"Heather"
<riverkeeper@ptrf.org>
03/26/2009 03:06 PM

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

History: This message has been replied to.

Here ya go.

Sorry for late response, I've been in Raleigh last two days, then in Greenville for meetings half of today. Just getting caught up to Wed and today's emails.

Heather Jacobs Deck
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-----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
Phone: 828-497-3531
Email: fox.rebecca@epa.gov

Attachments to SELC PTRF 401 Certification Comment Letter

07/07/2008

Attachment 1

SELC PTRF
401 Certification Comment Letter
07/07/2008

SOUTHERN ENVIRONMENTAL LAW CENTER

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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' analysis, or the arbitrarily-truncated, non-discounted versions of the cash cost analysis."[27] The net present value analysis revealed that "[a]lternatives L, SCRA, SJAA are essentially indistinguishable in terms of discounted cash cost; if any one of these is economically practicable, then all three of them are economically practicable."[28] The analysis also suggests that even the DL1B alternative may be practicable due to its similarity in cost.

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

But the FEIS does not provide that response. The FEIS's response to Dr. Wakeman's comments does not assess the weaknesses of the DEIS Marston cost model or the merits of the net present value analysis of the alternatives. It avoids discussion of Dr. Wakeman's criticisms on two grounds: that the DEIS Marston cost model was previously approved by professional economists, including Dr. Wakeman,[29] and that that same model has been consistently applied through the DEIS, SDEIS, and FEIS. Neither of these bases relieves the Corps of its obligation to respond to Dr. Wakeman's analysis in a "substantive and meaningful" manner.

That Dr. Wakeman did not raise the net present value analysis earlier in the NEPA process for this project cannot justify the FEIS's failure to respond to his comments.[30] First, as noted in the comment letter presenting the net present value analysis, the data necessary to perform the analysis was not disclosed to the public in the DEIS and was only made publicly available pursuant to a FOIA request submitted on November 20, 2007. Prior to the response to that request, it was not clear that the data necessary to calculate the analysis existed, and those data were not publicly available. It was only after the November 6, 2007 release of the SDEIS – which included the applicant's new cash-cost model – and the subsequent FOIA response that it was clear that such data existed. Second, the FEIS does not apply the same treatment to the applicant's objections to the DEIS Marston cost model. On February 7, 2007, PCS submitted a letter to the Corps criticizing the DEIS Marston cost model.[31] Despite contracting with Marston to provide the DEIS cost model and providing the data necessary for its preparation, on February 7, 2007 – after the release of the DEIS and only

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[27] Id.
[28] Id.
[29] In making this argument, the Corps misrepresents Dr. Wakeman's statements. The Corps implies that Dr. Wakeman stated that "Absent compelling evidence to the contrary" that the DEIS Marston cost model was sound. His letter actually says that "Absent compelling evidence to the contrary," the conclusion that SCRB, SCRA, and SJAB are practicable is economically sound. FEIS App. J-V.A.5. But he challenges the conclusion that those alternatives that were deemed impracticable by that model actually are impracticable – foreshadowing the criticisms contained in his comments on the SDEIS.
[30] See Natural Res. Def. Council v. Tenn. Valley Authority, 267 F. Supp. 128 (E.D. Tenn. 1973).
[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.

[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. Where 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," although 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 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

[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
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Attachment 2

SELC PTRF
401 Certification Comment Letter
07/07/2008

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December 31, 2007

Via U.S. Mail and Electronic mail

U.S. Army Corps of Engineers
Wilmington District
Regulatory Division
P.O. Box 1890
Wilmington, NC 28402-1890

Re: PCS Phosphate, File # 2001-10096

To Whom It May Concern:

Please accept the following comments on the Supplemental Draft Environmental Impact Statement ("SDEIS") 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.

As a preliminary matter, we are disappointed with the Corps' decision to release this supplement during the holiday season. It is logistically difficult for state and federal agencies and other interested parties to fully evaluate the document and draft comments on its substance.[1] The public is justifiably distracted at this time of year and is unlikely to comment. These comments are particularly important on a document such as the supplement, which the Corps' appears to be using to describe a sudden change in course on its analysis of this project six years into its review. Recognizing these difficulties, and the importance of commenting on the SDEIS, we requested an extension of the comment period until, at earliest, December 31, 2007. The Review Team was notified of a 10 day extension on December 17, 2007. This late notice ensured that comments on the SDEIS would be stifled and criticism of the SDEIS would be minimized. Moreover, the Corps

[1] It is our understanding that the U.S. Fish and Wildlife Service submitted its comments on December 12, 2007 and that state agencies were required to submit their comments to the state clearinghouse in early December in order to comply with the initial December 21, 2007 deadline.

failed to include in the SDEIS information critical to informal review and analysis. We have obtained some of this information pursuant to a FOIA request. The Corps has a continuing obligation to comply with NEPA. 40 C.F.R. § 1507.1. If necessary we will supplement these comments.

I. The SDEIS Development Process Was Inadequate.

The Draft Environmental Impact Statement envisioned an important role for the Review Team. It stated that "[t]he purpose of the Review Team was to identify major issues to be addressed in the EIS and to **provide input on potential alternatives** to be explored and potentially evaluated."[2] This involvement was not intended to end with the DEIS, but rather it was "anticipated that the Team will continue to meet and **provide input** during the review of the DEIS and development of the Final EIS (FEIS)."[3] The SDEIS states in Section 2.4.1 that the "Corps worked with the Applicant and members of the Review Team to develop various boundaries within each of the three project area tracts."[4] This statement, as it relates to Alternatives L and M is, at best, misleading. The Review Team, as a body, had no input into the development of Alternatives L and M.

A. The Review Team was not informed about Alternatives L and M.

The Corps did not work with members of the Review Team in developing the SDEIS or Alternatives L or M. The Corps conveyed limited information regarding the alternatives to the Review Team at a meeting to discuss new mitigation efforts being undertaken by PCS on July 24, 2007. As an introduction to the meeting, Tom Walker described the outline of the Alternative L using maps of other alternatives. The Review Team was not shown nor given any maps illustrating the outlines of the new alternative. The Corps did not provide any information regarding the wetland impacts under Alternative L. The Review Team was not made aware that Alternative M existed until PTRF inquired about it on October 30, 2007. Despite being on the Review Team, PTRF initially learned the Corps was considering Alternative M from a newspaper article.

B. The Review Team's comments were not considered in the SDEIS.

The Corps could excuse not consulting the Review Team on the SDEIS if the document reflected the Team members' comments on the DEIS. A review of some of the Team members' comments shows that not only were those comments not constructively applied in the SDEIS, but they were disregarded. A quick survey of the comments of the U.S. Environmental Protection Agency, the N.C. Wildlife Resources Commission, the U.S. Fish and Wildlife Service and the N.C. Division of Marine Fisheries demonstrates that the Corps did not rely on the Review Team's comments in developing the SDEIS.

The U.S. Environmental Protection Agency ("EPA") commented that "[d]ue to the functions provided by these areas, coupled with the continued loss of wetland habitat

[2] DEIS at 1-7 (emphasis added).
[3] *Id.* (emphasis added).
[4] SDEIS at 2-1.

and bottomland hardwood forests, in the Southeast United States, EPA considers the resources comprising this site to be [Aquatic Resources of National Importance]. We also believe the proposed project, which would impact 2,378 acres of wetlands and 7.3 miles of streams, may result in substantial and unacceptable impacts to these ARNI."[5] Going further, EPA stated: "[w]e believe the impacts associated with the proposed project may cause or contribute to significant degradation of waters of the U.S."[6]

The N.C. Wildlife Resources Commission ("WRC") directly addressed the impacts of mining in the NCPC tract. It commented that "drainage basin alteration [from mining in NCPC] will significantly impact the ability of these systems to function as a Primary Nursery Area ("PNA") through the removal of necessary chemical and biological components of the watershed."[7] Synthesizing its criticism of the DEIS, the WRC "recommend[ed] neither the AP, EAP, SCR, or SJA alternatives be considered as appropriate mining options on the NCPC tract because of significant degradation of fish and wildlife resources."[8] The WRC noted that "[w]e are especially concerned with the impacts to the valuable habitat areas within the NCPC tract" and that it "would look more favorably on mine expansion that does not include the NCPC tract."[9]

The U.S. Fish and Wildlife Service ("FWS") was no less direct. It concluded "that the proposed project may result in substantial and unacceptable adverse impacts to aquatic resources of national importance."[10] The agency also pointed out that "large-scale wetland impacts located directly adjacent to the Pamlico River . . . will act to exacerbate the impacts of eutrophication while altering local food web stability; both of which have important implications for estuarine productivity."[11] Since the "impacts are likely to produce a legacy of environmental effects that could last for years," the FWS recommended that the permit request be denied.[12]

The N.C. Division of Marine Fisheries ("DMF") highlighted a panoply of problems with the DEIS alternatives. DMF noted that South Creek is already "stressed," and that "further mining north of NC Highway 33 will only exacerbate existing conditions."[13] DMF's comments bluntly state that "[a]ll the alternatives examined in the DEIS would have significant adverse impacts to estuarine fisheries resources, fish habitats, water quality, and public trust waters in the Pamlico River system."[14]

The SDEIS plainly ignores these comments from expert resource agencies. Rather than evaluating alternatives that would impact fewer acres of wetlands in the NCPC and Bonnerton tracts, the Corps chose to evaluate alternatives that exacerbate the

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[5] Letter from Giattina to Pulliam of 02/09/07, at 2.
[6] *Id.* at
[7] Memorandum from Tripp to McGee and Walker of 02/01/07, at 4.
[8] *Id.*
[9] *Id.* at 5.
[10] Letter from Benjamin to Walker of 12/06/06, at 6.
[11] *Id.*
[12] *Id.*
[13] Memorandum from McKenna to McGee of 02/02/07, at 7.
[14] *Id.* at 1.

impacts that caused the Review Team agencies' concern. Alternative L mines over 3,600 acres of wetlands in the NCPC and Bonnerton tracts.[15] Alternative M mines over 4,000 acres in the NCPC and Bonnerton tracts.[16] Surely this enhanced mining was not what the EPA meant when it recommended "greater depth in the alternatives analysis for this project to ensure that the chosen alternative represents the [least environmentally damaging practicable alternative]."[17] It is clear from the Corps' decision to disregard agency appeals for less destructive alternatives in favor of alternatives that expand wetland impacts that it did not consult the Review Team's comments when drafting the SDEIS.

C. The Review Team was not provided an opportunity to comment on a draft version of the SDEIS.

The Corps could have overcome its failure to include the Review Team in the development of the supplement and ignoring Review Team comments in creating it if the agency had sought Review Team comments on a draft of the SDEIS. After all, the Review Team's purpose is to "provide input" during the development of NEPA documents for this project. Had the Review Team been consulted, many of the glaring omissions and errors of the SDEIS may have been avoided. The SDEIS could have been understandable and user friendly. Instead, it is confusing and lacks essential ingredients. Enlisting the expertise of the Review Team prior to public release of the document, as was done with the DEIS, may have averted these shortcomings.

In light of the foregoing problems with the vaguely worded assertion that the "Corps worked with the Applicant and members of the Review Team to develop various boundaries within each of the three project area tracts,"[18] the Review Team's role should be clarified in a second supplement to the DEIS. The second SDEIS should clearly state that input from the Review Team was not sought or considered in the development of the first SDEIS. To the extent that individual members of the Review Team were consulted, those interactions should be listed separately and not attributed to the Team as a whole.

II. Alternatives L and M Will Result in Significant Degradation of the Aquatic Environment.

Based on the resource agencies' criticisms of the DEIS, Alternatives L and M will result in significant degradation of the aquatic environment and cannot be permitted under the 404(b) Guidelines. The Guidelines prohibit the Corps from authorizing actions "which will cause or contribute to significant degradation of waters of the United States."[19]

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[15] SDEIS at 6-15.
[16] SDEIS at 6-17.
[17] Letter from Giattina to Pulliam of 02/09/07, at 2.
[18] SDEIS at 2-1.
[19] 40 C.F.R. 230.10(c).

State and federal agencies with expert knowledge of the ecosystems proposed to be impacted by the mine expansion spoke strongly against the significant wetland and streams impacts proposed by the Applicant. The EPA was concerned about both the type and scope of areas that would be impacted by the mine expansion. The EPA expressed trepidation about impacts "directly upstream of areas classified as primary nursery areas for recreational and commercial fish."[20] The agency stated that "we do not believe impacting 2,378 acres of wetlands and 7.3 miles of streams satisfactorily avoids and minimizes impacts to aquatic resources. We also believe it may be difficult to provide adequate compensation for the proposed project, due to the large scale nature and types of coastal habitats which will be impacted."[21]

The EPA's concerns were echoed by other expert agencies. The FWS concluded that "the proposed project may result in substantial and unacceptable adverse impacts to aquatic resources of national importance" due to the "large-scale wetland impacts located directly adjacent to the Pamlico River."[22] The DMF opposed all mining north of N.C. Highway 33 "because of probable significant adverse impacts to estuarine fisheries resources, fish habitats, water quality, and public trust waters in the Pamlico River system."[23] The WRC was "especially concerned with the impacts to the valuable habitat within the NCPC tract including wetlands, streams, creeks, and inland PNAs."[24] The National Marine Fisheries Service concluded that "mining the NCPC tract would adversely impact living marine resources and their habitats."[25] Due to these impacts, the NMFS recommended that "[t]he Department of the Army shall not authorize mining activities within the NCPC tract."[26] The South Atlantic Fisheries Management Council opined that "[n]ot only would the proposed project impact habitat through direct removal (loss of over 2,000 acres of wetlands), it poses a significant risk to the coastal ecosystem as a whole through alteration of food web dynamics and severely diminished water quality."[27]

Rather than evaluating alternatives that would alleviate the concerns of the resource agencies, the SDEIS amplifies mining impacts. Alternatives L and M would exacerbate the concerns regarding wetland destruction expressed by the resource agencies. Alternative L would mine 4,134.72 acres of wetlands total, including 1,584.28 acres in the NCPC tract and 2,040.83 acres in the Bonnerton tract.[28] Alternative M is more destructive, mining 4,591.37 acres of wetlands total, including 2,040.93 acres of wetlands in NCPC and 2,046 acres of wetlands in Bonnerton.[29] Similarly, the AP

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[20] Letter from Giattina to Pulliam of 02/09/07, at 2.
[21] *Id.* at 3.
[22] Letter from Benjamin to Walker of 12/20/06, at 6.
[23] Memorandum from McKenna to McGee of 02/02/07, at 1.
[24] Memorandum from Tripp to McGee and Walker of 02/01/07, at 5.
[25] Letter from Croom to Pulliam of 02/08/07, at 1.
[26] *Id.* at 4.
[27] Letter from Mahood to Pulliam of 02/09/07, at 2.
[28] SDEIS at 6-15.
[29] *Id.* at 6-17.

Alternative, the focus of much of the criticism of the DEIS, would mine 2,407.72 acres of wetlands within the NCPC tract.[30]

Alternatives L and M would also devastate the stream systems within the project area. Alternative L would excavate 29,288 linear feet of creeks and eliminate 11,909 acres of the drainage basin of the remaining creeks and streams.[31] Alternative M would expand those impacts, mining 36,990 linear feet of creeks and 12,571 acres of the drainage basins of the remaining creeks and streams.[32] The AP Alternative would mine 38,558 linear feet of creeks and 3,412 acres of their drainage basins.[33]

This analysis of the proposed wetland and creek impacts of Alternatives L and M shows that the very concerns documented by the resource agencies regarding the AP Alternative apply to Alternatives L and M as well. Rather than avoiding and minimizing wetland impacts, Alternatives L and M include expansive wetland impacts in sensitive areas. They destroy wetlands, creeks and drainage basins at a rate that will cause significant degradation for the very reasons identified by the expert agencies in their comments to the DEIS. We encourage the Corps to review these comments, to analyze Alternatives L and M in light of them and, as requested in our comments on the DEIS, to develop a second supplement to the DEIS that presents and evaluates alternatives that will not cause or contribute to the significant degradation of the aquatic environment.

III. The 15 Year Limitation Chosen by the Corps Is Arbitrary and Derails the Alternatives Analysis.

The Corps' determination that any alternative must provide 15 years of mining north of N.C. Highway 33 is arbitrary and slants the alternatives analysis to favor more destructive mine plans. The Corps' steadfast reliance on a 15 year analysis is unsupported by reason and cannot be justified in light of its impact on the economic practicability analysis. The Corps' 15 year minimum has its origins in the AP Alternative, a fact that undermines its applicability because (1) the AP Alternative is illegal and cannot be permitted under the 404(b) Guidelines and applicable state laws and (2) it does not meet the stated purpose and need for the project.

A. The AP Alternative is illegal and cannot serve as the foundation of the alternatives analysis.

The AP Alternative unlawfully impacts coastal wetlands. It directly impacts 38 acres of coastal wetlands.[34] In North Carolina, "[u]ses which are not water dependent shall not be permitted in coastal wetlands."[35] It is clear from a basic review of the applicable state law that phosphate mining is not water dependent. First, the regulations

[30] *Id.* at 6-18.
[31] *Id.* at 6-10; 6-12.
[32] *Id.*
[33] *Id.*
[34] SDEIS at 6-18.
[35] 15A NCAC 7H .0208(a)(1).

give examples of uses that are water dependent, including docks, wharfs, boat ramps, dredging, bridges, bulkheads, etc.[36] The regulations also state that water dependent structures are "those structures for which the use requires access or proximity to or siting within surface waters to fulfill its basic purpose."[37] Not only does phosphate mining not require surface water access "to fulfill its basic purpose," the presence of water is a hazard to mining. As the DEIS notes, "depressurization of the Castle Hayne Aquifer would be required to maintain **dry, safe mining conditions**."[38] Phosphate mining is not dependent on access to surface water, but rather is hampered by it. Moreover, the Corps has determined phosphate mining is not water dependent, shifting the burden to PCS under the 404(b) Guidelines to demonstrate a less environmentally damaging practicable alternative does not exist.

The Corps is not ignorant of this illegality. At the September 1, 2006 Review Team meeting, John Dorney of the Division of Water Quality told the group that the AP and EAP alternatives could not be permitted because they violated state law. We reminded the Corps of Mr. Dorney's statement in our February 8, 2007 comment letter on the DEIS.[39]

Furthermore, it appears that PCS has admitted that the AP alternative is illegal and finally relented from its position that it is the only practicable alternative. It recently submitted Alternative M. Critically, Alternative M does not impact any coastal wetlands.[40] While it would still contribute to significant degradation because of its expansive wetland impacts and violates state buffer mitigation requirements,[41] at least Alternative M does not facially violate state law protecting coastal wetlands.

The AP Alternative also violates state law regarding buffer mitigation. State law requires buffer mitigation for impacts to riparian buffers in the Tar-Pamlico River basin.[42] Under that law, PCS would be required to mitigate 280 acres of buffers to compensate for buffer impacts under the AP Alternative.[43] Based on an extensive search, PCS has only identified 76 to 158 acres for potential mitigation.[44] It acknowledged its inability to comply with the buffer mitigation requirements in a letter to the North Carolina Environmental Management Commission on February 20, 2006. That letter was included in the DEIS at Appendix I. In that letter it requested a variance from the

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[36] *Id.*
[37] 15A NCAC 2B .0202(67).
[38] DEIS at 4-41 (emphasis added).
[39] Letter at 7.
[40] SDEIS at 6-18.
[41] State law requires buffer mitigation for impacts in the Tar-Pamlico River Basin. 15A NCAC 2B .0260. Buffer impacts in Zone 1 require mitigation at a 3:1 ratio and impacts in Zone 2 require mitigation at a 1.5:1 ratio. 15A NCAC 2B .0260(3)(b). Alternative M would impact 44.84 acres of Zone 1 buffers and 30.23 acres of Zone 2 buffers, together requiring 179.87 acres of mitigation. PCS admits that despite an exhaustive search, it can only locate 76 to 158 cares of potential mitigation. DEIS at I-32. Alternative L may also be illegal, since it would require 132.06 acres of buffer mitigation, meaning PCS would have to successfully acquire 84% of the available mitigation to avoid violating buffer regulations.
[42] 15A NCAC 2B .0260.
[43] DEIS Appx. I-32.
[44] *Id.*

applicable law; that request has since been withdrawn. We encourage the Corps to follow PCS's lead and to accept that the AP Alternative is illegal. The arbitrary decision in the SDEIS to require 15 years of mining in the wetland areas north of N.C. Highway 33 is capricious when based on the Applicant's clearly illegal application for a 15 year mine plan.

The Corps' insistence on making the AP Alternative the focus of its analysis is puzzling given its past treatment of similar situations. The Corps has previously disregarded alternatives that facially conflict with state law. In the Final EIS for the Bogue Inlet Channel Erosion Response Project,[45] the Corps rejected an alternative that included the installation of a hardened structure on the shoreline to control erosion.[46] In eliminating that alternative from consideration, the FEIS recognized that "the use of hard structures as a shoreline erosion response measure for ocean and inlet structures is **prohibited by the State of North Carolina**."[47] After citing this specific prohibition on hardened structures, the FEIS concluded that "[t]herefore, this alternative has been eliminated from further consideration."[48] The unlawful alternative was also determined not to meet the project's purpose and need. This is a logical conclusion, since it is implicit in every applicant's purpose and need statement that the alternative that is ultimately selected complies with the law.

B. The AP Alternative does not meet the stated purpose and need.

The AP Alternative does not satisfy the Applicant's purpose and need because it fails to comply with state law and is not 20 years in length. PCS's stated purpose and need is "to continue mining its phosphate reserve in an economically viable fashion" on "approximately 20 year horizons."[49] It is implicit in the statement that this mining must be legal. The purpose and need could be rewritten so that it says that the purpose and need is "to continue mining its phosphate reserve in an economically viable fashion that complies with state and federal law." This change does not affect the substance of the statement, but expressly recognizes the otherwise implicit requirement that any alternative must be legal to satisfy the purpose and need. Since the AP Alternative violates at least two separate state laws, it cannot satisfy the Applicant's purpose and need.

The AP Alternative also fails to provide an "approximately 20 year horizon[]"[50] and therefore violates the purpose and need statement as expressed in the DEIS. As the Corps determined regarding the 12 year No Action Alternative, the AP Alternative "does not meet the applicant's purpose and need as it does not provide an approximately 20 year plan."[51] If 15 years can be considered "approximately 20 years," then the Corps

[45] FINAL ENVIRONMENTAL IMPACT STATEMENT: BOGUE INLET CHANNEL EROSION RESPONSE PROJECT, March 2004 ("Bogue FEIS"), http://www.saw.usace.army.mil/WETLANDS/Projects/BogueInlet/.
[46] Bogue FEIS at 111.
[47] *Id.* (emphasis added)
[48] *Id.*
[49] DEIS at 1-4.
[50] DEIS at 1-4.
[51] *Id.* at 2-12.

must articulate a reason why less than 15 years cannot be. Without any such justification, the Corps finding that the AP Alternative meets the purpose and need is arbitrary.

For the reasons stated above, the Corps cannot rationally rely on the clearly illegal AP Alternative to impose a requirement that any practicable alternative provide 15 years of mining north of N.C. Highway 33.[52] To the extent it is just accepting the Applicant's result driven premise, the Corps has failed to exercise the independent judgment of project purpose and need required by Corps regulations.[53] The Corps relies on that 15 year cutoff because it "involves no relocation during the initial 15 years."[54] As discussed above, no mine plan has been presented that can legally mine 15 consecutive years without relocation. We do not doubt that the Applicant could devise a mine plan that could mine 20 or more years in NCPC if allowed to entirely disregard the law. But that cannot be the baseline.

Considering the alternatives that do not facially violate the coastal wetlands use prohibitions or buffer mitigation requirements shows the error in relying on the AP Alternative's illegal 15 consecutive years of mining. The L, SCR and SJA Alternatives must relocate to a new mine pit after 8, 8 and 9 years respectively. If the Corps continues to believe that the Applicant must be able to mine north of N.C. Highway 33 for a time period equal to the longest consecutive mining that can be done in NCPC, then it should consider mine plans that allow 9 years of mining north of N.C. Highway 33. That, after all, is the maximum number of years that NCPC can be mined without facially violating state law, though even the legality of these alternatives is not assured.[55] Considering this time frame, the Corps could consider the EPA's request to reduce mining impacts in the NCPC tract by eliminating mining between the tributaries that feed South Creek.

IV. The SDEIS Economic Analysis Relies on Outdated Information, Makes Improper Comparisons and Lacks Critical Elements for the Corps' Practicability Determination.

The SDEIS introduces for the first time a new economic analysis to determine practicability of alternatives. It cryptically presents this new economic analysis that it appears the Corps believes changes the economic outlook on all of the alternatives considered in the DEIS. In revealing bits and pieces of this new analysis, the SDEIS includes a series of flaws that entirely undermine its value. First, the SDEIS fails to acknowledge the recent dramatic improvement in the fertilizer market. Second, the SDEIS continues to use the AP and EAP Alternatives, alternatives that the Corps knows are illegal and cannot be permitted, as the baseline for evaluation of the practicability of

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[52] The Corps has mentioned in the past that it believes re-evaluating its reliance on the 15 year time frame for the economic analysis would be arbitrary. This is an unconvincing argument since the Corps has furtively abandoned the original cost model in favor of the "cash cost" model in this SDEIS.

[53] *See* 40 C.F.R. 1506.5(c).

[54] SDEIS Summary at c.

[55] It is not clear that these alternatives could comply with state law considering the substantial buffer mitigation that would be required. PCS would have to demonstrate an incredible success rate in acquiring potential buffer mitigation sites in order to meet the buffer mitigation requirements for any of these alternatives.

new Alternatives L and M. Third, the SDEIS fails to justify or explain the application of the new "cash cost" economic analysis. Finally, the SDEIS does not produce a cost/ton concentrate figure, the basis for determining practicability. While each of these flaws could individually devalue the document, together they undermine the entire economic analysis and conclusion in the SDEIS.

A. PCS's improved economic outlook must be considered in the economic evaluation.

In the time period between the DEIS and the SDEIS, the economic outlook for PCS dramatically improved; yet the SDEIS does not reflect this important change. According to the DEIS Section 2.7.3, "the Corps has used sales of finished products as an indicator of the operations [sic] economic performance."[56] That section also pointed out that "Diammonium Phosphate (DAP) and Monoammonium Phosphate (MAP) remains a major part of PCS Aurora's product mix."[57] The Corps based its analysis of economic practicability on these facts and a finding that "the global phosphate fertilizer market will not experience significant increases in price"[58] and that PCS "will not experience more favorable economic conditions than those under which they are currently operating."[59] Following the release of the DEIS at least two factors have proven these assumptions false. First, there has been an ethanol boom driven by a move towards alternative fuels and federal subsidies. Second, large populations in China and India have moved into the middle class and changed their diets in ways that increase demand for fertilizers.

The ethanol boom and its effects on the corn and fertilizer markets have been widely publicized; it is unclear why the Corps has not found these impacts worth addressing in the SDEIS. The effects of the ethanol production expansion were clear as early as March 16, 2007. At that time, U.S. farmers were "expected to plant record corn acreage" that was to be accompanied by "higher fertilizer costs" that were "expected to increase."[60] At that time, MAP and DAP prices had already "risen by up to $80 a ton." The Fertilizer Institute confirmed this trend on July 12, 2007, issuing a press release identifying "increased demand for corn used in ethanol production and natural gas prices as the primary drivers behind fertilizer prices."[61] In fact, "[a]verage prices paid by U.S. farmers reached the **highest level on record in April this year.**"[62] The Fertilizer Institute projects a continued high demand, noting that "[e]thanol plants under construction are expected to add another 6.2 billion gallons of capacity" and that "U.S. ethanol production could easily reach 11 billion gallons in 2011."[63]

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[56] DEIS at 2-17.
[57] *Id.*
[58] *Id.* at 2-19.
[59] *Id.*
[60] *Fertilizer Demand in US Expected to Rise Thanks to Ethanol*, AXCESS NEWS, March 16, 2007, at 1, (Attached as Exhibit A).
[61] Press Release, The Fertilizer Institute, The Fertilizer Institute Releases Fertilizer Price Brochure: Fertilizer Prices Impacted by Global Demand, Ethanol Boom, Natural Gas Prices (July 12, 2007) (Attached as Exhibit B).
[62] *Id.* (emphasis added)
[63] *Id.*

The Fertilizer Institutes also recognizes increasing affluence around the world as a cause of increased fertilizer demand. "[P]hosphate demand grew by 19 percent from fiscal year 2001 to 2006."[64] "China, India and Brazil are the three largest contributors to the growth in world **demand**."[65] As these populations grow, so will their demand for phosphate. This trend is already being observed in Asia, where "growing affluence has led to an increase in demand for meat, which in turn has driven demand for grain to feed livestock."[66] This increase in grain demand for meat production and ethanol has resulted in a "boon for fertilizer companies."[67]

The impact of this increased demand has been undeniably positive for PCS Phosphate. In fact, "Potash proved to be the most popular fertilizer company among Pro investors"[68] in the third quarter of 2007 and "the favorite fertilizer stock among tickerspy members."[69]

PCS's own reports confirm this record breaking growth of the fertilizer market. According to their Securities and Exchange Commission filings, **"[h]igher prices and continuing strong demand resulted in record phosphate gross margin** of $129.9 million for the quarter, compared to $29.8 million in the year-earlier period. This raised our phosphate gross margin to $290.9 million for the first nine months of 2007."[70] It is clear from these filings that PCS Phosphate has benefited from the growing demand for fertilizers worldwide. It must be assumed, absent evidence to the contrary, that the Aurora facility has also benefited. PCS has confirmed as much in their discussions with the Corps, admitting that business is very good.[71] While PCS attempts to downplay the impact of these improved conditions with claims of market volatility, the market has been so profitable that the amount PCS exceeded its goals for this year would cover the cost difference between any of the alternatives.[72]

Rather than providing evidence contradicting this improved market, PCS's arguments to the Corps show that the Aurora plant has benefited from the improving fertilizer market. In August of 2003, PCS eagerly pointed out that the Aurora facility was failing to meet PotashCorp Guidelines for Business Unit Performance.[73] Said another way, PCS Phosphate Aurora was not making an adequate profit to satisfy their parent company. It based this argument on a finding that its Cash Flow Return on Investments did not meet PotashCorp standards.[74] PCS also argued as recently as February that the

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[64] *Id.*
[65] *Id.* (emphasis added).
[66] *Fertilizer Stocks Boosted by Global Demand, Ethanol Subsidies*, INDIE RESEARCH, at 1, (Attached as Exhibit C).
[67] *Id.*
[68] *Id.*
[69] *Id.*
[70] Available at http://biz.yahoo.com/e/071107/pot10-q.html, (emphasis added) (Attached as Exhibit D).
[71] Corps' notes of 10/04/07 meeting (Attached as Exhibit E).
[72] Letter from Wakeman to Corps of 12/28/07, at 9 (Attached as Exhibit F).
[73] Letter from Smith to Walker of August 30, 2006, at 8, DEIS Appx. D.
[74] *Id.*

Corps should consider both "Reference to historical operating **income performance data**" and "PotashCorp guidelines for business unit performance."[75]

Following the release of the DEIS, and after the fertilizer market has considerably improved, PCS is discouraging consideration of "profits," preferring only a comparison of alternatives' costs. According to Mr. Smith, "PCS continues to encourage the Corps and EPA to focus on cost comparisons of alternatives. Evaluations of profitability, **or factors that correlate to profitability**, are not appropriate in this process."[76] PCS wants to have its cake and eat it too. When it is failing to meet profitability standards set by its parent company, those shortcomings should be considered in the practicability analysis. But when the fertilizer market has improved considerably and PCS Phosphate is reaping record breaking profits, those same factors "are not appropriate in this process." The Corps should not engage in the selective evaluation that PCS promotes. Rather, the Corps should look to PCS's improved financial standing as confirmation that the market has improved and the economic analysis must be reopened and recalculated.

The Corps has been wary to discuss profitability, and we do not introduce these findings to encourage the Corps to determine PCS's appropriate level of profit margin. We introduce this information to show that the statements from the DEIS that "the global phosphate fertilizer market will not experience significant increases in price"[77] and that PCS "will not experience more favorable economic conditions than those under which they are currently operating"[78] are demonstrably false. These reports clearly show that the fertilizer demand has increased substantially, that domestic and international demand is expected to continue to increase and that PCS is directly benefiting from this improved demand. By choosing not to revise the economic analysis in the SDEIS to reflect this drastic shift in the fertilizer market, the Corps facilitates the destruction of wetlands that could practicably be avoided. No permit can be issued based on the outdated economic outlook in the DEIS. A second supplement must be drafted to incorporate this new economic picture. As it is, the Corps' economic analysis is built on a false premise and foundation and has no value.

B. The economic analysis improperly relies on illegal alternatives as the cost baseline.

The SDEIS continues and further amplifies a fundamental mistake of the DEIS by comparing the costs of all alternatives to the AP and EAP Alternatives. As the Corps is aware, these alternatives clearly violate state law and cannot be permitted under state law. In addition, those alternatives would result in significant degradation and cannot be permitted under the 404(b) Guidelines. Moving forward, the Corps should acknowledge the unlawfulness of these alternatives and discontinue their inclusion in any further analysis. Under no circumstances can the Corps use these illegal alternatives as a baseline. By making them the focal point of the SDEIS, as they were in the DEIS, the

[75] Letter from Smith to Walker of 02/07/07, at 1. (emphasis added)
[76] Email from Smith to Walker of 06/18/07, at 1, (Attached as Exhibit G). (emphasis added)
[77] DEIS at 2-19.
[78] *Id.*

Corps entirely distorts the economic analysis. The Corps must make efforts to correct this distortion, with supplemental analysis that compares potentially viable alternatives, those that are not facially illegal.

As discussed above, it is no secret that the AP, EAPA and EAPB Alternatives are illegal, cannot be permitted by state law and therefore cannot be practicable alternatives. Each violates state law prohibiting non-water dependent uses in coastal wetlands and state law requiring buffer mitigation. It appears as though the legality of potential alternatives is of no concern to the Corps, since it has given these illegal alternatives elevated status in both the DEIS and the SDEIS.

The Corps' treatment of these plainly unlawful alternatives is baffling. Any applicant could develop cheaper methods of performing a desired task by shortcutting the applicable law. But complying with the law is a cost that must be considered. PCS could have omitted its costs for operating labor, maintenance labor or overhead to make the AP and EAP Alternatives less expensive. If it had done so, the Corps would have almost assuredly rejected the cost calculations as incomplete and biased. Instead, the company has omitted the costs of complying with the law, the costs of avoiding coastal wetlands that cannot be legally mined and buffers impacts that cannot be mitigated. The Corps has embraced that omission. The DEIS and SDEIS focus on these artificially lowered costs as the baseline, and in doing so, distort the economic analysis. The cost differences between any of the potentially legal alternatives and the AP and EAP Alternatives are simply irrelevant. We are certain that if allowed to disregard additional legal requirements, the Applicant could develop an even less expensive mining plan. That too would be irrelevant. The only cost comparisons that are relevant and rational are those between reasonable alternatives that include the cost of complying with the law. The AP and EAP Alternatives errantly omit that cost.

The Corps' focus on the AP and EAP Alternatives in the SDEIS is not a harmless error. Rather, by focusing on the artificially reduced costs and illegally expanded time frames of these alternatives, the Corps has tilted the economic analysis in favor of more extractive mine plans that destroy more wetlands and streams.[79] Comparisons to the AP and EAP Alternatives invariably make the potentially legal alternatives seem overly expensive because they avoid areas that cannot be mined and include jumps that are necessary when those areas are avoided.

Moreover, the Corps' continued reliance on the AP Alternative as the baseline for its analysis raises questions regarding whether the agency has fulfilled its duty to independently evaluate the NEPA documents. By law, when the Corps delegates drafting of the EIS to a contractor, as was done with CZR Incorporated here, it "shall independently evaluate the statement prior to its approval and take responsibility for its scope and contents."[80] An independent evaluation of the DEIS and SDEIS could not accept the central role of the AP Alternative. It is a facially illegal alternative that is an outlier in terms of both cost and environmental impact when compared to the other

[79] *See generally* SDEIS Summary.
[80] 40 C.F.R. § 1506.5(c).

alternatives. Its mere inclusion in the alternatives analysis would benefit the Applicant. its role as the focal point stacks the deck against reasonable alternatives in such a way that a favorable outcome for PCS is ensured.

C. The SDEIS does not justify the new "cash cost" model or account for its flaws.

The SDEIS fails to fully analyze the "cash cost" model and its distortion of the relationship between the costs and benefits of mining in the S33 tract. As noted in the summary but not the substance of the SDEIS, the "cash cost" model was developed to account for the relocation of mine pits in all alternatives in the first 15 years. The Applicant claims that this new analysis is more appropriate than the original analysis used in the DEIS, because it concentrates relocation costs within the 15 year window that is considered by the Corps. It is important to remember that the original cost model in the DEIS "is the same one PCS is currently using for all its strategic planning."[81] This new 15 year "cash cost" model was introduced by PCS simply to support its permitting strategy. Rather than clarifying the economic picture, the Applicant's new "cash cost" model, further distorts the economic picture and skews the economic analysis.

This is another example of where the Corps' willingness to exclude the cost of complying with the law has distorted its analysis. The apparent justification for concentrating all relocation costs within the first 15 years with the "cash cost" model is that "[t]he AP and EAP alternatives involve no relocation during the initial 15 years."[82] The SDEIS fails to note that the only reason that is true is because these alternatives require mining areas that cannot be legally mined. It is clear looking at the alternatives that do not directly conflict with state law that no legal alternative can mine 15 years without relocating. At this point, neither PCS nor the Corps has identified any alternative that both 1) meets state law, 2) does not result in significant degradation of aquatic resources and 3) provides 15 years of mining without relocation. Therefore, if this is the Corps' justification for the new "cash cost" model, then that model is not justified.

The new "cash cost" model treats costs and benefits asymmetrically. In the original cost model, the cost of opening a new mine pit was amortized over the life of the mine pit. Said another way, the cost of opening the mine pit was spread over the time period that the pit would provide an economic benefit. Since opening the pit is necessary to gain the benefit of mining years later, this is a logical amortization and is how PCS actually accounts for their costs.[83] The "cash cost" model on the other hand front loads the costs of opening the pit, concentrating the losses in a few years and consequently amplifying benefits over the life of the mine after those few years. In this instance, PCS has attempted to support their previous contention that only AP and EAPA are practicable, by frontloading the costs of opening S33 so that they will be included in the Corps' economic analysis. Doing so makes mining the rest of S33 more profitable since costs are reduced during years outside the Corps' economic window, but the "cash cost"

[81] DEIS at A-142.
[82] SDEIS summary at c.
[83] DEIS at A-142.

model fails to recognize this benefit. PCS's ultimate costs and benefits are similar over the life of mining S33 in either plan.[84] Under the "cash cost" model, they are simply pushing those costs into the Corps' window of analysis in an effort to get the Corps to change its answer to the practicability question. The Corps did not agree with PCS's first attempt to get everything but AP and EAP deemed impracticable and should resist this new, fundamentally flawed invitation to do so.

PCS's contention that the DEIS practicability analysis calculated using its original cost model distorts economic reality is disingenuous. One would think that if the Corps' analysis was as off base as PCS claims, then the company would have complained about it immediately upon its release. To the contrary, PCS admits that "the cost model is the same one that PCS is currently using for all its strategic planning."[85] PCS has maintained throughout the NEPA process that only AP and EAPA are practicable alternatives, and anticipated that the original cost model would support that belief.[86] By PCS's calculations, it did so. Ross Smith, Environmental Affairs Manager for PCS, sent an 11 page letter on August 30, 2006 arguing that only AP and EAPA were practicable based on the 15 year segments of the original cost model analyzed by the Corps. This letter was sent just one month before the DEIS was released and well after PCS first received a draft. Accepting the Corps' use of the original cost model, Mr. Smith argued that the phosphate product markets were declining, that the Aurora facility was not meeting Potash Corp Business Unit Performance Standards, that mining south of N.C. Highway 33 was logistically impossible and that un-mined phosphate reserves should be considered in the economic analysis. Mr. Smith did not dispute the Corps' application of the original cost model in the economic practicability analysis. Not in one page, one paragraph or one sentence. This claimed distortion that is now a manifest injustice according to PCS was not mentioned prior to the DEIS.

In the DEIS, the Corps' disagreed with PCS's calculations, determining that only S33, DL1B and the No Action Alternative were impracticable.[87] The Corps could not find the other alternatives impracticable, meaning that by default they were practicable.[88] Following this determination, PCS sent another letter to the Corps arguing the impracticability of all but the AP and EAPA Alternatives.[89] It was in this February letter that PCS's claims regarding the use of the original cost model first emerged. The only issue addressed in this seven page letter was the Corps' use of the 15 year economic evaluation term. In the five months between its August and February letters, PCS's arguments shifted from a variety of claims to one previously unidentified argument. The company first made its concerns about the cost model known to the Review Team at its

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[84] For example, the overall costs computed by the "cash cost" model for Alternative L is $5,304,777 compared to $5,342,853 under the original cost model. SDEIS Section 8.0. For Alternative M, the "cash cost" model calculates total operating costs as $5,687,035 compared to $5,725,111 under the original cost model. This comparison would be more complete if "cash cost" analyses of all alternatives were included in the SDEIS.

[85] DEIS at A-142.

[86] Letter from Smith to Walker of 08/30/06, Letter from Smith to Walker of 02/07/07, (DEIS Appx. D).

[87] DEIS at 2-19.

[88] *Id.*

[89] Letter from Smith to Walker of 02/07/07.

July 24, 2007 meeting, more than 10 months after the DEIS and six years after the initiation of the permit process. It is difficult to believe that PCS just now realizes its original cost model "distorts" the practicability analysis. What is clear is that the company's arguments why the original cost model supported their practicability claims were unsuccessful, so they created a new "cash cost" model that they anticipate will give a more favorable answer. Without further demonstration why the original cost model, used by PCS in its own planning, is inadequate and the new "cash cost" model is appropriate, the Corps must reject this invitation to fundamentally alter the economic practicability analysis.

The Corps is now confronted with two flawed models. Both the original cost model and the "cash cost" model have weaknesses that originate from the truncation of the models at 15 years. The impacts of those flaws are considerably different. The original cost model takes a cautious approach, erring on the side of protecting wetlands, while the "cash cost" model promotes additional wetland impacts by considering costs, but not benefits of opening the S33 mine pit.

Going forward, the Corps must take a new look at the economic analysis, evaluating each alternative over as much of the life of the plan as is possible. There are two ways the Corps can do this. First, it can shorten each mine plan to 8-15 years[90] and then evaluate the practicability of the alternatives. This approach satisfies two goals. It is within the 15 year economic time frame that the Corps has stated it is comfortable examining. These alternatives would also fall within the approximate range of the AP Alternative and would therefore provide a long-term mine plan. The second way that the Corps can better evaluate the practicability of alternatives is to extend the analysis to the shortest potentially practicable alternative, the S33 Alternative (25 years), the DL1B Alternative (27 years) or SCR (32 years).[91] Extending the analysis in this way, in addition to making the changes noted in Dr. Wakeman's comment letter, will mitigate some of the flaws in the original cost model.

If the Corps chooses one of the truncated models, it must choose the original cost model. While it has its flaws, it has been the basis for the economic practicability discussion through the majority of the permitting process, it represents PCS's actual business practice, its application to all alternatives has been disclosed and it provides information relevant to the practicability determination included in the DEIS. In contrast, the "cash cost" model was recently introduced, it does not represent PCS's practice, its application to all alternatives has not been disclosed and it is unclear how it relates to

[90] Based on the representations of PCS, alternatives of 8-15 years would be adequate. PCS has developed a reputation for overstating its minimum requirements. In the process leading to the 1997 permit, it maintained that it needed a permit to mine all of NCPC or would go out of business. It did not receive the permit and did not go out of business. During this permit process the company has pleaded that it must have AP or EAPA to continue. It has since abandoned that claim and submitted Alternative M, demonstrating again that it did not need what it claimed it had to have. Based on this history, any claim that all alternatives must be at least 15 years in length should be dismissed. If PCS actually required 15 years of mining, then they would have requested 25-30 years of mining.

[91] Any use of the original cost model must take into consideration the flaws highlighted by Dr. Doug Wakeman in his letter to the Corps of 12/28/07.

practicability. It lacks the key criterion, cost per ton concentrate that the Corps' DEIS practicability determination relied on. These shortcomings of the "cash cost" model undermine its future use.

The Corps should develop a second Supplement to the DEIS that openly revamps the economic analysis to provide a clear, accurate depiction of the economic outlook. Accepting a flawed, result-driven analysis that is skewed to PCS's advantage over one that the Company claims is skewed in favor of protecting wetlands is not a justifiable decision. It is not rational.

A new analysis that accounts for both the amortized costs and the costs of complying with the law may even allow new alternatives to be developed that will avoid and minimize wetlands to the maximum extent. We join the resource agencies in urging the Corps to consider new, less destructive alternatives.

D. The information provided by the "cash cost" model cannot form the basis for the Corps' practicability determination.

Momentarily putting aside the apparent flaws in using the "cash cost" model for any purpose, based on the information presented in the SDEIS it cannot form the basis for the Corps' practicability determination. There are two unavoidable problems with the "cash cost" information presented in the SDEIS.

First, the scant information that is included in the SDEIS regarding the "cash cost" model does not include any information regarding the cost per ton of concentrate. In the DEIS economic analysis, the cost per ton figure was the defining criterion that the Corps used in determining practicability. The Corps concluded that the No Action, S33AP, and DL1B Alternatives were not practicable because the cost per ton concentrate was too high.[92] However, cost per ton concentrate of the remaining alternatives were all "similar to the current national averages and PCS's reported historic mine operating costs."[93] Therefore, the Corps could not deem those alternatives economically impracticable. The Corps recommends reading the SDEIS together with the DEIS, and it is structured as an extension of the DEIS,[94] so it must be assumed that the cost per ton concentrate will be the defining criterion for determining practicability in the SDEIS. Without similar data for each of the alternatives under the "cash cost" model, it is unclear how the Corps can make any determination on practicability. Unless it changes its method of determination entirely, it cannot. If the Corps has developed a new method of determining practicability, it should reveal that method. The practicability determination controls the alternatives analysis and is the type of information that must be included in NEPA documentation.

The second fatal flaw of the "cash cost" model, as represented by the spreadsheets appended to the SDEIS, is that it does not evaluate any of the alternatives from the DEIS.

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[92] DEIS at 2-19.
[93] *Id.*
[94] SDEIS Summary at c.

This precludes comparisons among the alternatives. Following the SDEIS, the analyses of all alternatives under the original cost model have been disclosed. But only the analyses of alternatives L and M under the "cash cost" model have been disclosed. Even if the "cash cost" model included cost per ton of concentrate, the determining factor in the Corps' practicability determination, it cannot be the basis for any determination because it does not consider the DEIS alternatives. Since the original cost model is the only model that compares all alternatives and includes the cost per ton criterion, and is therefore the only model that can be used, those alternatives that were practicable in the DEIS must remain practicable.

The Corps' avoidance of a forthright discussion of practicability is troubling. Although the Corps has "tentatively determined that SCR is impracticable"[95] in private, it publicly denies such a momentous shift in position by failing to alter the practicability analysis from the DEIS. We suspect that the Corps plans to make this "tentative" finding permanent in the FEIS without public disclosure, review and ability to comment, cornerstones essential to the NEPA process. Notes of the Corps' discussions with PCS and selected members of the Review Team certainly indicate that this will happen. We encourage the Corps to be open in NEPA documents and urge the agency to disclose to the public essential elements of this analysis that it has disclosed in private to a select few. The economic analysis is the driver in the practicability analysis, and the public should not have to read between the lines of the summary to get a glimpse of the Corps' intentions to drastically alter that analysis.

VI. The Summary is Not Supported by the Body of the SDEIS.

The summary of the SDEIS is not supported by the substance of the document. Rather than providing an overview of the information contained within the SDEIS, the summary of the SDEIS makes claims and assertions that are entirely unsupported by the text. The bulk of these missteps are a consequence of the Corps' decision not to update the economic analysis despite the addition of two new alternatives and an entirely new cost model.

The most obvious example of the summary adding new information is the attempted justification and presentation of the new "cash cost" model. A reader could reasonably expect from the summary that more detailed information regarding this shifting economic analysis could be found in "2.7 Economic Evaluation of Alternative Boundaries."[96] However, the SDEIS reports that "This section of the DEIS and its subsections remain unchanged at this time."[97] Section 8.0 is no more enlightening as to what information justifies the new cost model or what the new model reveals. The "cash cost model summaries" in that section do not convey any information explaining the need, development or usefulness of the "cash cost" model. This dearth of information is critical. The summary is written as if more detailed information were included in the

[95] Corps' notes of July 24, 2007 Review Team meeting supplied pursuant to SELC and PTRF FOIA request of November 20, 2007.
[96] SDEIS at 2-3.
[97] *Id.*

substance of the document. But the summary's overview of the Corps and Applicant's development of the SDEIS is wholly inadequate when no information is included in the substance of the document to support the findings and contentions asserted.

The summary asserts "that the exploration of an additional alternative, Alternative 'L', is necessary."[98] Alternative L is a bloated version of SCR, with substantially more wetland mining in both the Bonnerton and S33 tracts. As the Corps is well aware, it can only legally permit the least environmentally damaging practicable alternative. Since SCR is less environmentally damaging than L, Alternative L cannot be permitted. It is hardly clear why an alternative that cannot be permitted is "necessary."

The Corps' conclusion that Alternative L is "necessary" furtively suggests that it no longer finds alternatives SCRA and SCRB practicable, since the Corps would be obligated to pick either of these over L. But the SDEIS provides no evidence that indicates that either SCRA or SCRB are no longer practicable or that any information exists that could eventually support that conclusion. First, the SDEIS states that the economic analysis from the "DEIS and its subsections remain unchanged at this time."[99] A review of Section 8.0 of the SDEIS shows that there is no new information regarding the SCR alternatives. Neither was analyzed under the "cash cost" model. The results from the original model have not been altered. No new information regarding PCS's historical mining costs or the national average cost is included. The only comparison that is made shows that SCRA is less expensive than L and that SCRB is comparable.[100] With no new information in the SDEIS, it does not follow how the Corps could re-evaluate the practicability of the SCR alternatives. There is no basis for determining that either is impracticable and therefore the evaluation of L is superfluous. Unfortunately, the efforts wasted on L could have been invested in developing an alternative that includes less wetland mining, and therefore would avoid causing substantial degradation of the aquatic environment as requested in agency comments and PTRF's previous comments on the DEIS.

VII. The Proposed Economic Re-opener Will Allow Mining in Sensitive Areas.

The economic re-opener proposed in the summary is inadequate. As discussed above, the economic re-evaluation should be done now. The fertilizer market has drastically changed for the better between the DEIS and the SDEIS due to the ethanol boom. This improvement must be considered in this permitting process and not delayed for 8 years. The proposed re-opener in year 8 would not have any effect until year 12 of mining. At that point, many of the most sensitive wetlands on the Bonnerton tract would already be eliminated. Comparing the SCR and L Alternatives' Bonnerton mine plans shows that in the second part of year 11 and the first part of year 12, the L mining boundary would impact large stretches of nonriverine wet hardwood forests. These forests consist of swamp chestnut oak (*Quercus nigra*) and red bay (*Persea palustris*).

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[98] SDEIS Summary at a.
[99] SDEIS at 2-3.
[100] SDEIS at 6-7.

These types of forests are rapidly disappearing.[101] Due to its rarity and age, the stretch of nonriverine wet hardwood forest that would be eliminated under L, but avoided under SCR, has been recognized as a state significant natural area and is being considered for recognition as a nationally significant natural area.[102] Since the re-opener would only kick in after year 12, these forests would be mined even if PCS could practicably avoid them. To have any significant effect, the proposed re-opener examination period must be completed early enough to allow time for re-evaluation prior to the mining of these stretches of irreplaceable wetland hardwood forest.

VIII. Conclusion

In conclusion, we request that the Corps address these issues in a second supplement to the DEIS. A supplement is required when "there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts."[103] The dramatic change in the fertilizer market and PCS's economic standing is critical new information that shapes the economic practicability analysis and directly determines the scope of environmental impact. This information necessitates a second supplement. Further, when "a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion."[104] The DEIS combined with the SDEIS is "so inadequate to preclude a meaningful analysis" for the reasons discussed above.

We thank you for the opportunity to comment during this process. Please contact us if we can provide any additional information or clarify our comments in any way.

Sincerely,

Derb Carter /GRG

Derb Carter, Jr.
Director, Carolinas Office
Southern Environmental Law Center

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Southern Environmental Law Center

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[101] "Nonriverine Wet Hardwood Forests in North Carolina: Status and Trends." Michael P. Schafale, NC Natural Heritage Program March 1999 at 7. (Exhibit H)
[102] Pers. comm. Becky Fox, U.S. EPA.
[103] 40 C.F.R. § 1502.9(c).
[104] 40 C.F.R. § 1502.9(a).

Attachment 3

SELC PTRF
401 Certification Comment Letter
07/07/2008

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February 8, 2007

U.S. Army Corps of Engineers
Wilmington District
Regulatory Division
69 Darlington Avenue
Wilmington, NC 28403

Re: PCS Phosphate, File # 2001-10096

To Whom It May Concern:

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. SELC is a private, non-profit legal organization that seeks to protect and preserve the Southeastern environment. Additionally, we endorse the separate comments submitted by the Pamlico-Tar River Foundation as well as those submitted by Environmental Defense.

I. OVERVIEW

The draft environmental impact statement ("EIS") in the above-referenced matter is an extensive document that covers many important issues relating to Potash Corporation of Saskatchewan's ("PCS") proposed mine expansion. There are many things that the document does well, it provides a detailed description of the mining process, the area to be impacted, and each of the alternatives evaluated. Due to the length of the document, and the corresponding length of these comments, the successes of the document are not highlighted in this comment letter. Notwithstanding that omission, SELC and PTRF appreciate the Corps' effort in developing the EIS. This comment letter will primarily highlight areas in which the EIS can be strengthened or where more information should be provided to complete the document. A brief summary of those comments follows below.

The purpose and need is too narrow.

- The stated purpose and need excludes reasonable alternatives and foreordains mining in the NCPC tract.

- The purpose and need should be rewritten to represent the general goal of the proposed project: to provide a reliable, economical source of phosphate to the manufacturing plant.

The alternatives analysis is inadequate.

- The alternatives evaluated each seek to accomplish different goals, and therefore cannot provide the information necessary to determine whether wetlands have been avoided to the maximum extent practicable as required by the Guidelines.
- Multiple reasonable alternatives that are potentially practicable and less environmentally damaging than the current alternatives were not considered.

The economics analysis is incomplete.

- The economic analysis does not present the information in a manner that is understandable by the public. Important information on cost calculations is either omitted or buried in the appendix.
- The economic analysis does not provide enough information to allow the public to understand the basis of practicability determinations.

The EIS does not provide the information necessary for the Corps to make the required Section 404 determinations.

- The environmental impacts of the AP alternative are not fully discussed. Important direct and indirect impacts are omitted or only briefly discussed.
- The mitigation plan does not provide enough detail for a significant degradation determination. Fatally, it does not identify mitigation sites or how those sites will be developed.
- The EIS relies on scientifically inadequate studies for the vast majority of its claims that there will be no adverse impact to the aquatic ecosystem. These studies should be substantiated with peer reviewed studies.

The EIS does not adequately consider supplemental restrictions.

- The discussion of financial assurances does not adequately consider PCS' economic situation and the potential costs of reclamation and mitigation.
- The EIS should consider instituting conditional mining areas due to the unprecedented nature of the proposed impacts, the potential catastrophic effects, and extremely limited understanding of PCS' ability to prevent those effects from occurring.

II. STATUTORY CONTEXT

This EIS was prepared to comply with the National Environmental Policy Act ("NEPA"). Under NEPA, the purpose of an EIS is to incorporate the policies and goals of NEPA into actions of the federal government. 40 C.F.R § 1502.1. The broad purpose of NEPA represented in those policies and goals is to "sensitize all federal agencies to the environment in order to foster precious resource preservation." Nat'l Audubon Soc'y v.

Dep't of the Navy, 422 F.3d 174, 184 (4th Cir. 2005). The EIS process promotes that purpose in two ways. First, it guarantees that federal agencies will take an objective, thorough look at the environmental impacts of a proposed action so that the decision making agency makes an informed decision. Id. The second way it furthers NEPA's purpose is that it requires the agency to widely disclose the environmental impacts of the proposed action, ensuring that other governmental agencies and the public have the opportunity to inform themselves and comment on the action. Id. In order to fulfill that role, the evaluation of the environmental impacts must provide enough information to allow those who were not a part of the development process to gain a complete understanding of the issues surrounding the project. See Sierra Club v. U.S. Army Corps of Eng'rs, 772 F.2d 1043, 1054 (1985).

In a Section 404 permit application, an EIS serves as the basis for the evaluation of the permit application. Therefore, it must provide the necessary information for the Corps to make the determinations required under the Clean Water Act and its accompanying regulations, specifically the 404(b) Guidelines. The EIS must provide enough information for the Corps to determine if less environmentally damaging practicable alternatives exist and if the project would result in a significant degradation of the aquatic environment. The EIS must also provide the evidence of whether wetland impacts have been avoided to the maximum extent practicable, that the unavoidable wetland impacts have been minimized, and that there is adequate compensatory mitigation for those impacts.

III. DEIS FLAWS

A. Purpose and Need

The EIS must include the applicant's purpose and need. That statement should explain the underlying purpose and need to which the agency is responding. 40 C.F.R. § 1502.13. The purpose and need has much broader implications. The goal established in this section of the EIS provides the direction for the document and defines the realm of reasonable alternatives. See N.C. Alliance for Transp. Reform, Inc. v. U.S. DOT, 151 F. Supp. 2d 661, 686 (M.D.N.C. 2001). Therefore, the purpose and need must be broad; it cannot be narrowly defined so as to make the selection of a given alternative or action a "foreordained formality." Id. citing Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 196 (D.C. Cir. 1991). The purpose and need must reflect the "general" goal of the project, allowing for flexibility in selecting an alternative to meet that broader goal. See Van Abbema v. Fornell, 807 F.2d 633, 638 (7th Cir. 1986).

The applicant's stated purpose and need is too narrow. It does not meet the legal requirement that it state the general goal of the project and restricts the range of reasonable alternatives.

1. The stated purpose and need requires mining in the project area.

The DEIS defines the applicant's purpose and need in the first paragraph of Section 1.2.2 as follows:

> 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 mine operation at Aurora, North Carolina.

DEIS at 1-4.

*2. **The stated purpose and need is too narrow.***

The applicant's stated purpose and need does not meet the legal requirements, it is too narrow and does not represent the general goal of the project. PCS does not sell the phosphate ore it mines, but rather refines it into a variety of products. See DEIS at 1-1. The phosphate ore recovered in the mining process supplies the on-site plant. The purpose of mining within the project area is to supply the plant. Therefore, defining the purpose and need in terms that require mining is not only inconsistent with the remainder of the DEIS in that it treats mining as an end in and of itself, it does not represent the overall goal of the project. This restrictive purpose and need statement eliminates the consideration of alternative methods of meeting the ultimate goal, supplying the plant with phosphate ore in a reliable, economically viable manner. It is exactly this type of exclusion of viable alternatives that the regulations and case law prohibit.

*3. **The purpose and need should be revised to reflect the general goal.***

The unlawful restrictions in the stated purpose and need should be corrected by rewriting the first paragraph in Section 1.2.2. To represent the general goal of the project, the paragraph should read: The applicant's purpose and need is to maintain a steady supply of phosphate ore to its Aurora processing plant in an economical and reliable manner. This purpose and need accounts for the general goal of the project: securing an economical, long term supply of phosphate ore for the processing plant. While this may ultimately result in selecting an alternative that includes mining, it does not foreordain a mining alternative and would allow the Corps to evaluate the full range of reasonable alternatives.

B. Alternatives Analysis

The EIS must evaluate a range of reasonable alternatives to the proposed action. 42 U.S.C. § 4332. This section is "the heart of the environmental impact statement," forming the substance of the EIS and providing the information necessary for an

informed decision. 40 C.F.R. § 1502.14. In order to fulfill this substantial role, the analysis should "sharply" define the issues and provide a "clear basis" for decision making both by the agency and the public. Id. It is "absolutely essential" that the analysis provide the decision maker with an understanding of the positive and negative aspects of each alternative. NRDC v. Callaway, 524 F.2d 79, 92-93 (2d Cir. 1975).

The EIS does not have to consider all possible alternatives and does not have to address those that are remote or speculative. Vt. Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 551 (1978); Miller v. U.S., 654 F.2d 513 (8th Cir. 1981). However, an agency cannot exclude an alternative because it only partially achieves the purpose of the project. See Town of Matthews v. U.S. DOT, 527 F. Supp. 1055, 1057-58 (W.D.N.C. 1981). The agency should also consider variations of alternatives that have already been discussed as long as the variations are not minor. See California v. Bergland, 483 F. Supp. 465, 489 (E.D. Cal. 1980), aff'd, California v. Block, 690 F.2d 753, 767-68 (9th Cir. 1982).

The alternatives analysis in Sections 2 through 4 of the DEIS is inadequate because it does not include the information necessary for the Corps to make the required determinations for a Section 404 permit, it does not give a complete analysis of the AP alternative, and it does not consider all reasonable alternatives.

1. The alternatives evaluated do not attempt to avoid wetland impacts to the maximum extent practicable.

Although practically the Corps evaluates much of the information regarding a project at the same time, the regulations require a sequential analysis in evaluating a Section 404 standard permit. See MEMORANDUM OF AGREEMENT BETWEEN THE ENVIRONMENTAL PROTECTION AGENCY AND THE DEPARTMENT OF THE ARMY CONCERNING THE DETERMINATION OF MITIGATION UNDER THE CLEAN WATER ACT SECTION 404(B)(1) GUIDELINES 3 (February 6, 1990) ("MOA"). The Corps is obligated first to determine that wetland impacts have been avoided to the maximum extent practicable, then implement measures to minimize unavoidable impacts, and finally to compensate for those impacts with mitigation. Id. Under the applicable regulations, the avoidance requirement means that only the least environmentally damaging practicable alternative can be permitted. Id.; 40 C.F.R. 230.10(c).

The alternatives evaluated in the DEIS do not allow the Corps to determine that wetland impacts have been avoided to the maximum extent practicable. They are designed based on other considerations which, though relevant, do not attempt to maximally avoid wetlands as required.

The alternatives that were evaluated in the DEIS each approach mining from a different perspective. They are focused on the applicant's preference, avoiding certain areas, state agency jurisdiction, and the minimum mine operating requirements.

Individually, none of the alternatives attempt to avoid wetlands to the maximum extent practicable. Collectively, they do not provide the Corps with the information necessary to make the required avoidance determination. Due to their vastly different purposes, none of which is to maximally avoid wetland impacts, comparison of the alternatives to make an avoidance determination is impossible. The alternatives provide different options, some of which avoid more wetland impacts, but do not allow the Corps to determine how wetland impacts may be avoided to the maximum extent practicable.

The AP and EAP alternatives make no attempt to avoid wetlands to the maximum extent practicable. These alternatives were designed based on two considerations: (1) the location of the highest quality ore and (2) obtaining maximum efficiency with the mining equipment. DEIS at 2-10. Avoidance of wetlands was not a consideration in designing either of these alternatives.

The SCR alternative was developed through the review team process to be more environmentally sensitive than the AP and EAP alternatives, but still does not avoid wetlands to the maximum extent practicable. The boundary was designed to "avoid to the maximum extent possible, waterways and riparian corridors as well as those aquatic resources considered most valuable to the local aquatic ecosystem and most difficult to replace through compensatory mitigation." DEIS at 2-10. The boundary also protects more of the tributaries' drainage basins than the other alternatives. Id. Rather than attempting to avoid all wetlands to the maximum extent practicable, the SCR alternative selects certain areas that are to be avoided if possible. While prioritizing wetland value for protection purposes may be appropriate to minimize wetland impacts, the wetland impacts must first be found to be unavoidable. The SCR alternative skips this essential first step, it does not attempt to avoid overall wetland impacts to the maximum extent practicable, but rather attempts to avoid some wetland impacts to the "maximum extent possible."

The SJA alternative was also developed through the review team process. The SJA alternative was designed to avoid North Carolina Division of Water Quality ("NCDWQ") and Division of Coastal Management ("DCM") jurisdiction. DEIS at 2-10. No other consideration of wetland impacts was considered in developing this alternative. Since NCDWQ and DCM jurisdiction cannot be considered a substitute for avoiding wetlands to the maximum extent practicable, the SJA alternative does not allow the Corps to make the avoidance determination required by the regulations.

The DL1 alternative was designed to minimize mining on the NCPC tract. It was designed based on the minimum operating requirements of the mining equipment. DEIS at 2-10. The DL1 alternative is based solely on mining requirements; it does not attempt to avoid wetland impacts to the maximum extent practicable. Therefore it cannot assist the Corps in making the required avoidance determination.

While the Corps is not required to evaluate minor variations of existing alternatives, there are legitimate alternatives between the existing alternatives that could avoid more wetlands at a level that would be significant. The SCR alternative impacts 1,221 more acres of jurisdictional waters than the DL1 alternative. The SJA alternative impacts 2,746 more acres of jurisdictional waters than the DL1 alternative. There are several alternatives that could be evaluated between the SCR and SJA boundaries and the DL1 boundary that could be practicable and avoid significantly more wetlands than either the SCR or SJA alternatives. These alternatives would not be minor variations of existing alternatives, and would provide important information that would assist the Corps in making the required avoidance determination.

In order for the Corps to make the avoidance determination required by the regulations, the alternatives should attempt to find a line at which mining less would be impracticable, but mining more would impact avoidable wetlands. The Corps should evaluate alternatives that approach that line, one that is likely between the SCR and DL1 alternatives based on assumptions in the current economic analysis. By working with the applicant to develop an alternative between SCR and DL1 that could be practicable, then evaluating that alternative and others that avoid wetland impacts to a greater and lesser extent, the Corps can gain information to make the required avoidance determination. Without the information that analyzing these potential alternatives would provide, the Corps has no basis for determining that wetland impacts have been avoided to the maximum extent practicable. Since the purpose of the EIS is to provide this type of information, a supplemental EIS should evaluate alternatives that do so.

2. The AP analysis is incomplete.

In order to fulfill its role of making the environmental impacts of federal actions transparent, the EIS must put the public on notice of the pros and cons of each alternative evaluated. Without complete disclosure, the public cannot be expected to develop an informed opinion, one of the primary purposes of NEPA. As noted above, complete disclosure means providing enough information that those outside the development process, not on the review team, can acquire a complete understanding of the project. See Sierra Club v. U.S. Army Corps of Eng'rs, 772 F.2d 1043, 1054 (1985). The evaluation of the AP alternative fails to provide the necessary transparency because it does not disclose that the AP alternative cannot be permitted under state law.

The nature of the review team process that resulted in the draft EIS led to regular, in depth discussions of the alternatives between the Corps and several state agencies. During the September 1, 2006 review team meeting, John Dorney of the Division of Water Quality informed the review team that the AP alternative could not be permitted under state law. While the Corps should not be expected to approximate in a DEIS whether a proposal can be permitted under state law on all occasions, this is a unique situation. This is a high profile project that was the subject of detailed review for 6 years. Mr. Dorney, the representative of the agency responsible for issuing the necessary permit,

made clear to the review team that the AP alternative cannot be permitted. Moreover, the AP alternative is not even a "practicable" alternative under the 404(b) Guidelines because it is contrary to state law and thus not "available and capable of being done." 40 C.F.R. §230.10(2). In this situation the Corps should convey this information to the public openly in the EIS.

The fact that a proposed alternative cannot be permitted is the type of information that the public should be informed about. It is impossible for the EIS to give the public a complete picture of the alternatives without disclosing this fact, one that is well known to those involved in the EIS process. That it cannot be permitted is a significant disadvantage to the AP alternative, and it is specifically the type of information that is valuable in comparing the various alternatives.

We recommend correcting this omission by inserting a sentence in Sections 2.4.1.1 and 2.7 that states that the AP and EAP alternatives cannot be permitted under state law.

3. Reasonable alternatives were not considered.

The Corps is required to consider a range of reasonable alternatives in an EIS. 42 U.S.C. § 4332. That range should include more environmentally sensitive alternatives, whether that means "shelving" the project or reaching the goal through a different method. See Envtl. Defense Fund v. U.S. Army Corps of Eng'rs, 492 F.2d 1123, 1135 (4th Cir. 1974). Within the range of reasonable alternatives that the Corps should consider are alternatives that partially meet the goals of the original purpose. Since no true alternative will fully meet the goal of the proposed actions, alternatives that partially fulfill that goal should also be considered. See Town of Matthews v. U.S. DOT, 527 F. Supp. 1055, 1057-58 (W.D.N.C. 1981).

There are several reasonable alternatives that were not identified by the review team, and not evaluated in the EIS. For evidence that less environmentally damaging alternatives exist, the Corps only has to look at the average cost over the first 15 years of the alternatives that were found practicable. The SCRB alternative, the least environmentally damaging practicable alternative ("LEDPA") of the current alternatives, has an average annual cost in the first 15 years of $22.58/ton. The historic average cost from the years 2000-2005, a key ingredient in the practicability determination, was $24.13/ton. DEIS at 2-17. There are multiple alternatives that will result in an average cost within the $1.55/ton difference between the historic average and the SCRB cost. These alternatives have the potential to be less environmentally detrimental than the current alternatives, though they may still result in the significant degradation of the aquatic environment. Whether these potential alternatives would result in significant degradation cannot be determined without further consideration of their potential. The Corps should consider these alternatives.

a. The EIS should evaluate a DL1A alternative.

The EAP, SCR, and SJA alternatives evaluated in the EIS each include an A and B sequence. The S33AP and No Action alternatives cannot be mined in multiple sequences since they are wholly contained within the S33 tract. Like the EAP, SCR, and SJA alternatives, the DL1 alternative includes mining in all three tracts, but unlike those alternatives only the B sequence is evaluated. The EIS should evaluate the DL1A alternative.

According to the DEIS, the A sequence is preferred by the applicant. DEIS at 2-11. Presumably, the A sequence is less costly over the long term. The economic analysis supports this presumption, finding that over 26 years, the EAP, SCR, and SJA A sequences are all to some degree cheaper than the B sequences. Therefore a DL1A may be more economical than DL1B, and may be practicable. The DL1A sequence is a reasonable alternative, and should be fully evaluated in the EIS.

b. The EIS should consider the 15-20 year versions of the alternatives presented as well as any supplemental alternatives developed.

The applicant has clearly expressed an interest in mining the project area as completely as possible. DEIS at 2-9. They have also established to the Corps' satisfaction that long-term mining plans are necessary in phosphate mining for a variety of reasons. Id. Based on these premises, the applicant has proposed a 15 year mine plan and has developed alternatives that range from 12 years (No Action Alternative) to 49 years (EAP). The SJA and SCR alternatives span 38 and 32 years respectively. These plans cover more than the necessary 15-20 years. The EIS should evaluate the practicability of 15-20 year mine plans for each alternative, including those to be defined at a later date.

There are several reasons that shorter versions of the current alternatives, as well as any other potential alternatives, are preferable to over 30 year plans. As PCS acknowledges, the phosphate market is unstable, so predicting 30-40 years into the future is extremely difficult. DEIS at 2-18. The market may improve, allowing less sensitive, upland areas to be mined profitably.

Similarly, PCS' recent diversification of product line may result in significant profit increases, also allowing it to mine less sensitive areas more profitably than is currently expected. The EIS accounts for this possibility in the economic analysis, but does so in the context of the longer alternatives. DEIS at 2-19.

Limiting the permit to the 15-20 years, PCS states, is necessary to plan and prepare to mine will allow more information to be gathered on both their reclamation and mitigation efforts. There are serious concerns regarding the reclamation of mine sites due to high metal concentrations in the clay/gypsum blend. Extended permits prevent a full

reconsideration of reclamation practices and their impacts on the environment, including terrestrial and aquatic organisms as well as ground and surface waters. Shorter permits that are still within PCS' required 15-20 years would also allow their mitigation efforts such as Parker Farm to be further evaluated so as to improve their practices for future mitigation efforts.

The multi-tract mining alternatives considered in the EIS more than double the duration of the proposed alternative. Not only does this difference in time span complicate the economic analysis, it makes comparison of environmental impacts more difficult. Shorter alternatives would meet PCS' stated planning requirements while facilitating comparisons to the AP alternative. Finally, the shorter alternatives would promote more informed choices on mining 20-30 years in the future due to the additional economic, reclamation, and mitigation information that would be available. For these reasons, the EIS should analyze 15-20 year versions of the current alternatives and any other alternatives that are developed.

c. The EIS should identify the environmental benefits of life of mine alternatives.

The EIS focuses on alternatives that are "life of mine" alternatives, they exhaust mining in the project area. The premise is that despite the limitations in predicting economic trends and reclamation impacts 40 years into the future, these longer alternatives provide some environmental benefits. These benefits should be identified and fully discussed in the EIS.

d. The EIS should evaluate the practicability of using combinations of different mining approaches in each tract.

The alternatives evaluated in the EIS are applied equally throughout the three mining tracts, NCPC, Bonnerton, and South of 33. This approach fails to take into account the individual characteristics of the separate tracts in terms of either phosphate ore concentration or wetland sensitivity. The across the board application of a single mining approach unnecessarily excludes reasonable alternatives.

There are at least two alternatives that would impact fewer wetlands in NCPC that can be created by applying the mining approaches used in the EIS alternatives on a tract by tract basis. One potential alternative using this method would mine in NCPC according to the DL1 mine plan, in Bonnerton according to the SCR mine plan, and in S33 according to the AP mine plan. This alternative would impact approximately 2,943 acres of jurisdictional waters. For comparison, that is approximately 700 more acres of mining in jurisdictional waters than DL1, with no additional impact in the more sensitive NCPC or Bonnerton tracts.

Another alternative that could be created using this method would mine in NCPC according to the DL1 mine plan, in Bonnerton according to the SJA mine plan, and in S33 according to the AP mine plan. This alternative would impact approximately 3,537 acres of jurisdictional waters. It would mine approximately the same number of jurisdictional acres as the SCR alternative and approximately 1,200 more jurisdictional acres than DL1.

The range of alternatives considered excludes reasonable alternatives by applying mine approaches uniformly in the three potential mine tracts. By applying different mining approaches in different tracts, reasonable alternatives can be developed that may be practicable and come closer to avoiding wetland impacts to the maximum extent practicable. The examples of alternatives detailed above are two such possibilities. Each of these alternatives is environmentally preferable to the alternatives evaluated in the EIS because their impact is farther removed from the Pamlico River and South Creek. Additionally, the substantial damage that would occur to the tributaries to South Creek under the AP, EAP, SCR, and SJA alternatives would be significantly diminished. The Corps should evaluate the practicability of these alternatives and others that would result in a decreased environmental impact.

e. The EIS should evaluate a two drag line alternative.

The EIS evaluates the practicability of a single drag line alternative, the DL1B alternative. Although it was suggested in the review team meetings, a two dragline alternative ("DL2") was not evaluated. See DEIS at A-139. A DL2 alternative would be technologically and logistically possible. It may also satisfy the Corps' economic analysis given that it would approximately double the mining available in the NCPC tract. Compared to the AP alternative, a DL2 alternative would be less environmentally damaging and therefore should be evaluated.

f. The EIS should evaluate the practicability of supplementing mining with importation of ore.

The EIS excludes the possibility of importing ore to supply the plant facilities despite finding that the plant could be operated by importing ore from Morocco. The EIS states that importation to supplement any mine alternative "is essentially a delayed shutdown of the mine and as such would not meet the applicant's purpose and need." DEIS at 2-13. Supplementation with imported ore would actually extend the life of the mine, and is perfectly consistent with the applicant's purpose to continue mining.

There are two flaws in the EIS analysis: It does not differentiate importation from any other alternative; and it improperly excludes alternatives that partially satisfy the purpose and need. The finding that importation is a "delayed shutdown" does not distinguish supplemental importation from any other alternative. Therefore, it should not be excluded from analysis. Each and every mine alternative will ultimately result in the

shutdown of the mine. Even the AP alternative delays the shutdown of the mine for at least 15 years. Longer mine alternatives will delay the shutdown of the mine for a longer period of time. Delaying the shutdown of the mine would only fail to meet the purpose and need if the stated purpose and need were to cause an immediate shutdown of the mine. The stated purpose and need in Section 1.2.2 does not include the immediate shutdown of the mine. Therefore, importation to supplement any mine plan cannot be excluded as being inconsistent with the purpose and need because it, like all other alternatives, delays the shutdown of the mine.

Even if the purpose and need were to exclude solely relying on importation, supplementing mining with importation would partially meet the purpose and need. PCS would be able to mine their reserves in an economically viable method for an extended period of time. Supplementing mining with importation would simply allow PCS to subsidize more resource intensive upland mining with less expensive, high quality imported ore. This combination of approaches would provide both long term ore stability and access to the phosphate reserves within the project area. Therefore, supplemental importation cannot be eliminated and should be evaluated for practicability with DL1, S33, and the No Action alternatives. Supplemental importation would permit the applicant to mine within the project area practicably, and therefore is a reasonable alternative.

Giving more thorough consideration to supplemental importation neither dictates to the applicant how to run their business nor conflicts with the resolution of the litigation that resulted from the past permit. The Corps is limited to permitting the least environmentally damaging practicable alternative. It is inconsequential whether that alternative involves mining or importation. Supplemental importation would in fact be less environmentally damaging than the AP alternative, therefore the Corps' should determine if it is practicable. In that process, the applicant would submit economic information illustrating the cost involved in importing ore and adapting their facilities to accommodate the process just as they have submitted economic information regarding the other alternatives.

Permitting a mine plan that required importation for practicability would not differ from permitting any other mine plan. The Corps would authorize mining in a given area. The applicant could then determine whether it was in their interest to import through the entire mine sequence, import when the mining was exhausted, or discontinue mining. These choices are no different than the applicant would face if anything other than the AP alternative is permitted. If the AP alternative is not permitted, the applicant will have to determine whether the less than preferred permit suits their business expectations. By permitting a plan that required importation, the Corps would not be dictating the applicant's business plan, but rather restricting the applicant to the least environmentally damaging practicable alternative as the law requires.

Importation of ore from Morocco to supplement mining was improperly excluded from evaluation in the EIS. The reasoning for the exclusion, that it would result in a "delayed shutdown," does not distinguish the importation alternative from any other. Additionally, mining supplemented by importation would partially satisfy the purpose and need, and therefore should be considered. Since importation appears to be a reasonable alternative, and no justifiable reason for its exclusion has been stated in the EIS, it should be thoroughly evaluated as an alternative.

C. Economic Analysis

The economic analysis is a crucial part of the EIS. It is a key component of determining practicability, and the practicability analysis in turn narrows potential alternatives. Therefore the economic analysis must not only be thorough, but must also be presented in a manner which can be understood by the public. The economic analysis in Section 2.7 accomplishes these goals in some ways, but is lacking in that it does not discuss certain costs and does not present others clearly.

1. The economic analysis appropriately excludes the "lost" ore.

The applicant submitted information regarding ore that would not be mined under the various alternatives, identifying that ore as value lost. The Corps' economic analysis appropriately excludes that cost from the analysis. The applicant cannot claim the ore that cannot be mined as a loss. Under the Guidelines, the Corps' selection of the least environmentally damaging practicable alternative is required by law. As a result, any alternative that is not the least environmentally damaging practicable alternative cannot be permitted, doing so would be illegal. Therefore, any ore that is not recovered because certain areas cannot be mined is a loss that results because a preferred mine plan is not legal. Accounting for the un-recovered ore in the economic analysis would frustrate the purpose of the Clean Water Act by prejudicing the analysis against wetland protection.

Additionally, any ore not mined under a permitted mine plan may be accessible in the future without destroying the aquatic ecosystem due to advances in technology. Allowing the applicant to claim that ore as "lost" now and recover it in the future would produce a windfall for the applicant that the current economic analysis appropriately prevents.

2. The economic analysis does not discuss moving the mill.

The EIS documents that increased transportation costs play a significant role in the increased overall costs in the S33 tract. Although it has been considered at some level, there is no discussion in the EIS regarding the economic impact of relocating the mill facility. Since this action has the potential to significantly reduce one of the primary additional expenses in mining in the S33 tract, the EIS should directly address the possibility of moving the mill. This discussion should include any studies that have been

conducted regarding the feasibility of mill relocation and a description of how those studies have been implemented in the economic analysis.

In addition to providing this information, the DEIS should provide a comparison between the current expenses involved in relocating the mine with previous plans to do so. Prior to purchasing the NCPC tract, Texasgulf [PCS] had no option to mine in NCPC and therefore prepared a plan that included moving the mill south to reduce transportation costs. The development of this plan demonstrates that this was once a feasible option, and therefore the DEIS should provide information that disproves this previous understanding of feasibility.

3. The economic analysis does not present information regarding the cost variations in a form that is capable of being understood by the public.

A complex cost model is the basis for the economic analysis in the EIS; it is included in Appendix D. Marston developed the cost model to estimate the costs of mining the various mine plan alternatives. It provides detailed year to year costs in a number of categories as well as the overall cost of each alternative. However, this information is not presented in a way that is useful to the public. The information should be presented in a form that would allow meaningful review by the public.

One way in which the information could be better represented is through a graphical representation demonstrating how variables fluctuate through each of the mining alternatives. This display could plot the costs of each of the variables over the course of the mine plan for a given alternative. This approach could then be replicated for each alternative. This type of display would highlight the differences between alternatives in terms of the cost fluctuation of the important variables, allowing the public to develop a more informed opinion.

Another graphical representation of the data could show how each variable fluctuates in each alternative over the life of that alternative. For example, one graph could isolate transportation costs, diagramming the variation in costs over a period of time for each alternative on a single graph. Similar graphs could be developed for each of the cost areas that are expected to widely fluctuate with the mining advance. This type of presentation would put the information contained in the spreadsheet into context and allow a more thorough interpretation.

Representing the cost model results in these ways would assist in further explaining the differences between the mine plans that drive the additional costs. While it is easy with the information in the EIS to determine the relative expense of the alternatives, it is exceedingly difficult to determine why certain plans are significantly more costly. Representing the information in a format that is more user friendly than the spreadsheets in Appendix D should make this comparison substantially easier for the public.

4. The economic analysis does not explain mitigation costs.

The economic analysis does not explain how mitigation costs are calculated in the economic model. Given that the proposed impact is somewhat unprecedented for the applicant, a detailed explanation of how Marston determined the mitigation costs is appropriate. These costs should take into account the particular problems that will arise in attempting to mitigate for the proposed impacts. Not only would the applicant have to mitigate a very large area to compensate for the proposed level of destruction, but the mitigation would have to account for the diversity and the special functions of the proposed impact area. Therefore any calculation of mitigation costs must go beyond reliance on past mitigation sites such as Parker Farm due to the relative simplicity of that type of mitigation project. As discussed below in Section III(D)(2)(b), Parker Farm type mitigation would be inappropriate for the proposed impacts so the economics of Parker Farm are also inappropriate for this economic analysis.

Further explanation of the mitigation costs used in the cost model is even more important when looking at the apparent discrepancy between the values used in the model and those that result from applying Ecosystem Enhancement Program ("EEP") rates to the proposed mitigation. For example, the EIS estimates that mitigation for impacts in the AP alternative will cost approximately $46 million. Applying the EEP rates to the mitigation proposed for the AP alternative on page 26 of Appendix I would more than double the EIS estimate, with costs exceeding $92 million. While the estimated costs of the mitigating for the other alternatives increase when applying the EEP rates as well, the increases are not as significant as the doubling of mitigation costs for the AP alternative. Therefore, applying EEP rates could alter the economic analysis by reducing the increased costs of the other alternatives in comparison to the AP alternative.

While the Corps may not require Marston to adopt the EEP rates for estimating mitigation, the estimates used in the cost model should account for the factors addressed by the EEP rates rather than relying on only two previous mitigation projects. Relying on two mitigation experiences does not adequately estimate the cost of mitigation because it fails to control for the relative ease of PAII and Parker Farm. In fact, the authors of a study on PAII expressly caution against relying on the site to predict future success.[1] If the site cannot be relied upon to predict future success, it certainly cannot be relied upon to predict the cost of successful mitigation. Unless the applicant can demonstrate that the proposed impacts can be compensated with similar ease, which the complexity of the existing wetlands suggest they cannot, the current mitigation cost estimates are inappropriate. The estimates should reflect the complexity of mitigating for the proposed impacts and fully detail how that complexity is accounted for in the mitigation rates used to create the estimates.

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[1] West, Terry, et al., *Assessment of Function in an Oligohaline Environment: Lessons Learned by Comparing Created and Natural Habitats*, 15 ECOLOGICAL ENGINEERING 303, 319 (2000).

5. The economic analysis should include a comparison of actual costs.

The economic analysis relies solely on comparative costs in making a determination on practicability. In order to provide a complete picture of the alternatives, the economic analysis should also present a comparison of the total costs. The total costs give context to the increased costs and therefore are both relevant and informative. Although the total cost could be deduced through Appendix D, it should be the presented in the Section 2.7 economic analysis to complete the analysis.

6. The economic analysis does not provide sufficient guidance on practicability.

The economic analysis does not adequately explain the basis for practicability determinations. Rather than identifying a cost level below which an alternative is practicable and above which an alternative is impracticable, the analysis appears to rely on an "I know it when I see it" approach to practicability. By comparing historical operating income to historical rock cost averages, the Corps' has determined that the applicant can withstand some level of additional cost over some short period of time. Using that as context, the analysis then determines that some alternatives meet that standard while others do not. There is not sufficient information for anyone not involved in the practicability determination to determine when an alternative is practicable and when an alternative is impracticable, or how close to the border of practicability the current alternatives are. Under the current practicability analysis, that line must be somewhere between the average cost of SCR and DL1, but it is not clear where it is between those alternatives. This crucial aspect of the economic analysis should be more fully explained in the EIS so that those outside of the practicability determination process can determine the boundaries of practicability.

D. Section 404 Permit Information

Under Section 404 of the Clean Water Act, permits for dredged or fill material must be evaluated through the application of the 404(b) Guidelines. 33 U.S.C. § 1344(b). Those Guidelines provide that a permit application must be denied if there is a practicable alternative to the proposed project that has a less adverse effect on the aquatic ecosystem, if the proposed project would result in significant degradation, or if there is not sufficient information to make a reasonable judgment that the project will comply with the guidelines. 40 C.F.R. 230.12(a). A permit application must be rejected if it meets any of these conditions. The EIS does not provide enough information to determine if these criteria are met.

1. Alternatives that have less adverse effect on the aquatic ecosystem were not evaluated.

One of the primary purposes of the NEPA process is to ensure that federal agencies fully consider the environmental impacts of their actions. Based on the current economic analysis, there are multiple alternatives between the DL1B alternative and the SCR alternatives that could be practicable and would have a less adverse impact on the aquatic environment. These potential alternatives are discussed in more depth in Section III(B)(3) above. These alternatives should be evaluated in order to provide the Corps with the information necessary to make the required identification of the least environmentally damaging practicable alternative.

2. The EIS does not provide the necessary information to the required significant degradation determination.

Significant degradation in the context of a Section 404 permit is determined by balancing the environmental impact against the proposed mitigation. See City of Olmstead Falls v. U.S. EPA, 435 F.3d 632, 637-38 (6th Cir. 2006). This is an important variation from determining whether there is a less environmentally damaging practicable alternative, where mitigation is not considered. 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. See James City County v. U.S. EPA, 12 F.3d 1330, 1337 (4th Cir. 1993). Without a complete understanding of both the environmental impact and mitigation plans, the Corps cannot perform the required analysis. The EIS does not allow the Corps to perform the required balancing because the environmental impacts of the proposed project are not completely discussed and the mitigation plan does not provide the required detail.

a. The environmental impacts of the AP alternative are not fully discussed.

The EIS is the basis for the Corps' decision on whether the proposed action complies with the Guidelines. Therefore, the information regarding the environmental impacts of the proposed project must be discussed completely and thoroughly. While the EIS acknowledges complete loss of any environmental value of the area that would be directly impacted, it omits discussion of some critical direct and indirect impacts of the proposed action.

The discussion of water quality impacts on page 4-12 is cursory and should be expanded. Specifically, sources other than the Jacks Creek monitoring reports and the Porter Creek study should be cited for support of the claim that water quality impacts will be minimal. As discussed below in Section III(D)(3), these studies are not informative concerning the proposed impacts. Given that the wetlands that would be destroyed

perform significant water quality protecting functions, there should be some explanation why the loss of those functions will not negatively impact water quality. The cited studies are substantially flawed and cannot serve as the basis for such a bold conclusion. The water quality impacts should be fully discussed in the EIS.

A component of the water quality analysis is the salinity analysis on pages 4-10 and 4-11. This analysis finds that the elimination of the South Creek tributaries' headwaters will not affect the salinity within the tributaries. There are freshwater fish communities within the headwaters that could be drastically impacted. These impacts are dismissed through the misinterpretation of studies within the area. The Jacks Creek monitoring study is incapable of confirming any findings as it is relied on to do on page 4-11. Similarly, the study of PAII does not provide any support for the EIS' claim. The study was conducted on a small scale, with limited sampling sizes, causing the authors to caution using the study to make claims like those that the EIS makes.[2] The EIS should thoroughly evaluate the impact of eliminating the headwaters of coastal streams on the salinity within those streams. The studies cited cannot provide that evaluation and do not support the bold claims of the EIS that mining will result in minimal impact to the South Creek tributaries.

The discussion of wetlands impacts on page 4-14 suffers from similar deficiencies. The EIS relies heavily on Jacks Creek monitoring. This type of reliance is misplaced. As a result, the EIS makes a bold assertion, that eliminating 2,400 of 2,500 acres of wetlands will not negatively impact the remaining 100 acres, without any supporting documentation. The filtering, buffering, habitat, groundwater recharge, and nutrient cycling functions that wetlands provide are undoubtedly impacted by the size of the wetlands. As the wetlands shrink, many of these functions are effectively lost despite the fact that the peripheral wetlands remain. This occurrence means that any alternative extends well beyond the mine plan boundary and has a significant impact on the remnant wetlands. These impacts should be fully discussed in the EIS citing peer-reviewed scientific literature.

While the EIS admits that all immobile organisms within the project area will be eliminated, it proposes that more mobile organisms will be able to relocate to suitable habitat. These statements are made in the discussion of impacts to terrestrial and aquatic wildlife communities on pages 4-15 and 4-16. If these organisms are expected to emigrate to other habitats, the EIS should identify areas of habitat similar to that which would be destroyed as well as the corridors through which these mobile organisms may reach those habitats. If those areas cannot be identified, the EIS should state that all organisms within the area proposed to be impacted, mobile and immobile, will be eliminated.

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[2] West (2000).

The EIS does not fully discuss long term impacts of the proposed project. On multiple occasions long term impacts are acknowledged to be difficult to determine. DEIS at 4-13 and 4-15. The long term impacts of the proposed action have the potential to be catastrophic and widespread. In particular, the EIS should evaluate the long term impacts of replacing wetlands with 60 foot berms and uplands in relation to sea level rise and major storms. Sea level is predicted to rise and storms are expected to increase in intensity in the near future. These events could exacerbate the impact of the proposed action on the surrounding areas. In addition to eastern North Carolina's natural predisposition to flooding, the proposed impact would eliminate absorptive wetlands and replace them with berms that would channel rising seas and storm surges inland. These impacts would not only threaten the "avoided" wetlands within the project area, but would impact area towns such as Aurora.

Reclamation presents one of the more significant long term impacts that is not adequately addressed in the EIS. Apart from concerns regarding the vast majority of previously mined areas that have not been reclaimed, there are significant potential threats that result from the applicant's reclamation practices. The EIS admits these threats are difficult to evaluate over the long term on page 4-8. The most important of these potential impacts concerns the known cadmium-laced blend that the applicant uses to reclaim mined land. While the EIS does address the cadmium issue in some detail, it omits at least two crucial considerations: The impact of directly connecting reclamation areas to South Creek tributaries and the potential breach of the containment dikes.

Upon completion of reclamation, the applicant will breach the containment dikes to allow drainage into the existing tributaries. The EIS asserts that a rock dam will prevent any harm downstream. As the EIS explains it, Whitehurst Creek appears to be such a site. Since breaching the containment dike will directly connect a highly contaminated area to the tributaries, some evidence should be presented that the contamination is not transported. Long term monitoring at Whitehurst Creek could potentially demonstrate that, but no evidence to that effect is provided in the EIS. By connecting cadmium-contaminated reclamation areas to tributaries that lead to estuarine environments containing organisms that are adversely impacted by cadmium, such as crabs, the applicant would create a substantial threat through the proposed reclamation activities. This threat should be thoroughly discussed in the EIS.

Reclamation presents an additional threat due to rising sea levels and increased storm intensity. The reclamation areas will be raised above current height and surrounded by a containment dike to prevent contamination from spreading. There is no discussion in the EIS regarding the ability of the containment dikes to withstand being submerged or struck by very powerful storm systems. As noted in the EIS, hurricanes and nor'easters occur frequently in the area. Therefore the danger of placing contaminated waste sites within low-lying areas that border South Creek and the Pamlico River is significant. The failure of even one of the proposed containment dikes could result in an environmental impact that would eclipse the significant harm that has resulted

from previous discharges of cadmium by the applicant. The EIS should fully address these potential impacts.

b. The proposed mitigation plan is inadequate for comparison to the proposed impacts.

The EPA Region IV Compensatory Mitigation Policy ("Mitigation Policy") cited in the EIS on 4-91 highlights several flaws in the proposed mitigation plan. The Mitigation Policy states that the applicant should complete a mitigation analysis that is comparable to the alternatives analysis as the basis for selecting a mitigation alternative. Mitigation Policy at 4. The mitigation plan should include an assessment of the area impacted, detailed mitigation site information with a description of how a wetland will be established, and monitoring and performance criteria to determine the success of the wetland. Id. In addition to these components, the plan should include a reference wetland to serve as the target for the mitigation project. Although the EIS provides an assessment of the area impacted, the remaining criteria are noticeably absent. In addition to going against the policy, these omissions make any comparison of the proposed impacts and the proposed mitigation impossible. The mitigation plan is inadequate; it lacks the detail necessary for comparison and is unjustified in requesting mitigation ratios below the recommended standards.

i. The mitigation plan lacks the required detail

In order for the Corps to adequately determine whether a significant degradation would likely occur as the result of a project, the mitigation plan must provide some insight into the efforts to replace the lost value and functions of the impacted site. The detail of the mitigation plan, like the rest of the rest of the EIS, should reflect the significance and complexity of the project. See 40 C.F.R. § 230.6(b). The mitigation plan in Section 4.3.2 is entirely inadequate for the scope of the proposed project, even in combination with the conceptual mitigation plan included in Appendix I.

The mitigation plan in City of Olmstead Falls v. U.S. EPA ("Olmstead Falls") is instructive on the level of detail that should be expected in the EIS for this project. In Olmstead Falls, the City of Cleveland proposed to fill and culvert 5,400 linear feet ("lf") of Abrams Creek (14% of the AP impact), fill 2,500 lf of Abrams Creek tributaries (7% of the AP impact), and fill 87.85 acres of wetlands (4% of the AP impact). 435 F.3d at 633. To further compare those impacts to the AP alternative, the project in Olmstead Falls impacted over 30,000 fewer linear feet of streams and 2,320 fewer acres of wetlands. To mitigate for that impact, the mitigation plan included:

- preserving 1,070 lf of Abram Creek downstream of the airport;
- paying $2 million towards preserving 3600 lf of Abram Creek upstream of the airport;
- restoring 265 acres of wetlands;
- restoring 5,000 lf of the Black River;

- enhancing 12,400 lf of Doan Brook;
- paying $682,000 towards restoring 3,264 lf of Woodiebrook Creek;
- paying $600,000 toward the preservation of 4,707 lf of Spring Brook; and
- paying $500,000 toward the preservation of 3,000 lf of Elk Creek.

Id. at 634-35.

The level of detail of the mitigation plan in Olmstead Falls allows some meaningful evaluation of whether a significant degradation will occur. Despite the fact that impacts in Olmstead Falls were minimal compared to the AP alternative, the mitigation plan was very detailed. In contrast, the mitigation plan in the EIS lacks any detail. Fatally, it does not identify the sites for the proposed mitigation.

Identifying the sites proposed for mitigation is perhaps the most significant omission in the mitigation plan included in the EIS. The nature of the proposed impacts will require specific mitigation. The AP alternative proposes to impact areas that are substantially different in character and function than the areas previously impacted and subsequently mitigated by Parker Farm. The proposed alternative would have significant buffer, stream, and coastal and riparian impacts. These types of impacts cannot be mitigated through a Parker Farm type of project. While there may be farmland available that can be transformed into a Parker Farm type mitigation site, that type of mitigation will not be suitable for the proposed impacts. Rarer, more difficult to obtain, and more expensive waterfront sites will be necessary to mitigate for impacts to the Primary Nursery Areas, brackish marsh, over seven miles of tributaries, and riparian wetlands that would be impacted under the AP alternative.

A second shortcoming of omitting any designation of mitigation sites is that there is serious concern that the degree of mitigation that would be required for the AP alternative cannot be completed within the hydrologic unit. This possibility is acknowledged in the EIS. DEIS at 4-89. Without knowing where the potential mitigation sites are located, or even if they will be within the same hydrologic unit as the impact, the Corps cannot weight the severity of the impact against the potential mitigation.

Since the mitigation plan does not identify the proposed mitigation sites, it cannot include a description of how wetlands will be developed as recommended in the Mitigation Policy. The mitigation plan also lacks any monitoring or performance requirements, making it impossible to compare the functions and values of the proposed mitigation if successful to the impacted area.

Finally, the plan does not include a reference wetland. Without a reference wetland, it will be impossible to determine whether the mitigated wetlands are successful in replacing the functions and values lost in the impacted area. A reference wetland would also facilitate the significant degradation determination by illustrating what functions and values successful mitigation sites would possess in comparison to the site

proposed to be impacted. The absence of a reference wetland in the mitigation plan makes the Corps' required balancing of impacts and mitigation impossible.

ii. The lowered mitigation ratios suggested are not justified by the EIS.

A critical aspect of the mitigation plan is the mitigation ratio for the proposed impacts. The EIS cites the EPA standards of 2:1 for restoration, 4:1 for enhancement, 6:1 for creation, and 10:1 to 60:1 for preservation. DEIS at 4-91. The EIS then immediately proposes mitigation ratios that do not meet these standards, but does not adequately support the proposed reductions. These lowered ratios are based on the Parker Farm mitigation site. Id. Although the Parker Farm site has been determined to be successful, it does not indicate that PCS and CZR are infallible in terms of mitigation. There is no evidence that they are capable of repeating their success either in other areas similar to Parker Farm or in different types of mitigation. The mitigation ratios are based on a widely held understanding that mitigation is an inherently risky endeavor that cannot be assumed to fully compensate for the functions and values lost in the impacted area. By requiring the party responsible for mitigation to mitigate more than they impact, the recommended ratios provides some safeguards against mitigation efforts that fail either completely or to an extent that they cannot replicate the functions and values of the impacted area. Additionally, the ratios compensate for the differences in function between natural and created or restored wetlands and temporal losses of wetland function. Even Parker Farm, a generally successful mitigation site has been shown to be inferior to natural wetlands in certain aspects.[3]

The error in lowering mitigation ratios due to Parker Farm and PAII is best summarized by the authors of a study comparing PAII to the South Creek tributaries. Despite finding that PAII was comparable in some ways to the natural creeks, the authors had serious reservations about predicting mitigation success based on the study. Specifically, the authors state "these concerns . . . limit the ability to make accurate predictions about the probability of success (or failure) of future mitigation efforts." [4] Because of the shortcomings of mitigated wetlands and the inherent risk in mitigation, the standard EPA mitigation ratios should be the minimum acceptable ratios in PCS' mitigation plan.

iii. The mitigation plan does not meet the standards prescribed in the proposed mitigation rules.

The weaknesses in the mitigation plan in the EIS are even more apparent when compared to the draft mitigation rules currently being considered by the Corps. The draft rules require an explanation of how the selected site will compensate for the impacts

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[3] Bruland GL and Richardson CJ, *Comparison of soil organic matter in created, restored and paired natural wetlands in North Carolina*, 14 WETLANDS ECOLOGY AND MANAGEMENT 245, 250 (2006).
[4] West (2000).

ecologically, a description of the selection factors that were used in selecting the mitigation site, how that site will be protected in perpetuity, and a description of the current ecological conditions at the site. 71 Fed. Reg. 15519, 15550 (March 28, 2006). These requirements are all premised on the designation of a specific mitigation site. The "conceptual" plan proposed in the EIS falls substantially short of identifying a mitigation site or mitigation sites, substituting site selection factors for actual selected sites. While these draft rules are not binding, they further demonstrate the Corps' realization that a project cannot be fully evaluated without a detailed mitigation plan to compare with the proposed impact. The proposed mitigation plan in the EIS should be brought up to the standards of the draft rules, beginning with the identification of specific mitigation sites.

iv. The mitigation plan does not address important impacts.

Compensatory mitigation is based on the premise that the functions and value of the impacted area can be mitigated. While that may be possible for certain wetlands, it is not the case for the wetlands that would be impacted under the AP alternative. The functions and values provided by three Primary Nursery Areas that feed directly into a Special Secondary Area cannot be mitigated through compensatory mitigation. Similarly, the functions and values of a large, contiguous collection of diverse wetlands cannot be mitigated. These two unique aspects of the area that the AP alternative would impact certainly cannot be mitigated through a Parker Farm type mitigation project. The mitigation plan does not address these impacts, or how they will be mitigated, making the balancing of the proposed environmental impact and the proposed mitigation impossible.

3. *The studies relied on by the EIS do not provide the information necessary to satisfy the Guidelines.*

The Corps must deny a permit when there is not "sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with these guidelines." 40 C.F.R. § 230.12. The applicant has the burden of proof in demonstrating that their proposed project complies with the 404(b) Guidelines. 61 Fed. Reg. 30990, 30998 (June 18, 1996). The applicant has not demonstrated that the proposed project will not cause a significant degradation of the aquatic environment.

The EIS relies primarily on two studies to evaluate the environmental impacts of the proposed project. These studies, the Jacks Creek monitoring reports[5] and the Porter Creek study, do not provide enough information to support the claims that the EIS makes. Both of these studies have serious flaws that limit their applicability to the proposed project.

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[5] The monitoring performed at Jacks Creek was part of a monitoring program mandated by the last permit. In addition to Jacks Creek, Tooley Creek and Huddles Cut were monitored. Jacks Creek is the focus of the EIS because pre-mining and post-mining data are available on Jacks Creek. Therefore, the monitoring program will be referred to as the Jacks Creek study in these comments.

a. The Jacks Creek study does not support the EIS' claims.

The Jacks Creek study is relied on extensively throughout the EIS to dispel the possibility of harm to the aquatic environment. The Jacks Creek study is used to claim there will be no adverse consequences of mining to water quality, sediment metal concentrations, adjacent wetlands, fish communities, and benthic communities. DEIS at 4-13, 4-14, 4-15, and 4-17. The EIS then qualifies those claims by acknowledging, as the Jacks Creek reports do, that no definitive conclusion can be made based on the study. DEIS at 4-11, 4-13, 4-15, and 4-17. This qualification of the study is understated, the study has significant deficiencies: it lacks adequate baseline data, does not monitor for an extended period of time, analyzes an impact that is of an entirely different scale than the proposed impact, and lacks peer review which typically validates scientific studies.

i. The baseline data are inadequate.

The focus on the Jacks Creek study is based on one unique factor, that pre-mining and post-mining data exist for Jacks Creek. However, because of the limitations in the monitoring, these data are entirely inadequate. During the first year of monitoring, no baseline data were taken in regard to groundwater, surface water flow, water quality, or salinity. NCPC TRACT STREAM MONITORING PROGRAM FOR PCS PHOSPHATE COMPANY, INC.: YEAR ONE (1998) END-OF-YEAR REPORT at 35 ("Year One Report").

The second year of monitoring does provide data for groundwater, surface water flow, water quality, and salinity, but is not without serious reliability problems. These problems are most directly addressed in the conclusion of the fish sampling section. It states "[t]he data do not allow any determination of true differences in fish abundances between years." NCPC TRACT STREAM MONITORING PROGRAM FOR PCS PHOSPHATE COMPANY, INC.: YEAR TWO (1999) END-OF-YEAR REPORT at 71 ("Year Two Report"). Similarly, the section on benthic monitoring fails to state any conclusion other than recognizing that the data reflect a dynamic system. See Id. at 85.

The water quality monitoring conclusions were no clearer. The analysis in that section found that the difficulty in acquiring data "makes comparison of results among stations somewhat difficult, particularly for parameters that exhibit seasonality." Id. at 47. Going further, the report states that water quality data problems "may also hamper future comparisons of year-to-year variability for a given station . . . ." Id. Additionally, the "baseline" data collected during the 1999 monitoring season covered a season "characterized by periods of unusually high precipitation in eastern North Carolina, which had noticeable effects on the salinity and some, but not all, of the chemical parameters." Id.

The EIS sums up the weaknesses of the baseline data in the Jacks Creek study by stating that "it is difficult to draw any definite conclusions" because "there was only one year of baseline . . . data for Jacks Creek." DEIS at 4-13. The Year Two Report shows

this description to be a drastic understatement. The only determination of any sort that can be made from the baseline data is that the sampled system is a dynamic one, one that would require years, if not decades, of monitoring to demonstrate a trend. The Year Two Report admits that some of the data collected will be of little value to compare to different sample sites, much less to analyze trends from year to year. It also acknowledges that a portion of the baseline data was taken during a season which demonstrated decidedly uncharacteristic weather patterns.

The summary of the baseline data eliminates any predictive value of the Jacks Creek study. Even if the year of sampling were perfect, it would be too short to allow a meaningful prediction of the future. However, this year of sampling was far from perfect. The data are flawed, through no fault of the researchers. The purpose of the sampling is to allow a comparison of data over the years to evaluate the impact of mining. The fish and benthic community analyses acknowledge that satisfying this purpose is impossible given the dynamic nature of the system. The water quality analysis admits that the baseline data are essentially useless due to an unusually wet year and limitations in the data. With no useful baseline data, the Jacks Creek study has no basis for predicting that there will be no harm to the aquatic ecosystem. Therefore, any reliance on the Jacks Creek study to claim there will be no harm should be removed from the EIS. Specifically, the reliance on the study on pages 4-13, 4-14, 4-15, and 4-17, as well as throughout the EIS, should be deleted.

ii. The duration of post-mining monitoring is inadequate.

The post-mining monitoring is inadequate to determine whether there are actual impacts due to mining. Overlooking the substantial, fatal flaws in the baseline data, the post-mining data also make the Jacks Creek study inadequate for predicting the impact of the proposed project. The aquatic ecosystem sampled is a dynamic system; it changes naturally each year. Therefore, a prolonged sampling period is necessary if any conclusion can be made regarding the impact of changes such as reductions in drainage basin. For example, the 2004 Report ("Year Six Report") cited in the EIS states that "fish data illustrate the extreme natural variability in fish catch in these creeks." NCPC TRACT STREAM MONITORING PROGRAM FOR PCS PHOSPHATE COMPANY, INC.: YEAR SIX (2004) END-OF-YEAR REPORT at 59. That variability "makes it very difficult to discern any spatial or temporal patterns in fish abundance." Id. The report goes on to explain that future years of sampling may eventually be able to determine long term trends. Id.

The benthic samples showed similar "considerable variation." Id. at 63. This variation even extended to submerged aquatic vegetation. Id. at 64. On the last substantive page of the report, the last summary page of the benthic monitoring, the report cites a problem in discussion of the benthic community that overshadows the entire monitoring program. The report states that "such variability cannot easily be attributed to simple changes in hydrographic parameters or habitat structure." Id. It continues, emphasizing the need for further monitoring, stating that "[t]he large range of variability

documented thus far during this study reinforces the need for careful interpretation of any variation that may occur during continued post-disturbance monitoring." Id.

These sections of the Jacks Creek study highlight one of the problems that plague the study; the post-mining monitoring is insufficient to allow any prediction to be made. It is a short term study of a dynamic system that only shows trends over a long period of time. The report acknowledges its inadequacy in this regard. The information is directly applicable to the NCPC tract, but it is not a proper basis for predicting future impacts of mining. It is also not sufficient to refute the general consensus in the scientific community that drastic drainage basin reductions and nearly complete destruction of headwaters will adversely affect the aquatic ecosystem. Since the Jacks Creek study cannot be relied on to evaluate the proposed impacts, references to the study on pages 4-13, 4-14, 4-15, and 4-17, as well as throughout the EIS, should be deleted.

iii. The EIS distorts the Jacks Creek study conclusions.

In addition to the data flaws identified in the previous two sections, the Jacks Creek study cannot be relied upon to predict the impacts of the proposed project because the impacts studied are miniscule compared to the proposed impacts. The impacts to Jacks Creek under the current permit and impact to the NCPC creeks under the proposed permit are incomparable. The current permit impacted 198 acres of the Jacks Creek drainage basin, approximately 37% of the watershed. DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE TEXASGULF, INC. MINE CONTINUATION: AURORA, NORTH CAROLINA, JANUARY 1994 at 200. The AP alternative would impact 2,408 acres of wetlands, including nearly complete elimination of the watersheds of Jacks Creek (88%), Jacobs Creek (89%), Drinkwater Creek (88%), Tooley Creek (84%), Huddy Gut (73%), and Huddles Cut (93%). See DEIS at 6-60. There is no comparison between the impact to Jacks Creek under the current permit and the proposed impacts based on drainage basin reduction, even without considering the 38,558 linear feet of streams that would be destroyed under the AP alternative.

Due to the drastic difference in the current impact monitored by the Jacks Creek study and the proposed impact, no reasonable prediction of the impact to the aquatic ecosystem can be made based on the Jacks Creek study. Not only are the AP alternative impacts substantially greater for each stream than the impacts to Jacks Creek under the current permit, they combine to have an impact that dwarfs the impact to Jacks Creek under the current permit. The Jacks Creek study, even it were to have perfect data, could not reasonably predict the impact of the AP alternative on a single creek, much less the collective impact of the AP alternative on all of the South Creek tributaries and South Creek itself. Since the Jacks Creek study cannot be relied on to evaluate the proposed impacts, references to the study on pages 4-13, 4-14, 4-15, and 4-17, as well as throughout the EIS, should be deleted.

iv. The Jacks Creek study is unreliable because it is not peer reviewed.

Within the scientific community, peer review serves as a validation process. The peer review process certifies that the experiment design, procedures, and conclusions meet the standards of the scientific world. Studies that are not peer reviewed may meet these standards, and provide valuable information, but should not be relied upon extensively. The Jacks Creek study and its conclusions do not meet the standards of peer reviewed scientific papers. If the conclusions made in the EIS were submitted to peer review, the problems with data and scale identified in the previous three sections would be considered fatal flaws to the predictive use of the Jacks Creek study. While the monitoring reports may ultimately provide enough reliable data that they could be written into a study that would meet peer review standards, they do not currently meet that level of scientific reliability. The EIS improperly relies upon the Jacks Creek study, giving it the weight of a peer reviewed study while not holding it to the standards of such a study. Due to this misplaced reliance on the Jacks Creek study in the EIS, references to the study on pages 4-13, 4-14, 4-15, and 4-17, as well as throughout the EIS, should be deleted.

b. The Porter-Durham Creek study is not applicable to the proposed impact.

The second study which the EIS primarily relies upon to support the claim that there will be no adverse impacts to the aquatic ecosystem is the Porter Creek study. DEIS at 4-12. The Porter Creek study compared water quality in Porter-Durham Creek to the water quality in the South Creek tributaries based on a variety of parameters. The EIS claims the study is relevant to the proposed impact because PCS mined within 200-300 feet of Porter Creek in the 1970's and 1980's. Id. The study did not find any mining related variations between the water quality in Porter Creek and the tributaries, leading to the conclusion that mining the tributaries will not adversely impact water quality. Id. The variations that were discovered were found to be a result of the variations in channel depth between Porter Creek and the tributaries. Id. The EIS does not further address the physical differences in channel depth and volume or mining impact between Porter Creek and the South Creek tributaries. These differences are substantial, and minimize the value of the Porter Creek study in evaluating the proposed impacts.

Porter-Durham Creek and the South Creek tributaries are drastically different in their physical characteristics. In the EIS' description of water bodies, the differences between the creeks are apparent. Durham Creek is a "major tributary of the Pamlico River," drains over 41,000 acres, and is over 2000 feet wide at its mouth. DEIS at 3-35. Porter Creek is a "moderately sized tributary of Durham Creek," drains over 2,600 acres, and has an average depth of 4 feet. Id. The South Creek tributaries are significantly smaller. Jacks Creek is "short, narrow" and drains only 328 acres. Id. at 3-32. Jacobs Creek is a "small, shallow creek" that is described as "typical of many of the South Creek tributaries." Id. at 3-33. Jacobs and Drinkwater Creeks each drain only 418 acres. Id.

Tooley Creek is a "shallow tributary" that drains only 444 acres. Id. Huddles Cut is the largest of the South Creek tributaries, draining only 756 acres. Id. at 3-34. Huddy Gut is also substantially smaller than Porter and Durham Creeks, draining only 392 acres. Id. These differences can be easily summarized. Porter and Durham Creeks are large creeks that drain large areas and transport large volumes of water. The South Creek tributaries are small, shallow creeks that have relatively small drainage basins.

In addition to the physical differences between Porter and Durham Creeks and the South Creek tributaries, the impacts studied in the Porter Creek study are of an entirely different nature than the impacts proposed. PCS mined within 200-300 feet of Porter and Durham Creeks in the 1970's and 1980's. Id. at 4-12. Neither Porter nor Durham Creek were directly mined. Additionally, Porter and Durham Creek collectively retained over 41,000 acres of drainage basin after mining. Those impacts do not compare to the proposed impacts to the tributaries. In contrast to the zero linear feet of Porter and Durham Creek being mined, over 38,000 linear feet of the South Creek tributaries will be directly mined. Id. at 6-59. In addition to those impacts, each of the tributaries will have more than 70% of their drainage basin eliminated. See Id. at 6-60. Huddles Cut alone will lose 93% of its drainage basin. Id. The impacts to Porter and Durham Creek did not directly impact the creeks and left a substantial drainage basin intact. The impacts to the South Creek tributaries will directly eliminate over 7 miles of the tributaries themselves and destroy nearly all of their drainage basins.

These differences between Porter and Durham Creeks and the South Creek tributaries make any reliance on the Porter Creek study unjustified. Not only were the impacts studied much less invasive and destructive than the proposed impacts, they affected large creeks. The proposed impacts will more adversely affect smaller, more vulnerable creeks than the studied impacts. Any comparison of the two mining plans is unjustified. This unreasonable comparison is best illustrated by considering the proposed impacts to Huddles Cut. The AP alternative would mine 702 acres of Huddles Cut drainage basin, the largest drainage basin of the South Creek tributaries. Id. That is approximately 93% of Huddles Cut entire drainage basin. Mining the same number of acres in the Porter Creek drainage basin would only result in a 27% reduction. In Durham Creek's drainage basin, eliminating an area equal to 93% of Huddles Cut's drainage basin would be less than a 2% reduction. Any prediction of the water quality impacts of the proposed project on the water quality in the South Creek tributaries based on the Porter Creek study is clearly erroneous.

The EIS' reliance on the Porter Creek study to claim that water quality in the tributaries will not be impacted by the proposed project is clearly misplaced. The differences in the physical characteristics of the impacted water bodies as well as the drastic differences in impact to those water bodies eliminates any predictive value of the study. Therefore, the reference the Porter Creek study on page 4-12, as well as any other comparative use of the study in the EIS, should be deleted.

E. Expert Analyses of the EIS

The limitations and omissions identified in this comment letter have been echoed by experts. In addition to the North Carolina Division of Marine Fisheries ("NCDMF"), the U.S. Fish and Wildlife Service ("FWS"), and likely other governmental agencies, many non-governmental scientists agree that the impacts of the proposed alternative would be devastating to the aquatic environment.

The NCDMF and FWS have been extensively involved in the review team process and the development of the EIS. That experience combined with their technical expertise makes their criticisms of the EIS particularly relevant. Both agencies, relying on significant scientific research, conclude that the EIS does not adequately represent the environmental impacts of the proposed project, that mitigation cannot compensate for those impacts, and that no mining in NCPC should be permitted. Although our comments focus more specifically on the information that must be added for the Corps to be able to make an informed decision, we would reach a similar conclusion based on the evidence in the current EIS. We therefore fully endorse NCDMF and FWS' conclusion that any mining in NCPC would constitute significant degradation based on the information presented in the EIS.

The scientists that have signed on to the January 26, 2007 letter submitted by PTRF have a wealth of experience and expertise. They have expressed significant doubts regarding the claims of minimal impact stated in the DEIS. To the contrary, they express a view that any mining in the headwaters of the South Creek tributaries or the tributaries themselves will have significant adverse impacts on the immediate environment as well as far reaching effects on the systems surrounding the project area. These views are well grounded in basic scientific understanding of the role of wetlands and the facts of the proposed impacts. These views are in line with both our concerns presented in these comments and the concerns of NCDMF and FWS in their comments.

F. Additional Considerations

1. Financial assurance should be more thoroughly discussed.

The EIS briefly discusses financial assurances in Section 4.3.2.3.4.4 on page 4-92. The discussion provides a cursory overview of the basics of financial assurances, but it does not discuss the application of those basics to the proposed impact. There is no discussion of project specific circumstances such as declining phosphate markets, the costs of reclamation and mitigation, and the tenuous financial position that PCS claims to be in. Each of these variables should be part of the Corps' "hard look" at whether to require financial assurances. The final EIS should fully examine the pros and cons of requiring financial assurances in this permit.

2. Conditional Mining Areas should be considered.

A possibility that is not discussed in the EIS is the potential designation of Conditional Mining Areas ("CMA"). A CMA is an area of particular environmental concern that is permitted to be mined only after reclamation success is demonstrated. This approach has been used at PCS' White Springs, FL site when the operation was under the control of Occidental Chemical Company. See Department of the Army Record of Decision, Permit application 84B-4652, October 7, 1987 at 32-33. The proposed mine plan threatens sensitive areas in each tract. In particular, the tributaries to South Creek, pocosin bays in S33, and wetlands in Bonnerton are sensitive environmental areas. Given that the proposed impact is unprecedented, it is substantially different than any previous impact in this area, the possibility of establishing CMAs should be discussed in the EIS. Any permit that allows mining in NCPC near the South Creek tributaries, in the southern portion of S33, or in Bonnerton should require that the applicant demonstrate that the aquatic ecosystem has not been adversely impacted prior to continued mining in these vulnerable areas. The EIS cites previous impact studies that cannot begin to predict the impacts of the proposed project. Implementing CMAs would tentatively permit mining, but not rely entirely on poorly supported claims that no adverse impact will occur. Because CMAs would protect sensitive environmental areas until the applicant could demonstrate that the proposed impacts will not adversely impact the aquatic ecosystem, their potential use should be evaluated in the EIS.

IV. CONCLUSION

We appreciate the opportunity to comment on the draft EIS. We re-emphasize our understanding of the complexity of this project and the substantial effort that the Corps has invested in the draft EIS. The changes suggested in these comments would make the EIS a more complete document, one that can serve the role that is mandated to it by NEPA. Thank you for considering these comments.

Sincerely,

Derb S Carter /GRG

Derb S. Carter
Senior Attorney
Southern Environmental Law Center

Geoffrey R. Gisler
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Southern Environmental Law Center

Attachment 4

SELC PTRF
401 Certification Comment Letter
07/07/2008

February 8, 2007

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

To Whom It May Concern:

This letter and attached document is in response to the request by the PCS Phosphate, Inc. which applied to the Army Corps of Engineers (USACE) for a Clean Water Act Section 404 permit to impact and fill wetlands and waters of the state for the purpose of continuing its mining operations along South Creek and the Pamlico River in eastern Beaufort County near the town of Aurora. The permit request includes excavation of 2,408 acres of wetlands and waters, including brackish marsh and public trust areas, and greater than 38,800 linear feet of stream. Sections of three designated inland Primary Nursery Areas that drain to South Creek, a Secondary Nursery Area, would be excavated under the Applicant Preferred mining alternative. This alternative lies within a tract of land known as the NCPC tract, which is bordered to the north by the Pamlico River and to the east by South Creek.

Due to the special nature of the upland-, wetland-, and estuarine-creek ecosystem within the NCPC tract, we, the undersigned believe that the Applicant Preferred alternative would result in a significant adverse impact to the aquatic ecosystem that cannot be replaced through mitigation in a reasonable time frame. Furthermore, we contend that any mining through the headwaters or other downstream portions of the three PNAs and their associated riparian wetland complex would result in significant degradation. The attached document, "Impacts to the Aquatic Environment Associated with the PCS Phosphate, Inc. Proposed Mine Expansion" produced by the Pamlico-Tar River Foundation has been included to support this claim.

Sincerely,

Heather Jacobs
Pamlico-Tar **RIVERKEEPER®**
Pamlico-Tar River Foundation

John Alderman, President
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Impacts to the Aquatic Environment Associated with PCS Phosphate, Inc. Proposed Mine Expansion

I) INTRODUCTION

1.1 Purpose: The purpose of this document is to evaluate the impacts to the aquatic environment located within and adjacent to the proposed mine expansion by PCS Phosphate, Inc. This tract of land is commonly referred to as the NCPC tract (formerly owned by the North Carolina Phosphate Company). Information originates from peer reviewed journals, the Draft Environmental Impact Statement (DEIS), and personal communication with researchers and DENR Agency personnel.

1.2 Significant Degradation: Under 404(b)1 guidelines of the Clean Water Act, the US Army Corps of Engineers (hereafter referred to as the Corps) must deny a permit to fill wetlands if it will result in significant degradation of the waters of the U.S. The burden of proof lies with the applicant to prove that wetland and water fill activities will not cause significant degradation. Two considerations that are balanced in determining whether significant degradation occurs are a) impact to the environment and b) the mitigation required by the permit. The Corps may be more likely to find significant degradation if: 1) the impact affects a particularly sensitive or unique area; 2) the impact affects a large area; or 3) the affected environment has other features that are not easily replicated by mitigation.

Four broad categories of impacts can result in significant degradation:

1. Impacts to human health;
2. Impacts to wildlife;
3. Impacts to the aquatic ecosystem; and
4. Impacts to recreational, aesthetic, and economic values.

When evaluating these impacts, the guidelines specify a focus on the "persistence and permanence" of the impacts. This paper's focus is on proposed mining sequences and their associated aquatic ecosystem impacts. Certain impacts to aquatic environments that are scrutinized by the Corps include but are not limited to:

water chemistry	salinity	temperature	dissolved gas levels
nutrients	eutrophication	diversion of flow	hydrologic changes
shoreline erosion	aquatic communities	aquatic habitat	spawning areas
nutrient cycling	contaminant levels	invasive species	
altering upstream or downstream areas			

1.3 Applicant Preferred Alternative: PCS Phosphate, Inc. has applied for a permit to impact 2,408 acres of jurisdictional waters and wetlands. A breakdown of the impact can be found in Table 1. The request includes more than 38,800 linear feet (lf) of intermittent and perennial stream impact and a 70% to > 90% reduction of the drainage basins of 6 named

tributary drainage basins (Table 2). Some reductions are considered permanent, others temporary in the DEIS. The present natural hydrology within and in the periphery of the mine site will be permanently altered. Three streams located within the NCPC tract proposed to be excavated are listed as inland Primary Nursery Areas (PNAs) (Street et al. 2005).

Table 1: Breakdown of wetland and water impacts by biotic community type (DEIS)

Biotic Community Type	Applicant Preferred Site
Public Trust Waters (acres)	5
Public Trust Waters (linear feet)	14564
Perennial Stream (acres)	3
Perennial Stream (linear feet)	7008
Intermittent Stream (acres)	3
Intermittent Stream (linear feet)	17267
Wetland Brackish Marsh	38
Wetland Bottomland Hardwood Forest	102
Wetland Herbaceous Assemblage	235
Wetland Scrub-Shrub	202
Wetland Pine-Plantation	514
Wetland Hardwood Forest	509
Wetland Mixed Pine/Hardwood Forest	564
Wetland Pine Forest	195
Pond	19
Upland Herbaceous	234
Upland Scrub-Shrub	262
Upland Pine Plantation	55
Upland Hardwood Forest	67
Upland Mixed Pine/Hardwood Forest	140
Upland Pine Forest	38
Upland Agricultural Land	117
Upland non-vegetated/maintained areas	92
Total (wetlands, waters, upland)	3412
Total linear feet streams	38839
Total Uplands (acres)	1005
Total Wetlands/water (acres)	2407

Table 2: Drainage basin reductions for tributaries to the Pamlico River and South Creek under the applicant preferred (AP) alternative (DEIS)

Creek Name	Existing Total Drainage (acres)	Drainage in NCPC Tract (acres)	Drainage in AP to be Excavated (acres)	Proposed Drainage Basin Reduction (%)
Jacobs	418	407	370	89
Jacks	320	310	280	88
Tooley	444	430	375	84
Drinkwater	426	418	373	88
Huddles Cut	756	707	702	93
Huddy Gut	392	285	285	73

1.4 NCPC Characterization:

More than 70% of the NCPC tract proposed for mining consists of delineated, federal and state jurisdictional wetlands and open waterways. Riparian wetland types located in this tract of land and within the AP site include estuarine, riverine, headwater, and flat or depressional hardwood and pine wetlands. Certain wetland types such as brackish marsh, bottomland hardwoods and scrub-shrub within the NCPC tract are irregularly inundated due to dominance of wind tides, which can cause dramatic fluctuations in salinity and water levels. The soils are poorly drained with a high runoff potential. Under natural conditions, the seasonal high water table ranges from ground surface to 2 feet below ground level. Wetland types are noted in Table 1. Jacobs, Jacks, and Tooley Creeks are designated inland PNAs and South Creek is a special secondary nursery area. These nursery areas are important habitats for numerous finfish and shellfish species. Complete descriptions of the significant tributaries to South Creek within the NCPC track can be found in the Journal of the Elisha Mitchell Scientific Society (1985 v.101). In general, tributaries to South Creek within the NCPC tract have complex marsh biotic communities that are influenced by complex, interacting environmental factors rather than one environmental gradient. They occur along steep physical gradients where laterally uplands and forested wetlands dominate and upstream areas gradually give way to swamp forests. Most of the tributaries are relatively shallow, narrow systems where runoff is greatest during the winter season when evapotranspiration is low. Downstream reaches of the tributaries are bordered by brackish marsh dominanted by *Juncus romerianus* (needlerush), but also include a mosaic of other marsh species. Creek sediments are high in organic content. South Creek is dominated by wind tides. Annual precipitation is around 50 inches/year.

The following sections provide information on the potential for water quality and other aquatic environmental impacts associated with the proposed mining alternative.

The first discussion below in section II is related to downstream and peripheral impacts to areas not directly impacted via the proposed mine expansion within the NCPC tract.

II) Impacts to Downstream/Peripheral Wetlands of the Proposed Mine Site

Wetlands perform many functions critical to the health of aquatic environments (USEPA, 2001). North Carolina has lost approximately 50% of its original 11.1 million acres of wetlands (Dorney et al. 2004). Today, approximately 95% of the remaining wetland acres in the state are found within the coastal plain (Bales and Newcomb 1999). The Albemarle-Pamlico Estuary is a nationally significant estuarine resource. This estuarine system provides essential nursery habitat for most of the commercial and recreational fish and shellfish species caught on the US east coast. Over 90% of North Carolina's commercial fish landings and over 60% of recreational harvest by weight are comprised of estuarine-dependent fish species (Street et al. 2005).

Wetland and stream functions (2408 acres) within the mine excavation site will be permanently lost, as noted in the DEIS. The uses of the land to be mined will also be permanently altered. Section III of this document describes functions that will be lost within the mine site (AP), and assesses whether or not these functions can be recovered through mitigation/reclamation within a reasonable time frame (10 years). Table 3 includes functions that will be lost or reduced in wetland and stream systems along the periphery of the mine site within the NCPC tract. Impacts to downstream areas are not required to be mitigated; therefore, any impact or loss of function in these areas will not be replaced.

Table 3: List of functions provided by downstream and peripheral wetlands of the proposed AP mine alternative and associated impacts.

Functions Provided	Impacted by AP Alternative	Explanation
Flood control	Impacted	Section 2.4
Nutrient cycling	Impacted	Section 2.4a
Carbon sink or source	Impacted	Section 2.5
Sink for pollutants	Impacted	Loss of upstream functions as sink and placement of dike constructed with contaminated sand tailings. Section 2.6.
Sediment accumulation	Not-Impacted	
Soil Organic Matter accumulation	Not-Impacted	
Primary Productivity	Impacted	Increasing load from upstream nutrients and groundwater input. Sections 2.4a and 2.5
Dampen wave energy (erosion control)	Not-Impacted	
Habitat (terrestrial & aquatic)	Impacted	Section 2.3
Nursery	Impacted	Section 2.4
Detritus export	Impacted	Section 2.5

2.1. Elemental Contamination

A study conducted prior to the implementation of the wastewater recycling system at the plant site revealed that sediments in the vicinity of discharge sites on the Pamlico River and South Creek contained elevated levels of cadmium, molybdenum, arsenic, Manganese, vanadium and titanium as well as fluorine (Riggs et al 1989). All of these elements are found within the phosphate grains. The toxicity of heavy metals to the aquatic environment has been well studied. Specifically in the Pamlico Estuary several studies have associated metal contamination with crab shell disease (Engel and Noga 1989; Brouwer et al. 1992; Gemperline et al. 1992; Weinstein et al. 1992). Since the recycling system has been in place in the mid-1990s for PCS Phosphate, crab shell disease has declined (personal communication, Sean McKenna, DMF 2006). The reclamation process uses a blend of gypsum and clay, which results in elevated levels of metals, specifically cadmium within the mine site. Studies conducted by North Carolina State University and outlined in the DEIS also found that cadmium had bio-accumulated in several plant species located on existing reclamation areas. Further studies revealed elevated levels of cadmium in benthic organisms, blue crabs and clams adjacent to PCS outfalls and ponds on company property.

Of particular concern is the potential impact of metals leaching into downstream muds from reclamation areas. The company proposes, at some point in the future, to reconnect natural downstream areas with reclaimed streambeds within the mine site. It is clear in the DEIS that current levels of cadmium and other metals around the mine site are elevated, including areas in the NCPC tract which could cause adverse biological effects. The future long-term impacts from mining and reclamation activities on cadmium and other heavy metal accumulation within the aquatic environment are unknown. The potential suspension and transport of contaminated muds during hurricane events or other strong storm events should also be evaluated. The DEIS fails to consider these long-term impacts to the downstream aquatic environment.

2.2 Flow Dynamic Impacts on Salinity Gradient

The tributaries of South Creek have varying salinities (0-17 ppt). During low precipitation years, it is evident that salinities are mainly driven by South Creek and ultimately by the Pamlico River Estuary (Davis et al. 1985). Watershed input of precipitation and potentially surficial groundwater flow are sources of freshwater to the headwater portions of these streams, and also play an important role in producing a downstream salinity gradient. The greatest runoff occurs during winter when evapotranspiration is low (Bradshaw et al. 1985). Both vertical and downstream stratification occurs after periods of runoff. Groundwater salinities for the Jacks Creek watershed ranges from fresh (~0) to 13 ppt (Brinson et al 1985). Sun et al. (2002) suggest that topography affects stream flow patterns and storm flow peaks and volumes, and is the key to wetland development in the southern US. The unique features and diversity of the contiguous forested wetlands, uplands, and riparian wetlands (marsh, bottomland hardwood) within the proposed mine block underscore the potential difficulty of providing mitigation that replicates the complexity of this system.

The 2006 DEIS uses a similar argument to the previous permit EIS against any significant salinity change due to large drainage basin reductions and excavation of ephemeral, intermittent, and perennial stream segments. The basis for such an argument appears to come from two studies: West's (1990) benthic study comparing Project Area II to 4 natural stream channels, and

the NCPC monitoring program in Jack's Creek (CZR Incorporated et al. 2005). West's (1990) study sample size for water quality parameters is 4 replicates throughout one year, of which the report states, "It should be noted... that these data address only gross trends in temporal variation in water quality because the time scale of sampling (trimonthly) far exceeded the time scale of significant change in water quality parameters (<1 day)." Furthermore, the sample sites were located in the lower stream segments (lower half to third approximately) of each tributary (Jacks, Jacobs, Drinkwater and Tooleys) where influence from South Creek likely is the dominant factor. The 2-4 ppt salinity change in this study does not capture the salinity regime of the upstream portions. The second study on Jacks Creek is seriously limited because 1) Only one year of baseline sampling took place, and 2) The impact described for Jacks Creek (37% drainage basin reduction) cannot be reliably scaled up to assess potential aquatic system impacts from 73-93% drainage basin reductions as proposed in the DEIS.

These cited studies do not provide sufficient evidence to support the premise that drainage basin reductions will not result in salinity changes to downstream segments. By mining through upland and adjacent wetlands areas, as well as headwaters and perennial stream segments, the drainage basins will be severely reduced. As a result, there could be potentially significant increases salinity for at least 15 years until reclamation can, at best, re-establish a drainage basin. At this time it is unclear how the drainage basins will be permanently altered by reclamation activities, but it is clear that the alterations will be significant and long-term. Due to the significant increase in elevation of the reclamation area and altered soil horizons that will not resemble natural conditions, drainage basins could potentially be permanently and significantly altered. The affects of salinity changes on stream systems are further described in the following sections.

2.2.a Groundwater Alterations:

There is little information in the DEIS regarding the nature of groundwater- or surface water flow in reclaimed areas as compared to flow under natural conditions. Castle Hayne Aquifer impacts have been studied fairly extensively, but there is a lack of information on how surficial aquifer or subsurface (rain-driven subsurface flow) may be altered in either adjacent natural areas or in reclaimed tracts. The potential loss of groundwater input as well as surface drainage loss to South Creek tributaries could further impact the naturally occurring vertical and downstream salinity gradients.

2.3. Salinity Change Impacts to Other Factors

Eliminating the freshwater /saltwater interface will most likely significantly alter natural function of the creeks, including nutrient cycling (discussed in section 2.4.a below). Salinity changes will also result in the loss of freshwater habitat for beneficial finfish species such as pumpkinseed, largemouth bass, and bluegill. WRC shock studies from November 2006 (Data provide by Maria Tripp, NC WRC) as well as Rulifson (1990) confirm freshwater species present; including those listed above, in South Creek tributaries within the NCPC tract.

There also exists the potential for accelerated sea level rise that would result in salt-induced stress to forested and bottomland-hardwood freshwater wetland areas and more rapid succession to brackish marsh. Such salinity stress could affect the carbon and nutrient dynamics of these wetlands, resulting in nutrient and energy loss (Lugo et al. 1988). This could, in turn, result in the

loss of bottomland hardwood- and freshwater marsh functions at a much faster rate than what would occur naturally.

2.4 Hydrologic Changes and Consequences

EPA estimates than one acre of wetland can hold up to one and a half million gallons of floodwater (US EPA, 2001). Verry (1997) suggests that wetlands can reduce flood peaks even when wetlands are at water storage capacity, behaving similarly as reservoirs or lakes. Such flood storage loss will alter the local hydrology within the NCPC tract. Dike construction may induce more lateral flow and floodwater movement to areas previously inundated on less frequent levels. Altered hydroperiods would result in an increase in frequency and magnitude of anaerobic conditions within the riparian wetland areas. Increased anaerobic conditions can promote release of nutrients (especially phosphorus and iron) from sediments into the water column. Increased nutrients could result in increased algal blooms, further exacerbating anaerobic bottom waters and mortality of fish and benthic fauna. Elevated levels of phosphorus can also stimulate blooms of potentially toxic cyanobacteria (Burkholder 2002).

2.4.a Nutrient Cycling

Changes in hydrology resulting in prolonged anoxic conditions could significantly alter the nutrient dynamics of the system. Mitsch and Gosselink (1993) stated, "Anoxic conditions during flooding have several other effects on nutrient availability. Flooding causes soils to be in a highly reduced oxidation state and often causes a shift in pH, thereby increasing mobilization of certain minerals such a P, N, Mg, S, Fe, Mn, B, Cu, and Zn. This can lead to both greater availability of certain nutrients and also to an accumulation of potentially toxic compounds in the soil."

Phosphorus sorption potential in forested wetlands is partly a function of flooding and saturated soil conditions that cause the accumulation of organic matter and aluminum (Axt and Walbridge 1999). Natural wetlands appear to have superior P sorption capacity in surface soils and, conversely, upland P sorption occurs in the subsurface soil. Thus, wetlands appear to perform P sorption via surface runoff and upland areas are more suited for improving groundwater quality. (i.e. differences in soil chemistry as a function of landscape position). *Again, it is important to point out the diversity of upland, riparian wetland, and forested wetland systems in the NCPC tract.*

It is unclear from the DEIS whether groundwater input is significant in the wetland and estuarine creek systems of the NCPC tract. If groundwater input does play an important role, then there is likely to be a high input of nutrients entering the system from the subsurface flow through organic soils. Therefore, the primary productivity in upper areas of the creek systems may depend on this high nutrient groundwater input.

An active point in the nutrient cycle is the naturally occurring die-offs of freshwater algae. The potential loss of freshwater input and subsequent loss of freshwater algae could eliminate this part of the nutrient cycle (personal communication, Robert Christian, ECU 2006).

Finally, marshes act as sinks for nutrients, sequestering them in plant tissue and sediments thus removing them from the water column. The major tributaries to the Pamlico Sound, the Neuse and Tar Rivers, have been designated by the NC Environmental Management Commission as

"Nutrient Sensitive Waters" due to consistently elevated levels of nitrogen, phosphorus and other pollutants and basin-wide nutrient reduction strategies have been implemented. This nutrient enrichment has promoted algal productivity, hypoxia, anoxia, and fish kills in the lower estuaries (Burkholder et al. 2006). Removal of wetlands in the Pamlico Sound system would exacerbate the impacts of this loading by removing the nutrient uptake capability of the marshes.

2.5 Carbon Cycle (Export and Sequester)

The interaction of marshes and adjacent, aquatic systems can be very important to the supply or sequestering of organic carbon to those aquatic ecosystems. Some studies suggest that marshes can either export or retain carbon, depending on the relationship between aerobic microbes and their consumers (Mitsch and Gosselink 1993). Marshes are detrital-based systems and conversely many studies have found the export of detrital (particulate organic) and/or dissolved organic carbon to be an important input to aquatic systems. Bottomland Hardwoods (BLH) perform functions such as nutrient uptake and transformations, sediment retention, floodwater storage, and organic C export to downstream ecosystems (Mitsch and Gosselink 1993). Other studies have found that much carbon is 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 1993). Mining in the areas close to the estuary as proposed in all alternatives (except in the area south of highway NC 33) will remove mature watersheds that are potentially significant sources of organic carbon to the estuary.

Unless the impact is mitigated with creation or effective, carefully evaluated restoration of systems that can provide a similar magnitude and quality of organic carbon to the estuary, the estuary will suffer a net loss of habitat quality.

2.6 Headwater Stream Function

The proposed mine site includes mining through more than 38,000 linear feet of stream, including 100 acres of BLH wetlands and other areas of riparian wetlands. Of particular concern is any mining alternative that would eliminate the headwater stream channel as well as its associated BLH and freshwater riparian wetlands. A memo from John Dorney (NC DWQ), April 2006 states, "Headwater streams are very common and provide significant benefits to downstream water quality and aquatic life. Intermittent streams have significant aquatic life even though their flow is not constant throughout the year. Headwater wetlands are often associated with these streams and provide important water quality filtration to protect downstream water quality as well as significant aquatic life habitat. Therefore based on this on-going research, the Division of Water Quality believes that protection of these headwater streams and wetlands is essential to protect downstream water quality."

Headwater stream areas are typically influenced by adjacent riparian zones and should be considered jointly with their associated riparian wetland areas. Physical hydrology/topography (geomorphology) defines ecosystem function of headwater wetlands (Havens et al. 2004). Coastal plain headwater wetlands typically have higher frequencies of overbank flows, flatter hydrograph and longer inundation periods than piedmont or mountainous headwater regions (Hupp 2000).

2.6 Other Mining Impacts

Construction of the dike system that will transect South Creek tributaries may also directly impact surface water quality via sedimentation and increased turbidity. Another main concern is the direct erosion of contaminated sand tailings, which are the base used in dike construction. The DEIS notes that a 1980 study found cadmium present in all three ore-processing by-products (sand tailings, clay, and phosphogypsum) in levels that exceed natural background concentrations at the ground surface (Wakefield 1980). Therefore, dike construction may cause direct contamination of surface water and/or muds of the tributaries within the NCPC tract

2. 7 Section II Summary

Existing in-stream data for South Creek tributaries within the NCPC tract suggest that drainage basin input of freshwater is important to the overall function of those stream systems. The direct mining of headwater, intermittent, and perennial stream channels as well as their associated riparian wetlands would impact the hydrology, salinity gradient, nutrient cycling, and carbon availability of the downstream portions of the south Creek tributaries, listed in Table 2. The DEIS fails to demonstrate that mining portions of the estuarine creeks and riparian wetlands would not result in a significant impact to downstream and peripheral areas.

The following section discusses direct impacts via the mine expansion, including a discussion of existing wetland functions and the possibility that these functions can be replaced through reclamation and mitigation.

III) MITIGATION

The DEIS notes that the existing functions of the 2,408 acres of wetlands within the mine expansion boundary would be lost. The question then remains is whether resulting compensatory mitigation and the reclamation process can replace the functions lost through mining- and fill activities (Table 4). PCS Phosphates' conceptual mitigation plan could result in approximately 4,000 acres of restored, enhanced or preserved land. Mitigation ratios in this plan depend upon the wetland type. At this time, it is unclear where mitigation will take place, although it is understood that one planned site is located on a tributary to Pungo Creek, which drains to the Pungo River. It has not been demonstrated or suggested by the company that all of the mitigation would take place within the South Creek watershed, where the impacts would occur. Furthermore, the buffer mitigation requirements are so large that the company has requested a flexible plan that will replace required buffer restoration with other BMPs aimed at reducing nitrogen and phosphorus runoff. This telling fact should be clearly conveyed in the DEIS.

The more than 2000 acres of wetlands and waters, along with the 1000 upland acres proposed to be impacted within the South Creek watershed, comprise a contiguous and interdependent system, which currently includes three inland primary nursery areas (PNAs). Will the resulting mitigation of unknown acreage per mitigation site result in complete replacement of the functions lost from the proposed wetland- and waters, within an appropriate timeline (10 years)? Will the resulting mitigation offer the full suite of functions and protection to PNA that the existing wetlands and upstream channels of the NCPC tract provide?

As compensatory wetland mitigation becomes increasingly important in the health of our aquatic ecosystems, the research related to assessing the functional equivalency of restored or created sites to natural conditions has also increased. The section below summarizes research conducted on-site or in similar wetland systems found within the NCPC tract, including the success of restoring wetland function.

Table 4. Wetland functions (combined for all wetland types) and whether such loss of functions from mining activities can be replaced within a 10-year timeframe.

Functions Provided	Lost / Recoverable with Mitigation within 10-years	Explanation
Flood control	Lost	Loss of floodplain due to reclamation and resulting higher elevations; potential for net loss of 100-year floodplain. Mitigation may enhance flood control functions, but flood plain acres will be lost
Nutrient cycling	Lost	Aspects of complex biogeochemical cycling will not recover within 10 years. See Section 3.1 and 3.3.
Carbon sink or source	Lost	Not recoverable within 10 years. See Section 3.3.
Sink for pollutants	Recoverable with mitigation	However, it is unlikely that mitigation will occur upstream or adjacent to an inland PNA.
Sediment accumulation	Not wholly recoverable	See Section 3.3.
SOM accumulation	Lost	SOM content will be lower and will not recover in 10 years. See Section 3.2.
Primary Productivity	Recoverable with mitigation	PP is a function of stream depth. See Section 3.4.
Dampen wave energy (erosion control)	Recoverable with mitigation	Highly dependent on location of mitigation site. A Parker Farm-like mitigation effort will not replace functions lost in riparian wetland systems adjacent to estuarine streams
Habitat (terrestrial & aquatic)	Recoverable with mitigation	See Section 3.5.
Nursery	Recoverable with mitigation	However, successful mitigation projects a function of location. See Section 3.5.
Detritus export	Lost	Not recoverable within 10 years.

3.1 Denitrification:

A study comparing restored to natural BLH wetlands found that restored wetlands have lower denitrification potentials, even though the correct hydrology and vegetation was present (Hunter and Faulkner 2001). This study suggests that restoration of water quality functions of BLHs are dependent on more than hydrology alone.

3.2 Soil Organic Matter (SOM):

Soil properties of created and restored wetlands systems differ from those of natural wetlands (Verhoeven et al. 2001). In restored and created wetlands in the NC coastal plain, mean SOM

content for all created and restored wetlands analyzed was significantly lower than the mean SOM content in adjacent natural wetlands for four HGM settings (headwater riverine, mainstem riverine, non-riverine mineral soil flat, and nonriverine organic soil flat; Bruland and Richardson 2006). Bailey Creek and Parker Farm are compensatory mitigation sites for PCS located within the South Creek watershed. The Parker Farm restored areas have only 24.2% SOM content, whereas SOM content of the adjacent natural wetland is 77.4% (Bruland and Richardson 2006). There was no significant difference in SOM content between the created site and natural site on the Bailey Creek area. However, it is important to note that the natural area of Bailey Creek had the second lowest SOM content (8.9%) out of 11 natural wetlands analyzed. Low SOM content may hinder development of microbial communities, which are critical to wetland function (Duncan and Groffman 1994, Bruland 2004). Bacterial communities that rely upon this organic matter for energy provide via mineralization, inorganic nitrogen, phosphorus and carbon to the wetland system.

3.3 In-stream and Riparian Wetland Soil Structure:

West's (2000) analysis of Project Area 2 (created estuarine creek/marsh) as compared to Jacobs, Drinkwater, Jacks, and Tooley Creeks revealed that PA2 sediments lacked woody-detrital covering, significant peat component, and predominance of silt and clay found in natural creek sediments. West also pointed out that evidence is lacking for detectable accretion of these components over a 10-year period in PA2.

Based upon a 15-year study of vegetation and soil development in the created PA2 brackish marsh system, wetland soil formation is slower to develop than the plant community (Craft et al. 2002). Biomass of the regularly inundated *Spartina alterniflora* reached natural levels within three years. *Juncus roemerianus* and *S. cynosuroides*, two species inundated less frequently, required nine years to match natural marsh conditions, and the upland *S. patens* had not achieved natural marsh equivalence after 15 years. Soil characteristics, including porosity, organic C and total N reservoirs, along the streamside and interior areas were estimated to require 70-90 years to reach natural marsh conditions. Wetland soil conditions of the upland border, dominated by *S. patens* were estimated to require more than 200 years to recover.

3.4 Sediment Interaction

Bradshaw et al. (1985) suggested the physical attributes of South Creek tributaries strongly influence sediment chemistry: "The large amount of metabolism per unit surface area in such shallow waters also means that primary productivity is highly concentrated per unit area, an important characteristic for a viable nursery. Because these creeks are so shallow, activity of the sediments is necessarily a large proportion of ecosystem function." This is an important aspect to consider if estuarine stream channels are to be impacted. The resulting mitigation must match not only the hydrology, soil, and vegetation of the natural area, but stream depth as well to replace the high productivity found in the existing NCPC South Creek tributaries.

3.5 Habitat Replacement

An assessment of nursery function of the created brackish-marsh / estuarine-stream complex PA2 over a 10-year period found that nursery functions. as related to ichthyofauna and benthic infauna (Rulifson 1991), were supported in the created area (West et al. 2000). West et al. (2000) linked the success of the created area to four aspects related to its location. First, the created

habitat is surrounded by the same habitat it was intended to replace or mimic. Second, the surrounding area is a large undeveloped habitat that eliminates anthropogenic sources of pollution and other aspects that can negatively impact restoration or creation projects. Third, due to its non-tidal nature, erosive forces are minimal. Lastly, the created area, similar to its adjacent natural habitats, is limited in the amount of fauna it can sustain under highly variable abiotic factors. As West et al. (2000) points out, the majority of the taxa found in the area are part of a small subset of resilient, tolerant estuarine species. Due to the proximity of PA2 to two relatively undisturbed natural creek systems, invertebrate recruitment pools are large and ultimately may play an important role to the success of the PA2 mitigation site. Considering that the proposed mining alternatives would require a much larger scaled salt marsh mitigation site, it is questionable whether recruitment pools will be sufficient to garner similar results. The DEIS needs to provide evidence that scaling up a project such as PA2 is feasible with a high probability of success.

As noted above, the sediments are dissimilar between the natural creeks in the NCPC tract and the created PA2 area, and there was no evidence of accretion of peat, woody detritus and silt and clay over a ten-year period. Perhaps this is a function of a lack of upstream watershed, including riparian and forested wetland habitat. However, this difference seems to play an insignificant role in the ability of mobile benthic and fish fauna to inhabit the area; there appeared to be enough high quality food to account for the equality of abundances of invertebrates in created vs. the natural system. Other potential functions of woody detrital material, such as nutrient cycling functions, were not tested. The soil and vegetation study described in Section 3.3 estimated that wetland soil characteristics in created brackish-marsh systems require 70-200 years to re-establish natural conditions (Craft et al. 2002). While the West et al. (2000) and Rulifson (1991) studies demonstrate that created marsh creek system can support fauna, these studies did not address whether created wetlands can establish the biogeochemical, microbial and other functions of natural wetlands.

There is also an important question related to reference sites for future mitigation. If a mining alternative were to be permitted that would directly impact the estuarine creek systems and their associated riparian wetlands in the NCPC tract, what wetland and streams systems would be used as a reference for evaluating future mitigation success? Due to climate change and off-shore evidence of shifts in range of species, it will be important to have a contemporary reference point to evaluate future mitigation efforts. Use of a static reference point, from historical South Creek tributary data, will not be sufficient to adequately evaluate the success of future mitigation efforts.

Final aspects to consider are the loss of a native seed bank with the removal of wetlands under any mining alternative, and the possibility for invasive plant species colonization. Wetland mitigation also cannot replace seed bank loss. The DEIS fails to consider the potential for spread of invasive plant species to peripheral and downstream wetland areas not directly impacted by mining activities. *Phragmites* sp. and other invasive species are present on the current reclamation areas.

3.6 Section III Summary

The proposed impacts via the AP mining alternative would directly and indirectly impact estuarine stream and riparian wetland ecosystem health and function. As evaluated in Section II, the AP alternative would result in significant degradation of the aquatic environment. Section III analyzes the potential for functional equivalence between restored or created wetland systems to natural conditions. While some functions, such as aquatic habitat, may be restored within 10 years, many other functions and natural wetland characteristics will only be restored with a significant lag period on the order of decades. Furthermore, the DEIS fails to demonstrate the feasibility of reliably scaling up mitigation efforts (compared to much smaller past projects) that would yield a high probability of success.

The proposed brackish marsh mitigation will be similar to PA1 and 2 located between Jacobs and Drinkwater Creeks on the west side of South Creek. The loss of the salinity/ freshwater interface by mining through a major portion of South Creek tributary's drainage basins will not be recovered through this type of mitigation. The complexities of the systems located within the NCPC tract cannot be replicated through mitigation without an associated significant lag time as mentioned. Existing riparian wetlands within the NCPC tract provide quality protections for the inland PNAs, and resulting mitigation must also provide this protection. Many individual functions of the wetlands and stream channels located within the NCPC track are interdependent. Replacing a contiguous wetland/stream system with smaller, fractured mitigation sites will result in the loss of interdependent functions, the interaction of upland, flat and riparian wetlands and coastal streams, and the complexity of the system presently occurring within the NCPC tract.

IV) CONCLUSIONS

The applicant has failed to demonstrate that mining activities within the NCPC tract, especially within riparian wetlands and stream channels, will not cause significant degradation of the aquatic environment. Furthermore, the applicant has failed to demonstrate that appropriate mitigation will take place in a timely manner to replace the functions lost through the excavation of wetlands and waters. Situations identified in this document that would lead to a significant adverse impact to the aquatic environment include:

- Elemental enrichment of estuarine streams from mining and reclamation activities, including cadmium and fluorine, as well as phosphate enrichment, that would cause adverse biological effects.
- Hydrologic alterations due to drainage basin reductions that would result in downstream salinity changes.
- Hydrologic alterations that would result in increased anaerobic conditions in riparian wetland areas resulting in changes to the nutrient cycling.
- Loss of freshwater habitat due to drainage basin reductions from mining.
- Changes to the carbon cycle due to the removal of mature watersheds that are potentially significant sources of organic carbon to the estuary.
- Loss of headwater stream function and their associated wetlands that would result in the loss of water quality filtration.
- Direct sedimentation and metal contamination impacts from dyke construction across estuarine streams.

Therefore, it is our determination that mining riparian wetlands and streams, including sections of three designated inland PNAs within the NCPC tract will result in adverse impacts on the aquatic ecosystem that cannot be appropriately mitigated and would constitute significant degradation under 404(b)1 guidelines.

V) REFERENCES

Axt, J.R., and M.R.Walbridge. 1999. Phosphate Removal Capacity of Palustrine Forested Wetlands and Adjacent Uplands in Virginia. *Soil Science Society of America Journal* 63:1019-1031.

Bales, J.D. and D.J. Newcomb. 1999. North Carolina Wetland Resources. Raleigh, NC: US Geological Survey Water Supply Paper 2425.

Bradshaw, H.D., M.M. Brinson, E.A. Matson, and G.J. Davis. 1985. Composition and Metabolism of Sediments in Irregularly Flushed Estuarine Creeks in North Carolina. *Journal of the Elisha Mitchell Scientific Society* 101(2): 52-75.

Brinson, M.M., H.D. Bradshaw, and M.N. Jones. 1985. Transitions in Forested Wetlands along Gradients of Salinity and Hydroperiod. *Journal of the Elisha Mitchell Scientific Society* 101(2): 76-94.

Brouwer, M., D.E. Engel, J. Bonaventura, and G.A. Johnson. 1992. In Vivo Magnetic Resonance Imaging of the Blue Crab, *Callinectes sapidus*: Effect of Cadmium Accumulation in Tissues on Proton Relaxation Properties. *The Journal of Experimental Zoology* 263:32-40.

Bruland G.L. 2004. An observational, geostatistical, and experimental assessment of edaphic properties and process in created, restored, and natural wetlands of the southeastern coastal plain. Ph.D. dissertation. Duke University, Durham, North Carolina, USA.

Bruland, G. L. and C.J. Richardson. 2006. Comparison of soil organic matter in created, restored and paired natural wetlands in North Carolina. *Wetlands Ecology and Management* 14:245-251.

Burkholder, J.M. 2002. Cyanobacteria, pp. 952-982. Invited, peer-reviewed contribution for the *Encyclopedia of Environmental Microbiology*, by G. Bitton (ed.). Wiley Publishers, New York.

Burkholder, J.M., D.A. Dickey, C. Kinder, R.E. Reed, M.A. Mallin, G. Melia, M.R. McIver, L.B. Cahoon, C. Brownie, N. Deamer, J. Springer, H. Glasgow, D. Toms and J. Smith. 2006. Comprehensive trend analysis of nutrients and related variables in a large eutrophic estuary: A decadal study of anthropogenic and climatic influences. *Limnology and Oceanography* 51:463-487.

Craft, C., S.Broome, and C. Campbell. 2002. Fifteen years of vegetation and soil development after brackish-water marsh creation. *Restoration Ecology* 10(2): 248-258.

CZR Incorporated, R.W. Skaggs, and D.W. Stanley. 2005. NCPC Tract stream monitoring program for PCS Phosphate Company, Inc. Year seven (2004) end-of-year report.

Davis, G.J, H.D. Brasdshaw, M.M. Brinson, and G.M. Lekson. 1985. Salinity and Nutrient Dynamics in Jacks, Jacobs, and South Creeks in North Carolina, October 1981-November 1982. *Journal of the Elisha Mitchell Scientific Society* 101(2): 37-51.

Dorney, J. April 5, 2006. Memo: Background information on the water quality and aquatic life values of headwater streams and headwater wetlands. Wetlands Program Development Unit. NC Department of Environment and Natural Resources.

Dorney, J., D. Hugget, and R. Ferrell. 2004. State Wetland Programs: North Carolina. Windham, ME: Association of State Wetland Managers. Available at http://www.aswm.org/swp/northcarolina9.htm.

Duncan C.P. and P.M. Groffman. 1994. Comparing microbial parameters in natural and constructed wetlands. *Journal of Environmental Quality* 23: 298-305.

Gemperline, P.J., K.H. Miller, T.L.West, J.E. Weinstein, J.C. Hamilton, and J.T. Bray. 1992. Principal Component Analysis, Trace Elements, and Blue Crab Shell Disease. *Analytical Chemistry* 64(9): 523-531.

Havens K.J, D. O'Brien, D. Stanhope, K. Angstadt, D. Schatt, and C. Hershner. 2004. Initiating development of a forested headwater wetland HGM model for wetlands management in Virginia. Center for Coastal Resources Management; Virginia Institute of Marine Sciences. Final Report to The U.S. Environmental Protection Agency (CD #983596-01).

Hunter R.G., and S.P. Faulkner 2001. Denitrification potential in restored and natural wetlands. *Soil Science Society of America Journal* 65: 1865-1872.

Hupp, C.R. 2000. Hydrology, geomorphology and vegetation of Coastal Plain rivers in the south-eastern USA. *Hydrological Processes* 14: 2991-3010.

Lugo A.E, S. Brown and M.M. Brinson. 1988. Forested wetlands in freshwater and salt-water environments. *Limnology and Oceanography* 33(4 part 2), 894-909.

Mitsch, W.J and J.G. Gosselink. 1993. Wetlands, 2nd Edition. John Wiley & Sons, Inc. New York.

Riggs , S.R., E.R. Powers, J.T. Bray, P.M. Stout, C. Hamilton, D. Ames, R. Moore, J. Watson, S. Lucas, and M. Williamson. 1989. Heavy metal pollutants in organic-rich muds of the Pamlico River Estuarine System: Their concentration, distribution, and effects upon benthic environments and water quality. Albemarle-Pamlico Estuarine Study. Project No. 89-06.

Rulifson, R.A. 1991. Finfish Utilization of Man-Initiated and Adjacent Natural Creeks of South Creek Estuary, North Carolina Using Multiple Gear Types. *Estuaries* 14(4): 447-464.

Street, M.W., A.S. Deaton, W.S. Chappell, and P.D. Mooreside. 2005. North Carolina Coastal Habitat Protection Plan. NC Department of Environment and Natural Resources, Division of Marine Fisheries.

Sun, G., S.G. McNulty, D.M. Amatya, R.W. Skaggs, L.W. Swift Jr., J.P. Shepard, and H.Riekerk.2002. A comparison of the watershed hydrology of coastal forested wetlands and the mountainous uplands in the Southern US. *Journal of Hydrology* 263:92-104.

United States Army Corps of Engineers (USACE). 2006. Draft Environmental Impact Statement for the PCS Phosphate Mine Continuation, Aurora, North Carolina.

United States Environmental Protection Agency (USEPA), 2001. Sustainable Communities. Office of Water document number EPA843-F-01-002k.

United States Environmental Protection Agency (USEPA), 2001.Functions and Values of Wetlands. Office of Water document number EPA843-F-01-002c.

Verhoeven J.T.A., D.F. Whigham, R. van Logtestijn, and J. O'Neil. 2001.A comparative study of nitrogen and phosphorus cycling in tidal and non-tidal riverine wetlands. *Wetlands* 21: 210-222.

Verry, E.S. 1997. Hydrological processes of natural, northen forested wetlands. In: Trettin, C.C., Jurgensen, M.F., Grigal, D.F., Gale, M.R. Jeglum, J.F. (Eds.). Northern Forested Wetlands, Ecology and Mangament. Lewis, New York, pp. 163-188.

Wakefield, Z.T. 1980. Distribution of cadmium and selected metals in phosphate fertilizer processing. TVA Publication Y-159.

Weinstein, J.E., T.L. West, and J.T. Bray. 1992. Shell Disease and Metal Content of Blue Crabs, *Callinectes sapidus*, from the Albemarle-Pamlico Estuarine System, North Carolina. *Archives of Environmental Contamination and Toxicology* 23:355-362.

West, T. L. 1990. Benthic Invertebrate Utilization of Man-Made and Natural Wetlands. Report to Texasgulf Chemicals, Inc. Aurora, North Carolina 27896.

West T.L., L.M. Clough, and W.G. Ambrose Jr. 2000. Assessment of function in an oligohaline environment: Lessons learned by comparing created and natural habitats. *Ecological Engineering* 15: 303-321.

Wharton, C.H., W.M. Kitchens, and T.W.S.E.C. Pendleton.1982. The ecology of bottomland hardwood swamps of the southeast: a community profile. U.S. Fish and Wildlife Service, Biological Services Program, Washington, D.C.

Attachment 5

SELC PTRF
4(1 Certification Comment Letter
07/07/2008

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.

References

Browder, J. A., Z. Zein-Eldin, M.M. Criales, M.B. Robblee, S. Wong, T.L. Jackson, and D.Johnson. 2002. Dynamics of Pink Shrimp (*Farfantepenaeus duorarum*) Recruitment Potential in Relation to Salinity and Temperature in Florida Bay. Estuaries Vol. 25, No. 68, p. 1355-1371.

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Bulger, A.J., B.P. Hayden, M.G. McCormick-Ray, M.E. Monaco, and D.M. Nelson. 1990. A proposed estuarine classification: analysis of species salinity ranges. ELMR Rept. No. 5. Strategic Assessment Branch, NOS/NOAA, Rockville, MD, 28 p. (Cited by Pottillo et al. 1995.)

Carter V. 1997. Technical Aspects of Wetlands Wetland Hydrology, Water Quality, and Associated Functions. US Geological Survey Water Supply Paper 2425

Council for Agricultural Science and Technology. 1999. Gulf of Mexico Hypoxia: Land and Sea Interactions. Task force Report no. 134

CZR Incorporated, J.T. Trefry, and T. Logan. 1999. Final report for the cadmium and other metals study on and adjacent to PCS Phosphate Reclamation Areas (R-1, R-2, R-3, and the Charles Tract).

DFO, 2000. Effects of sediment on fish and their habitat. DFO Pacific Region Habitat Status Report 2000/01.

Erwin, K. L., S. J. Doherty, M. T. Brown, and G. R. Best. 1997. Evaluation of constructed wetlands on phosphate mined lands in Florida. Vol. 1. FIPR proj. 92-03-103.

Galatowitsch, S. M. and A. G. van der Valk. 1996. The vegetation of restored and natural prairie wetlands. Ecol. Appl. 6:102-112

Galindo-Bect, M.S., and E. P. Glen. 2000. Penaeid shrimp landings in the upper Gulf of California in relation to Colorado River freshwater discharge. Fish. Bull. 98:222-225.

Henley W.F., M. A. Patterson, R. J. Neves, A. and D Lemly. 2000. Effects of Sedimentation and Turbidity on Lotic Food Webs: A Concise Review for Natural Resource Managers. Rev. Fish. Sci. Vol 8 pp125-139.

McKenna, S., M. Jansen and M.G. Pulley. 1990. Shell disease of blue crabs, Callinectes sapidus, in the Pamlico River, North Carolina. Div. Mar. Fish. Sp. Sci. Rep. No. 51. 30pp.

Minello, T. J. 1999. Nekton densities in shallow estuarine habitats of Texas and Louisiana and the identification of essential fish habitat. Ameri. Fish. Soci. Symp. 22:43–75.

Minello, T. J. 2000. Temporal development of salt marsh value for nekton and epifauna: Utilization of dredged material marshes in Galveston Bay, Texas, USA. Wetlands Ecol. and Manag. 8:327-341.

Minello, T. J, and J. W. Webb, Jr. 1997. Use of natural and created *Spartina alterniflora* salt marshes by fishery species and other aquatic fauna in Galveston Bay, Texas, USA. Mar. Ecol. Prog. Ser. 151:165-179.

Minello, T. J, and R. J. Zimmerman. 1992. Utilization of natural and transplated Texas salt marshes by fish and decapod crustaceans. Mar. Ecol. Prog. Ser. 90:273-285.

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Monaco, M.E., and R.L. Emmett. 1988. National Estuarine Inventory: Estuarine Living Marine Resources Project, Washington State Component. Ocean Assess. Div., NOS/NOAA, Rockville, MD, 82 p. (Cited by Pottillo et al. 1995.)

Mueller A.J., and G.A. Matthews. 1987. Freshwater inflow needs of the Matagorda Bay System with Focus on Penaeid Shrimp. NOAA Tech. Memo. NMFS-SEFC-189.

Orlando, S.P., Jr., L.P. Rozas, G.H. Ward, and C.J. Klein. 1993. Salinity characteristics of Gulf of Mexico estuaries. National Oceanic and Atmospheric Administration, Office of Ocean Resources Conservation and Assessment, Silver Spring, MD, 209 p. (Cited by Pottillo et al. 1995.)

Pattillo, M., L. P. Rozas, and R. J. Zimmerman. 1995. A review of salinity requirement for selected invertebrates and fishes of U.S. Gulf of Mexico estuaries. NMFS. SEFC. Gal. Lab.

Peterson, G. W., and R. E. Turner. 1994. The value of salt marsh edge vs. interior as a habitat for fish and decapod crustaceans in a Louisiana tidal marsh. Estuaries 17:235–262.

Rozas, L. P., and R. J. Zimmerman. 2000. Small-scale patterns of nekton use among marsh and adjacent shallow nonvegetated areas of the Galveston Bay Estuary, Texas (USA). Marine Ecology Progress Series 193:217–239.

Schreuder, P.J., J. K. Earls and J. M. Dumeyer. 2006. Impact of Phosphate Mining on Streamflow. FIPR Project Number #01-03-145R.

Simenstad, C. A. and R. M. Thom. 1996. Functional equivalency trajectories of the restored Gog-Le-Hi-Te estuarine wetland. Ecol. Appl. 6:38-56.

Street, M.W., A.S. Deaton, W.S. Chappell, and P.D. Mooreside. 2005. North Carolina Coastal Habitat Protection Plan. NC Division of Marine Fisheries, Morehead City, NC. 608 p.

Streever, W. J. 2000. *Spartina alterniflora* marshes on dredged material: a critical review of the ongoing debate over success. Wetlands Ecol. and Manag.8:295-316.

Streever, W. J., K. M. Portier, and T. L. Crisman. 1996. A comparison of dipterans from ten created and ten natural wetlands. Wetlands 16:416-428.

Turner, R. E. 1977. Intertidal vegetation and commercial yields of penaeid shrimp. Trans. of Amer. Fish. Soci. 106:411–416.

Turner, R. E. 1992. Coastal wetlands and penaeid shrimp habitat. Pages 97–104 *in* R. H. Stroud, editor. Stemming the tide of coastal fish habitat loss. National Coalition for Marine Conservation, Savannah, Georgia, USA.

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