KeyBank Main
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January 14, 2011

To Whom It May Concern:

Whitestone Farms has been a valued client of KeyBank for more than 20 years, and we have enjoyed the organization's continued patronage of our services. Throughout the relationship they have maintained a highly satisfactory relationship with Key, and we have no negative events in our records.

In fiscal terms, Whitestone's relationship exceeds $1.5 Million dollars. Some accounts of note include:

→ A commercial line of credit $700,000 limit, with $450,000 available

→ Deposits totaling nearly $250,000

In closing, we value Whitestone Farms' business and hope this letter helps them develop further business opportunities in Alaska.

With Regards,

William C. Staley
Assistant Vice President
Small Business Relationship Manager
E-Mail: William_C_Staley@keybank.com

Whitestone Farms

PO BOX 1229
Delta Junction, AK 99737
Phone: (907) 895-4938 * Fax: (907) 895-4787

November 28, 2006

Letter of Guarantee

This letter will serve as notification that Whitestone Farms will irrevocably continue to financially support Whitestone Community Association, dba Whitestone Power & Communications.

This guarantee insures a continuance of all payments on the part of Whitestone Farms for all costs and debts incurred by Whitestone Power & Communications. It is in our best interest to continue to pay for this service in exchange for the benefit that this utility provides.

We have interlocking directorships on the two boards, including Mr. David DiGloria, the treasurer; Mr. Nyron Wheeler and Mr. Jack Frederick.

If further information is required, please feel free to contact us.

Signed:

David J. DiGloria
Treasurer

WP&C WHITESTONE POWER & COMMUNICATIONS
PHONE: (907) 895-4938 FAX (907) 895-4787 P.O. BOX 1630 DELTA JCT. AK, 99737

Meeting Minutes of Whitestone Hydrokinetic Project Meeting September 24, 2008

Subject: RISEC Project in the Tanana River

Participants at the Meeting:
Steve Selvaggio, President, WCA
Josiah Keller, Clerk, WCA
Ernest Prax works for Senator Therriault
Bonnie Borba – ADF&G
Jim Durst – ADF&G - Habitat
Fronty Parker – ADF&G
Chris Milles – DMLW – Northern Region Land Section
Louise Smith - USFWS
Ellen Lyons, Army Corp of Engineers
Jeanie Proelx – DMLW - Lands
Steven Selvaggio, WCA
Jinni Selvaggio, Secretary, WCA
Nyron Wheeler, Board Member, WCA
Diane Sam, land section, DNR
Jim Ferguson, ADF&G (Anchorage) (by phone)

Stu Pechek w/ DNR opened the meeting and introduced Steve Selvaggio

Steve Selvaggio Presents Project: Proposal of Developmental Hydro-Kinetic Energy Project

WCA is looking at deploying a turbine unit and producing between 20 & 30 KW / either floating or immersed depending on best technology for river conditions. This is a pioneering project. Within two years of funding, we'd like to deploy the unit on the river, once all studies are completed. We're interested in deploying the unit only for the high water months for the first few years instead of all year around – maybe May-September to avoid ice breakup, etc…

Right now we're looking for the appropriate permitting for permission to conduct the studies and then to deploy and run the prototype. We're looking at four to five years from actual beginning of project to end.

Chris Milles - Question: What's the position of WCA vs. FERC requirements?

Josiah Keller: Working w/ FERC right now for a preliminary 3 year permit to begin the studies. It is renewable after three years.

Chris Milles - from DNR's perspective of authorization – they can negotiate with public licensed utilities but everything else is by competition. They CAN deal w/ non-licensed utilities through a leasing process if it's under 10 years. Long term authorization might be a different matter. Lease for the shore lands would be a competitive deal.

There's no conflict with GVEA.

Land Use permit for the testing phase from DNR
There would need to be a public notice that WCA would pay for.
DNR is not sure what the fee schedules would be right now. ? per KWH They're still gathering information and working out the green energy questions.

Two difficulties: Debris & Anchoring (w/ fish being a secondary issue)

Jim Durst - Question: How set are we on that site?? Downstream seems like the flow is a little more predictable.

Steve Selvaggio: The primary location is due to the proximity of the grids.

Jim Ferguson - FERC has a link for hydro-kinetic licensing. It hasn't happened in Alaska yet…. Only in experimentation form. This is a very different project. There is a FERC guidance document – get it off the website. It talks about the various steps that you need to go through w/ hydro projects.

Steve: The coast guard has been contacted. They haven't returned the calls yet. They do get informed through the Army Corp of Engineers as well and have already been briefed by them on this project.

Jim Durst: No wildlife concern, but a lot of unease about the fish. This piece of real estate is very important to the salmon. Chinook, Coho, Chum – hundreds of thousands. It should be fairly easy to design a screen system for logs, debris and adult salmon. More worried about the juveniles headed south. At Eagle, they're monitoring the fish to see if they avoid pressure differences. The adults concentrate on the banks and river bottoms. So submersible wouldn't be good. You lose velocity; you gain a lot of fish. The juveniles are only about an inch long when they start traveling. Looking for info on the pressure drops on the turbine blades.

Steve: We only want to look at the 25KW – maybe even put limitations on further growth. A unit that small shouldn't be too much of a danger to the juvenile salmon.

Stu Pechek: Question: Is there any other alternative (technology-wise) that would be more beneficial?

Steve: We'd like to just focus on the studies right now. Then when we know what we're looking at, we'll put out bids for the materials / construction and look at alternatives then.

Ellen Lyons: Start right away on getting Jurisdictional Determination (JD) from Army Corp of Engineers. We might need to pull someone else in to do a Wetland Determination. Initiate the permit from them as soon as we know where we're headed. It takes six months to a year to issue a permit.

Steve: We need to know if we have a good chance of permitting all the way around.

Jim Durst: No assurance at this point – don't know enough characteristics. Intrigued by the idea and open to talk about it, but need more information. Mac McClain – regional supervisor – is not here today but has a better feel for data collection and what is needed. Two focuses on data: adults vs. juveniles and if the screen doesn't keep out the juveniles, what happens to them if they run through the turbine.

Need to define exactly what needs to be tested and what data needs to be gathered.

ADF&G needs to give us a list of what they're looking for. Description of what they think they're going to need. Steve will forward that to EPRI and have them contact Jim Durst.

Steve: What permitting is needed just to begin study of the river?

Letter of Permission from Army Corp for testing
No need for anything else unless we put a structure out in the water.

Fish Habitat Permit – controlled by expiration dates.

Land Use permit from DNR (Mining, Land & Water) They have a fact sheet that will tell us when it kicks into needing more permits. They will get us that document.

Once we start w/ permanent structures or instruments in the water that will remain, then the permitting will need to be updated.

Meeting concluded at 3:35 pm

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Meeting Minutes of Whitestone Hydrokinetic Project Teleconference, June 29, 2009

Conference Participants:

Debbie Berlin, Alaska Department of Fish & Game, Fairbanks
Bonnie Borba, Alaska Department of Fish & Game, Fairbanks
Donald Degan, Biologist, Aquacoustics, Inc.
Jim Durst, Alaska Department of Fish & Game, Fairbanks
Jim Ferguson, Alaska Department of Fish & Game, Anchorage
John Hasz, P.E., Hasz Consulting Co.
Brian Hirsch, U.S. Department of Energy
Jerry Johnson, UAF, Alaska Hydrokinetic Energy Research Center
Diana Lineburger, Alaska Department of Fish & Game, Fairbanks
Mac McClain, Alaska Department of Fish & Game, Fairbanks
Neil E. McMahon, AIDEA
Frank Maxell
Susan Mitchell, CE2 Engineers, Inc.
Stu Pecheck, Alaska Department of Natural Resources
Christopher H. Roach, P.E., Consulting Engineer
Steven A. Selvaggio, EIT, Hasz Consulting Co.
Steven M. Selvaggio, President, Whitestone Community Association
A. J. Waite, Alaska Department of Natural Resources
Sue Walker, NOAA
Carl???

Steven M. Selvaggio (SMS), Chairman of the Meeting

Overview: Final goal is to deploy a 25KW hydrokinetic unit in the Tanana River and hook up to the SNAP program. Why when we already have Golden Valley power now? Our intent is research and development – pilot project. Permanently, we'd like to deploy an additional 75 KW unit if everything is successful. We intend to do the appropriate studies now before deploying any devices. We want to satisfy all parties involved that a device can be deployed with minimal negative results.

Jim Ferguson (JF): How do you see this proceeding?

Is there data we can collect to look into devices that would have minimal effect? I'm not that concerned about debris, more concerned with fish and game issues, i.e. travel of fish and damage to them. How are we going to go about that? What studies are acceptable?

JF: You've got some funding from AEA? Is that available now?

SMS: No. The funding is not for this project. It was not available for non-profit organizations. Our original request was for 4 million for the next two years.**Jim Durst(JD)**: are you piggybacking w/ Nenana?

SMS: Gwen and I thought that would be a good idea. What we wanted to do was to collaborate and share info. It would be much stronger to go ahead with cross sections of multiple projects, understanding of each river, etc.

JD: I was at their public meeting; it's good to know how many times we're coming around on ourselves. In reading Don's letter of ways to approach this, we're pleased to hear people say lets figure this out before putting devices in. How do we do this? There are two aspects: one is how fish interact - where fish are, state and time of year. Two - does it depend on which device you choose? There are a lot of maybes. There are three outcomes of this thinking. One: it doesn't matter what you do in your design, fish can sense the device and get out of the way and then we don't have to worry about it.
Two: take your device under the worst case scenario, feed it fish and see what happens. Real or synthetic fish - maybe they'll do fine.
Three: they aren't avoiding, aren't doing so well going through, so what is it about the device or placement that we can change.

Given the way the project has morphed over time and changed a bit, what's your thinking on what you'd like to get started on?

Donald Degan (DD): I agree with you. First, though, after talking with Steve, is trying to work with engineers to come up with some parameters of the different systems we could use and try to identify which ones would least impact the fish. Hopefully something the fish would avoid. If not, we should see how we could minimize the impact in the river and go on from there. We need to review some of the information prior to deciding which device to deploy and get some input from fisheries to make that decision.

JD: Difficult to hear Don

Summary: Agree with Jim Durst. The outcome is dependent on the device type. It sounds like we'll be able to provide some feedback to Steve Selvaggio and others prior to the decision on which device will have the least impact. If we can't do that, we'd steer towards placement of the system to try to minimize the impact.

JF: Do you have a feel for how many designs you'll be able to look at now?

DD: Steve? Is your son available? Can he answer this question?

Steven A. Selvaggio (SAS): We haven't seen a design that we believe in. A lot of stuff that's been tried with tidal energy is unsuitable for what we're doing here. We haven't seen

something that we can say is worth trying. River characteristics are different, etc… I think a valuable direction to go in would be to start with indentifying areas of the river

that are worth investigating for their suitability to run a river turbine. Then from there look at what the fish characteristics are in those areas. As far as a design we want to work with, we're a long way from that.

SMS: Might be behind the times, but I think a lot of these devices are still having their problems. We're a little way from a device that will keep functioning.

Chris Roach (CR) joined the conf:

JD: In some of your earlier documents last year, you had a design then recognizing it was just a straw man for analysis, is there anyone putting that kind of device in?

Brian Hirsch (BH): Yes, involved in putting one in Ruby.

JD: Vertical shaft three blade?

BH: Four blade.

JD: Is that back in the water this year?

BH: Back in this past week. Anchoring system was developed, now it's in.

JD: As you're able, we'd appreciate any updates – what changes make it more functional and how it's working.

BH: Is similarly requesting updates, hopefully they'll get that to us.

SMS: We're looking for a way to proceed that will be acceptable prior to a device being found. Donald? Are there studies we can do?

DD: Based on Fish &Game's letter and concerns for the project, we could use some hydrology info as well as setting up some sonar systems to look at fish distributions across space and time in that general area once we identify habitats and currents in the area. I don't want to leave the idea of different types of devices though, because I feel some of the devices out there may be better than others. I don't have a good feel for it, but would guess an open turbine design with blades won't be as nice on the fish as something like a paddle wheel design, but I don't know any speeds on those devices. We're going to be working with some other people on tidal turbine set ups and they've already decided on what they're deploying. I think they may have some good options.

Maybe also find out what's happening at Ruby when they get going. Are there fishery studies? Also at Eagle. What type of device is planned for that site?

BH: I think at Eagle, they did some level of fishery studies a year ago. Does anyone have access to that?

JD: AK Power & Telephone hired Biosonics to do that work at Eagle and we haven't seen any results yet. We don't know.

Open hydro design already in? No permits to put anything else in yet.

Stu Pechek (SP): Is there any info with any of these devices…that might pertain to this that can be utilized.

Answer is not really. If we track on this nationwide, between Alaska and Maine, we're really on the forefront of developing this. Fundamentally for all these projects we're going to need a flume study with real tagged fish or silicone fish and find out what the direct impact of these structures are. The acoustic info won't tell us enough.

DD: I agree with that. I think we can get some additional info from some of the engineers on diff designs. If Steven can provide some of that and also what type of equipment we're looking at, I think we need to look further into the systems design and look for something that won't cause problems. Flume studies are great but aren't real world studies. We'll still have to put something in the river and study that.

SMS: Chris? Any input about the hydro end of this

CR: Not really. We can do topo surveys of the river bed, velocity fields in the vicinity of the proposed structure, put together the hydro information and figure out where we want to put the device. Once your structure goes in, we can repeat the studies and see how it's changed. As far as fish – I don't know. I'm not qualified to comment on that.

We'd be able to determine changes in the bed and bank characteristics as well as changes in velocity fields around the structure, impacts and flow dynamics.

JD: That all sounds pretty good. Do you have any sense for how much velocity changes, with different stages in this river? Do you just get a bigger patch of fast water, or does the location and quality of fast water change. Second, I think you know the bottom end of the Delta River is very important for spawning. Any way of getting a handle on installation of devices in that area

CR: Is this device going to change the overall flow patterns?

JD: Are you really after stage velocity relationships? Is there any area that will stay high velocity?

CR: Yes. We would be developing both bed topo and velocity fields for multiple discharges. We'd be using Doppler radar. From that you would get a velocity field through the depth and width of the channel in the area of the structure. You would know the diff flow fields, low through high flow. Then you could make informed decisions as to what would be the best position to put it in.

DD: Where we want to start is with acoustic Doppler profiles in the area we want to use as well as upstream and downstream. With that info, we'd be able to use the historical data from fish and game to indentify potential life stages and species of fish that would inhabit that area so we could come up with a plan. We'd at least have an idea of expense and amount of variation. If we could get more info on the effect that different types of devices would have on that flow…. We could at least identify which life stages would be affected.

JD: I think that makes a lot of sense as far as the approach. Recent data on chum distribution - Chinook, not much. This year it will happen real soon because they're on their way. Your approach is sound because it's two pronged, assessment and info from the engineers. That makes sense. We'd be able to work with whoever is doing this – velocity fields and fish fields. The acoustics stuff would really help validate what we believe is going on.

SMS: Feels like we're covering the area efficiently for the time being? Prior to a device being deployed…am I understanding that?

JD: It's looking pretty good. What Chris described would give us answers to most of what we addressed in the letter.

SAS: We haven't begun research on the device. We are going to do that. I haven't seen anything to convince me, so we're still working on that. We really do want to identify the areas we'll be using as far as the fish studies and looking at the device types and how they'll affect what's happening.

JD: Point well taken. Chris can indentify.

SAS: No question it will be a process.

CR. Question for Steven Selvaggio: the devices you're thinking of using to sense the path of fish – are you thinking about using a stationary bank-mounted sensor?

Steve redirects question to Don Degan

DD: Depends on the size of area we'd be sampling.

CR: The device I'm thinking of using I can check to see if it has a high enough resolution for fish.

What system?

CR: Acoustic Doppler radar??? from Comtech

JD: We can go through our data and tune up our generic tables for when we think certain life stages have the highest probability of being in the area. So you know what to look for when you're up there. Don, do you know what the size range is you can detect? We have such a huge range: big fish in the summer, tiny Chum fry, Coho, Chinook, lots of sizes we'd need to detect. What is your resolution in a silty river like this?

CR: I could give you some ideas, but I think it's river dependent. Not so much silt, but turbulence and debris.

Debbie Berlin (DB): Dependent on the range you're covering and the background noise you're trying to see it above. Don, I think you know better about the systems, what you can see, etc…

DD: There are other options available: Other systems to look at. But once we identify what species and size, then we can optimize the system to see them.

SMS: Jim, I'm wondering if we have enough cooperation with this meeting that we could write something up to define what we've discussed and make sure fish and game is agreed. I don't want to throw funds down the tube. This might never be successful, but we want Fish & Game's blessing on this. Are we at that point?

JD: Yes, we need to take a good crack at it. Resolution is still something I'm unclear on. We'll have to see how that develops. Whether you can really see what we're going to need to see. That's something other people will have to figure out. But it will be a big part of our evaluation;

DD: We want to identify areas of concern. Then we can proceed from that point.

JD: Right. We'll be talking to our people, what they've seen and what they can accomplish with their equipment.

SMS: Okay. I think we've accomplished what the meeting is for. Sound good?

JD: Everyone is either comatose or in agreement in Fairbanks.

SMS: We'll transcribe and send notes.

Question for Susan Walker

Flume? Can you describe that?

Susan Walker (SW): Modeled lab study that mimics the flow characteristics and puts the device in a controlled environment then feeds fish though it to study. You mimic your river characteristics.

JD: Flume studies give you the worst case scenario. The fish can only go through, so it answers the question of is the device hard on the fish. They provide a lot of good info.

SMS: Jim Durst, I think this info will be useful for your department, too.

JD: Right. Anything is useful. Earlier, you tossed out some numbers and one of our staff is just finishing her masters on fish effect of overpressures, but it's applicable to some of our work. There's a potential that the long term recommendation numbers may be revised. We continually look at those numbers to see if they need to be adjusted. If we revise them, we'll get those to you.

SMS: Will you want to be onsite sometimes when Don and Chris are working?

JD: Yes, we have Fronty Parker. It will depend on our field schedule. But we appreciate the opportunity to come down and look at the water together. The schedule may be dictated by local weather – if a big storm comes up, we may want to get out there and document what's happening.

Everyone left except for:

Don Degan
Chris Roach
Susan Mitchell
John Hasz
Steven Selvaggio
Jerry Johnson

SMS: There will be notes. I can send this discussion to you.

Jerry Johnson (JJ), Great.

SMS: I have everyone here. Gwen thought we'd collaborate somehow. Should I be talking to you from now on?

JJ: Yes.

SMS: Denali Commission is putting out another RFP. We'll do another two year proposal for study.

JJ: Gwen hasn't really talked to me. If you've already talked about collaboration are you interested in coming up to attend our meeting? You're welcome to.

SMS: (Introduces Susan Mitchell to the rest of the group.) Sounds like we have a direction?

DD: I think so.

John Hasz (JH): We're from the engineering side, looking at the device. What you have first is the characteristics of the river and fish. We can work in parallel on the development of what we perceive is the best efficiency/usable long life device that could be put into the river. At that point, then look at various devices, pros and cons, velocity, area entrapment, and get an idea of what devices and their efficiencies might be best suited for the area. I can see us doing that, but the question comes down to, once we have the rive rand device identified, it seems that there will be a stumbling block. I know you discussed the flume, but I suspect that fish and game or the environmental people will want to know that the device we pick, what its influence would be on the river and fish itself. And that study is a significant and involved long-term costly study outside of our scope before we put the device in the river. How do we really know what the effect will be in the flume since we're using clear water and can trap the fish? I suspect that kind of info will be required prior to everyone saying yes, this is worthwhile doing.
I think the schedule will be lengthened once we know what we're looking for and what devices we're trying for.

DD: I think that's a good point, John. I tend to agree, and would like to see some engineering info in parallel with the other work we're doing. Maybe we could look at the various options available. Cost in reduction and efficiency – affect on the fish – look at that. I don't deny the flume would be important, but I think the way to approach this would be to put a device in the river and look at it for a period of time to watch the behavior of the fish.

SMS: Another big issue is debris. Said there's no difference really between open rotor and closed rotor.

DD: I think we'll have to look at the info on those types. I think a paddle wheel type would be better than a rotor.

JH: Yes, but it's more vulnerable in the river conditions. That's the battle of designs.

CR: I wanted to bring up the issue that we'd discussed – looking at different alternatives for anchoring the structure. Surface-mounted or submerged foundation of some kind? Anchoring system? Then have the turbine suspended off of a floating platform and it would be subject to impact from debris.

Other concept, submerge the foundation and anchor but also the device so it's below whatever debris is coming down the river.

JJ: We're looking at the environmental impacts of a variety of devices and the aspects involved. We're trying to do a fairly comprehensive study.

SMS: Have you picked out a device yet?

JJ: We're not device developers or device specific.

If we're going to anchor to the bottom, we'll need some sort of study for the riverbed.

CR: At this point, we're still looking at a surface mount, but yes, if we change that we'll have to consider further study.

Susan Mitchell (SM): Are you still using the schedule that was submitted with the grant application?

SMS: I think the schedule is changed. This proposal is going to involve the engineers. I just wanted to make sure everyone is in touch with each other. But yes, the schedule will need to change.

Hydrokinetic Meeting Notes

1-26-10

AEA Office

Participants

1. Neil McMahon (AEA)
2. Phile Brna (USFWS)
3. Gary Prokosch (DNR DMLW)
4. Martin Leonard (YRITWC)
5. Jack Schmid (UAF)
6. Ben Beste (AP&T)
7. Paul Jacobson (EPRI)
8. Jim Durst (ADF&G)
9. Andy Seitz (UAF School of Fisheries)
10. Betsy McCracken (USFWS--Conservation)
11. Dominic Lee (Little Su)
12. Brian Hirsch (NREL)
13. David Oliver (Terrasond)
14. Monty Worthington (ORPC)
15. Joe Klein (ADF&G)
16. Sue Walker (NMFS)
17. Jerry Johnson (UAF)
18. Dave Messier (YRITWC)
19. Mary McCann (HDR)
20. Steve Stassel (AE&E)
21. Debbie Burwen (ADF&G Accoustics)
22. Glen Martin (AP&T)
23. Alan Fetters (AEA)

Any quotations that are stated below are loosely based on Neil McMahon's handwritten notes and are not meant to be taken as a verbatim record of the meeting, but should cover the major discussions. My apologies if my transcription loses the subtlety of conversation or misattributes a question or comment, as my notes are sketchy at best in some parts and generally do not include my own comments, questions, etc.

Neil began the meeting with introductions and began by addressing the Hastings report.

Neil: Is 90% a common confidence interval?

Others: No, 95% is more common.

Neil: Is predation a concern in studies to be performed? I had not seen it as a concern in other meetings or within my research.

Joe Klein and others: Yes, if a fish is dazed after having gone through the turbine, that may cause them to be preyed upon.

(Several mention that I should probably do an overview of the study so as to fill in those who had not read the report)

Neil: An overview of the Hastings report. The study was done by Normandeau, commissioned by HydroGreen, which has installed a 14-foot diameter turbine in the tailrace of a dam on the Mississippi River in Minnesota. In general they found that the mortality rate was approximately 1%, which was similar to the control group. The study used fish that had balloon tags. Predation was not observed, for neither the test nor control groups.

Paul Jacobson explains the balloon tags: The tags are essentially small party balloons with a small capsule that is broken prior to release. The balloon inflates over time and the fish are collected after going through the turbine. The focus of the studies are on mortality. They could cause a change in behavior in transit. Used in the East and Pacific Northwest in conventional hydro studies.

Phil Brna—Not likely to be useful with juvenile salmon

Mary McCann—Used on salmon smolt in a number of instances

(Someone)—how would it work in a river?

Paul Jacobson—The balloon is used for recovery, it does not provide information about avoidance. Not a good method for behavior.

Neil—is the tailrace a special case that may or may not apply in AK?

Brian Hirsch (?)—HydroGreen designed for dams.

Ben Beste—AP&T evaluated the technology for use in Eagle but found it was not applicable in Eagle. The method of deployment—using heavy machinery to get it in and out of the river—would not work well in Eagle where it would need to be removed for winter, etc.

Sue Walker—The technology is being proposed for a site in British Columbia at Canoe Pass. It is supposed to be installed in the 3rd quarter of 2010 and be a 250 kW unit. It is near Vancouver. Department of Fisheries and Ocean and Environment Canada are supposed to be part of the evaluation.

Brian Hirsch—I am working with some Canadian colleagues and I can talk to them to see if they have further info.

Martin Leonard—I can talk with Encurrent to see if they have more info.

David Oliver—They chose this area because it had lower regulatory hurdles. It is not a natural body, but would only need an alteration to existing infrastructure.

Monty—How applicable is this study with a different technology, as this was an axial flow instead of cross-flow (like ORPC, Encurrent, etc.). How can this be transferred, using tip-speed ratios?

Martin Leonard—What about the difference between the open vs. the closed environment of the tailrace? The Yukon will be quite different than the tailrace.

Monty Worthington—also the HydroGreen unit had a shield around the unit.

Ben Beste—(some comment that my notes make no sense of…sorry)

Sue Walker—Cumulative effects are important, even if there is a low mortality, the effects are multiplicative

Several in agreement that this was very important—particularly with regards to resident fish

Paul Jacobson—the study provides little evidence for predation

Andy Seitz—48 hours is not enough time to evaluate the mortality. A week is more applicable. In particular salmon smolts are different than the species tested in the study. Juveniles are more fragile than adults.

Sue Walker—If you know the studies of the effects of copper on salmon survivability and physical harm. Injuries cause a release of pheromones, which cause other smolt to go into hiding mode.

???—How would this work in a large river?

Sue Walker—These would have to be done in a laboratory. Asks about the stage of the EPRI flume studies.

Paul Jacobson—EPRI will be commencing as soon as possible. Waiting final approval from DOE for animal welfare issues. Study plan is not yet available but as an overview:

- DOE provided funding to EPRI
- Consists of desktop and laboratory flume
- Subcontracting to Alden Labs and Contee (?)
- Additional funding from AEA, AP&T, NWT, Canada, Indian and Northern Affairs
- Testing: New Energy, Lucid and Sanderson Engine
- Create blade strike numerical modeling.
- Alden test Gorlov turbine
    - Any species can be used (closed flume)
    - Currently planning rainbow trout
    - Will only allow fish to pass through turbine
- Contee (sp?) test ducted Encurrent turbine
    - Shad and Atlantic salmon (connected to Connecticut River)
        - Only native species
    - Will study behavior and avoidance
        - Adults and smolt (?)
- Would like to study a horizontal axis as well

Debbie Burwen—Only adults or juveniles

Paul J.—use juvenile

Brian Hirsch—which manufacturer for the Gorlov?

Paul J—manufactured for the test by Sanderson to conform to the constraints of the flume

Ben Beste—Will they be generating power? Will the velocity controlled?

Paul J—They will be controlled

Sue Walker—You said you were looking for funding?

Paul—It is approximately $10K per test, would like to extend the tests to other turbines

David Oliver—At the different locations, will the velocity of the river be controlled or the rotation of the turbine be controlled?

Paul—Uncertain

Martin—Puts in a plug for an unshrouded device.

Glen Martin—The shroud should increase downstream water pressure, which should allow stream velocity to change (*poor notes on comment, sorry)*

Monty—If the fish in the Hastings study are not applicable, do we need to look at each species? Are Atlantic salmon close enough to pacific?

Debbie Burwen—Size and behavior are the most important

Andy Seitz—Size is important. Rainbow and Atlantic are relatively similar to AK species

Jim Durst—We'd be more comfortable with Pacific. Rainbow has been used to test electrofishing

Monty Worthington—Is there any legality of moving Pacific species to the East?

Someone—they are also raised in the Great Lakes

Betsy McCracken—You'd need a transportation (*license? Permit? Bad notes*)

Paul Jacobson—Risk of disease would make it difficult

Phil Brna—We wouldn't allow it into Alaska in a similar case. If a guarantee of 100% mortality, maybe.

Jim Durst—It's not impossible, but very difficult—need to treat effluent, etc.

Brian Hirsch—So it would be best to have comparable species or have it done in AK

Phil Brna—There's always uncertainty if it's different species

After discussion about the technologies and the engineering specifics, it was decided that an engineering presentation would be very useful. This could possibly be part of AWRA (American Water Resources Assn. annual meeting, the Rural Energy conference, or some other forum)

Brian Hirsch—Is the balloon method the preferred method by Fish and Game?

David Oliver—Would this provide info about avoidance?

Jim Durst and Betsy McCracken—Depends on the size and type (*of fish, bad notes again)* Can the fish see and react to the turbine? Do the fish avoid it like the plague? Three different scenarios

1. There's a pressure signal and the fish won't go there
2. The fish doesn't sense it or doesn't care and the turbine doesn't effect it
3. Fish don't avoid it—either size or species selective
    a. What happens? Do they get clobbered? That's the scenario that is most worrisome

Paul Jacobson (?)—What is the methodology at Eagle?

Glen Martin—in 2008 gain baseline with Biosonics to track fish in the approximate area. We plan on installing a device in May or June. The plan calls for using short-range acoustical imaging, correlating with the sonar. We're working with Jim Durst and Andy Seitz. Still need to figure out how to capture post-turbine. Also correlating with data from the Six-Mile study area (*unsure if name is correct)* Adults were generally close to the banks, not many fish in the middle of the river. Unsure if outgoing smolt were missed or will be missed this spring/summer. We're still figuring out the procedure for setting up the turbine, etc.

Debbie Burwen—How far out?

Ben Beste—the sonar was 150' out from the bank.

Glen Martin—The cameras will on the turbine and will likely need to be rotated, as they cannot cover the entire area at the same time.

Someone—How different will it be on the up vs. downriver side of the blade?

Neil—where in the river will the device be? How far from shore, depth, etc.?

Glen Martin—it will be in the middle of the river. The device will be ?X10 feet, submerged about 2-3 from the surface. No generator will be in the water. It will be attached to a barge with pontoons which will have a platform to walk on. The river is approximately 30 feet in the area.

Biosonics will dial into the sonars each day to check them out. Hard drives will have to be mail periodically. The device will be in the water from may to September.

Phil Brna—It seems like it would be useful to have a turbine 101.

Gary Prokosch and Sue Walker—AWRA is March 30, 31, April 1, 2 in Anchorage.

Neil—Rural Energy conference is April 27-29 in Fairbanks. Speakers for the Rural Energy conference include Tom Ravens from UAA to talk about assessment work, Jerry Johnson to discuss UAF's studies at Nenana, Monty Worthington to talk about project development, and Jim Norman from ABS Alaska to talk about the nuts and bolts of installation, etc. using the Ruby and Eagle projects as a basis.

Monty—Paul once the funding is underway, when will results be known?

Paul J.—Start right away, results will likely be at the end of the summer. It is a two-year project

Andy Seitz—What is the procedure for reporting?

Paul J.—They will go to the DOE, which means they will be publically available.

Phil Brna—Can we get a study plan or study design so we can comment on it?

Paul J—I will talk with the contractors. Receiving comments would be beneficial.

Phil Brna—Are there study plans for the Yukon

Jim Durst—They are still in development.

Glen Martin—We need to figure out fish capture. We will send it to the resource agencies to receive comments. Likely ready within a month.

Martin Leonard—Ruby, the final report should be ready by mid-March

Neil—I would like to have an update on Nenana to provide a compare/contrast with Eagle.

Monty Worthington—ORPC's is a different design, horizontal and not vertical. The rpm of ours is similar to the Encurrent—40-80 rpm—with similar tip-speed. The river device is 7' in diameter and 40' long, fully submerged. Unit would be about 10' above the river bottom, below debris and navigation (4-5'). We'd applied for a similar study as Eagle with hydroaucustics, but it was not funded. The timeline for deployment is summer 2011. The second project is in cook Inlet, a fish study was completed. The report should out this week and includes fish distribution in the study area. The deployment will be 2011. Still in the process of developing a post-deployment plan.

Phil—What is the advantage of the turbine design?

Monty—Still an open question, but it is all below the surface. In the inlet it would be 30-40' below the surface. The velocity profile will be more consistent in a horizontal layout than vertical. The forces acting on the turbine will be more consistent than in a vertical arrangement.

Joe Klein—Resident fish are very important. So studying the large fish will be important.

Debbie Burwen—In other studies they've found it very difficult to catch smolt.

Betsy McCracken—It does look like a screw-trap. What is the current status of the Ruby project?

Martin Leonard—We had challenges as aspects of the project were changed this year. There is now a mooring in the river. Looking to have a full season next summer. If you go to http://www.yritwc.org/Departments/Energy/tabid/79/Default.aspx and follow the energy links, there will be video, photos and documents. The current turbine is a 5 kW turbine that is geared down to 2.5 kW.

Betsy McCracken—Any information on magnetic fields and EMF?

Monty Worthington—We've only looked at the cable. With shielded design there is no electric field, and the magnetic field is below background. With a power of 1 MW or less, the magnetic field is significantly less than the underwater power line of Chugach Electric. The magnetic field cannot be shielded. The EMF of the generator is an unknown; we're still working on how to figure what it is and/or how to model it.

Brian Hirsch—Is there data on the impacts of EMF?

Monty W—We have not found much info on the effects. The most comprehensive has been with the Naikoon wind project off BC, but that is projected as a 200 MW project. So far it appears there is more effect on sharks and rays, but the reports are contradictory.

Sue Walker—Pacific Northwest National Labs (PNNL) is doing lab experiments on this. Irv Schultz (sp?) is starting with salmonids, and will be furthering work with halibut and rockfish.

Mary McCann—The Cowrie reports are the state of the art research. (*the website is http://www.offshorewindfarms.co.uk/Pages/COWRIE/ I was able to find several articles concerning EMF, but have not had a chance to read them.)*

Does anyone work for one of the national labs?

Brian Hirsch—I work for NREL. We're mostly working with modeling turbines, sediments, and energy impacts.

Joe Klein—Are there plans for multiple units at any of the sites?

Martin Leonard—The plan has been to refine the technology, and then possibly expand.

Brian H.—There was also plans to use a 25 kW unit. The overall plan was to start small and then go bigger.

Gary Prokosch—There will definitely be differences when dealing with arrays, and also of different designs.

Joe Klein—Certainly it will be different if the units are in a line, one after another vs. in a row across the water. If they are in a line down the river, it may be the first turbine may not have a negative effect, but going through multiple may increase mortality.

Glen Martin—At Eagle, the idea had been to set up an array with one after another. This is to have a narrow horizontal profile, primarily for traffic concerns. We've figured that there needs to be 300 kW for both communities. This could be done with 3 100 kW units.

Sue Walker—I'm still trying to get AEA access to our hydrokinetic data.

Jim Durst—Suggest that you access the ARLIS facility for more information. Ask the reference staff for help in gathering information.

Neil M—(wrapping things up) I would like to call the next meeting to address the non-biological effects on the river environment: sedimentation, flow changes, etc. Probably for early- to mid-February. Please also include your phone number, company/department, and division or job title on the spreadsheet. If you were on the phone, please send me you contact information so that I can fill in the information.

Hydrokinetic Working Group Meeting Notes

March 4, 2010

AEA Office

9-11:10 AM

Participants:

1. Neil McMahon (AEA)
2. Peter Crimp (AEA)
3. Doug Johnson (ORPC)
4. Phil Brna (USFWS)
5. Eric Rothwell (NOAA)
6. David Meyer (USGS)
7. Debbie Burwen (ADF&G)
8. Sue Walker (NMFS)
9. Jason Meyer (ACEP)
10. Joe Klein (ADF&G)
11. Mary McCann (HDR)
12. Tom Ravens (UAA)
13. Kim Kruze (CZMA)
14. Dominic Lee (Little Su Construction)
15. Alan Fetters (AEA)
16. Jerry Johnson (UAF)
17. Jack Schmid (UAF)
18. Andy Seitz (UAF)
19. Steven Selvaggio (Whitestone Community)
20. Steve Selvaggio (Whitestone Community)
21. Brian Hirsch (NREL)
22. Jim Norman (ABS Alaska)
23. Jim Durst (ADF&G)
24. Monty Worthington (ORPC)
25. Another ORPC person I did not catch the name of
26. David Oliver (Terrasond)
27. Ben Beste (AP&T)
28. Jim Boschma (Boschma)
29. Jodi Fondi (Denali Com)
30. Brian Polagye (U Washington)
31. David Messier (YRITWC)
32. Betsy McCracken

Notes:

Neil McMahon: Introductory comments. Distribution of reference list. NOAA will be publishing their hydrokinetic links soon (end of March). Asks about water rights and water use authorization.

Gary Prokosch: The AWRA conference will have a panel discussion on permitting on March 31st. It will go over FERC, state, and federal input. Will be after lunch on the 31st. I will send an agenda out. Jim Strandberg will be the keynote address during lunch. It will go over how the process is done. My traditional hydro specific, but will address the permitting process.

Neil: Could you touch upon 2 or 3 issues that will effect permitting

Gary: Water rights are not an issue for tidal—we've decided not to deal with it. Land issues definitely, tidal land use, fisheries, marine mammals. For rivers there will be water right permits, land use permits, right of ways, easements, navigability (under Coast Guard). There is definitely a learning curve involved with this.

Phil Brna: Have you decided how deal with the water rights permit?

Gary: We've done preliminary studies.

Phil: Have you figured out how to determine the volume of water used?

Gary: We have a basic idea how to based on the flow through the turbine in cfs. This allows the permit holder to have rights if there is a change in flow from development either upstream or downstream—insertion of dikes, etc.

David Meyer: And the turbines will also likely change the flow itself [bad notes, ?]

Doug Johnson: Is there any precedence for this anywhere else?

Gary: I wish. Maybe Minnesota, it's a ____ type of state. The East Coast has different types of laws.

David Meyer: You might have use flood way analysis. Those permits come from….?

Kim Kruze: The Dept. of Commerce. They do flood plan mapping on a voluntary basis

David Meyer: If it raises the height of the water, it might be an issue, particularly if it is a floor insurance community.

Phil: Some places require a flood permit issuance: Anchorage and Mat-Su, maybe others

Doug: ORPC is doing some of the modeling, to see if there are standing waves, etc. created. Our device was put in the water yesterday in Maine.

David Meyer: It's likely a matter of degree

Jim Durst: Working with the Alaska Railroad on bridges and culverts, FEMA has been intimately involved. We have found that the current models are not adequate in braided, silty rivers with the wood being brought down like in our rivers.

Doug: Andy, Jerry are you on? These would be keys to the Nenana project.

Steve Selvaggio: This should be done on a device by device case and the particular placement. It is something that has to be looked at. With an array and pilings, it will have a larger effect than a small.

Steven Selvaggio: Mirko Previsic did the studies using energy equations.

Neil: discussed some of the findings from the papers. Verdant's FERC application showed a 1 cm increase in height for 1 MW. The other papers showed height changes before and after the devices.

Tom Ravens: The tidal cases will be different from the river

David Oliver: You should be able to determine areas of catastrophic from models and areas in the bathymetry. These will be revealed in time with surveys. You'll be able to see areas filling in. For example near the Iguigig planned site, there's an area of shoaling after the proposed area. There is a possibility that the area will fill in with sediment. Monitoring will be needed to see what areas are susceptible.

Tom Ravens: It will need to be done with modeling and monitoring. In a river, the discharge is fixed. The turbine is modeled by adding roughness, essentially increasing the friction. This will reduce the velocity, which will increase the water level.

Steve Selvaggio: With our experience on the Tanana an object can cause major changes to river flow. Little is needed to change the flow. Debris of all sorts can do it. If it is monitored it can be predicted. We're working with Chris Roach, some of the effects can be predicted.

Gary: We see this all the time in rivers with debris dams.

Neil: [something I didn't write down]

Phil: It will change the erosion and sediment areas. The habitat will likely change.

Steve: We've seen navigation change, new silt bars created. Harbors will move with just a log jam. In the winter the ice builds new channels.

Gary: That's a good point: after the winter, are they going to have to redeploy? How easy it going to be to redeploy the devices somewhere else and how easy it going to be to permit this?

Doug Johnson: We're looking at this. It's bringing up great questions. We're trying to figure out if we should have fewer, larger turbines or more, smaller turbines. The rivers are so dynamic and it's not known how the velocities will change.

Gary: How will the resource agencies react? If the site needs to move, how can this be done?

David Oliver: Different rivers may be more or less stable. I don't see the Iguigig area changing.

Neil: [I think] what are the factors affecting the stability?

David Meyer: Icing, the sediment load, the variability in the stream flow. But largely it's the bank composition. With nice hard banks, it makes a stable channel. Take the Matanuska: above the [ ] bridge, it is really braided, and then below it is a solid channel, then it goes back to being braided.

Phil: Can the FERC process deal with movable projects?

Steven: When we did our application, we staked out a large area, a broader area than needed with the permit.

Phil: For FERC, we've always dealt with a single place.

David Meyer: Changing a road requires an amendment.

David Oliver: When I've dealt with clients, it's about transmission. We've looked 1000 meters above and below a village.

Eric Rothwell: In other cases people divert the flow to diversions, instead of moving the diversion.

[someone]: With a movable structure, FERC might follow the lead of the state agencies. If previous research is done on how the thalweg moves, that might be relevant. No precedent has been set.

Jim Norman: Neil, is FERC involved with these meetings? Are you sending info to the hydrokinetic coordinators?

Neil: I have not involved them yet, but I will try to contact them soon.

Kim: When I was working with DMLW, it was generally a cost issue. A person can rent a large area, but the state requires compensation for using state resources. So people generally decrease the area to decrease the rents. Also if there are other conflicts, the size is reduced to reduce the conflicts.

Phil: Look at ORPC, if the project is offshore Fire Island like it is proposed where we don't think there are many fish then its ok, but if it is moved closer to the island where there are fish, then there might be an issue

Kim: People don't like reanalyzing things, so that if there are potential areas of relocation, it would be best to be able to analyze them all at once.

Neil: I'd like us to move on to near-field effects. The sources I've read have shown that there will be an acceleration of the water around the devices (above and below) , a slowing down of water behind the turbine, and possible cavitation and turbulence from the turbine. What are the possible issues with some of these effects?

Gary: I don't know. If it slows down, its going to increase sediment deposits. That might not be good for flow. But it depends where it is, how much silt there is. It may be that water used to flow into sloughs, and it may make it so that that won't happen.

David Meyer: There is modeling done by Jeff Conway that may be very useful. He's been doing model using 2-D and 3-D looking at scouring and deposition. Of course, these will be different, but they will still need to be some sort of anchoring, so the models could still be applicable. It looks at the effects on large and small areas: how bars change, the degree of water rise, the depth of scour. There's been 20 years of studies looking at the effects of bridge piers.

Gary: They'd likely need to be modified.

Doug: We met with Jeff and talked about the modeling.

Steve: We have a USGS document from 2006 that we've used that has been useful. It is close to our study area.

Steven: It has been useful as a preliminary study. It looks at the scour from the Richardson bridge. It is specific to bridges, but predicts where sedimentation will build.

Tom: Can it be distributed?

David Meyer: It is available at the USGS. Jeff and Tim are also doing work on the Copper River that might even be more applicable.

Joe Klein: What data requirements are needed for the modeling?

David Meyer: The needs to be a detailed bed topography and bed material. That's a big order. Jeff uses a single or multi-beam scanner and GPS to make an accurate map. If it's at low water, need to use Lidar on exposed bed.

David Oliver: You can also use scanning lasers. It's cheaper and don't have to bring in aircraft.

Dave Meyer: We use a ground-based Lidar

Joe: Do need a period of record?

Dave Meyer: You can manufacture some of it—look at long-term variability.

David Oliver: I thought the USGS had data on Alaska's rivers for quite some time.

Dave Meyer: Not long enough.

Gary: We also see some of these changes with log jams.

Debbie Burwen: They do change habitat. Some species like it, some species don't.

Jim Durst: I see the changes on a couple of scales: 1) right at the level of the turbines, there is a pressure difference. Is it large enough to cause damage? There is a lack of hard data. Unlike the studies on traditional hydro turbines, where there has been extensive studies. I don't think we need to spend that much money. We need more info though. Fish live in a pressure environment with their swim bladder and [something I didn't write down]. 2) it has the potential to change flow. This can change migratory habits, rest areas. It could affect downstream gravel bars, spawning grounds. The size of the system change will affect things differently.

Neil: Could you explain how it could affect migratory patterns more?

Jim Durst: Fish are all about saving energy. They "look" for the right type of flow: low velocity for going upstream, high velocity for going downstream. It might change access to different channels. We're looked at different effects—water chemistry, water quality, and velocity—it looks like velocity is a major determinant of migratory patterns [I think I wrote that down correctly?] If there are large scale changes, it could affect the migration.

Tom: How do fish react to trees, etc. that block the flow?

Jim: Depends on the size of the water body. From radio tag data, up-migrating fish will move up and then hang out behind islands, banks, etc. to rest, and then move up further. Smolt we know that minnow traps can be used in low velocity areas—eddies, near logs—to find outmigrating smolt.

Tom: Could the turbine act to attract fish?

Jim: There aren't many logs hanging out in the fastest part of the river, so it is unlikely.

Jim Norman: If there is a potential high pressure differential near the blades, what are the thresholds?

Jim Durst. From the literature, there are known parameters. We need someone to put sensors on turbines though. It's not anticipated to be a big deal, but it needs to be done.

Jim Norman: It's still dependent on if the fish react before they get to the turbine. Glen Martin at AP&T is trying to determine this.

Neil: I've also read that cavitation could be seen as positive if it can act as a sound warning to the fish. Wondering what other people thought of this.

David Oliver: you can't count on that. Cavitation will occur near the surface, but not down below.

Neil: Aeration?

Tom: Oxygen absorption is increased by turbulence. So it could increase oxygen locally.

Phil: Nitrogen saturation has bigger effects. We've had 100 years of hydro projects to study, now we're trying to reinvent all this in a few years

David Oliver: Is there any methodology in the permit process for the studies?

Mary McCann: The obligation is on the applicant to conduct the studies.

Gary: Until there is a complete FERC plan, it is hard to predict.

Phil: So many things are site specific, I can't guess now.

Mary [?]: We can see study requests work or not, the process is the same [or something like that, indecipherable notes]

Monty: ORPC came up with study plans, but it was frustrating. We would have liked more input during the study plans. We would have liked to have known some of the questions that were raised today.

Neil: Am I hearing that you would rather not come up with your own questions?

Monty: It that we don't know what needs to be answered. We needed to figure out what the questions were.

Phil: Same here. We don't know what questions to ask either. In traditional hydro, we know what answers we want; we don't here.

Gary: FERC provided the opportunity for feedback, right?

Monty: Yes, but it was confusing [or something like that]

Phil: One of the things that I have learned over the years is that people ask questions differently. When we talk about objectives, clarity is given. It also becomes more expensive. We know that we won't get everything that we want. Especially when you're talking about the FERC process, with only 30-45 days, it get to be difficult. That's why we need to do things like this. Today I've thought of 5 or 6 things that I'd never thought of before. It is important that some studies are done, it may be that it shows that nothing new needs to be done, or maybe it shows that more research needs to be done or a change is required.

Sue Walker: I agree. The most important thing we need to know is if there is any direct effect on fish. We need priorities and a list of studies. Perhaps if the smolt are in the high velocity, then maybe the turbines can use lower velocity

John [?, ORPC]: There are different ways to look at the technology. If the technology and fish should be in separate bodies of water or prove that the technology has not detrimental effect.

Monty: We need to be in an area with fish to show that it is not detrimental. Our goal is not to avoid, we need to learn about the interactions.

Gary: Outside fish, with land we need to know the reaction upstream and downstream. Does it cause a rise, deposition, change in sand bars?

Neil: Would this be done through models?

Phil: It is good to see that we all want the same thing: clean, renewable energy.

Tom: Question: From an academic standpoint, do you want generic river/inlet models. We could easily do simple models, or do they need to be more site specific?

Gary: Generic models are good, but they must be truth tested.

David Oliver: In the permitting phase, the model will be the thing to point to, but it must be measured in the river. The model can be pointed to but it must then be reapplied.

Gary: Agree, during the permitting you will only have the model to point to.

David: [something I did not write down]

Jim Norman: If you analyze with a model, and knowing that the river is always changing, how can you tell difference between the natural changes and the effects of the turbine?

David Oliver: AP&T and Ruby did baseline studies. The pre-emptively established a baseline. I think that was very responsible.

Jim Norman: Is there enough consistency in the variability to make any conclusions?

Mary McCann [?]: It depends why you want to know.

Jim Norman: there appears to be a need for it [?]

Mary McCann: You can likely determine the increase in sedimentation, bank erosion…

David Oliver: You must know the state of the river before.

Jim Durst: We've often seen that when troubles arise after projects (mines, timber projects, roads) that if there was not a good pre-deployment study, everything gets ascribed to the project. The project gets blamed for all the problems. So it is good from a resource and corporate liability perspective.

Brian Hirsch: I'd like to see a prioritization of studies. Also when I was the project lead at Ruby, people told me we were lucky that we deployed after the salmon ran up the river, because it was a bad salmon year. We might have been blamed.

[?]: It is important to know what is reasonable to ask. It should be a negotiated process

[?]: I remember that people were catching fish upstream from the Ruby project and were catching fish with scars and scratches (which are pretty common in fish) and blaming it on the Ruby project.

[?]: the baseline monitoring is important to protect people from these sorts of questions

Debbie Burwen: Eagle is close to an established sonar site

Neil: [wrapping it up] I wanted to let people know about a technical conference that I am arranging. After the last meeting it became clear that there was interest in having a technical conference for the resource agencies. I've been able to secure three speakers: Monty Worthington from ORPC, Ed Lovelace from Free Flow Power, and Bob Moll from New Energy Corp, the maker of the Encurrent turbines. It is scheduled for 12:30 to 5:30 at the BP Energy Center on April 12th. Two of them happen to be up here for another meeting at AEA and they agreed to speak and take questions. I'm planning on about an hour per manufacturer, including Q&A. Afterwards, what I am hoping is that groups can get together to come up with studies and do some prioritization of those studies.

Gary: I don't think we'll be able to prioritize studies.

Phil: More in the topics of study, in a generic way. I've floated the idea to USFWS, and I was surprised by the response. I had 15 people respond who wanted to join, some that I didn't even send the email to: mostly biologists but also hydrologists.

Neil: I'll be sending out the notes and the meeting information after I receive confirmation from BP on the use of the room. Thank you for joining in today.

Hydrokinetic Working Group Meeting Notes
5-5-2010

Participants:
Neil McMahon (AEA)
Jodi Fondi (Denali Commission)
David Oliver (Terrasond)
Betsy McCracken (USFWS)
Joe Klein (ADF&G)
Phil Brna (USFWS)
Eric Rothwell (NOAA)
Colleen Parker (Coast Guard)
Thomas Watts (Coast Guard)
Jack Schmid (UAF)
Jim Durst (ADF&G)
Chad Gaballa (Alaska-Canada Research Innovation Centre)
Brian Hirsch (NREL)
Bob McCormick (Coast Guard)
Jason Meyer (ACEP)
Jim Boschma (Boschma)
Gary Prokosch (DNR-MLW)
Jim Norman (ABS Alaska)

[*The following notes are my transcribed from my handwritten notes. It is meant to be a summary of the conversation and will certainly have missed some aspects of the discussion—especially any comments that I made in the discussion were generally not written down. My apologies if I have misrepresented or misinterpreted a statement or garbled the transference.]*

Neil—General introduction: including proposed agenda and purpose. Overall purpose of meeting is to discuss the methodology that we can apply in future meetings to determine the most far-reaching, scientifically valid, cost effective, and transferrable research topics, objectives and methodologies.

Joe K.—Before we go onto the agenda, something I'd like to address is the possibility of creating a matrix of the issues, so that it could be given to someone who is looking at doing a project. It could provide a way for developers to see what the possible elements are that they need to look at. It can be broken down into section. It can also provide reference to other resources impacted: land, navigation, culture, etc.. It could provide a template for our future talks as well.

Jim Durst—The framework sounds like a good starting point. In talking with others it looks like the devil is in the details. I am assuming that we're looking at an 80/20 rule, about 80% of the information will be transferrable from one project to another, with 20% being site specific. When we're looking at the critical path analysis, we've so far been relying on the technology as the driving force, and it will soon be that the technology has developed beyond the baseline data.

?--Some of the 80% will likely be EMF, pressure, hydrology, pressure drop.

Betsy—There is a matrix in one of the attachments that was sent out earlier (passes the matrix around the room)

Neil—I will resend the document out to everyone in the group again, in case it was misfiled.

Chad Gabbala—Introduces self and role in Whitehorse. Works for Alaska-Canada Research Innovation Centre in Whitehorse, Yukon. There are number of Canadian groups interested in the technology. There is a growing demand for power, especially for mining. Will need another 100 MW of power in a short period of time, only 120 MW in the territory now. Yukon is interested in doing the implementation of the technology correctly. There is a unique situation that we have now for cross-border communication and would like to have common methodologies across the border.

?—Hydro center in New Orleans.

Brian H.—There is value in connecting with them. I've been in contact with others in NREL about it, and have sent Neil's contact info to them.

Neil—Asks for a further description of SMART objectives

Betsy—I've used it for both strategic and operational planning. It is all based on measurable performance, being able to show that some is being accomplished

David—Metrics [hmm…sorry, not sure what it was about]

Betsy—The basis is doing scientifically repeatable studies. It provides a better basis for accountability

Phil—It allows it so that there are no arguments. If the study is not done properly then we don't find out what we want to know—perhaps the study isn't long enough, looking at the right parameters, etc. The SMART program helps to ensure that studies are designed properly with defined, measurable objectives. It is much easier with management decisions. Trying to provide causal effects is much more difficult.

?—I see that biometricians [statisticians] is a major component.

Phil-It is very difficult to ascribe a particular effect to a project due to natural variability

Gary—It goes to what is the baseline. It's very important to know the baseline

Jim D—Without the baseline it is a difficult to know. Once a device is in the water, any changes will be ascribed to the device—be it the chatter on the river or the Canadians. I think that looking at this is all step 2, step 1 is always going to be where is it going to go.

Gary—There isn't any way to do a baseline on a global scale, it will be site specific.

David—What I'm hearing is that a baseline could be for one year?

? –Perhaps, it depends.

Jim—You need to have a control to calibrate the results to. It will cost more up front, but in the long run it will lower costs as it will be easier to ascribe any changes to the device or show that the changes were not caused by the device.

Chad—Look at cumulative effects yet?

David—we're not at that point yet. We're still dealing with individual projects. We know that it's important, but there isn't enough information yet to deal with it.

With a river like the Yukon, can there be a unified control for multiple sites

Joe—To go back to the matrix, looking at the project, what needs to be known. You can go see what has been done elsewhere and then perhaps apply it at the particular spot. So if another project has already addressed an issue we can look at the evidence that is supplied to us to make a determination if the data is sufficient.

Phil—On the Yukon, if we're measuring something, we'd need to look at a number of factors. Say we look at noise. Are they similar turbines, what's the water quality like, the noise will likely propagate the same, but maybe not. We definitely need the baseline data though first. Fish migration will be a lot more complicated.

If we think of a control an example might be a mine. With mining we might look at one river, what species are present, what is the habitat, what do we know about the fish. When the mine goes in, do you have enough info to know that the mine caused changes. A control would be a similar type of river. If certain things change and others don't in the two rivers, then you might be able to determine the mine caused the changes.

Joe—The theory is similar to in medicine: there is a control and a treatment group. There needs to be level of confidence of the results. Another classic example is logging versus no logging in areas to determine the changes caused by the logging. It is important how the experiment is designed to determine cause and effect.

Jim Boschma—How do we determine how much fish impingement we will have on our fish screens at our Takotna project.

Jim D—I'm not sure that was the intent of our comments on that. The best would be that the design is self-cleaning. We will need a monitoring plan

Chad—I've had some experience with acoustics. It appears that you guys are looking at a classics statistics approach. What we're looking at using acoustics to look at behaviour, and then do device optimization.

David—They are also doing observation at Eagle.

Chad—We're looking to get hands on a Kongsberg (sp?) that was used in the Columbia, not sure if it will work on such a small scale project.

David—It has not been asked of the projects yet, but it would solve some of the questions in the pilot phase.

Joe—How about navigation, including fish wheels? What does the Coast Guard do to permit them?

Tom Watts—Once its site specific: where will it be put in the river. We have jurisdiction up the Yukon and smaller tributaries, anything that is navigable.

David—I have a question. So the Ruby project was in the water for 90 days or so. How do we communicate that there was an obstruction? Not sure how to let the barge companies know. The YRITWC mounted a light.

Bob-McCormick—Coast guard has oversight over state marine information system. We'd provide the information about an obstruction to navigation in a notice to mariners. We coordinate with NOAA if it needs to be on charts. The best way would be to coordinate with our office to determine what needs to be done.

Gary—What should have been done differently at Ruby?

Bob—If it can be addressed beforehand, it would be best. They need to be in compliance with the national standards. For a research buoy, it would be important that it does not look like an aid

to navigation. There are specific guidelines for color, the color of lights. There is not permit, per se, but it needs to be in compliance with the guidelines.

Chad—Is there anyone looking at aesthetics?

Bob—We don't regulate aesthetics. We do have regulations on types of lights. Strobes are not good, as they tend to blind pilots. Lights should be white to yellow with particular flash characteristics. It depends though on the traffic density, water depth.

?—Has there been any communication with the Eagle project?

Bob—No. The Coast Guard has come to realize that it needs to engage the developers. Particularly the project near Fire Island, which is in piloted water. It needs to be done beforehand. The application currently is vague, with no specifics. We will make ourselves available, help identify user groups and work to come up with a plan.

Tom W—On other thing I'd like to add was that we were told by a barge company on the Yukon that they drags chains down the river as a brake as they travel downriver. This is important so that groups do not have cables, etc. going across the channel.

David—As I talked to some of the barge companies, they said they went down the river in the thalweg and up the river in the slower sections.

Bob—We can also put on the charts no anchoring zones. We can work with NOAA to get that on the charts

David—I'd agree with that, but can it also be done in rivers?

Bob—NOAA doesn't do that, but the Army Corps and Coast guard can communicate that information.

Gary—DNR would have that information on status plats

Phil—I have a question for the developers, if there is one thing that you want to know—what would it be?

Jim—Are the units going got damage a fish population. We'll have to study the various systems in the water, the fish will ultimately have a choice on what they do.

Betsy—Going back to it, you need to have the baseline.

Brian—What I see is that there is uncertainty with the regulatory regime on what is necessary. What is the process that needs to be gone through. How can we do replicable and verifiable research?

David—At this phase, each developer wants to know how the device interacts with fish and to describe the weaknesses and strengths of the device. There needs to be real world measurements on how they interact. Perhaps this needs to be on a broader scale than what will be happening on the East Coast.

Betsy—There are difference between the marine and riverine ecosystems. Different species—behavior and habitat. Very site specific

Jim Norman—We all have the same goal: not to harm fish.

Jim D.—There 's been more revising of the study at Eagle. It is difficult proposition

?—Can the info from the Kvichak be used?

?—We can't say that the results from a clear river will be the same as a turbid river; there was also problems that came up early in the study.

Chad—Is there some regulatory end point? A presumption of zero impact?

?—The goal is to protect fish population, not 100% of fish.

?—There is no universal threshold, no absolute standard. It isn't absolute in the FERC process

?—The goals are to avoid, minimize, and compensate. In that order

? –Need to find what fish are doing before. Same with hydrology, need to do it before and then do it after. But it depends on the site. Need to define the baseline.

Joe—With sediment transport, with the hydrology constantly changing, how does one define the baseline? You have to make assumptions of linearity. Same thing in biology. Make measurements and assumptions, and if the results go out of line, then remeasure.

Phil—First year: see where fish are in the water column, what types, etc. So the adults might be found in such a place, and based on that the turbine should be placed to avoid the highest concentration.

Gary—Or place it in highest concentration to see what the effect is.

Phil—That's why you deal with water and we deal with fish…[chuckles all around]

David—can there be control for multiple places?

Betsy—what I see is sonar from both banks in conjunction with other measurements—depth, velocity, sediments. With these the condition at this site can be found and then after deployment we can determine what change has taken place.

Joe—With more complex projects we may need more time. The baseline might be one year, perhaps two. The FERC process allows for this timing.

? –Instead of looking at just 1 site, is there a way to look at multiple sites, the entire river?

Chad—I have a background working with some of these issues, worked with the setting up of the Eagle counting station. We're looking to do projects on our side of the border and may be able to spit up money to look at transborder issues and coordinate projects across the border

Joe—With hydroaucustics, we may not have time for planning for this summer.

?—We need to be realistic about what can be accomplished—preliminary bathymetry, velocity.

David—Jim, could you speak to the fish study at Eagle.

Jim—There are plans on using Didson cameras, but there are problems with mounting them to get the necessary field of view. The process to monitor and measure needs to be refined. Not all the questions will be answered. It will be difficult to visualize the fish at 50 ft. The turbine is 8 ft X16 ft so it is a fairly large area. Hard to get a large enough field of view

David—Would a Kongsberg (sp?) be a better bet? If it meet the standard, I'm not sure. In the past people have employed Didsons and sampling. Looking to see the impact from the turbine. The fish collection plan is passive, with a certain number of hours of collection. Don't want to leave it too long so as not to catch logs, etc.

Joe—It is experimental and will help to determine how to assess the effects. We also have to think there may be differences between clear vs. turbid rivers. The methodology needs to be meaningful.

Gary—There must be a methodology in use already for this sort of thing?

Jim—Not for this sort of project.

Gary—Not even for determining baseline?

Phil—We do management studies, this is not the same as determining impact. For example, most people are fine with aerial studies for populations, but that wouldn't be definitive in this case.

Gary—For this summer, people should go to find what fish there are and where they are?
David—There's a disconnect between the expectation and what is being done.
Phil—We need to know behavior, where they are, how many, their lateral and vertical location.
Brian—What if there is no effect seen? Then these things wouldn't be needed, right?
Joe,--If that can be determined definitely, then perhaps
Neil- -So what can we do to move forward? We need to start somewhere.
Gary—We can start looking at hydrology—I don't see this being much different than other types of projects. It should be pretty straightforward.
David—I can show what we have done for baseline work, and come up with a common methodology.
Betsy—If we can come up with a worksheet of what answers need to be provided and the protocols to determine those answers, that would be useful. We can a have consistent and complete…[something]
Jim N.—One set of criteria—there are tasks that are independent of the turbine and some that are dependent on the presence of the unit being in place.
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The following was provided by Monty Worthington prior to the meeting:

As far as input on the Generic questions list, I would offer that items 1 through 4 are very much in line with work that should be completed as part of a dedicated research effort and not something that should morph into a list of requirements for a specific project. I believe that is the intention of the generic vs site specific studies, and it will be important to be sure that however the generic studies are designed and carried out they are rigorous and widely transferrable. In the relation of these questions to the riverine environment I would put a plug in to support AHERC's efforts in these study areas. As we have an agreement with AHERC to allow the testing of other technologies at our FERC site as part of their Nenana Hydrokinetic Test Site, it would allow their studies and information to be leveraged by any technology or project developers that wanted to have tests done there. AHERC will have a paper out soon that begins to characterize power density and turbulence modeling at the Nenana Hydrokinetic Test Site, and they are prepared to further this work into sediment transport if they can find support for it, so there is already a body of knowledge to build on. They also have developed a fisheries study plan that has strong support from ADF&G, it is however far more involved than what ORPC could support for our project alone. My thought is that in supporting these studies at a focused location that has many of the common characteristics of "generic" Alaskan rivers much of the work done there would be exportable to other specific sites without requiring replication.

As for the site specific studies, I will be interested to hear what areas are encouraged to be investigated on a individual site basis. Much of this list is of course things that would be necessary for project design, but some of it certainly falls into regulatory requirements.

Finally, as usual I support the MOU with FERC so if we get any traction on that I am willing to help however I can to bring it to fruition. Dorothy Shockley's concerns at our meeting last week certainly brought up the rural communities' support for such an agreement that would give a mechanism for informing them of potential projects in their area.

Alaska Hydrokinetic Working Group Meeting
October 13, 2010

Participants

Eric Rothwell (NOAA/NMFS)
Brian Hirsch (NREL)
Doug Johnson (ORPC)
Betsy McCracken (USFWS)
Joe Klein (ADFG)
Neil McMahon (AEA)
Krissy Plett (DNR-DMLW)
Lisa Rabbe (USCOE)
Sue Walker (NMFS)
Steve Selvaggio (Whitestone)
Steven Selvaggio (Whitestone)
Bob Smith (Pulse Tidal)
Jim Durst (ADFG) and others whose names I did not catch
Petty Officer Bulickes
Denali Daniels (Denali Com)
Jim Norman (ABS Alaska)
Mary McCann (HDR)
Andy Seitz (UAF SFOS)
Jam Konigsberg (
Stephanie Nowers (REAP)
Wyn Menefee (DNR-DMLW)
Louse Smith (USFWS)
Bob McCormick (USCG)

The following are from Neil McMahon's handwritten notes. Most sections are summaries of people's comments and are not verbatim; any errors are unintentional.

Neil M.—(Begins with an introduction to the meeting, introductions around the table and on the teleconference). The agenda for the meeting is generally split between getting updates on this summer's field season and looking ahead to this fall and winter's meeting season.
Doug Johnson—To give an update on ORPC this last summer, we had great success in launching our device in Maine and have been delivering electricity to the Coast Guard. We've had good success working with the agencies in Maine. In Alaska, we're about a year behind our work in Maine. This past summer, we continued to do environmental monitoring and site characterization work in Cook Inlet. There appear to be no fatal flaws in the plan to date. We also continue to work with CIRI on the Fire Island intertie. That project still appears to be on track.
Brian Hirsch—Looking ahead, what are the plans for 2012?
Doug J.—We are planning on a 2012 deployment for the Fire Island project. We also have some other projects in the pipeline. We've started to look at the Forelands area out from the Kenai. We're also interested in the Homer application to the RE Fund to be funded as the Kachemak Bay region also has good potential. We're also working with AHERC (the Alaska Hydrokinetic Energy Research Center) at the Nenana site. Next summer we plan to have a deployment of the mooring and a testing of the debris diversion.
Sue Walker—NMFS had the opportunity to go to Maine to look at ORPC's operations, including the video monitoring and SSI technology.
(No one from AP&T was on the teleconference to provide an update on the Eagle project, so Jim Norman from ABS Alaska provided the update)
Jim Norman—The summer season went very well, except for the problems the road closure caused. That made it very difficult to make it to the site. Besides that it was a successful season. The deployment process had a learning curve, with the first time taking more effort than the subsequent deployment. There was also a minor coolant issue and some issues with grid frequency, but both of those were resolved. The main issue that needs to be resolved is debris management. I say management because a lot of the debris can't be stopped. We'll tackle that problem next year. We had great crews working throughout the summer. We didn't operate as much as we wanted [a little over

two weeks]. Also the fish study was able to do some testing on and off the barge. So far the results look pretty optimistic. I'll let Andy Seitz provide more info on that though.
Andy Seitz—We collected baseline information from the margins of the river. We were able fish off of the barge a bit, but did not get to sample during the peak of the smolt outmigration. We did find a number of resident fish and were able to capture one uninjured fish from the barge.
Doug J.—What RPMs were you running at?
Jim—21-23
Brian Hirsch—What sort of output were you seeing?
Jim N—We were maxing at about 20 kW in 2.4 m/s water.
Brian H—Neil, do you remember what we were seeing when we were there in August? Was it in the 17-20 kW range?
Neil—I saw it bouncing between 12-15 kW in a 7 ft/s (2.1 m/s), with the variations taking place over seconds.
Brian—What's you plan for next year?
Jim N—Debris management will be a major focus. It will be major effort over the winter to address options. We'll refine the deployment process.
(Dave Pelunis-Messier from the YRITWC's Ruby project was unable to attend the meeting so I provided an update).
Neil—The Ruby project had some successes this summer. The anchors that were deployed in 2009 were able to be reused, which was the hope of the previous year's design. There was also a redesign of the transmission cable—since that was the cause of the failure in 2009. The cable was reinforced with an extra sleeve of PVC and then weighted with 3/8" cable. The pontoon was redeployed in July and the transmission cable was attempted to be deployed at the same time. It was attempted to pull the cable from the shore to the barge using a johnboat, but it wasn't able to pull the cable all the way to the barge. It stopped a couple of hundred feet from the end goal. They had to wait for the next free barge (a couple of weeks later) to try to pull the cable further. That turned out to be unsuccessful. So the turbine wasn't able to produce power during this field season. The barge also had issues with debris. One of the instances piled enough debris on the front end that it was pitched with its bow underwater. The debris diverter was redesigned, which seemed to help.
Jim N.—Something that I forgot to add, as part of the Denali Com. grant, it was also to test running the turbine as the prime power for the grid. That worked out well.
Steve Selvaggio—The Whitestone Power and Communications projected was funded through DOE this year. Our engineering team is working hard to finish the design. We've had a strong relationship with permitting agencies. We're now looking at marketing our design within the state, nationally and internationally. We're planning on beginning construction in 2011. We've applied for the FERC permit. We were also able to get UAA out to do a velocity study and NOAA also helped out this summer. The biggest problem that we see is debris, it's a big issue. The problem of having 4000 pound trees with rootwads going down the river. Some of the debris floats, and some of it doesn't. We've been in talk with Alan Fetters quite a bit. We're now looking at secondary and primary control systems.
Steven—We've been successful in receiving permits from the Corps of Engineers. It looks like our DNR permits are a done deal, but they haven't been processed yet. There doesn't seem to be any problems from the ADF&G and USFWS; they've endorsed our design. [missing something here: some notes of mine that don't make any sense. Sorry] We plan to deploy in May of 2012. We seem to have some very high velocities near us.
Brian H.—What is the size and nameplate capacity?
Steven—Well, it hasn't been tested yet, but we expect at least 100 kW. The size of the wheel is 16' in diameter and 18' in width. The pontoon will be 30' in length.

Jim Boschma—We were able to test some of our modifications this summer. Our device is 15 kW and received most of the permits needed, but the next issue is to do fish safety tests. We have two designs a curtate and pi-pitch design. In both designs, the angle of attack changes continuously. Ice was developing in Gaines Creek when we got all of the permits, so we're planning on deploying in June. We plan to bring it up to 30 kW with a second turbine.
Doug J.—I was out in McGrath and the people there were really excited about what you've been doing. How did you get it there?
Jim B.—We're able to use a DC-4 that flies in there, but we didn't get it in the water this year. The first time it will be in the water will be June 2011.
Brian H.—Is there other power there that you'll be hooking into?
Jim B.—There's 15 buildings there and the mine has a couple of 50 kW diesel generators. The water there is pretty clean, which is different from other places in Alaska.
Doug J.—What's the depth of water that you have there?
Jim B.—The depth is about 1.2 meters. The unit is fully submerged, and we have a Ventouri flow accelerator to increase the flow. You can check out a presentation that we did on AEA's website (http://www.akenergyauthority.org/OceanRiver/4-12-2010_HydrokineticTechConf/AKCyclogeneric500.pdf) or our website at http://www.boschmaresearch.com/Site/HOME.html
Steve S.—How are you going to deal with the silt load in river? Is the river you're going to be on glacial?
Jim B—I used to live at Ft. Greely so I know how much silt can be in the water, the river's basically a flowing sand stream near Greely. We're designing our device to handle the conditions. We're planning on using extruded blades, with a rubber like coating and a metal spar to provide strength.
Bob Smith—We've now had 18 months of operation in the Humber Estuary. We've learned quite a bit to optimize the design of the oscillating hydrofoil. We've been able to manage the controls so that we can now turn it on and off from the office. We did have some difficulties with the electrical system, but those seem to have smoothed out now. We're now looking to scale it up to the 1.2 MW size. We're at the end of the preliminary design, getting to the point that we're sizing the bolts, etc. We're planning on deploying it off the coast of northwest Scotland, in protected waters, in 2012. We're working at deploying in Cook Inlet, still deep in negotiations and hoping to have an agreement soon. We've chosen the west coast of Scotland instead of the Orkneys because the sheltered location will minimize extraneous costs and it will be economically viable from the beginning.
Steve S.—Was the electrical problem a frequency issue of tying into the grid?
Bob S.—No it was an electrical issue with the drives on the rig controlling the pitch of the blade.
Doug J.—Is there something similar to FERC in Britain? Have they been helpful?
Bob S.—It's fine as long as you follow the process. In the UK the process seems clearer. We've been able to work cooperatively with the agencies. In the US it seems that the issue is that there is no one who ultimately makes the decision.
Steve S.—Neil, do you know what the depths in the Cook Inlet?
Doug J.—We've been looking for at least 40' of depth, but there are some areas as deep as 160'. Of course, some areas go dry.
Petty Officer Bulickes (sp?)—Why is it that you want to know? The Inlet has navigational issues. It is a narrow channel, with strong tides. Safety is a major concern. We have been working with ORPC on this in great detail.
Steve S—I had some questions on the Iguigig project with regards to navigational issues.
Bob McCormick—We would be looking at any sort of boat traffic to ensure safety. It extends to any navigable river and includes anchoring, etc.
Steve S.—I've been helping Alan Fetters with permitting, and one of the things that has come up with has been seals, whales and steelheads.

Sue W.—What is the question? Do you want to know NMFS role?
Steve S—What is would be considered an impact?
Sue W.—Are you asking what the concerns are? We'd look at the impacts to migration, any sort of life history, direct and indirect impacts. I did a presentation at Eastport that I can probably share.
Neil—If there aren't any other project questions, I'd like to continue with some topics for planning for the future. Should we split the group to address tidal issues specifically at some point?
Doug—ORPC has been approached by other areas (Homer, out in the Aleutians, Teller), so there are places outside of Cook Inlet that down the road that this technology will likely be installed.
Steve S—Tidal is different and I think it should be separated. There are so many differences
Doug J—I think there are more similarities than differences. Debris will be an issue for us out in the Inlet, just as it is in the rivers.
Brian H—Is there much of a difference in permitting?
Sue W. –They're very similar for permitting purposes. Mostly it would be difficult to attend another meeting [A lot of agreement from everyone on that point]
Neil—How about the timing of the meetings? Should we have them monthly, more or less frequently? Can we come up with a set day each month?
--Agreement that every two months would be best and that the Doodle polls are effective.
The next meeting will be in early-mid December.
Neil—Would it be beneficial for the working group have a goal statement? Many of the other working groups have stated goals, and I wondered if we should as well.
Eric Rothwell—We each have our own goals for what we would like to get out of the meetings, but it might be useful for there to be one that we can all look to.
Neil—Okay, we don't need to spend the time today to do this. I send out a suggestion and then we can get feedback through email. That would likely be a better use of time.
Neil—Several months ago Jerry Johnson at UAF brought up the idea of having a technical conference this fall. We had discussions about it this summer and included Monty Worthington and Joe Klein, but we didn't get beyond the discussion phase. I got busy with designing the Emerging Energy Technology Fund, and the conference fell to the wayside. Essentially we were interested in having a professional conference with submitted papers and presentations, primarily focusing on river hydrokinetic. I was unable to find any conferences specific to rivers, so I thought this might be a niche to develop. We could invite nationally and internationally. I there any interest in something like this? Is there a time of year that would be better than others?
Stephanie Nowers—REAP is holding the Business of Clean Energy in April. While it would not be as technically focused, perhaps it is something that could fit.
Wyn Menefee—In-river specific would be beneficial if we could see what other people are doing. The issue that I can see is that when I speak with other state entities is that they are looking at a much larger scale—like down on the Mississippi. Alaska's project will be much smaller. It might be of great value if others are doing similar things, but the large projects may not be applicable.
Sue W.—There are some in Canada (on the MacKenzie), also interest in Maine, remote Africa, Sri Lanka. It would be valuable to make these connections.
Doug J.—We've also been in touch with people from Chile and New Zealand who are interested in in-stream power. We could also look at partnering with somehere else on this. SnoPUD is also interested at looking at the larger rivers in Washington on top of their tidal project.
Wyn M.—I agree the feedback from other places would be beneficial. Perhaps holding it in another state where there is better access for more people would make it more successful.
Denali Daniels—The library at UAS(F?) is having an Alaska Energy exhibit that Gwen Holdman is heading up. Perhaps this is something that can be combined.

Brian H.—NREL is doing work on the Mississippi. The conference could be very useful depending on the focus. A lot of the issues are similar and there may be enough overlap. There's also the research institute in Louisiana that focused on river hydrokinetics, and a military base down there that NREL is working with.
Doug J.—We'll also be working on things in Maine and on the Tanana next summer, so it might be an opportunity for us to do show & tell.
Brian H.—I'll connect with NREL about this.
Doug J.—We should also work with OREC (the industry trade organization) to align state and federal agendas.
Neil—We have also discussed coming up a state strategic plan for hydrokinetics so that various state and federal entities could better align funding. Also the strategic plan would be a way that if parties in the state are applying for federal funding, they can point to the state's strategic planning goals to show how their activities are supported by the state. This is something that we could work out at the conference, or do beforehand.
[there was agreement that this sounded like a good idea]
Neil—I watched a webinar today on the EPRI fish flume study, which was interesting. We can discuss the study in more depth when we discuss some of the fish specific topics later.
Neil—Is anyone interested in bringing in one the people who wrote the National Park Service's recreation guide for hydrokinetics? One of the authors is from Alaska. [I then go on to say erroneously that the NPS has the role of permitting for recreation and aesthetics. This is incorrect; they helped to write the handbook, but they do not have statutory powers. My apologies for my mistake.]
Somebody(?)—Is there any role that the State Parks play in this process?
Wyn Menefee—While I do not work in the Parks department, the park system is limited to only the bounds of the state parks.
Neil—Late last spring in our last meeting of the season, the idea was raised of having a permitting matrix that we could use to discuss the permitting needs. Joe Klein started the process and then I worked with Betsy McCracken to flesh it out in more detail. I was wondering if this is something that we should revive, as it sort of died during the summer. [There was a general confusion over this was as few people remembered this, including those involved.] Well, what I can do is send the matrix out again and then we can see if this will be useful for moving forward or not.
Neil—Another potential topic that we can address would be crafting an MOU with FERC, something that we have touched upon in previous meetings but that has not progressed beyond the mentioning stage. Is there any feedback on the relevance and importance of this?
Doug J.—We've seen that this has been very beneficial in Maine. It has been very useful to us as a business. What I've seen its main value is in getting people and agencies organized. All agencies have been involved in the process.
Wyn M.—We'd be particularly interested in anything that leads to data sharing. We've discussed this in the past and still see value in it. It could lead to better coordination. Of course, since nothing has happened on it in the past year or so, it has not been a high enough precedence, unless someone else takes the lead.
Sue W.—[my notes don't make any sense]
Mary McCann—The MOU isn't just with FERC. The benefits extend beyond that since Maine actually changed their laws to help develop offshore energy, and tidal was included in that legislation.
Joe K.—[my notes don't make any sense]
Neil M.—[I wrap up the meeting, thanking people for taking the time to join] The next meeting will be scheduled for early December.

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Meeting Minutes of Whitestone Hydrokinetic Project Teleconference October 14, 2010

Subject: Whitestone Poncelet RISEC Project

Bring up to date
Connect to the Grid Questions

Dennis Johnson, Senior Controls Engineer, Applied Power & Control
Steve M. Selvaggio, WCA
Steven A. Selvaggio, HCC
Jack Schmid, UAF
Neil McMahon, AEA
John Hasz, HCC
Alan Fetters, AEA
Susan Mitchell, CE2 Engineers

SMS: Golden Valley doesn't think there will be any connect problems. What we want to talk about right off is control.

DJ: Generator Selection? Marathon? I wanted to go over the operation gain. The Marathon is fairly limited. Speed of operation – how that ties in to what you're expecting for loading, regulation and so on. I'm just wondering where you're at with that selection.

SAS: Yes. We're looking at the marathon

DJ: We didn't have a way to easily control the flow to this right?

JH: No, it's whatever the river is doing. Therefore we need to come on at a prescribed RPM and lock in, then kick out if the RPM drops and we're starting to pull power. The river is pretty constant once it comes up to the flow we're looking for. We're not looking for a lot of dropouts. We're wondering what kind of controls you envision to make this automatic, failsafe, robust and not needing to be tweaked all the time.

DJ: It comes down to the control of the RPM.

JH: Do we need to control RPM? Or just note RPM and fire when it's correct.

DJ: In the perfect work, diesel or something where you can control the speed…. If we came in just over 1200 RPM then closed online and started to bring the speed/load up… that's a perfect world, but I don't know what you have for regulation here.

JH: You really bring power up not speed right?

DJ: It's an induction machine right? So we have to raise the RPM of the generators. That was the concern, being able to get it in at the right point so we can bring online not under too much load, but to be able to bring the load up. Do you have a way to raise and lower the wheel?

JH: Yes, but we would rather not.

DJ: The controls would look at RPM sets. There has to be something to correct and bring them back into range.

What's the band of RPM we're looking it if we're looking at 1200

SAS: Less than 100. 1195 to 1220-1250. Because the gear ratio is so great to the wheel, the speed is basically constant. We will put a brake on the wheel. If we lower it into the water, we release the brake and the wheel starts to spin. As it comes up to speed, we should have something, a tack system that senses when it comes up to speed and brings it online. Do you think there would be some kind of droop to bring it offline, or would it keep going?

DJ: So you bring it online, you're saying there would be a void?

SAS: Yes, or can you compensate for that.

DJ: I keep going back to the diesel engine. If you can control the speed of the engine, you just set it where you want it. But you don't have that kind of control here in your scenario.

SMS: What about adapting a Woodward speed control that signaled the servo and actually caused a breaking action or release from the breaking action – similar to controlling a rack on a common rail pump or rotary pump. Is that a consideration?

DJ: I guess you could tie something in. To correct it –speed it up, slow it down…. Sounds like you want to control the speed…. More from going down, not from going higher.

SMS: The wheel turns at 40% of the water speed.

SAS: As long as the generator is big enough and the wheel can't overwhelm it, you shouldn't ever be able to over speed it, right? The generator should always contain it.

JH: What baffles me then is say we bring it up to 1210 and we close the circuit, isn't it locked in? And the speed of the generator will be proportional to the load output. I just don't see the issue we're talking about because it's locked in and will operate because we're in the infinite grid and will hold the cycles. Even if we missed it, we would be on the negative side, drawing current – isn't that where we are?

DJ: If it just has enough flow to bring it up to speed and it starts to pull load, it will slow down somewhat. We have no way to regulate it. We have to get it from 1200 up to its full load.

SMS: I'm assuming we would bring it up to speed like an alternator on a diesel – when it's matching frequency, they close. You've got an idle prime mover that has to come up to speed and lock onto the grid, once it does, my understanding is it's not producing any power till it locks on the grid at the right RPM.

DJ: But we're still talking induction generator, right?

JH: Yes, should we be talking something else here? I'm thinking synchronous, but we're open to whatever.

SMS: We want to bring the generator up the appropriate speed and frequency to match GVEA and let them control it then.

DJ: GVEA would provide the excitation for the machine and the output would be whatever speed you can then bring it up.

JH: And that's an induction motor correct?

DJ: Yes, it's a consideration. We could try to work that out here.

SAS: We won't have a way to control frequency. It's related to speed and would go up and down.

DJ: You want to basically get it online and make the power.

SMS: Alan – do you have any particularly voltage output you like to see.

AF: 480 is what we would use. This unit would have no use in most of the smaller villages. It would have to go through an inverter and control it that way, or move it and some sort of self excitation. 480 is normal for small communities. You can go to a 4160 – it won't change transfer cost at all. How many KW?

SAS: Somewhere around 100.

AF: The real issue is induction: grid interaction.

SMS: That's part of our project. Right now it's easiest to get it in the water and produce power. Then we can work w/ controls and generating hardware and make it work. We could experiment with our own grid here.

AF: Have you thought of variable speed transmission? From 1200-… whatever range – they're taking a variable speed diesel and control and 1800 rpm 1200 rpm alternator.

JH: All those things should be considered to make this thing more ubiquitous. But if the way we're thinking is going to cause serious troubles, then maybe we're going the wrong way…

AF: I would say you're just very limited in your marketing. Having a self excited or synchronous is a bigger market than something that is just grid interactive.

JH: We also looked at wind – which is where it's being done right now. We could look at our paddle wheel as being a wind generator and pick up the controls used there and be in business.

AF: If you're more open to what you're using for a generator, there are pros and cons to all of them.

JH: It's not that we haven't thought of it, we just haven't been looking at marketing right now. But they are very viable methods to accomplishing power generation. This one just looked the most simple. If it has too many hitches, we're not linked into this even as the way we want to go right now. It's just what we're thinking right now…

If you can regulate your speed plus 20-50 RPM…. It's the best

JH: The grid is maintaining the speed once we lock in right? So I'm not looking at us controlling the speed electronically, other than the generator – that's the output. We could get a generator that's way overrated so there's no way it can break away no matter what it puts out. Therefore it's controlled. Is that clear thinking?

AF: I like that idea. I don't understand river velocity. Is it constant enough?

JH: The river is very constant

SAS: In addition to the gear box which is most of the speed – it's linked to the generator by a belt drive so it can easily be changed. If we have a range where we get below what the generator will produce or above, it can be changed to bring it back into range.

AF: If you're happy with that, you can design the hardware to work in those velocities, yes; induction is the easiest for grid interaction.

If the gear ratio is right, we're not going to put into the water unless it's going at least 8 ft/sec – the wheel comes on line at the speed, no matter how much faster the water goes, the generator will always control it. We have the belt drive to soften the blow coming online and also the efficiency of the wheel is affected by the ratio to the water speed. The flow rate is pretty predictable over a short period of time. Over the whole summer it will change, but not in fast changes.

JH: We like the idea of the belts because they limit the torque. We can come back to the point where we think it's simple. I don't want to regulate mechanically if we don't have to unless we need to in order to get online. I want the electronics to do the regulating. We're trying to make this low tech.

AF: Right.

SMS: The economics of these units – if they enhance diesel fuel, which will be a problem. We want to keep this as simple as possible.

AF: Induction vs synchronous, induction will win if you're looking at economics.

JH: Once the mechanical system is together, we have no problem putting on a different generator or controls.

SMS: It's in our original proposal – to first connect to the GVEA grid, then to modify in order to connect to a smaller grid.

JH: We come back to Dennis then – in all of our discussion have you become more concerned or less.

DJ: I don't know if more concerned. I just want to be able… the issue is that if you bring this online you want to have it low load condition…. If you can accomplish that then load it up… that's fine. But if you want to take it offline, how do you unload it?

SAS: Do you have to unload it?

DJ: No….

JH: Valid concern/question. Over speed protection – what that means as far as the unit is concerned.

DJ: Also the wear and tear on the electrical there.

SMS: I guess you could use heavy arc shoots for make or break connection, but the wheel would double speed. So we're going right up to 90% of river speed. You'd have to have a generator unit that can handle that abuse.

JH: We'd go from 1200 to 2500 RPM. Would the generator handle that or do we need a brake?

SAS: It won't be an instant speed up. The wheel weights 2500 lbs. Maybe we could have some sort of brake system on the speed that would kick in….

JH: The question is will we hurt the alternator. Do we need to protect it? What do we use, how do we get around it, that's the question: electrically and mechanically.

SAS: What is the danger – besides destroying the generator? Is there any other danger to it being offline and spinning way above normal speed?

DJ: It sounds like you've already oversized your gen. So even if you unload, it very well could still operate at its normal RPM rate. The change isn't instantaneous.

SMS: It will take moments to even pick up the wheel RPM.

SAS: The gear ratio is like 282:1 it's somewhat variable…. So the wheel picks up 1 RPM, the generator is going a lot faster.

SMS: I'm sure we could get something to respond to a small oil braking system on the shaft. Maybe that's simpler than I think it is.

DJ: What's your process for raising/lowering the wheel?

SAS: Mechanical jacks – manual procedure. We could automate, but we're trying to keep costs down and minimize the use of hydraulics: oil and water. The other problem is the wheel is not the same weight on either end.

SMS: Also – you want to be there as little as possible. You want to cut down maintenance. Jack? Any thoughts?

JS: My thoughts are mostly on the last part – how do you disconnect, brake this thing so you don't have abrupt changes.

SAS: We should take w/ marathon and find out. There must be some safety factor – see if we're going to overwhelm it.

SMS: We did talk about a Michael lock system. So when it comes offline, it activates and actually brakes the wheel. That would be very simple. You could monitor that and control it through a Woodward EPG governing system. Once the speed is up too high, the brake applies itself more and more.

SAS: You could hook it into the tack system as well.

DJ: They would work in conjunction. You want to look at the wheel RPM and if it increases, apply some sort of break.

JH: Raising and lowering is only a must for the wheel – getting it in and out of the river. It has nothing to do w/ controlling speed.

SMS: We have to have a separate power circuit to keep up the controls we have on the craft.

SAS: So we need answers from Marathon, but we're on the same path we were on previously.

SMS: You could probably have a unit made for a certain amt of abuse.

DJ: I'm sure you could.

JH: If we got down the road after this was evaluated, we could look at a finite grid. We'd just have to put it online for a test. We could easily to do that assessment here at Whitestone.

SMS: I think we've covered it all.

DJ: Yes… sounds like we need some research with Marathon.

JS: Got me thinking about stability and breaking.

SMS: We want to consider any of these scenarios – whether a community could benefit by linking to an infinite or finite grid.

JS: I look forward to your project being constructed.

SMS: HCC has made really good progress on the design. We're pretty serious about this, as you can tell. Dennis? Do you want us to make the calls or do you want to? I would mention you doing that because I think you're a little smarter in this area, but we can do it as well.

DJ: Do you have any contacts there?

SAS: Yes. I could start off with the contact, and then send you the information I have.

DJ: I know the rep out here, but he won't have a lot of knowledge about the set up.

SMS: Thank you so much. I'm sure we'll be coming up with some other ideas.

Alaska Hydrokinetic Working Group Meeting Notes

12-15-2010

10:30-12:00 PM

AEA Boardroom

Participants:

Neil McMahon (AEA)
Wyn Menefee (DNR-DMLW)
Glen Justis (USACE)
Besty McCracken (USFWS)
Jennifer Spegon (USFWS)
Lorraine Cordova (USACE)
Jaime Hidalgo (DNR)
Renee Rom (DNR)
Paul Vale (DNR)
Jaime Smith (TATEC)
Don Degan (Aquacoustics)
Anne Marie Muller
Andy Varne (SWAMC)
John Robius
Brent Petrie (AVEC)
Jan Konisgberg
Jerry Johnson (UAF)
Kate Savage (NMFS)
Jack Schmid (UAF)
Louise Schmidt
Todd Raddenbaugh (UA—Dillingham Campus)
Allison Sturley (AE&E)
Kimbrough Mauney (ORPC)
Jason Meyer (ACEP)
Bruce Hannah (Canada Division of Fisheries and Ocean)
Eileen Hendry (NWT Power)
James Boschma (BRI)
Rich Gervais (Canada DFO)
Matt Cutlip (FERC)
Joe Klein (ADF&G)
Dave Pelunis-Messier

Disclaimer: The following are transferred from Neil McMahon's handwritten notes. All errors are unintentional and Neil's fault. Apologies to anyone whose message was garbled in this transcription.

Neil McMahon: *Welcomes everyone to the meeting, briefly addresses the agenda and asks everyone introduce themselves. Asks a representative from Northwest Territories Power to talk about their project in the MacKenzie River.*

Eileen Hendry: This past summer NWT Power installed a 25 kW unit in the MacKenzie River at Fort Simpson. It was extremely challenging as it was completely new. It was very expensive for the power that was produced, but it did work as advertised. We also worked with the territorial government on the project. With regards to permitting, there were three different organizations that we had to interface with. We started in January, and it was a confusing process. The longest process was getting approval for navigable waters; that took about eight months.

Bruce Hannah—Did the 5 kW go in?

Eileen Hendry—No, next year we will likely test the 25 kW in the place we were planning for the 5 kW this year. The location this summer was not ideal.

Bruce—The manufacturer was New Energy Corporation [NEC], right? [*Editors note: this is the same manufacturer for the projects at Eagle and Ruby on the Yukon River]*

Eileen—The turbine worked as promised. The flow just wasn't very good and the placement was some distance from the shore. We did run a cable to the shore. Due to log impacts and damage to the turbine, we lost half of the operating season. Other log impacts also effected the project, but they were cleared without damage. NEC is supposed to do some redesign work for the debris diversion device this winter.

Wyn Menefee—Is there any deflector for the turbine?

Eileen—There is a log deflector, a A-frame essentially made from 12x12s. These are connected to the main anchor, approximately 30 meters in front of the turbine. It doesn't deflect everything. We also

had issues with debris getting stuck between the blades and anchor chains. The device sits on the surface with the top of the blades being about 18" below the surface. It appeared the log impacts were mostly from logs lower in the water column. The power conversion worked fine. Fort Simpson is a large community so the output didn't effect the grid.
Wyn—Is there anything analogous to America's Federal Energy Regulatory Commission that regulates energy in Canada?
Eileen—No, each community is a separate case with its own grid and not connected to the North American grid, so I don't think that it would apply. We are a public utility with a board so that decides how we spend money and how much is charged.
Bruce—Is there anything further south that you know of?
Eileen—I think that is all done on the province level, not on the federal level.
Todd Raddenbaugh—So if it is a rural area not on the grid you are able to regulate yourselves?
Eileen—There is no board over the entire country [editors note: *Canada, that is*]
Wyn—Is the NEC turbine off-the-shelf?
Eileen—Yes, but it is still in the developmental stage. This was the first one installed in northern Canada.
Jim Norman—Are there any solutions for debris?
Eileen—There are different ideas for other booms. Most of them deflect, but do not keep everything out. Depending on where the logs are in the water, the booms are not 100% effective. We have looked to collect the and then clear the debris. Also we are looking to adjust the boom to have it ride better. We are expecting feedback from NEC, which will be a report for other options and a new location.
Jim—I had heard that the diversion boom attachment wasn't quite right.
Eileen--The boom wasn't floating right.
Jim—I had also heard that there was issues with the power cable being covered with sand and silt. Is there are plan to fix this issue?
Eileen—No, we're going to move it to a different location where it won't be such a concern. Also the site this summer was 200 meters from shore, the new site should be easier to remove the material. To bring everything in, we used heavy equipment from the shore, but it wasn't 100% effective. We had three cables tied together, but we ended up damaging the jacket of the conductor because it turned out the sand and silt made it too difficult to pull the cables by the steel cable.
Jim—Where did the cable come up from the bottom of the riverbed? Was there any issues with debris on the power cable?
Eileen—It came up from the back of the barge. There weren't any issues with debris collecting on it. We did have some issues with it rubbing at the end of the barge, but we used some rubber mats to protect it, and that was sufficient.
Jim—Any problems with the spreader bar?
Eileen—it was damaged in the removal but not by debris. We are expecting a report on this from NEC—they did the removal and not NWT Power.
Jim—What is the grid load at Ft. Simpson?
Eileen—The average load is 500-800 kW. This year was historically low water, so the power was even lower than expected. The average output was about 6 kW. The site had been selected to convenience, not for the resource. The average flow was 1-1.2 m/s was maximum velocities of 1.5-1.6 m/s. We were disappointed with the flow velocities.
???—What was the operating season?
Eileen—We installed the turbine on June 19th and removed it the 14th of October. We are expecting that we'll be able to run it for 4 months on average. We are also constrained in that we had to use a river barge for the removal and we got on the last trip of the season. There were still some trees coming down even as it was removed. We used a barging company to deploy. We had the cable on the shore

and used the barge to pull it out to the turbine barge. No issues arose. There were issues with the retrieval.
Jim—I also heard that you removed the anchors.
Eileen—With the break up of the ice, we assume that the ice would tear it out and the anchors would end up in the Arctic Ocean. We used a single Danforth anchor and used the barge to test it.
Jim—The installation needs to be quick, or costs increase fast.
Eileen—Installation was $10K per day. Also since we had to contract boats, debris maintenance was a significant cost.
???—About how much did it cost to install?
Eileen—I'd probably need to get it cleared to tell you how much it costs. There are costs that will be recurring for other installations but some were specific to the fact that this was the first time that we had done this. I'd say that it was a high number, potentially more than 75 times more expensive than producing power with diesel, and that is with the best case scenario. We did show that it worked properly and we better flow the performance would be better. We didn't have any gearbox issues, unlike at Eagle. NEC is doing some redesign over the winter.
Jim—At Eagle we were right on the cusp of the gearbox.
???—Was there any analysis on the effect on fish?
Eileen—It was not part of the project. We didn't have any anecdotal evidence on any effects, but there was not any monitoring.
Neil McMahon—Thank you Eileen, we'll be moving on to the next portion of the agenda. I hope that we'll be able to maintain communication between Alaska and NWT so that we can learn from each other's projects. The next presenter is Glenn Justis from the Army Corps of Engineers, who is here to talk about the permitting requirements for USACE section 404 and 10 permits.
Glen Justis [presenting from PowerPoint presentation found at ftp://ftp.aidea.org/HydrokineticWorkingGroup/ArmyCorpsofEngineers-RegulatoryProgram.pdf] The presentation will be on section 404 of the Clean Water Act—which covers discharges into waters, including wetlands; Section 10 of the Rivers and Harbors Act—which covers all work affecting navigable water; and Section 103 of the marine Protection, Research and Sanctuaries Act—which is less likely to come into play for these projects. USACE jurisdiction includes navigable waters, adjacent wetlands and some non-navigable tributaries.
There are four types of permits:
Nationwide general permits require no more than minimal impacts. There are 40 types of nationwide permits.
Regional general permits are similar to nationwide general permits, but are limited to regions.
Letters of Permission (LOPs) include activities with minor impacts, for example the placement of a buoy.
Standard Individual permits are for activities with more than minimal impact. The process requires public notice and receipt of comments. All decisions must be consistent with other federal laws.
These permits require some things that NEPA doesn't require: for example, water quality input from the state and consistency from the coastal zone management agency.
The decision that is made must be the least environmentally damaging choice. The first option is avoidance of a harmful activity. If that is not possible, then other measures need to be taken into account. For certain locations, for example special aquatic sites (wetlands, tidelands, etc.), it must be shown that there is no less damaging alternative. This is different from NEPA requirements.
To analyze the alternatives it is necessary to look at state water quality standards, toxic effluents, endangered species act, marine sanctuaries, potential degradation of water, human health, effects on aquatic life and aquatic ecosystems, recreational, aesthetic and economic consequences.
In case of unavoidable effects, mitigation activities may be required. The intent is always to minimize harm, but there may be compensation that may be required. For some activities, the goal may be to

have no let loss and commensurate compensation may be required. For wetlands, it is the function and value of the wetland that must be maintained, not the actual footprint.
While only 3% of applications are denied, most (potentially 85%) are modified—few of the proposals leave in the same form that they arrived.
Todd Raddenbaugh—How about an estuary? Is that covered?
Glen Justis—If it is navigable and has high value wetlands it may be more difficult to receive authorization.
I will also send out contact information that can then be sent to the group for the webpage, regulations, and guidance.
Neil McMahon—Thank you, Glen for providing us with the presentation. The next presentation will be from Wyn Menefee who is the Chief of Operations for the Department of Natural Resource (DNR) Division of Mining, Lands, and Water (DMLW)
Wyn Menefee—[The presentation can be found at ftp://ftp.aidea.org/HydrokineticWorkingGroup/AKDNR-AuthorizationsforHydrokineticProjects.pdf] The Mission of DNR is to develop, conserve and enhance natural resources for present and future Alaskans. DNR encourages environmentally responsible development of its natural resources. We are interested in developing resources, but we also have to make sure that it is done responsibly.
There are a number of authorizations that are required. DNR regulations the appropriation of water. For example, water flowing through a turbine is a beneficial use of the water. It would only be a portion of the total flow of the river, but it would need to be accounted for. DNR does not currently provide water rights permits for marine waters, although it does maintain the authority. If the water use is large, long-term baseline studies may be required.
Land use permits are required because the state owns all submerged lands under navigable waters in the state. Land use permits must consider the interaction of the proposed activities with the other uses and potential uses of the land and resources. Environmental impacts must be evaluate. Current concerns include: impacts on fish and mammals, sediment transport and how it may affect other uses, users, and ecosystems, navigability, public trust and access, and debris deflection. Debris deflection is important for the long term sustainability. We won't require proof that it will be 100% effective, but instead that it has been addressed, because we don't want the devices being taken downstream.
The projects can be modified at any stage, and DNR will work with applicants.
Coastal Management program involved local communities with district and statewide policies. The Coastal program has jurisdiction far up many of the larger rivers.
Ownership of land can be complex and disputes can be present. In large, navigable rivers there will not be any contention, but some of the smaller tributaries may be less certain. Water rights are required regardless of land ownership because the state owns all water in the state.
The best place to start with this is with a public information center. They will get you in contact with the appropriate people.
An important part of this process can be facilitated with pre-application meetings, so that issues can be addressed before the formal application process has been started. The process takes time, at least six months, if not one year. It must take time because it is important that DNR come to decisions that are as sound as possible. The appeals process can hold things up. Appeals are first handled administratively, but they can be sent to Alaska Superior Courts and Supreme Court.
We also have certain issues due to budget constraints, as not all positions are filled, and this may slow the process.
Eileen –What extent of public consultation is involved?
Wyn—Depends on the type and size of project. For a lease or other long term disposal of interest, there are certain things that must be done: posting in a newspaper, etc. 30 days are generally required for public comment. Unlike the Feds, it is required to inform the public and address the comments, but not

necessarily ask for consultation. We look for written responses, we hold few hearings. The project proponents pay for the notice. Since FERC requires consultation, we try not to repeat requirements.
Neil McMahon—Thank you, Wyn. We have come to the end of the time allotted. Since this is my last working group meeting that I will be leading, I would like to thank everyone who has participated. I have found working group to be a very rewarding process and more successful than I thought it could be, for that I thank everyone who has given their time to participate in the meetings. We will be hiring my replacement soon, and they will be continuing the working group. The next meeting will be planned for February and the topic will likely be focused on marine mammals.
Thank you for joining today.

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Meeting Minutes of Whitestone Hydrokinetic Project Meeting, January 11, 2011

Subject: Whitestone Poncelet Risec Project

Participants at the Meeting:
Steve Selvaggio, WCA
Steven Selvaggio, WCA
Jinni Selvaggio, WCA
Stu Pecheck, AKDNR
AJ Waite, AKDNR
Jim Durst, AKDF&G
Jeannie Proelx, DMLW - Lands
Chris Milles – DMLW – Northern Region Land Section
Sheryl Lauder, GVEA
Greg Wyman, GVEA

Steve: Call from AEA – invited down – our engineering is just about done – they want to see the 3D models of the device.
TOPIC: Secondary Power run from hydro device to GVEA structures
Our run is to transect 4 (see attached). The structure is up on the hill about 900 feet away from that point and we'll be working with armored cable.

Greg: Farther along than I thought you were….

Steve: It will be on the rock side.

Steven: In June the water is going about 4/5 meters/second. That's where we're looking to be - about 50 feet from the shore. We have a plan to anchor to the shore so that we're not in the water at all with the anchoring systems. This is good news for us as we had no idea the water was that fast.

Steve: The blades draft at 2 feet. That's all we're harvesting.

Steven: We're looking at raw data from UAA – they're planning a lot more as far as the data goes…

Jeannie: The plan is to put in the device for testing first?

Steve: We'd like to construct this year and then just deploy it. Not tie in to the grid yet. We want to just let it run for a bit. We intend to cut the expense, but have the equipment on hand to manage this in the water. We're hoping to deploy this fall if possible. We're waiting on money. Some of the components have a 20 week lead time. So depending on funds, we'll have to see. We'd like to practice deployment before fall. But realistically we're looking at deployment in spring of 2012.
This project is not intended for the community of Whitestone. This is a stand alone to be used to address the problems of connecting / questions. The second portion of the experiment is to hook up to an infinite grid (GVEA) so that we can demonstrate that the unit is able to produce reliable power.
Third/ to run to a smaller grid. We could do that with our power plant. In the southeast, this is very important. I t could be dispatchable power in some portions of the state where the rivers run full time. It's all PLC driven. If we have the charts of a village – power needs – through the plc system, we could chart that and put out what it needs. It can put out more or less power depending on the needs.

Chris: First part is you're just showing that it works? Second: hooking up to GVEA Grid. Third? If you were going to hook up to Whitestone, you'd have to change the place you have it, right?

Steve: Yes. We'd have to be closer to the other side of the river.

Chris: When we're addressing what Whitestone wants for this, will it be both locations? Transect 4 and 6?

Steven: No, I don't think so. We're obviously in prototype stage… but at this point, this project is not feasible for Whitestone, payback is too long. We want to show that it can be done and is viable. The places we're targeting for long term use is places that are paying more than .25/kwh.

Chris: My question is what kind of authorization is being sought from us for this location? Temporary for six months then move it? Or it's going to be there year after year for six months. Temp/ or long term?

Steve: I think both. We may need a couple years to continue to demonstrate it.

Chris: We can go five years….

Steven: Our FERC license goes for five years.

Chris: So it looks like we'd go for a land use permit – five years / six months at a time.

Steve: Unfortunately changes take place so fast…. Our focus is getting away from the thought of wanting it in there to sell power/ supply to WSF… our interest is now statewide of nationwide depending on how the state receives it. The meeting with AEA will be March 2nd. We haven't decided where we'd go after this. Selling patents/ selling power… we don't know. We have to be careful how we handle this.

Stu: But for test purposes, you're just looking at this river right now.

Steve: We've worked through all the permits and are lined up to go. AEA sees that and sees that it would be smart to test it here. AEA has a powerhouse group: Chris Noonan. AVAK takes care of bulk fuel facilities… they're really interested in something like this…. This could take the place of your power plants for spring summer and fall. Cut down on your barging fuel up the river in places.
I'm assuming we're allowed to clear a swath of five feet for the connect? It's all state land. It would be securely anchored with manta rays.

Chris: Part of the testing for three years in connecting it to the grid. What does GVEA have to do at the top?

Greg: Just a transformer. We would continue straight back 50 feet and put in a brand new pole behind the existing structure. We'd have to get some additional right-of –way. We would go due East from pole six (see attached)… go strait away from the river, due east. If we keep it close enough, we don't even have to put an anchor down. Then we can put a standard transformer bank up there.

Steven: we measured 870 feet from pole six.

Greg: All we would do is modify the easement up on top. When all's said and done we'd just leave the pole there. We'd just modify the as-builts. We're still doing an as-built for the river crossing.

Steve: Undoubtedly, AEA will want us to continue here. Why do new permitting for somewhere else.
Then on the landing spot we want to put a 20' connex. We'd also like to put in a light pole down there as well. This would be back on the power easement. / state lands.

Chris: This is a connex for a shop for the hydrokinetic deal?

Steve: Yes, tooling and all that.

Chris: If the drop is in the GV right of way, we can just include it.

Greg: We'd have to look at that. We may have to drop back to nine to put in a light pole. We might be able to do something on eight – we'll just have to look.

Chris: You want to do that instead of WSF?

Steve: Yes, that's ¾ mile away from our grid. We may have to cut a path into the connex. The root mat is still there/ pretty rough. The craft will always be on the beach to be worked on, but we'd need some sort of four wheeler path to the connex. Hopefully we'll get some updated photos with google earth. We can also number the transects so everyone understands.

Stu: Does the public still use that spot?

Steve: Yes…

Steven: We're hoping to do most of the maintenance in place. But we're also buying a small power boat that can push it around if necessary.

Steve: We have a fairly simple cabling system to draw and feed and have a pilot boat control the rear of the craft as it comes into position. But we also want to do this quickly so we don't tie up the navigable waters.

Steven: We're going to submit the FERC license on the 17th and you all will get to see some better drawings and in depth explanation.

Steve: Please comment. This is for the safety of all departments and the public.

Chris: When you tie into the grid GVEA will buy that power back?

Greg: Yes – just like the SNAP program. We'll be paying whatever it is…