Part 1

Reference: Exhibit 017-016 C, Page 1, Dr. Schindler states: "Throughout this EIS, data from RAMP are relied on for background. Likewise, the Cumulative Effects Assessment is based heavily on RAMP. Yet 2004 and 2010 internal reviews of RAMP, as well as recent reports of expert panels appointed by the Federal and Provincial Ministers of Environment indicate that the RAMP monitoring program is thoroughly flawed."

1. In your report, you mention the 2004 and 2010 reviews of RAMP. Did you review RAMP's response to the comments and recommendations provided by the nine members of the peer review panel (Panel) in their report submitted in January 2011?

2. In your opinion, will the implementation of the Panel's recommendations to RAMP change the quality of the monitoring activities in the Lower Athabasca River?

3. In addition to the Panel's recommendation to RAMP, what changes do you recommend be made to RAMP's monitoring program to make it more reliable?

Schindler: It is noteworthy that CAPP now recommends that RAMP and CEMA be scrapped, and that they support the newly-announced independent monitoring panel. See also my final comment.

Question 1: I did, and it gives little comfort. They gave similar responses to the first review, and it made no significant change in the program. The basic problem is lack of experience and competence in the designers and executors of RAMP.

Question 2: Very little. I find the RAMP response to be largely hollow assurances and bafflegab. Many of the criticisms and assurances are very similar to those made in 2004, and as the 2010 review makes clear, little progress was made in the ensuing years. Any department in a university receiving two such bad reviews would be long gone. These responses and other examples I have seen indicate that RAMP's personnel lack leadership, experience, and synthesis abilities.

Question 3: I support the recommendation of the Alberta Environment Monitoring Panel (AEMP), which is now supported by the Minister's Working Group report and CAPP, that RAMP and CEMA should be scrapped, and their functions replaced under the newly appointed independent monitoring panel. Personally, I would also give the responsibility for impact assessment to this independent panel, rather than a consultant dependent on industry for its livelihood. The whole process is rather like two wolves and a sheep voting on what is for dinner! One hopes that the independent panel will quickly harness Environment Canada's expertise in monitoring, and build on it to develop the required capacity in all agencies to develop a monitoring program that can detect long-term trends, keep current methods in use while maintaining adequate QA/QC, provide timely and scientifically-defensible recommendation, and build the public trust that is necessary to reverse the extreme polarization that has developed as the result of RAMP's and CEMA's incompetence and lack of transparency. We had the

competence under the Northern River Basins Study, and the success of the NRBS model is well known to the independent modeling panel. I recommend that the Secretariat support the independent initiative.

It is clear from Environment Canada's recent findings, if not our 2008 assessment, that RAMP has engaged in 15 years of incompetent groping and floundering. They have long lost the support of NGOs and aboriginal communities and are not truly multi-stakeholder, in striking response to the NRBS. . There are also other excellent models of how to proceed, such as the US Geological Survey's NAWQA program, which has just undergone a review similar to RAMP's, with glowing reports. It is designed and run by experienced professional scientists.

Reference: Exhibit 017-016 C, Page 1, Dr. Schindler states: "This situation has not improved, and release of a monitoring plan that is comprehensive and governed at arms length from government and industry must be a condition of any future approvals."

On October 17, 2012, Alberta announced that it will build the most comprehensive environmental monitoring program in Canada with the establishment of a new arm's-length environmental monitoring agency. While the new agency is being established, environmental monitoring in the oil sands region will continue to be led through a joint federal-provincial program announced in February. To date, that program has added new water quality sites on the Athabasca River and Muskeg River system; increased air monitoring by adding more sampling sites; and, improved bio-diversity monitoring to include all oil sands producing areas. Up to $50 million a year is being provided by industry in the region to support the joint federal-provincial environmental monitoring plan.

4. Assume for the purpose of this question that Shell's JPME project is approved. Provided that Shell does not begin construction before 2018, in your opinion does Alberta have enough time to implement the plan prior to any additional development taking place in the JPME area?

Question 4: The announced independent panel is a good start, but I do not think this question can be answered until a few critical functions of the independent monitoring panel are resolved, and that program is under way. Some of my concerns:

Will they be truly independent? Some forces would like them to report through Alberta Environment's bureaucracy, or the new "superagency" for streamlining the project review process. There will be no public trust if this is the case, and the Secretariat could help immensely by reinforcing the need for independence.

How will they be funded? This is still to be resolved by the panel. I have seen no assurance that industry will supply $50 million to the independent panel. The money available from provincial and federal agencies will not suffice. If industry is to fund the panel, it must be in such a way that the public at large can be assured that reported results are free of political spin. The lock-step formula suggested in the working group report, where funding is based on production, would be the preferred formula.

How will the need for scientific and aboriginal representation be resolved? Again, the NRBS represents a good model that worked well, probably too well for those who want science they do not like to be buried. At present, Alberta Environment does not have enough science capacity to even be represented in any meaningful way. One hope is that experienced scientists will be involved (see my final remark below).

Can the independent panel resolve the apparent dichotomy between federal and provincial departments? Despite the famous February handshake between Ministers of Environment, the monitoring so far has been largely federal, and there is no sign of cooperation. Moreover, there has been no signed agreement between the two levels of government.

The Secretariat could help greatly by supporting the independent panel initiative. I recommend that they meet with Drs. Tennant, Wallace, and Taylor, who were members of the AEMP panel, the subsequent working group, and have been appointed to the Independent Board. The members of the Tennant panel who were on AEMP and the recent working group fully understand the importance of resolving the above issues. But even if this is done quickly, I think the Shell approval should be delayed until the new monitoring plan has revealed the current state of the river. It is already obvious from the recent work of Environment Canada (see exhibit 005-026 (SETAC abstracts); Parrott et al. (Exhibit 005-026) and Kirk et al. (Exhibit 005-026) that the Athabasca river is more polluted than industry, RAMP, Evans and Talbot (Exhibit 005-026), CEMA and consultants have led us to believe, with demonstrated widespread air pollution and mortalities of larval fishes exposed to melting snow, even at diluted concentrations. It is time to build safeguards into the design of new projects from the start.

5. Will that timeframe provide Shell with enough time to make adjustments to its proposed project to meet future requirements?

Question 5: Based on my observations above, I very much doubt it.

Reference: Exhibit 017-016 C, Page 9, Dr. Schindler states: "In summary, there has been much paper generated over protecting the Muskeg River, but meanwhile the river's biological health has been destroyed….. apparently, if RAMP and the JPME EIS are to be believed, without exceeding a single guideline for water quality! This says much about the quality of a process based on unverified models and questionable monitoring data."

6. Do you agree or disagree with the following findings contained in the Muskeg River Watershed Management Framework Second Annual Report October 2011?

a) Several metals exceeded the MRMF targets but they appeared to have natural sources, which indicated a need to revise the targets. A red management condition was triggered by an exceedance of the peak total aluminum limit, indicating a need to evaluate how industry activities are contributing to these elevated concentrations. This issue was first identified by

operators in relation to difficulties they experienced in attenuating suspended solids concentrations during site dewatering.

a. It is well recognized in the toxicological community that targets for individual contaminants are meaningless in mixtures of contaminants. In addition, there are not even guidelines for some contaminants, such as alkylated PAHs and dibenzothiophenes, which are emerging as pollutants of concern that have carcinogenic, mutagenic and teratogenic effects on fish. In addition, there were no chemical measurements made in the Muskeg at snowmelt, when low pH and high acidity would enhance the toxicity of metallic contaminants, as has been shown in numerous studies in eastern Canada, the USA, Scandinavia, Scotland and eastern Europe.

b) The peak total mercury concentrations observed in the Muskeg River at M2 were well below the draft provincial acute guideline. The mean total mercury concentrations were well below the provincial chronic guideline and were less than the average mercury concentrations in the lower Athabasca River. Neither of the tributaries are significant sources of mercury. No longitudinal trends were found.

b. Mercury has low toxicity to fish except at high concentration. Of concern are its biomagnifications, persistence, and toxicity to humans who eat the fish. Fish in the river already have mercury above subsistence guidelines, and the ELA METAALICUS study (Harris et al., exhibit 017-016BB) suggests that any additional mercury will quickly drive it higher still. NPRI data show a seven fold increase in emissions of mercury in less than 10 years. In addition, there are no guidelines for *methyl* mercury, the form that bioaccumulates in fish and humans. Judging from the Kirk et al. abstract (exhibit 005-026), this will be the primary form of mercury in the river at snowmelt. Shell did no measurements of mercury during snowmelt, or of the methyl mercury input from industry. Both we and Environment Canada could easily see longitudinal trends in mercury. Again, the lack of being able to detect such trends points to RAMP's incompetence.

c) Heavy hydrocarbons were generally detected throughout the watershed. These detections occurred primarily in winter when groundwater seepage was the major contributor to river flows. The fact that detections occurred throughout the basin suggested that the hydrocarbon load was associated with natural sources; however it is difficult to separate the natural signals from the anthropogenic ones in the context of the distinct hydrogeologic gradient of the Muskeg River basin.

c. Our studies show that PACs, including PAHs, in the rivers are higher in summer, because airborne emissions are kept out of the river by ice (Kelly et al. 2009, exhibit017-016E). The Env. Canada abstracts by Muir et al. and Kirk et al. suggest that during snowmelt, these airborne loadings are added to the river, the abstract by Parrott et al. (exhibit 005-026) suggests that the meltwater is toxic at that time. Again, Shell has not measured the situation at snowmelt, the time that has been recognized for years as the time when first extensive damage to biota

occurs. No one disputes that high concentrations of heavy hydrocarbons occur naturally. The real question of how much industrial development has increased the load has been obscured by incompetent monitoring.

d) As with heavy hydrocarbons, naphthenic acid concentrations were also inversely related to river flow, which indicated a seepage-related source. The absence of distinct steps in naphthenic acid concentrations between sites suggested minimal influence from process-related seepage

d. I have no specific expertise in naphthenic acid degradation, this might be a good question for Dr Jones.

7. In your opinion, is the current monitoring program for the Muskeg River watershed flawed?

Question 7: It is badly flawed. The statistical design is weak, there has been no consideration of replication in design of sites, times or methods used by AOSERP's pre-impact assessment, and there has been little or no work done at the most toxic period, spring snowmelt. As a result, few recent analyses would stand the test of peer review as in a scientific publication. The proponents frequently state that there are only depositional environments in the upper Muskeg River, and few in the Athabasca, but Environment Canada's scientists quickly located erosional sites, which contain sensitive benthic indicator species. In short, the science of EIS in the oil sands has been as shoddy as that in the monitoring program.

8. What, if any, changes to the existing practices to monitor impacts on the Muskeg River watershed would you recommend?

Question 8: There are so many flaws that a treatise would be required to answer this. The short answer is that if Environment Canada were to apply the protocols in its Phase 1 and Phase 2 monitoring plans (available on the web) and the studies were planned by its experienced scientists, existing problems would disappear. See again my final comment.

<u>Reference:</u> Exhibit 017-016 C, Page 9, Dr. Schindler states: "They particularly underscore the enormous rate of increase in NOx between 2005 and 2010, which was assessed at 3.5%/year. Curtis et al. (2010 J. Limnol.) illustrate that at least one sensitive lake in the area has been acidified by oil sands, and that emissions from oil sands combustion sources are reaching lakes over quite a large area."

RAMP 2011 Final Technical Report Page 5-559

5.12.7 Classification of Results
Results of the analysis of the 2011 RAMP lakes compared to historical data suggest that there was no significant change in the overall chemistry of the 50 RAMP lakes across years that were attributable to acidification. A long-term decline was noted for DOC, although this appeared to be the result of factors other than acidifying emissions (e.g., hydrology). Based on the analysis

of among-year differences in concentrations of ASL measurement endpoints, as well as trend analysis and control plotting of ASL measurement endpoints on individual lakes, there was no evidence to suggest acidification in these lakes.

Schindler comment: An experienced aquatic scientist would not expect to find impacts of airborne pollutants on lake water chemistry in summer, except in the case of very high air pollution, because most of the constituents of concern are either hydrophobic or of low solubility at medium to high pH. Hence, this whole part of RAMP's program has been a ludicrous waste of money. The focus to detect early chemical problems should be on water at snowmelt, or on lake sediments, where the input of contaminants is known to accumulate. For most toxic metals, concentrations in water are always low except at very low pH, at higher pH they are passed to sediments where they are sequestered. This statement is an example of the naivete of RAMP's designers. Note that Environment Canada's recent studies have targeted snowmelt and sediments, and in contrast to RAMP, easily found evidence of pollution, and of potential biological harm.

10. Assume that the suggestions made by the peer review panel are implemented. Would you continue to believe that RAMP data is flawed?

11. If yes, why do you disagree with the conclusions in RAMP's 2011 report?

Question 10 and 11: I do not believe that implementation of these suggestions will make significant improvements. The above example is one of many that suggest that RAMP is guided by people who do not have the required expertise in designing or executing monitoring programs. See my final remark. This program must not continue to be run by unqualified persons.**Reference: Exhibit 017-016 C, Page 15, Dr. Schindler states: "For example, it is generally assumed that diffusion will keep contaminants in submerged tailings from reaching the water column, but it has recently been discovered that methane and hydrogen sulfide are released from the tailings, bubbling into overlying water."**

12. Assume that Shell's proposed EPL will have no tailings. In your opinion, will that make a difference to achieving self-sustaining aquatic ecosystems in the EPL?

13. What is your opinion of an EPL with no MFT and no process affected water (PAW), i.e., should this be a preferred option for final reclamation (compared to an EPL with either MFT or PAW?

Questions 12 and 13: Having no input of MFL or PAW will help, because it will reduce the load of toxins, but other sources such as seepage from mined pits will still contribute high sulfate (with microbial processes yielding H_2S and methane, the gases that form bubbles) and yield some toxic contaminants. I doubt whether the effect will be enough to allow the development of self-sustaining ecosystems. I further doubt this process can be predictably modeled with any degree of certainty, and a full-scale "experiment" would be the only reliable test. I am sure that

the seepage would also yield high salinity, and this alone may restrict the development of biological diversity. Hence, I put little faith in the claim that self-sustaining ecosystems are assured.

Part 2:

<u>Reference:</u> Exhibit 001-001C EIA Volume 4a- Aquatic Resources Page 6-511 (PDF 589)

In its EIA Aquatic Health Application Case review Shell states that "Chromium and strontium were predicted to have a low magnitude effect in the Muskeg River and Jackpine Creek. In Kearl Lake, cadmium and strontium were predicted to have a low magnitude effect. "Shell then states that "…after reclamation, it is unlikely that changes to the concentrations of these selected substances will be sufficient to affect the resistance or resilience of the two stream ecosystems"

1. Would you agree with Shell's conclusion that after reclamation, it is unlikely that changes to the concentrations of these selected substances will be sufficient to affect the resistance or resilience of the two stream ecosystems?

Question 1: No I would not. Again, they ignore the critical snowmelt period, shown to be of concern for fish by Dr Parrott and her colleagues. Also, they again rely on single contaminant guidelines for metals. Parrott et al. (see exhibit 002-026) express concern about PACs, for which there are no guidelines. These are the facets of concern, not the few individual metals that Shell highlights. Given the doubts expressed by experts on reclamation and the fact that a multiplicity of pollutants would remain, I think chances for recovery of the Muskeg River are very poor.

2. In your opinion has Shell fully investigated the potential health effects to early life stages of fish, in other words eggs and larval stages, of chromium and strontium and any other individually measured constituent concentrations?

Question 2: No. What is needed is the sort of assessment done by Dr Parrott et al., followed by examination of larval fishes *in situ* during the critical snowmelt period.

3. In your opinion has Shell fully evaluated possible synergistic/compounding effects of these constituents as a whole for those only reported in low concentrations?

Question 3: No. Environment Canada's scientists have shown this clearly in their abstracts, as well as in earlier studies.

4. In your opinion does the current level of understanding of aquatic systems enable the ability to effectively assess resilience or resistance? How about the ability to identify thresholds for assessing significance when assessing effects on fish and fish habitat?

Question 4: No. Resistance and resilience are still subjects of research, and few predictions can be made with confidence. In most cases I am familiar with, there are a variety of responses,

ranging from linear to exponential declines in response to pollutant loads. True thresholds are rare.

Reference: Transcript Volume 9 Page 7-8 (PDF 7-8)

On Ms. Campbell of OSEC stated that "in terms of peat, it's extremely difficult to recreate (peat) because of hydrology, topography and water quality on these process-affected mine sites. Even under ideal conditions, it's estimated that it would take one to three centuries. So for peat, it really is a long duration, significant, basically irreversible situation. The marshes that have been reclaimed to date on mine sites will be affected by the high salinity of the water, potentially other toxins in the water, and all the evidence so far is that they are a very poor substitute in terms of the biodiversity."

1. Based on this observation, could you comment on potential effects to Project related aquatic resources due to this transition from freshwater to saline wetland habitat as reclamation?

Question 1: I agree totally with Ms Campbell's assessment, which agrees with statements by my wife, Dr Suzanne Bayley of the University of Alberta, and her colleagues Dr. Lee Foote of the University of Alberta and Dr Rebecca Rooney of U of Waterloo. It is seepage from wetlands that supply baseflow to lakes and streams, and salinity in the seepage would be of concern for aquatic life. It would be of most concern under baseline flows in winter and late summer, when precipitation and runoff would supply minimum dilution.

2. Could you comment on other potential impacts to fish habitats from the inability to replace peatlands and their specific functions such as water balance, cover or temperature regulation?

Question 2: Peatlands supply all of these functions. In the upper Muskeg River, deep holes in the peat supply cold water refugia for fish, and, during winter, seepage that is known to support overwintering amphibians. When surfaces are frozen, seepage from wetlands supplies the only water to streams, which is why the larger streams continue to flow in winter.

3. Do you know of, if any, possible mitigation that might be applied in order to offset the impacts of this saline intrusion?

Question 3: This topic has been much investigated by wetland reclamation experts in the area, and the short answer is no. I am not enough of an expert to supply details, but Drs. Bayley, Rooney, or Lee Foote would be able to supply more specifics. See their publications at Exhibit 017-

References: Transcript Volume 5 page 769 (PDF 49)

Regarding End Pit Lakes eventually serving as functional aquatic habitat Mr. Vandenberg of Shell stated that Shell concluded that "you wouldn't have the exact same species, but you would

have species at every trophic level, that means the lakes would function as self-sustaining ecological systems, but not necessarily with all of the same species that you would find on the site today."

Transcript Volume 8 page 194-203 (PDF 194-203)

In his review of End Pit Lakes (or EPLs) Dr. Miller mentioned that naphthenic acids would degrade very slowly although they eventually wouldn't be a problem after a few hundred years. He speculates that the lack of further degradation after 4 years is based on continuing seepage input into the pit lake. He mentioned that mercury, cadmium and strontium are a lesser concern but a concern nonetheless. Dr. Miller also stated that "there is going to be a fairly high salt load and that although salts can be diluted and released they cannot really be treated in an end pit lake and that "…salts would remain in the end pit lakes forever." Dr. Miller concludes by expressing his concern about uncertainties associated with End Pit Lakes being successfully reclaimed by stating that "creation of EPLs is a grand experiment".

Schindler comment: Mr. Vanderberg's statement cannot be based on science. The success of end pit lakes has been a very mixed bag, as Dr Miller has pointed out. Mr Vanderberg would not make such a statement in a scientific meeting, I am sure!

I agree almost entirely with Dr. Miller's statement. Salinity can only be removed by distillation or reverse osmosis. The only point I disagree with him on is that there is no concern about mercury. If there were a fishery to develop, and it was to replace that lost from tributaries, it would be of little use to subsistence users unless mercury in fish were low.

1. In light of Shell's statement that there would be "species at every trophic level" how might you characterize the point at which an EPL becomes a 'self-sustaining ecological system'?

Question 1: I see no scientific basis for Shell making this statement. Few end pit lakes from base metal mining or coal mining have developed self-sustaining fisheries. Most of the "successes" that I know of use artificial habitat such as old tires and require frequent re-stocking. Those I know are also much smaller. Many are too acidic, saline, contain high toxic metals, etc. so do not support fish. I agree with Dr. Miller about a grand experiment, because there are presently no data upon which to base a conclusion. It is noteworthy that the Royal Society report expressed similar concerns. The "species at every trophic level" is a vague statement, there are entire food chains that contain no vertebrates, topped by predatory insects or crustaceans. And I do not believe that even a complete food chain of invertebrates can be assured.

2 Based on your own testimony and submission information as well as Dr. Miller's observations regarding the effectiveness of pit lakes, could you comment on the potential for these long term impacts to impede the ability the JPME EPLs to ever provide a 'sustainable' functional habitat for benthic organisms and fish species?

Question 2: I predict that EPLs will never provide a replacement fishery that is comparable to that lost, or habitat for any but a narrow diversity or low abundance of invertebrates.

3 If not, can you propose an economically and technically feasible alternative(s) to the current End Pit Lake approach that would perform a similar set of functions and be more effective in terms of providing functional habitat?

Question 3: In managing fisheries near most other sorts of activities such as logging and agriculture, we have learned that we must protect shorelines of streams, and important aquifers that supply water from wetlands that may be rather distant from streams. One wonders why there is another standard for mining. It also seems clear that to sustain the health of the Athabasca River system, the biological health of tributaries must be maintained. As AOSERP showed clearly already in the 1970s, the streams are not only of concern due to water quality in the Athabasca River. They supply many thousands of fish to the mainstem, and provide critical habitats during migration. Even if EPLs were successful, these functions would be lost.

Reference: Transcript Volume 9 Page 16 (PDF 16)

As stated by Ms Campbell an ecosystem base flow, or EBF, which is a flow threshold of 87 m3/sec below which withdrawals are prohibited, has yet to be established for the lower Athabasca River Water Management Framework.

1. Could you describe what the short, medium and long term impacts to JPME Project area fish and fish habitat might be (including the Athabasca River and PRM waterways) if withdrawals continue below the prescribed limit?

Question 1: It is impossible to answer this question, because RAMP, CEMA and Alberta Environment have never fulfilled the important task of identifying where key habitat for fish occurs. Their various interim estimates, based on "wetted area" and the like, are simply inadequate. The necessary funds and expertise must be expended to develop a true biological baseline. In this regard, if I were to do it, my first step would be to consult aboriginal people who use the area. They know well the areas used by larger fish species, and sometimes have useful observations on small species and amphibians as well. So far, there seems to be a reluctant by those assigned to this task to get their hands dirty! This is further reflected in the tardiness of the final Muskeg River Management Framework.

Cumulative Effects:

1. **In your opinion, has Shell's cumulative effects assessment adequately evaluated effects on water quality, aquatic health, and fish habitat at the regional level including within the Peace Athabasca Delta?**
2. **If not, have you specified any specific shortfalls that need to be addressed? If yes, what are they and what would be the repercussions of not addressing them?**

I do not believe that Shell's approach based on numerous models even scratches the surface of what is needed. I know that Environment Canada is wrestling with this problem, and engaging national

experts on the topic. The only one to even lay out a reasonable framework, though a very preliminary one, for aquatic effects, is Dr Monique Dube, now employed by Total. While given the inadequate long-term data base she and her colleagues have not been able to properly assess toxic contaminants, they have identified statistically significant upward trends in the river for sulfate, sodium, chloride, and phosphorus, four of the simplest parameters to measure. Water quantity has trended downward, as almost all recent studies have concluded (for example, Rasouli et al, tabled with my original critique, exhibit 107-016T). This model needs to be fleshed out and executed, and terrestrial equivalents develop. I doubt that Shell's consultants are capable of doing this, it is an exercise that requires the combined efforts of Canada's top scientists.

Continuing not to address the cumulative effects problem will leave us with the same "sliding baseline" that we have now for most parameters, exacerbated by the weaknesses in past monitoring. We have thirty five years of oil sands development, and whether or not industry has significantly affected the river is still contested, despite the expenditure of millions! This cannot continue, it makes us look like the most incompetent country in the civilized world. And that the terrestrial impact is significant regionally is not even debatable, as is visible from space, and from studies of woodland caribou and other species.

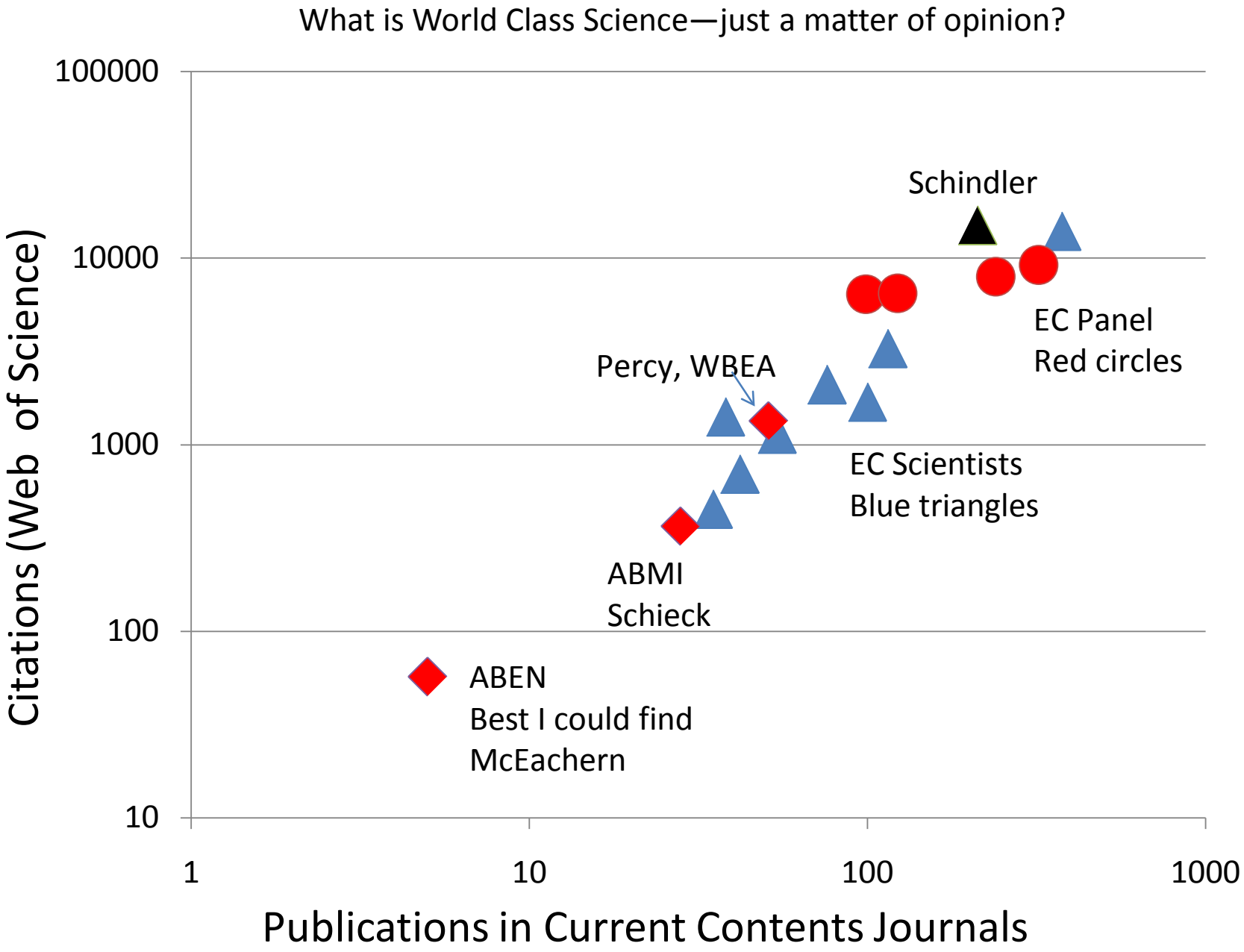
Worst of all, the needs of the true "top predator" in the Delta ecosystem, aboriginal people, have not been considered at all. Their "consultation" has been little more than visits by white people who brief them on what is planned. The assurances made under Treaty 8 are never discussed. The inroads that the greatly increased population of non-aboriginal hunters to the area have made into traditional foods, fish, and trapping livelihoods has not been properly evaluated. Our international image is very poor, we are violating UN human rights legislation in several ways. In Thomas King's language, the Delta is populated by "Inconvenient Indians," and their needs are being ignored, as they have throughout industrial development in Canada.

Further Response to Part 1 Questions regarding RAMP:

The problem with oil sands monitoring, impact assessment and cumulative effects assessment is, with the exception of the WBEA air monitoring, none of it has been designed by professionals. The people responsible for designing and executing the programs have no scientific "track record." The flaws have been easy to see, hence the unanimity among expert panels in their conclusion that the monitoring program was inadequate. I think that the problem is exposed by the figure (attached), which exemplifies that lack of experience in water monitoring and cumulative effects assessment. It was constructed by a colleague in early 2011, when several of the panels were still deliberating. The single AENV scientist with enough of a publication record to even appear on the multiple log scale is now gone, replaced by an individual who is invisible by such criteria, i.e. no relevant science background.

In short, we have had a monitoring program designed and run by amateurs, whose lack of experience is very visible to experienced ecologists. Much the same can be said of cumulative

effects assessment and EIA work. Yet the opinion of these amateurs has been considered to be equal to that of experienced scientists. There is little point in continuing the charade, they do not have the capacity to improve. Please, Panel help to make the improvements that we need for proper assessment of potential harm to the Lower Athabasca!


What is World Class Science—just a matter of opinion?
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Publications in Current Contents Journals
Schindler
EC Panel
Red circles
Percy, WBEA
EC Scientists
Blue triangles
ABMI
Schieck
ABEN
Best I could find
McEachern