 3.3.2.1.1 states: "Restoration is usually preferred over creation as it often has a greater chance of success due to soil characteristic, hydrologic regime, landscape position or other factors that favor re-establishment of wetland or other surface water communities." BOR Section 3.3.2.1.1 then sets ranges of ratios, but only for limited wetland communities. These ratios are 2:1 to 5:1 for mangrove swamps, cypress swamps, and hardwood swamps, and 1.5:1 to 4:1 for saltwater marshes and freshwater marshes.

825. BOR Section 3.3.3.2 lists 16 items that must be included in mitigation proposals. BOR Section 3.3.4 requires monitoring of mitigation areas until success is achieved. BOR Section 3.3.5 requires protection of mitigation areas from "incidental encroachment or secondary activities." BOR Section 3.3.6 requires the identification of mitigation success criteria in the ERP.

826. BOR Section 3.3.7 requires a showing of financial responsibility for conducting mitigation, managing the mitigation site, monitoring mitigation, and conducting any necessary corrective mitigation. BOR Section 3.3.7.2 requires security in the amount of 110 percent of the cost of mitigation. BOR Section 3.3.7.6(d) allows the use of a cash deposit into an

escrow account as an acceptable form of establishing financial responsibility. BOR Section 3.3.7.7.a and c requires the amount of financial responsibility to be based on all phases of a phased mitigation project and the cost of services and materials to be based on third-party fair market value.

827. BOR Section 4.2 limits offsite drainage to amounts that will not cause adverse impacts. BOR Section 4.2.a and b bases the limit, for open drainage systems, to the pre-activity amount resulting from the 25-year, 24-hour storm event with a specified antecedent moisture condition. BOR Section 4.2.c bases the limit, for closed drainage systems, to the pre-activity amount resulting from the 100-year, 24-hour storm event with the same specified antecedent moisture condition. BOR Section 1.7.1 defines an "closed drainage system" as a "watershed in which the runoff does not have a surface outfall up to and including the 100-year flood level."

828. BOR Section 4.4 states:

> Flood plain encroachment - No net encroachment into the flood plain, up to that encompassed by the 100-year event, which will adversely effect [sic] either conveyance, storage, water quality or adjacent lands will be allowed. Any required compensating storage shall be equivalently provided between the seasonal high water level and the 100 year flood level to allow storage function during all lesser flood events.

829. BOR Section 5.1 requires that "projects be designed so that discharges will meet applicable state water quality standards." The following sections in the BOR contain elaborate water-quality provisions.

830. Several legal issues arise about the BOR and its role in these cases. First, Charlotte County argues that BOR Section 2.1 requires IMC to obtain a conceptual ERP for the original Ona Mine because OFG is a phase of the larger project or to demonstrate that OFG is "totally independent" of the remainder of the original Ona Mine. Although phasing arises again as to financial responsibility, it does not arise for these cases under BOR Section 2.1 because DEP did not adopt this BOR section. Even if it had, OFG is independent of the remainder of the Ona Mine. The only dependency involving OFG is with the mined-out Ft. Green Mine, which will receive clay tailings at CSA O-1 and O-2.

831. Second, IMC argues that the Legislative recognition of the importance of phosphate mining is entitled to weight in the application of the public interest balancing test. No statute so provides. Absent such direct mandate from the Legislature, the executive branch should not assign relative values to proposed activities, resulting in agency determinations that phosphate mines are more important than private large-vessel marinas, but perhaps not as important as marinas reserved for

use by disabled persons. The importance of phosphate mining receives its due consideration in determining whether IMC has made all practicable design modifications to eliminate or reduce the impacts of mining on wetlands and other surface waters.

832. The most important legal issue in these cases is the relationship of CRP reclamation activities and ERP mitigation. Ms. Llewellyn explained that, at one time, there was some doubt that reclamation work for a CRP could also count as mitigation for an ERP (or dredge and fill permit), but subsequent legislation clarified that CRP wetlands reclamation activities count toward ERP mitigation. No one disputes that CRP reclamation counts toward ERP mitigation.

833. A more complicated issue is whether wetlands reclamation activities that meet all CRP requirements constitute adequate ERP mitigation. As noted above, Section 373.414(6)(b), Florida Statutes, provides that CRP wetlands reclamation activities are "appropriate" ERP mitigation, provided the reclamation activities "maintain or improve the water quality and the function of the biological systems." Section 373.414(6)(b), Florida Statutes, raises two issues: 1) whether "appropriate" ERP mitigation means that CRP reclamation totally or partly preempts ERP mitigation or merely counts toward ERP mitigation; and 2) whether "maintain or improve the water quality" means to maintain the water quality or allows

degradation, but not so much as to cause the water to violate its applicable class standards.

834. The proper interpretation of Section 373.414(6)(b), Florida Statutes, is that CRP wetlands reclamation activities count toward ERP mitigation, but do not preempt, even partly, ERP mitigation.

835. At one time, CRP wetlands reclamation activities counted toward mitigation, but only if they maintained or improved the water quality and the type, nature, and function of biological systems. Although not free from ambiguity as to the extent of mitigation that CRP "may" be considered as providing, Section 403.918(2)(b), Florida Statutes (1991), provided:

> Reclamation and restoration programs conducted pursuant to s. 211.32 may be considered as mitigation to the extent that they restore or improve the water quality and the type, nature, and function of biological systems present at the site prior to the commencement of mining activities.

836. In these cases, DEP and IMC argue that CRP reclamation preempts ERP mitigation. They impliedly argue for partial preemption, as revealed by IMC's attempt to satisfy most of the ERP mitigation requirements, including financial responsibility, as discussed below. Even Charlotte County, construing the Altman Final Order, concedes some preemption, although it argues for limited preemption--specifically, of BOR Sections 3.3.1 and

3.3.2--for which wetlands reclamation under CRP can be "directly substituted" for wetlands mitigation under ERP.

837. Even partial preemption raises practical concerns. BOR Section 3.3.1 contains several mitigation provisions potentially useful for a phosphate mining company seeking an ERP to construct and operate a phosphate mine. If a proposed activity is in an area that already fails to meet applicable water quality standards and the applicant cannot show that the proposed activity will not contribute to the existing violation, BOR Section 3.3.1.4 offers the applicant an opportunity to mitigate by offering water quality enhancement. BOR Section 3.3.1.5 allows an applicant to mitigate adverse secondary impacts from proposed activities to upland habitat functions for listed species by implementing wildlife management plans and other measures. BOR Section 3.3.1.8 allows an applicant to offer "innovative mitigation proposals" when conventional mitigation options fail to offset adverse relevant impacts. If CRP wetlands reclamation activities preempt BOR Section 3.3.1, unless DEP chooses to restrict partial preemption more narrowly, these advantages will be lost to the phosphate mining industry.

838. Partial preemption also raises a problem of statutory interpretation. Limiting the preemption only to BOR Sections 3.3.1 and 3.3.2 or just to BOR Section 3.3.2, which is the section on mitigation ratios, ignores the fact that, according

to the BOR, mitigation is addressed in BOR Sections 3.3-3.3.8. If Section 373.414(6)(b), Florida Statutes, intends for CRP wetlands reclamation to preempt only the direct part of ERP wetlands mitigation, the statute should so provide, but instead the statute offers no guidance in selecting which portions of BOR Sections 3.3-3.3.8 to preempt.

839. As impliedly conceded by DEP and IMC, total preemption is out of the question. As noted above, ERP mitigation requires financial security at the start of the project, but, as noted below, CRP reclamation requires financial security only if the applicant fails to comply with the reclamation schedule and then only for the area that is noncompliant with the reclamation schedule. Total preemption would thus eliminate a substantial amount of ERP financial security and all financial security until many years into mining.

840. Total preemption would also eliminate the detailed ERP requirements for monitoring, protecting, and evaluating mitigation areas because CRP reclamation contains no such provisions. Unless DEP adopted ERP mitigation for mining and CRP for post-mining, total preemption would eliminate mitigation during mining because ERP mitigation addresses all impacts, but CRP reclamation addresses only reclamation, which obviously follows the completion of mining in the area to be reclaimed. Absent ERP mitigation during these activities, IMC would not be

required to mitigate for impacts during mining, such as drawdowns of adjacent wetlands due to the vast mine cuts or water-quality violations resulting from mining, and DEP thus would not be authorized to require IMC to construct the ditch and berm system.

841. The preemption issue may be driven by IMC's attempt to avoid the application of the mitigation ratios in the BOR. For several reasons, none of which is preemption, mitigation ratios should not be imposed on IMC in these cases.

842. BOR Sections 3.3.2 and 3.3.2.1.1 recognize the ratios as guidelines. BOR Section 3.3.1.8 allows "innovative mitigation proposals" that "deviate from the standard practices described in subsections 3.3-3.3.6." Ratios exist because the reclamation of wetlands function takes time and does not always succeed to the extent anticipated. Ratios give the permitting agency and the applicant flexibility by allowing the project to compensate for these deficits by overshooting the mark.

843. No panacea, mitigation ratios do not relieve the applicant of the responsibilities of designing and constructing wetlands competently, as five acres of permanently distressed, low functioning reclaimed mangrove swamp do not offset the loss of one acre of high functioning mangrove swamp. Mitigation ratios are no substitute for rigorous functional analysis. The First District, in <u>Florida Power Corporation v. Department of</u>

Environmental Regulation, 638 So. 2d 545, 553 (Fla. 1st DCA 1994), described the rejection by Mr. Irwin of an attempt to impose a 10:1 ratio for preserved wetlands on his client: "he felt mitigation should be based on functional analysis."

844. Applying a mitigation ratio in these cases implies the failure of specific wetlands within the mosaic proposed by IMC. Mitigation ratios do not contemplate wetlands mitigation in a mined landscape, as is revealed by the discussion of wetlands "restoration" versus "creation" in BOR Section 3.3.2.1.1. Once the topography, soils, and geology down to 52 feet are removed, the notion of restoration, as used in BOR Section 3.3.2, loses its meaning.

845. Only guidelines, the mitigation ratios are also too general to be of much use in these cases or, addressing IMC's concern in particular, to serve as a basis for denying an ERP. BOR Section 3.3.2.1.1 specifies ranges of ratios only for hardwood swamps (2:1 to 5:1) and freshwater marshes (1.5:1 to 4:1). Failing to differentiate among bay swamps, mixed hardwood forests, and cypress swamps and failing even to recognize wet prairies, the mitigation ratios poorly reflect the mitigation experience of the phosphate mining industry.

846. If these mitigation ratios were applied to these cases, IMC would clearly satisfy the freshwater marsh ratio. IMC's undeniable success in generating freshwater marshes across

the reclaimed landscape would entitle it to the low end of the ratio range, which it satisfies by mining 67 acres of freshwater marsh and reclaiming 103 acres. The arithmetic is little tighter as to hardwood swamps, for which IMC proposes to mine 82 acres (including a small area of wetland forest mixed, which is reclaimed in the same acreage) and to reclaim 105 acres. This deviation from the guideline mitigation ratio is insubstantial under the facts of these cases and the poor fit of the mitigation ratios on post-mining mitigation.

847. Counting CRP reclamation, where appropriate, toward ERP mitigation is proper, but using CRP reclamation to preempt, in whole or in part, ERP mitigation is unwise and not required by the statute. Section 373.414(6)(b), Florida Statutes, requires only that DEP treat CRP wetlands reclamation activities as "appropriate" ERP mitigation, if certain conditions are met. "Appropriate" means "suitable" or "fit," not "sufficient," as DEP argues in its proposed recommended order. "Suitable" or "fit" suggests only that CRP wetlands reclamation activities should count toward ERP mitigation. Not taking a clear position on this issue, the BOR notes only that mitigation for phosphate mining shall be "in accordance" with the statute. Based on the clear language of the statute and for the reasons set forth above, DEP should interpret this statute to mean only that CRP

wetlands reclamation activities should count toward ERP mitigation.

848. If DEP chooses instead to treat "appropriate" as "sufficient," under Section 373.414(6)(b), Florida Statutes, then it must carefully apply the conditional language for preemption. If CRP reclamation actually maintains water quality and biological functions, its preemption of ERP mitigation should be inconsequential. DEP's interpretation, which is to allow IMC not to maintain water quality, as long as the degradation does not violate Class III standards, raises the possibility that the CRP "mitigation" will not be the functional equivalent of ERP mitigation.

849. DEP may be reluctant to apply the conditional language of Section 373.414(6)(b), Florida Statutes, without substituting "applicable water quality standards" for "water quality," due to the appearance of the same conditional language in Section 378.203(10), Florida Statutes, which is the definition of "restoration." This concern is unfounded for two reasons. First, as noted in the next section, Chapter 378, Part III, Florida Statutes, fails to incorporate the statutory definition of "restoration" into any reclamation standard, and the rules adopt a more relaxed approach to restoration. Second, even if the Legislature were to amend Chapter 378, Part III, Florida Statutes, to apply this performance criterion to CRP restoration

of wetlands, Section 378.203(10), Florida Statutes, requires DEP to apply this criterion subject to "technological limitations and economic considerations"--qualifications that do not attenuate the force of the conditional language in Section 373.414(6)(b), Florida Statutes.

850. One final disincentive exists for interpreting "maintain" as "degrade, but not below applicable standards." Such an interpretation may result in a determination that CRP criteria offset relevant impacts that ERP mitigation criteria would not otherwise offset. Such an interpretation would invite ERP challenges based on the residual provisions of Sections 373.413(1) and 373.414(1), Florida Statutes. These statutes clearly state that ERP permitting is part, but not all, of a showing that a proposed activity "will not be harmful to the water resources."

851. When discussing the principle of deference to proposed agency action, DEP and IMC cite approvingly Florida Audubon Society et al. v. Lennar Homes, Inc. and South Florida Water Management District, 2003 WL 124674, DOAH Case No. 02-1629 (Jan. 2003), but they did not cite this Final Order for the District's rejection of the legal conclusions of the undersigned Administrative Law Judge as to the operation of Sections 373.413(1) and 373.414(1). In Lennar, the South Florida Water Management District, applying Sections 373.413(1) and

373.414(1), Florida Statutes, cautioned that an applicant had to provide reasonable assurances that the proposed activity met the ERP criteria and, separate and distinct from this showing, had to provide reasonable assurances that the proposed activity "will not be harmful to the water resources." In the long run, undermining the relatively clear ERP criteria unwisely leaves proposed activities subject to the more amorphous standard of harm to the water resources and ignores many years of work in developing the increasingly refined ERP rules.

852. This Recommended Order therefore interprets Section 373.414(6)(b), Florida Statutes, to require only that CRP reclamation be counted toward ERP mitigation. This Recommended Order does not apply mitigation ratios so as to conclude that the OFG mitigation is inadequate.

853. Even if DEP concludes that CRP reclamation preempts ERP mitigation, DEP must deal with a significant issue concerning ERP mitigation. Unless DEP applies partial preemption to ERP financial responsibility, which is under BOR mitigation provisions, IMC must comply with ERP financial responsibility. It appears that neither DEP nor IMC believes otherwise because, as noted below, the financial responsibility that is part of these cases bears the clear indicia, such as timing and amounts, of ERP financial responsibility, not CRP financial responsibility.

854. Under ERP, IMC must demonstrate financial responsibility for the proposed mitigation. Mitigation is what is necessary to offset the relevant impacts of the proposed activities. For OFG, the most visible of these mitigative actions, if not also the most important, is obtaining and transporting sand tailings to the mine cut in sufficient quantities to replicate pre-mining topography. Accordingly, this aspect of mitigation must be covered by ERP financial responsibility.

855. IMC dismisses Charlotte County's argument that it must post financial security for the sand tailings by noting that backfilling of sand tailings is part of "mining operations" because it is part of waste disposal. Perhaps this is true, but, as discussed in the next section, Florida Administrative Code Rule 62C-16.0051(2) and (8)(b)2 devotes considerable attention to backfilling, as part of reclamation. However, for the sake of this discussion, one may assume that the CRP regulatory scheme differentiates between mining operations and reclamation, which begins where mining operations end, so as to exclude backfilling with sand tailings. If this distinction exists in the CRP regulatory scheme, it is absent in the ERP regulatory scheme. ERP financial responsibility, which is indisputably what IMC has offered at this point, focuses on "mitigation," not "mining operations" or "reclamation."

856. The mitigation for which ERP financial responsibility is required is easy to identify. The purpose of ERP financial responsibility is to ensure that an applicant finishes what it starts. IMC has an economic incentive to mine. Except to avoid penalties and unfavorable agency action on future mining applications, IMC has no direct economic incentive to return the sand tailings to the mine cuts or otherwise undertake mitigation. At the point that IMC's direct economic incentive ends, ERP financial responsibility begins, without regard to the economically insignificant CRP distinction between mining operations and reclamation. Applying to those proposed activities that, in an unregulated environment, an applicant would have no economic incentive to conduct, ERP financial responsibility exists to ensure that the permit holder that derives the economic benefit from the permitted activity--not the taxpayers--bears the cost of mitigation.

857. Relying on CRP nomenclature, IMC has offered a hybrid form of financial responsibility that resembles ERP financial responsibility, but for the omission of the third-party cost of acquiring and transporting the sand tailings to backfill the mine cuts at OFG. Absent the backfilling of sand tailings, the remainder of mitigation has nowhere to take place, so financial responsibility for the latter, without the former, is useless. As IMC argues in its proposed recommended order, its status as a

phosphate mining company does not mean that it should be treated worse than other ERP applicants, but neither does it mean that it should be treated better. Mining is beside the point here. Mitigation is what must be financially secured, and backfilling the mine cuts is, under ERP, mitigation.

858. The BOR requirement that the costs be based on third parties supplying the materials at fair market value presents a problem as to sand tailings, given the enormous volume required to fill the OFG mine cuts and the presumably limited availability of this commodity in such volumes. There are few active phosphate mining companies, and not all of them might be able to supply such vast amounts of sand tailings when they are needed.

859. However, the "innovative mitigation proposals" endorsed in BOR Section 3.3.1.8 apply only to BOR Sections 3.3 through 3.3.6; the financial-responsibility provisions are in BOR Section 3.3.7. Although DEP failed to adopt it, BOR Section 1.3 reminds the user of the Basis of Review that its primary goal is to meet District water resource objectives, and the "criteria are designed to be flexible." DEP's failure to adopt BOR Section 1.3 does not change the flexible character of BOR criteria.

860. The purpose of financial responsibility is to ensure the availability of sand tailings at no cost to the taxpayers,

not to discourage their use in reclamation. DEP should exercise the flexibility inherent in the Basis of Review by considering alternatives to third-party costs for the acquisition of sand tailings in the volume required. Financial security based on third-party cost estimates do not guarantee the actual availability of the massive volumes of sand tailings that are needed to fill the mine cuts when they are needed. DEP should instead allow, and perhaps require, IMC to post financial security for the cost of sand tailings by conveying a first mortgage lien or security interest, free of all other encumbrances, in DEP's favor as to these sand tailings and grant to DEP the right to sever them from the land on which they are located.

B. Final Conclusions of Law Regarding ERP

861. Unmitigated, the proposed activities will have direct impacts to wetlands and other surface waters in terms of their functions provided to fish and wildlife and the quality of receiving waters, and the proposed activities will be contrary to the public interest.

862. Unmitigated, the proposed activities will not cause adverse secondary impacts. The secondary impacts from the ERP all require their own permitting, and a more precise analysis of these impacts, as direct impacts, will take place in those permitting proceedings for these proposed activities. Also, the

agricultural activities, post-reclamation, are not secondary impacts facilitated by this ERP because they pre-exist the proposed activities for which IMC seeks an ERP.

863. Unmitigated, the proposed activities would require the analysis of adverse cumulative impacts; however, the proposed mitigation is in the Peace River basin, so, if DEP deems the mitigation adequate, cumulative impacts are irrelevant by statute. If DEP deems the mitigation inadequate, cumulative impacts are irrelevant because DEP must deny the ERP anyway.

864. The presence of direct adverse impacts requires IMC to undertake design modifications to eliminate or reduce these impacts to the extent practicable. IMC satisfies the requirement of elimination by modifying the design to delineate the no-mine area within OFG. The delineation of the no-mine area means that it is highly unlikely that this land will ever be mined.

865. By contrast, IMC's decision to reduce the original Ona Mine to OFG does not constitute a design modification to eliminate or reduce impacts. IMC plans to obtain the permits and approvals to mine the remainder of the original Ona Mine in the future, although OFG is a standalone project. Thus, IMC has only deferred the mine-permitting process for over 15,000 acres to the east of OFG. If IMC gets credit now for the elimination or reduction of these 15,000 acres, its later attempt to mine

this land retroactively negates a conclusion of elimination or reduction as to this land.

866. After eliminating impacts by delineating the no-mine area, IMC has reduced impacts through its adoption of various other safeguards, such as a ditch and berm system, replication of the pre-mining topography (which precludes Land-and-Lake reclamation), and various other means set forth above. IMC has thus adopted the necessary design modifications to eliminate and reduce the impacts to the extent practicable.

867. The determination of the practicable limits of design modifications to eliminate or reduce impacts is necessarily imprecise, especially for a proposed activity of the scale and complexity of OFG. No one at IMC can predict with certainty the market value of phosphate rock during mining or after processing or exactly how much mineable rock is where within OFG. Production costs, such as the cost of fuel, electricity, equipment, and labor, are variable. There is enough margin that Robert Kinsey, IMC Vice President Operations Support, can concede that the removal of another 50 acres from the area to be mined would not deprive the project of its financial feasibility, but even he cannot know precisely the breakeven point. Prospectively, only the most generalized conclusions of practicability are themselves practicable.

868. Any determination of the limits of practicability must acknowledge IMC's observation, that, unlike most applications, this proposed activity is mining and the disturbance of wetlands and other surface waters is part of, not incidental to, the proposed activity. Phosphate mining has a comprehensive impact on the overburden--and the wetlands, streams, and wildlife that have carved their niches in the overburden--but, as the Legislature has found, these disturbances are inextricably linked to the extraction of the phosphate ore out of the deeper part of the surficial aquifer. The practicability determination in these cases thus must also acknowledge that phosphate mining is restricted to the few areas with mineable quantities of phosphate ore. IMC does not propose to destroy wetlands and surface waters to build a regional shopping center or residential/commercial mixed-use development, which could be sited anywhere. IMC has thus adopted the necessary design modifications to eliminate the impacts to the extent practicable.

869. These conclusions of adequate elimination and reduction of impacts do not mean that IMC's proposed mitigation is sufficient, or that IMC may not be able to make additional design modifications, such as enlarging the no-mine area, without endangering the financial feasibility of the proposed project. These findings mean only that IMC has made sufficient

design modifications that it is entitled to proceed to the next step of the ERP process: detailed analysis of the impacts, pursuant to the three categories listed in the first paragraph of this subsection.

870. The inquiry as to the functions that wetlands and other surface waters provide to fish and wildlife focuses on the impacts to the abundance and diversity of fish and wildlife and their habitat. This functional determination for each wetland or other surface water is driven by five factors: condition, hydrologic connection, uniqueness, location, and fish and wildlife use. This functional determination for each wetland or other surface water is also driven by alterations to hydroperiods, water levels, water quality, and habitat.

871. During mining, the ditch and berm system will provide a measure of protection to wetlands and other surface waters not to be mined, but, based on past experience, the system will not prevent drawdowns unless IMC installs recharge wells. With recharge wells, further analysis of the impact of mining on wetlands and other surface waters within the no-mine area is unnecessary.

872. Turning to the condition of wetlands and other surface waters to be mined, their condition varies more widely than does the condition of wetlands and other surface waters in the no-mine area, which are at least high functioning, except

for part of Horse Creek's riparian wetlands, the wetlands associated with Streams 7e, 8e, and 9e, a small fringe along the Heart-Shaped Wetland, the riparian wetland of Stream 6w, and the East Lobe. Among the hydrologically connected wetlands and other surface waters besides streams, those outside the no-mine area are mostly moderate functioning, with isolated low-functioning areas, except for the wetland systems of the Stream 1e series and Streams 3e and 3e′, which are generally high functioning. Except for two small areas of moderate functioning wetlands, the Stream 1e series wetlands are all high, very high, or highest functioning. By contrast, the Stream 3e corridor and the southwest half of its headwater wetland are moderate functioning, as is part of the headwater wetland of Stream 3e′, and no area within the wetlands associated with these two streams is in the highest two categories of functional value.

873. The streams and their floodplains are prominent among hydrologically connected resources for their direct impact on detrital export, base flow maintenance, water quality enhancement, and nursery habitat. The only streams outside the no-mine area in relatively unaltered condition are the Stream 1e series and Stream 3e.

874. The isolated wetlands at OFG, especially if ephemeral, are important habitat for wildlife, especially amphibians. There are few very such wetlands presently at OFG,

and the high functioning isolated wetlands are all in the Panhandle, outside the no-mine area.

875. The public interest test, which is reserved for proposed activities in wetlands or other surface waters, balances a variety of factors, including flooding, streamflow, and marine productivity, as well as the current condition and relative value of functions performed by areas to be mined, and the duration of the impacts. Unmitigated, of course, the proposed activity fails the public interest test, both during mining, which is a temporary impact, and after mining, where the unmitigated condition of the land would be permanent.

876. The water quality test is whether the proposed activities will not violate applicable water quality standards. At OFG, the waters are Class III waters. Unmitigated, mining obviously would violate applicable water quality standards. The Basis of Review for water quality requires, for parameters not meeting water quality standards, that IMC show that the proposed activity will not contribute to the existing violation or, failing that, a net improvement.

877. These cases obviously turn on the adequacy of mitigation. Two guiding principles from the Basis of Review bear emphasis at this point. Although, as stated by the court in 1800 Atlantic, mitigation is typically possible to offset impacts, mitigation may not be sufficient to offset impacts to

wetlands or other surface waters "not likely to be successfully recreated." On the other hand, the Basis of Review, after expressing a preference for the re-creation of historic communities, acknowledges that the re-creation of other communities is acceptable if doing so would result in a greater improvement in "ecological value."

878. The proposed mitigation is insufficient to offset the relevant impacts. The most significant omission is the exclusion from the no-mine area of the Stream 1e series, its wetlands, and its 25-year floodplain. This is necessary due to the excellent condition of this wetlands/surface water system, the many complex functions that this system provides, and the unlikelihood that IMC can successfully reclaim this system within any reasonable period of time, if ever.

879. By soil type and floodplain width, the Stream 1e series, unlike Stream 3e, resembles Horse Creek, which, with its 100-year floodplain, are the two most important natural resources at OFG.

880. A forested wetland riparian system presents the usual difficulties of reclamation posed by all forested wetlands besides cypress swamps. Mining this forested wetland riparian system and its floodplain poses the long-term loss of the canopy, which cools the waters and reduces evaporation loss and provides valuable habitat; the roots of mature trees, which

enter into complicated relationships with the soil and improve water quality by uptaking nutrients; the trunks of mature trees, which attenuate floodwaters; and the floodplain, which provides a microtopography of considerable complexity and importance in terms of habitat value and water quality.

881. For Stream 1e itself, the only comparable reclamation is Dogleg Branch, but it is a poor comparable. First, reclaimed Dogleg Branch does not communicate with its floodplain, while the Stream 1e series communicates with its broad floodplain. Second, Dogleg Branch was a much simpler reclamation project. It is much shorter than the Stream 1e series, lacks flow-through wetlands, and never lost its headwater wetlands, as would the Stream 1e series presently at OFG. Dogleg Branch and the Stream Restoration Plan are sufficient to support reasonable assurance for those other lower functioning, less complicated stream systems at OFG, even Stream 3e, but not the Stream 1e series.

882. For E008, the reclaimed bay swamp at the upper end of the Stream 1e series, IMC has failed to provide reasonable assurance of the reclamation of a functional hydroperiod or inundation depth for this riparian wetland. For all their hydrological and biological importance, bay swamps have not been reclaimed except under circumstances inapplicable here.

883. On the other hand, there is scant mention in the record of the inconvenience to mining and additional expense

that will ensue from placing the Stream 1e series, its connected wetlands, and its 25-year floodplain into the no-mine area. Deputy Director Cantrell alluded to this as a reason why DEP could not require IMC not to mine this resource. Although the conclusory balancing of factors is the responsibility of DEP, not the Administrative Law Judge, the role of the hearing is to develop the factual background against which informed balancing can take place. Without considerably more in the record as to the impracticability of placing the Stream 1e series, its connected wetlands, and its 25-year floodplain into the no-mine area, DEP cannot reasonably rely on impracticability as a basis for declining to do so. Moreover, given the above-described characteristics of the Stream 1e series, its connected wetlands, and its 25-year floodplain, as well as other factors, including the phosphate mining industry's reclamation experience, the placement of the Stream 1e series, its connected wetlands, and its 25-year floodplain, in the no-mine area is imperative, regardless of the impact upon IMC.

884. DEP abuses its discretion if it does not modify the ERP as follows:

> a. Add the Stream 1e series, its connected wetlands, and its 25-year floodplain to the no-mine area. However, DEP may allow IMC to mine up to five percent of this floodplain, if it is outside of any wetlands area, to straighten the no-mine boundary, so as to facilitate mining. If the relevant impacts

from transporting the dragline can be mitigated, after they have been eliminated and reduced, add suitable provisions to allow IMC to transport the dragline through as narrow and unforested a corridor as possible across Stream 1ee, which has the narrowest riparian band among the streams of the series and is in the path of the most direct route to where the dragline must go, during the dry season, upon such conditions as DEP finds necessary to impose.

b. Add Stream 3e′ to the Stream Restoration Plan.

c. Amend Table 1 to indicate that the hydroperiod for bay swamps is 8-11 months.

d. Amend ERP Specific Condition 10.a to require an adequate number of properly spaced recharge wells in the ditch and berm systems--with or without the floats recommended by Dr. Garlanger.

e. Require IMC to grade the tops of spoil piles--whether in rows, U-turns at the end of rows, or against the sides of mine cuts--to achieve a constant progressive depth of sand tailings from five feet, nearest the basin divide, to fifteen feet, nearest the riparian wetland.

f. Require a new Map I-1 that is the same as that submitted at the end of the hearing.

g. Amend ERP Specific Condition 14.b to require a minimum of one foot of muck for each reclaimed bay swamp.

h. Amend ERP Specific Condition 14.c to require at least four feet of sand tailings and four inches of topsoil at the location of each reclaimed wet prairie, except that rim mulching may substitute for topsoil.

i. Substitute in ERP Specific Condition 14.i the interval of 0.1 foot for 1.0 foot for the contours of reclaimed wetlands, as shown on the final topographic map. (This is the level of precision at which the hydrologists work, and it is within the level of precision of the GPS-aided earthmoving equipment.)

j. Require the incorporation of Figure 13-3 and add to ERP Specific Condition 16.B.2 the requirement that IMC must conduct multiple transects over, as far as practicable, the centers of sand tailings valleys and overburden plateaus in each of those modeled wetlands that are large enough to span sand tailings valleys and overburden plateaus--e.g., W003, W039, and E018/E019/E020.

k. Replace Stream 8e, as a reference wetland, with Stream 7e on Table RF-1.

l. Add Table RF-1 to identify the 35 reference wetlands in the ERP.

m. Eliminate the visual-evaluation exception from ERP Specific Condition 17.d. (This was more appropriate when monitoring imposed a criterion of species identity, such as from the Morisita's Index.)

n. Prohibit IMC from conveying OFG to the Carlton-Smith family or any other party until DEP has released IMC from all liability for mitigation. (If the vague assurances in the CDA about a conveyance after reclamation allow a conveyance without completion of all mitigation, DEP and its contractors may not be able to enter the land to perform the required work, even if DEP has sufficient financial security to complete the mitigation.)

o. Recalculate financial responsibility in Table B in ERP Specific Condition 3 to include a hydrologist's fees for post-backfilling engineering work to assure proper hydroperiods and inundation depths for reclaimed wetlands.

p. Recalculate financial responsibility in Table B in ERP Specific Condition 3 to include a mechanism to assure the ability of DEP or its contractors to obtain and transport adequate sand tailings when needed to backfill the mine cuts at OFG.

q. Recalculate financial responsibility in Table B in ERP Specific Condition 3 to include the additional length of Stream 3e′.

r. Amend ERP Specific Condition 11 to require that IMC relocate gopher tortoises prior to mining, in accordance with its plans, and present to BMR an approval from FWC to its gopher tortoise relocation plan.

IV. CRP

A. Statutes, Rules, and Legal Issues

885. Section 378.202, Florida Statutes, provides:

> (1) Florida is endowed with varied natural resources that provide recreational, environmental, and economic benefit to the people of this state. The extraction of phosphate is important to the continued economic well-being of the state and to the needs of society. While it is not possible to extract minerals without disturbing the surface areas and producing waste materials, mining is a temporary land use. Therefore, it is the intent of the Legislature that mined lands be reclaimed to a beneficial use in a timely manner and in a manner which recognizes the diversity among mines, mining operations, and types of lands which are mined.
>
> (2) The rules developed by the department for the regulation of mandatory land reclamation should be consistent with the goals of the state to simplify and coordinate regulation. The department shall enter into memoranda of understanding to eliminate duplication, to simplify the processing of

reclamation applications, and to maximize the effectiveness of the regulatory process.

886. Section 378.207, Florida Statutes, provides:

> (1) The department, by rule, shall adopt statewide criteria and standards for reclamation. Such rules shall recognize that surface mining takes place in diverse areas where the geologic, topographic, and edaphic conditions are different, and that reclamation operations and the specifications therefor may vary accordingly. The rules, recognizing technological limitations and economic considerations, shall require the return of the natural function of wetlands or a particular habitat or condition to that in existence prior to mining.
>
> (2) The criteria and standards shall govern performance of reclamation and not the methodology to be used to achieve compliance with the reclamation obligation or the manner in which mining and associated activities are conducted.

887. Section 378.203, Florida Statutes, provides in relevant part:

> (9) "Reclamation" means the reshaping of lands in a manner that meets the reclamation criteria and standards contained in this part.
> (10) "Restoration" means the recontouring and revegetation of lands in a manner, consistent with the criteria and standards established under this part, which will maintain or improve the water quality and function of the biological systems present at the site prior to mining. In requiring restoration of an area, the department must recognize technological limitations and economic considerations. For example, restoration must be considered accomplished when immature trees are used; mature trees are not required to be replanted in areas

> where mature trees were removed to allow mining.
>
> (11) "Revegetation" means, in reclaimed areas, a cover of vegetation consistent with the criteria and standards established pursuant to this part and consistent with the land form created and the future land uses. In restored areas, it means a cover of vegetation that is designed to return the restored area to the condition in existence prior to mining.

888. Section 378.208, Florida Statutes, sets forth the CRP requirements for financial responsibility, and Section 378.209(1), Florida Statutes, sets forth the CRP requirements for the pace of reclamation. Because the corresponding rules track the statutes, but add more details, these provisions are set forth below in Florida Administrative Code Rule 62C-16.0075.

889. Florida Administrative Code 62C-16.051 provides, in relevant part:

> (2) Backfilling and Contouring. The proposed land use after reclamation and the types of landforms shall be those best suited to enhance the recovery of the land into mature sites with high potential for the use desired.
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> * * *
>
> (3) Soil Zone.
>
> (a) The use of good quality topsoils is encouraged, especially in areas of reclamation by natural succession.
>
> (b) Where topsoil is not used, the operator shall use a suitable growing medium for the type vegetative communities planned.

(4) Wetlands which are within the conceptual plan area which are disturbed by mining operations shall be restored at least acre-for-acre and type-for-type.

(5) Wetlands and Water Bodies. The design of artificially created wetlands and water bodies shall be consistent with health and safety practices, maximize beneficial contributions within local drainage patterns, provide aquatic and wetlands wildlife habitat values, and maintain downstream water quality by preventing erosion and providing nutrient uptake. Water bodies should incorporate a variety of emergent habitats, a balance of deep and shallow water, fluctuating water levels, high ratios of shoreline length to surface area and a variety of shoreline slopes.

(a) At least 25% of the highwater surface area of each water body shall consist of an annual zone of water fluctuation to encourage emergent and transition zone vegetation. This area will also qualify as wetlands under the requirements of subsection (4) above if requirements in paragraph 62C-16.0051(9)(d), F.A.C., are met. In the event that sufficient shoreline configurations, slopes, or water level fluctuations cannot be designed to accommodate this requirement, this deficiency shall be met by constructing additional wetlands adjacent to and hydrologically connected to the water body.

(b) At least 20% of the low water surface shall consist of a zone between the annual low water line and six feet below the annual low water line to provide fish bedding areas and submerged vegetation zones.

(c) The operator shall provide either of the following water body perimeter treatments of the high water line:

1. A perimeter greenbelt of vegetation consisting of tree and shrub species indigenous to the area in addition to ground cover. The greenbelt shall be at

least 120 feet wide and shall have a slope no steeper than 30 feet horizontal to one foot vertical.

2. A berm of earth around each water body which is of sufficient size to retain at least the first one inch of runoff. The berm shall be set back from the edge of the water body so that it does not interfere with the other requirements of subsection (5).

(6) Water Quality.

(a) All waters of the state on or leaving the property under control of the taxpayer shall meet applicable water quality standards of the Florida Department of Environmental Protection.

(b) Water within all wetlands and water bodies shall be of sufficient quality to allow recreation or support fish and other wildlife.

(7) Flooding and Drainage.

(a) The operator shall take all reasonable steps necessary to eliminate the risk that there will be flooding on lands not controlled by the operator caused by silting or damming of stream channels, channelization, slumping or debris slides, uncontrolled erosion, or intentional spoiling or diking or other similar actions within the control of the operator.

(b) The operator shall restore the original drainage pattern of the area to the greatest extent possible. Watershed boundaries shall not be crossed in restoring drainage patterns; watersheds shall be restored within their original boundaries. Temporary roads shall be returned at least to grade where their existence interferes with drainage patterns.

(8) Waste Disposal.

(a) Clay Wastes.

1. Disposal areas shall be reclaimed as expeditiously as possible. Experimental methods which speed reclamation and which

are consistent with these rules are encouraged.

2. To the greatest extent practical, all waste clays shall be disposed of in a manner that reduces the volume needed for disposal.

3. Above-ground disposal areas shall be reclaimed in a manner so that long-term stabilization of retention dikes and dams is assured.

4. Waste clays shall be disposed of in a manner which minimizes the length of time waste disposal sites are needed for mining operations, reduces the impact on drainage patterns and premining topography, and considers postreclamation land use potential.

(b) Sand Tailings.

1. Sand tailings should not be permanently spoiled above natural grade unless needed to meet regulatory or environmental requirements.

2. The operator shall give highest priority to the use of sand tailings for backfilling mine cuts, for accelerating the thickening of waste clays, or as a soil enhancement by mixing the sand with the surface clays on clay storage areas.

(9) Revegetation. The operator shall develop a revegetation plan to achieve permanent revegetation, which will minimize soil erosion, conceal the effects of surface mining, and recognize the requirements for appropriate habitat for fish and wildlife.

(a) The operator shall develop a plan for the proposed revegetation, including the species of grasses, shrubs, trees, aquatic and wetlands vegetation to be planted, the spacing of vegetation, and, where necessary, the program for treating the soils to prepare them for revegetation.

(b) All upland areas must have established ground cover for one year after planting over 80% of the reclaimed upland area, excluding roads, groves, or row crops. Bare areas shall not exceed one-quarter (1/4) acre.

(c) Upland forested areas shall be established to resemble premining conditions where practical and where consistent with proposed land uses. At a minimum, 10% of the upland area will be revegetated as upland forested areas with a variety of indigenous hardwoods and conifers. Upland forested areas shall be protected from grazing, mowing, or other adverse land uses to allow establishment. An area will be considered to be reforested if a stand density of 200 trees/acre is achieved at the end of one year after planting.

(d) All wetland areas shall be restored and revegetated in accordance with the best available technology.

1. Herbaceous wetlands shall achieve a ground cover of at least 50% at the end of one year after planting and shall be protected from grazing, mowing, or other adverse land uses for three years after planting to allow establishment.

2. Wooded wetlands shall achieve a stand density of 200 trees/acre at the end of one year after planting and shall be protected from grazing, mowing, or other adverse land uses for five years or until such time as the trees are ten feet tall.

(e) All species used in revegetation shall be indigenous species except for agricultural crops, grasses, and temporary ground cover vegetation.

(10) Wildlife.

(a) The operator shall identify what measures have been incorporated into the conceptual plan or program to offset fish and wildlife values lost as a result of mining operations and shall identify special programs to restore, enhance, or reclaim particular habitats, especially for endangered and threatened species, as identified by the Florida Game and Fresh Water Fish Commission or the U.S. Fish and Wildlife Service.

(b) The operator may designate specific locations within the mine as “Wildlife

Areas" and include a plan for reclamation and management for sites so designated. Slopes, revegetation, and erosion control requirements may be modified by the department in such areas on a case-by-case basis where such changes will benefit the overall plan for the propagation of wildlife areas.

(11) Time Schedule.

(a) Each operator shall develop a time schedule for completion of the reclamation process in the area covered by the application. The time schedule shall include an estimate of:

1. When removal of phosphate rock in the area will be completed, including the estimated acreage to be mined in each calendar year that mining will occur.

2. When any other mining operations phase in the area will be completed and an explanation of such operations.

3. When waste disposal will be started and completed.

4. When contouring will be started and completed.

5. When revegetation will be started and completed.

(b) Completion dates.

1. Where mined-out areas will be used for waste disposal, waste disposal shall be completed as soon as practical after mining has occurred. Waste disposal on other sites shall also be completed as soon as practical. The completion date for waste disposal shall consider the availability and volume of materials needed.

2. Contouring for all acres mined in a given calendar year shall be completed no later than 18 months after the end of that calendar year or 18 months after an area is capable of being contoured when additional mining operations, such as waste disposal, occur. If contouring is needed on lands that are disturbed by mining operations, but not mined, then contouring on such lands shall be completed no later than the end of

> the year following the year in which mining operations ceased on such lands.
>
> 3. Revegetation shall be completed as soon as practical after each acre is contoured, but no later than six months after contouring is required to be completed. The executive director may allow a later completion date upon a showing of good cause.
>
> 4. Reclamation and restoration shall be completed within two (2) years of the actual completion of mining operations, exclusive of the required growing season to ensure the growth of vegetation, except that where sand-clay-mix or other innovative technologies are used, the department may specify a later date for completion. The required completion date may vary within a program, depending upon the specific type of mining operation conducted.
>
> 5. The completion dates for each phase of the reclamation and restoration activities shall be extended by the period of any delays attributable to causes beyond the reasonable control of the operator.

890. Florida Administrative Code 62C-16.0041(1)(f) requires a written and graphic description of the reclamation and restoration plans.

891. Florida Administrative Code Rule 62C-16.0021 provides the following definitions for Florida Administrative Code Chapter 62C-16:

> (4) "Conceptual reclamation plan" or "conceptual plan" shall mean a graphic and written description of general activities to be undertaken across the whole mine to comply with the reclamation standards contained in this chapter.

(9) "Mining operations" shall mean those physical activities other than prospecting and site preparation, which are necessary for extraction, waste disposal, storage, or dam maintenance prior to abandonment.

(13) "Reclamation" shall mean the reshaping of lands in a manner which meets the reclamation standards, including revegetation, contained in this chapter.

(15) "Restoration" shall mean the recontouring and revegetation of lands in a manner, consistent with the criteria and standards established pursuant to this chapter, which will return the type, nature, and function of the ecosystem to the condition in existence immediately prior to mining operations. In requiring restoration of an area, the department shall recognize technological limitations and economic considerations. For example, restoration shall be considered accomplished when immature trees are used; mature trees are not required to be replanted in areas where mature trees were removed to allow for mining.

(16) "Revegetation" shall mean, in reclaimed areas, a cover of vegetation consistent with the standards established pursuant to this chapter and consistent with the land form created and the future land uses. In restored areas, it means a cover of vegetation that is designed to return the restored area to the condition in existence prior to mining.

(18) "Waste" shall mean all earth materials, exclusive of the phosphate being mined for sale, removed from the acres mined and requiring some means of disposal. This shall only include wastes generated by mining or benefaction of the phosphate.

(19) "Wetlands" shall mean the various types of habitats and vegetative communities

which exist where the water table is at or above grade for periods of the year and shall include forested wetlands, such as hardwood swamps, cypress swamps, and domes, and nonforested wetlands, such as wet prairies and freshwater marshes.

892. Florida Administrative Code 62C-16.0075 provides:

(1) Security.

(a) Form of Security. If the Department determines that an operator is not in compliance with the rate of reclamation established in subsection (5), the Department shall notify the operator in writing that the operator shall have 30 days to post one or more of the following forms of security:

1. A lien in favor of the state on unmined lands or on reclaimed and released real property owned in fee simple absolute by the operator.

2. A surety bond using the form provided by the bureau or a comparable format approved by the bureau.

3. A letter of credit using the form provided by the bureau or a comparable format approved by the bureau.

4. A donation of land acceptable to the state whereby every acre donated would relieve the company of the obligation to bond or otherwise provide security for the reclamation of acres mined, based on a ratio of 1 acre donated to cover the financial responsibility for 10 or more, at the discretion of the department, acres of mined lands. This donation would not relieve the operator of the obligation to reclaim and will not be released upon reclamation of the delinquent acres. The donation shall be made in accordance with Chapter 253, F.S.

5. A cash deposit or trust fund payable to the state.

(b) The form of security posted shall be at the option of the operator and shall cover the number of acres for which the operator is delinquent in reclaiming in the required time period as well as the number of acres that the operator must reclaim in the current five-year period. The security posted shall remain in effect until all delinquent acres are reclaimed, except as provided in subparagraph (1)(a)4. above.

(c) Release of posted securities. The operator may request that the land upon which a security has been posted be released. Such request shall be in writing to the bureau. If the security cannot be released, the executive director or his designee shall notify the operator in writing within 30 days of such request specifically what work must be done in order to obtain release of the security. The posted security shall be released within 30 days of a determination by the executive director that reclamation upon delinquent acres has been completed. Release shall consist of notification in writing by the executive director that the operator is no longer under obligation to have a posted security and return of the security, except for donated lands.

(d) Failure to provide the department with an acceptable form of security within the time allowed will constitute a major violation for which the department may institute a civil action in accordance with Rule 62C-16.071, F.A.C.

(e) The notification provided pursuant to paragraph (1)(a), shall include:

1. The number of acres on which reclamation is delinquent.

2. Which five-year period the delinquency covers.

3. The number of acres covered by the current five-year period.

4. The amount of security required at the current time.

5. How the amount of security was determined.

(f) Should the security be in the form of a surety bond, letter of credit or cash deposit, or trust fund payable to the state, the amount of the security will be adjusted annually for the percentage change in the construction cost index as published in the Engineering News Record. The percentage change shall be for the twelve-month period beginning on the date of notification, pursuant to paragraph (1)(a).

(2) Establishment of required security. The amount of the security shall be established by the executive director using the following criteria:

(a) The amount and type of reclamation involved.

(b) The probable cost of proper reclamation.

(c) Inflation rates based on the construction cost index as published in the Engineering News Record.

(d) Changes in mining operations.

(e) The amount of security shall not exceed $4,000 per acre for each reclamation program, adjusted annually by the appropriate inflationary index for construction.

(3) Waiver or Modification of Financial Security. In instances where the intent of the financial responsibility requirements will not be at risk, the department may modify or release an operator from the requirements of posting security. Requests for such modifications or releases shall be filed as requests for a variance in accordance with Rule 62C-16.0045, F.A.C. Consideration shall be given to the following:

(a) Past performance by the operator in complying with approved reclamation programs and conceptual plans.

(b) Compliance by the operator with all other portions of this rule.

(c) The size and nature of the operation, when the reclamation effort may be reduced significantly by the lapse of time and/or a single reclamation program currently underway would bring the operator into compliance with reclamation rates. It must be shown that reclamation rates would be met should a portion of the reclamation program(s) be considered as reclaimed in proportion to the percentage of the reclamation work effort completed on the program.

(d) The department's analysis of the operator's financial statements.

(4) Financial Statements.

(a) Within 120 days of the end of the operator's annual reporting period, operators shall submit to the department audited financial statements for the mining operation.

(b) Operators that are subsidiaries of a parent may be required to submit audited consolidated financial statements only.

(c) Operators that are parents may be required to submit both separate audited financial statements and consolidated financial statements.

(d) The bureau shall consider the following in the determination of the financial statement's format requirements for segments of a business enterprise:

1. Generally accepted accounting principles.

2. Securities and Exchange Commission (SEC) regulations.

(e) The financial statements must include, at a minimum, a profit or loss statement, balance sheet, statement of changes in financial position, and an audit report. For operators reporting to the SEC, their annual Form 10K shall constitute compliance with this requirement.

(f) All financial statements shall be considered confidential by the department and shall be maintained in locked files of which only authorized personnel shall have access.

(g) The operator shall be responsible for the confidentiality of all financial statements until receipt by the department.

(h) If an operator is not in compliance with the rate of reclamation specified in subsection (6) below, the department may request an explanation of any item of concern on the financial statements, such as, but not limited to, disclaimers or qualifications in the audit report, declining profits, losses, low asset to liability ratio, or rearrangement of debt. This may be followed with a request to interview the auditor of the financial statements, to review the auditor's workpapers, to review the worksheets used to prepare the financial statements, or to review the accounting records of the reporting or current period.

(5) Operators of mines in existence on July 1, 1978, shall have until July 1, 1988, to meet the rate of reclamation in subsection (6) below without incurring the obligation to post any form of security.

(6) For the purpose of Rule 62C-16.0075, F.A.C., the reclamation shall be accomplished in accordance with the following criteria:

(a) For the period July 1, 1975, to December 31, 1980, for existing mines, or the first five-year period of mining for new mines, no reclamation shall be required and any reclamation which is completed shall be credited forward.

(b) For the period January 1, 1981, to December 31, 1985, for existing mines, or the second five-year period of mining for new mines, reclamation of acres mined shall be completed at the rate of an acreage equivalent of 15 percent of the acres mined during the period July 1, 1975, to December 31, 1980, or the immediately preceding five-year period, as appropriate. Reclamation in excess of the required percentage shall be credited forward.

(c) For the period January 1, 1986, to December 31, 1990, for existing mines, or the third five-year period of mining for new mines, reclamation of acres mined shall be completed at the rate of an acreage equivalent of 60 percent of the acres mined during the period January 1, 1981, to December 31, 1985, or the immediately preceding five-year period, as appropriate. Reclamation in excess of the required percentage shall be credited forward.

(d) For the period January 1, 1991, to December 31, 1995, for existing mines, or the fourth five-year period of mining for new mines, reclamation of acres mined shall be completed at the rate of an acreage equivalent of 75 percent of the acres mined during the period January 1, 1986, to December 31, 1990, or the immediately preceding five-year period, as appropriate. Reclamation in excess of the required percentage shall be credited forward.

(e) For the period January 1, 1996, to December 31, 2000, for existing mines, or the fifth five-year period of mining for new mines, and each five-year period thereafter, reclamation of acres mined shall be completed at the rate of an acreage equivalent of 100 percent of the acres mined during the immediately preceding five-year period. Reclamation in excess of the required percentage shall be credited forward.

(f) For the purposes of this subsection, completed shall mean reclaimed through the initial revegetation and not through final release of the reclaimed area.

(g) Acres to be credited forward shall consist of acres mined or disturbed after June 30, 1975, and completed pursuant to paragraph (f) above.

(h) The time periods and reclamation rates specified in this subsection may be modified or waived for experimental reclamation programs to take into account the effect of a temporary shutdown of mining operations or other physical restraints, for unreasonable delays in the processing of reclamation applications by the department,

> or to relieve or prevent extreme economic hardship on the operator.
>
> (i) The rate of mining during any five-year period is to be determined solely by the operator and not the department.

893. The statutory definition of "restoration," found in Section 378.203(10), Florida Statutes, states the principle of maintaining or improving water quality and function of biological systems, but does not, in itself, impose this requirement upon reclamation activities of any type. No provision of Chapter 378, Part III, Florida Statutes, of which the cited sections above are a part, applies the definition of "restoration" found in Section 378.203(10), Florida Statutes.

894. Section 378.207(1), Florida Statutes, authorizes DEP to adopt rules that, "recognizing technological limitations and economic considerations, . . . require the return of the natural function of wetlands or a particular habitat or condition" to its pre-mining status. Conditioning CRP wetlands reclamation upon technological limitations and economic considerations establishes a major distinction between this regulatory scheme and the ERP regulatory scheme.

895. Distinguishing between uplands, on the one hand, and wetlands and waterbodies, on the other hand, the CRP rules set out the details of CRP reclamation. The rules require reclamation, which is the appropriate reshaping of lands and revegetation. For wetlands and waterbodies, the rules require

restoration "at least acre-for-acre and type-for-type." Restoration means revegetation to return the "type, nature, and function" of the ecosystem to its pre-mining condition, subject to technological limitations and economic considerations. Consistent with these distinctions, revegetation for reclaimed areas merely means a vegetative cover consistent with the land form created and future land uses, but revegetation for wetlands and waterbodies means a vegetative cover designed to return the restore an area to its pre-mining condition.

896. Although the rules fail to implement the statutory definition of "restoration" with respect to water quality, the failure of Chapter 378, Part III, Florida Statutes, to incorporate the definition of "restoration" into any substantive standard or requirement excuses this omission by DEP. This failure is due to the fact that DEP has not updated the CRP rules in some time. The rules' reference to the "type, nature, and function" derives from a statutory reference since amended to emphasize function.

897. In any event, it is not difficult to harmonize the rules, with the requirement of wetlands restoration by type, nature, and function, with the statutes, with the emphasis on the natural function of wetlands or habitat. The CRP rules carry forward the most important statutory criterion--function, which also drives the BOR analysis.

898. Charlotte County and the Authority have relied upon the "type-for-type" and "acre-for-acre" language of the rule and "type, nature, and function" language of the statute in contending that CRP reclamation imposes distinct, if not also more rigorous, standards upon IMC. This is not true.

899. The meaning of "type" is forested wetland or herbaceous wetland. In its proposed recommended order (Conclusions of Law, paragraph 29), DEP contends that "type" is the FLUCFCS Level II coding. This contention does not work too well, as a couple of illustrations will demonstrate. If "type" is FLUCFCS Level II coding, then an applicant could replace temperate hardwood (425) with willow (429) or xeric oak (421) with wax myrtle (429). On the other hand, an applicant could not replace xeric oak or live oak (427) with sand live oak (432) because of the different Level II codes, even though FLUCFCS 420 is "Upland Hardwood Forests" and FLUCFCS 430 is "Upland Hardwood Forests Continued." (DOT ran out of numbers in the 420s so it added the 430s for the same upland hardwood forest category of community.)

900. "Type" performs a little better in wetlands, but fails to make a critical distinction when, under FLUCFCS 640, which is "Vegetated Non-Forested Wetlands," freshwater marshes (641) could be substituted for wet prairies (643). "Type" simply cannot mean Level II distinctions from the FLUCFCS manual.

901. Charlotte County and the Authority contend that "type" means FLUCFCS Level III codes. This approach suffers from the same slavish devotion to replication, at the expense of function, that characterizes their reliance on the Morisita's Index. For example, pre-mining, OFG contains 81 acres of freshwater marshes and 108 acres of wet prairies; post-reclamation, it will contain 67 acres of freshwater marshes and 95 acres of wet prairies. Level III "type" analysis would militate in favor of IMC's reclaiming an additional 14 acres of freshwater marsh--probably at the expense of shallower wet prairie. This would represent a loss of function.

902. Nor would a Level I approach work. Code 600 is "Wetlands."

903. Authority for interpreting "type" to mean forested wetlands for forested wetlands and herbaceous wetlands for herbaceous wetlands is contained in the CRP rules, which speak of wooded or forested wetlands and herbaceous or nonforested wetlands. By this approach to "type," DEP would capture some useful information, due to the very different characteristics of these two classes of communities, without the risk of any distortion and without much overlap with "function." When further delineation is indicated, such as between a bay swamp and a cypress swamp, analysis will emphasize "function" over "type," as it should normally do in all situations.

904. This definition of "type" also means that IMC has satisfied the acre-for-acre requirement. IMC will reclaim more forested wetlands than it mines, and it will reclaim more herbaceous wetlands than it mines.

905. As suggested in Section 378.207(1), Florida Statutes, "function" is sufficient to evaluate wetlands. Much of the BOR is devoted to the analysis of the functions of wetlands and other surface waters. Between "type" and "function", there is not much, if anything, left for "nature" to describe. "Nature" means the essential characteristics of a thing. If "function" or "type" does not capture the uniqueness of a community, perhaps "nature" can do so. "Nature" may serve other purposes, depending on the facts of the case.

906. To complete the financial-responsibility issue discussed in the preceding section, Florida Administrative Code Rule 62C-16.0075(1)(a) clearly requires financial responsibility only when an operator, as distinguished from an applicant, has fallen behind its reclamation schedule, not, as is required by ERP financial responsibility, prior to the start of mining. Florida Administrative Code Rule 62C-16.0075(1)(b) bases the amount of financial security for CRP reclamation on the acreage as to which the operator has fallen behind in reclaiming, not, as is required by ERP financial responsibility, the cost of mitigation.

907. Falling behind on reclamation means failing to comply with the schedule set forth in Florida Administrative Code Rule 62C-16.0075(6)(a)-(e), which requires, for instance, that 15 percent of the mined area must be reclaimed by the end of the tenth year of mining. As provided in Florida Administrative Code Rule 62C-16.0075(6)(f), an operator completes reclamation by completing initial revegetation, not by obtaining a release, This means that CRP financial responsibility would be released before DEP determines that the reclamation is successful.

B. Final Conclusions of Law Regarding CRP Approval

908. IMC has failed to provide a CRP or graphic description of its plan to reclaim uplands or restore wetlands and other surface waters. The CRP approval does not incorporate Map I-2 and Map I-3.

909. IMC will backfill and contour OFG to reclaim the types of landforms that are best suited to enhance the recovery of OFG into a mature site with high potential for its intended agricultural use.

910. IMC will use good quality topsoils or a suitable growing medium for the communities targeted. IMC will reclaim wetlands at least acre-for-acre and type-for-type.

911. IMC will reclaim wetlands and other surface waters consistent with health and safety practices so as to maximize beneficial contributions within local drainage patterns, provide

aquatic and wetlands wildlife habitat, and maintain downstream water quality by preventing erosion and providing nutrient uptake. All the water leaving OFG will meet applicable water quality standards, and the water within wetlands and other surface waters shall be of sufficient quality to allow recreation and support fish and wildlife. Interestingly, the most detailed requirements of Florida Administrative Code Rule 62C-16.051(5) pertain exclusively to deep-water wetlands.

912. IMC will not violate water quality standards for water leaving OFG or waters of the State within OFG. All water within wetlands and other surface waters will be of sufficient quality to allow recreation and support fish and wildlife.

913. IMC will take all reasonable steps to eliminate the risk of flooding on property not owned by IMC, and it will restore the original drainage pattern to the greatest extent possible.

914. IMC has assigned the highest priority to using sand tailings for backfilling mine cuts and will not spoiled sand tailings above grade.

915. IMC has developed a reclamation plan to achieve permanent revegetation, minimize erosion, conceal the effects of surface mining, and recognize the habitat requirements of fish and wildlife, subject to the following exceptions. CRP Specific Condition 8.a specifies for pine flatwoods and palmetto prairie

only 15 inches of sand tailings underlying 3-6 inches of topsoil or green manure; the sand tailings must be at least two feet deep. CRP Specific Condition 8.b specifies for sand live oak only several feet of sand tailings underlying 3-6 inches of topsoil or green manure; if topsoil, sand tailings must be six feet deep, and, if green manure, sand tailings must be at least eight feet deep. CRP Specific Condition 8.b specifies for xeric oak scrub only several feet of sand tailings underlying 3-6 inches of topsoil or green manure; the sand tailings must be at least eight feet deep.

916. IMC will reclaim upland areas to resemble pre-mining conditions, use indigenous species, and reclaim and revegetate all wetlands in accordance with the best available technology. However, it is unclear how IMC will protect reclaimed uplands from grazing, mowing, or other adverse land uses to allow establishment, herbaceous wetlands from grazing, mowing or other adverse land uses for three years after planting to allow establishment, or wooded wetlands from grazing, mowing, or other adverse land uses for five years or until the trees are ten feet tall.

917. IMC has identified programs to offset fish and wildlife values lost due to mining operations.

918. IMC has adopted an estimated time schedule for the completion of the reclamation process. However, based on Map

H-9, which is the Tailing Fill Schedule, and Map CL-1, which is the Reclamation Schedule, IMC does not appear to comply with the deadlines for contouring after mining operations, revegetating after contouring, and reclaiming and restoring after mining operations, at least not for all of OFG, as discussed above in connection with these maps.

919. DEP abuses its discretion if it does not modify the CRP approval as follows:

> a. Incorporate Map I-2, in its entirety, and Map I-3 into the CRP approval.
>
> b. Amend CRP Specific Condition 8.a to require at least two feet of sand tailings underlying the specified topsoil or green manure for pine flatwoods and palmetto prairies.
>
> c. Amend CRP Specific Condition 8.b to require at least six feet of sand tailings, if under the specified topsoil, or eight feet of sand tailings, if under the specified green manure, for sand live oak.
>
> d. Amend CRP Specific Condition 8.b to require at least eight feet of sand tailings, if under the specified topsoil or the specified green manure, for xeric oak scrub.
>
> e. Amend the CRP approval to require IMC to protect the uplands, herbaceous wetlands, and wooded wetlands from grazing, mowing, or other adverse land uses until the uplands are established and for the specified periods for the wetlands (or until the specified condition for the wooded wetlands). This may require prohibiting the conveyance of the land and restricting agricultural activities in the meantime.

f. Modify deadlines, as necessary, for contouring, revegetating, reclaiming, and restoring, as necessary, to comply with the standards set forth in Florida Administrative Code Rule 62C-16.0051(11)(b)2, 3, and 4.

V. WRP

920. As DEP states in its proposed recommended order, the legal issue in the WRP modification requires only the comparison of the proposed activities with the already-permitted activities. Cf. Missouri Coalition for the Environment v. Corps of Engineers of the United States Army, 678 F. Supp. 790 (E.D. Mo. 1988), aff'd, 866 F.2d 1025 (8th Cir.), cert. denied, 493 U.S. 820 (1989). The construction of mitigation is an impact, and the finished mitigation is designed to offset to this impact, as well as the much greater impacts of the already-completed mining itself.

921. The WRP presently in existence, exclusive of the modification sought in these cases, establishes conclusively that the mitigation described in that WRP offsets the impacts permitted by that WRP. By their present challenges, Charlotte County and the Authority cannot challenge the WRP itself, especially now that the main impacts--i.e., from mining--have already taken place. The present challenges are therefore limited to a comparative analysis of the offsets provided in the

WRP presently in existence and the offsets proposed in the WRP modification.

922. Among the issues subsumed by this comparative approach is cumulative impacts. Arguably, an WRP modification requires cumulative-impact analysis because, unlike the ERP, the WRP is not subject to the statutory exemption for same-basin mitigation. However, cumulative-impact analysis for the WRP modification is improper because the cumulative-impact analysis has already taken place in the issuance of the WRP. A modification that reduces impacts should not be the occasion of a new cumulative impact analysis, especially of mining in general, as opposed to the reclamation activities covered by this WRP modification.

VI. Summary of Final Conclusions

923. DEP should issue the ERP, subject to the conditions set forth in paragraph 884 above. DEP should issue the CRP approval, subject to the conditions set forth in paragraph 919 above. DEP should issue the WRP modification.

924. For a complex and extensive proposed activity, such as that proposed for OFG, numerous substantial modifications should not be grounds for denial of the permit or approval, especially if, as here, the application reflects a substantial effort on the part of the applicant to conform to the permitting and approval criteria and the application is close to satisfying the

permitting and approval criteria. As revealed in the first quoted sentence of Section 373.414(9), Florida Statutes, and 1800 Atlantic, the legislative and judicial preference, for ERP (and, by inference, CRP approval) favors "Yes, But" over "Just Say No." DEP should therefore specify what is required to make the proposed activity permittable and give the applicant an opportunity to agree to the necessary changes to eliminate or reduce relevant impacts or supplement mitigation. The applicant may then decide whether it wishes to incorporate these changes, litigate in a different forum, or drop the project.

925. For a complex and extensive proposed activity, the means identified by DEP to eliminate or reduce impacts or supplement mitigation may be correspondingly complex and extensive. Here, DEP may determine that it may specify adequately these means without the need for any supplemental factfinding. However, if DEP determines that it requires supplemental factfinding, this determination should not result in the denial of the permit or approval.

926. Consistent with 1800 Atlantic and Collier Development, DEP may determine that one or more of the conditions that it decides that it must add to the ERP or CRP approval requires a remand to the Administrative Law Judge for supplemental factfinding. If so, DEP should remand the cases with explicit directions as to the purposes and scope of the remand, and the

Administrative Law Judge will expeditiously schedule and conduct the hearing and issue a brief supplemental set of findings to assist DEP in the proper exercise of its discretion.

RECOMMENDATION

It is

RECOMMENDED that the Department of Environmental Protection issue a Final Order:

1. Granting the ERP with the conditions set forth in paragraph 884 above.

2. Approving the CRP with the conditions set forth in paragraph 919 above.

3. Approving the WRP modification when the ERP and CRP approval become final and the time for appeal has passed or, if an appeal is taken, all appellate review has been completed.

4. Dismissing the petition for hearing of Petitioner Peace River/Manasota Regional Water Supply Authority for lack of standing.

DONE AND ENTERED this 9th day of May, 2005, in Tallahassee, Leon County, Florida.

ROBERT E. MEALE
Administrative Law Judge
Division of Administrative Hearings
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Filed with the Clerk of the
Division of Administrative Hearings
this 9th day of May, 2005.

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NOTICE OF RIGHT TO SUBMIT EXCEPTIONS

All parties have the right to submit written exceptions within 15 days from the date of this Recommended Order. Any exceptions to this Recommended Order should be filed with the agency that will issue the Final Order in this case.