Accufacts Inc.
"Clear Knowledge in the Over Information Age"

Observations on Sakhalin II Transmission Pipelines

prepared for

by
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This report is developed from information clearly in the public domain. All observations and comments are derived from data supplied from these sources.

Summary

This document presents a brief independent perspective on the Sakhalin Energy Investment Company (SEIC) Sakhalin II Phase 2 project's potential for the transmission pipelines to impact salmon, and was prepared at the request of The Wild Salmon Center.[1] This analysis focuses largely on a review of recently updated river crossing documents specifically referenced throughout this paper, many documents on the SEIC "Documentation" and "Environmental Impact Assessment" public websites,[2] as well as information gathered from various meetings and onsite visits on Sakhalin Island, Russia over the past several years as this project has evolved in certain critical areas.

While this report attempts to cite the most recent versions of various SEIC documents (usually updated December 2005), there is still considerable confusion concerning salmon impacts. Such confusion at this late date in a pipeline field construction cycle (pipe is actually going into the ground and crossings are occurring) raises serious concerns and strongly suggests that project scheduling could be overriding this matter. At this stage of the project, enough analysis and advanced work should have been completed to permit development of a clear master document identifying all rivers that can be impacted by wet cut crossing (not just the Group II or III). Accufacts advises that the allocation of salmon sensitive river crossings mentioned in this paper be considered incomplete until such a master list can be produced, confirmed, and verified by independent sources expert in Sakhalin Island salmon ecology.

Given an obligation to remain brief, this paper focuses only on twelve critical issues from Accufacts' perspective regarding transmission pipeline activity, and by no means is meant to address all issues of concern that could affect salmon. There is no specific priority to the issues identified, as Accufacts considers all of them important. None of these issues should or would be considered insurmountable or irresolvable provided an environment for constructive dialogue, resolution, and proper follow through is permitted. This report thus raises grave questions as to why timely resolution and execution of these important issues for this project have not occurred. Major pipe is being laid and crossings are occurring with very high potential for salmon damage. The twelve issues can be divided into two major categories, construction related and operational related.

Construction Related Issues:

1) The river crossing strategy is unduly complicated for a relatively simple issue. Which of the 1,084 river crossings are directly routed through salmon beds, or are sensitive, and when and for what duration? That determination is best left to salmon experts.

[1] Information on The Wild Salmon Center is available at: www.wildsalmoncenter.org/

[2] http//www.sakhalinenergy.com/documents/doc_EIA_Lender_docs.asp for the 2005 updates, and http://www.sakhalinenergy.com/about/abt_eshia_eia_asp for the project's earlier Environmental Impact Assessment.

2) Construction impacts to rivers extend well beyond the time of an actual river crossing. Monitoring sediment impacts to salmon from construction activity should be longer term, extending beyond the time of an actual pipe crossing.

3) Requirements to carry out the dual pipeline river crossings within a single effort are not being followed, resulting in more crossing mobilizations and possible impacts.

4) SEIC's updated River Crossing Strategy does not exclude dry crossing, a policy in conflict with Sakhrybvod's prohibition on this river crossing activity.

5) There is no abort crossing alternative should a crossing cause undo damage from excessive silting.

6) Given the extreme terrain, all girth weld inspection records should be independently reviewed and retained for the life of the pipelines.

7) The engineering design details pertaining to the 54 pipeline reroutes need to be independently assessed for adequacy and completeness.

Operational Related Issues:

8) Since poaching is a serious threat to salmon, the plan to restrict access along the pipeline right-of-way needs to be evaluated as to its effectiveness and, in all probability, improved. Poaching access is a direct environmental impact issue.

9) Important simple enhancements to the oil pipeline leak detection system are warranted to insure timely determination of a pipeline rupture release, or a simple "leak."

10) The onshore pipeline spill response plan appears to be understating the oil spills associated with RF Government Degree No. 613.

11) Given the potential for large volume oil releases, remote operated valve proximity on the oil pipeline across specific critical salmon rivers needs to be verified.

12) Pigging plans, especially to prevent pipeline rupture that can result in the greatest risks for fish destruction, have not been adequately defined.

Sakhalin II Phase 2 Transmission Pipeline System

SEIC is an organization of corporations brought together for oil and gas field development, and includes majority interest owner Shell Oil Company, that has lead responsibility for the project's management. Originally, Sakhalin II Phase 2 project estimates were placed at $10 billion (U.S.), and then re-estimated to $12 billion. Recent announcements now estimate the project at approximately $20 billion with high potential for project estimates to go much

higher.[3] While only a small percentage of the project's overall budget, the transmission pipeline system is nevertheless a critical component of Phase 2. The transmission pipeline system consists of a 48-inch (X-70 grade) natural gas and a 24-inch (X-65 grade) crude oil pipeline. Both pipelines will be approximately 636 kilometers long running south along the length of the island and are thicker walled.[4] Design MAOP for both systems will be 100 barg. The transmission system originates at Booster Station 1 (BS #1) located at a new Onshore Processing Facility (OPF) situated approximately one-third of the way down the north end of the island. BS# 1 will take delivery of processed treated oil and gas (via a new 20-inch oil and a new 20-inch gas line) from two separate offshore Pitun-Astokhskoye oil field platforms located approximately 150 kilometers north of the Lunskoye gas field, in the Sea of Okhotsk. In 2005, after much debate, these two sub sea production pipelines were redesigned to run approximately 20 kilometers further south and out of the feeding area directly off eastern Sakhalin Island of the western grey whale, an endangered species.[5]

The OPF will receive and process untreated raw wet production gas (via two new 30-inch 26 kilometer production pipelines) running from the offshore Lunskoye gas field production platform situated just east of the island. Treated gas and condensate produced from the OPF will be commingled with the Pitun-Astokhskoye oil field produced gas and crude oil, respectively, at BS # 1 for shipment down the transmission pipelines. The transmission pipelines will deliver oil and gas to the southern end of the island which remains essentially ice free. A new oil export terminal will be used to receive and ship the crude oil for marine export. A new world scale dual train liquefaction plant will liquefy the gas received from the gas transmission pipeline into LNG which will be temporally stored for marine export. Approximately halfway down the transmission system, Booster Station 2, consisting of oil pumps and gas compressors, will be installed to achieve the flow capacity on both the oil and gas pipelines. The oil pipeline will be rated at 195,000 B/D while the capacity of the gas transmission pipeline will be approximately 1,800 MSCF/D, depending on the time of year.

Sakhalin Island is considered a sparsely populated island roughly 950 km long (running north to south) by 60 to 160 km wide. Approximately 700,000 people reside on the island, with a large segment of the population concentrated in the major city of Yuzhno-Sakhalinsk located in the south. The island is considered a cold climate region (short summers, long cold winters) with temperature ranges of -40 to +20°C. Considerable variation in climate and rainfall (ranging from 10 to over 800 mm/yr) occurs throughout the island. Sakhalin is separated by two lower level mountain ranges (~1,600 meters upper elevation) running north to south along the island. The significant rainfall and the mountain ranges generate an extensive system of thousands of rivers running to the ocean. Wild salmon are predominant

[3] Reuters News Article, "Shell's Sakhalin-2 warns of more LNG delays," 2/13/06 at http://today.reuters.co.uk/newsArticle.aspx?type+businessNews&storyID=2006-02-13T053153Z_01_T67238_RTRUKOC_0_UK-ENERGY-RUSSIA_SAKHALIN_TARGET.xml

[4] The 48-inch pipeline is mostly 17.6 mm with some 21.1 and 25.3 mm pipe, while the 24-inch is mostly 9.5 mm with some 11.4 and 13.7 mm thickness pipe.

[5] Ibid., Environmental Impact Assessment Addendum (2005), Chapter 13, "Material Project Changes Since the 2003 EIA," section 13.3.2, p 20.

in much of this ecosystem. Salmon play a major role in the diet of the population and are a significant and important commercial enterprise for the island's economy.

The Sakhalin II project pipelines must traverse approximately 1,100 rivers. The river systems can vary considerably on the island, but many are relatively shallow and narrow most of the year (less than 10 meters in width and 0.5 meters in depth at many proposed pipeline crossings, with flow varying significantly either because of seasonal snow melt, groundwater hydrology, or variations in the rainy season which fluctuates greatly as one moves south down the island).[6] Terrain varies from wetlands and marsh peat bog, to forested mountain ranges.[7] Because of the terrain, geology and the hydrology from extensive rainfall, landslides, mudflows, and known serious earthquake faults represent major technical challenges associated with the route selection for the pipelines. The project calls for inspection of all girth welds which is a rational premise given the difficult terrain and high potential for additional stress on the girth welds. Accufacts advises that records for girth welds be maintained for the life of the pipelines and independently reviewed to assure proper quality control and scrutiny. In addition, engineering analysis for the critical redesigned 54 reroutes out of potential landslide areas should be independently audited given the significance of these important changes.[8]

Construction Related Issues:

River Crossing Construction Modes

Construction activity associated with pipeline crossing of rivers can place salmon at risk because of direct destruction of sensitive gravel beds from poor selection of specific river crossing sites containing salmon or eggs/embryos. Salmon mortality can be elevated when crossing construction activity generates silt, suspended solids, or other contaminants that migrate downstream into spawning activities or gravel beds containing eggs/embryos. Salmon mortality can be affected by temporal as well as physical aspects of the pipeline construction. For example, timing of the construction of crossings through rivers can be modified in order to help reduce the impact on salmon during spawning. Appropriate timing of crossing construction along with proper evaluation, monitoring, and control of solids/silt carryover downstream, can also help curtail the destruction of salmon eggs/embryos. For Sakhalin Island "The spawning season varies per species and starts as early as May for the Sakhalin taimen and can last until mid-December for silver salmon. For the key commercial species (pink and chum salmon) the spawning season is July-September. Eggs and embryos for all species, except Sakhalin taimen, are present in river gravels mainly during the autumn – winter period (October-April)."[9]

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[6] Environmental Impact Assessment Volume 4: "Pipeline Transportation System, Gas Disposition Terminal and Booster Station," Chapter 1A, Table 1.14, page 1-30.
[7] Environmental Impact Assessment Addendum (2005), Chapter 3, "Pipeline Construction in Wetland Areas."
[8] Environmental Impact Assessment Addendum (2005), Chapter 13, "Material Project Changes Since the 2003 EIA," page 8.
[9] River Crossing Strategy, December 2005, page 100, at: http://www.sakhalinenergy.com/environment/rivers/riv_main_asp

As presented in the above referenced River Crossing Strategy document, there are basically four methods to cross a river with pipelines: 1) aerial, 2) wet cut trenching, 3) dry cut trenching, and 4) a specialized form of underground boring called horizontal directional drilling (HDD). Aerial or above river crossing can consist of spanning the river via no support for narrow spans, or support for wider spans utilizing a pipe support, bridge, or suspension mechanism. For narrow river spans aerial crossing is usually not invasive to critical aquatic species. Wet cut trenching involves cutting a trench in a flowing river to lay the pipeline into the riverbed and then re-covering the pipe. Dry cut involves damming or diverting the river to permit a pipe trench to be cut along the dry riverbed between two dams. Accufacts concurs with the position of Russian authorities that dry cut should not be allowed on this project for many reasons unique to the island's environment. For example, dry cut can create much more silt than wet cut depending on a river's conditions. While it may be SEIC's intent to use dry cut only on non flowing rivers (such as those which are clearly frozen in the winter or dry in the summer at crossing sites) there appears to be no clear guidance that would clearly prohibit the utilization of dry cut on salmon sensitive rivers that could become at risk to such activity if poorly executed. It should be noted that the most recent issue of SEIC's Pipeline Project River Crossing Report apparently indicates that dry crossing can be utilized (such as in low/no flow conditions).[10]

HDD utilizes specialized tools to drill a path under the river and then pull the pipe through the bored tunnel. A proper HDD is also not usually a problem for water species as the river is seldom disturbed, though HDD can be quite time consuming, expensive, and is not always appropriate. It is Accufacts' opinion that HDD would also be unnecessary and inappropriate for non-sensitive shallow or narrow river crossings. As of this writing, seven major river crossings have been designated to utilize HDD (originally eight were selected but one crossing, the Buyuklinka River, was deemed to be an inappropriate HDD candidate). While HDD tends to be the preferred form of river crossing on major waterways containing sensitive ecosystems, we must caution that HDD may not always be a viable option. Even though the success rate for HDD can be high, not all HDDs are successful because of surprises in actual geology that prevent successful application of HDD, and/or certain other factors (i.e., drill diameter and length, soil conditions). A contingency river crossing plan should be in place for HDD crossings if such uncertainty exists for the seven designated rivers to be crossed by HDD.

Based on the numerous discussions/positions offered for or against the various river crossing approaches by many parties, as well as site visits of various crossings, Accufacts concludes that the wet cut approach is appropriate for the vast majority of the river crossings in the Sakhalin II project provided certain "effective" precautions are undertaken to minimize threats to salmon and their habitat (see next section). While wet cut crossing is not usually permitted in certain areas of the world involving sensitive fish species, Accufacts believes the application here appears rational because of several unique and compelling reasons. While many of the narrow rivers could be ideal candidates for aerial river crossings, issues related

[10] Pipeline Project River Crossing Report updated June 22, 2004, rev P4 section 6.1.4, page 25, and River Crossing Strategy, updated December 2005, section 2.4.4 page 20.

to security, and concerns about creating bridges and access pathways into the many remote and highly inaccessible areas of Sakhalin are bona fide issues of concern.

Poaching, a significant problem on Sakhalin, can have a serious impact on salmon species if access to remote regions is made too easy. It is very clear that a major risk to salmon is evident should remote sites to rivers become more accessible, either from aerial river bridges or road access to or along the pipeline right of way. We cannot find sufficient detail as to how SEIC will prevent or restrict access along the right-of-way. Given the very serious negative impact that poaching can play on salmon, Accufacts believes that efforts to prevent the pipeline from becoming a poaching highway demonstrate minimum commitment to this very import threat.[11] Further discussion and actions by the pipeline operator are merited in this area given that poaching is a serious direct environmental impact threat.

Accufacts needs to be very clear that the arguments presented by SEIC against aerial crossing are a little too stretched, coming across as biased or attempts to misinform.[12] Claims of "international standards" carry little credibility when it can be clearly demonstrated that such statements are taken well beyond their context. For example, the U.S. Federal Energy Regulatory Commission guidelines indicated in the recently updated River Crossing Strategy are not the most appropriate standard to be utilized for sensitive river ecological issues, nor is FERC the final authority on many sensitive pipeline river issues in the U.S.[13] River crossing policies established by more credible agencies actually chartered with protecting endangered species (such as the U.S. EPA or various State agencies) are much more experienced in these sensitive water matters.[14] Nevertheless, Accufacts supports the wet crossing decision as discussed and conditioned above. We must be very clear that should an actual wet cut crossing prove to be highly destructive to salmon in a specific river for a variety of reasons, there may be cause to abort that crossing and utilize an alternative method such as HDD or aerial crossing. No abort crossing option is listed in any of the river crossing strategy plans.[15] In such an abort circumstance, an aerial crossing may be appropriate especially if a crossing cannot be actually utilized as a poaching bridge because of a particular river crossing's remoteness.

Critical Sakhalin River Classifications and Identification

Current SEIC documents indicate that 1,084 rivers need to be crossed by new pipeline construction. Of these 1,084 rivers, approximately 160 rivers have been classified as Group II or III, identified as containing "commercial interest salmon" or Red Book fish species, and thus have been required by Sakhrybvod not to be crossed via wet cut during the spawning

[11] Environmental Impact Assessment Addendum (2005), Chapter 11 "Protected Areas," section 11.3, p 12.
[12] Ibid., "River Crossing Strategy," section 2.4.1, p 18.
[13] Ibid., "River Crossing Strategy," Annex C "FERC Guidelines."
[14] For Washington State see http://apps.ecy.wa.gov/permithandbook/category.asp?id=2 for just one example.
[15] It appears that the mitigation plan relies heavily on crossing "timing," while important, a step that may prove incomplete or inappropriate, especially given the many uncertainties associated with spring thaw.

season.[16, 17] Rivers clearly containing salmon habitat have been classified as either Group I (watercourses with no salmon spawning and insignificant importance for fishery), Group II (watercourses with insignificant salmon spawning and minor importance for fishery), and Group III (watercourses with significant salmon spawning and major fishery importance and/or Red Data Book species, such as the Sakhalin taimen).[18] As mentioned earlier, the seven HDD crossings should not have a major impact on the river if performed properly. In addition, the remaining 917 rivers (Group I and non Group other rivers claimed to not have major commercial fish species) could serve as tributaries into sensitive commercial salmon rivers.

SEIC's recently updated program attempts to assess all river crossings as to their potential to generate suspended solids that could carry into sensitive salmon habitat in downstream Group II or III rivers.[19] Based on a "sensitivity evaluation," rivers will be identified that may require monitoring during a crossing. It is very unclear and confusing as to how many of the 1,084 river crossings will thus be identified as sensitive and actually monitored during crossing activity. While there may be some slight uncertainty in river flow estimates at the time of a crossing, all of the river crossings that could place salmon at risk should be clearly known well ahead of any actual scheduled crossing effort. By now the project should be able to identify those rivers that could be problematic to salmon given the project's schedule. Accufacts finds it most disturbing that such a critical item has not happened given the construction activity of the transmission pipelines. Note that the Assessment Sheet does not address the issue of early identification or which specific rivers are to be monitored.[20] It appears that current activity is only focusing on Group II and Group III rivers and even this conclusion may be uncertain. Clear early identification of rivers needing additional monitoring during crossings is warranted and justified given the long logistics lead times that may be associated with establishing proper monitoring during an actual wet cut crossing. The fundamental question is simple: How many and which of the 1,084 rivers are to be monitored for actual solids generation during critical pipeline crossing activity? A critically related question is: How many of these river crossings are directly in salmon beds?

River Crossing Timing, and Time for Crossing

Depending on various conditions, a wet cut crossing will generate a series of pulsed suspended solid waves flowing downstream, usually with the greatest solids resulting from the original trenching activity when the stream bed is most disturbed. As the silt pulse moves down the river, its impact, both peak value and duration, will be reduced by dilution and settlement into the riverbed. When and how far downriver this suspended material travels defines its potential to impact salmon species.

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[16] Ibid., River Crossing Strategy.

[17] Sakhrybvod is a Russian governmental agency overseeing fish species.

[18] Sakhalin Environmental Impact Assessment, Volume 4, Chapter 3, "Impacts Assessment, Mitigation and Monitoring," page 3-16.

[19] Ibid., River Crossing Strategy, Figure 5-1.

[20] Ibid., River Crossing Strategy, Annex D, "Outline of River Crossing Execution Plan," or Annex E, "Example of a River Crossing Assessment Sheet."

To avoid major salmon impact from this carryover, timing for performing a wet cut river crossing on a particular river is driven largely by the two critical periods that could affect salmon: spawning or egg/embryo stages. Damage during spawning can be eliminated by scheduling specific river crossings in the winter months that are outside the spawning cycle. Winter crossings increase the potential to damage eggs/embryos that exist in gravel beds. Winter crossings, however, can also extend the time of the crossing, increasing silt generation and migration downriver, though river flows may be reduced. Even in the coldest of winters on the island, anyone experienced in cold weather pipeline work knows that only the shallowest of rivers will actually freeze sufficiently at a crossing to severely limit water flow and thus potential solids/silt carryover downstream. The rivers may actually be covered with sheets of ice and snow, which can also hinder serious monitoring of silt moving downstream. It is important to know just how much damage extends down the river into egg/embryo containing gravel beds for each sensitive crossing.

An additional issue related to river crossing needs to be mentioned. The original crossing intent was to lay both pipelines during a single disturbance window.[21] Many crossings, however, are occurring at much different times essentially opening or extending the time window for wet trenching activities and their potential impacts.[22] While Accufacts can understand the need for some flexibility in crossing attempts, the rationale for why there is such a serious deviation in the intended river crossings of both pipelines needs to be explained along with the special precautions taken to insure these deviations are not seriously impacting salmon.

Monitoring of River Crossings During Construction

Usually, but not always, the greatest silt or solids generation or contamination during wet cut activity occurs during the actual trench cut when soil is moved to create a trench for the pipeline in flowing water. Monitoring information should thus provide evidence of solids plume generation during this critical activity for all flowing river crossings employing wet cut. Photos should be taken to permit an understanding of silt plume generation during trenching. We see little, if any, photographic evidence posted on the website properly documenting this critical activity.

While the majority of the monitoring efforts appear to be focused on direct crossing activity, there is an important need to insure that a longer term monitoring program for the rivers is in play during other construction activity that can seriously silt the river. This is especially important given evidence indicating that silting impact has gone well beyond the planned one day actual crossing threat. Limiting or over focusing monitoring mainly on the crossing actions misses many factors. Changes in weather can exacerbate poor right-of-way drainage or construction practices that can seriously increase silt introduction into rivers with very

[21] Environmental Impact Assessment Volume 4: "Pipeline Transportation System, Gas Disposition Terminal and Booster Station," Chapter 2, section "Crossing Construction Work Sequence Description," page 2-50.

[22] See SEIC River Crossing information at http://www.sakhalinenergy.com/environment/rivers/riv_main.asp

detrimental impact to salmon. A longer term sediment monitoring program should be implemented that covers the rivers for all these construction related activities.

There are five construction sections along the pipeline right-of-way down the island. Within each of these areas, river crossings will usually occur in a consecutive or sequential manner down the pipeline to minimize staging efforts of major crossing equipment and contractor workforce. This is reasonable as the terrain and weather patterns along the island make transportation and restaging very difficult. Sequential crossing, however, may place project pressures to proceed with work even though the potential for silt carryover downstream may be high for a particularly sensitive river. As a result, advanced clear identification and proper monitoring of sensitive river crossings and potential downstream silting impacts is very important. The current plans assume that silt will only migrate up to 500 meters downstream, a critical assumption that needs to be verified in the field.

To improve progress tracking, Accufacts advises that the biweekly river crossing reports summarize each specific river crossed via pipeline type (oil and/or gas) as presented in the first Biweekly Winter Crossing Report but subsequently dropped. Photos included on the website should at least indicate: 1) conditions just before crossing activities, 2) soil plumes during certain high plume generation critical activities such as trenching, and 3) downstream panoramas that might depict snow/ice conditions that could hinder plume dispersal determinations and sampling/measurement. Photos for each crossing should be issued at the same time that biweekly reports are posted on the website

While the reports can be a positive step toward instilling confidence that this project is treating salmon impact with proper deference, we find most disturbing statements in the early Winter Crossing Reports that turbidity meters have yet to be utilized in the field.[23] Notwithstanding the difficulties and unpredictability associated with customs, it is not like this critical monitoring equipment wasn't expected or needed well in advance of the scheduled winter crossing activity. TSS sampling has limited value in insuring confidence that solids are not becoming a problem downstream during wet cut activities. Lack of proper measuring equipment just reinforces the need for photos showing critical downstream turbidity plumes during the time of most silt generation (i.e., the trenching). Based on the Winter Crossing Reports to date, logistics problems appear to be expanding the crossing times on various rivers. This may not be a problem for the rivers that are frozen or very low flow, but not enough photos are available to verify this conclusion.

Mitigation of Construction Impacts

It is our understanding that Russian law permits the utilization of monetary compensation for fish kill calculations. We do not know if this applies to those kills that could be excessive, or that could decimate critical habitat to the point of non-recovery of the species in a river, for example. To date, timing of wet cut crossings and assuming that time to cross are short, appear to be the only mitigation methods that this project is mainly relying upon for this crossing activity; an assumption yet to be proven or adequately demonstrated, as previously

[23] BiWeekly Winter Crossing Report Issues #1 through #4 for December 1, 2005 – January 25, 2006.

discussed. Accufacts is especially concerned that there appears to be very little detail in the procedures defining a crossing occurring directly in a salmon bed, as well as when and how to deal with a crossing that has become problematic.

There have been various claims pointing to serious deficiencies in some river crossing practices, apparently committed by contractors of SEIC. SEIC's response is that a few discrepancies do not necessarily indicate a problem in river crossing processes or practices. It is all too common in projects to blame contractors for poor work, implying that the owner is not responsible. In all too many major projects, such breakdowns can be indicators of serious QA/QC procedure failures that may suggest a much more systemic problem in a project. Accufacts would hope that these situations are truly startup pains and that proper procedures have now been implemented to rectify these occurrences. Follow through on key observations indicated in this report should quickly prove if these events were truly isolated cases and that a greater concern is not present on this very important project.

Operational Related Issues:

While the transmission pipelines have seen significant improvement in pipeline design and routing, critical operational related concerns remain due to their very high potential to impact large segments of salmon.

Leak Detection System

Chapter 2 of the EIA, indicates that "The pipeline system will also be equipped with a state-of-the-art highly sensitive leak detection system and maintenance programme, which will detect losses of less than 1% of the inventory of the pipeline."[24] The leak detection systems are described in further detail in section 2.7.5 of this same chapter. While we always encourage improvements in leak detection technology and application, given the many factors associated with the 24-inch oil pipeline, there is a high probability that this tight leak detection threshold will not, ironically, determine large hole releases associated with rupture failures in a timely manner, or slower rate seepage leaks.

There is a common misperception in pipeline and public arenas that ramping down to tighter thresholds actually improves a system's leak detection capability. Rupture releases exhibit highly unique hydraulic dynamics in pipelines that are considerably different than "leaks."[25] Tight leak detection systems can miss or seriously delay appropriate recognition and response to high rate releases calling for rapid shutdown and isolation of the pipeline. In addition, too low a leak detection threshold can actually train control center operators to miss or ignore a real release alarm in the large volume of noise from too many false alarms.[26] We

[24] Environmental Impact Assessment Addendum (2005), Chapter 2 "Oil Spill Response," section 2.7.1, page 73.

[25] Ruptures represent pipe fracture mechanics where a "hole" rapidly enlarges for various reasons, resulting in high mass flow releases.

[26] U.S. National Transportation Safety Board (NTSB) Safety Recommendation letter to Ms. Stacy Gerard, Acting Assistant Administrator/Chief Safety Officer – Pipeline Hazardous Materials Safety Administration, in reference to P-05-1 through P-05-5, December 23, 2005.

would expect that on the oil pipeline considerable effort will be spent to try and "tune" the leak detection system at the announced threshold, and predict these efforts will produce a low confidence in the leak detection system and a high number of false alarms. We highly advise SEIC to undertake a simple analysis and modification of their leak detection system to insure proper identification of rupture releases, as well as leaks, which are two very different failure phenomena on this critical pipeline system. Untimely leak detection recognition and response to oil pipeline releases can significantly increase the spill volume of oil commensurate with large fish kills in sensitive areas.

Onshore Spill Response Magnitude

Russian Federation Government Degree No. 613 sets various minimum requirements for spill response plans and staging equipment.[27] The spill tonnage indicated in the tables covering the transmission pipeline appears low and inconsistent with the nameplate capacity of the oil pipeline of 195,000 B/D. In all fairness, SEIC has indicated that these specific calculations are indicative only and are being reassessed.[28] It should be noted that pipeline spill volumes presented assume determination and pump shutdown based on unproven leak detection times of 15 minutes for small leaks and 5 minutes for ruptures, a most unlikely probability (see above section for critically needed improvements in this area).[29]

Valves

At last review there appeared to be 82 valves installed along the 626 kilometers of oil transmission pipeline.[30] The location of these valves should be cross referenced against pipeline elevation profiles and those rivers that may be most salmon sensitive to insure adequate valve placement and remote operation/reliability. A proper analysis can't be finalized until a master list of salmon sensitive rivers crossed by the onshore pipelines can be produced.

Pigging

There is insufficient detail as to future pigging intent on the transmission pipelines and a proper evaluation of such a program thus cannot be performed. A pigging program should focus on an effective cleaning pig program first and then on a smart pig program capturing the unique risks (i.e., displacement or corrosion) associated with the pipeline that could most likely result in pipeline rupture. The industry now has a smart pigging standard (API Standard 1163, "In-line Inspection Systems Qualification Standard") that should prove helpful in this area.[31] Accufacts needs to be very clear that a proper thorough cleaning pig program coupled with an effective rational smart pig program can be most effective in

[27] Environmental Impact Assessment Addendum (2005), Chapter 2 "Oil Spill Response," page 15.
[28] Ibid., Oil Spill Response, page 17.
[29] Ibid., Oil Spill Response, page 15.
[30] Environmental Impact Assessment (2004) Volume 4: Pipeline Transportation System, Gas Disposition Terminal and Booster Station, Chapter 2 "Project Description," page 2-11.
[31] Accufacts Inc., "Observations on the Application of Smart Pigging on Transmission Pipelines - A Focus on OPS's Inline Inspection Public Meeting of 8/11/05," prepared for the Pipeline Safety Trust, September 9, 2005.

preventing failure on these systems. More detail is needed in this area and Accufacts is not suggesting excessive running of smart pigs on the 24-inch pipeline or on the 48-inch pipeline (this is no small feat), that could be a waste of resources or an illusionary safety if improperly implemented.

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