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PUCO

*Peter Campbell King
J. Kevin King
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(1924-1984)
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(1927-2007)*

April 28, 2008

Chairman Joseph T. Kelliher
Commissioner Suede G. Kelly
Commissioner Philip D. Moeller
Commissioner Marc Spitzer
Commissioner Jon Wellenhoff
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

via e-filing

Re: Rockies Express Pipeline, L.L.C.
Proposed REX EAST Project
FERC Docket CP07-208-000

**Response of Hoosier Hills Regional Water District
to the Final Environmental Impact Statement
and Request for Review**

Dear Commissioners:

Elrod Water Company, Inc., d/b/a Hoosier Hills Regional Water District ("Hoosier Hills") submits this Response to FERC's Environmental Impact Statement filed April 11, 2008. Your critical analysis of the FEIS, and your intervention, is urgently needed.

Chairman Kelliher's letter to Senator Lugar dated April 17, 2008¹ indicates that the Commission is assured that the concerns raised by Hoosier Hills, Franklin County residents and their legislators are properly addressed and resolved by FERC Staff in the FEIS. Your collective assurance is likely based on a reliance on the accuracy of its staff's analysis in the FEIS; however, this Honorable Commission is not afforded the luxury of such a reliance.

¹ Accession Number 20080424-0038, Response to US Senator Richard G. Lugar's 3/19/08 letter on behalf of an individual re the Rockies Express Pipeline Project - East under CP07-208.

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The Staff's review process has been fraught with a wide range of material inadequacies, beginning with REX's submission of documentation for the wrong part of the Whitewater River, instead of proposed drilling site. Further, Staff failed to recognize impacts on the groundwater from operation. Many important factors were largely, or completely, ignored, including the fact that no other source of water is readily available should this aquifer be contaminated; that even if the pipeline does not contaminate the aquifer, HHRWD will be forced to incur astronomical costs merely by the presence of the pipeline in the aquifer. Other concerns raised were summarily dismissed as "negligible" or "minimal". Finally, the absence in the FEIS of any analysis as to why the pipeline must be sited in this critical sole source aquifer, and why it could not be re-routed, is unjustified and imprudent.

Certain conclusions reached by the FERC Staff are based on erroneous information submitted by REX. The errors are so material that the staff's recommendations on which they are based fail to serve their intended purpose: the purported protection against the spoliation of the Whitewater River aquifer.

From its Executive Summary problems are apparent.

At ES-3: the FEIS states:

The potential for contamination from spills of diesel fuel and hydraulic fuels is also a concern. Rockies Express has provided a plan to reduce the potential for spills and to control and remove any spills that may occur.

In fact, REX's HDD Contingency and Frac-Out Plan has no plan to remove spills. Removing spills is not possible in the aquifer. REX's HDD Contingency and Inadvertent Release Plan indicates that, in the event of an in-stream contamination, it plans merely the following:

- **Monitor** the extent of the drilling fluid plume and **observe** if the release results in distressed or dying fish;
- Trip drill rod and down hole tools back toward the direction of flow until the drilling mud returns through the drilled hole to the entry/exit pit;
- Adjust the drilling fluid properties and **resume drilling**;
- **Notify** downstream water intake authorities
- **Allow the contaminants to dissipate**
- Prepare a **report**

REX's draft HDD Contingency and Inadvertent Release Plan §4.6.2.

Allowing this dangerous activity to occur in the sole source of potable water for 37,000 rate payers, which conclusion is based on fundamental factual mistakes, cannot be allowed to proceed.

The scope of the review was skewed.

At 1-4, **Scope of the Environmental Review** states that the principal objectives in preparing this EIS were to:

- Identify and assess potential impacts on the natural and human environment that would result from the implementation of the proposed actions;
- Describe and evaluate reasonable alternatives to the proposed actions that would avoid or minimize adverse effects on the environment; and
- Identify and recommend specific mitigation measures, as necessary, to minimize the environmental impacts.

Nowhere does it appear that considering recommending against the request to route the pipeline through this site was within their scope: only how to approve it. Such an approach was based on the prospect of expanding the natural gas market by the Applicant; it impaired the Staff's ability to analyze all critical issues with the necessary level of critical scrutiny to vet fully whether the siting of the pipeline as proposed is in fact proper.

The FEIS is mistaken in concluding that HDD will be successful.

HDD will not be successful at this site.

One possible explanation for the FERC Staff's erroneous conclusion to the contrary is *because REX gave the FERC Staff the wrong data*. We only recently discovered the discrepancy because, despite our repeated requests for the geotechnical analysis REX agent Jim Thompson claimed to have to support the activity, and despite Thompson's public promise to provide the information, none was ever forthcoming. After almost a week of our repeated requests for the information he promised to forward, Thompson instead forwarded our requests for the documentation to REX's legal department, where the requests have languished. *See*, attached string of emails between attorney Tamara Wilson and REX agent Jim Thompson.

Rex's geotechnical analysis is of the wrong area: milepost 391 in tract IN-FR-112.001. The pipeline is proposed to cross the Whitewater River at milepost 393 in tract IN-FR-115.001. The two sites have materially different geologic properties.

Stream Survey Data Sheets and QHEI scoresheets for the two sites highlight the important differences between them. Tract 112, at the erroneous milepost 391, has some clay in the soil, making it less permeable and more stable. It has a QHEI score of 63. The site of the Hoosier Hills aquifer at milepost 393 has a **higher QHEI score, 72**, reflecting its composition

solely of loose matter such as sand and gravel. It is highly permeable and highly unstable. It is similar to the White River, which REX appropriately determined is not a candidate for an HDD crossing.

The error is material because the true geologic properties of the Whitewater River at the proposed crossing will doom any attempt at HDD. REX's and FERC Staff's error as to fundamental material facts raises serious questions about due diligence and the competence of the analysis on which the FEIS is based.

Once HDD fails, REX's Contingency Plan is to proceed with trenching, an option rife with its own risks.

Trenching is a risky crossing method, more dangerous to the quality of the water than HDD. It is likely to contaminate the groundwater from the surface of the soil. By disturbing the soil, trenching in the waterway would also create a "French drain" aquifer intrusion path, placing this critical aquifer at risk. Yet, the FEIS appears to condone granting the drilling contractor to proceed with trenching upon HDD's failure, without requiring particularized analysis and without considering even a minor route alternative. No project approval should proceed unless these serious deficiencies are properly addressed.

It is also important to note that the Indiana DNR has neither considered nor approved any alternative crossing method. If REX is going to proceed under the authority granted to it by FERC, then FERC must require REX to utilize safe methods in the aquifer, approved by state and local authorities, or opt for altering the pipeline's route.

Staff erroneously concluded that the construction would contact only the uppermost reaches of the Wellhead Protection Area. Because of the growth of the service area of HHRWD the WPA is larger than that considered.

The FEIS at 4-27 states that the pipeline's HDD exit point would be at least 1,200 feet west of the 5-year time of travel area for HHRWD's wells, thus purportedly minimizing any impacts on the Wellhead Protection Area ("WPA") by REX's HDD activities. HHRWD's WPA is now larger than that submitted by REX and considered by the FERC Staff.

The current pumping rate used by HHRWD is 1,440,000 gallons per day, over double the pumping rate of 603,000 gallons per day on which the WPA on file with IDEM was established nearly ten (10) years ago. Based on the current pumping rate, the WPA is significantly closer to the pipeline's HDD exit point than the calculated 1200 feet. Within the next ten years, HHRWD's documented expansion plans anticipate increasing the pumping rate another twofold, to 2,880,000 gallons per day, further decreasing the distance between the WPA and the proposed site of the REX pipeline. The growth of HHRWD is necessitated by the tremendous commercial and residential growth in Franklin County and other surrounding counties served by this aquifer.

This issue needs to be revisited before the Commission concludes that the HDD activity is safe at this site.

Staff's dismissal of HHRWD's concerns with turbidity fails to consider turbidity caused by frac-outs and by hydrostatic testing.

At 4-27, paragraph 2, FERC Staff dismissed the possibility of causing turbidity in the HHRWD wells, but does acknowledge that a frac-out is possible. A frac-out would cause increase turbidity in the Whitewater River. Additionally, REX's hydrostatic testing of its pipeline will also dramatically increase turbidity in the aquifer, causing significant problems for the affected water companies for several months. Neither of these causes was considered or addressed in the FEIS.

One well-documented aspect of the Whitewater River in this area is that there is vertical leakage from the river down into the underlying aquifer. The HHRWD WPA crosses the Whitewater River downstream of the proposed location for directional drilling. Further, the FEIS acknowledges that HDD will likely increase turbidity in the Whitewater River. Turbid water will flow downstream and leak into the underlying aquifer and into the HHRWD WPA, causing HHRWD to incur significant costs to monitor and manage it.

The FEIS erroneously considered only human waste as the source of fecal coliforms' contamination of the groundwater.

The reasoning in the FEIS as to this issue is erroneous on several levels. First, at 4-26, the FEIS dismisses the potential agricultural contaminants entering the aquifer, reasoning that REX will sequester the topsoil. Its reasoning is faulty because, during construction, *run-off from the fields will have direct access to the aquifer through the exposed pipeline.*

Once the soil is disturbed, the area around the pipeline will have higher permeability by several orders of magnitude, which will cause the area around the pipeline to act as a French drain: this means that *the pipeline will be a conduit for contaminants directly to the aquifer.* Agricultural contaminants from the surrounding field will not only drain into the area around the pipe, *they will also move more quickly down into the aquifer due to the increased permeability of the soils surrounding the pipeline.*

Secondly, Staff dismissed Hoosier Hills' concerns with fecal contamination, reasoning that no septic systems have been identified. The Staff completely ignored the fact that the entire region is agricultural. Farmers do raise livestock in this area, and animal manure is spread over this land. That potential for contamination was ignored. Further, as noted above, any contaminant (including but not limited to e Coli) in the field will travel into the subsurface and the aquifer at a much quicker rate due to the increased permeability of the soil surrounding the trench.

This issue needs to be revisited before the Commission concludes that there is no risk of fecal coliforms entering the groundwater in the Project area.

The FEIS fails to establish how 350 feet from the HHRWD wells could be a sufficiently safe distance, and how the Staff established that number.

The FEIS reasons that "construction would be more than 350 feet from Hoosier Hills' current wells" and concludes that "therefore, no impacts on their mechanics or function would be anticipated". There is no basis in the science or in logic for the Staff to choose an arbitrary number of 350 feet; indeed, no basis was noted. Further, the effects of movement of the groundwater, both natural and as a result of the forces of the water pumps, has not been considered. The route of the proposed pipeline falls squarely within both the 1 and 5 year Times of Travel; the wells will most assuredly be affected by activity outside of this arbitrary 350 feet.

"Negligible Impact" violates the zero tolerance nature of the potable water business. Any amount of contamination by REX is too much.

The FEIS rationalizes the impact to the site by characterizing it as "negligible" or "minimal". Any evaluation as "negligible" or "minimal" by those who do not rely on this groundwater source must be weighed with a critical eye, especially where, as here, it was made without considering that the business of providing potable water – especially the sole source of potable water – is a zero tolerance business: one that should not be destroyed merely to expedite the pursuit of private business.

We do thank the FERC Staff for recognizing that *the Whitewater River is a major or sensitive waterbody along the route* [ES-8], and that "an inadvertent spill of hazardous materials could cause contamination within the WPA". It is positive that the Staff recommended that "Rockies . . . develop a site-specific specialized spill plan . . . and [obtain] written approval of the Director of OEP prior to the start of construction . . ." We question, however, the efficacy of such a precaution, given REX's failure and/or refusal to acknowledge the magnitude of the risk to this water source and the inadequacy of REX's plans filed to date.

For example, despite the fact that in the draft EIS, FERC directed REX to file site-specific HDD plans by the end of the DEIS comment period, REX has not done so. Given the fact that REX has realized no consequences as a result of its noncompliance, one could reasonably expect a continuation of its previous behavior.

The FEIS' recommendation for monitoring for two years after commencement of operations evidences a fundamental misunderstanding of the dynamic nature of this river.

The analysis and treatment of this waterway, both by REX and by FERC staff, has been in a vacuum, based on a fiction that the makeup of the Whitewater River is static in nature. Nothing could be further from the truth. As one resident of the area explained to REX officials at the Franklin County Area Planning Commission meeting in March of this year, this river and the river beds are in a constant state of change. The river you see today is not the same river you will see tomorrow.

Nothing in any of the documentation supports a conclusion that this dangerous activity of invading the waterway with this pipeline will somehow no longer be a risk after two years. As

shown below, the costs HHRWD will be forced to incur will be exorbitant and will continue well beyond the two years proposed in the FEIS.

REX's and the FERC Staff's failure to apprehend the significance of this issue is all the more reason to reject the placement of the pipeline in this aquifer, and to vet a better route for the pipeline.

REX's project inequitably places an undue burden on Hoosier Hills Water and its customers to incur significant infrastructure modification and monitoring costs.

HHRWD certainly realizes the importance of bringing quality natural resources to a growing market, and does not oppose the pursuit of business ventures such as the one at issue. Beyond the risk of contamination, HHRWD strongly objects to the undue burden placed on it and its customers by this project. It is HHRWD and its customers who will see immediate and permanent increased costs for monitoring and for the required changes to their operations, including the modification of the water treatment plant, even if contamination never occurs.

Increased monitoring costs:

HHRWD would be required to **drill monitoring wells and equip the sites with sampling capabilities** to protect against the contamination risks from surface contaminants, and because of the expected increase in turbidity, which will last several months after drilling.

Long-term and permanent increases for the 50+ years of operation will be suffered by HHRWD and its customers, as HHRWD will be required to install monitoring wells near the pipeline **to pull samples several times a week, if not daily, to begin testing for contaminants traditionally found in surface water**, in addition to the groundwater contaminants currently tested for. It is extremely expensive to run tests in increased scope and frequency, reasonably estimated to be approximately **\$2,000 - \$3,000 per week**.

Infrastructure modifications:

HHRWD will also be required to **modify its Water Treatment Plant**. The plant is not designed or currently equipped to handle turbidity problems. This is a new complication for HHRWD, because turbidity is generally a surface water problem, and not within the scope of its business as a groundwater operation.

Creating a system similar to a surface water plant (such as installing ultra filtration membranes) is not guaranteed to prevent contaminants getting through to the plant. Filters will not capture certain contaminants such as *Cryptosporidium* and *Giardia*, pesticides and herbicides. They can easily pass into the plant. This is yet another reason why HHRWD, as a steward of the public water supply, must zealously protect against intrusion into its wellhead protection area, and why this Commission must resist the urgings of REX executives to rubber-stamp the FEIS.

Finally, should HHRWD be forced to replace the current wellfield, water treatment plant and a transmission main to the existing customers, the present cost would be roughly \$16.8 million dollars. These costs represent a burden that far exceeds the costs to REX to adopt one of the reasonable alternative routes.

Other minor alternative routes were proposed to FERC through the comment process:

Affected landowner Andy Stirn submitted alternatives to FERC. See, **Accession Numbers 20080313-5140 and 20080321-0070**. His proposed route follows the Texas Eastern pipeline that reasonably routes the pipeline south of Cedar Grove and north of New Trenton. REX is connecting with this point about a mile across the state line in Butler County. Yet, no consideration was given to these reasonable suggestions.

Another affected landowner, Monica Yane, who has farmed the area with her husband for many years, advised FERC and REX of the erosion challenges inherent in this part of Franklin County, Indiana. She proposed that FERC and REX consider the Eastern Panhandle route, which travels across flat, almost treeless ground, and is free of the potential for erosion and sinkholes common to the proposed REX route.

Legislators from the affected area have raised their concerns with FERC.

As noted above, **United States Senator Richard G. Lugar** has inquired of this Commission in response to concerns raised by members of his constituency. **State Rep. Robert J. Bischoff** has also expressed his own grave concerns with the prospect of this pipeline invading the aquifer. Rep. Bischoff's concerns are based on his experience as the Chairman of the Indiana House of Representatives Natural Resources committee, and his service on the Agriculture & Rural Development committee, the Roads & Transportation committee, and the Veterans Affairs & Public Safety committee. Since Rep. Bischoff's letter was filed, more members of state and local government have raised their concerns:

- **State Senator Johnny Nugent**, Chair of the Agriculture & Small Business Committee;
- **Rep. Cleo Duncan**, ranking member of the Roads & Transportation Committee, also serves on the Statutory Committee on Interstate and International Cooperation;
- **Ripley County Commissioners.** Robert C. Reiners, District 1, Chuck Folz, District 2, and Lawrence Nickell, District 3;
- **The Franklin County Commissioners.** On February 4, 2008 the Franklin County Commissioners passed Resolution 2008-06, condemning the proposed location of the REX pipeline, and directing any and all county agencies and employees to take any and all necessary steps to provide necessary information and/or documentation and/or to make public objections to the location of the REX pipeline through Franklin County.

Given, however, that state and local agencies are limited in their power over this matter as stated at 1-17 of the FEIS, your exercise of your authority in this matter to take pause and require that this application process is performed correctly, is all the more important. Facts and assumptions need to be corrected; considerations remain unaddressed. No one other than you can require that to be done.

Still unaddressed:

While Hoosier Hills Regional Water District, and so many other affected parties, provided FERC with an abundance of information substantiating the legitimacy of our concerns, no analysis has occurred to consider:

- Why the pipeline should run through the only source of potable water to 37,000 Hoosiers; and
- Why the proposed pipeline route cannot be modified slightly to avoid the Whitewater River aquifer or aquifer recharge areas that might accelerate aquifer contamination altogether.

Determining the facts underlying these questions will make clear the imprudence of the current route. In turn, the decision can still be made to alter the route away from the aquifer. There is sufficient time, despite the significant pressure you are receiving from REX executives to expedite your approval of the application. No amount of money is worth the harm risked here.

Commissioners, the concerns of the people of Franklin County and the adjacent counties are valid, and many. They will have no source of potable water if REX's activities ruin the Whitewater River aquifer. Unfortunately, these concerns seem to be falling on deaf ears when it comes to being heard by those of any influence in this process.

An associate in my office spoke with REX representative Allen Fore, in an attempt to resolve the grave concerns of Hoosier Hills. She stressed the importance of considering even a slight modification of the pipeline route to take it out of the Whitewater River aquifer. Mr. Fore shrugged off her request, answering only: "it's up to FERC".

Setting aside for a moment the fact that REX could certainly move a portion of the pipeline route voluntarily when it could no longer deny that its chosen route was unacceptable – and indeed has done so on another portion of this pipeline – it appears that Mr. Fore's designation of your Commission as the sole entity with the authority to force the proper critical review is coming to fruition.

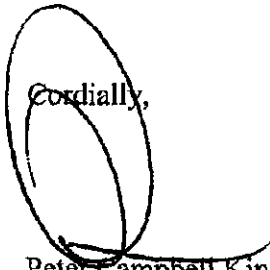
I hope that the above makes clear the gravity of this issue. We respectfully request that the Commission bring this ill-conceived, erroneously-based invasion into this invaluable aquifer to an appropriate halt, and that you take any one of the following actions:

- Table your approval of the project to afford additional time for consideration of the matters we have raised;
- Table your approval of the project until the above errors are corrected; or
- Order an evidentiary hearing before an administrative law judge with the commission to explore the merits of re-routing the pipeline away from the aquifer.

Thank you for your time and consideration. Should you have any questions, or require any additional information, please do not hesitate to call.

With kind regards, I remain

Cordially,

A handwritten signature in black ink, consisting of a large, stylized 'P' followed by a horizontal line.

Peter Campbell King
Counsel for Hoosier Hills Regional Water District

PCK/TBW
Enclosures

Cc: Sen. Richard Lugar
Sen. Evan Bayh
Rep. Mike Pence
Rep. Baron Hill
Rep. Michael Bischoff
State Senator Johnny Nugent
Rep. Cleo Duncan
Ripley County Commissioners
Franklin County Commissioners

From: Tamara Wilson twilson10@indy.rr.com
To: Jim Thompson
cc:
Date: Wed, 26 Mar 2008 08:16:59 -0400
Subject: RE: REX and Hoosier Hills Regional Water District - follow-up for information

Thank you, Jim, for your reply of this morning.

I must say I'm surprised at the change from your assurances in front of the Franklin County APC and Franklin County citizens that you would provide the information, to this, after nearly an entire week, your reply that you've forwarded my requests to the Rockies Express' legal team. What happened?

Do you have any idea of how long it will take to hear from them, or when I can expect either the requested information or some answer? Given the compressed timing requirements, an expedited production of the information would be greatly appreciated.

Thank you.
 Tamara Wilson
 Cline, King & King, PC
 PO Box 250
 Columbus, IN 47202-0250
 812-372-8461
 317-417-0047 (mobile)

-----Original Message-----

From: Jim Thompson jimt@caprock-llc.com
Sent: Wednesday, March 26, 2008 7:47 AM
To: Tamara Wilson
Cc: pck@lawdogs.org; Childs, Ryan; Billings, Christie; Phil McKiernan; Weekley, Alice; Fore, Allen - Rex Project external contact
Subject: RE: REX and Hoosier Hills Regional Water District - follow-up for information

Tamara,

I did receive your messages and have forwarded your requests to Rockies Express's legal team.

Thanks,

Jim

Jim Thompson
 Caprock Environmental Services, LLC

contractor for
 Rockies Express Pipeline, LLC
 940-A Science Blvd.
 Columbus, OH 43230

(614) 328-2070 (office)
 (614) 328-2060 (FAX)
 (866) 566-0066 (Toll Free)
 (806) 570-6800 (Mobile)
jimt@caprock-llc.com

-----Original Message-----

From: Tamara Wilson <tbw@lawdogs.org>
 Sent: Monday, March 24, 2008 2:42 PM
 To: Jim Thompson
 Cc: pck@lawdogs.org
 Subject: FW: REX and Hoosier Hills Regional Water District - follow-up for information

Good afternoon, Jim:

I am once again following up with you after we met last Wednesday, March 19, 2008 at the Franklin County (Indiana) Area Planning Commission. Last Friday, March 21, 2008 I called you at the number on your business card which you provided me on Wednesday as well, and left a voicemail message for you in which I gave you my mobile number so that you could return my call. To date I have not heard from you.

You and Allan Fore indicated on Wednesday night that Rockies Express had heretofore no intention of answering any of the questions Hoosier Hills posed to FERC unless and until FERC instructed you to do so, pointing out that "no one had asked you for this information directly". I then asked you for the information, and you stated that you would provide it to me. Yet, I have not gotten a response either from my email or my phone call.

I am still in need of obtaining the information you told me you would send me, which information is outlined below. Also, I want to provide you with whatever information you might need, as I stated to you in person and in my first email, in order to satisfy you that the Whitewater River is not conducive to HDD and that the route of the pipeline should be moved out of the Whitewater Aquifer. I want to provide you with whatever you need to become better informed, since before I posed my questions to you on the record, you were unaware that the topography and hydrogeology of the White River and Whitewater River were the same, and that HDD is equally inappropriate for the Whitewater River as it is for the White River.

Again, it is imperative that you return my call or emails right away. Time is of the essence. If you have no intention of providing the documentation, kindly let me know, and I will not bother to continue to try to reach you.

Thank you. I look forward to hearing from you right away.

Tamara B. Wilson
 Cline, King & King, PC
 PO Box 250
 Columbus, IN 47202-0250
 812-372-8461
 317-417-0047 (mobile)

-----Original Message-----

From: Tamara Wilson <tbw@lawdogs.org>
 Sent: Wed, 19 Mar 2008 23:22:44 -0700
 Subject: REX and Hoosier Hills Regional Water District

Jim:

Thank you for speaking with me earlier tonight. As you can imagine, I was disappointed to learn that all of the concerns and questions that the Hoosier Hills Regional Water District had submitted to FERC in the comment period would not be addressed or considered by REX unless or

until FERC posed the questions to you itself.

I hope that we are now able to work through this issue of the proposed placement of the REX pipeline through the Whitewater River aquifer, that REX will reconsider its placement and move the route of the pipeline out of the aquifer and out of the Wellhead Protection Areas of the four water companies serving this area.

As we discussed, I am sending you this email so that you will provide me with the following:

1. your geotech analysis reports and any and all other hydrogeology information you have on the Whitewater River and your proposed HDD and pipeline placement in the Whitewater River aquifer; and
2. your gas analysis on the gas REX proposes to transport in the proposed pipeline

Additionally, as you know, there were many questions posed tonight for which REX did not have the answers. Can you also please send me whatever information and documentation you have on:

1. The expected temperature of the pipeline in operation;
2. studies or analyses on what effect the elevated temperature of the pipeline will have on the aquifer;
3. the gauge of the pipe used at the water crossing and in the aquifer;
4. any other aquifers the proposed pipeline is slated to cross;
5. this area being (or not being) a seismic area;
6. the use of the Bentonite mud in the HDD process. Specifically, I am unclear on a couple of points. You explained that the drill shaft you are boring will be approximately a 60-inch hole and that the bentonite "plug" will hold the shaft open and become displaced on the exit side of the drilled drill shaft when the pipe is inserted. I later understood you to say that the bentonite "mud" will remain around the outside of the pipe, but only at the ingress and egress points of the pipeline on either side of the Whitewater River and not past the transition zone. What I do not understand then has to do with the span of the pipeline between the entry and exit, where the bentonite mud will not remain. What will fill the gap, then, between the 42-inch pipe and the 60-inch hole? Is the soil simply expected to cave in around the pipe?

Lastly, can you please tell me what information you need to see in order to confirm what we told you tonight -- that the hydrogeology of the Whitewater River and aquifer is not suited for placement of the REX pipeline in this location. I am happy to provide you with whatever documentation you would consider credible and authoritative so that you can substantiate the merits of my client's strong opposition to the placement of the pipeline in the aquifer. Please advise and I will provide you with whatever helps.

Again, Jim, thank you very much for your time and consideration. I look forward to hearing from you soon, and to receiving the above information right away.

Very truly yours,
Tamara B. Wilson
Cline, King & King, PC
812-372-8461
317-417-0047 (mobile)

**GEOTECHNICAL INVESTIGATION
ROCKIES PIPELINE PROJECT – EAST
WHITEWATER RIVER CROSSING
FRANKLIN COUNTY, INDIANA
BROOKVILLE, INDIANA**

**TERRACON NO. 11075020
JUNE 2007**

Prepared for:

**Rockies Express Pipeline LLC
Houston, Texas**

Prepared by:

Terracon

Naperville, Illinois

May, 2007	50556.003
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May, 2007	50556.003
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**Rockies Express – East Pipeline Project
Stream Survey Data Sheet**

Unique Site ID: WB-IN-392-BBB		Waterbody Name: Whitewater River	
Date: 5/17/07	State: IN	County: Franklin	Crew: ANS+BB
Tract Number(s): IN-FR-112.001		Milepost of Feature: 392.5 (at centerline or corridor entry point)	

Stream Characteristics

Stream Classification:		Crosses Centerline:	
<input type="checkbox"/> Ephemeral	<input type="checkbox"/> Intermittent	<input checked="" type="checkbox"/> Perennial	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Width at OHWM* (ft): 50ft (at centerline, if crossing)		Approximate Average Water Depth (ft): 10ft	
Top of Bank Width (ft): 80ft (at centerline, if crossing)		Average Width at OHWM in Corridor (ft): 60ft	
Bank Height (ft): 20ft		Connects to: WB-IN-392-AAA (Blue Creek) (other waterbodies, wetlands) Connects to it	
Approximate Water Velocity (fps): 2 fps		Riparian Forest: <input checked="" type="checkbox"/> Present <input type="checkbox"/> Absent	
Adjacent Bank Vegetation: Silver Maples, Box Elder, TOX RAD, Wood Nettle, VITRIP, PLAOCC			
Stream Bottom Composition:			
<input checked="" type="checkbox"/> Boulders	<input type="checkbox"/> Slate	<input checked="" type="checkbox"/> Silt	<input checked="" type="checkbox"/> Clay/Hardpan
<input type="checkbox"/> Bedrock	<input checked="" type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Leaf Pack/Woody Debris	<input type="checkbox"/> Muck
<input checked="" type="checkbox"/> Cobble	<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine Detritus	<input type="checkbox"/> Artificial
Unique Features:			
<input type="checkbox"/> Seeps	<input type="checkbox"/> Gravel Beds	<input type="checkbox"/> Erosion	<input type="checkbox"/> Bank Collapse
<input type="checkbox"/> Rip-rap road	<input type="checkbox"/> Bedrock	<input type="checkbox"/> Wells	<input type="checkbox"/> Adjacent Wetlands
<input type="checkbox"/> Buildings	<input type="checkbox"/> Cut-off Channels	<input type="checkbox"/> Riffles/Runs	<input checked="" type="checkbox"/> Steep Side Slopes

Notes/Drawing

See QHEI data sheet

*Ordinary High Water Mark (OHWM) 1.0 meter = 3.28 feet

LMW 5/24/07



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

63

River Code: 365003 RM Stream: WB-TN-392-BBB Whitewater RiverDate: 5/17/07 Location: TN-FR-112-001Scorer's Full Name: ANS + BJB Affiliation: FEARW-Dex

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE		POOL RIFFLE		POOL RIFFLE SUBSTRATE ORIGIN		SUBSTRATE QUALITY	
<input type="checkbox"/> BLDR/SLBS [10]	<u>10</u>	<input type="checkbox"/> GRAVEL [7]	<u>10</u>	<input type="checkbox"/> Limestone [1]	<input type="checkbox"/> SILT: [1]	<input type="checkbox"/> SILT HEAVY [-2]	Substrate <div style="border: 1px solid black; padding: 2px; display: inline-block;">15</div> Max 20
<input type="checkbox"/> BOULDER [9]	<u>10</u>	<input type="checkbox"/> SAND [8]	<u>50</u>	<input type="checkbox"/> TILLS [1]	<input type="checkbox"/> SILT MODERATE [-1]	<input type="checkbox"/> SILT MODERATE [-1]	
<input type="checkbox"/> COBBLE [8]	<u>10</u>	<input type="checkbox"/> BEDROCK [8]	<u>10</u>	<input type="checkbox"/> WETLANDS [0]	<input type="checkbox"/> SILT NORMAL [0]	<input type="checkbox"/> SILT FREE [1]	
<input type="checkbox"/> HARDPAN [4]	<u>10</u>	<input type="checkbox"/> DETRITUS [3]	<u>10</u>	<input type="checkbox"/> HARDPAN [0]	<input type="checkbox"/> EXTENSIVE [-2]	<input type="checkbox"/> MODERATE [-1]	
<input type="checkbox"/> MUCK [2]	<u>40</u>	<input type="checkbox"/> ARTIFICIAL [0]	<u>10</u>	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> NORMAL [0]	<input type="checkbox"/> NONE [1]	
<input type="checkbox"/> SILT [2]	<u>40</u>	NOTE: Ignore Sludge Originating From Point Sources		<input type="checkbox"/> RIP/RAP [0]	NESS:	<input type="checkbox"/> COAL FINES [-2]	
NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or +)		<input checked="" type="checkbox"/> 4 or More [2]		<input type="checkbox"/> 3 or Less [0]			

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur		AMOUNT: (Check ONLY One or check 2 and AVERAGE)		Cover <div style="border: 1px solid black; padding: 2px; display: inline-block;">9</div> Max 20
<input checked="" type="checkbox"/> UNDERCUT BANKS [1]	<input checked="" type="checkbox"/> POOLS > 70 cm [2]	<input checked="" type="checkbox"/> OXBOWS, BACKWATERS [1]	<input type="checkbox"/> EXTENSIVE > 75% [11]	
<input checked="" type="checkbox"/> OVERHANGING VEGETATION [1]	<input checked="" type="checkbox"/> ROOTWADS [1]	<input checked="" type="checkbox"/> AQUATIC MACROPHYTES [1]	<input checked="" type="checkbox"/> MODERATE 25-75% [7]	
<input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input checked="" type="checkbox"/> BOULDERS [1]	<input checked="" type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input checked="" type="checkbox"/> SPARSE 5-25% [3]	
<input checked="" type="checkbox"/> ROOTMATS [1]	COMMENTS:		<input type="checkbox"/> NEARLY ABSENT < 5% [1]	

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY		DEVELOPMENT		CHANNELIZATION		STABILITY		MODIFICATIONS/OTHER		Channel <div style="border: 1px solid black; padding: 2px; display: inline-block;">15</div> Max 20
<input checked="" type="checkbox"/> HIGH [4]	<input checked="" type="checkbox"/> EXCELLENT (7)	<input checked="" type="checkbox"/> NONE [6]	<input checked="" type="checkbox"/> HIGH [3]	<input type="checkbox"/> SNAGGING	<input type="checkbox"/> IMPOUND.					
<input checked="" type="checkbox"/> MODERATE [3]	<input checked="" type="checkbox"/> GOOD [5]	<input checked="" type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> RELOCATION	<input type="checkbox"/> ISLANDS					
<input checked="" type="checkbox"/> LOW [2]	<input checked="" type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input checked="" type="checkbox"/> LOW [1]	<input type="checkbox"/> CANOPY REMOVAL	<input type="checkbox"/> LEVEED					
<input checked="" type="checkbox"/> NONE [1]	<input checked="" type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]		<input type="checkbox"/> DREDGING	<input type="checkbox"/> BANK SHAPING					
				<input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS						

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH		FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)		BANK EROSION		Riparian <div style="border: 1px solid black; padding: 2px; display: inline-block;">8</div> Max 10
<input checked="" type="checkbox"/> WIDE > 50m [4]	<input checked="" type="checkbox"/> FOREST, SWAMP [3]	<input checked="" type="checkbox"/> CONSERVATION TILLAGE [1]	<input checked="" type="checkbox"/> NONE/LITTLE [3]			
<input checked="" type="checkbox"/> MODERATE 10-50m [3]	<input checked="" type="checkbox"/> SHRUB OR OLD FIELD [2]	<input checked="" type="checkbox"/> URBAN OR INDUSTRIAL [0]	<input checked="" type="checkbox"/> MODERATE [2]			
<input checked="" type="checkbox"/> NARROW 5-10 m [2]	<input checked="" type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]	<input checked="" type="checkbox"/> HEAVY/SEVERE [1]			
<input checked="" type="checkbox"/> VERY NARROW < 5 m [1]	<input checked="" type="checkbox"/> FENCED PASTURE [1]	<input checked="" type="checkbox"/> MINING/CONSTRUCTION [0]				
<input checked="" type="checkbox"/> NONE [0]	COMMENTS:					

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH		MORPHOLOGY		CURRENT VELOCITY (POOLS & RIFFLES)		Pool/ Current <div style="border: 1px solid black; padding: 2px; display: inline-block;">8</div> Max 12
(Check 1 ONLY!)	(Check 1 or 2 & AVERAGE)	(Check All That Apply)				
<input checked="" type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input checked="" type="checkbox"/> EDDIES [1]	<input type="checkbox"/> TORRENTIAL [-1]			
<input checked="" type="checkbox"/> 0.7-1m [4]	<input checked="" type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input checked="" type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]			
<input type="checkbox"/> 0.4-0.7m [2]	<input checked="" type="checkbox"/> POOL WIDTH < RIFFLE W. [0]	<input checked="" type="checkbox"/> MODERATE [1]	<input type="checkbox"/> INTERMITTENT [-2]			
<input type="checkbox"/> 0.2-0.4m [1]		<input checked="" type="checkbox"/> SLOW [1]	<input type="checkbox"/> VERY FAST [1]			
<input type="checkbox"/> < 0.2m [POOL=0]	COMMENTS:					

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH		RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS		Riffle/Run <div style="border: 1px solid black; padding: 2px; display: inline-block;">0</div> Max 8
<input type="checkbox"/> Best Areas > 10 cm [2]	<input type="checkbox"/> MAX > 50 [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]					
<input type="checkbox"/> Best Areas 5-10 cm [1]	<input type="checkbox"/> MAX < 50 [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]					
<input type="checkbox"/> Best Areas < 5 cm		<input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]					
(RIFFLE=0)			<input type="checkbox"/> EXTENSIVE [-1]					
COMMENTS: <u>Non riffle</u>				<input type="checkbox"/> NO RIFFLE (Metric=0)				

6) GRADIENT (ft/mi): 3.0 DRAINAGE AREA (sq.mi.): 3.0%POOL: 20 %GLIDE: 40
%RIFFLE: 0 %RUN: 40

* Best areas must be large enough to support a population of riffle-obligate species

LMK 5/24/07

Is Sampling Reach Representative of the Stream (Y/N) Y If Not, Explain:

Major Suspected Sources of Impacts (Check All That Apply):

None ☐ Industrial ☐ WWTP ☐ Ag ☐ Livestock ☐ Silviculture ☐ Construction ☐ Urban Runoff ☐ CSOs ☐ Suburban Impacts ☐ Mining ☐ Channelization ☐ Riparian Removal ☐ Landfills ☐ Natural ☐ Dams ☐ Other Flow Alteration ☐ Other: _____

First Sampling Pass

Gear: _____ Distance: _____ Water Clarity: _____ Water Stage: - Canopy: % Open 80%

Stream Measurements:

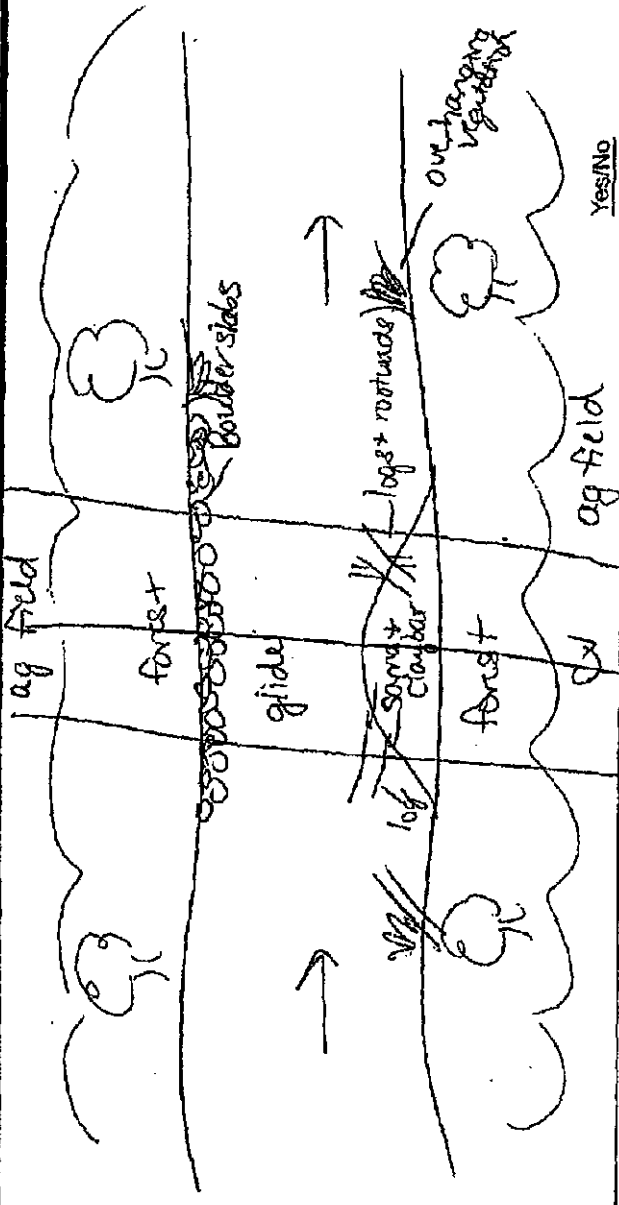
Average Width	Average Depth	Maximum Depth	Av. Bankfull Width	Bankfull Mean Width	W/D Ratio	Bankfull Max Depth	Floodprone Area	Entrenchment Ratio
50ft	10ft	15ft	65ft	3ft				

Subjective Rating (1-10) 7

Aesthetic Rating (1-10) 8

Gradient: ☐ Low, ☐ Moderate, ☐ High

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No

☐ Is Stream Ephemeral (no pools, totally dry or only damp spots)?

☐ Is there water upstream? How Far: _____



☐ Is There Water Close Downstream? How Far: _____

☐ Is Dry Channel Mostly Natural?

**Rockies Express – East Pipeline Project
Stream Survey Data Sheet**

Unique Site ID: WB-IN-393-AAA		Waterbody Name: Whitewater River	
Date: 5/17/07	State: IN	County: Franklin	Crew: AMS/AB
Tract Number(s): IN-FR-115.001		Milepost of Feature: 393.0 (at centerline or corridor entry point)	

Stream Characteristics

Stream Classification:		Crosses Centerline:	
<input type="checkbox"/> Ephemeral	<input type="checkbox"/> Intermittent	<input checked="" type="checkbox"/> Perennial	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Width at OHWM* (ft): 		Approximate Average Water Depth (ft): 10ft	
Top of Bank Width (ft): 		Average Width at OHWM in Corridor (ft): 50ft	
Bank Height (ft): 20ft		Connects to: WB-IN-392-AAA (other waterbodies, wetlands) connects to it	
Approximate Water Velocity (fps): 5 fps		Riparian Forest: <input checked="" type="checkbox"/> Present <input type="checkbox"/> Absent	
Adjacent Bank Vegetation: PLAOC, JUBNIG, GLAGIG, ACENEG, FESARU, EUPSER POANRA			
Stream Bottom Composition:			
<input checked="" type="checkbox"/> Boulders	<input type="checkbox"/> Slate	<input checked="" type="checkbox"/> Silt	<input type="checkbox"/> Clay/Hardpan
<input type="checkbox"/> Bedrock	<input checked="" type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Leaf Pack/Woody Debris	<input type="checkbox"/> Muck
<input checked="" type="checkbox"/> Cobble	<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine Detritus	<input type="checkbox"/> Artificial
Unique Features:			
<input type="checkbox"/> Seeps	<input type="checkbox"/> Gravel Beds	<input type="checkbox"/> Erosion	<input type="checkbox"/> Bank Collapse
<input type="checkbox"/> Rip-rap road	<input type="checkbox"/> Bedrock	<input type="checkbox"/> Wells	<input type="checkbox"/> Adjacent Wetlands
<input type="checkbox"/> Buildings	<input type="checkbox"/> Cut-off Channels	<input type="checkbox"/> Riffles/Runs	<input checked="" type="checkbox"/> Steep Side Slopes

Notes/Drawing

See QHEI data sheet

*Ordinary High Water Mark (OHWM) 1.0 meter = 3.28 feet

5/24/07

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 72River Code: 6508003 RM Stream: Whitewater River WB-IN-343 PAXDate: 5/17/07 Location: IN-FR-115.001Scorers Full Name: ANS & BJB Affiliation: SENEW-REX

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE		POOL RIFFLE		POOL RIFFLE SUBSTRATE ORIGIN		SUBSTRATE QUALITY	
<input type="checkbox"/> BLDR/SLBS [10]	<input type="checkbox"/> GRAVEL [7]	<input type="checkbox"/> SAND [8]	<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/> LESTONE [1]	<input type="checkbox"/> SILT	<input type="checkbox"/> SILT HEAVY [-2]	Substrate <div style="border: 1px solid black; padding: 2px; display: inline-block;">15</div> Max 20
<input type="checkbox"/> BOULDER [8]	<input type="checkbox"/> SAND [8]	<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/> TILLS [1]	<input type="checkbox"/> WETLANDS [0]	<input type="checkbox"/> SILT MODERATE [-1]	
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/> HARDPAN [0]	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> SILT NORMAL [0]	
<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> LACUSTRINE [0]	<input type="checkbox"/> SILT FREE [1]	
<input type="checkbox"/> MUCK [2]	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> LACUSTRINE [0]	<input type="checkbox"/> SHALE [-1]	<input type="checkbox"/> EXTENSIVE [-2]	
<input type="checkbox"/> SILT [2]	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> LACUSTRINE [0]	<input type="checkbox"/> SHALE [-1]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/> NORMAL [0]
				<input type="checkbox"/> COAL FINES [-2]	<input type="checkbox"/> NONE [1]		

NUMBER OF SUBSTRATE TYPES: 4 or More [2]
(High Quality Only, Score 5 or >)

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur		AMOUNT: (Check ONLY One or check 2 and AVERAGE)	
<input type="checkbox"/> UNDERCUT BANKS [1]	<input type="checkbox"/> POOLS > 70 cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]	<input type="checkbox"/> EXTENSIVE > 75% [11]
<input type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> AQUATIC MACROPHYTES [1]	<input type="checkbox"/> MODERATE 25-75% [7]
<input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input type="checkbox"/> SPARSE 5-25% [3]
<input type="checkbox"/> ROOTMATS [1]	COMMENTS:		<input type="checkbox"/> NEARLY ABSENT < 5% [1]

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS/OTHER
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]	<input type="checkbox"/> SNAGGING
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> RELOCATION
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]	<input type="checkbox"/> CANOPY REMOVAL
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]		<input type="checkbox"/> DREDGING
				<input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH		FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)		BANK EROSION	
<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> CONSERVATION TILLAGE [1]	<input type="checkbox"/> NONE/LITTLE [3]	<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> HEAVY/SEVERE [1]
<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]	<input type="checkbox"/> OPEN PASTURE, ROWCROP [0]	<input type="checkbox"/> MINING/CONSTRUCTION [0]	
<input type="checkbox"/> NARROW 5-10 m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]				
<input type="checkbox"/> VERY NARROW < 5 m [1]	<input type="checkbox"/> FENCED PASTURE [1]				
<input type="checkbox"/> NONE [0]					

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH	MORPHOLOGY	CURRENT VELOCITY (POOLS & RIFFLES!)	Pool/Current
(Check 1 ONLY!)	(Check 1 or 2 & AVERAGE)	(Check All That Apply)	
<input type="checkbox"/> > 1m [6]	<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> EDDIES [1]	<input type="checkbox"/> TORRENTIAL [-1]
<input type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]	<input type="checkbox"/> MODERATE [1]	<input type="checkbox"/> INTERMITTENT [-2]
<input type="checkbox"/> 0.2-0.4m [1]		<input type="checkbox"/> SLOW [1]	<input type="checkbox"/> VERY FAST [1]
<input type="checkbox"/> < 0.2m [POOL=0]	COMMENTS:		

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE			
RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
<input type="checkbox"/> Best Areas > 10 cm [2]	<input type="checkbox"/> MAX > 50 [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> Best Areas 5-10 cm [1]	<input type="checkbox"/> MAX < 50 [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> Best Areas < 5 cm		<input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
(RIFFLE=0)			<input type="checkbox"/> EXTENSIVE [-1]
COMMENTS:		<input type="checkbox"/> NO RIFFLE (Metric=0)	

COMMENTS:

6) GRADIENT (ft/mi): 30 DRAINAGE AREA (sq.mi.):%POOL: 10 %GLIDE: 10%RIFFLE: 50 %RUN: 40

* Real grass must be large enough to support a population of off-toadys species

LMN 5/24/07

Is Sampling Reach Representative of the Stream (Y/N) Y If Not, Explain:

Major Suspected Sources of Impacts (Check All That Apply):

None ☐ Industrial ☐ WWTP ☐ Agriculture ☐ Livestock ☐ Silviculture ☐ Construction ☐ Urban Runoff ☐ CSOs ☐ Mining ☐ Channelization ☐ Riparian Removal ☐ Landfills ☐ Natural ☐ Dams ☐ Other Flow Alteration ☐ Other: _____

First Sampling Pass

Gear: _____ Distance: _____ Water Clarity: _____ Water Stage: - Canopy - % Open 80%

Stream Measurements:

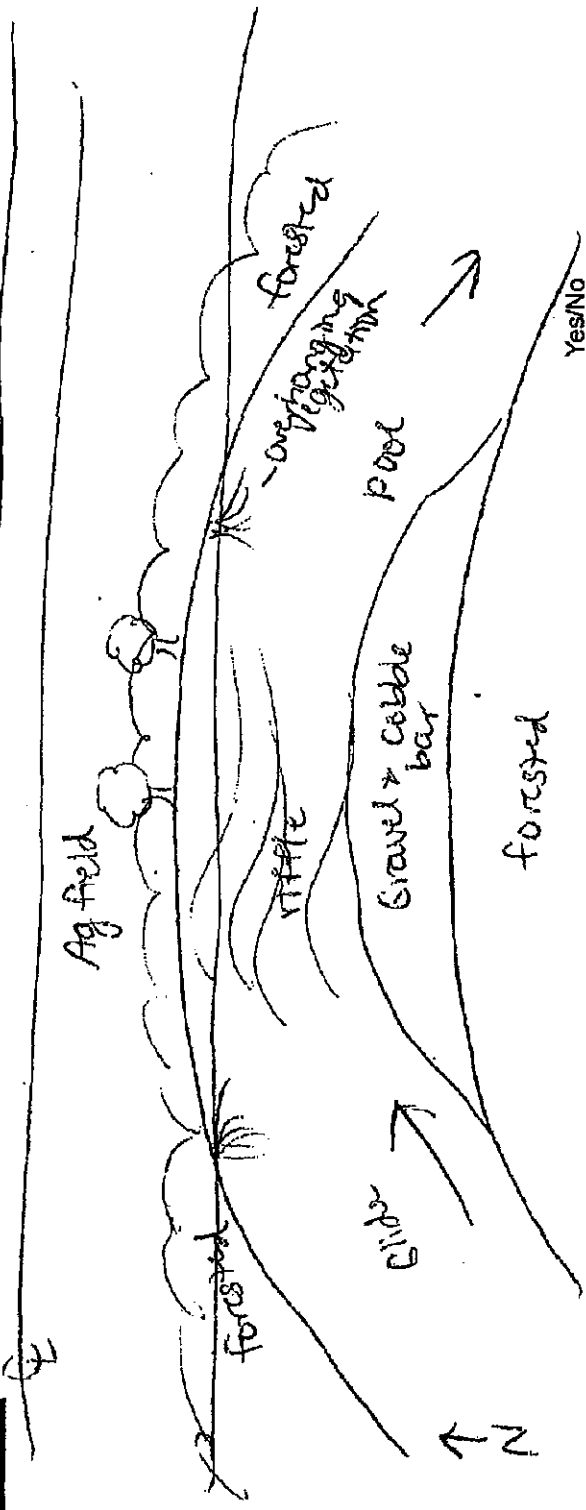
Average Width	Average Depth	Maximum Depth	Av. Bankfull Width	Bankfull Mean Width	W/D Ratio	Bankfull Max Depth	Floodprone Area	Entrenchment Ratio
50ft	10ft	15ft	70ft	54ft				

Subjective Rating (1-10) 8

Aesthetic Rating (1-10) 8

Gradient: ☒ Low ☐ Moderate ☐ High

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No

Is Stream Ephemeral (no pools, totally dry or only damp spots)? ☐ Yes ☐ No

Is there water upstream? ☐ Yes ☐ No

How Far: _____

Is There Water Close Downstream? ☐ Yes ☐ No

How Far: _____

Is Dry Channel! Mostly Natural? ☐ Yes ☐ No

Lmt 5/24/07