Mike_Wicker@fws.gov
03/26/2009 03:16 PM

To "Pace.Wilber" <Pace.Wilber@noaa.gov>, Rebecca Fox/R4/USEPA/US@EPA, Ron Sechler <ron.sechler@noaa.gov>, Tom
cc
bcc
Subject

History: This message has been replied to.

Either of these options on the long term will allow the site to again make a positive contribution to the downstream estuary post mining.

1.) Topsoil, A horizon (averaging one foot of depth, no less than six inches) would allow the site to recover at a greatly accelerated pace in contrast to not having topsoil and would make the reclaimed area suitable for a number of tree species. We prefer the topsoil option but this is **not mandatory**.

OR

The following two options can also be used which are expected to cause minimal cost to PCS if any.

2.) In upland areas plant longleaf pine. Longleaf pine is a priority species for UFSWS.
3.) Plant bald cypress on wetland areas (if Atlantic white cedar was shown to do well, that would be OK as well since Atlantic white cedar is also a priority tree species for the USFWS). The three priority species for the USFWS in NC are longleaf pine, bald cypress, and Atlantic white cedar.

Longleaf pine, bald cypress, and Atlantic white cedar are all available as seedlings. One source for seedlings is the NC Division of Forest Resources at Claridge Nursery near Goldsboro, NC. All three of these species will grow on low fertility sites and longleaf and cypress are long lived species that despite slow growth will live long enough to eventually make nice trees even on sterile sites and will produce decay resistant litter that over the very long term will rebuild soil. All of these species provide wildlife habitat and all occur naturally in monotypic stands.

* All three of these optons would be on top of the already agreed-upon 3-foot CAP needed per the cadmium risk assessment recommendations

Plus as minimization Not required. But desired.

Construction of a shallow 50 - 100 acre (approximately 3 foot deep wetland that would be planted with native submerged aquatic vegetation into which the mine depressurization water would be run thru prior to entering the estuary. The constructed wetland could be shaped according to site conditions (linear, oval or rectangular) and should have a topsoil bottom to

support submerged aquatics. We believe such an area would be tremendously productive and serve as an interim benefit to the estuary until the mining is over (at which time the pumping would cease) and the reclaimed areas could supply reasonable surface water drainage to the estuary. This would help to minimize watershed loss which is one of our major concerns.

Background information on soil and trees

The USFWS has encouraged a topsoil cover, to take advantage of the soil structure, organic matter, nutrients, and seed sources available in that material which is available as mining operations advance. From an ecological perspective, there is certainly support for this approach in the literature (Farmer and Blue 1978; Schuman and Power 1981) and in the reclamation of phosphate mined lands in Florida (Ron Concoby, IMC-Agrico Company, pers. comm.; Christine Keenan, Florida Department of Environmental Protection, Mine Reclamation Section, pers. comm.; John Kiefer, CF Industries, pers. comm.; Mike Shannon, Cargill Industries, pers. comm.). For example IMC-Agrico, Cargill Industries, and CF Industries in central Florida do upland reclamation of phosphate mined lands by using native topsoil (top approximately 4 to 10 inches) as a cover in ~5% of their overall upland reclamation programs. This is done to get the benefits of native vegetation seed banks for xeric/oak and mesic upland pine flatwood communities, key habitat types for restoration in the perspective of the local regulatory authorities and environmental groups. The percentage of wetland reclamation which employs topsoil is far higher. While not the norm for upland restoration (because 90 to 95% of upland reclamation uses no topsoil), topsoil addition is the desired method when restoration of the native plant community is the target post-reclamation landuse. The size of individual upland restoration parcels employing topsoil in Florida ranges from ~3 to 200 acres and cumulatively exceeds 600 acres with hundreds more acres projected or planned.

While topsoil has known ecological restoration benefits, those benefits primarily relate to supporting a defined goal of restoring a productive and diverse community that would contribute in a meaningful way to area ecology. In Beaufort County, topsoil depths are ~3 to 18 inches (Kirby 1995) in the dominant soil series (Portsmouth, Cape Fear, Roanoke, and Wahee). **There is likely not sufficient topsoil to advocate a use of topsoil alone for all reclamation needs.**

In a subset of areas where the diversity of native vegetation is desired (e.g.,

the wetland community types such as bottom land hardwood and scrub pocosins or particularly diverse upland assemblages), use of 6 to 12 inches of topsoil on top of is suggested. The benefits of a seed stock for native plant diversity would be significant. Cypress could also be planted in these areas; their need for more organic material than would be in the overburden mix would be addressed by the topsoil addition. Cypress could also be grown on areas without topsoil. This also represents a compromise...it is a recognition that topsoil resources in the vicinity of the advancing mine are limited and that they probably cannot serve as the basis for all reclamation but should be used selectively as seed banks and in establishment of a better substrate for cypress (or other wetland species) restoration so that native vegetation other than the plantings can colonize the area.

Longleaf pine

Longleaf pine occupied extensive areas of the Coastal Plain when European settlers arrived (Wahlenberg 1946). Today, longleaf pine occupies only 1% of its original range in the Southeast (Ware et al. 1993). Longleaf pine normally occurs on dry, sandy soils, and does not thrive where there is excessive moisture, as in swamps or pocosins (Wahlenberg 1946). While tap roots can extend deep for plant stability, longleaf pines develop extensive lateral root systems; most roots are within 0.3 m (1-foot) and nearly all are within 0.6 m (2-feet) (Boyer 1990).

Longleaf pine could very likely be grown on areas capped with prestrip overburden from the advancing mine (PCS Phosphate's initially conceived approach). Longleaf pine occurs naturally on low fertility sites such as the Carolina sandhills, and the species' historic range includes Beaufort County. In this case, the depth of uncontaminated cover material should be at least 3-feet to ensure cadmium is not translocated back to the soil surface with time. This approach allows use of material other than topsoil. PCS Phosphate is considering mixing the top ~35-feet of prestrip overburden from areas to be mined in the future as the source material for the cover; this depth represents that which is top cut with existing equipment (bucket wheel excavator). This material should provide a suitable substrate for the longleaf pine areas.

Baldcypress

Like longleaf pine, the bald cypress resource is only a fraction of that in earlier

years even though demand is still strong. **Cypress occurs on soils ranging widely in texture, reaction, base saturation and fertility (Coultas and Duever 1984). It is not demanding nutritionally. It is a shallow rooted species with a tap root. While it may not seem suited to reclamation on phosphate mined lands in eastern north Carolina, it was one of two species that appeared to do well on blended reclamation substrates in experimental work performed in this area (Steve Broome, North Carolina State university, pers. comm.).**

Baldcypress (*Taxodium distichum* (L.) Rich.) has been an important tree of commerce in the South, including North Carolina. The total resource is only a fraction of that in earlier years even though demand is still strong. Ashe (1894) noted that the supply of cypress suitable for lumber and shingles in eastern North Carolina was almost gone, but there were still some large tracts in Tyrrell and Washington Co. In the South, harvesting of cypress peaked at 1.3 billion board feet (bbf) in 1913 (Krinbill 1956). The slack-line technique used by early loggers in southern swamps was described by Bryant (1913). The reserve of cypress sawtimber decreased from 40 bbf in 1913 to 13 bbf in 1953, with 1.2 billion board feet (bbf) in North Carolina (Betts 1960). In 1990, there was an estimated 2.1 bbf of cypress sawtimber in the northern Coastal Plain (Thompson 1990) and southern Coastal Plain of North Carolina (Johnson 1990).

Cypress, which can live more than 1000 years, produces little merchantable heartwood before 200-300 years in age (Betts 1960, Krinbill 1956, Hall and Maxwell 1911). By usual methods of forest valuation, It could be argued that high quality cypress is prohibitively expensive to grow in rotations of 200-300 years (Krinbill 1956). In addition, other factors also affect yield, e.g, the hydro-period influences wood quality; if the site is too dry, or if water levels fluctuate too much, trees tend to develop heart rot, become hollow or pecky, and produce a higher percentage of sapwood (Krinbill 1956; Pinchot and Ashe 1897). Although undesirable for timber quality, defects would benefit wildlife by providing more dens and nest cavities.

In addition to its importance for timber, baldcypress is also important to wildlife. Historically, remote cypress swamps were a favored habitat of ivory-billed woodpeckers (Ridgeway 1898) as well as Carolina parakeets (Brewster 1889, Maynard 1881). Both species are now extinct. The potentially large size of cypress also makes it an important source of dens large enough to accommodate black bears and other animals. Seeds and fruits of cypress also represent a source of soft mast.

Atlantic white cedar

We believe that PCS has done some experimentation with Atlantic white cedar and it may provide another alternative to topsoil. Atlantic white cedar (*Chamaecyparis thyoides* (L.) B.S.P.) is an evergreen conifer that grows in fresh water swamps and bogs along a narrow coastal belt from southern Maine to northern Florida and west to southern Mississippi (Laderman 1989). Historically, white cedar was the most valuable tree in the Albemarle Peninsula in the coastal plain of eastern North Carolina (Krinbill 1956).The acreage of AWC today is probably <= 5% of the original (Davis et al. 1997, Frost 1987, Kuser and Zimmerman 1995, Lilly 1981).The precipitous decline in acreage of AWC resulted not only from logging, but also from uncontrolled wildfires and widespread ditching and drainage of peatlands for agricultural purposes.

The Atlantic white cedar ecosystem is categorized as globally endangered by The Nature Conservancv. Cedar bogs support high breeding bird densities (425 to 554 pairs per 100 acres or 40 ha) of species such as ovenbirds (*Seiurus aurocapillus*), yellowthroats (*Geothlypus trichas*), and prairie, prothonotary. and hooded warblers (*Dendroica discolor* , *Protonotaria citrea* , and *Wilsonia citurna* , respectively). Hessel's hairstreak (*Mitouri hesseli*), a butterfly, uses Atlantic white cedar exclusively. Black bear (*Ursus americanus*), river otter (*Lutra canadensis*), and bobcat (*Felis rufus*) are numerous in cedar bogs, as are the State-listed eastern diamond-back rattlesnake (*Crotalus adamanteus*). The federally-listed red-cockaded woodpecker (*Picoides borealis*) inhabits mature pines that are scattered around cedar bogs.

"Pace.Wilber"
<Pace.Wilber@noaa.gov>
03/27/2009 07:47 AM

To Jennifer Derby/R4/USEPA/US@EPA, Rebecca Fox/R4/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Mike Wicker
cc
bcc
Subject PCS Draft Permit Conditions for Monitoring and Adaptive Mgmt

History: This message has been replied to.

Hi everyone.

Please check the addressees of this email. If I've inadvertently omitted anyone from your office that should be getting this message, please forward.

Attached are draft permit conditions that speak to monitoring impacts to PNAs and adaptive management. On the phone call, I mentioned an outline for a monitoring plan. While cleaning up what Ron and I had developed after getting input from the Beaufort Lab, FWS, and a few others, it seemed the outline could be couched as a permit condition, so that is what we've done. Also in the attached is a very brief background section meant to review some of the context for the monitoring an adaptive mgmt.

Any comments are welcome. And if CESAW has a preferred format they would like me to follow or similar draft conditions already in development , I am happy to adjust.

Pace

--

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Recommendations for the Monitoring of Impacts to Primary Nursery Areas

Background

Throughout reviews of the proposal by PCS to expand its mine into the NCPC, Bonnerton, and S33 tracts, resource agencies expressed concerns over direct and indirect impacts to creeks that function as nursery areas for estuarine and marine fauna. South Creek, which borders the NCPC tract, is designated by the State of North Carolina as a Primary Nursery Area, and the NC Division of Marine Fisheries has jurisdiction over this aspect of South Creek. Three creeks that discharge into South Creek from the NCPC tract, Tooley, Jacobs, and Jacks Creeks, and one creek that borders the Bonnerton tract, Porters Creek, are designated as Inland PNAs and are under the jurisdiction of the NC Wildlife Resources Commission. At the federal level under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), these creeks are Habitat Areas of Particular Concern, which is the highest level of protection afforded by the Magnuson-Stevens Act, and wetlands that serve as headwaters of those creeks are essential fish habitat (EFH) under the Magnuson-Stevens Act.

While the footprint of the proposed mine does not extend into the PNAs, the resource agencies are concerned that the extensive mining of wetlands that serve as the headwaters of these creeks may impair the function of these PNAs. Accordingly, a monitoring program coupled with an adaptive management process are proposed to gauge the impacts to the PNAs from the mining so that appropriate adjustments can be made to mine operations. By "appropriate adjustments," we simply mean compliance reviews common for permits that authorize projects of this size and duration, and recognition of the inevitable uncertainties at the time of permitting about how large projects affect the landscape, and vice versa. Similar monitoring should be part of the mitigation and reclamation activities so that the expected benefits from these activities can be evaluated. The monitoring program and adaptive management process described below are viewed as consistent with the recently issued water quality certification to the extent that the water quality certification describes the monitoring. PCS has six months to flesh out the monitoring program required by the water quality certification. We expect a single monitoring and adaptive management program would meet the requirements of state and federal authorizations.

Proposed Permit Conditions

Monitoring of PNA Functions

PCS shall develop and implement a plan of study to address the effects of a reduction in headwater wetlands on the utilization of Porters Creek, Tooley Creek, Jacobs Creek, Drinkwater Creek, and Jacks Creek as nursery areas by resident fish and appropriate invertebrate species. This plan shall be submitted to NMFS for review and approval prior to initiation of land clearing activities in the headwater wetlands of PNAs within the NCPC tract. The plan shall identify reference creeks (at least four); sampling stations, schedules, and methods; laboratory methods; data management and analysis; and quality control and quality assurance procedures.

At a minimum, the plan shall address the following issues and include the following data collection:

1. Has mining altered the amount or timing of water flows within the creeks?

--Continuous water level recorders to measure flow
--Rain gauges to measure local water input
--Groundwater wells to measure input to the creeks
--Continuous salinity monitoring
--Periodic DO monitoring (continuously monitored for several days at strategic times of year)

2. Has mining altered the geomorphic or vegetative character of the creeks?

--Aerial photography to determine creek position, length, width, sinuosity (annual)

--Cross section of creeks at key locations (annual)
--Sediment characteristics (texture, organic content, and contaminants) (annual)
--Vegetation (percent cover by species) along the creek to determine zonation changes and invasions (spring and fall)
--Sediment chlorophylls or organic content in vegetation zone (spring and fall)
--Determination of location of flocculation zones with each creek (spring and fall)

3. Has mining altered the forage base of the creeks?
--Benthic cores to sample macroinfauna (spring and fall)
--Benthic grabs focused upon bivalves, such as *Rangia* sp. (spring and fall)
--Net samples for grass shrimp, blue crabs, and small forage fish (such as *Fundulus* spp.); sampling gears would be chosen to reflect ontogenetic shifts in creek usage (monthly)

4. Has mining altered the use of the creeks by managed fish?
--Life-stage specific sampling based on time year, sampling gears would be chosen to reflect ontogenetic shifts in creek usage. (monthly or seasonally)

5. Do creek sediments include contaminants at levels that could impact fish or invertebrates?
--Creeks would be sampled for metals, including cadmium, mercury, silver, copper, and arsenic (annual)
--Availability and uptake by appropriate aquatic species (e.g., *Rangia* sp., blue crabs) should measured using appropriate bioassay techniques (annual)

Adaptive Management
PCS shall establish an independent panel of scientists and engineers to annually evaluate whether direct and indirect impacts from mining and benefits from the compensatory mitigation are in accordance with expectations at the time of permitting. The panel shall meet during January or February of each calendar year and shall review data collected through the previous calendar year. By March 31, the panel shall provide the Wilmington District and PCS with recommended changes to the mining and mitigation that are necessary to bring the project into alignment with expectations. The Wilmington District will consider this information and comments from resource agencies to determine if corrective actions or permit modifications are needed. All data, reports, and presentations reviewed by the panel shall be placed and maintained on a publically accessible internet site.

"Heather"
<riverkeeper@ptrf.org>
03/27/2009 09:38 AM

To Rebecca Fox/R4/USEPA/US@EPA
cc
bcc
Subject RE: draft monitoring and reclamation plans

Thanks Becky-- we will work diligently on any recommendations we might have ASAP.

Heather Jacobs Deck
Pamlico-Tar Riverkeeper
Pamlico-Tar River Foundation
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Waterkeeper Alliance Member

-----Original Message-----
From: Fox.Rebecca@epamail.epa.gov [mailto:Fox.Rebecca@epamail.epa.gov]
Sent: Friday, March 27, 2009 9:09 AM
To: Heather
Cc: Hough.Palmer@epamail.epa.gov
Subject: draft monitoring and reclamation plans

Hi Heather,

Attached are draft DBR monitoring plan and reclamation plan for mined areas N33 for PCS. Please forward to other NGOs for review. Please provide comments on these and any other monitoring recommendations by noon on Monday. Will send draft maps when we they are ready. Sorry for short turnaround time but this is on a very tight schedule... Will call you later. bf

(See attached file: PCS Reclamation (draft).doc)(See attached file: PCS monitoring (draft).doc)

Becky Fox
Wetland Regulatory Section
USEPA
Phone: 828-497-3531
Email: fox.rebecca@epa.gov

"Pace.Wilber"
<Pace.Wilber@noaa.gov>

03/27/2009 09:39 AM

To Rebecca Fox/R4/USEPA/US@EPA

cc Jennifer Derby/R4/USEPA/US@EPA, Mike Wicker <Mike_Wicker@fws.gov>, Palmer Hough/DC/USEPA/US@EPA, Pete Benjamin

bcc

Subject Re: PCS Draft Permit Conditions for Monitoring and Adaptive Mgmt

History: This message has been replied to.

Hi Becky.

Hopefully this will be clear . . . . As noted in past emails, three of the the state-designated inland PNAs border NCPC, only one state-designated inland PNA borders Bonnerton (Porter Creek). Other creeks at both tracts undoubtedly function as pnas, but they lack the the PNA designation. NMFS discussions about monitoring have primarily focused on the four state-designated inland PNAs (hence we emphasize NCPC). Our draft permit condition, though, includes Porter Creek (so we are not emphasizing NCPC to point of excluding Bonnerton). To examine these creeks, reference areas are needed, and given the sequencing of mining, it is conceivable that reference creeks for NCPC could later become baselines for for examining impacts from mining the Bonnerton tract--these are details that would have to worked out with PCS. As for duration of the baseline monitoring, that depends on when the permit is issued, we are comfortable with adapting monitoring schedules to mining schedules. Given the sequencing and duration of each sequence, baselines for some creeks will be better than for others--IMHO that is just a reality we have to cope with.

Lastly, regarding "approval" of the detailed plan, I believe the federal and state permits should adhere to the same schedules to the extent practicable. The extent this can be achieved is still to be determined. The COE would be the approving authority for the plan, but we expect they would seek everyone's input in when doing that evaluation . . . and, obviously, we (including some participation by our Beaufort lab) are preparing to work with PCS and COE as much as it takes develop the plan details.

Pace

Fox.Rebecca@epamail.epa.gov wrote:
> Thanks Pace! Couple of questions: Plan is for NCPC creeks only -- are
> there no plans for Porter Creek on Bonnerton because the results from
> NCPC monitoring will be used to predict and adapt mining/mitigation for
> Bonnerton? I assume the plan will include baseline data collection --
> it may be implicit in conditions, in that to determine if alteration has
> occurred will need baseline. As you state 401 gives 6 months after
> permit issuance for submittal of monitoring plan and then is reviewed
> for approval by DWQ -- who would review and approve this plan? Thanks
> again! b
>
> Becky Fox
> Wetland Regulatory Section
> USEPA
> Phone: 828-497-3531
> Email: fox.rebecca@epa.gov
>

> "Pace.Wilber"
> <Pace.Wilber@noaa.gov>
>
> 03/27/2009 07:47 AM
>
> To: Jennifer Derby/R4/USEPA/US@EPA, Rebecca Fox/R4/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Mike Wicker <Mike_Wicker@fws.gov>, Pete Benjamin <Pete_Benjamin@fws.gov>, Tom Welborn/R4/USEPA/US@EPA, "Walker, William T SAW" <William.T.Walker@usace.army.mil>, Ron Sechler <ron.sechler@noaa.gov>
>
> cc:
>
> Subject: PCS Draft Permit Conditions for Monitoring and Adaptive Mgmt

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for a monitoring plan. While cleaning up what Ron and I had developed after getting input from the Beaufort Lab, FWS, and a few others, it seemed the outline could be couched as a permit condition, so that is what we've done. Also in the attached is a very brief background section meant to review some of the context for the monitoring an adaptive mgmt.

Any comments are welcome. And if CESAW has a preferred format they would like me to follow or similar draft conditions already in development , I am happy to adjust.

Pace

--

Pace Wilber, Ph.D.
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Southeast Regional Office, NOAA Fisheries

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> http://sero.nmfs.noaa.gov/dhc/habitat.htm
>
>
> (See attached file: PCSMonitoringPlanDRAFT.doc)

--

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"Heather"
<riverkeeper@ptrf.org>
03/27/2009 09:39 AM

To Rebecca Fox/R4/USEPA/US@EPA
cc
bcc
Subject FW: SELC FEIS letter to COE

History: This message has been replied to.

The requested letter.

Heather Jacobs Deck
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Waterkeeper Alliance Member

-----Original Message-----
From: Fox.Rebecca@epamail.epa.gov [mailto:Fox.Rebecca@epamail.epa.gov]
Sent: Thursday, March 26, 2009 10:39 AM
To: Heather
Subject: SELC FEIS letter to COE

HI Heather,

Could you send me an electronic copy of the SELC 7-7-08 letter to COE re FEIS? I have hard copy but not electronic -- have electronic copy of SELC letter to DWQ but not the letter to COE. Thanks and talk to you later. b

Becky Fox
Wetland Regulatory Section
USEPA
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Email: fox.rebecca@epa.gov

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Charlottesville, VA
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Atlanta, GA
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Sewanee, TN

July 7, 2008

Via U.S. Mail and Electronic Mail

Mr. Tom Walker
U.S. Army Corps of Engineers
Wilmington District
Regulatory Division
ATTN: File Number 2001-10096
P.O. Box 1890
Wilmington, NC 28402-1890

Re: Final Environmental Impact Statement for the PCS Phosphate Mine Continuation: Aurora, North Carolina

Dear Mr. Walker:

Please accept the following comments on the Final Environmental Impact Statement ("FEIS") for the PCS Phosphate Mine Continuation in Aurora, North Carolina. The Southern Environmental Law Center ("SELC") submits these comments on behalf of the Pamlico-Tar River Foundation ("PTRF"). PTRF is a private, non-profit organization that has been dedicated to protecting, preserving, and promoting the Tar-Pamlico River and its watershed since 1981. PTRF is a member of the Review Team for this project. SELC is a private, non-profit legal organization that seeks to protect and preserve the Southeastern environment.

Unfortunately, the FEIS continues many of the deficiencies of the Draft Environmental Impact Statement ("DEIS") and the Supplemental DEIS ("SDEIS"). It relies on an inappropriate, inconsistent economic analysis and fails to fully account for the impacts of the proposed project or provide adequate mitigation. Further, it fails to adequately address significant comments on the DEIS and SDEIS and is internally contradictory in response to others. Because of these deficiencies, the FEIS violates the National Environmental Policy Act ("NEPA") and cannot serve as the decisional document for the Corps' Clean Water Act ("CWA") § 404(b)(1) Guidelines analysis.[1]

[1] By restricting this discussion to these deficiencies, we do not concede that the FEIS has satisfactorily addressed our comments on the DEIS and/or the SDEIS. We incorporate those comments by reference and focus these comments on new information presented in the FEIS.

I. The FEIS Economic Analysis Does Not Overcome the Presumption that Less Environmentally Damaging Practicable Alternatives Exist and Cannot Support a § 404 Permit for Alternative L.

The applicant must, but has not, overcome the presumption that no less environmentally damaging practicable alternative exists and therefore the FEIS does not support issuing a permit for Alternative L under the Clean Water Act § 404(b)(1) Guidelines.[2] The FEIS must comply with the "hard look" at environmental impacts and assessment of reasonable alternatives required by NEPA and provide the information necessary to satisfy the § 404(b)(1) Guidelines. The alternatives analysis – specifically the economic analysis – is central to complying with those laws. The alternatives that must be analyzed under NEPA and the Clean Water Act differ. NEPA only requires the Corps to consider a reasonable range of alternatives.[3] But the CWA requires something more: "No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem."[4] Because of this requirement, "under the CWA, it is not sufficient for the Corps to consider a range of alternatives to the project: the Corps must rebut the presumption that there are practicable alternatives with less adverse environmental impact."[5]

Because the economic practicability analysis is fundamentally flawed, the FEIS does not successfully rebut the regulatory presumption that less damaging alternatives exist. In our comments on the SDEIS, we stated that the SDEIS similarly failed to rebut this presumption and that it did not demonstrate that no practicable alternatives with less adverse environmental impacts existed, but that it only potentially identified the less environmentally damaging alternatives of those evaluated.[6] The Corps responded that "[a]n adequate range of reasonable alternatives has been evaluated in the EIS process," suggesting a misunderstanding of the distinction between the alternatives analyses of NEPA and the CWA. To comply with the CWA § 404(b)(1) Guidelines, the applicant – and therefore the FEIS – must rebut the presumption that less environmentally damaging practicable alternatives exist, including alternatives that have not been evaluated. The FEIS fails to rebut this presumption because it relies on an internally inconsistent economic analysis and excludes consideration of less environmentally damaging potentially practicable alternatives without analysis.

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[2] This discussion centers on the economic analysis as presented in the FEIS. This analysis, as discussed in Section IIA, is a hybrid of the DEIS Marston cost model and the SDEIS Marston cash-cost model. We do not, by focusing on the shortcomings of the analysis here, accept that it is the proper analysis or that its development and use are defensible. Rather, the Corps is obligated to evaluate the net present value analysis presented by Dr. Doug Wakeman in his December 28, 2007 comment letter on the SDEIS. That analysis not only corrects the flaws of the DEIS and SDEIS models, it shows that SCRA, SCRB, SJAB, and potentially DL1B are practicable.

[3] 40 C.F.R. § 1502.14.

[4] 40 C.F.R. § 230.10(a).

[5] Greater Yellowstone Coalition v. Flowers, 321 F.3d 1250, 1262 n.12 (10th Cir. 2003).

[6] FEIS Appendix ("App.") J-V.B.2.C63.

The FEIS economic analysis turns on the inconsistent treatment of the practicability of mining the southern portion of the south of highway 33 tract ("S33"). The development of the long-term alternatives that have been evaluated in the DEIS, SDEIS, and FEIS relied on an assumption that mining in the southern portion of S33 would become practicable; the FEIS's economic analysis relies on a contradictory assumption regarding those same mining costs. The FEIS mine alternatives include mining in the southern section of the S33 tract based on the premise that though not currently practicable, mining those tracts will become practicable. It states that "[t]he applicant has also indicated that it believes the market will eventually become favorable; a reasonable position based on USGS information regarding the rate of depletion of domestic production capacity and the applicant's future shift to higher margin products. The Corps has determined that it is therefore appropriate to include [the southern portion of S33] in the evaluation."[7] The FEIS re-affirms that "[t]he applicant has indicated . . . [that] it expects [the southern section of S33] will become practicable at some point in the future."[8] Said another way, mine plan alternatives that include mining in the southern portion of the S33 tract[9] were included for evaluation from the DEIS through the FEIS on the expectation – promoted by the applicant, "reasonable" based on USGS information, and agreed to by the Corps – that the combination of more favorable market conditions and a shift in products would make mining in that area practicable.

Yet the FEIS reverses the assumption underlying the alternatives to eliminate all alternatives that provide less than 15 years of mining in the NCPC and Bonnerton tracts – all but the AP, EAP, M, and L alternatives – from consideration. The FEIS states that to be practicable an alternative must "provide the applicant with the certainty of practicable costs for at least 15 years"[10] and further states that "higher costs" – presumably meaning impracticable costs – are not experienced under the SJAB, SCRB, and SCRA alternatives "within the initial 15 years."[11] If the assumption that the areas in the southern section of S33 will become practicable were maintained, there is no basis for declaring these alternatives impracticable since they provide at least 15 years of practicable mining costs. But the FEIS concludes that "[t]he Corps finds that SCRA, SCRB, and SJAB are not practicable alternatives due to the required commitment to the higher mining costs within the initial 10-12 years of the plan without the expectation of fully recovering these development costs."[12] This finding contradicts the very assumption used to include the southern section of S33 in each of the mine plans. Those areas were included precisely because PCS, the USGS, and the Corps expect that those predicted higher costs will be practicable in the future and that the company will fully recover the development costs required to open the S33 mine pit. In other words, in the FEIS, the assumption that the southern section of S33 will be practicable applies to include those areas in proposed

[7] FEIS at 2-26.
[8] The FEIS includes the caveat that the costs may become practicable "many years in the future." FEIS at 2-29. This "analysis" is inadequate. If costs are expected to be practicable in the future, it is critical to know if they are expected to be practicable in 15 years, 20 years, 30 years, etc. and how the difference affects the practicability of mining S33.
[9] All alternatives in the FEIS include mining in the S33 tract.
[10] FEIS at 2-29.
[11] FEIS at 2-30.
[12] Id.

alternatives, but does not apply when determining the economic practicability of those alternatives.

The result of this shift is critical and biases the economic analysis in favor of more-extractive, more-destructive mine plans, consequently obscuring the least environmentally damaging practicable alternative. The Corps included the southern portion of S33 for consideration on the advice from PCS and the USGS that the market and product shifts would make those areas practicable in the time frame under consideration. Because of that support, each of the alternatives include long-term mine plans that are substantially longer than that required by the company for logistical planning. The Corps and PCS's reversal regarding the future practicability of the southern stretch of S33 – despite recent booms in the fertilizer market – means that less environmentally damaging alternatives have been deemed impracticable. The end result is that the Corps considers the southern portion of S33 practicable for the purpose of including that land in any permit issued, but considers it impracticable when considering the practicability of less environmentally destructive alternatives. That the company has reversed its position in a manner that benefits it is unsurprising. But the Corps' acceptance of this practicability assessment invalidates the economic analysis and prevents the FEIS from overcoming the presumption that practicable alternatives exist that are less environmentally damaging than Alternative L.[13]

This error is compounded by the FEIS's flippant dismissal of anything less than a full-length, 32-year SCRA mine plan. As the Corps is aware, "[t]he level of documentation [in the NEPA process] should reflect the significance and complexity of the discharge activity."[14] The difference between Alternative L and a shorter SCRA mine plan is substantial. In comparison to Alternative L, the full-length SCRA avoids 622.12 acres of terrestrial wetlands[15] and 14,928 linear feet of creeks.[16] Depending on how a shorter SCRA mine plan is drawn, it may avoid more wetlands and creeks. By any measure, these are substantial impacts that should not be overlooked without documentation. But rather than evaluating how shortening the SCRA mine plan affects the cost of that mine plan, the FEIS concludes that "[r]educing the amount of mining on the S33 Tract will not solve this dilemma since that would then push more of the relocation costs into the initial years, thereby driving that cost up."[17] The FEIS fails to identify any cost estimates describing how much shortening SCRA by any number of years would affect the cost of mining in the initial years of S33. The Corps, by all appearances, has "eyeballed" it, an approach that fails to "reflect the significance" of the variation of impacts between the L and SCRA alternatives. Therefore, the FEIS does not take the requisite "hard look" at a potentially practicable alternative that would dramatically reduce the environmental impact of the proposed.

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[13] See Hughes River Watershed Conservancy v. Glickman, 81 F.3d 437, 446 (4th Cir. 1996) ("For an EIS to serve [its purpose], it is essential that the EIS not be based on misleading economic assumptions.").
[14] 40 CFR 230.6(b).
[15] FEIS at 6-76.
[16] FEIS at 6-59.
[17] FEIS at 2-30.

II. The FEIS Violates NEPA and is Inadequate for the § 404(b)(1) Guidelines Analysis Because it Fails to Adequately Respond to Substantive Comments.

Under NEPA, the Corps is required to respond to substantive comments on the DEIS and SDEIS.[18] That response may vary, and may be based on an explanation "why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position."[19] The Council on Environmental Quality ("CEQ") has clarified that regulation regarding comments on methodology, stating that "agencies must respond to comments, however brief, which are specific in their criticism of agency methodology."[20] Providing example, the CEQ mandated that where a commenter criticized agency analysis "because of its use of a certain computational technique" then the "agency would have to respond in a substantive and meaningful way to such a comment."[21] The Fourth Circuit Court of Appeals has applied this standard, requiring that an agency "must . . . reasonably respond to those comments that raise significant problems."[22] In addition, the Corps' public interest review requires that full consideration be given to all expert comments.[23] Here, the Corps has failed to respond to at least two critical comments: Dr. Douglas Wakeman's comments criticizing the economic analysis and Pamlico-Tar River Foundation's comments identifying significant impacts from mining on the NCPC tract.

A. The FEIS violates NEPA because it fails to substantively respond to the comments of Dr. Douglas Wakeman regarding the economic analysis.

Dr. Douglas Wakeman provided detailed comments on the appropriateness of the Corps economic analysis – or "its use of a certain computational technique" – in his December 28, 2007 comment letter on the SDEIS. Dr. Wakeman points out that the DEIS Marston cost model "suffered from three important shortcomings," including truncating the model at 15 years, applying accounting principles, and failing to use discounted values.[24] The SDEIS cash-cost model "corrects only one of these errors, by shifting from accounting costs to predicted cash costs."[25] To correct the remaining two errors, Dr. Wakeman – using information obtained pursuant to a November 20, 2007 Freedom of Information Act ("FOIA") request – calculated the net present value of each of the alternatives.[26]

The results of that analysis were telling. Under "a full-length, appropriately-discounted cash flow basis . . . these alternatives appear far more similar in cost than is

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[18] 40 C.F.R. § 1503.4(a).
[19] Id.
[20] 46 Fed. Reg. 18026, 18034 (March 23, 1981).
[21] Id.
[22] North Carolina v. Federal Aviation Admin., 957 F.2d 1125, 1135 (4th Cir. 1992).
[23] 33 C.F.R. 320.4(a)(3).
[24] App. J-V.B.2 P. 1 (Letter from Wakeman to Corps of Dec. 28, 2007)
[25] Id.
[26] Id. at 2. Dr. Wakeman was still unable to calculate net present value for each of the alternatives, since the necessary data was not released in the DEIS, SDEIS, or in response to the FOIA request.

readily apparent using either the prior 'full-cost' anal sis, or the arbitrarily-tru d, non-discounted versions of the cash cost analysis."[27] The net present value an s revealed that "[a]lternatives L, SCRA, SJAA are essentially indistinguishable ms of discounted cash cost; if any one of these is economically practicable, then all t of them are economically practicable."[28] The analysis also suggests that even the B alternative may be practicable due to its similarity in cost.

Based on this result, Dr. Wakeman's criticism of the "computational te que" used by the Corps to determine economic practicability of alternatives – the M n cost models – was not only substantive, it fundamentally challenged a central tenet e Corps analysis and an essential ingredient in applyin the § 404(b)(1) Guideli the applicant's request. Consequently, under governing NEPA regulations, it nec ates a "substantive and meaningful" response.

But the FEIS does not provide that response. The FEIS's response to I Wakeman's comments does not assess the weakness s of the DEIS Marston c odel or the merits of the net present value analysis of the ernatives. It avoids dis on of Dr. Wakeman's criticisms on two grounds: that the EIS Marston cost model previously approved by professional economists, in ding Dr. Wakeman,[29] a at that same model has been consistently applied through t DEIS, SDEIS, and FEI either of these bases relieves the Corps of its obligation to spond to Dr. Wakeman' alysis in a "substantive and meaningful" manner.

That Dr. Wakeman did not raise the net pres t value analysis earlier i NEPA process for this project cannot justify the FE s failure to respond to h comments.[30] First, as noted in the comment letter p enting the net present v analysis, the data necessary to perform the analysis s not disclosed to the p in the DEIS and was only made publicly available pursua o a FOIA request subm on November 20, 2007. Prior to the response to that re est, it was not clear tha data necessary to calculate the analysis existed, and thos ata were not publicly a ble. It was only after the November 6, 2007 release of the EIS – which included t applicant's new cash-cost model – and the subseque FOIA response that it v lear that such data existed. Second, the FEIS does not a y the same treatment t applicant's objections to the DEIS Marston cost mo . On February 7, 2007 S submitted a letter to the Corps criticizing the DEIS rston cost model.[31] De contracting with Marston to provide the DEIS cost del and providing the d necessary for its preparation, on February 7, 2007 – er the release of the DE nd only

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[27] Id.

[28] Id.

[29] In making this argument, the Corps misrepresents Dr. Wake n's statements. The Corps i es that Dr. Wakeman stated that "Absent compelling evidence to the trary" that the DEIS Marsto t model was sound. His letter actually says that "Absent compelling e ence to the contrary," the co sion that SCRB, SCRA, and SJAB are practicable is economically soun FEIS App. J-V.A.5. But he lenges the conclusion that those alternatives that were deemed impra able by that model actually a impracticable – foreshadowing the criticisms contained in his nments on the SDEIS.

[30] See Natural Res. Def. Council v. Tenn. Valley Authority, 2 F. Supp. 128 (E.D. Tenn. 19

[31] App. J-VII.A.1.

nine months prior to Dr. Wakeman's comments – PCS argued that "[a] 'Cash Cost' basis evaluation more accurately portrays the timing of major expenditures associated with development capital and receding face write-off and demonstrates more clearly the point at which the applicant must commit to relocations."[32] Rather than pointing to PCS's prior opportunity to object to the DEIS Marston cost model – as it does with Dr. Wakeman – the FEIS states that "[t]he Corps recognizes this point and has incorporated it into the economic practicability evaluation found in Section 2.7 of the FEIS."[33] The FEIS's response to Dr. Wakeman's comments – refusal to consider his proposed cost model calculations – cannot be considered "substantive and meaningful" when its response to PCS's analogous comments is contradictory.

These inconsistent responses to criticisms of the DEIS Marston cost model similarly undermine the FEIS's alternate justification for failing to substantively respond to Dr. Wakeman's comments – that the Corps has consistently applied the DEIS Marston cost model through the DEIS, SDEIS, and FEIS. In response to Dr. Wakeman's analysis, the Corps claims that "[t]he cost model as applied in the FEIS and the Corps' approach to determining practicability have remained consistent throughout the DEIS, the SDEIS and the FEIS."[34] To clarify its argument that it has not altered the DEIS Marston cost model or the economic practicability analysis, the FEIS states that "[t]he Corps finds the use of the 'cash-cost' model data to be, at best, uninformative in determining alternative practicability" and that it "has not used the cash cost analysis in its approach to determining alternative practicability."[35] It is based on this claimed complete rejection of the cash-cost model that the FEIS justifies its failure to respond to Dr. Wakeman's analysis. "[Dr. Wakeman's] comment letter contains several manipulations of cost data using the cash cost and discounting techniques. The Corps has not used the cash cost analysis in its approach to determining alternative practicability therefore, we do not attempt to justify, clarify or defend its use."[36] As a result, only "[c]omments relevant to the overall approach and NEPA/CWA process are addressed" in the FEIS response to Dr. Wakeman.[37]

But the Corps has not consistently applied the DEIS Marston cost model and has incorporated the cash-cost model into its practicability analysis. The FEIS refutes this point on multiple occasions in response to both our comments and Dr. Wakeman's comments.[38] Repetition does not render the statement that "[t]he cost model as applied in the FEIS and the Corps' approach to determining practicability have remained consistent throughout the DEIS, the SDEIS and the FEIS" accurate.[39] First, consistent application of the same practicability analysis to the same alternatives with the same cost estimates must yield the same result. That has not occurred here. In the DEIS, the SCRA, SCRB,

[32] App J-VII.A.1.C7.
[33] App. J-VII.A.1.R7.
[34] App. J-V.B.2.R.1.
[35] App. J-V.B.2.R.5.
[36] App. J-V.B.2.R.1.
[37] Id.
[38] App. J-V.B.2.R.1, R.5; App. J-V.B.2.R.33, R.49, R.50, R.66.
[39] App. J-V.B.2.R.1.

and SJAB alternatives were considered practicable.[40] In response to this determination, on February 07, 2007 PCS sent a letter to the Corps in which it introduced a cash-cost analysis to argue against the practicability of these three alternatives specifically.[41] The mine plans and cost estimates of these alternatives remained unchanged in the SDEIS, so did their practicability.[42] But in the FEIS, the Corps has determined "that SCRA, SCRB, and SJAB are not practicable alternatives."[43] There are only three factors that could have caused this reversal of practicability: an alteration of the mine plans, an increase in costs related to the mine plans, or a change in the practicability analysis. Neither the mine plans nor their related costs changed. The practicability analysis must have changed.

The Corps' responses to PCS's comments show exactly how the practicability analysis has changed – by adoption of the results and findings of the cash-cost model. The Corps' response to PCS is in stark contrast to its rejection of the cash-cost model in its response to our comments and those of Dr. Wakeman. The Corps could not have been stronger in its condemnation of the cash-cost model in response to comments in opposition to the applicant's preferred alternative. The FEIS proclaims unequivocally that "[t]he Corps has not used the cash cost analysis in its approach to determining alternative practicability therefore, we do not attempt to justify, clarify or defend its use."[44] Moreover, "[t]he Corps finds the use of the 'cash-cost' model data to be, at best, uninformative in determining alternative practicability . . . The Corps has not used the cash cost analysis in its approach to determining alternative practicability."[45] But when the applicant argued in support of more-extractive mine plans that the "'Cash Cost' basis evaluation more accurately portrays the timing of major expenditures associated with development capital and receding face write-off and demonstrates more clearly the point at which the applicant must commit to relocations,"[46] the Corps responded that it "recognizes this point and *has incorporated it into the economic practicability evaluation* found in Section 2.7 of the FEIS."[47]

And it is based on the incorporation of "this point" from the cash-cost model – that the "'Cash Cost' basis evaluation . . . demonstrates more clearly the point at which the applicant must commit to relocations"[48] – that the Corps reverses its determination of practicability on the SCRA, SCRB, and SJAB alternatives. Rather than documenting any change in the application of the DEIS Marston cost model to these three previously practicable alternatives, the FEIS rejects these alternatives based on "development costs . . . necessary to open the S33 Tract for any mining [that] are actually incurred at the time of the relocation."[49] The FEIS could not, and did not, make this determination based on a consistent application of the Marston cost model in the DEIS – that model amortizes

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[40] DEIS at 2-19.
[41] App. J-VII.A.1.
[42] SDEIS at 2-3.
[43] FEIS 2-30.
[44] App. J-V.B.2.R.5.
[45] Id.
[46] App. J-VII.A.1.C7.
[47] App. J-VII.A.1.R.7 (emphasis added).
[48] App. J-VII.A.1.C7.
[49] FEIS at 2-30.

costs over the life of the mine pit. The FEIS's rationale is not supported by that cost model, as evidenced by PCS's introduction of the cash-cost model after the DEIS was published to make the very argument that the Corps uses to dismiss the three previously practicable alternatives.

What is obfuscated by the Corps' statements that it "has not used the cash cost analysis in its approach to determining alternative practicability"[50] is not whether the Corps has used the cash-cost model – it acknowledges doing so expressly in its responses to PCS's comments and implicitly in the text of the FEIS – but rather to what extent it has relied on the cash-cost model. It appears as though the Corps has rejected the cash-cost data – finding it "at best, uninformative in determining alternative practicability."[51] But at the same time the Corps has embraced its conclusions – "[t]he Corps recognizes [that the cash-cost model differently demonstrates the timing of costs and commitment to relocations] and has incorporated it into the economic practicability evaluation found in Section 2.7 of the FEIS."[52] Basing the FEIS practicability determinations on the results of the cash-cost model while rejecting the data and analysis that led to those results is irrational, arbitrary, and capricious; and it cannot be the basis of this fundamental aspect of the FEIS. If the cash-cost data are "at best, uninformative in determining alternative practicability," then the conclusions based on those data are themselves uninformative and should not be used to determine practicability.

In sum, both explanations for omitting a "substantive and meaningful" response to Dr. Wakeman's comments are invalid and therefore the FEIS violates the mandate in 40 C.F.R. § 1503.4 to reply to substantive comments. Dr. Wakeman's net present value analysis cannot be disregarded because of any previous review of the DEIS Marston cost model. The data necessary for that analysis were only available one month before his comment letter was submitted. Further, PCS submitted criticisms of the analysis and introduced an entirely new method of analysis – the cash-cost model – only nine months earlier and that new method of analysis was accepted and incorporated into the FEIS. Dr. Wakeman's net present value analysis also cannot be disregarded on the premise that "[t]he cost model as applied in the FEIS and the Corps' approach to determining practicability have remained consistent throughout the DEIS, the SDEIS and the FEIS."[53] That statement – though repeated frequently in response to comments – is false. The FEIS's economic analysis is not a clarification of the previous analysis, but rather introduces new factors. There is no other way to explain reaching a different result on the practicability of SCRA, SCRB, and SJAB. Neither the mine plans nor the costs of those alternatives changed between the SDEIS and the FEIS, but their practicability did. The Corps admits that this change is a result of the incorporation of the cash-cost model in their response to PCS's criticism of the DEIS Marston model; a comparison of PCS's explanation supporting that criticism to the FEIS shows that it has been incorporated wholesale. In plain terms, the economic analysis in the FEIS was not present in the DEIS or the SDEIS. It modifies the earlier economic analysis and – since it was not included in

[50] App. J-V.B.2.R.5.
[51] Id.
[52] App. J-VII.A.1.C7.
[53] App. J-V.B.2.R.1.

the SDEIS – that modification must have occurred since the release of the SDEIS. Dr. Wakeman's comments in response to the SDEIS presenting the net present value analysis were therefore timely, relevant, and require a substantive response. The FEIS's failure to do so is arbitrary and capricious.[54]

The FEIS's failure to respond to Dr. Wakeman's analysis is not trivial or inconsequential. The practicability analysis is a central component of the § 404(b)(1) Guidelines analysis and necessarily circumscribes the determination of the least environmentally damaging practicable alternatives. Because of the role of the economic analysis, the FEIS is not only in violation of NEPA, but is inadequate for making the required § 404(b)(1) analysis. Because "a court must view deficiencies in one part of an EIS in light of how they affect the entire analysis,"[55] and the economic analysis permeates the entire analysis, the omission of a substantive, reasoned response to Dr. Wakeman's analysis undermines the FEIS. Dr. Wakeman's comments identify a significant problem with the Corps' analysis, and the Corps "must . . . reasonably respond to those comments that raise significant problems."[56]

This failure to reasonably respond and the resulting continued reliance on the FEIS's flawed practicability analysis, results in incomplete responses to other comments. The FEIS fails to substantively and meaningfully respond to multiple comments suggesting that the Corps evaluate less environmentally damaging alternatives. The FEIS relies on this faulty analysis to avoid consideration of alternatives suggested in our comments on the DEIS,[57] the Pamlico-Tar River Foundation's separate comments on the DEIS,[58] and the comments of multiple resource agencies. The Corps cannot rely on the faulty economic analysis presented in the FEIS to avoid substantively responding to these comments.

Finally, the FEIS's statement that it has not included the cash-cost model in the economic practicability is demonstrably false in light of its response to PCS's letter introducing that model and the economic analysis included in the FEIS. The inclusion of this false statement in the economic analysis causes the FEIS to violate NEPA. When an EIS "sets forth statements that are materially false or inaccurate the Court may find that the document does not satisfy the requirements of NEPA, in that it cannot provide the basis for an informed evaluation or a reasoned decision."[59] Therefore, the FEIS violates NEPA and cannot serve as the decisional document for the Corps' § 404(b)(1) Guidelines analysis.

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[54] See Hughes River Watershed Conservancy v. Glickman, 81 F.3d 437, 445 (4th Cir. 1996).
[55] Nat'l Audubon Soc'y v. Dep't of the Navy, 422 F.3d 174, 186 (4th Cir. 2005).
[56] North Carolina v. Federal Aviation Admin., 957 F.2d 1125, 1135 (4th Cir. 1992).
[57] App. J-V.A.2.R6, R7, R11, R12
[58] App. J-V.A.1.R8, R9.
[59] Western N.C. Alliance v. N.C. Dep't of Transp., 312 F. Supp. 2d 765, 776 -777 (E.D.N.C. 2003) (internal quotation marks omitted).

B. The FEIS violates NEPA because it fails to substantively respond to the comments of the Pamlico-Tar River Foundation regarding the environmental impacts of mining on the NCPC tract.

The Pamlico-Tar River Foundation ("PTRF") submitted an independent, literature review based evaluation of the environmental impacts with its comments on the DEIS. That evaluation was supported by 12 prominent scientists with expertise in coastal and wetland ecology. These scientists concluded, based on an evaluation of the proposed impacts, that substantial mining in the NCPC tract would result in significant degradation.[60] This letter consisted of a 14 page analysis that relied on 35 cited authorities. It was a substantive comment that merited a thorough response.

The FEIS does not adequately respond to this comment letter. In fact, the FEIS omits any detailed response to the analysis.[61] The only comment in the FEIS regarding this report is that it has "been included in Appendix F" and that "relevant information" has been included in the FEIS.[62] The regulations do not authorize the Corps to include unidentified "relevant information" in lieu of responding to substantive comments. The Corps must respond to comments and must do so in one of five prescribed methods.[63] To fit within one of those prescribed methods, the Corps must identify the "relevant information" and indicate how it has been applied. It does just that in response to PCS's introduction of the cash-cost model – indicating that the Corps "has incorporated it into the economic practicability evaluation found in Section 2.7 of the FEIS."[64] A similar response is required here for "relevant information" that is incorporated into the FEIS – whether it is from the PTRF comments or PCS's Entrix report.

For those portions of PTRF's comments that are not deemed "relevant information," the agency must "[e]xplain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position."[65] The Corps cannot ignore PTRF's comments, leaving the public to decipher which elements were considered "relevant" and how they were incorporated into the FEIS. Because the FEIS fails to adequately respond to PTRF's comment letter, it violates NEPA and cannot act as the decisional document for the Corps' CWA § 404(b)(1) Guidelines analysis.

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[60] App. J-V.A.1. While the letter centered on the AP Alternative, the evaluation of the environmental impacts of mining in the NCPC tract also apply to Alternative L due to its significant mining in the tract.
[61] See App. J-V.A.1.
[62] App. J.II-7.
[63] 40 C.F.R. § 1503.4.
[64] App. J-VII.A.1.R.7.
[65] 40 C.F.R. § 1503.4(a)(5).

III. The FEIS Improperly Excludes Consideration of Cumulative Impacts and Mitigation and Cannot Be the Basis for the Corps' Significant Degradation Determination.

Because the FEIS fails to account for important impacts and neglects to propose mitigation for the full length of proposed impacts, it does not provide the information necessary for the Corps to make the significant degradation determination required by the CWA § 404(b)(1) Guidelines. Significant degradation in the context of a Section 404 permit is determined by balancing the environmental impact against the proposed mitigation.[66] Because of this requisite balancing, the EIS must provide a detailed analysis of both the environmental impacts and the proposed mitigation. When the proposed mitigation does not offset the environmental impacts, the Corps should make a significant degradation finding and deny the permit.[67] Without a complete understanding of both the environmental impact and mitigation plans, the Corps cannot perform the required analysis. The FEIS does not allow the Corps to perform the required balancing because it omits critical cumulative impacts and proposes incomplete mitigation.

A. The FEIS does not account for cumulative impacts of future mining.

Cumulative impacts are the combined effect of the action being evaluated as well as other "past, present, and reasonably foreseeable future actions."[68] NEPA and the Corps' public interest review require consideration and evaluation of cumulative impacts.[69] While it is reasonable to assume that the evaluation of long-term alternatives would better evaluate "reasonably foreseeable future actions" than shorter alternatives, the FEIS does not do so. Rather, by referring to the alternatives as "holistic," though it is clear that none of the alternatives limit future mining, the FEIS avoids consideration of future impacts. In addition to the NCPC, Bonnerton, and S33 tracts included in the FEIS alternatives, Section 2.3.1 identifies four additional sites that PCS has mineral rights to within the project area: Core Point, the Edward Tract, the Grace Tract, and the Pamlico River. As the Corps is aware, "[t]he applicant has clearly conveyed a desire to mine the entire project area over time if the market allows."[70] Further, if PCS's newly preferred alternative, Alternative L, is permitted, some ore deposits will remain un-mined in both the NCPC and Bonnerton tracts. As the FEIS acknowledges, "[a]ny permit issued in this action would not require the permanent forfeiture of the right to mine any remaining reserves,"[71] meaning that PCS could apply for a permit to mine the avoided ore. Since "the Aurora Phosphate deposit is one of the few remaining minable deposites [sic] in the United States"[72] and the company has indicated that at least those areas in South Creek and the Pamlico River can be economically mined, we must assume that PCS will pursue mining beyond the extent of any permit that results from this process. Such an impact is

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[66] See City of Olmstead Falls v. U.S. EPA, 435 F.3d 632, 637-38 (6th Cir. 2006).
[67] See James City County v. U.S. EPA, 12 F.3d 1330, 1337 (4th Cir. 1993).
[68] FEIS at 4-42 (citing 40 C.F.R. § 1508.7).
[69] 33 C.F.R. § 320.4(a).
[70] FEIS at 2-28.
[71] FEIS at 2-31.
[72] FEIS at 1-4.

foreseeable and contemplated by the FEIS's discussion of the development of alternatives. Yet the FEIS concludes that "impacts resulting from each boundary by definition include all foreseeable future impacts resulting from mining activity."[73] Potential future mining in these approximately 40,000 acres adjacent to the proposed mine expansion is a foreseeable future action that must be considered.[74]

B. The FEIS does not propose mitigation for significant impacts.

The FEIS also falls short in providing enough information on the second component of the § 404(b)(1) significant degradation determination, mitigation. Although the mitigation plan required in the FEIS does not have to include every detail, "an EIS involving mitigation must include a serious and thorough evaluation of environmental mitigation options for a Project to allow its analysis to fulfill NEPA's process-oriented requirements."[75] "More generally, omission of a reasonably complete discussion of possible mitigation measures would undermine the "actionforcing" function of NEPA. Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects."[76]

The long-term alternatives evaluated in the FEIS were developed with an eye towards facilitating the development of mitigation measures. The FEIS states that "longer term alternatives may . . . improve compensatory mitigation," while to PCS those alternatives also allow "larger scale mitigation projects."[77] But while the long-term plans provide in excess of 30 years of mining, the mitigation proposed in the FEIS is not commensurate.

The least environmentally damaging practicable alternative according to the flawed economic analysis in the FEIS, Alternative L, spans 37 years; the proposed mitigation for Alternative L only purports to account "for the first 15 years of impacts."[78] The FEIS's response to comments shows that even that estimate of 15 years of mitigation may be optimistic; according to the response, the compensatory mitigation plan "does identify sites to be used for impacts occurring in the initial 12-15 years."[79]

This omission of any proposed mitigation for the impacts in the last 22 to 25 years of Alternative L renders the FEIS completely inadequate for making a significant

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[73] FEIS at 4-43.

[74] The applicant's request for a 37 year permit does not dilute the importance of these potential future impacts. Any permit that may be issued as a result of this request represents an authorization to mine, not an obligation to mine. Should PCS determine that they can increase their revenues by pursuing mining in one of these tracts; any permit that may be issued as a result of this process would not be an obstacle in that pursuit. The Corps is well aware of PCS's ability to apply for mining permits in the additional tracts, at the October 12, 2004 Review Team Meeting, Project Manager Tom Walker stated that "PCS could move to other areas outside the current project area." DEIS at A-121.

[75] O'Reilly v. U.S. Army Corps of Eng'rs, 477 F.3d 225, 231 (5th Cir. 2007).

[76] Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 352 (1989).

[77] FEIS at 2-10.

[78] FEIS at 4-104.

[79] App. J-V.A.2.R44.

degradation determination. The impacts that will occur under the Alternative L mine plan after the initial 12-15 years are not incidental. After year 15, Alternative L would impact 507.41 acres of terrestrial wetlands,[80] 23.16 acres of riparian buffers,[81] and 14,362 linear feet of creeks.[82] These impacts include 181 acres of wetland hardwood forests, 66 acres of mixed pine-hardwood forest, 45 acres of pine forest, and 31 acres of scrub-shrub assemblage.[83] Each of these community types must be mitigated at a 2:1 ratio for restoration and up to an 8:1 ratio for preservation, even under the reduced recommended ratios in the FEIS.[84]

Thus, the compensatory mitigation plan proposed in the FEIS cannot be considered "a serious and thorough evaluation of mitigation options" and therefore the FEIS does not "fulfill NEPA's process-oriented requirements."[85] Consequently, the FEIS does not provide the information necessary to apply the § 404(b)(1) Guidelines. The Corps cannot balance the proposed impacts against the proposed mitigation when there is no proposed mitigation for a significant portion of the proposed impact. Consequently, the FEIS cannot support the Corps' public interest review, which states that "no permit will be granted which involves the alteration of wetlands identified as important . . . unless the district engineer concludes . . . that the benefits of the proposed alteration outweigh the damage to the wetland resources."[86]

C. The proposed mitigation does not compensate for the loss of nonriverine wet hardwood forests.

The mitigation proposed in the FEIS is not only inadequate in scale – omitting mitigation for more than 500 acres of wetlands impacts – but also in detail. Although it recognizes that the Bonnerton tract contains "mature hardwood stands" that would be destroyed by alternative L, the proposed mitigation plan does not indicate that those stands are nationally significant due to the rarity of large, mature nonriverine wet hardwood forests nor does it identify any efforts to restore this rare community type in any of the selected mitigation sites. These omissions make clear that the Corps has not taken the necessary "hard look" at the consequences of the proposed impacts on this rare community.

The nonriverine wet hardwood forests on the Bonnerton site have been identified as a site of national significance, meaning that the site is one of the five best examples of that community type in the nation.[87] The Bonnerton site has two features that make it a site of national significance, its size and quality. As noted above, large tracts of nonriverine wet hardwood forests are rare. Of the 25 known sites in North Carolina, only

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[80] FEIS at 6-59.
[81] Id.
[82] See id.
[83] FEIS at 6-72.
[84] FEIS at 4-107.
[85] O'Reilly v. U.S. Army Corps of Eng'rs, 477 F.3d 225, 231 (5th Cir. 2007).
[86] 33 C.F.R. § 320.4(b)(4).
[87] The publication noting the site as a site of national significance is in press. (Schafale, pers. comm.)

seven are greater than 100 acres.[88] Covering 198 acres, the Bonnerton site is the fourth largest known site. In addition to its size, the Bonnerton site is high in quality, with large trees that are increasingly uncommon. The N.C. Natural Heritage Program describes the site as "very good" quality.

The Corps' regulations recognize that unique or rare wetlands have special public interest. They recognize "wetlands which are unique in nature or scarce in quantity to the region or local area" as "important to the public interest."[89] The Bonnerton nonriverine wet hardwood forests are significant on a national level, and therefore they are of the utmost importance to the public interest.

Moreover, the proposed mitigation plan does not identify how the loss of this rare forest will be mitigated. A mitigation plan may be inadequate where it does not "adequately replace the types and qualities of wetlands the proposed project would destroy."[90] Here, there is no proposed mitigation to replace the nonriverine wet hardwood forests on Bonnerton. Specific, tailored mitigation is necessary to replace these types of forests; "Nonriverine Wet Hardwood Forests rarely regenerate to the characteristic oak species and tend to become stands of weedy tree species that show little tendency to ever return to an oak canopy."[91] Further, since these communities are characterized by specific canopy species,[92] they cannot be mitigated by generic "hardwood wetland restoration, enhancement, or preservation sites."[93] As presented in the FEIS and Appendix I, the proposed mitigation plan does not adequately replace the nonriverine wet hardwood forests on Bonnerton. Any mine plan that includes destruction of this nationally significant resources is contrary to the public interest and will result in significant degradation of the aquatic environment and cannot be permitted.

V. Conclusion

The FEIS does not comply with NEPA and does not support issuing a permit for Alternative L under the CWA § 404(b)(1) Guidelines. Not only does the FEIS fail to fully address the shortcomings of the DEIS and SDEIS, it is inconsistent and internally contradictory. Further, the FEIS's responses to comments on the economic analysis include false statements that undermine the analysis and violate NEPA. Finally, the FEIS's proposed mitigation is wholly inadequate. It not only fails to propose any specific mitigation for the more than 500 acres of wetlands and 14,000 linear feet of streams that would be impacted in S33 under Alternative L, the mitigation is insufficient.

For these reasons and others stated above, the FEIS is inadequate. It does not satisfy NEPA and cannot serve as the basis for issuing any permit under the CWA §

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[88] Michael P. Schafale, *Nonriverine Wet Hardwood Forests in North Carolina: Status and Trends*, January 2008, available at http://www.ncnhp.org/Images/Other%20Publications/nrwhf2008rpt.pdf.
[89] 33 C.F.R. § 320.4(b)(2)(viii).
[90] James City County v. U.S. Envtl. Protection Agency, 12 F.3d 1330, 1337 (4th Cir. 1993).
[91] Shafale, supra n.71 at 7.
[92] Id. at 1.
[93] FEIS App. I at 5.

404(b)(1) Guidelines. Therefore, we request that the Corps enlist the expertise of the Review Team to prepare a supplement to the Final EIS that repairs the shortcomings of that document or in the alternative, we request that the Corps deny PCS's permit request for Alternative L.

Sincerely,

Derb S. Carter, Jr.
Senior Attorney/Carolinas Office Director
Southern Environmental Law Center

Geoffrey R. Gisler
Associate Attorney
Southern Environmental Law Center

Palmer Hough/DC/USEPA/US
03/27/2009 11:05 AM

To "Pace.Wilber" <Pace.Wilber@noaa.gov>
cc mike_wicker@fws.gov, pete_benjamin@fws.gov, Rebecca Fox/R4/USEPA/US@EPA, ron.sechler@noaa.gov
bcc
Subject Re: elevation package

Pace:

The econ analysis/LEDPA designation is critical/central to the case but we want our argument to be two fold:

1) the environmental impacts of the project, as currently proposed, are unacceptable; and
2) less environmentally damaging alternatives are available

-Palmer

Palmer F. Hough
US Environmental Protection Agency
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FAX: 202-566-1375
E-mail: hough.palmer@epa.gov

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Palmer Hough
EPA West -- Room 7231-L
Mail Code 4502T
1301 Constitution Avenue, NW
Washington, DC 20460

"Pace.Wilber" Hi Becky. The outline surprises me . . . . I though... 03/27/2009 11:00:58 AM

From: "Pace.Wilber" <Pace.Wilber@noaa.gov>
To: Rebecca Fox/R4/USEPA/US@EPA
Cc: mike_wicker@fws.gov, pete_benjamin@fws.gov, ron.sechler@noaa.gov, Palmer Hough/DC/USEPA/US@EPA
Date: 03/27/2009 11:00 AM
Subject: Re: elevation package

Hi Becky.

The outline surprises me . . . . I thought the cornerstone of EPA's position was the economic analysis behind the LEDPA designation. Is that the case?

I'm still doing the GIS crunching, but have to go to a dr appt. I'll complete as soon as I return.

Pace

Fox.Rebecca@epamail.epa.gov wrote:
> Hey FWS and NMFS!
>
> Palmer and I are diligently working on the elevation package and would
> love any input we could get from you all. I think we can all use a lot
> of the same information for our individual packages. Below is the
> outline, Palmer put together. We would especially like input on item
> IV. Any write up of info you can prepare for us would be very helpful.
> Unfortunately, time is very tight and we need to have a draft ready
> early next week. We have to have elevation to Army by 4-6 and package
> has to go through reviews and briefings, etc. Thanks! b
>
> I. Introduction
> II. Project History
> III. Aquatic Resources of National Importance
> IV. Substantial and Unacceptable Impacts
> V. Alternatives Analysis
> VI. Compensatory mitigation
> VII. EPA/FWS/NMFS Recommended Alternative
>
> Becky Fox
> Wetland Regulatory Section
> USEPA
> Phone: 828-497-3531
> Email: fox.rebecca@epa.gov
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>

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http://sero.nmfs.noaa.gov/dhc/habitat.htm

"Pace.Wilber"
<Pace.Wilber@noaa.gov>
03/27/2009 01:36 PM

To Palmer Hough/DC/USEPA/US@EPA, Rebecca Fox/R4/USEPA/US@EPA
cc
bcc
Subject Re: elevation package

Thanks for the clarification. I think it would be good for us to talk about NOAA's position. Since we are not at the same stage as EPA and FWS in the 404(q) process, as an agency we've not had to wrestle as deeply yet with some of these issues. Please call when you have a chance.

843-953-7200

Pace

Hough.Palmer@epamail.epa.gov wrote:

> Pace:
>
> The econ analysis/LEDPA designation is critical/central to the case but
> we want our argument to be two fold:
>
> 1) the environmental impacts of the project, as currently proposed, are
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> -Palmer
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> ---
>
> Palmer F. Hough
> US Environmental Protection Agency
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> Room 7231, Mail Code 4502T
> 1200 Pennsylvania Avenue, NW
> Washington, DC 20460
> Office: 202-566-1374
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> EPA West -- Room 7231-L
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> 1301 Constitution Avenue, NW
> Washington, DC 20460

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  |mike_wicker@fws.gov, pete_benjamin@fws.gov,
ron.sechler@noaa.gov, Palmer Hough/DC/USEPA/US@EPA
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|Re: elevation package
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>
> Palmer and I are diligently working on the elevation package and would
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outline, Palmer put together. We would especially like input on item
IV. Any write up of info you can prepare for us would be very

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Unfortunately, time is very tight and we need to have a draft ready
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b

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VII. EPA/FWS/NMFS Recommended Alternative

Becky Fox
Wetland Regulatory Section
USEPA
Phone: 828-497-3531
Email: fox.rebecca@epa.gov

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"Walker, William T SAW" <William.T.Walker@usace.army.mil>
03/27/2009 02:22 PM

To "Pace.Wilber" <Pace.Wilber@noaa.gov>, Rebecca Fox/R4/USEPA/US@EPA
cc Jennifer Derby/R4/USEPA/US@EPA, "Mike Wicker" <Mike_Wicker@fws.gov>, Palmer Hough/DC/USEPA/US@EPA, "Pete Benjamin"
bcc

Subject RE: PCS Draft Permit Conditions for Monitoring and Adaptive Mgmt

Pace,

Thanks for the input. I think the information, in the format provided, can easily be developed into a permit condition. We have worded into all conditions requiring monitoring and/or reporting (e.g mitigation, reclamation, progression of impacts, etc) the requirement that reports be submitted by certain dates and be made available in whole or in summary to any interested parties. It is also our intention to accept comments on these reports when appropriate and conveen regular (annual?) meetings of some oversight group to provide input to the Corps. Our thoughts currently are that this group be similar in composition to the review team.

Thanks
Tom

-----Original Message-----
From: Pace.Wilber [mailto:Pace.Wilber@noaa.gov]
Sent: Friday, March 27, 2009 9:40 AM
To: Fox.Rebecca@epamail.epa.gov
Cc: derby.jennifer@epa.gov; Mike Wicker; hough.palmer@epa.gov; Pete Benjamin; smtp-Sechler, Ron; Welborn.Tom@epamail.epa.gov; Walker, William T SAW
Subject: Re: PCS Draft Permit Conditions for Monitoring and Adaptive Mgmt

Hi Becky.

Hopefully this will be clear . . . . As noted in past emails, three of the the state-designated inland PNAs border NCPC, only one state-designated inland PNA borders Bonnerton (Porter Creek). Other creeks at both tracts undoubtedly function as pnas, but they lack the the PNA designation. NMFS discussions about monitoring have primarily focused on the four state-designated inland PNAs (hence we emphasize NCPC). Our draft permit condition, though, includes Porter Creek (so we are not emphasizing NCPC to point of excluding Bonnerton). To examine these creeks, reference areas are needed, and given the sequencing of mining, it is conceivable that reference creeks for NCPC could later become baselines for for examining impacts from mining the Bonnerton tract--these are details that would have to worked out with PCS. As for duration of the baseline monitoring, that depends on when the permit is issued, we are comfortable with adapting monitoring schedules to mining schedules. Given the sequencing and duration of each sequence, baselines for some creeks will be better than for others--IMHO that is just a reality we have to cope with.

Lastly, regarding "approval" of the detailed plan, I believe the federal and state permits should adhere to the same schedules to the extent practicable. The extent this can be achieved is still to be determined. The COE would be the approving authority for the plan, but we expect they would seek everyone's input in when doing that evaluation . . . and, obviously, we (including some participation by our Beaufort lab) are preparing to work with PCS and COE as much as it takes develop the plan details.

Pace

Fox.Rebecca@epamail.epa.gov wrote:
> Thanks Pace! Couple of questions: Plan is for NCPC creeks only --
> are there no plans for Porter Creek on Bonnerton because the results
> from NCPC monitoring will be used to predict and adapt
> mining/mitigation for Bonnerton? I assume the plan will include
> baseline data collection -- it may be implicit in conditions, in that
> to determine if alteration has occurred will need baseline. As you
> state 401 gives 6 months after permit issuance for submittal of
> monitoring plan and then is reviewed for approval by DWQ -- who would
> review and approve this plan? Thanks again! b
>
> Becky Fox
> Wetland Regulatory Section
> USEPA
> Phone: 828-497-3531
> Email: fox.rebecca@epa.gov
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>
> "Pace.Wilber"
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> a.gov>
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> 03/27/2009 07:47
> AM
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> To
> Jennifer Derby/R4/USEPA/US@EPA,
> Rebecca Fox/R4/USEPA/US@EPA,
> Palmer Hough/DC/USEPA/US@EPA,
> Mike Wicker
> <Mike_Wicker@fws.gov>, Pete
> Benjamin <Pete_Benjamin@fws.gov>,
> Tom Welborn/R4/USEPA/US@EPA,
> "Walker, William T SAW"
> <William.T.Walker@usace.army.mil>
> , Ron Sechler
> <ron.sechler@noaa.gov>
>
> cc
>
> Subject
> PCS Draft Permit Conditions for
> Monitoring and Adaptive Mgmt
>
>
> Hi everyone.
>
> Please check the addressees of this email. If I've inadvertently
> omitted anyone from your office that should be getting this message,
> please forward.
>
> Attached are draft permit conditions that speak to monitoring impacts
> to
>

> PNAs and adaptive management. On the phone call, I mentioned an
> outline
>
> for a monitoring plan. While cleaning up what Ron and I had developed
> after getting input from the Beaufort Lab, FWS, and a few others, it
> seemed the outline could be couched as a permit condition, so that is
> what we've done. Also in the attached is a very brief background
> section meant to review some of the context for the monitoring an
> adaptive mgmt.
>
> Any comments are welcome. And if CESAW has a preferred format they
> would like me to follow or similar draft conditions already in
> development , I am happy to adjust.
>
> Pace
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> Pace Wilber, Ph.D.
> Atlantic Branch Chief, Charleston (F/SER47) Southeast Regional Office,
> NOAA Fisheries PO Box 12559 Charleston, SC 29422-2559
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> 843-953-7200
> FAX 843-953-7205
> pace.wilber@noaa.gov
>
> http://sero.nmfs.noaa.gov/dhc/habitat.htm
>
>
> (See attached file: PCSMonitoringPlanDRAFT.doc)

--

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Atlantic Branch Chief, Charleston (F/SER47) Southeast Regional Office, NOAA
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843-953-7200
FAX 843-953-7205
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http://sero.nmfs.noaa.gov/dhc/habitat.htm

Mike_Wicker@fws.gov
03/27/2009 03:27 PM

To Rebecca Fox/R4/USEPA/US@EPA

cc Palmer Hough/DC/USEPA/US@EPA, pace.wilber@noaa.gov, pete_benjamin@fws.gov, ron.sechler@noaa.gov

bcc

Subject Some verbage, will work to provide more later, feel free to use whatever you want I think we may need to reduce some of our concerns to bullet format without so much technical jargon, I will try to work on that next week

The PCS mine expansion is proposed adjacent to the Albemarle Pamlico Estuary Complex, the largest lagoonal estuary in the country and nationally significant estuarine resource. The fringe marshes, creeks, and beds of submerged aquatic vegetation in the Albemarle Pamlico Estuary Complex provide essential nursery habitat for most commercial and recreational fish and shellfish in the North Carolina coastal area (Street et al. 2005) and important habitat for waterfowl (http://www.fws.gov/birddata/databases/mwi/mwidb.html), shorebirds and other migratory birds. The importance of wetlands to coastal fish is not unique to North Carolina. Over 95% of the finfish and shellfish species commercially harvested in the United States are wetland-dependent (Feierabend and Zelazny 1987). The estuary also provides important habitat for anadromous fish, including the endangered shortnose sturgeon (*Acipenser breviorostrum*). The Albemarle Pamlico Estuary Complex supports an important recreationally-based economy. According to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2006) fishing expenditures for 2006 in North Carolina totaled over 1.1 billion dollars. Given that the proposed expansion would result in such large-scale impacts it would likely have direct effects on the environmental quality of the Albemarle Pamlico Estuary Complex. We are especially concerned about the potential for mine expansion and operation to be detrimental to the food webs of the Albemarle Pamlico Estuary Complex. Consequently, as stated in our January 5, 2007 letter, the Service continues to believe that the proposed PCS mine expansion will result in substantial and unacceptable impacts to aquatic resources of the Albemarle Pamlico Estuary Complex. Our concerns regarding the FEIS revolve around three specific issues discussed below.

1. Proposed mining operations will negatively impact estuarine trophic structure through disruption of substrate inputs crucial to primary producers; reduction of energy sources that fuel estuarine productivity; and degradation of the nutrient sequestration capacity of the estuarine system. Estuary productivity is dependent on the complex interactions among the

various components of the aquatic food web; with epiphytes (attached to wetland macrophytes) and submerged aquatic vegetation; (SAV) forming the foundation of the estuarine food web (Odum 1971; Mitsch and Gosselink 2000; Wetzel 2001). SAV populations have recently declined by as much as 50%, possibly because of anthropogenic impacts (North Carolina Division of Marine Fisheries 2005). As a result, detritus supplied by wetland macrophytes has become more important as an epiphytic substrate. While phytoplankton are also important for productivity, the role of wetland plants and SAV detritus is of greater importance to the overall stability of shallow aquatic food webs (Rich and Wetzel 1978). It is our opinion that the proposed mining operations will negatively impact both types of epiphytic substrates, and adequate mitigation is not proposed in the FEIS. However, adequate restoration is available if PCS focuses their expansion and other operations on lands south of Hwy 33.

Also of importance to estuarine food webs is the gradual and episodic release of dissolved organic matter (DOM) from the contributing basins and wetlands immediately adjacent to the Albemarle Pamlico Estuary Complex. This energy source fuels bacterial communities that, through mineralization, provide inorganic nitrogen, phosphorous and carbon, supporting productivity. In addition, DOM supported bacteria are an important component of the "microbial loop" (Pomeroy 1974; Sherr and Sherr 1988). This part of aquatic food webs links DOM (of autochthonous and/or allochthonous origin) to higher trophic levels, via bacteria-protist-metazoan-zooplankton interactions. The impacts associated with the proposed alternative would decrease the quantity and quality of allochthonous DOM supplied to the estuary because of the close proximity of PCS's proposed mining operations.

Marsh systems provide additional functions that can influence estuarine food webs. For example, carbon of wetland origin is also exported from marsh systems in the guts of migratory feeding fish and birds or cycled through the marsh to the upper ends of tidal creeks and back to the marsh (Mitsch and Gosselink 2000). Also, marshes act to sequester and process inorganic nutrients from flood waters. The major tributaries to the Pamlico Sound, the Neuse and Tar Rivers, have been found to be excessively polluted with nutrients and are currently being managed to reduce nutrient loads. Nutrient enrichment, or eutrophication, has promoted increased algal

productivity, which had resulted in hypoxia, anoxia, and fish kills in the lower estuary. Removal of wetlands in the Pamlico Sound system acts to exacerbate the impacts of this loading by removing the system's nutrient uptake capability.

Most of the wetlands that would be subjected to impacts are wet forests, including bottomland hardwood forests. These areas are subjected to repeated periods of inundation and desiccation. This is important from a biogeochemical perspective as it allows for the accumulation of particulate organic matter and its subsequent processing (dissolution and mineralization). This leads to episodic exports of dissolved organic materials to the estuary. It also retains nutrient loads carried by high flow events, which are later sequestered into forest biomass. Such systems are also important for denitrification. These areas also provide refugia and nursery habitat for aquatic organisms during high flow periods. Productivity is high in such wetlands with pulsing hydroperiods (Mitsch and Gosselink 2000).

2. Mining will directly affect the rate at which water is routed through the watershed. As the mine expansion progresses, there is an ever increasing trend of diverting surface water drainage which once promoted estuarine productivity into National Pollutant Discharge Elimination System (NPDES) channels, pipes and outfalls. This redirection of surface flows contributes to estuarine degradation because it removes natural watershed drainage patterns that 1) promote infiltration and trapping of sediments and other pollutants, and 2) provide a beneficial diffuse source of water to the estuary. This critical watershed function is reflected in the DEIS (paragraph 3, A-91) "Mr. Wicker stated that the ... catchment basin is critically important for these streams, because rainfall is the stream's source of water. Dr. Skaggs replied that Mr. Wicker's summation was correct." In light of this concern, we are troubled that the rate of mine expansion far exceeds the rate of recovery completed. According to page 4-78 of the SDEIS between 1965 – 2005 a total of 7,729 acres were mined but only 1,101 were reclaimed. In short, reclamation (including vegetation and hydrology restoration) will allow the water quality benefits of natural drainage to return to the estuary over time; however, the discrepancy in progress between mining and reclamation activities significantly limits the potential for system recovery.

Offsets to wetland plant community losses through the proposed mitigation schedule may not be adequate to maintain the wetland functions within the watershed. Replacing mature wetlands with

immature restored or created wetlands will not provide the physical or chemical functions of existing wetland systems. Plant communities drive many physical and chemical processes within wetlands such as 1) sedimentation, and, because of adsorption, nutrient retention, 2) hydrological demand through transpiration, 3) nutrient (inorganic nitrogen and phosphorous) cycling, 4) soils for microbial communities responsible for denitrification and 5) flood mitigation because mature communities are stable sources of hydraulic roughness.

It is our opinion that the applicant should provide upfront mitigation for stream, riparian buffer and wetland impacts. By replacing mature watershed systems with restored wetlands, there will be significant lag time (several decades at least) before vegetation and soils can develop so they can adequately mitigate for the losses of DOM production and nutrient sequestration/processing provided by the present ecosystems. Given the estuary's designation as an aquatic resource of national importance, this large-scale loss of habitat quality for a period of decades is not acceptable.

The Albemarle Pamlico Estuary Complex is a bar-built estuary (Odum 1971), enclosed by North Carolina's Outer Banks. These barrier islands create a lake-like, brackish water body with only small outlets connecting it to the Atlantic Ocean (Paerl et al. 2001). Such geomorphic character produces a relatively closed system with a hydrologic residence time of about one year (Giese et al. 1985). This means that the Albemarle Pamlico Estuary Complex is highly effective at retaining nutrients, sediments and organic matter conveyed by its freshwater sources. These sediments and organic materials have absorptive relationships with nutrients, heavy metals and other toxicants that may cause chronic ecosystem impacts during hydrologic events that resuspend benthic materials in the estuaries. Thus, the impacts represented by PCS Phosphate's mining expansion should be considered with considerable diligence, as such impacts are likely to produce a legacy of environmental effects that could last for years, affecting estuarine food webs.

References cited:

Feierabend, S.J. and J.M. Zelazny. 1987. Status report on our nation's wetlands. National Wildlife Federation, Washington, D.C., 50pp.

Giese, G.L., H.B. Wilder and G.G. Parker. 1985. Hydrology of major estuaries and sounds of North Carolina. USGS water-supply paper 2221.

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Fox.Rebecca@epamail.epa.gov

Fox.Rebecca@epamail.epa.gov	Tomike_wicker@fws.gov, pete_benjamin@fws.gov, pace.wilber@noaa.gov, ron.sechler@noaa.gov ccHough.Palmer@epamail.epa.gov
03/27/2009 10:24 AM	Subjectelevation package

Hey FWS and NMFS!

Palmer and I are diligently working on the elevation package and would
love any input we could get from you all. I think we can all use a lot
of the same information for our individual packages. Below is the
outline, Palmer put together. We would especially like input on item
IV. Any write up of info you can prepare for us would be very helpful.
Unfortunately, time is very tight and we need to have a draft ready
early next week. We have to have elevation to Army by 4-6 and package
has to go through reviews and briefings, etc. Thanks! b

I. Introduction
II. Project History
III. Aquatic Resources of National Importance
IV. Substantial and Unacceptable Impacts
V. Alternatives Analysis
VI. Compensatory mitigation
VII. EPA/FWS/NMFS Recommended Alternative

Becky Fox
Wetland Regulatory Section
USEPA
Phone: 828-497-3531
Email: fox.rebecca@epa.gov

Jim Giattina /R4/USEPA/US
03/27/2009 07:49 PM

To arthur.l.middleton@usace.army.mil, william.t.walker@usace.army.mil, samuel.k.jolly@usace.army.mil,
cc Stan Meiburg/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Jennifer
bcc

Subject Follow-up to March 24 Meeting re PCS

Ken, Tom W, Arthur, David, Ross, Jeff, Tom R, and George:

We want to thank everyone again for participating in Tuesday's meeting. We found the discussions very productive. A number of action items were identified at the end of the meeting. I would like to capture that list, identify the lead for each action, and provide you with the status of actions which EPA/NMFS/FWS are responsible for. According to my notes, we identified the following four actions:

1) EPA in coordination with FWS and NMFS will provide GIS coverages identifying the proposed "EPA/FWS/NMFS" mining boundaries for the NCPC and Bonnerton tracts presented yesterday (the boundary for S33 continues to be the boundary certified by the State). We will forward this information to you on Monday 3/30.

2) FWS will provide language describing the reclamation provisions discussed on 3/24. We will forward this information to you on Monday 3/30.

3) NMFS will provide the language describing the monitoring provisions discussed on 3/24. We will forward this information to you on Monday 3/30.

4) Once it receives the GIS coverages, PCS will evaluate the economic viability of the EPA/FWS/NMFS alternative and share its results with the agencies.

In addition to expanded impact avoidance and improved reclamation and monitoring provisions, the EPA/FWS/NMFS alternative also includes measures to ensure that avoided aquatic resources are provided long-term protections from future mining with the appropriate binding real estate instrument. As discussed on 3/24, we suggest the use of conservation easements. As noted on 3/24, we are also open to discussion regarding compensatory mitigation credit for the protection of these avoided areas. We welcome your recommendations regarding the appropriate level of compensation credit for the preservation, enhancement, and/or restoration of avoided aquatic resources.

At the 3/24 meeting PCS requested that the agencies continue to pursue formal elevation of the Corps' proposed permit for the alternative known as "Modified Alternative L" that was certified by the State. Although not discussed on 3/24, we would like to organize a site visit for agency officials who would be involved in the review of this elevated permit decision. We would like to know your availability on April 27 and the morning of April 28.

Please let me know if I you have any changes to the action item list and indicate your availably for a site visit. Again thank you for participating in yesterday's meeting.

Thanks, Jim

"Pace.Wilber"
<Pace.Wilber@noaa.gov>
03/27/2009 10:36 PM

To Jennifer Derby/R4/USEPA/US@EPA, Rebecca Fox/R4/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Mike Wicker
cc
bcc
Subject Acre table

History: This message has been replied to.

Hi everyone.

Attached is a draft table that compares the acres by "Biotic ID" between the Mod Alt L and the new line proposed Tuesday. I'm still error checking, so please consider this a draft and let me know of anything you see that is awry.

Pace

--

Pace Wilber, Ph.D.
Atlantic Branch Chief, Charleston (F/SER47)
Southeast Regional Office, NOAA Fisheries
PO Box 12559
Charleston, SC 29422-2559

843-953-7200
FAX 843-953-7205
pace.wilber@noaa.gov

http://sero.nmfs.noaa.gov/dhc/habitat.htm

Palmer
Hough/DC/USEPA/US
03/28/2009 02:44 PM

To "Pace.Wilber" <Pace.Wilber@noaa.gov>
cc Rebecca Fox/R4/USEPA/US@EPA
bcc
Subject Re: Acre table

Pace:

I did find one thing that raised concerns. When I added the wetlands impacts for the Mod Alt L (left out perennial and intermittent streams) to compare it to our alternative, it came out to 3905.9 acres. But I thought the wetland impacts for Mod Alt L were 3,953. Not a big deal considering the scale but an inconsistency nonetheless.

Thanks, Palmer

Wetland Impacts

	Mod ALT L	EPA/FWS/NMFS
	69.1	55
	322.7	213.1
	420.9	338.5
	624.2	565.4
	958.6	491.5
	862	549.5
	351	258.9
	264	264
	21.6	21.6
	11.8	1.1
total	3905.9	2758.6

Palmer F. Hough
US Environmental Protection Agency
Wetlands Division
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1200 Pennsylvania Avenue, NW
Washington, DC 20460
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E-mail: hough.palmer@epa.gov

Street/Courier Address
USEPA
Palmer Hough
EPA West -- Room 7231-L
Mail Code 4502T
1301 Constitution Avenue, NW
Washington, DC 20460

"Pace.Wilber" Hi everyone. Attached is a draft table that comp... 03/27/2009 10:37:18 PM

From: "Pace.Wilber" <Pace.Wilber@noaa.gov>
To: Jennifer Derby/R4/USEPA/US@EPA, Rebecca Fox/R4/USEPA/US@EPA, Palmer

Hough/DC/USEPA/US@EPA, Mike Wicker <Mike_Wicker@fws.gov>, Pete Benjamin <Pete_Benjamin@fws.gov>, Tom Welborn/R4/USEPA/US@EPA, "Walker, William T SAW" <William.T.Walker@usace.army.mil>, Ron Sechler <ron.sechler@noaa.gov>

Date: 03/27/2009 10:37 PM
Subject: Acre table

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http://sero.nmfs.noaa.gov/dhc/habitat.htm

[attachment "AcreSummariesPurpleLine_March27.pdf" deleted by Palmer Hough/DC/USEPA/US]

"Pace.Wilber"
<Pace.Wilber@noaa.gov>
03/28/2009 03:11 PM

To Palmer Hough/DC/USEPA/US@EPA
cc Rebecca Fox/R4/USEPA/US@EPA
bcc
Subject Re: Acre table

Hi Palmer.

While the checking is going generally well, there are a few things that have caught my eye. From what I can tell, there are some oddities in the CZR data that are just propagating through into our analysis. Some of this may simply reflect the vaugeries of GIS, some are minor problems with the data I got from CZR (e.g., polygon slivers), some may reflect things I've done. Once we are happy with the purple line, we just need to pass it to CZR and let them do the full analysis.

Pace

Hough.Palmer@epamail.epa.gov wrote:

> Pace:
>
> I did find one thing that raised concerns. When I added the wetlands
> impacts for the Mod Alt L (left out perennial and intermittent streams)
> to compare it to our alternative, it came out to 3905.9 acres. But I
> thought the wetland impacts for Mod Alt L were 3,953. Not a big deal
> considering the scale but an inconsistency nonetheless.
>
> Thanks, Palmer
>
> (Embedded image moved to file: pic20399.jpg)

Palmer F. Hough
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1301 Constitution Avenue, NW
Washington, DC 20460

|------------->
| From: |
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>--|
  |"Pace.Wilber" <Pace.Wilber@noaa.gov>
|

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| To: |
|------------->

>--|
  |Jennifer Derby/R4/USEPA/US@EPA, Rebecca Fox/R4/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Mike Wicker <Mike_Wicker@fws.gov>, Pete |
  |Benjamin <Pete_Benjamin@fws.gov>, Tom Welborn/R4/USEPA/US@EPA, "Walker, William T SAW" <William.T.Walker@usace.army.mil>, Ron Sechler |
  |<ron.sechler@noaa.gov>
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[attachment "AcreSummariesPurpleLine_March27.pdf" deleted by Palmer
Hough/DC/USEPA/US]

Wetland Impacts		
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"Heather"
<riverkeeper @ptrf.org>
03/29/2009 04:45 PM

To Rebecca Fox/R4/USEPA/US@EPA
cc
bcc
Subject RE: revised additional reclamation measures

History: This message has been replied to.

Thanks Becky. Have passed on. This is a much cleaner and more concise version that the first draft that was sent.

Geoff and I have already developed draft recommendations. WE have sent to the wider group for any comments /edits. We plan to get that to you all by Monday afternoon.

I will be on the call Monday-- but am at a 2-day meeting in Mebane tomorrow and Tuesday, so will have limited access to email. If you need something, check in with Geoff at SELC and he can track me down (or just call my cell).

Thanks. (Hope you are a least enjoying part of your weekend. I was able to play in our garden today for a bit).

Heather Jacobs Deck
Pamlico-Tar Riverkeeper
Pamlico-Tar River Foundation
Phone: (252) 946-7211
Cell: (252) 402-5644
Fax: (252) 946-9492
www.ptrf.org
Waterkeeper Alliance Member

-----Original Message-----
From: Fox.Rebecca@epamail.epa.gov [mailto:Fox.Rebecca@epamail.epa.gov]
Sent: Saturday, March 28, 2009 12:26 PM
To: Heather
Subject: revised additional reclamation measures

Heather,

We have revised the additional reclamation measures from what I sent you last week. I'm attaching the revised plan. Please forward on to the other NGOs for their review. Thanks! bf

(See attached file: Additional Reclamation Measures_3-28-09.doc)

Becky Fox
Wetland Regulatory Section
USEPA
Phone: 828-497-3531
Email: fox.rebecca@epa.gov

"riverkeeper@ptrf.org" <riverkeeper@ptrf.org>
03/29/2009 10:02 PM
Please respond to riverkeeper@ptrf.org

To Rebecca Fox/R4/USEPA/US@EPA
cc
bcc
Subject RE: revised additional reclamation measures

I will have my laptop with me. I'm just not sure if I'll have access to the internet where the meeting is. I've asked Geoff to keep me in the loop via phone if anything is needed before Tuesday night.

The monitoring and reclamation package looks good...we have a few suggestions that Geoff will tidy up and get to you tomorrow.

Your hard work is much appreciated by many.

Heather Jacobs Deck
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Pamlico-Tar River Foundation
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Cell: (252) 402-5644
Fax: (252) 946-9492
www.ptrf.org
Waterkeeper Alliance Member

-----Original Message-----
From: Fox.Rebecca@epamail.epa.gov [mailto:Fox.Rebecca@epamail.epa.gov]
Sent: Sunday, March 29, 2009 5:10 PM
To: Heather
Subject: RE: revised additional reclamation measures

Thanks Heather! Yep, the first version was created by Mike and was a bit rambling and not specific enough as to what we were asking for but we liked the general ideas. Mike has been a great help! Not much off time here this weekend -- did take off about an hour to eat lunch and walk the dogs to the mailbox (have a half mile drive so that was a little bit of a getaway) but it's been from dawn to late night most of the time. Palmer and I have to get the elevation package ready for reviews by hopefully tomorrow... would like to get a yoga session in but it's not looking good... b

ps assume you will not have a laptop with you so won't be able to get emails in the evening???

Becky Fox
Wetland Regulatory Section
USEPA
Phone: 828-497-3531
Email: fox.rebecca@epa.gov

"Heather" <riverkeeper@ptrf.org>
03/29/2009 04:45

To Rebecca Fox/R4/USEPA/US@EPA
cc

PM

Subject

RE: revised additional reclamation measures

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Thanks. (Hope you are a least enjoying part of your weekend. I was able to play in our garden today for a bit).

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-----Original Message-----
From: Fox.Rebecca@epamail.epa.gov [mailto:Fox.Rebecca@epamail.epa.gov]
Sent: Saturday, March 28, 2009 12:26 PM
To: Heather
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(See attached file: Additional Reclamation Measures_3-28-09.doc)

Becky Fox
Wetland Regulatory Section

USEPA
Phone: 828-497-3531
Email: fox.rebecca@epa.gov

Mike_Wicker@fws.gov
03/30/2009 11:04 AM

To Palmer Hough/DC/USEPA/US@EPA
cc Rebecca Fox/R4/USEPA/US@EPA, "Pace.Wilber" <Pace.Wilber@noaa.gov>
bcc
Subject Citations that you asked for

Farmer, E.E. and W.G. Blue. 1978. Reclamation of lands mined for phosphate. Pages 585-608 In: F.W. Schaller and P. Sutton (eds.). Reclamation of Drastically Disturbed Lands. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, Madison, WI.

Schuman, G.E. and J.F. Power. 1981. Topsoil management of mined soils. Journal of Soil and Water Conservation 36: 77-78.

Other references in relation to soils and reclammation that I may have mentioned in narrative but not provided citations for:

Boyer, W.D. *Pinus palustris* Mill. longleaf pine. Pages 405-412 In: R.M. Burns and B.H. Honkala (Tech. Coords.). Silvics of North America. Volume 1, Conifers. Agriculture handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC.

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Cheng, H.H. and D.J. Mulla. 1999. The soil environment. Pages 1-14 In: D.C. Adriano, J.-M. Bollag, W.T. Frankenberger, Jr. and R.C. Sims (eds.). Bioremediation of Contaminated Soils. Number 37 in the series Agronomy. American Society of Agronomy, Inc., Crop Science Society of America, Inc., Soil Science Society of America, Inc. Madison, WI.

Cieslinski, G., K.C.J. Van Rees, P.M Huang, L.M. Kozak, H.P.W. Rostad and D.R. Knott. 1996. Cadmium uptake and bioaccumulation in selected cultivars of durum wheat and flax as affected by soil type. Plant and Soil 182: 115-124.

Coultas, C. F. and M. J. Duever. 1984. Soils of cypress swamps. Pages 51-59. In: K.C. Ewel and H.T. Odum (eds.). Cypress Swamps. University Presses of Florida, Gainsville, FL.

Farmer, E.E. and W.G. Blue. 1978. Reclamation of lands mined for phosphate. Pages 585-608 In: F.W. Schaller and P. Sutton (eds.). Reclamation of Drastically Disturbed Lands. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, Madison, WI.

Grant, C.A., W.T. Buckley, L.D. Bailey and F. Selles. 1998. Cadmium accumulation in crops
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Kirby, R.M. 1995. Soil survey of Beaufort County, North Carolina U.S. Department fo Agriculture, Natural Resources Conservation Service. Raleigh, NC.

McLaughlin, M.J., M.J. Bell, G.C. Wright and G.D. Cozens. 2000. Uptake and partitioning of cadmium by cultivars of peanut (*Arachis hypogaea L.*). Plant and Soil 222: 51-58.

Schuman, G.E. and J.F. Power. 1981. Topsoil management of mined soils. Journal of Soil and Water Conservation 36: 77-78.

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U.S. Fish and Wildlife Service. 2001. Significance of cadmium in the terrestrial environment on and adjacent to PCS Phosphate mine reclamation lands (Draft report). Raleigh Field Office, Raleigh, NC.

Van Driel, W. B. Van Luit, K.W. Smilde and W. Schuurmans. 1995. Heavy-metal uptake by crops from polluted river sediments covered by non-polluted topsoil. I. Effects of topsoil depth on metal contents. Plant and Soil 175: 93-104.

Van Noordwijk, M. W. Van Driel, G. Brouwer and W. Schuurmans. 1995. Heavy-metal uptake by crops from polluted river sediments covered by non-polluted topsoil. II. Cd-uptake by maize in relation to root development. Plant and Soil 175: 105-113.

Wahlenberg, W. G. 1946. Longleaf pine: its use, ecology, regeneration, protection, growth, and management. Charles Lathrop Pack Forestry Foundation.

Washington, DC.

Wenzel, W.W., D.C. Adriano, D. Salt and R. Smith. 1999. Phytoremediation: A plant-microbe-based remediation system. Pages 457-508 In: D.C. Adriano, J.-M. Bollag, W.T. Frankenberger, Jr. and R.C. Sims (eds.). Bioremediation of Contaminated Soils. Number 37 in the series Agronomy, American Society of Agronomy, Inc., Crop Science Society of America, Inc., Soil Science Society of America, Inc. Madison, WI.

Palmer
Hough/DC/USEPA/US
03/30/2009 12:10 PM

To "Pace.Wilber" <Pace.Wilber@noaa.gov>
cc Mike_Wicker@fws.gov, Rebecca Fox/R4/USEPA/US@EPA
bcc
Subject Re: Question about Joint Elevation Packages

Pace:

Thanks for agreeing to review the package, will get it to you and Mike ASAP. If NMFS does decide to withdraw its elevation letters, we appreciate your doing so in a way that does not weaken ours.

Also,what is the status of the GIS coverages? We were hoping to be able to share those with the Applicant and the District today.

Thanks, Palmer

Palmer F. Hough
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Wetlands Division
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Cell: 202-657-3114
FAX: 202-566-1375
E-mail: hough.palmer@epa.gov

Street/Courier Address
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Palmer Hough
EPA West -- Room 7231-L
Mail Code 4502T
1301 Constitution Avenue, NW
Washington, DC 20460

"Pace.Wilber" Hello Palmer and Becky. We would be happy to... 03/30/2009 12:02:07 PM

From: "Pace.Wilber" <Pace.Wilber@noaa.gov>
To: Rebecca Fox/R4/USEPA/US@EPA
Cc: Palmer Hough/DC/USEPA/US@EPA, Mike_Wicker@fws.gov
Date: 03/30/2009 12:02 PM
Subject: Re: Question about Joint Elevation Packages

Hello Palmer and Becky.

We would be happy to review the elevation package. There is a point about essential fish habitat (EFH) that has gotten lost in some of the discussion, so we'd want to make sure this point is clear. In short, the portions of the inland Primary Nursery Areas that have intermittent flows as well as the wetlands that serve as headwaters to those portions of those streams are EFH but they are not Habitat Areas of Particular Concern (HAPCs). This is important to us because HAPCs are afforded a higher level of protection under Magnuson-Stevens Act. So while there will be

direct impacts to EFH, there will only be indirect impacts to HAPCs, and the COE will condition any permit to require close monitoring of the HAPCs for these impacts and to require corrective actions.

We expect the COE will send us a 3(c) letter today. After discussion with our Regional Administrator this morning, I doubt we will elevate further due to competing time commitments and the COE having been pretty responsive to the specific concerns we raised in past letters. If we do chose to withdraw our elevation, we would want to do so in a manner that does not weaken points made by EPA and FWS. I think reviewing your elevation package will help us better grasp how to walk that thin line.

Pace

Fox.Rebecca@epamail.epa.gov wrote:

Mike and Pace,

We are just putting the finishing touches on our DRAFT impacts section
and it would be very helpful if your agencies could take a look and
provide input -- caveat is that it would have to happen very quickly --
it is only several pages long. Thanks! b&p

Becky Fox
Wetland Regulatory Section
USEPA
Phone: 828-497-3531
Email: fox.rebecca@epa.gov

	Palmer Hough/DC/USEPA/US	
To		Mike_Wicker@fws.gov
	03/30/2009 11:28 AM	
cc		"Pace.Wilber" <Pace.Wilber@noaa.gov>
, Rebecca		Fox/R4/USEPA/US@EPA
Subject		Question about Joint Elevation Packages(Document link: Rebecca

Fox)

Mike:

We were asked by our upper management about the possibility of having a joint elevation package between FWS and EPA (I presume this would apply to NMFS but not sure how that would work since NFMS has not technically started an elevation since it has not received an NOI - but I was not asked this question).

While we are developing all the components, points, arguments, etc in our package based on your input and will share parts or all of our draft package with you - b/c we want to ensure that we are taking a stand that represents the collective judgment of all three agencies - I just assumed that having an actual joint letter signed by both EPA and DOI - by EPA's deadline of 4/6 would be logistically impossible.

What are your thoughts? I assumed that FWS would need its extra days just to get it package through your Regional Office, FWS HQ office and then to DOI.

-Palmer

ps: continued thanks to you and Pace for all of your years of work on this effort and your fantastic support over the last few weeks.

Palmer F. Hough
US Environmental Protection Agency

Wetlands Division
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1200 Pennsylvania Avenue, NW
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E-mail: hough.palmer@epa.gov

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--

Pace Wilber, Ph.D.
Atlantic Branch Chief, Charleston (F/SER47)
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http://sero.nmfs.noaa.gov/dhc/habitat.htm

"Pace.Wilber"
<Pace.Wilber@noaa.gov>
03/30/2009 01:09 PM

To Rebecca Fox/R4/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Jennifer
cc
bcc
Subject Newest NCPC lines

Hi everyone.

This is a bit rushed, so hopefully no big errors. Attached ppt shows the latest line for the NCPC tract. There are some issues with calculating the acres, and we hope to meet with CZR tomorrow to see what is going on here. I propose we send COE and PCS the only the line, not the acreages. For technical reasons, we should rely upon CZR to do those calculations.

Pace

--

Pace Wilber, Ph.D.
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http://sero.nmfs.noaa.gov/dhc/habitat.htm

Palmer
Hough/DC/USEPA/US
03/30/2009 03:39 PM

To "Pace.Wilber" <Pace.Wilber@noaa.gov>, Mike_Wicker@fws.gov
cc Rebecca Fox/R4/USEPA/US@EPA
bcc

Subject PCS Elevation: Draft Impacts Discussion for your expedited review

Pace/Mike:

Attached is the Impacts discussion from our draft permit elevation package for PCS. We are very interested in your thoughts and comments on this. As you know we are under great pressure to get a draft package pulled together for broader review here at EPA, so would we appreciate you thoughts/edits etc as soon as possible.

Thanks, Palmer


Impacts section_v5.doc

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IV. Substantial and Unacceptable Impacts

40 CFR 230.10(c): Significant Degradation

EPA is concerned that compliance with requirements of Section 230.10(c) of the Guidelines has not been demonstrated. Section 230.10(c) requires that no discharge of dredged or fill material shall be permitted which will cause of contribute to significant degradation of waters of the United States. The Guidelines explicitly require evaluation of all direct, secondary, (i.e., indirect), and cumulative impacts reasonably associated with the proposed discharge in determining compliance with Section 230.10(c). In accordance with the Guidelines, determining significant degradation requires specific consideration of effects on such functions and values as wildlife habitat, aquatic system diversity, stability and productivity, recreation, aesthetic and economic values.

Of the 15,100 acre project area, the proposed mine advance would impact approximately 11,454 total acres and result in direct impacts to approximately 3,953 acres of wetlands, 19 acres of open waters and 25,727 linear feet of streams. This represents the single largest wetland impact ever authorized under the Clean Water Act in NC and represents a significant loss of wetlands, streams and other waters of the United States within the nationally significant Albemarle Pamlico Estuary Complex.

As previously noted, all of the site's wetlands perform important ecological functions that support the Albemarle Pamlico Estuary such as temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. Also as previously noted, all of the site's stream resources perform important ecological functions that support the Albemarle Pamlico Estuary such as the transport of water, nutrients and sediment downstream, pollutant processing and removal, and maintenance of biologically diverse plant and animal habitat. We recognize that not all of the approximately 3,953 acres of wetlands and 25,727 linear feet of streams that would be impacted by the proposed project perform all of these respective functions to the same degree (because of their position in the landscape and/or their level of prior disturbance), however, the complete loss of this entire suite of wetland and stream functions on this scale raises serious ecological concerns.

The habitat functions provided by wetlands and streams that would be lost are particularly important in light of the ecological and economic value of the Albemarle Pamlico Estuary's commercial and recreational fishery/shellfish resources. Also, the state has designated the entire Tar – Pamlico River Basin as Nutrient Sensitive Waters because of problems associated with excessive levels of nutrients in the river such as harmful algal blooms, low oxygen levels, increased fish kills, and other symptoms of stress and diseases in the aquatic biota. The state developed a strategy to reduce nutrient inputs from around the basin to the estuary that is yielding improvements to water quality. Nonetheless, we are very concerned that loss of the water quality enhancement functions provided by the approximately 3,953 acres of wetlands and 25,727 linear feet of streams that would be completely eliminated by the proposed project could

impact the perennial reaches of the four Primary Nursery Areas, the headwater drainages of the project site's tidal creeks, including those designated as Primary Nursery Areas, would be reduced by approximately 70 percent. Our concerns regarding the proposed drainage basin reductions are amplified on the NCPC tract since its watersheds have already lost approximately 1,268 acres of wetlands as part of the Applicant's 1997 mining permit.

Eliminating the headwater streams and wetlands and significantly reducing the drainage areas of the project site's Primary Nursery Areas and other tidal creeks would:

- Reduce flow from ground water and stormwater runoff to the tidal creeks, thereby decreasing fresh water input and increasing their salinity through estuarine tidal influences.
- Reduce filtration of nutrients and other contaminants previously accomplished by the site's streams and wetlands, increasing sedimentation and turbidity in tidal creeks and reducing the introduction of organic materials critical for biological activity in the tidal creeks.

We believe the disruption of these processes and functions in the drainage basin will significantly impact the site's tidal creeks and impair the ability of these systems to function as Primary Nursery Areas.

Estuarine animals exist in a community assemblage and the influence of a factor, such as salinity on one species may be extended either directly or indirectly to affect other species. The cumulative effects of even small changes in an estuary may have a total systemic effect on the marine resources and the economic activities that depend on them. We believe the potential effect of Drainage Basin Reduction (DBR) on the production of marine fisheries resources is significant.

Besides its effect on fish production, DBR will likely result in increased sedimentation and turbidity, which are significant contributors to declines in populations of aquatic organisms. The direct effects of sedimentation and turbidity at various trophic levels are mortality, reduced physiologic functions and avoidance. Sedimentation can clog the gills of fish, reducing respiratory abilities. This stress may reduce tolerance levels to disease and toxicants and to changes in dissolved oxygen concentrations and salinity, compromising the health of local fisheries resources. Decreases in primary production are associated with increases in sedimentation and turbidity and produce negative cumulative effects through depleted food availability to zooplankton, insects, freshwater mollusks and fish. Decreases in available food at various trophic levels also results in depressed rates of growth, reproduction and recruitment. These effects lead to alterations in community density, diversity and structure.

Mining will directly affect the rate at which water is routed through the watershed. DBR will reduce contiguous sheet flow and as the mine expansion progresses there is an ever increasing trend of diverting surface water drainage which once promoted estuarine productivity into National Pollutant Discharge Elimination System (NPDES) channels, pipes and outfalls. This redirection of surface flows contributes to estuarine degradation because it removes natural watershed drainage patterns that 1) promote infiltration and trapping of sediments and other pollutants, and 2) provide a beneficial diffuse source of water to the estuary and subsequently decreases the buffering capacity of the system. These changes will likely increase the amount of

the conclusion that current and future DBRs from mining activities would have no significant effect on downstream ecosystems. Data collected by NC Wildlife Resource Commission in November 2006 to determine species present in Jacks, Jacobs and South Creeks does not support that fish production originates from downstream estuarine environments. The report does not address freshwater species nor did it establish a connection between biota and previous mining impacts in the area including watershed reduction and ground water draw down. The report used "baseline" data for Jacks Creek collected after the watershed had already been reduced by almost 20 percent. Small reductions in watershed area may have large biotic impacts and therefore it is problematic using this data as a baseline to determine DBR impacts. This report also makes a troubling extrapolation that since past smaller DBRs did not adversely impact the tidal creeks, the much larger DBRs associated with the proposed project (i.e., 70 to 80 percent DBRs) also would not adversely impact the tidal creeks. However, data does not exist to draw this conclusion.

The Entrix report and the Corps' February 24, 2009, Notice of Intent letter both present the success of the PA II man-made marsh on the PCS project area to hypothesize that the DBRs will not cause significant loss of habitat value and nursery functions of the tidal creeks. The West (2000) study evaluating PA II is frequently cited in these discussions and is used by the Entrix report to argue broad scale functional equivalency of PA II to local tidal creeks. We do not believe it is valid to use the West study to make these inferences. The study's objective was to assess how well PA II could provide suitable habitat for fish, benthic and plant species and not to evaluate the effects of DBR on these populations. The data was collected from the lower reaches of the stream channel and did not fully assess the upper channel's biota. These results support the potential for species repopulation in the lower reaches of the creeks but do not support the proposition that DBR will not impact the upper channel's biota. The report does not provide data on the functional equivalence of factors, such as stream substrate, biogeochemical processes, wetland plants, etc. and in fact, there was no evidence of accretion of natural sediment structure (woody detrital covering, large peat component, etc) or organic carbon in the 10 years of the study. We believe the data presented does not overcome the large body of scientific information showing that mining through the headwaters of estuarine streams and their riverine habitat will have a significant negative impact on the functioning and structure of the creeks impacted by the proposed mining activities. There is, however, a large amount of scientific data supporting the importance of headwater streams and wetlands on downstream water quality.

Summary

In summary, the proposed project would eliminate critical ecological functions provided by approximately 3,953 acres of wetlands and 25,727 linear feet of streams within the nationally significant Albemarle Pamlico Estuary. Wetland functions include temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. Stream functions include transport of water, nutrients and sediment downstream, pollutant processing and removal, and maintenance of biologically diverse plant and animal habitat. Of particular concern are the proposed projects:

- Direct impacts to portions of a nonriverine hardwood wetland forest that has been designated as a Nationally Significant Natural Heritage Area by the NC Natural Heritage Program, and

Derb Carter
<derbc@selcnc.org>
03/30/2009 04:04 PM

To "Pete_Benjamin@fws.gov" <Pete_Benjamin@fws.gov>, Mike Wicker <mike_wicker@fws.gov>, Tom Welborn/R4/USEPA/US@EPA, Rebecca
cc
bcc
Subject FW: press on PCS elevation

Some of the press on PCS I thought you might find of interest.

Derb

An editorial also ran in the Charlotte Observer over the weekend:
http://www.charlotteobserver.com/opinion/story/371034.html

EPA has second thoughts on coal, phosphate mines

Agency rightly questions impact on streams, rivers and wetlands.

Resulting articles:
AP http://www.newsobserver.com/1565/story/1458993.html
N&O (also in today's print) http://www.newsobserver.com/news/story/1458425.html
WDN http://www.wdnweb.com/articles/2009/03/26/news/news01.txt

"Pace.Wilber"
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03/30/2009 04:24 PM

To Jim Giattina/R4/USEPA/US@EPA
cc arthur.l.middleton@usace.army.mil, william.t.walker@usace.army.mil, samuel.k.jolly@usace.army.mil,
bcc
Subject Re: Follow-up to March 24 Meeting re PCS

History: This message has been forwarded.

Hello everyone.

At the close of the meeting last Tuesday, NMFS offered to capture into a GIS the lines that were drawn for the NCPC and Bonnerton tracts and distributed in hard copy. The attached zip file contains three sets of shapefiles, one set for NCPC and two sets for Bonnerton (north and south). The attached pdf shows these lines in purple relative to the GIS data provided to us in January by CZR. Please note the area indicated for the NCPC tract is a bit larger than what was provided last Tuesday. This increase in area of the proposed mine reflects clarification of conversations between EPA and NGOs. The approximate area of this addition is shown in the pdf. Questions about that clarification should be directed to EPA since they were the agency that participated in the original and follow-up conversations. I would be happy to answer any questions you have about how the hard copies distributed last week were formatted for a GIS.

Pace

Giattina.Jim@epamail.epa.gov wrote:
> Ken, Tom W, Arthur, David, Ross, Jeff, Tom R, and George:
>
> We want to thank everyone again for participating in Tuesday's meeting.
> We found the discussions very productive. A number of action items were
> identified at the end of the meeting. I would like to capture that
> list, identify the lead for each action, and provide you with the status
> of actions which EPA/NMFS/FWS are responsible for. According to my
> notes, we identified the following four actions:
>
> 1) EPA in coordination with FWS and NMFS will provide GIS coverages
> identifying the proposed "EPA/FWS/NMFS" mining boundaries for the NCPC
> and Bonnerton tracts presented yesterday (the boundary for S33 continues
> to be the boundary certified by the State). We will forward this
> information to you on Monday 3/30.
>
> 2) FWS will provide language describing the reclamation provisions
> discussed on 3/24. We will forward this information to you on Monday
> 3/30.
>
> 3) NMFS will provide the language describing the monitoring provisions
> discussed on 3/24. We will forward this information to you on Monday
> 3/30.
>
> 4) Once it receives the GIS coverages, PCS will evaluate the economic
> viability of the EPA/FWS/NMFS alternative and share its results with the
> agencies.
>
> In addition to expanded impact avoidance and improved reclamation and
> monitoring provisions, the EPA/FWS/NMFS alternative also includes

> measures to ensure that avoided aquatic resources are provided long-term
> protections from future mining with the appropriate binding real estate
> instrument. As discussed on 3/24, we suggest the use of conservation
> easements. As noted on 3/24, we are also open to discussion regarding
> compensatory mitigation credit for the protection of these avoided
> areas. We welcome your recommendations regarding the appropriate level
> of compensation credit for the preservation, enhancement, and/or
> restoration of avoided aquatic resources.
>
> At the 3/24 meeting PCS requested that the agencies continue to pursue
> formal elevation of the Corps' proposed permit for the alternative known
> as "Modified Alternative L" that was certified by the State. Although
> not discussed on 3/24, we would like to organize a site visit for agency
> officials who would be involved in the review of this elevated permit
> decision. We would like to know your availability on April 27 and the
> morning of April 28.
>
> Please let me know if I you have any changes to the action item list and
> indicate your availably for a site visit. Again thank you for
> participating in yesterday's meeting.
>
> Thanks, Jim
>
>
>

--

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rename the file extension to its correct name.

For further information, please contact the EPA Call Center at (866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

Geoff Gisler
<ggisler@selcnc.org>
03/30/2009 04:25 PM

To Rebecca Fox/R4/USEPA/US@EPA, David McNaught <dmcnaught@edf.org>, Palmer Hough/DC/USEPA/US@EPA, Tom
cc David Emmerling <david.emmerling@ptrf.org>, Derb Carter <derbc@selcnc.org>, Jim Stephenson <jims@nccoast.org>, "Mike_Wicker@fws.gov" <Mike_Wicker@fws.gov>, Molly
bcc

Subject RE: Monday Agency/NGO discussion 1 PM

History: This message has been forwarded.

All,
I have attached our recommended modifications to the monitoring and reclamation plans. In summary of today's phone call:

Although we believe that the mine advance should move immediately South of 33, the environmental NGOs are willing to accept a mine plan that allows considerable mining on the two tracts North of 33: NCPC and Bonnerton. That mining, however, must be conditioned upon a guarantee that ALL mining-avoidance areas are put under some sort of conservation instrument that ensures their perpetual exemption from mining. Perhaps a conservation easement to an appropriate land trust. That mechanism must include protection of the vegetation within the nationally significant natural heritage area on the Bonnerton Tract.

With that condition, we agree to the "option B" mining avoidance lines offered by the EPA/USFWS/NOAA on the NCPC tract. That plan will protect the two NMFS areas at Huddy's and Tooley's headwaters (areas 4 and 5), but will allow the mining of the area included in the red polygon, part of Drinkwater Creek's headwaters.

We are concerned about the impacts to the SNHA on Bonnerton due to mining in the vicinity of the SNHA and any relocation of equipment through the area. But we can agree to the mine advance offered by the EPA/USFWS/NOAA on the Bonnerton tract under the condition that the Company can ensure (and demonstrate) that relocation of its equipment between the North and South mining segments of the Bonnerton tract can be made without significant, long-term degradation of the important SNHAs or tributaries or riparian areas of Porter and Durham Creeks, which are the key targets of additional avoidance on that tract (NMFS avoidance areas 3, 6, and 7).

Lastly, the environmental NGOs also would endorse a mine advance South of 33 that follows the SCR boundary.

Geoff Gisler
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Date: 3-28-09

Additional Measures to Improve Reclamation Areas

EPA, FWS and NMFS recommend the following measures to minimize the impact of the mining project on avoided aquatic resources by improving the quality of the reclamation area. It should be noted that these improvements would be in addition to the already agreed-upon 3-foot site cap needed to address the cadmium risk assessment recommendations. PCS's reclamation plan shall describes the process that it will use to implement these reclamation efforts, sets measurable success criteria, establishes a process to measure those criteria, and creates a mechanism for releasing those results to our agencies and the public annually. Reclamation under the plan must be completed and released within 15 years of initial land clearing for mine expansion.

1) We recommend that a topsoil cover be added to the reclaimed areas utilizing, to the extent appropriate and practicable, the topsoil removed prior to site mining. Reuse of on-site topsoil takes advantage of the soil structure, organic matter, nutrients, and seed sources available in that material (i.e. the A Horizon) which is removed as mining operations advance. There is support for such an approach in the published literature (Farmer and Blue 1978; Schuman and Power 1981) and addition of topsoil to phosphate reclamation sites in Florida has yielded positive environmental results. Adding approximately one foot of topsoil on average (no less than six inches) would allow the site to recover at a greatly accelerated pace in contrast to not having topsoil and would make the reclaimed area suitable for a broader array of tree species. While we recognize that adequate amounts of topsoil will likely not be available to re-cover the entire reclamation area because of losses during removal and site preparation, reasonable targets for the percent of the reclamation site amended with topsoil should be established.

2) We also recommend that upland portions of the reclamation area be replanted in longleaf pine (*Pinus palustris)* and wetland areas be replanted in bald cypress *(Taxodium distichum)* and/or Atlantic white cedar *(Chamaecyparis thyoides)* if Atlantic white cedar is shown to do well on the reclamation sites. All three of these species will grow on low fertility sites and longleaf pine and bald cypress are long lived species that despite slow growth rates can be expected to live long enough to eventually establish moderate stand coverage even on sterile sites and will produce decay resistant litter that over the very long term will rebuild soil. All of these species provide wildlife habitat and all occur naturally in monotypic stands.

3. We recommend that reclamation efforts in riparian areas receive priority treatment, particularly for those riparian areas adjacent to streams that will be connected to existing surface waters (e.g. Whitehurst Creek). PCS's reclamation plan must include an explanation of site development that will minimize erosion, eliminate contaminant transportation from the clay/gypsum blend through the stream channel, and facilitate the development of a mature vegetated riparian buffer.

Recommendations for the Monitoring of Impacts to Primary Nursery Areas

Background

Throughout reviews of the proposal by PCS to expand its mine into the NCPC, Bonnerton, and S33 tracts, resource agencies expressed concerns over direct and indirect impacts to creeks that function as nursery areas for estuarine and marine fauna. South Creek, which borders the NCPC tract, is designated by the State of North Carolina as a Special Secondary Nursery Area, and the NC Division of Marine Fisheries has jurisdiction over this aspect of South Creek. Three creeks that discharge into South Creek from the NCPC tract, Tooley, Jacobs, and Jacks Creeks, and one creek that borders the Bonnerton tract, Porters Creek, are designated as Inland PNAs and are under the jurisdiction of the NC Wildlife Resources Commission. At the federal level under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), these creeks are Habitat Areas of Particular Concern, which is the highest level of protection afforded by the Magnuson-Stevens Act, and wetlands that serve as headwaters of those creeks are essential fish habitat (EFH) under the Magnuson-Stevens Act.

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While the footprint of the proposed mine does not extend into the PNAs, the resource agencies are concerned that the extensive mining of wetlands that serve as the headwaters of these creeks may impair the function of these PNAs. Accordingly, a monitoring program coupled with an adaptive management process is proposed to gauge the impacts to the PNAs from the mining so that appropriate adjustments can be made to mine operations. By "appropriate adjustments," we simply mean compliance reviews common for permits that authorize projects of this size and duration, and recognition of the inevitable uncertainties at the time of permitting about how large projects affect the landscape, and vice versa. Similar monitoring should be part of the mitigation and reclamation activities so that the expected benefits from these activities can be evaluated. The monitoring program and adaptive management process described below are viewed as consistent with the recently issued water quality certification to the extent that the water quality certification describes the monitoring. PCS has six months to flesh out the monitoring program required by the water quality certification. We expect a single monitoring and adaptive management program would meet the requirements of state and federal authorizations.

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Proposed Permit Conditions

Monitoring of Affected Creeks and Streams

Deleted: *PNA Functions*

PCS shall develop and implement a plan of study to address the effects of a reduction in headwater wetlands on the utilization of Porters Creek, Tooley Creek, Jacobs Creek, Drinkwater Creek, and Jacks Creek as nursery areas by resident fish and appropriate invertebrate species and on all other creeks and streams whose headwaters are reduced 10% or more by mine expansion. This plan shall be submitted to NMFS, US FWS, NCWRC, NCDMF, NCDWQ, NCDLR for review and approval prior to initiation of land clearing activities in the headwater wetlands of PNAs within the NCPC tract. PCS shall make the plan publicly available for comment at the time it submits the plan to the reviewing agencies and shall provide individual notice of the plan to those persons that request notice. The plan shall identify reference creeks (at least four – Muddy Creek's usefulness as a reference creek should be reevaluated, not assumed); sampling stations, schedules, and methods; laboratory methods; data management and analysis; and quality control and quality assurance procedures.

Monitoring under the plan shall begin 10 years before land clearing is anticipated. For those streams with impacts expected to occur within the first 10 years of the mine expansion, monitoring shall begin as soon as possible following plan approval. Monitoring shall continue for 30 years following completed reclamation (to match North Carolina's solid waste monitoring requirements).

At a minimum, the plan shall address the following issues and include the following data collection:

1. Has mining altered the amount or timing of water flows within the creeks?
--Continuous water level recorders to measure flow
--Rain gauges to measure local water input
--Groundwater wells to measure input to the creeks
--Continuous salinity monitoring
--Periodic DO monitoring (continuously monitored for several days at strategic times of year)

2. Has mining altered the geomorphic or vegetative character of the creeks?
--Aerial photography to determine creek position, length, width, sinuosity (annual)
--Cross section of creeks at key locations (annual)
--Sediment characteristics (texture, organic content, and contaminants) (annual)--Vegetation (percent cover by species) along the creek to determine zonation changes and invasions (spring and fall)
--Sediment chlorophylls or organic content in vegetation zone (spring and fall)
--Determination of location of flocculation zones with each creek (spring and fall)
--Erosion of overburden cap that forms the streambed banks in any reconnected stream system

Deleted: ¶

3. Has mining altered the forage base of the creeks?
--Benthic cores to sample macroinfauna (spring and fall)
--Benthic grabs focused upon bivalves, such as *Rangia* sp. (spring and fall)
--Net samples for grass shrimp, blue crabs, and small forage fish (such as *Fundulus* spp.); sampling gears would be chosen to reflect ontogenetic shifts in creek usage (monthly)

4. Has mining altered the use of the creeks by managed fish?
--Life-stage specific sampling based on time year, sampling gears would be chosen to reflect ontogenetic shifts in creek usage. (monthly or seasonally)

5. Do creek sediments include contaminants at levels that could impact fish or invertebrates?
--Creeks would be sampled for metals, including cadmium, mercury, silver, copper, and arsenic (annual)
--Availability and uptake by appropriate aquatic species (e.g., *Rangia* sp., blue crabs) should measured using appropriate bioassay techniques (annual)--Effect on heavy metal concentrations in bottom sediments of connecting reclaimed areas to downstream creeks (e.g. Whitehurst Creek)

Deleted: ¶

Groundwater Monitoring

- Groundwater monitoring wells should be placed in reclamation areas and peripheral areas. Number and location of wells shall be determined in consultation with the North Carolina Department of Environment and Natural Resources (Department).
- Groundwater monitoring should commence with weekly samples for a period of 5 years to generate an acceptable baseline. After 5 years, monthly monitoring is acceptable.
- Monitoring must continue for 30 years post reclamation. The post-reclamation time period can be lengthened by the Department.
- If elevated levels of heavy metals are detected, monitoring should continue to be conducted weekly.
- At a minimum, heavy metals, including cadmium, arsenic, and chromium should be analyzed. Other parameters may be added per the discretion of the Department.
- PCS Phosphate shall develop a remediation strategy for heavy metal contamination of groundwater and tributaries that drain or are adjacent to mined areas. That strategy must be made available for public review and comment before approval by the Department.

Monitoring of Reclaimed Areas

PCS's monitoring plan must include specific conditions that measure the viability of capping and top soil cover approaches. Those conditions must include measurable standards and regular inspection intervals. The plan should further include an evaluation of the following characteristics:

1) physical conformation (to measure the rates of settling and erosion, the resulting changes in conformation)

2) patterns in overall water balance and groundwater levels,

3) soil profile development and quality (especially looking for toxicants),

4) vegetative community development patterns, and

5) animal use patterns, along with some body burden testing for resident animals as sentinels for cadmium movement.

Adaptive Management

PCS shall establish an independent panel of scientists and engineers to annually evaluate whether direct and indirect impacts from mining and benefits from the compensatory mitigation are in accordance with expectations at the time of permitting. The panel shall meet during January or February of each calendar year and shall review data collected through the previous calendar year. By March 31, the panel shall provide the Wilmington District and PCS with recommended changes to the mining and mitigation that are necessary to bring the project into alignment with expectations. Every fifth year, the panel shall review the monitoring methods, sampling locations, parameters analyzed, and other elements of monitoring protocol to determine if modifications to the plan are appropriate. The Wilmington District will consider this information and comments from resource agencies to determine if corrective actions or permit modifications are needed. If the panel concludes that the mine expansion has caused significant adverse environmental impacts that are not offset by mitigation, then corrective action shall be taken. All data, reports, and presentations reviewed by the panel shall be placed and maintained on a publically accessible internet site.

Palmer Hough/DC/USEPA/US
03/30/2009 04:58 PM

To Rebecca Fox/R4/USEPA/US@EPA
cc
bcc
Subject Re: Fw: Monday Agency/NGO discussion 1 PM

Becky:

On the second point, can you follow up with Geoff, did he mean to say modified ALT L?

Regarding monotypic stands, I guess I assumed having one target species is better than the proposed option of a moonscape. Can we assume there will be a lot of volunteer species that will move in? Do you have language that you want to add to the reclamation provisions to address this concern?

-Palmer

Palmer F. Hough
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Rebecca Fox Palmer, What do you think about EPA input on r... 03/30/2009 04:42:37 PM

From: Rebecca Fox/R4/USEPA/US
To: Palmer Hough/DC/USEPA/US@EPA
Date: 03/30/2009 04:42 PM
Subject: Fw: Monday Agency/NGO discussion 1 PM

Palmer,

What do you think about EPA input on reclamation re monotypic stands.

Also Geoff's write up still says SCR boundary S33... b

Becky Fox
Wetland Regulatory Section
USEPA
Phone: 828-497-3531
Email: fox.rebecca@epa.gov
----- Forwarded by Rebecca Fox/R4/USEPA/US on 03/30/2009 04:40 PM -----

Geoff Gisler
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03/30/2009 04:25 PM

To Rebecca Fox/R4/USEPA/US@EPA, David McNaught <dmcnaught@edf.org>, Palmer Hough/DC/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
cc David Emmerling <david.emmerling@ptrf.org>, Derb Carter <derbc@selcnc.org>, Jim Stephenson <jims@nccoast.org>, "Mike_Wicker@fws.gov" <Mike_Wicker@fws.gov>, Molly Diggins <Molly.Diggins@sierraclub.org>, Melody Scott <msscott@edf.org>, "pace.wilber@noaa.gov" <pace.wilber@noaa.gov>, "Pete_Benjamin@fws.gov" <Pete_Benjamin@fws.gov>, Heather <riverkeeper@ptrf.org>, "ron.sechler@noaa.gov" <ron.sechler@noaa.gov>, Sam Pearsall <SPearsall@edf.org>, Todd Miller <toddm@nccoast.org>
Subject RE: Monday Agency/NGO discussion 1 PM

All,
I have attached our recommended modifications to the monitoring and reclamation plans. In summary of today's phone call:

Although we believe that the mine advance should move immediately South of 33, the environmental NGOs are willing to accept a mine plan that allows considerable mining on the two tracts North of 33: NCPC and Bonnerton. That mining, however, must be conditioned upon a guarantee that ALL mining-avoidance areas are put under some sort of conservation instrument that ensures their perpetual exemption from mining. Perhaps a conservation easement to an appropriate land trust. That mechanism must include protection of the vegetation within the nationally significant natural heritage area on the Bonnerton Tract.

With that condition, we agree to the "option B" mining avoidance lines offered by the EPA/USFWS/NOAA on the NCPC tract. That plan will protect the two NMFS areas at Huddy's and Tooley's headwaters (areas 4 and 5), but will allow the mining of the area included in the red polygon, part of Drinkwater Creek's headwaters.

We are concerned about the impacts to the SNHA on Bonnerton due to mining in the vicinity of the SNHA and any relocation of equipment through the area. But we can agree to the mine advance offered by the EPA/USFWS/NOAA on the Bonnerton tract under the condition that the Company can ensure (and demonstrate) that relocation of its equipment between the North and South mining segments of the Bonnerton tract can be made without significant, long-term degradation of the important SNHAs or tributaries or riparian areas of Porter and Durham Creeks, which are the key targets of additional avoidance on that tract (NMFS avoidance areas 3, 6, and 7).

Lastly, the environmental NGOs also would endorse a mine advance South of 33 that follows the SCR boundary.

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[attachment "Additional Reclamation Measures_3-28-09.ngo.doc" deleted by Rebecca Fox/R4/USEPA/US] [attachment "PCS monitoring (draft).ngo.doc" deleted by Rebecca Fox/R4/USEPA/US]

Mike_Wicker@fws.gov
03/30/2009 05:06 PM

To Palmer Hough/DC/USEPA/US@EPA
cc Rebecca Fox/R4/USEPA/US@EPA, "Pace.Wilber" <Pace.Wilber@noaa.gov>
bcc
Subject Re: PCS Elevation: Draft Impacts Discussion for your expedited review

History: This message has been replied to.

Pete and I are reviewing your impact discussion.

While we are doing that I thought you might like to look at DMF letter on the FEIS. It has some good language in it that Sean (DMF) put together. I called Sean and he said use whaetever we want. We are all in this together.

(See attached file: PCS FEIS 6-30-08.doc)

NCDENR

North Carolina Department of Environment and Natural Resources

Michael F. Easley, Governor
William G. Ross Jr., Secretary

Division of Marine Fisheries

Dr. Louis B. Daniel III, Director

MEMORANDUM

To: Melba McGee
Through: Anne Deaton
From: Sean McKenna
Date: June 27, 2008
Subject: PCS Phosphate mine advance, Beaufort County

The following comments by the North Carolina Division of Marine Fisheries (NCDMF) on the Final Environmental Impact Statement (FEIS) are offered pursuant to G.S. 113-131. The Potash Corporation of Saskatchewan Phosphate Division (PCS), Aurora Operation has applied for a Department of the Army authorization to continue its phosphate mining operation on the Hickory point peninsula adjacent to the Pamlico River and South Creek, north of Aurora, in Beaufort County. The applicant's purpose and need is to continue mining its phosphate reserve in an economically viable fashion. More specifically, the applicant's purpose and need is to implement a long-term systematic and cost-effective mine advance within the project area for the ongoing PCS phosphate mine operation at Aurora (Beaufort county), North Carolina. The mining method is "open pit." The upper soil layers are completely removed to reach target phosphate ore at varying depths. All surface features, including topography, vegetation, and waters, are destroyed, when mining occurs, and the soils and surface features are rebuilt in an altered fashion some years later.

On April 25, 2008 the PCS requested that it's application be modified to request a permit for Alternative L. Based on information provided by the applicant this alternative would provide approximately 37 years of mining at current production levels (5M tons of concentrated phosphate rock per year). Alternative L avoids all areas regulated by CAMA. Alternative L is an 11,909-acre project area with direct mining impacts to 4,135 acres of wetlands and 20 acres of open waters (8 acres of streams and 12 acres of ponds). There will also be drainage basin reduction to a number of creeks and streams in the project area. Impacted waters include Whitehurst Creek (4%), Jacks Creek (68%), Jacobs Creek (54%), Drinkwater Creek (61%), Tooley Creek (46%), and 45% of the unnamed tributaries of South Creek. These creeks drain into South Creek, a MFC designated Special Secondary Nursery Area, and their loss will have significant adverse impacts on the function of the downstream nursery area. Huddles Cut and Huddy Gut drainage basins would be permanently reduced by 63% and 58% respectively. An unnamed tributary of the Pamlico River would be reduced by 45%. In the Bonnerton Tract, Porter Creek would be reduced by 70%, Durham Creek would be reduced by two percent, and Bailey Creek would see a 3% reduction. Drainage reductions in the S33 Tract include Bailey Creek (40%), Broomfield Swamp (72%), and Cypress Run (75%). Jacobs, Tooley, Jacks and Porter creeks are designated inland PNAs by the NC Wildlife Resources Commission.

Based on the discussion below, the NCDMF finds this FEIS to be inadequate. Therefore, it is not suitable for use as a decision support document in its current form. Furthermore, if this document were to be utilized as the primary support document for issuance of a permit for the requested mine advance, the NCDMF would be opposed to Alternate L or any alternate that involves further mining in the NCPC tract due to the significant negative adverse impacts to estuarine fisheries resources, fish habitats, water quality, and public trust waters in the Pamlico River system. Impacts would include both direct and indirect effects. Direct effects would be seen through drainage basin reductions, sedimentation, and loss of habitat.

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Indirect effects would include negative impacts to Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPCs), impacts associated with heavy metal contamination, drainage basin reductions, impacts to commercial and recreational fisheries, long-term water quality impacts from the mining activity, and loss of wetland functions.

As noted in Section 1.6 (Areas of Controversies and Unresolved Issues) of the FEIS;

> "Areas of potential controversy include avoidance, minimization, and/or mitigation of impacts to wetlands and waters; **overall level and extent of impacts to aquatic resources**; direct, indirect, and cumulative impacts to surface and groundwater quality, air quality, and terrestrial and aquatic communities; elevated cadmium concentration in reclaimed lands; and length of the authorized permit activities."

The NCDMF raised concerns about these unresolved issues in our comments on the Draft EIS [DEIS (2/2/07)] and the supplement to the DEIS (12/4/07), and is very disappointed that the CORPS chose not to adequately address them in the FEIS. Not only were our concerns not fully addressed, but the CORPS never contacted the NCDMF to talk about these issues during the preparation of the FEIS. The NCDMF understands that this is a CORPS document and ultimately they have the final say on the adequacy and content of the document. However it is important to remember that this document will also be used to satisfy the requirements of the State Environmental Policy Act, and the NCDMF is the state agency charged with the stewardship of the marine and estuarine resources of the State of North Carolina and is responsible for the management of all marine and estuarine resources. Therefore the NCDMF believes that our concerns merit full consideration by the CORPS since the proposed action will have significant negative adverse impacts to estuarine fisheries resources, and fish habitats of the state, based on the information provided.

In addition to significant concerns with the proposed mining activity and the inadequacy of the FEIS, the mitigation plan only addresses direct impacts. According to the National Environmental Policy Act of 1969 (NEPA) "Effects include: (a) Direct effects, which are caused by the action and occur at the same time and place. (b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Effects and impacts as used in these regulations are synonymous. Effects include ecological (such as the effect on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial." (40 CFR 1508.8). Mitigation under the NEPA process (40 CFR 1508.20) includes "(a) Avoiding the impact altogether by not taking a certain action or parts of an action. (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation. (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. (e) Compensating for the impact by replacing or providing substitute resources or environments." Based on these NEPA requirements the NCDMF feels that the mitigation plan must also address indirect impacts. Indirect impacts to EFH/HAPC total 3,349 acres (Table 1). Since there are no suitable habitats to mitigate

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for these losses the NCDMF feels that the only option available is avoidance and minimization. To that end over 88% of the impacts to EFH/HAPC can be avoided by not allowing any further mining on the NCPC tract, by avoiding these areas impacts to EFH/HAPC would be minimized to 13%. In view of the fact that indirect impacts were not accounted for in the mitigation section of the FEIS the NCDMF finds this section FEIS to be inadequate, and requests that no action be taken on this permit until such time as a complete mitigation plan is developed that provides mitigation for both direct and indirect impacts as required by NEPA. Additionally, the mitigation plan needs to include a contingency plan and financial assurances to address potential long-term increased metal concentration in the aquatic and terrestrial environment from mining and reclamation activities. Also, if the CORPS determines that indirect impacts do not need to be mitigated for, then a contingency plan and financial assurances for these indirect impacts needs to be provided.

Table 1. Alternative L impacts (total acres) to Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPCs) by area.

	Area impacted (acres)[1]		
EFH/HAPC	NCPC	Bonnerton	S33
Tidal freshwater (palustrine) emergent wetlands	46	2	0
Tidal palustrine forested areas	15	0	0
Estuarine wetlands	87	0	0
Unconsolidated bottom (soft sediments)	38	0	0
Tidal creeks	38	0	0
Tidal freshwater	1	0	0
Estuaries	130	0.5	4
Mixing and seawater zone of the Pamlico River	87	0	0
Primary nursery Area[2]	28.8	70.8	0
Special Secondary Nursery Area[3]			
Tidal freshwater SAV	1	0	0
Estuarine SAV	33	0	0
Submerged rooted vascular plants (seagrasses)	31	0	0
Total EFH/HAPC impacts	535.8	73.3	4
Percent of EFH/HAPC impacts	87.39%	11.96%	0.65%

[1] Data provided in the FEIS by the applicant

[2] FEIS states that there are only 22 acres of impacts, but they only included the portion of the PNA in the Public trust areas. Also Designation of PNAs is done entirely under state authority; however, the South Atlantic Fishery Management Council includes North Carolina's PNAs as Essential Fish Habitat by reference.

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[3] Total SSNA in the South Creek Complex total 2,736 acres, all of which would be indirectly impacted by this project.

CONCERNS/DEFICIENCIES:

4.1.3.1 Elemental Contaminant Issues

> "There are many interactions between and among metals, the species of metals, and the physical environment (pH, salinity). Some factors enhance uptake while others inhibit or moderate absorption. Some metals have greater effects on invertebrate organisms, while other metals affect vertebrates more acutely. Fish and wildlife are often used as sentinel species and bioindicators during ecological risk studies (Peakall and Burger 2003). The elemental contaminants within the reclamation areas and found in plant and animal tissues at PCS are cadmium, arsenic, chromium, and zinc. Cadmium is a teratogen, a carcinogen, and a possible mutagen. Arsenic is also a carcinogen and disrupts production of the multifunctional nucleotide ATP involved with intracellular energy transfer. While chromium and zinc are considered essential trace elements, health effects from chromium depend upon its oxidation state. Zinc as a free ion in solution is highly toxic for fish and invertebrates and can suppress copper and iron absorption. Other determining factors in the bioavailability of metals are host, age, gender, size, genetic characteristics, behavior (food chain relationships), and the interactions and synergies between all factors. Indirect effects of contaminants are difficult to determine and are likely to disrupt aquatic populations at several trophic levels (Fleeger et al. 2003)."

A review of the CZR Incorporated (1999) report indicates the following:

1. Clay, produced during the initial processing of the phosphate rock, has elevated concentrations of silver, arsenic, cadmium, chromium, manganese, uranium, zinc, phosphorus, total organic carbon, and calcium carbonate.

2. Sand tailings, produced with clay during the initial processing of the phosphate rock, have elevated concentrations of arsenic, cadmium, uranium, and phosphorus.

3. Bucket wheel spoil, overburden removed from above the main phosphate rock deposit has a slightly elevated concentration of silicon.

4. Gypsum, a byproduct of the reaction of sulfuric acid with phosphate rock, showed levels of arsenic, at or above the average level for continental rock. Cadmium levels were enriched, on average, 156 times above background. Levels of uranium, zinc, and phosphorus were also significantly elevated.

5. Blend, composed of clay (1 part) and gypsum (2 to 4 parts), is used in the reclamation process. Blend showed elevated concentrations of silver, arsenic, cadmium, manganese, uranium, zinc, phosphorus, and total organic carbon.

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6. Concentrations of metals in the sediment of R-3 North and R-3 South showed elevated concentrations of silver, arsenic, cadmium, chromium, copper (R-3 North), molybdenum, selenium, and zinc. Levels of cadmium and chromium (R-3 South) on the sampled reclamation sites (R-3 North and R-3 South) exceeded the effects-range-median value which is defined as the concentration above which harmful effects would occur frequently. Levels of silver, arsenic, copper, and zinc exceeded the effects-low-range value which is defined as the concentration below which adverse effects would occur only rarely.

7. Dissolved metal concentrations in surface waters of R-3 North and R-3 South showed elevated levels of arsenic, cadmium, molybdenum, and zinc. Particulate metals for these sites was high in arsenic, cadmium, chromium, molybdenum, and zinc (R-3 South only). These sites exceed chronic freshwater water quality criteria for cadmium and chromium (R-3 North).

The transfer of toxic chemicals through marine food chains can result in bioaccumulation in fishery resources. Ecological concerns of contamination in the marine environment include changes in species distributions and abundance, habitat alterations, and changes in energy flow and biogeochemical cycles. The toxic effects of chemical contaminants on marine organisms are dependent on bioavailability and persistence, the ability of organisms to accumulate and metabolize contaminants, and the interference of contaminants with specific metabolic or ecological processes. Accumulation of contaminants in biological resources may occur through aqueous, sedimentary and dietary pathways.

The FEIS must thoroughly address the movement, metabolism, bioaccumulation, fate, and short-term and long-term impacts of these substances (silver, arsenic, cadmium, chromium, copper, molybdenum, selenium, manganese, uranium, phosphorus, zinc, total organic carbon, and calcium carbonate) on commonly occurring estuarine organisms important in the estuarine food chain, as well as in vertebrate and invertebrate fishes taken in the commercial and recreational fisheries of the Pamlico River system and other areas to which fishes from that area may migrate and support the food chain or be harvested. This analysis is important given that section 3.6.2.9 (Bottom Sediments) of the FEIS states "In the 1997 study and NCPC monitoring, arsenic, cadmium, molybdenum, selenium, and zinc were found to be elevated above the level in the continental crust in most, if not all, of the sampling stations (CZR Incorporated, Trefry, and Logan.1999)." This analysis should look at direct, indirect, and cumulative impacts.

The importance of the elemental contaminant issues cannot be understated given the potential biological, and economic impacts. In 1987 a severe outbreak of shell disease (complete breakdown of the crystalline matrix of the endocuticle) in blue crabs in the Pamlico River was investigated (McKenna et. al. 1990). The majority of diseased crabs were caught between Durham and South creeks. Possible causes of this outbreak were cadmium and/or fluoride (McKenna et. al. 1990). The authors of this study concluded, "The association between Texasgulf and the outbreak of shell disease in the Pamlico River cannot be dismissed as a fortuitous event and warrants further investigation." This outbreak had significant biological impacts to the blue crab resource in the river by causing mortalities of effected crabs, and resulted in local and national concern about potential human health concerns related to eating seafood from this system, and to a lesser extent consumption of all seafood caught in North Carolina. Fishermen and dealers were not able to sell their product, resulting in lost income and markets. No further outbreaks of this disease have been seen since the completion of the plants water recycling system in 1992. However, this event does show the need to examine the direct, indirect, and cumulative impacts of these toxins. This is especially important given the uncertainty

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surrounding the current method of capping overburden (see section 4.1.3.1). As noted at the end of section 4.1.3.1 "Any permit issued by the Corps for further mining at the Aurora operation will necessarily include conditions to successfully address the cadmium and other heavy metals issue. **The specific conditions will be developed after considering the success of capping methods employed to date. The conditions will also likely include a monitoring program and contingency plans.**" The NCDMF feels that the ecological consequences warrant delaying action on this permit until this issue is resolved.

4.2.1.2 Soils

"Due to the nature of open pit mining, removal of the overburden, or all soils and stratigraphic units overlying the ore, would result in the unavoidable loss of soils in the area of impact under any of the mining boundaries. The soil character would be irreversibly altered.

Impacts to existing wetlands within the mine perimeter are permanent. The purpose of reclamation is not to restore wetland (or upland) functions of soils but to safely fill the excavated area according to state/federal laws; however, additional goals of reclamation are the establishment of both upland and wetland habitat that will invite and support wildlife."

The direct, indirect, and cumulative impacts of these losses must be examined as to there affect on downstream waters.

4.2.1.6 Surface Waters

"Long-term water quality impacts from the mining activity are more difficult to assess. Once mining is completed, PCS will be required by the North Carolina Division of Land Resources to reclaim the area mined, pursuant to an approved reclamation plan. The areas reclaimed may or may not function as wetlands. Once this area is reclaimed, drainage will also be restored, resulting in run-off from the reclaimed land entering the creeks. Potential long-term impacts to water quality in primary nursery areas include the permanent loss of the filtering and flow moderation benefits of the wetlands through which this run-off would otherwise drain. Although compensatory mitigation within the same hydrologic unit would be required, it would not be at the location of the impacted wetlands, and those wetlands would not be available to provide functions lost at this particular site.

"In addition, there is a potential for long-term water quality impacts resulting from the use of the gypsum-clay blend materials in the reclamation effort. Particular concern over the potential for cadmium, found in the gypsum-clay blend, entering the receiving waters has been expressed."

Changes in the drainage basin will affect freshwater inflow and salinity patterns in South Creek. The impact of phosphate mining on streamflow in Florida was examined by Schreuder et al. 2006. This study indicated that mined basins have increased overall stream flow. The analyses also showed that flood-flows from mined basins were reduced by mining operations, while median and base-flows were significantly increased. Mueller and Matthews (1987), Browder et al. (2002), and Galindo-Bect and Glenn (2000) showed

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that changes in freshwater inflow affects salinity patterns, which in turn affects shrimp growth, survival, and subsequent recruitment and stock size available for harvest. Estuarine animals exist in a community assemblage; thus, the influence of salinity on one species can be extended either directly or indirectly to affect other species (Pottillo et al. 1995). The cumulative effects of even small changes in an estuary may have a total systemic effect on the marine resources and the economic activities that depend on them (Monaco and Emmett 1988; Bulger et al. 1990; Orland et al 1993). Since 1994 the commercial harvest of finfish and shellfish in North Carolina has averaged 160,564,051 pounds with a average dockside value of $94,999,172 (NC DMF Trip Ticket data 1994-2005). Effects of drainage basin reductions on the production of marine fisheries resources must be addressed.

Besides its effect on fish production, reduction in the drainage basin area will result in increased sedimentation and turbidity, which are significant contributors to declines in populations of North American aquatic organisms (Henley et al. 2000). The direct effects of sedimentation and turbidity at various trophic levels are mortality, reduced physiological function, and avoidance. Sedimentation can clog the gills of fish, reducing respiratory abilities. This stress, may in turn, reduce tolerance levels to disease and toxicants, and to changes in dissolved oxygen concentrations and salinity, compromising the health of local fisheries resources. Elevated levels of sediment (typically over background) may be harmful to fish (i. e., acutely lethal, or elicit sublethal responses that compromise their well-being and jeopardize survival), and negatively impact their habitat (DFO 2000). Decreases in primary production are associated with increases in sedimentation and turbidity and produce negative cumulative effects through depleted food availability to zooplankton, insects, freshwater mollusks, and fish. Decreases in available food at various trophic levels also result in depressed rates of growth, reproduction, and recruitment (Henley et al. 2000). These effects lead to alterations in community density, diversity and structure. The effects of changes in sedimentation on marine resources and primary and secondary production must be addressed.

Reduction of the drainage basin area will eliminate contiguous sheet flow and decrease the buffering capacity of the system. These changes will likely increase the amount of sediments, nutrients, and toxics entering the system. Nitrogen and phosphorus can accelerate eutrophication resulting in algal blooms, reduced water clarity, shifts in algal and fish populations, and fish kills. Currently South Creek is stressed, with water quality problems including algal blooms and increases in suspended solids. While these existing problems are probably not the result of current mining activities, reduction in buffering capacity of the tributaries from further mining north of NC Highway 33 will only exacerbate existing conditions. Many hypoxic zones in the world have been caused by excess nutrients exported from rivers, resulting in reduced commercial and recreational fisheries production (Council for Agricultural Science and Technology 1999). The effects of cadmium and other heavy metals and the reduction in buffering capacity must be examined.

4.2.1.9 Wetlands and Open Waters (Section 404 Jurisdictional Areas)

> "All of the proposed locational mine continuation boundaries except the No Action alternative boundary would result in the disturbance or loss of wetland communities. The resulting ecological consequences include the loss or disruption of the following wetland functions: groundwater discharge and recharge, **surface water storage, organic matter production and export, sediment capture and retention of pollutants,** wildlife habitat including EFH/HAPC, and nutrient accumulation, cycling and transformation. Drainage area reductions for area creeks also would potentially

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impact adjacent Section 404 jurisdictional wetlands by altering the input of freshwater into these systems. Intact wetlands outside of the boundaries of the proposed mine continuation boundaries would potentially be affected by changes in water quality, as well as by diminished input from runoff upstream."

Wetlands have many functions including high net primary production; fish and wildlife habitat; retention of nutrients, sediments, and toxins; shoreline protection; attenuation of flood waters; recharge of groundwater aquifers; and nutrient cycling. A review of wetland functions can be found in the North Carolina Coastal Habitat Protection Plan (Street et al. 2005) and Section 4.2 of the Compensatory Section 404/401 Mitigation Plan. Specific wetland issues relating to this FEIS can be found elsewhere in this document. Hydrologic processes control the formation, persistence, size, and function of wetlands, while soils and vegetation alter water velocities, flow paths, and chemistry (Carter 1997). Wetlands restoration and creation projects do not consistently replace lost wetland structure and/or function (Erwin et al. 1997; Minello 2000; Streever 2000). In addition, there is evidence showing that some wetland attributes of natural and restored or created wetlands may be similar, while others may be different, and that different wetland attributes develop at different rates (Galatowitsch and van der Valk 1996; Minello and Webb 1997; Simenstad and Thom 1996; Streever et al. 1996; Streever 2000). Densities of both fishes and decopod crustaceans were lower in created salt marshes (2 to 15 yr in age) then in natural marshes (Minello and Zimmerman 1992; Minello and Webb 1997).

4.2.1.11.2 Aquatic Wildlife Communities

"Removal of open water habitat also would result in localized losses of aquatic organisms and their habitat and would remove some EFH/HAPC communities. However, no commercially important species are likely to be directly affected. Loss of aquatic habitat and loss of aquatic fauna will be offset over time by mitigation activities including restoration of open water and by reclamation activities through restoration and creation of additional open water habitats and other aquatic habitats as appropriate with current reclamation practice and geomorphic constraints. Aside from the AP alternative boundaries, the proposed mine continuation alternatives would excavate upper headwater intermittent or perennial streams, not brackish marsh and estuarine creeks (Section 4.2.2.11.2). Although these headwater reaches provide important support functions, they do not support the large diverse aquatic communities associated with deeper downstream reaches."

Nursery areas are those portions of estuarine waters most critical to the early life history stages of marine and estuarine organisms. Early development of the post larval stages of many fish and shellfish species occurs in Primary Nursery Areas (PNAs). More than 90% of North Carolina's commercial fisheries harvest and 60% of the sport fisheries harvest consists of species dependant on estuarine nursery areas. Direct impacts to nursery areas include drainage basin reductions, and loss of wetlands and open water habitat. As noted in Section 4.2.1.20 "..lost resources include permanent loss of existing topography and soils, and potentially permanent losses of currently existing wetlands and open water, biotic communities, and fish and wildlife habitat quality within the project area." The cumulative effects of even small changes in an estuary may have a significant systemic effect on the marine resources and the economic activities that depend on them (Monaco and Emmett 1988; Bulger et al. 1990; Orland et al, 1993). There is a high probability that the various restoration projects will be unsuccessful in fully restoring natural process. Some of

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the affected waters are PNAs, and all the waters support various aquatic organisms that contribute to the estuarine food chain, and ultimately to fisheries production. This section must address the effects on estuarine species, both direct and indirect, through the loss of open water habitat.

> "Within the project area, as in other estuaries, salinity is highly variable due to wind tides and rainfall. Therefore, although optimum salinities likely exist for many species (Peterson et al. 1999; Secor et al. 2000; Specker et al. 1999), estuarine fishes at all life stages are adapted to a wide range of salinities (Malloy and Targett 1991; Banks et al. 1991; Limburg and Ross 1995; Buckel et al. 1995). Even if salinity was affected by mining, impacts to fisheries are unlikely because many studies have demonstrated the insensitivity of estuarine fishes, especially at post-larval stages, to drastic changes in salinity (Crocker et al.1983; Zydlewski and McCormick 1997; Nordlie et al. 1998; Estudillo et al. 2000)"

While estuarine species are able to tolerate temporary fluctuations in salinity, a permanent change in salinity patterns will likely result in a total change in species assemblages.

> "Similarly, monitoring data collected during NCPC monitoring suggest that mining activity would not impact fish and benthos"

The sample intensity and the parameters measured are inadequate to support such a broad generalization. The statement should be deleted unless the applicant can show with a high degree of statistical certainty that it is true.

Section 4.2.1.17.9 Recreational Resources

Recreational fishing, especially with hook and line, is growing within coastal North Carolina. On January 1, 2007 the State of North Carolina required all people (over the age of 16) fishing in coastal and joint waters for recreational purposes to purchase a coastal recreational fishing licenses. Revenues from license sales are used to manage, protect, restore, develop, cultivate, conserve, and enhance the marine resource. The FEIS must address probable mining effects on such fisheries. Data are available from a number of sources, and the applicant has the ability to conduct appropriate studies, as needed.

4.2.1.21 Cumulative Impacts

> "The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) define cumulative effects as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). The document further states that, by definition, cumulative effects must be evaluated along with the direct effects and indirect effects (those that occur later in time or farther removed in distance) of each boundary. The range of alternatives considered must include the No Action boundary as a baseline against which to evaluate cumulative effects of the AP or EAP alternative boundary. The range of actions that must be considered includes not only the project proposal but all

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connected and similar actions that could contribute to cumulative effects. Specifically, NEPA requires that all related actions be addressed in the same analysis (Council on Environmental Quality 1997)."

The NCDMF concurs with the need for this assessment and finds the information in the FEIS to be deficient. Significant revisions must be done to meet the federal NEPA requirements. This section should use the Council on Environmental Quality 1997 document "Considering Cumulative Effects Under the National Environmental Policy Act" as a guide in the preparation of this section.

4.3.1.4.3 Watershed Acreages and Hydrologic Regimes

"There is no evidence to support that any adverse impacts will occur. Conversely, there is evidence to show that 1) salinity levels will not be significantly affected by reduction in drainage area (and thus reduction in freshwater flow), 2) the creeks will continue to have their salinity levels determined by the Pamlico River/South Creek system, 3) the creeks will continue to function as nursery areas, and 4) no adverse impacts should occur from sediments or run-off during construction, mining, or reclamation activities (CZR Incorporated 1994)."

The referenced studies are not adequate (short duration, areas had only minimal drainage impacts, the study area has been significantly impacted since 1968 and current dewatering practices affect surface and sub-surface flow in both the study and control sites thus masking any effects) to support the above conclusions. The FEIS needs to provide a review of the scientific literature. For example, a quick review of the literature showed that restoration and creation projects do not consistently replace lost wetland structure and function (Erwin et al. 1997; Minello 2000; Streever 2000). In addition, there is evidence showing that some wetland attributes of natural and restored or created wetlands may be similar, while others may be different, and that different wetland attributes develop at different rates (Galatowitsch and van der Valk 1996; Minello and Webb 1997; Simenstad and Thom 1996; Streever et al. 1996; Streever 2000). Densities of both fishes and decopod crustaceans were lower in created salt marshes (2 to 15 yr in age) then in natural marshes (Minello,. Zimmerman 1992, Minello and Webb 1997), and these are the fisheries resources of greatest importance in coastal North Carolina.

The NCDMF also strongly recommends that existing water quality monitoring programs be maintained and/or expanded, depending on the final selected alternative. In addition to water quality monitoring, programs should be designed and implemented to sample fishery resources, and heavy metal contamination.

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"Pace.Wilber"
<Pace.Wilber@noaa.gov>
03/30/2009 05:28 PM

To Jim Giattina/R4/USEPA/US@EPA

cc arthur.l.middleton@usace.army.mil, william.t.walker@usace.army.mil, samuel.k.jolly@usace.army.mil,

bcc

Subject Re: Follow-up to March 24 Meeting re PCS

History: This message has been replied to.

Hello everyone.

Draft monitoring language is attached.

Pace

Giattina.Jim@epamail.epa.gov wrote:
> Ken, Tom W, Arthur, David, Ross, Jeff, Tom R, and George:
>
> We want to thank everyone again for participating in Tuesday's meeting.
> We found the discussions very productive. A number of action items were
> identified at the end of the meeting. I would like to capture that
> list, identify the lead for each action, and provide you with the status
> of actions which EPA/NMFS/FWS are responsible for. According to my
> notes, we identified the following four actions:
>
> 1) EPA in coordination with FWS and NMFS will provide GIS coverages
> identifying the proposed "EPA/FWS/NMFS" mining boundaries for the NCPC
> and Bonnerton tracts presented yesterday (the boundary for S33 continues
> to be the boundary certified by the State). We will forward this
> information to you on Monday 3/30.
>
> 2) FWS will provide language describing the reclamation provisions
> discussed on 3/24. We will forward this information to you on Monday
> 3/30.
>
> 3) NMFS will provide the language describing the monitoring provisions
> discussed on 3/24. We will forward this information to you on Monday
> 3/30.
>
> 4) Once it receives the GIS coverages, PCS will evaluate the economic
> viability of the EPA/FWS/NMFS alternative and share its results with the
> agencies.
>
> In addition to expanded impact avoidance and improved reclamation and
> monitoring provisions, the EPA/FWS/NMFS alternative also includes
> measures to ensure that avoided aquatic resources are provided long-term
> protections from future mining with the appropriate binding real estate
> instrument. As discussed on 3/24, we suggest the use of conservation
> easements. As noted on 3/24, we are also open to discussion regarding
> compensatory mitigation credit for the protection of these avoided
> areas. We welcome your recommendations regarding the appropriate level
> of compensation credit for the preservation, enhancement, and/or
> restoration of avoided aquatic resources.
>
> At the 3/24 meeting PCS requested that the agencies continue to pursue
> formal elevation of the Corps' proposed permit for the alternative known
> as "Modified Alternative L" that was certified by the State. Although
> not discussed on 3/24, we would like to organize a site visit for agency

> officials who would be involved in the review of this elevated permit
> decision. We would like to know your availability on April 27 and the
> morning of April 28.
>
> Please let me know if I you have any changes to the action item list and
> indicate your availably for a site visit. Again thank you for
> participating in yesterday's meeting.
>
> Thanks, Jim
>
>
>

--

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Palmer
Hough/DC/USEPA/US
03/30/2009 05:38 PM

To Pace.Wilber@noaa.gov, Mike_Wicker@fws.gov, Rebecca Fox/R4/USEPA/US@EPA
cc
bcc
Subject revised reclamation provisions

History: This message has been replied to.

Pace/Mike/Becky:

Here is a redline showing the NGO additions to the reclamation provisions and a few more edits I made as well.

Let me know if this is OK and I will forward to the entire group.

Thanks, Palmer

Additional Reclamation Measures_3-30-09.doc

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Deleted: 29

Additional Measures to Improve PCS Reclamation Areas

EPA, FWS and NMFS recommend the following measures to minimize the impact of the mining project on avoided aquatic resources by improving the quality of the reclamation area. It should be noted that these improvements would be in addition to the already agreed-upon 3-foot site cap needed to address the cadmium risk assessment recommendations. PCS's reclamation plan shall describe the process that it will use to implement these reclamation efforts, set measurable success criteria, establish a process to measure those criteria, and create a mechanism for releasing those results to our agencies and the public annually. Reclamation under the plan must be completed and released within 15 years of initial land clearing for mine expansion.

1) We recommend that a topsoil cover be added to the reclaimed areas utilizing, to the extent appropriate and practicable, the topsoil removed prior to site mining. Reuse of on-site topsoil takes advantage of the soil structure, organic matter, nutrients, and seed sources available in that material (i.e. the A Horizon) which is removed as mining operations advance. There is support for such an approach in the published literature (Farmer and Blue 1978; Schuman and Power 1981) and addition of topsoil to phosphate reclamation sites in Florida has yielded positive environmental results. Adding approximately one foot of topsoil on average (no less than six inches) would allow the site to recover at a greatly accelerated pace in contrast to not having topsoil and would make the reclaimed area suitable for a broader array of tree species. While we recognize that adequate amounts of topsoil will likely not be available to re-cover the entire reclamation area because of losses during removal and site preparation, reasonable targets for the percent of the reclamation site amended with topsoil should be established.

2) We recommend that upland portions of the reclamation area be replanted, to the extent appropriate and practicable, in longleaf pine (*Pinus palustris)* and wetland areas be replanted in bald cypress *(Taxodium distichum)* and/or Atlantic white cedar *(Chamaecyparis thyoides)* if Atlantic white cedar is shown to do well on the reclamation sites. All three of these species will grow on low fertility sites and longleaf pine and bald cypress are long lived species that despite slow growth rates can be expected to live long enough to eventually establish moderate stand coverage even on sterile sites and will produce decay resistant litter that over the very long term will rebuild soil. All of these species provide wildlife habitat and all occur naturally in monotypic stands. Reasonable targets for the percent of the reclamation site replanted with these species should be established.

Deleted: also

3) We recommend that reclamation efforts in riparian areas receive priority treatment, particularly for those riparian areas adjacent to streams that will be connected to existing surface waters (e.g. Whitehurst Creek). PCS's reclamation plan must include an explanation of site development that will minimize erosion, eliminate contaminant transportation from the clay/gypsum blend through the stream channel, and facilitate the development of a mature vegetated riparian buffer.

Palmer
Hough/DC/USEPA/US
03/30/2009 05:47 PM

To Pace.Wilber@noaa.gov, Mike_Wicker@fws.gov
cc Rebecca Fox/R4/USEPA/US@EPA
bcc
Subject PCS Elevation: draft ARNI section for your review

Mike/Pace:

Attached for your review is the draft discussion making our ARNI argument. We would appreciate any comments etc you have on this section as well.

-Palmer

ARNI section_v7.doc

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III. Aquatic Resources of National Importance

The 15,100 acre project area is located adjacent to the Pamlico River which is part of the nationally significant Albemarle Pamlico Estuary Complex (see Figure 2). The project area contains 6,293 acres of wetlands and 115,843 linear feet of streams that support the Albemarle Pamlico Estuary and collectively constitute aquatic resources of national importance (ARNI). The Albemarle Pamlico Estuary Complex is the largest lagoonal estuary in the country. The fringe marshes, creeks, and beds of submerged aquatic vegetation in the Albemarle Pamlico Estuary Complex provide essential nursery habitat for most commercial and recreational fish and shellfish in the North Carolina coastal area (Street et al., 2005) and important habitat for waterfowl[1], shorebirds and other migratory birds. The importance of wetlands to coastal fish is not unique to North Carolina. Over 95 percent of the finfish and shellfish species commercially harvested in the United States are wetland-dependent (Feierabend and Zelazny, 1987). More than 70 percent of the commercially or recreationally valuable fish species of the Atlantic seaboard rely on the Albemarle-Pamlico system for some portion of their life cycle and more than 90 percent of the fish caught in NC depend on the estuary as a nursery habitat (Association of National Estuary Programs, 2009).

As discussed earlier, the project site consists of three distinct tracts, NCPC, Bonnerton and S33. The NCPC tract is adjacent to the Pamlico River and South Creek. Seventy-one percent of this tract is designated as wetlands and contains six tidal creeks, including three inland Primary Nursery Areas. The Bonnerton tract is adjacent to the Pamlico River and Durham Creek. Seventy-six percent of this tract is designated as wetlands and it contains the headwater drainage to one inland Primary Nursery Area. The Bonnerton tract also contains an approximately 271 acre nonriverine hardwood forested wetland that has been designated as a Nationally Significant Natural Heritage Area. The S33 tract is farther inland than either the NCPC or Bonnerton tracts and contains the headwaters of two creeks which ultimately drain into South Creek. Approximately 20 percent of the S33 tract is delineated as wetland.

The FEIS classifies the site's wetlands into ten categories: brackish marsh complex, bottomland hardwood forest, herbaceous assemblage, shrub-scrub assemblage, hardwood forest, mixed pine-hardwood forest, pine forest, pocosin-bay forest, sand ridge forest, and pine plantation. All of the site's wetlands perform important ecological functions that support the Albemarle Pamlico Estuary such as temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. The FEIS classifies the site's stream resources into intermittent streams, perennial streams and pubic trust areas (i.e., navigable/canoeable creeks in coastal counties). All of the site's stream resources perform important ecological functions that support the Albemarle Pamlico Estuary such as the transport of water, nutrients and sediment downstream, pollutant processing and removal, and maintenance of biologically diverse plant and animal habitat. Of particular ecological importance are the wetland areas on the Bonnerton tract designated as a Nationally Significant Natural Heritage Area and the tidal creeks on the NCPC and Bonnerton tracts, four of which have been identified as Primary Nursery Areas.

Nationally Significant Natural Heritage Area

[1] See FWS waterfowl survey website: http://www.fws.gov/birddata/databases/mwi/mwidb.html

The Bonnerton tract contains an approximately 271 acre wetland acre that has been designated by the NC Natural Heritage Program as a Nationally Significant Natural Heritage Area. The Natural Heritage Program designates areas in the state which it has determined to be important for conservation of the state's biodiversity as Significant Natural Heritage Areas. These areas can be classified as significant by the Natural Heritage Program at the county, regional, state or national level. The fact that the Bonnerton tract's Significant Natural Heritage Area has been classified as nationally significant means the Natural Heritage Program has determined it to be one of the five best examples of this community type in the nation. The 271 acre nonriverine Wet Hardwood Forest (WHF) community type found on the Bonnerton tract is considered to be among the most threatened and endangered of NC's natural communities.

Nonriverine WHF communities are dominated by some of the same trees as wetland bottomland hardwood forests, and especially by several oak species, including swamp chestnut oak (*Quercus michauxii*), laurel oak (*Quercus laurifolia*), cherrybark oak (*Quercus pagoda*) and water oak (*Quercus nigra*). The nonriverine WHF is habitat for many species, including black bear (*Ursus americanus*) and wild turkey(*Meleagris gallopavo*) . The multi-layered structure characteristic of mature WHFs supports high densities and diversities of neotropical migrant birds such as wood thrush (*Hylocichla mustelina*), Swainson's warbler (*Limnothlypsis swainsonii*), worm-eating warbler (*Helmitheros vermivorus*), prothonotary warbler (*Protonotaria citrea*), hooded warbler (*Wilsonia citrina*) and white-breasted nuthatch (*Sitta pusilla*)

Some of the indicators of quality in a WHF are canopy maturity, canopy age structure, extent and connection to other natural communities. Historically nonriverine WHFs naturally occurred in large patches and it is believed that some aspects of their ecosystem function are dependent on this large extent. The Natural Heritage Program also finds that the rate of loss of this community type is greater than all other community types in the state.

Tidal Creeks/Primary Nursery Areas

There are nine tidal creeks on the project site: Jacks Creek, Jacobs Creek, Drinkwater Creek, Tooley Creek, Huddy Gut, Huddles Cut, Porter Creek, Bailey Creek and Whitehurst Creek. All nine of these tidal creeks perform similarly critical biological support functions and have thus been a focus of concern throughout our review of the proposed project. Four of these tidal creeks, Jacks Creek, Jacobs Creek, Tooley Creek and Porter Creek, have been specifically designated as Primary Nursery Areas by the NC Wildlife Resources Commission. Primary Nursery Areas are defined as those areas inhabited by the embryonic, larval or juvenile life stages of marine or estuarine fish or crustacean species due to favorable physical, chemical or biological factors. The purpose of inland Primary Nursery Areas are to establish and protect those fragile inland waters which support embryonic, larval or juvenile populations of these species. The critical input to and function of Primary Nursery Areas are not contained just within the public trust waters but includes the headwater drainages. Wetlands that surround or serve as headwaters for estuarine creeks are essential for the creeks to serve as Primary Nursery Areas.

Estuarine waters occur along three sides of the proposed mining site and support a wide range of fishery resources, including commercially or recreationally important species such as striped bass (*Morone saxatilis*), atlantic shad (*Alosa sapidissima*), atlantic herring (*Clupea harengus*), summer flounder (*Paralichthys dentatus*), blue crab (*Callinectes sapidus*), shrimp (*Caridea*) and oysters (*Ostreidae*). The estuary also provides important habitat for anadromous fish, including the endangered shortnose sturgeon (*Acipenser breviorostrum*). Nursery areas located in the creeks and embayments of the estuarine system, such as those found on the project site, are important to over 75 species of fish and shellfish (Association of National Estuary Programs, 2009).

Mike_Wicker@fws.gov
03/30/2009 06:46 PM

To Palmer Hough/DC/USEPA/US@EPA
cc Rebecca Fox/R4/USEPA/US@EPA, "Pace.Wilber" <Pace.Wilber@noaa.gov>, Pete_Benjamin@fws.gov
bcc
Subject Re: PCS Elevation: Draft Impacts Discussion for your expedited review

History: This message has been replied to.

Just a few comments on page #3 relating to disruption of estuarine productivity and the benthic community. Feel free to use or reject. I thought the discussion was very good.

(See attached file: PCS impact discussion, USFWS Comments on page #3.doc)

In answer to your question as to a joint elevation. We want to use the same concerns which may have the same impact as a joint elevation (at least we think it would) but are reluctant to promise that we can get our document or a joint letter signed as quickly as you can (since you are ahead of us). It is our experience that our administration waits to the last minute to sign documents and we do not want to hold you up. We do plan on elevating and will be right behind you (just a few days later since we are on a different schedule).. We believe having a common message with EPA and NMFS and the NGO'S will be very helpful to us and hopefully to the environment and we are committed to having a common content as yours (except for agency specific boilerplate).

So we are planning on a very similar elevation package but a separate elevation package for now.

Thanks for all your good work

IV. Substantial and Unacceptable Impacts

40 CFR 230.10(c): Significant Degradation

EPA is concerned that compliance with requirements of Section 230.10(c) of the Guidelines has not been demonstrated. Section 230.10(c) requires that no discharge of dredged or fill material shall be permitted which will cause of contribute to significant degradation of waters of the United States. The Guidelines explicitly require evaluation of all direct, secondary, (i.e., indirect), and cumulative impacts reasonably associated with the proposed discharge in determining compliance with Section 230.10(c). In accordance with the Guidelines, determining significant degradation requires specific consideration of effects on such functions and values as wildlife habitat, aquatic system diversity, stability and productivity, recreation, aesthetic and economic values.

Of the 15,100 acre project area, the proposed mine advance would impact approximately 11,454 total acres and result in direct impacts to approximately 3,953 acres of wetlands, 19 acres of open waters and 25,727 linear feet of streams. This represents the single largest wetland impact ever authorized under the Clean Water Act in NC and represents a significant loss of wetlands, streams and other waters of the United States within the nationally significant Albemarle Pamlico Estuary Complex.

As previously noted, all of the site's wetlands perform important ecological functions that support the Albemarle Pamlico Estuary such as temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. Also as previously noted, all of the site's stream resources perform important ecological functions that support the Albemarle Pamlico Estuary such as the transport of water, nutrients and sediment downstream, pollutant processing and removal, and maintenance of biologically diverse plant and animal habitat. We recognize that not all of the approximately 3,953 acres of wetlands and 25,727 linear feet of streams that would be impacted by the proposed project perform all of these respective functions to the same degree (because of their position in the landscape and/or their level of prior disturbance), however, the complete loss of this entire suite of wetland and stream functions on this scale raises serious ecological concerns.

The habitat functions provided by wetlands and streams that would be lost are particularly important in light of the ecological and economic value of the Albemarle Pamlico Estuary's commercial and recreational fishery/shellfish resources. Also, the state has designated the entire Tar – Pamlico River Basin as Nutrient Sensitive Waters because of problems associated with excessive levels of nutrients in the river such as harmful algal blooms, low oxygen levels, increased fish kills, and other symptoms of stress and diseases in the aquatic biota. The state developed a strategy to reduce nutrient inputs from around the basin to the estuary that is yielding improvements to water quality. Nonetheless, we are very concerned that loss of the water quality enhancement functions provided by the approximately 3,953 acres of wetlands and 25,727 linear feet of streams that would be completely eliminated by the proposed project could

exacerbate existing water quality problems in the Tar – Pamlico River and hamper the state's ongoing efforts to improve the river's water quality.

Direct Impacts to Nationally Significant Natural Heritage Area

EPA is particularly concerned with the proposed project's direct impacts to the wetland area on the Bonnerton tract that has been designated by the NC Natural Heritage Program as a Nationally Significant Natural Heritage Area. As previously noted, the 271 acre nonriverine WHF found on the Bonnerton tract is an extremely unique and rare community type, one that has experienced a rate of loss higher than all other community types in the state. The fact that the Bonnerton tract's Significant Natural Heritage Area has been classified as nationally significant means the Natural Heritage Program has determined it to be one of the five best examples of this community type in the nation.

As previously noted, some of the indicators of quality in a nonriverine WHF are canopy maturity, canopy age structure, extent and connection to other natural communities. Historically, nonriverine WHFs naturally occurred in large patches and it is believed that some aspects of their ecosystem function are dependent on this large extent. The proposed project would directly impact approximately 97 acres[1] of this ecologically valuable and rare wetland system and would allowing mining through the middle of the 271 acre area, bisecting it into two separate and smaller pieces, an eastern and a western piece. This large reduction in size and the fragmentation of the tract into two separate pieces undermines some of the key ecological characteristics which make it ecologically valuable and "nationally significant." Although the NCDWQ's CWA Section 401 Water Quality Certification requires the mined out area between the eastern and western pieces to be restored after mining, we believe it will be extremely difficult, based on the current state of the science, to restore this area to its prior condition after mining and this will have a significant detrimental impact to the integrity of this rare and threatened biological community. In addition to reducing the size of the area and fragmenting it into two pieces, the large scale disturbances associated with allowing phosphate mining through the middle of the area (land clearing, groundwater extraction, pit excavation, road and support infrastructure construction, etc) will further lower the ecological value of the remaining eastern and western pieces of the area.

Given the unique and valuable nature of this nationally significant resource, it is EPA's determination that the direct impacts of mining the 271 acre Significant Natural Heritage Area on the Bonnerton tract does not comply with Subparts C-F of the Guidelines, specifically Subpart C – Impacts on physical characteristics of the aquatic ecosystem, Subpart D –Impacts on the biological characteristic of the aquatic ecosystem, Subpart E – Impacts to special aquatic sites and Subpart F – Effects on human use characteristics (SNHA designation).

Indirect Impacts to Tidal Creeks/Primary Nursery Areas

EPA is also particularly concerned with the proposed project's indirect impacts to the project area's nine tidal creeks, four of which have been classified by the NC Wildlife Resource Commission as Primary Nursery Areas. Although the proposed project would not directly

[1] Based on the February 24, 2009, Notice of Intent letter from the Wilmington District Corps, page 6.

impact the perennial reaches of the four Primary Nursery Areas, the headwater drainages of the project site's tidal creeks, including those designated as Primary Nursery Areas, would be reduced by approximately 70 percent. Our concerns regarding the proposed drainage basin reductions are amplified on the NCPC tract since its watersheds have already lost approximately 1,268 acres of wetlands as part of the Applicant's 1997 mining permit.

Eliminating the headwater streams and wetlands and significantly reducing the drainage areas of the project site's Primary Nursery Areas and other tidal creeks would:

- Reduce flow from ground water and surface water runoff to the tidal creeks, thereby decreasing fresh water input and increasing their salinity through estuarine tidal influences.
- Reduce filtration of nutrients and other contaminants previously accomplished by the site's streams and wetlands, increasing sedimentation and turbidity in tidal creeks.
- Reduce productivity of native fish and shellfish in the downstream estuary by disrupting the estuarine food web (caused by a reduction of organic materials critical for biological activity in the surface water drainage).
- Shift downstream estuarine productivity from the benthic community which is dominated by sensitive submerged aquatic vegetation and benthic invertebrate species to tolerant phytoplankton species (exacerbate ongoing environmental stress and create an open niche for problem invasive plant and animal species that are adapted to degraded environments to colonize the estuary).

We believe the disruption of these processes and functions in the drainage basin will significantly impact the site's tidal creeks and impair the ability of these systems to function as Primary Nursery Areas.

Estuarine animals exist in a community assemblage and the influence of a factor, such as salinity on one species may be extended either directly or indirectly to affect other species. The cumulative effects of even small changes in an estuary may have a total systemic effect on the marine resources and the economic activities that depend on them. We believe the potential effect of Drainage Basin Reduction (DBR) on the production of marine fisheries resources is significant.

Besides its effect on fish production, DBR will likely result in increased sedimentation and turbidity, which are significant contributors to declines in populations of aquatic organisms. The direct effects of sedimentation and turbidity at various trophic levels are mortality, reduced physiologic functions and avoidance. Sedimentation can clog the gills of fish, reducing respiratory abilities. This stress may reduce tolerance levels to disease and toxicants and to changes in dissolved oxygen concentrations and salinity, compromising the health of local fisheries resources. Decreases in primary production are associated with increases in sedimentation and turbidity and produce negative cumulative effects through depleted food availability to zooplankton, insects, freshwater mollusks and fish. Decreases in available food at various trophic levels also results in depressed rates of growth, reproduction and recruitment. These effects lead to alterations in community density, diversity and structure.

Mining will directly affect the rate at which water is routed through the watershed. DBR will reduce contiguous sheet flow and as the mine expansion progresses there is an ever increasing

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trend of diverting surface water drainage which once promoted estuarine productivity into National Pollutant Discharge Elimination System (NPDES) channels, pipes and outfalls. This redirection of surface flows contributes to estuarine degradation because it removes natural watershed drainage patterns that 1) promote infiltration and trapping of sediments and other pollutants, and 2) provide a beneficial diffuse source of water to the estuary and subsequently decreases the buffering capacity of the system. These changes will likely increase the amount of sediment, nutrients and toxics entering the system. Nitrogen and phosphorus can accelerate eutrophication resulting in algal blooms, reduced water clarity, shifts in algal and fish populations and fish kills. Currently South Creek, which is stressed with water quality problems including algal blooms and increases in suspended solids, is designated as a Nutrient Sensitive Water (NSW) by the state, as is the entire Tar-Pamlico River Basin. We believe the reduction of the South Creek's buffering capacity associated with the large scale removal of wetlands and streams from the watersheds draining to the creek will likely exacerbate its existing water quality problems by removing the system's nutrient uptake capability. Hypoxic conditions caused by excess nutrients can result in reduced commercial and recreational fisheries production.

We believe proposed mining operations will negatively impact estuarine trophic structure through disruption of substrate inputs crucial to primary producers; reduction of energy sources that fuel estuarine productivity; and degradation of the nutrient sequestration capacity of the estuarine system. Estuary productivity is dependent on the complex interactions among the various components of the aquatic food web; with epiphytes (attached to wetland macrophytes) and submerged aquatic vegetation (SAV) forming the foundation of the estuarine food web. SAV populations have recently declined by as much as 50 percent, possibly because of anthropogenic impacts. As a result, detritus supplied by wetland macrophytes has become more important as an epiphytic substrate. While phytoplankton are also important for productivity, the role of wetland plants and SAV detritus is of greater importance to the overall stability of shallow aquatic food webs. It is our opinion that the proposed mining operations will negatively impact both types of epiphytic substrates.

Also of importance to estuarine food webs is the gradual and episodic release of Dissolved Organic Matter (DOM) from the contributing basins and wetlands immediately adjacent to the Albemarle Pamlico Estuary Complex. This energy source fuels bacterial communities that, through mineralization, provide inorganic nitrogen, phosphorous and carbon, supporting productivity. In addition, DOM supported bacteria are an important component of the "microbial loop." This part of aquatic food webs links DOM (of autochthonous and/or allochthonous origin) to higher trophic levels, via bacteria-protist-metazoan-zooplankton interactions. The impacts associated with the proposed project would decrease the quantity and quality of allochthonous DOM supplied to the estuary because of the close proximity of PCS's proposed mining operations.

Most of the drainage basin wetlands that would be subjected to impacts are wet forests, including bottomland hardwood forests. These areas are subjected to repeated periods of inundation and desiccation. This is important from a biogeochemical perspective as it allows for the accumulation of particulate organic matter and its subsequent processing (dissolution and mineralization). This leads to episodic exports of dissolved organic materials to the estuary. Wetlands impacted by the proposed project also retain nutrient loads carried by high flow events, which are later sequestered into forest biomass. Such systems are also important for

denitrification. These areas also provide refugia and nursery habitat for aquatic organisms during high flow periods.

The applicant provided a December 2007 report prepared for PCS by Entrix, on "*Potential Effects of Watershed Reduction on Tidal Creeks – An Assessment*". We believe that while the report clarifies currently known characteristics of the South Creek tributaries, it does not support the conclusion that current and future DBRs from mining activities would have no significant effect on downstream ecosystems. Data collected by NC Wildlife Resource Commission in November 2006 to determine species present in Jacks, Jacobs and South Creeks does not support that fish production originates from downstream estuarine environments. The report does not address freshwater species nor did it establish a connection between biota and previous mining impacts in the area including watershed reduction and ground water draw down. The report used "baseline" data for Jacks Creek collected after the watershed had already been reduced by almost 20 percent. Small reductions in watershed area may have large biotic impacts and therefore it is problematic using this data as a baseline to determine DBR impacts. This report also makes a troubling extrapolation that since past smaller DBRs did not adversely impact the tidal creeks, the much larger DBRs associated with the proposed project (i.e., 70 to 80 percent DBRs) also would not adversely impact the tidal creeks. However, data does not exist to draw this conclusion.

The Entrix report and the Corps' February 24, 2009, Notice of Intent letter both present the success of the PA II man-made marsh on the PCS project area to hypothesize that the DBRs will not cause significant loss of habitat value and nursery functions of the tidal creeks. The West (2000) study evaluating PA II is frequently cited in these discussions and is used by the Entrix report to argue broad scale functional equivalency of PA II to local tidal creeks. We do not believe it is valid to use the West study to make these inferences. The study's objective was to assess how well PA II could provide suitable habitat for fish, benthic and plant species and not to evaluate the effects of DBR on these populations. The data was collected from the lower reaches of the stream channel and did not fully assess the upper channel's biota. These results support the potential for species repopulation in the lower reaches of the creeks but do not support the proposition that DBR will not impact the upper channel's biota. The report does not provide data on the functional equivalence of factors, such as stream substrate, biogeochemical processes, wetland plants, etc. and in fact, there was no evidence of accretion of natural sediment structure (woody detrital covering, large peat component, etc) or organic carbon in the 10 years of the study. We believe the data presented does not overcome the large body of scientific information showing that mining through the headwaters of estuarine streams and their riverine habitat will have a significant negative impact on the functioning and structure of the creeks impacted by the proposed mining activities. There is, however, a large amount of scientific data supporting the importance of headwater streams and wetlands on downstream water quality.

Summary

In summary, the proposed project would eliminate critical ecological functions provided by approximately 3,953 acres of wetlands and 25,727 linear feet of streams within the nationally significant Albemarle Pamlico Estuary. Wetland functions include temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of

biologically diverse plant and animal habitat. Stream functions include transport of water, nutrients and sediment downstream, pollutant processing and removal, and maintenance of biologically diverse plant and animal habitat. Of particular concern are the proposed projects:

- Direct impacts to portions of a nonriverine hardwood wetland forest that has been designated as a Nationally Significant Natural Heritage Area by the NC Natural Heritage Program, and
- Indirect impacts to the site's tidal creeks, four of which have been designated as Primary Nursery Areas by the NC Wildlife Resources Commission, associated with the 70 percent reduction in the drainage basins for these creeks.

EPA believes that impacts to these ecological functions at the scale associated with this project will result in significant degradation [40 CFR 230.10(c)] of the Nation's waters. Further, as discussed below, we do not believe the proposed compensatory mitigation would reduce these adverse impacts to an acceptable level.

IV. Substantial and Unacceptable Impacts

40 CFR 230.10(c): Significant Degradation

EPA is concerned that compliance with requirements of Section 230.10(c) of the Guidelines has not been demonstrated. Section 230.10(c) requires that no discharge of dredged or fill material shall be permitted which will cause of contribute to significant degradation of waters of the United States. The Guidelines explicitly require evaluation of all direct, secondary, (i.e., indirect), and cumulative impacts reasonably associated with the proposed discharge in determining compliance with Section 230.10(c). In accordance with the Guidelines, determining significant degradation requires specific consideration of effects on such functions and values as wildlife habitat, aquatic system diversity, stability and productivity, recreation, aesthetic and economic values.

Of the 15,100 acre project area, the proposed mine advance would impact approximately 11,454 total acres and result in direct impacts to approximately 3,953 acres of wetlands, 19 acres of open waters and 25,727 linear feet of streams. This represents the single largest wetland impact ever authorized under the Clean Water Act in NC and represents a significant loss of wetlands, streams and other waters of the United States within the nationally significant Albemarle Pamlico Estuary Complex.

As previously noted, all of the site's wetlands perform important ecological functions that support the Albemarle Pamlico Estuary such as temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. Also as previously noted, all of the site's stream resources perform important ecological functions that support the Albemarle Pamlico Estuary such as the transport of water, nutrients and sediment downstream, pollutant processing and removal, and maintenance of biologically diverse plant and animal habitat. We recognize that not all of the approximately 3,953 acres of wetlands and 25,727 linear feet of streams that would be impacted by the proposed project perform all of these respective functions to the same degree (because of their position in the landscape and/or their level of prior disturbance), however, the complete loss of this entire suite of wetland and stream functions on this scale raises serious ecological concerns.

The habitat functions provided by wetlands and streams that would be lost are particularly important in light of the ecological and economic value of the Albemarle Pamlico Estuary's commercial and recreational fishery/shellfish resources. Also, the state has designated the entire Tar – Pamlico River Basin as Nutrient Sensitive Waters because of problems associated with excessive levels of nutrients in the river such as harmful algal blooms, low oxygen levels, increased fish kills, and other symptoms of stress and diseases in the aquatic biota. The state developed a strategy to reduce nutrient inputs from around the basin to the estuary that is yielding improvements to water quality. Nonetheless, we are very concerned that loss of the water quality enhancement functions provided by the approximately 3,953 acres of wetlands and 25,727 linear feet of streams that would be completely eliminated by the proposed project could

exacerbate existing water quality problems in the Tar – Pamlico River and hamper the state's ongoing efforts to improve the river's water quality.

Direct Impacts to Nationally Significant Natural Heritage Area

EPA is particularly concerned with the proposed project's direct impacts to the wetland area on the Bonnerton tract that has been designated by the NC Natural Heritage Program as a Nationally Significant Natural Heritage Area. As previously noted, the 271 acre nonriverine WHF found on the Bonnerton tract is an extremely unique and rare community type, one that has experienced a rate of loss higher than all other community types in the state. The fact that the Bonnerton tract's Significant Natural Heritage Area has been classified as nationally significant means the Natural Heritage Program has determined it to be one of the five best examples of this community type in the nation.

As previously noted, some of the indicators of quality in a nonriverine WHF are canopy maturity, canopy age structure, extent and connection to other natural communities. Historically, nonriverine WHFs naturally occurred in large patches and it is believed that some aspects of their ecosystem function are dependent on this large extent. The proposed project would directly impact approximately 97 acres[1] of this ecologically valuable and rare wetland system and would allowing mining through the middle of the 271 acre area, bisecting it into two separate and smaller pieces, an eastern and a western piece. This large reduction in size and the fragmentation of the tract into two separate pieces undermines some of the key ecological characteristics which make it ecologically valuable and "nationally significant." Although the NCDWQ's CWA Section 401 Water Quality Certification requires the mined out area between the eastern and western pieces to be restored after mining, we believe it will be extremely difficult, based on the current state of the science, to restore this area to its prior condition after mining and this will have a significant detrimental impact to the integrity of this rare and threatened biological community. In addition to reducing the size of the area and fragmenting it into two pieces, the large scale disturbances associated with allowing phosphate mining through the middle of the area (land clearing, groundwater extraction, pit excavation, road and support infrastructure construction, etc) will further lower the ecological value of the remaining eastern and western pieces of the area.

Given the unique and valuable nature of this nationally significant resource, it is EPA's determination that the direct impacts of mining the 271 acre Significant Natural Heritage Area on the Bonnerton tract does not comply with Subparts C-F of the Guidelines, specifically Subpart C – Impacts on physical characteristics of the aquatic ecosystem, Subpart D –Impacts on the biological characteristic of the aquatic ecosystem, Subpart E – Impacts to special aquatic sites and Subpart F – Effects on human use characteristics (SNHA designation).

Indirect Impacts to Tidal Creeks/Primary Nursery Areas

EPA is also particularly concerned with the proposed project's indirect impacts to the project area's nine tidal creeks, four of which have been classified by the NC Wildlife Resource Commission as Primary Nursery Areas. Although the proposed project would not directly

[1] Based on the February 24, 2009, Notice of Intent letter from the Wilmington District Corps, page 6.

impact the perennial reaches of the four Primary Nursery Areas, the headwater drainages of the project site's tidal creeks, including those designated as Primary Nursery Areas, would be reduced by approximately 70 percent. Our concerns regarding the proposed drainage basin reductions are amplified on the NCPC tract since its watersheds have already lost approximately 1,268 acres of wetlands as part of the Applicant's 1997 mining permit.

Eliminating the headwater streams and wetlands and significantly reducing the drainage areas of the project site's Primary Nursery Areas and other tidal creeks would:

- Reduce flow from ground water and surface water runoff to the tidal creeks, thereby decreasing fresh water input and increasing their salinity through estuarine tidal influences.
- Reduce filtration of nutrients and other contaminants previously accomplished by the site's streams and wetlands, increasing sedimentation and turbidity in tidal creeks.
- Reduce productivity of native fish and shellfish in the downstream estuary by disrupting the estuarine food web (caused by a reduction of organic materials critical for biological activity in the surface water drainage).
- Shift downstream estuarine productivity from the benthic community which is dominated by sensitive submerged aquatic vegetation and benthic invertebrate species to tolerant phytoplankton species (exacerbate ongoing environmental stress and create an open niche for problem invasive plant and animal species that are adapted to degraded environments to colonize the estuary).

We believe the disruption of these processes and functions in the drainage basin will significantly impact the site's tidal creeks and impair the ability of these systems to function as Primary Nursery Areas.

Estuarine animals exist in a community assemblage and the influence of a factor, such as salinity on one species may be extended either directly or indirectly to affect other species. The cumulative effects of even small changes in an estuary may have a total systemic effect on the marine resources and the economic activities that depend on them. We believe the potential effect of Drainage Basin Reduction (DBR) on the production of marine fisheries resources is significant.

Besides its effect on fish production, DBR will likely result in increased sedimentation and turbidity, which are significant contributors to declines in populations of aquatic organisms. The direct effects of sedimentation and turbidity at various trophic levels are mortality, reduced physiologic functions and avoidance. Sedimentation can clog the gills of fish, reducing respiratory abilities. This stress may reduce tolerance levels to disease and toxicants and to changes in dissolved oxygen concentrations and salinity, compromising the health of local fisheries resources. Decreases in primary production are associated with increases in sedimentation and turbidity and produce negative cumulative effects through depleted food availability to zooplankton, insects, freshwater mollusks and fish. Decreases in available food at various trophic levels also results in depressed rates of growth, reproduction and recruitment. These effects lead to alterations in community density, diversity and structure.

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Also of importance to estuarine food webs is the gradual and episodic release of Dissolved Organic Matter (DOM) from the contributing basins and wetlands immediately adjacent to the Albemarle Pamlico Estuary Complex. This energy source fuels bacterial communities that, through mineralization, provide inorganic nitrogen, phosphorous and carbon, supporting productivity. In addition, DOM supported bacteria are an important component of the "microbial loop." This part of aquatic food webs links DOM (of autochthonous and/or allochthonous origin) to higher trophic levels, via bacteria-protist-metazoan-zooplankton interactions. The impacts associated with the proposed project would decrease the quantity and quality of allochthonous DOM supplied to the estuary because of the close proximity of PCS's proposed mining operations.

Most of the drainage basin wetlands that would be subjected to impacts are wet forests, including bottomland hardwood forests. These areas are subjected to repeated periods of inundation and desiccation. This is important from a biogeochemical perspective as it allows for the accumulation of particulate organic matter and its subsequent processing (dissolution and mineralization). This leads to episodic exports of dissolved organic materials to the estuary. Wetlands impacted by the proposed project also retain nutrient loads carried by high flow events, which are later sequestered into forest biomass. Such systems are also important for

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Summary

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EPA believes that impacts to these ecological functions at the scale associated with this project will result in significant degradation [40 CFR 230.10(c)] of the Nation's waters. Further, as discussed below, we do not believe the proposed compensatory mitigation would reduce these adverse impacts to an acceptable level.