



Regional Citizens' Advisory Council / "Citizens promoting environmentally safe operation of the Alyeska Terminal and associated tankers."

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August 16, 2002

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Prince William Sound
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BLM TAPS Renewal FIS
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 9700 South Cass Avenue
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Dear Sir or Madam:

The Prince William Sound Regional Citizens' Advisory Council (PWS RCAC) has reviewed the "Draft Environmental Impact Statement Renewal of the Federal Grant for the Trans-Alaska Pipeline System Right-of-Way" (DEIS) and we are pleased to submit our comments regarding it. Please see attached report, "Comment and Concerns Regarding Draft Environmental Impact Statement (DEIS) for Trans Alaska Pipeline System (TAPS) Grant and Lease as Compiled by Prince William Sound Regional Citizens' Advisory Council" for a compilation of the comments.

Our concerns lie mainly in assuring our members and the citizens that we represent that all operational risks and impacts of TAPS to the environment are known and do not increase during the renewal period. PWS RCAC wants TAPS to be verifiably well maintained and operated within its design constraints.

We note that the DEIS is quite lengthy at 1700 pages. With only 45 days to prepare comments, it is possible that errors have found their way into our comments. For this we apologize in advance. Hopefully, any errors will be minor in nature and will not affect the substance of the comments. Nevertheless, if errors are found we would be pleased to correct any that you might chose to bring to our attention.

Our comments are quite detailed and a thorough review of the report is suggested. Nevertheless, its contents can be summarized as follows:

- The DEIS has not adequately assessed the historic impact of TAPS either from normal operations or from catastrophic incidents. 113-1
- The assessment of probable impact from normal future operations of TAPS is incomplete. 113-2
- Potential impact caused by catastrophic incidents has been largely understated. 113-3
- Excessive reliance on incomplete data provided by industry coupled with a failure to consider relevant data from government and citizen sponsored research have rendered suspect many of the assessments of impact. 113-4
- Use of obsolete literature has rendered suspect many of the assessments of impact. 113-5
- The environmental impact of inadequate maintenance programs has not been considered in depth. 113-6

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- The DEIS cites regulatory compliance as evidence of benign environmental impact. | 113-7
- The DEIS fails to consider the environmental impact of off-normal operations of TAPS. | 113-8
- Assessments of environmental impact do not follow from the data cited that purport to support them. | 113-9
- Issues such as the ownership model which could have significant adverse environmental impact have been summarily excluded from the DEIS. | 113-10
- Numerous inconsistencies and errors of fact and inference have been identified in the DEIS. | 113-11

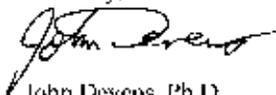
Consequently, we do not believe the environmental impacts, past, present, and future, as cited in the DEIS are accurately and completely portrayed. We request that issues cited above and described in detail in the report be examined and resolved prior to issuing the final Environmental Impact Statement. | 113-12

Adequate maintenance of TAPS is an important issue considered in the Draft Environmental Impact Statement (DEIS). We have analyzed the JPO's Reliability Centered Maintenance activities and our comments regarding TAPS condition and useful life can be found in "Review of Reliability Centered Maintenance Documents Right-of-Way Renewals Project Valdez Marine Terminal RCAC Contract No: 552.02.01." This report appears to be relevant to the decision-making processes associated with some of the issues cited above. We have also attached a copy of this report to this letter. | 113-13

In making the right-of-way renewal decision we recommend that the systems integrity of TAPS both with respect to adequacy of operations and with respect to mechanical integrity be made a primary consideration in any renewal decision. We recommend that the systems integrity be reviewed in detail at least once every five years during any renewal period and that this review be made a condition of renewal of the Grant. | 113-14

FWS RCAC staff would be pleased to provide any additional information to assist you in revising the DEIS. Let us know what you need.

Sincerely,



John Devens, Ph.D.
Executive Director

Cc: Jerry Brossia, Authorized Officer
Richard Ranger, Alyeska Pipeline

Attachments:

1. "Comment and Concerns Regarding Draft Environmental Impact Statement (DEIS) for Trans Alaska Pipeline System (TAPS) Grant and Lease as Compiled by Prince William Sound Regional Citizens' Advisory Council"
2. "Review of Reliability Centered Maintenance Documents Right-of-Way Renewals Project Valdez Marine Terminal RCAC Contract No: 552.02.01."

552.105.070816.DEISComCov.dta

**Comments and Concerns Regarding
Draft Environmental Impact Statement (DEIS)
for
Renewal of Trans Alaska Pipeline System (TAPS)
Grant and Lease
as Compiled by
Prince William Sound
Regional Citizens Advisory Council**



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1 DEIS is a sizeable document.

1.1 Considerable work and study of literature.

The Draft Environmental Impact Statement (DEIS) is a large document. Its 1700 pages of text, maps, tables, and charts demonstrates that considerable effort went into preparing the document. Many hundreds of literature citations are made documenting the present state of the Trans-Alaska Pipeline System (TAPS) and how it will operate during the renewal period.

We note that three renewal periods were considered (1) 30 years; (2) less than 30 years, and (3) no renewal. It appears that a renewal period of 30 years is preferred with most of the analysis devoted to the maximum renewal permitted. Initially, the Prince William Sound Regional Citizen's Advisory Council (PWS RCAC) viewed a 5-year renewal period as the most desirable; however, an analysis of that position indicated that our concerns lay mainly in assuring our members and the citizens that we represent that all operational risks and impacts of TAPS to the environment are known and do not increase during the renewal period. PWS RCAC wants TAPS to be verifiably well maintained and operated within its design constraints. Consequently, we recommend that the systems integrity of TAPS both with respect to adequacy of operations and with respect to mechanical integrity be reviewed in detail at least once every five years during any selected renewal period.

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1.2 May be greatest single source of reference data on TAPS

The DEIS when completed will contain in one place the greatest amount of data and information likely to ever be publicly available on TAPS. This data includes detailed descriptions of how TAPS works, the physical environment in which TAPS operates, and the life supported by the physical environment. This information is in addition to voluminous quantities of raw data taken from literature citations and other sources. PWS RCAC is very interested in making sure that the DEIS is complete and without errors. Our comments identify issues, both general and specific, that appear not to have been addressed in the DEIS, and we provide recommendations for revisions to the DEIS to include these. Additionally, we have identified errors in the text, and again we make specific recommendations for corrections.

A major point needing clarification throughout the DEIS relates to the fact that descriptions of biological resources relevant to the TAPS ROW and associated operations appear to be based on assessments of present-day biological resources after almost 30 years of routine TAPS operations. Minimal discussion is provided regarding impacts to these resources that may have occurred as a result

113-16

of the routine TAPS operations over the approximately 30-year period. As noted in Section 1.2 of the DEIS, "NEPA regulations require federal agencies to analyze the totality of the affected environment associated with a federal action, including cumulative impacts ... cumulative impacts include past, present, and reasonably foreseeable future actions." It seems reasonable that "past" and "present" actions in the preceding language should consider or address impacts that may have occurred due to routine TAPS operations over the past approximately 30 years. With the exception of limited discussions regarding impacts of the Exxon Valdez spill (e.g., Section 3.11.5; Section 3.19.1.3 for fish in Prince William Sound; and Section 3.22.3.5 for sea otters in Prince William Sound) the impression from the DEIS is that the present-day status of biological resources for the TAPS ROW and associated areas represents the background or non-impacted situation for the resources. This may or may not be accurate, and needs to be acknowledged and addressed in the DEIS

113-16
(Cont.)

Considerable discussion of sociocultural and socioeconomic aspects of TAPS can be found in the DEIS. With respect to subsistence economies, the DEIS appears to approach subsistence activities using a cash economy yardstick. Unfortunately, this can cause a low value to be placed on the destruction of all or part of a subsistence economy and tends not to give full consideration to the cultural damage to users of the subsistence resources. The DEIS needs to place additional emphasis on the cultural impacts associated with loss of subsistence resources.

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The DEIS appears to concentrate on normal operations of TAPS with regard to assessing impact to the environment. Although environmental impact from catastrophic events has received some discussion, discussion of off-normal TAPS operations and environmental consequences associated therewith has received little attention in the DEIS. Off-normal operations can be viewed as operation of a subsystem under conditions different than that anticipated in its design or outside or at the margins of its design envelope. A good example is the operation of the gravity separation process of the Ballast Water Treatment Facility (BWTF) when one of 3 process tanks is out of service for major maintenance and the remaining 2 tanks are operating at decreased separation capacity because properties of the oil have changed from that assumed.

113-18

Discussion of decommissioning and dismantlement (D&D) of TAPS is discussed. Very few people seem to view not renewing the rights-of-way as a viable option. Consequently, the feasibility of TAPS D&D as discussed in the DEIS is receiving little attention. One item of note is that the DEIS mentions TAPS as a possibly historic structure. Quite possibly an historic-structure designation could prevent the dismantlement of TAPS, an option not considered in the DEIS.

113-19

1.3 Right or wrong, DEIS may become the last word in publicly available information on TAPS

Prince William Sound Regional Citizens' Advisory Council (PWS RCAC) is concerned about whether the DEIS is complete and without errors. One obvious error in the DEIS pertains to economic benefits of oil spills. A proper analysis of the economic data cited in section 4.7 should indicate that on the whole there are no economic benefits to an oil spill and that if there are no economic benefits to be had, any damage to fishing and tourism cannot be offset by such benefits. And, the comments in the Executive Summary stating that the most significant impacts will be economic can be true only if catastrophic spills are avoided.

113-20

2 General concerns

2.1 Time period for public comment period is too short

The 1700 pages of the DEIS and hundreds of literature citations (including many Alyeska Pipeline Service Company (Alyeska) reports and personal communications) cannot be assembled, read, and analyzed in the allotted 45 days. The lack of availability of supporting documents, especially the personal communications, itself imposes delays inconsistent with a 45-day review period. In addition, there are many citations to the literature and industry/government reports that are called out in the text of the DEIS but not listed in the accompanying reference sections for each chapter. A number of these citations are critical to support or refute issues of concern to the PWS RCAC. Below is a list of citations that the PWS RCAC review identified as missing from the references. It is highly probable that there are others as well, and a complete cross-check of cited literature and the reference sections should be completed for the final EIS. Missing or incorrect references identified by PWS RCAC include:

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- ADF&G. 1986b. (Cited in text of DEIS but not listed in the references for any chapter.)
- Angliss et al. 2001. (Cited in text of DEIS but not listed in the references for any chapter.)
- Bence et al. 2000. (Cited in text of DEIS but not listed in the references for any chapter.)
- Boehm et al. 1998. (Cited in text of DEIS but not listed in the references for any chapter.)
- Boehm et al. 2001. (Cited in text of DEIS but not listed in the references for any chapter.)
- Calkins. 1994. (Cited in text of DEIS but not listed in the references for any chapter.)
- Carlson and Kvenvolden. 1996. (Cited in text of DEIS but not listed in the references for any chapter.)

113-22

Davis 1984. (Cited in text of DEIS but not listed in the references for any chapter.)
 Green 2002. (Cited in text of DEIS but not listed in the references for any chapter.)
 Hood et al. 1979. (Cited in text of DEIS but not listed in the references for any chapter.)
 Hostettler et al. 2000. (Cited in text of DEIS but not listed in the references for any chapter.)
 Johnson and Garshelis. 1995. (Cited in text of DEIS but not listed in the references for any chapter.)
 Morstad 1999. (Cited in text of DEIS but not listed in the references for any chapter.)
 Short, J.W. and R.A. Heintz. 1998. (Incorrectly cited in text of DEIS as 1998. It should be 1997, but it too is not listed in the references for any chapter.)

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Finally, the time period chosen for citizen comment coincides with the peak times for subsistence, tourism and fishing activities. Many interested citizens will be working their summertime businesses and will not have time to comment. PWS RCAC requested via the Trustees for Alaska that the comment period be extended by at least another 45 days, but that request was denied.

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2.2 Issues excluded from Scope

Issues summarily excluded from the scope of the DEIS may have significant environmental impact. For example, the ownership model is important because owners control use of resources devoted to minimizing environmental impact. Impacts of various ownership models should be examined. In particular, the decision making practices under the current ownership model appear to allow the owners committee a considerable role in management of operations having potentially significant environmental impacts. Recently, the owners directed that the maintenance budget be cut by 10% to 25% "without decreasing scope." How can tens of millions of dollars worth of maintenance be eliminated with out lessening the scope and what is the environmental impact?

113-24

Renewal conditions requiring that TAPS be operated and maintained in accord with the assumptions underlying the predictions of future impact are appropriate and very important. TAPS was new in 1978 and a policy of deferred maintenance likely had minimal environmental impact. Deferred maintenance on an aging system that was designed to have a life of 30 years has a potentially much higher risk of significant and adverse impact. Any renewal of the grant and lease should include requirements for determining the present state of TAPS and a 5 year cycle of verifying that it is being properly maintained. A complete

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and independent systems audit will accomplish the verification. Regulatory enforcement tools sufficient to enforce regulatory compliance must be given to regulators.

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Citizen's oversight groups such as Prince William Sound Regional Citizens' Advisory Council have had substantial impact in lessening adverse effects both from operations and from potential catastrophes. Industry has acknowledged the helpfulness of PWS RCAC on numerous occasions. For example, PWS RCAC has exercised leadership (1) in having vapor controls installed on Berths 4 and 5; (2) in developing and installing ice detection radar in PWS; (3) in having a fleet of 5 state-of-the-art tugs to assist tankers in both normal operations and in emergency situations; (4) in helping develop realistic contingency plans for response to oil spill scenarios; and (5) in helping develop geographic response strategies for protection and cleanup to specific sensitive resources. Impact of citizen oversight groups should be included in the DEIS. In fact, impacts associated with citizens' oversight groups can be compared with the impact associated with the absence of such groups because the pipeline itself does not have a citizens' oversight group.

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Side stepping the authorization of fines by the Bureau of Land Management (BLM) to the TAPS owners (Item 4) is inappropriate (page 2-6). The DEIS should justify how giving the BLM such authority would require another NEPA. If new rule-making regulations are required, then so be it. Without the authority to fine TAPS Owners, the BLM's oversight role is significantly diminished.

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Why would setting up an Escrow Account to cover TAPS Removal and ROW Rehabilitation require a NEPA analysis as noted on page 2-6 (item 7)? And, if it does, is that adequate justification for not doing it?

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The DEIS appears to have little discussion of improvements for contingency planning? Why aren't the impacts and lessons learned from the Exxon Valdez Oil spill (EVOS), Livengood, and other spills incorporated into the DEIS for contingency planning purposes? The EVOS had significant environmental impacts, that are well documented by numerous studies funded and published by the State/Federal EVOS Trustees Council. These studies are not referenced by the DEIS. Both the state and federal governments responded to the EVOS by revising and upgrading oil spill contingency planning requirements as a way to preclude or minimize future spill impacts. There are specific contingency planning upgrades that should have been addressed in the DEIS as a way of mitigating for or precluding environmental impacts of catastrophic future spills. The DEIS appears not to have considered revisions or upgrades in contingency planning and the impacts associated therewith.

113-29

Some contingency planning upgrades include requirements for Geographic Response Strategies (GRS) for the protection of sensitive areas. GRS are standard along the west coast of both Canada and the US and are being implemented along the east coast. The impact of improved skimming systems that are capable of responding in fast water is yet another planning scenario whose impact could have been assessed. Detailed spill scenarios are necessary to provide for the careful analysis of impacts and resource requirements in managing an incident.

Contingency planning for spills along the pipeline itself consists of about 220 equipment and containment sites whose purpose is the pre-positioning of equipment and berms to manage spills occurring near the site. The equipment and containment sites do not specifically identify sensitive resources along the pipeline nor would they provide the same level of protection to these sensitive resources as do the GRS sites in the Sound. The GRS sites in the Sound have been identified in advance and are much better matched with a workable cleanup strategy supported by equipment, personnel, and training specific to each individual site. GRSs along the various watersheds crossed by the pipeline will significantly lessen the potential environmental impact of catastrophic spills into the watersheds. The Copper River watershed could be seriously damaged by oil spills into any of the number locations where TAPS crosses its tributaries.

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2.3 Quality of raw data

The DEIS places considerable reliance on data provided by Alyeska and owners in citations of TAPS Owners 2001a (Draft Environmental Report provided by Owners) and in citations of personal communications. Considerable amounts of data are taken from cited literature. Data from recent measurements appear to be used less frequently. Very little validation of data provided by the owners can be found in the DEIS. One noteworthy aspect of TAPS Owners (2001a) is that it claims to be a draft. It seems unreasonable that the DEIS should make so much use of a draft report (i.e. a report for which the authors will not take responsibility) and then fail to include published works by experts. The TAPS Owners 2001a should not be used in the DEIS unless its authors take responsibility for its contents.

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2.4 Potential impacts of spilled oil

As noted in the Specific Comments below, the DEIS does not adequately address the potential impacts of oil spills on fish. The evaluation of oil spill impacts is largely restricted to concerns regarding containment and clean up of whole product oil; the fate and effects of aqueous phase oil on fish are not adequately evaluated. Of additional concern, the DEIS appears to selectively cite Exxon sponsored studies on the effects of spilled oil on fish, and does not always provide a balanced accounting of Exxon Valdez oil spill (EVCOS) impacts. The DEIS frequently refers to scientific controversy regarding impacts to fish when a

113-31

more accurate representation is that there are technical disagreements between government scientists and Exxon funded contractors. TAPS traverses the Copper River drainage (noted on page 3.19-31) which is the major salmon producer in Prince William Sound (PWS). It is critical that the DEIS present a more balanced and thorough analysis of potential oil spill impacts because of the ecological and economic importance of salmon produced in this and other areas that may be impacted by TAPS oil spills.

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Birds and marine and terrestrial mammals were significantly affected by EVOS, and yet there is no mention of this in Table 2-1 (Page 2-15). Much of the cumulative impact from the past 30 years of operations appears not to have been included in the DEIS.

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Section 3.11.5 devotes three paragraphs to the Exxon Valdez oil, and cites one paper written by Paul Boehm (Boehm et al. 1998), who is an Exxon consultant. The DEIS states 'by May 1989, most of the floating oil either had been removed by skimmers, had left the coastal area, had evaporated, had degraded, or stranded on shoreline or in sediments.' In actual fact, less than 15 percent of the oil was recovered by skimmers, so writing that sentence the way the authors did, drastically overemphasizes the effectiveness of the cleanup and response effort. The most comprehensive mass balance for the Exxon Valdez oil spill was prepared by Wolfe et al. 1994. No mention of this paper, or any number of the other papers (which number in the hundreds) written on the Exxon Valdez oil spill, are cited in this section. Also no mention is made of any of the more recent studies completed by the NOAA Auke Bay Laboratories, which demonstrate that persistent and buried oil continues to impact localized areas within Prince William Sound. There is no mention of hydrocarbon measurements in the water column following the Exxon Valdez oil spill or the extensive shoreline contamination as documented by massive research programs summarized in two conference proceedings dedicated to the EVOS (Wells et al. 1995 and Rice et al. 1996). None of the more recent studies by various EVOS Trustee-sponsored researchers is cited, and none of the more recent Auke Bay studies that demonstrated longer-term impacts from concentrations much lower than the NOAA ERL (as low as 1 ppb for several key Alaskan species) were mentioned. The DEIS should provide a balanced presentation of EVOS impacts and oil persistence.

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The DEIS also places considerable emphasis on subtidal sediment hydrocarbon burdens, when the majority of the impacts from most oil spills (including the EVOS) actually occur in the intertidal zone (Section 3.11.5). This focus on a single paper to cite that higher concentrations of sediment hydrocarbons were observed at Drier Bay (which were attributed to historic cannery operations and other anthropogenic sources along with natural background levels) versus the

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hydrocarbon contamination at the Bay of Isles (which remains to this day as one of the more heavily oiled areas), presents an incomplete discussion of existing environmental impact. As described in this discussion the Exxon Valdez oil spill appears to be nothing more than a minor perturbation to Prince William Sound.

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The emphasis on subtidal sediments is misleading. It is a well-known and documented fact that very little of the Exxon Valdez oil reached the subtidal sediments in Prince William Sound. The impacts were primarily intertidal, and this is completely ignored in the DEIS. Also, nothing is said about the tens of thousands of birds, marine mammals, and intertidal organisms that were impacted by the spill.

113-36

Of additional concern, there is no discussion of the subsistence and economic impacts to the villages and ports around Prince William Sound (Tatillek, Cordova, Valdez, etc.) from extensive fisheries closures. The DEIS does not adequately convey the socioeconomic impacts of EVOS and should be revised accordingly.

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More recent literature has been overlooked. Studies funded by the oil industry seem to have been favored (e.g. TAPS owners 2001a (draft owners environmental report)). Contradictory studies funded by others appear to have been overlooked. For example, NOAA and Auke Bay Laboratory toxicity studies indicate that Alaska North Slope crude oil is much more toxic than originally thought and that the toxicity is amplified by sunlight. Likewise, recent research funded by PWS RCAC indicates that the dispersants now dedicated for use on oil spills in Prince William Sound are likely to be ineffective and are more toxic than originally thought.

PWS RCAC is pleased to note that research by Jeff Short and his colleagues on possible sources of hydrocarbons in PWS from other than Alaska North Slope crude oil has been cited in the DEIS (although the citation is missing from the references). There are other sources of hydrocarbons (and PAHs in particular) from coal, natural seeps at Katalla, source rock, and other geologic features; however, the discussion of the other sources of hydrocarbons is incomplete and misleading. For example, many of these PAH sources are trapped in solid substrates located in deep water, and as such, the PAHs are not bioavailable. Liquid oil and petroleum products also contain PAHs, but, their PAHs are more readily dissolved from fluid oil films and small, dispersed droplets into the aqueous phase, and as such they are more bioavailable. Also, because most crude oils and petroleum products tend to be near the surface or in the upper water column, they are more available to intertidal and subtidal species. In this regard, we believe that some of Mr. Short's other research regarding the lingering effects of the Exxon Valdez oil spill should be included when changes

113-38

to the DEIS are considered. If one were to examine the intertidal zone of the beaches oiled by the Exxon Valdez spill in Prince William Sound: (1) considerable quantities of hydrocarbons will be found; (2) these intertidal hydrocarbons will show high levels of bioavailability; and (3) the hydrocarbons will bear the unmistakable signature of Alaska North Slope crude oil. Recent literature documenting substantial research is available on this subject from Jeff Short and others, and a more detailed discussion, supported by recent literature citations, of the lingering effects of the Exxon Valdez oil spill is needed if there is to be any reasonable claim that the cumulative impact of the first 25 years of TAPS operations has been addressed in the DEIS.

The Exxon Valdez oil spill is implicated in long-term damage to sea otters and ducks as documented in Irons et al. (2000); Trust et al. (2000); Esler et al. (2000a), 2000b; Lance et al. (2001), and Bodkin et al. (2002). The long term effects of the Exxon Valdez oil spill on pink salmon and herring, from the government perspective are explored in Rice et al. (2001) and Carls et al. (2002a). Exxon Valdez oil is still present in PWS. Oil persistence in Prince William Sound is discussed in Carls et al. (2001b) and Short et al. (2002). "Why is oil bad for fish?" has been documented extensively in Carls et al. (2001) and Moles (2001).

Oil industry sponsored studies and government sponsored studies of the Exxon Valdez Oil Spill have arrived at different and conflicting conclusions regarding the different effects and impacts to the environment. The DEIS in its analysis of the cumulative effects of TAPS has not addressed the fact that conflicting credible research exists on what reasonably should have been of interest in a study of cumulative environmental impact. The DEIS should not only report the controversy; the discussions of cumulative impact should try to resolve the controversy. The issue of why oil industry and government sponsored studies of the same oil spill arrived at such different conclusions is explored in Peterson et al. (2001), and these findings should also be included in any revisions to the DEIS.

2.5 Changes to TAPS operations and validity of DEIS impact prediction

The DEIS appears to be primarily concerned with design basis operations. Off-normal operations appear not to have been reasonably considered in assessing impacts. For example, the BWTF 90s Tanks (gravity separation of crude oil from ballast water) are having problems with waxy solids that prevent timely removal of the waxy solids and recovered crude oil from the process. The waxy buildup is a recurring problem in the 90s Tanks and along with other scheduled maintenance has limited operational capacity of the gravity separation process to less than 50% of its design. The impacts associated with operation of processes away from their design bases need to be assessed in the DEIS.

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Alycska's historical business model is to make operational changes and to defer maintenance based upon bottom line priorities. The increased risk associated with deferred maintenance, including that of catastrophic failure due to corrosion, needs to have its environmental impact considered.

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Frequent personnel or operational and management reorganizations may result in the reassignment of personnel to positions of oversight with which they are not familiar. The DEIS should consider increased risk and potentially adverse environmental impact associated with large-scale reorganization driven personnel reassignments. For example, in the reorganization now being implemented, all of the asset team leads (personnel reporting to the VMT Manager) have new assignments and almost all of the asset leads have never had responsibility for nor detailed knowledge of the operations that they now supervise.

113-41

2.6 Interpretation of data to produce conclusions regarding environmental impact

The connections between raw data and impact conclusions are not clear in many instances. For example, the DEIS reports that the current fleet of 26 tankers (3 with double hulls) will reduce in size to 8 to 10 tankers by 2020. Currently there are 25 tankers in the fleet including 7 with double hulls. Operation of 8 to 10 tankers in 2020 is predicted to result in a substantial reduction in the annual probabilities of accidents and spills. Is risk really reduced if a minimal number of tankers is attempting to carry 1,000,000 bbl per day and the owners are resisting further investment in TAPS anticipating shutdown in 2034?

113-42

In the DEIS section for the "Affected Environment" (Section 3), reasonably detailed descriptions are provided for the anticipated range of DEIS components, including existing biological resources associated with the TAPS ROW. The descriptions of existing biological resources are almost exclusively directed at resources presently in place after almost 30 years of the TAPS operations. Very little discussion is provided for how these resources may have changed or been impacted over the approximately 30-year period of routine TAPS operations, except for very brief discussions relating to impacts from the Exxon Valdez oil spill and acknowledging compliance (but not necessarily no impacts) with (National Pollution Discharge Elimination System (NPDES)-permitted operations such as the ballast water treatment facility (BWTF) discharges at the Valdez Marine Terminal. While information relating to characteristics of biological resources in the absence of the past approximately 30 years of routine TAPS operations would likely be relevant to the no-action alternative (i.e., the alternative associated with cessation of pipeline operations and removal of its components), the DEIS acknowledges the following for the no-action alternative

113-43

(page 4.7-1 in Section 4.7.1.1): "No action has not received engineering and environmental study and its description remains somewhat speculative." As such, very little information is available in the DEIS for likely environmental impact to biological resources if the past approximately 30 years of routine TAPS operations had not occurred.

113-43
(Cont.)

2.7 Qualitative vs. Quantitative nature of impacts cited

Assigning probabilities for very unlikely catastrophic events is more qualitative than quantitative. The potential impact of such events is cited as minimal because a low, perhaps unrealistic, probability is driving the potential impact. For example, an Exxon Valdez type incident is predicted to occur no more than once every 1000 years, but we know that such a incident has occurred once in the first 25 years of TAPS operations. What justifies the use of a now much reduced probability for this kind of incident? Have the hidden risks all been identified, quantified, and ultimately reduced?

113-44

Total impact in Prince William Sound has been described qualitatively and in terms of 10-year old research that is arguably incomplete and controversial. A bottom line of no lasting impact is cited in the DEIS. More recent research indicates a continuing impact that was not cited in the DEIS. Recent field measurements at oiled beaches still show the presence of significant quantities of Exxon Valdez oil (Short et al. 2002). Additionally, recent research shows that Alaska North Slope crude oil is more toxic than originally believed and that the effects of this increased toxicity are amplified by sunlight.

113-45

2.8 Adequacy of Spill Scenarios for Analysis of Environmental Consequences

On page 4.4-3 (section 4.4.1.1 Pipeline and Valdez Marine Terminal Spill Scenarios and Locations) it is stated that data from small to moderate spills considered to be in the "anticipated to likely" category were examined from the 25 years of TAPS operations. Were data on large spills that actually occurred (but were statistically considered to be "unlikely to very unlikely") excluded from the analysis? If so, the DEIS should explicitly stated that although larger spills have occurred in the past, they were not included in the analysis of spill impacts that would occur from large but unlikely or very unlikely spills in future.

113-46

In table 4.4-2 (on page 4.4-7) the frequency range for "very unlikely" should read 10^{-6} to 10^{-7} (it is printed incorrectly). Without digging into the methodology used for spill frequency analysis (which is evidently covered in the appendices) it is hard to comment on the estimated frequencies used in the DEIS. As noted above, we already know that one low-probability high-impact event (the Exxon Valdez oil spill) has already occurred, along with the Eastern Lion oil spill at the terminal in 1994 and the ballast water treatment facility spill in 1997. How did

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these known events factor into the calculations used in the DEIS? The DEIS should compare the frequency of observed spill events by size during the first 30 years of operation to the estimated frequency of events for the second 30 years of operation.

113-48
(Cont.)

With regard to the 1994 Eastern Lion oil spill at the terminal (Jones 1994; KLI 1994) and the 1997 ballast water treatment facility spill (Jones 1997; KLI 1997), why were neither of these spill events discussed in the DEIS? It would be appropriate for actual spill events, which occurred at the Valdez Marine Terminal, to be considered in the design and development of hypothetical spill scenarios for predicting potential impacts 30 years into the future.

With regard to spill scenario event number 11 (in Table 4.4-2 on page 4.4-8) it is unrealistic that a 2.1 million gallon spill to land outside the containment barriers would not reach the waters of Port Valdez. The slope of the land at the Valdez Marine Terminal is moderately steep, and it is hard to imagine that all the oil could be stopped from entering the Unnamed Valdez Marine Terminal Creek or otherwise flowing over land into the Port.

113-49

As a general note on both Tables 4.4-1 and 4.4-2, these tables would be easier for the lay reader to evaluate if the frequency was reported as once in X years (i.e., the reciprocal of the frequency) and the volume spilled was reported in gallons

113-50

On page 4.4-9 a 'guillotine' break of the pipeline is described as a short duration release. Could a guillotine break last from less than one hour to a period of days depending on how long it takes the affected pipe void volume to drain?

113-51

On page 4.4-9, risk is defined as the product of the annual frequency of a spill event and the severity of consequences. The development of very unlikely but highly catastrophic scenarios is then briefly discussed, but the reader is directed to yet another section (4.4.1.3) for additional discussion. This brings up a general concern about the DEIS. The reader is frequently directed to either preceding or following sections (sometimes contained in separate computer files) before a particular thought or line of inquiry can be completed. The DEIS would be more useful if organized to keep related ideas or topics together.

113-52

On page 4.4-10, scenario 5 is described as a crack in a cargo tank of a vessel loading Alaskan North Slope crude oil. It is improbable that the oil could be contained within the boom surrounding the tanker, as the volume released would depend on the amount of oil in the tanker relative to the position of the crack in the vessel.

113-53

On page 4.4-15 the frequency of a guillotine break in the pipeline from an airplane impact is estimated to have an occurrence of around once in 100 to 400 years (8.6×10^{-3} /year). Does this aircraft impact frequency account for terrorist activities such as those of September 11, 2001, or is the overlying assumption throughout the DEIS that all aircraft/pipeline or aircraft/terminal incidents were the result of an accident?

113-54

On page 4.4-16 spill incidence frequencies are reported as 1.7×10^{-4} or 1.2×10^{-2} , etc. The DEIS would be much more useful to the lay reader if spill frequencies were consistently but parenthetically also reported as once in 5882 years or once in 83 years, etc.

113-55

On page 4.4-20 parametric surface area analysis is defined to assume flat ground, with the area covered determined by the volume spilled and a specified oil thickness of 1, 2, or 3 inches. Objective analysis takes surface terrain (containment features, slope, etc.) into account. No evaporation or seeping into the ground is factored into the estimate of area covered. On page 4.4-21, it is stated that objective analysis is applied only to guillotine pipeline break spill scenarios. In these instances the volume spilled is not specified or tied to flow rates. Instead, the minimum volume to cover the area of interest was used in the spill scenarios. This approach (using the minimum volume to cover the specified area) would minimize the estimated amount of oil encountering a surface water body. This estimation approach is flawed because water may act as an infinite sink (where instead of pooling, the oil can readily spread on the water surface away from the point of contact) such that a much larger area would eventually be impacted (specifically, the banks of the water body in question). The DEIS should have considered such possibilities instead of simply using the minimum volume to cover the area of interest, without the possibility of subsequent entrainment into a flowing water body such as a stream or river. Putting it another way, the objective approach does not account for oil entering a creek, stream, or river and being further transported by water flow, thereby increasing the contaminated area.

113-56

In the footnote on page 4.4-21, the DEIS states that evaporation rates are predicted based on Fingas (1996). This approach tends to over estimate evaporation from thicker oil pools, because of diffusion control in the oil phase (Payne et al. 1984), which is not accounted for in the approach used by Fingas. As a result, the amount of oil remaining to spread, be contained, or picked up by mechanical means will be consistently underestimated in the DEIS.

113-57

In section 4.4.1.3.2 Catastrophic Valdez Marine Terminal Events (on page 4.4-22) the total volume of oil contained in 18 crude oil storage tanks at the Valdez Marine Terminal should be presented in gallons to give the lay reader an idea of

113-58

the huge volume contained at that facility. For example, there are 21 million gallons per tank (two times the volume of oil spilled in the FVOS) x 18 tanks = 378 million gallons. To put that into perspective that most Alaskans can relate to, that is equivalent to approximately 34 Exxon Valdez-sized spills stored in one location.

113-58
(Cont.)

On page 4.4-22, the DEIS states that catastrophic storage tank failure or rupture is extremely rare. Causes of actual tank failures include: foundation failure, weld failure, impact by rail truck, and flooding. Foundation failure was not considered likely, but it could occur with a major earthquake. A spill from such an event could easily enter Port Valdez waters, although the frequency for a storage tank failure event was listed in the DEIS as 1.8×10^{-6} (once in 555,000 years). How can such a frequency be justified when we already know that an initiator event with the potential to cause foundation failure (the 1964 earthquake) occurred within the last 50 years? By the estimates presented in the DEIS, such unlikely events could produce spill magnitudes ranging from approximately 50,000 barrels (2.1 million gallons) on land outside secondary containment, to a spill of more than 143,000 barrels (6 million gallons) into Port Valdez. The DEIS states that 2.1 million gallons of oil spilled at the terminal can be contained and won't reach Port Valdez. If only a small portion of a spill of this size were to reach the Unnamed Valdez Marine Terminal Creek, it would be almost impossible to contain.

113-59

On page 4.4-24 the DEIS acknowledges that the transport of oil downstream from a spill is a very complex process. While models exist to predict such behavior, they generally require large quantities of field data that were unavailable for preparation of the DEIS. As a result, a number of simplifying assumptions regarding slick sizes, geometries, and trajectories on flowing water were made. Specifically the oil was modeled as a rectangular slick, which moved at the current speed until it reached various collection points along the river or stream. Most of the analyses presented deal with estimated cleanup percentages, and there is very little consideration given to downstream impacts to fish and invertebrates from dissolved fractions that transit significant distances beyond the initial spill impact zone.

113-60

On page 4.4-26 (section 4.4.3.1 values Marine Terminal Fire Event (scenario I0)) the DEIS considers the impact from a fire caused by an airplane crash into one of the tanks contained within the East Tank Farm. It is assumed that the contents of the second tank and the dike walls are not affected during the event. The DEIS should consider what happens if the second tank and dike walls are affected by the fire. On this and subsequent pages (4.4-29) the DEIS should state what data can be cited to ensure that the other tanks would not be damaged by the heat and also explode and burn.

113-61

<p>On page 4.4-29, it is stated that a Fire Dynamics Simulator (FDS) model was used to obtain estimates of near-field soot and combustion product concentrations. In the text it is admitted that the model has not been applied to very large fires or compared to field measurements and that there were a number of memory and grid point constraints that affected the model results. Nevertheless, the data generated from model runs are presented in Table 4.4-6 with no additional caveats in either the title or footnotes to qualify the results. In addition the table would be much more useful if toxicity or concentrations of concern to human health were also presented. Without them, it's hard to interpret the consequences from the data as presented.</p>	<p>113-62</p> <p>113-63</p>
<p>On page 4.4-32 there are a number of assumptions invoked which clearly limit the extent of the fire considered in the scenario, and many of these may need to be questioned. For example, the fire control assumes availability of high-level industrial fire brigade support from the Valdez Fire Department. The DEIS should consider what would happen if access to the VMT were to become limited because of the Dayville Road being blocked by winter weather and other causes.</p>	<p>113-64</p>
<p>On page 4.4-33 the DEIS states that the Valdez Marine Terminal currently has a draft firefighting strategy to keep adjacent tanks cool in the event of a dike fire. The Valdez Marine terminal has been in existence for over 25 years. Why does Alyeska only have a DRAFT firefighting strategy to keep adjacent tanks cool in the event of a tank or dike fire? Does the Draft designation indicate a lack of commitment to the strategy? What is the potential environmental impact? Also, do the firefighters at the Valdez Marine Terminal have the specialized training and equipment necessary to fight large dike fires? Are there sufficient resources (foam) available to handle such an event?</p>	<p>113-65</p>
<p>Tables 4.4-9 and 4.4-10 (on pages 4.4-35 and 4.4-36) present maximum modeled public exposures to soot and fire combustion products from two pipeline fire and spill scenarios. The DEIS should provide some reference to acceptable levels. Are there chronic or IDLH (immediately dangerous to life and health) values published for these products? This information should be presented in the tables.</p>	<p>113-66</p>
<p>On page 4.4-38 (section 4.4.4.1.2 Impacts for Selected Spill Scenarios) the DEIS describes a spill scenario for a "very unlikely" guillotine break, where over 2,200,000 gallons of crude oil is released in a short time. Based on a parametric calculation, the estimated size of potentially contaminated soil would be 84 acres, with an assumed spill pool thickness of one inch. The DEIS goes on to state that the pipeline is adjacent to Goldstream Creek (the location selected for the</p>	<p>113-67</p>

scenario), and as a result, the oil would drain into the creek resulting in a land area of only about 0.2 acres being contaminated (as calculated using the objective analysis method). "The majority of the contaminated land would be confined along the creek and downstream." Given this scenario, the DEIS should then address the distance that the oil might flow downstream and the additional area of ecosystem oiling and impacts that would result from extensive contamination of the streambed and banks. Likewise, after the bulk of the oil had been retained in stream banks, sediments, and natural collection points, additional downstream impacts to fish, infauna, epifauna, and streambed vegetation would occur from dissolved constituents. Dissolved BTEX and PAH components could travel for tens if not hundreds of miles before nontoxic concentrations are

113-67
(Cont.)

reached from a combination of evaporation and dilution from fresh-water tributaries feeding into the stream. None of these considerations are mentioned in the DEIS until page 4.4-40.

113-67
(Cont.)

Even when the potential impacts are discussed (page 4.4-40; section 4.4.1.3.2 Impacts of Spill Scenarios), a number of unrealistic and simplifying assumptions are made. The oil is assumed to move downstream with distinct leading and trailing edges (plug flow) and a slick length that remains constant in time. From numerous real-world events from spills along rivers and streams, it is known that slick length does not remain constant in time, but actually increases due to shoreline stranding, streambed and bank contamination, and subsequent bleed off and leaching. The DEIS analysis does not include any of these behaviors and most of the weathering processes known to affect oil spreading and drift are ignored. Also, none of the analyses presented in the text or the accompanying tables include realistic response times or remediation effectiveness. Instead, exceedingly fast response times and high percentages of oil available for recovery are presented for each scenario, with no discussion of the limitations or difficulties associated with actual cleanup effectiveness. In several instances under low flow conditions, the DEIS estimates 100 percent of the released oil would be subject to capture (for example see Tables 4.4-15 through 4.4-18), which is unlikely to occur. The tables refer to "percentage of spill subject to recovery at containment site (CS)." They don't actually state that the cited percentage is the amount of oil that will be recovered. Nevertheless, the DEIS implies much higher recoveries than can ever be realistically achieved, and so, it is misleading. Finally dissolution and concomitant toxicity to fish, and all other life forms within the spill zone and further downstream are completely ignored.

113-68

Table 4.4-19 on page 4.4-50 presents a summary of spill volumes, rates and drainage times for different pipeline break scenarios, but the drainage times are very short. They are probably not realistic and do not allow for slower oil drainage as its viscosity increases due to cooling upon exposure to colder air after the pipeline break.

113-69

On page 4.4-53 there is an acknowledgement that impacts to rivers and creeks under high flow conditions for the postulated guillotine break scenarios would be major. Subsequent cleanup could take considerable time and effort because it was unlikely that a significant portion of the spilled oil could be captured. These high flow scenario impacts are not quantified in the DEIS.

113-70

In section 4.4.5.1 Spill Locations (page 4.4-60) nine scenarios for oil spills that could reach the waters of Port Valdez are defined. In four of the scenarios contaminants are released directly into the water, and in five scenarios the initial release of crude oil is on land, with the oil then flowing over land into the waters

113-71

of Port Valdez. For the spills on land, it is assumed that the oil flows from the discharge point to the Unnamed Valdez Marine Terminal Creek, which eventually flows into Port Valdez near Berths 3, 4, and 5. The volumes for most of the hypothetical spills that are projected to reach water are far less than the 2 million gallon figure that is claimed to be successfully retained or prevented from reaching the waters in the port elsewhere in the DEIS. The DEIS should elaborate further on this apparent discrepancy. Specifically, how in Table 4.4-2 can a 2 million gallon crude oil spill on land outside of dike containment be prevented from reaching port waters (event No. 11), while much smaller volumes do get into the marine environment? Also, why are there only eight spills reaching marine waters identified in Table 4.4-2, while the text (on page 4.4-60) referring to the table discusses nine scenarios? Finally, how do the scenarios compare to actual spill events that have occurred at the terminal (e.g., the 1994 Eastern Lion oil spill and the 1997 BWTF spill) over the last 25 years?

113-71
(Cont.)

On page 4.4-62 (in section 4.4.4.5.3 Properties of North Slope Crude Oil), the inset states that 15-20 percent will evaporate within 24 hours of a spill. This loss by evaporation is greater than any measured during controlled oil weathering experiments with Prudhoe Bay crude oil under Alaskan conditions (Payne et al. 1984) or predicted by oil weathering computer models developed for NOAA and validated after the Exxon Valdez oil spill (Payne et al. 1991a). The DEIS should also address the fact that evaporation from thicker oil pools will be significantly retarded because of diffusion-controlled processes within the oil phase (Payne et al. 1984).

113-72

On page 4.4-62 the description of oil weathering behavior is very good. The DEIS should be edited to include a similar presentation for the oil spill scenarios into rivers and creeks.

113-73

Section 4.4.4.5.4 (on pp 4.4-63 through 4.4-66) should be revised to include the effects of dissolution of BTEX constituents and lower molecular weight PAH (naphthalenes, phenanthrenes, anthracenes, dibenzothiophanes, etc.), which do have finite solubilities in seawater. These constituents can reach lethal concentrations in exposed waters, particularly during the initial stages of a spill (Payne et al. 1984, 1991a, French-McCay 2002; Payne and Driskell 1999, 2001; Barron et al. 2002, Duesterloh et al. in press).

113-74

On page 4.4-63 under the section on "likely spills" scenario five involves the introduction of 500 barrels (21,000 gallons) from a tanker during loading operations. Can 21,000 gallons from a leak really be completely contained within a boom placed around a tanker? During the Eastern Lion spill event, oil was observed being entrained underneath the boom surrounding the vessel by tidal currents. Why wouldn't that be a problem with this scenario as well? Also, the

113-75

DEIS states that Alaska North Slope crude oil does not dissolve during the first 24 hours. That statement is inaccurate. It is during this first 24 hour period that the maximum amount of dissolution from BTEX and lower molecular weight PAH (naphthalenes, phenanthrenes, anthracenes and their alkylated homologues) occurs (Payne et al. 1984). Although most of the BTEX components are lost by subsequent evaporation from the water column, the lower molecular weight PAH are more persistent, and they will continue to dissolve into the water from oil on the water surface or from oil stranded on shorelines for months, as long as there is direct oil/water contact (Payne et al. 1984, 1991a,b,c). This section of the DEIS should be revised to reflect these well-known dissolution processes.

113-76

On page 4.4-63 under "unlikely spills" an 80 barrel (3600 gallon) spill during tanker loading operations is described. The DEIS states that the spill would be contained by the protective boom placed around the vessel; however, observation of oil-spill boom placed around the tankers at the berths at the Valdez Marine Terminal has shown that sections of the boom can be pressed tight against the hull of the vessel depending on wind and current conditions. Under such a configuration, it is unlikely that all of the oil would be retained, particularly if it were spilled from a loading arm or the deck of the tanker during loading operations. This scenario also minimizes the impact of dissolved constituents which can reach lethal concentrations in the immediate vicinity of the spill. Therefore, the statements of minimum impact from this scenario and the others discussed are not completely accurate. For example, oil from the 1994 Eastern Lion oil spill, which only lost an estimated 200 barrels (8,400 gallons), was detected for almost 12 months in mussels collected at the terminal and 6 km across the port at Gold Creek as part of the Prince William Sound RCAC I.TEMP analysis (KLI 1994; Payne et al. 1998, 2001, 2002). The DEIS should be rewritten to more accurately reflect known impacts that occur even after "minor" oil spills in near shore marine environments.

113-77

On page 4.4-64 under the discussion of impacts from "very unlikely" spills, it is assumed that the oil would not be contained for up to two hours after its initial release into the waters of Port Valdez. The DEIS then incorrectly assumes that after that time all the oil can be boomed to prevent further spreading and shoreline impacts. From real-world oil spill experience, it is known that large spills cannot be easily contained as stated in the DEIS. The DEIS assumes optimal weather conditions for the response operations and most oil spills occur under adverse conditions.

113-78

On page 4.4-65 scenario number 11 claims that only two miles of shoreline would be significantly impacted during the two hours before the response. In making this prediction, the model used in the DEIS assumes a constant wind out of one

113-79

direction (most favorable conditions), when in fact the winds in Port Valdez are more variable. The possibility of containing a spill of that size in two hours is so low that very little credence can be placed on the predicted results. It is absolutely impossible to believe that a 6 million gallon oil spill could be completely contained after having two hours to spread and drift under the influence of wind and currents under real world conditions. For example, during the Eastern Lion spill at the VMT in 1994, the response was mounted in under two hours, and yet, the oil could not be contained. Within one and one-half to two days, oil and sheens were observed from that spill as far away as the Solomon Gulch hatchery and Duck Flats to the east and near the beach south of the Valdez Small Boat Harbor to the northeast. Eventually, oil was also found as far west as Andersen Bay at the west end of Port Valdez and in the Mineral Creek area on the north side west of the city of Valdez (Jones 1994). Even if all the oil in the hypothetical DEIS scenario were blown ashore, we know from experience after the Exxon Valdez oil spill, that subsequent tides and waves will remove and redistribute significant quantities of oil to other locations. Booms placed along the contaminated shorelines to prevent such continued transport processes were not effective in 1989, and there have not been significant improvements in boom technology sufficient to deal with the wind, wave, and current conditions in Port Valdez. As a result, it is impossible to believe that the impacts from this hypothetical spill scenario would be "small and localized" as stated in the DEIS. This scenario discusses a spill approximately 1/3 the size of the Exxon Valdez oil spill, which eventually contaminated over 800 miles of coastline in Prince William Sound and the northern Gulf of Alaska. As noted above, residues from the Eastern Lion oil spill were chemically detected across the port at Gold Creek for many months, and that was from a significantly smaller oil release. While the DEIS admits that oil on the shoreline could continue to impact the waters of the Port in the immediate area, it then states that because of dilution and the existing hydrocarbon background concentrations, these impacts would be minimal. That statement is not true. Although it is a fact that the PWS RCAC LTEMP mussel and sediment samples have shown BWTf-sourced hydrocarbon contamination in the port (Payne et al. 2001, 2002), the levels are still quite low, so leaching of water-soluble constituents and particulate/oil-phase hydrocarbons from the shorelines into Port Valdez in the weeks and months after a spill such as that described in scenario 11 would not be "minimal." Finally, the water exchange rates cited in the DEIS for the Port are being questioned as being too high (Payne et al. 2002). The DEIS spill scenarios and impact analyses for spills originating at the VMT should be reconsidered and rewritten to reflect what is actually known about real-world oil spill containment, the inefficiencies of on-water oil recovery, oil spill cleanup, oil weathering behavior (including dissolution), and the intertidal and water column impacts documented after 13 years of studying the aftermath of the Exxon Valdez oil spill.

113-79
(Cont.)

Based on this review of the hypothetical spill scenarios presented in the DEIS, the following general comment seems appropriate: All of the impacts discussed in the DEIS are based on specific and very inflexible scenarios prescribed in such a way that there is a very limited geographical extent of oil contamination in each case. The assumptions of minimal oil spreading, transport, and substrate contamination are based on unrealistic response times, unproven oil containment and cleanup efficiencies, and generally favorable weather conditions. When there is doubt as to whether the spilled oil could be contained as depicted in the scenarios, then little credence can be placed on the predicted impacts. As noted in considerable detail throughout this section, there are so many problems with the assumptions and restrictions imposed on the scenarios presented, that the very foundation of the DEIS is called into question.

113-80

2.9 Equivalence of regulatory compliance and lack of environmental impact

Compliance with environmental regulations is cited as evidence of minimal impact. Environmental impact and regulatory compliance are not equivalent. Impact assessment needs additional metrics based on up-to-date science and technology. Special vigilance is needed when industry has assisted in developing (exemptions to) the regulations. For example, Alyeska's NPDES Permit for the Ballast Water Treatment Facility has upper discharge limits that can be met without much challenge. Alyeska's Title V air quality permit application has been pending without action at the Alaska Department of Environmental Conservation for 5 years. In the interim, Alyeska has been operating the Valdez Marine Terminal under a more liberal Prevention of Significant Deterioration permit. At the suggestion of Alyeska and industry, the National Emission Standard currently being proposed by EPA excludes emissions from Alaska North Slope crude oil and from the Ballast Water Treatment Facility. A source emitting 25 tons or more per year of hazardous air pollutants (HAPs) is defined by EPA to be a major source. Yet, the proposed rule exempts a source, the VMT, exceeding the threshold by a factor of 5-10 (see discussion below in Section 3.5). The DEIS contains data indicating that hazardous air pollutants exceed the major source threshold by a factor of approximately 5.

113-81

Section 3.11.1 (under Section 3.11 – Anthropogenic Influences on Physical Marine Environment) considers discharges from the Ballast Water Treatment Facility (BWTF) at the Valdez Marine Terminal. However, the primary thrust of the entire section is the statement that all discharges are in compliance with the applicable NPDES permit. Most of the discussion centers on biochemical oxygen demand and BTEX measurements, which have significantly improved after the installation of the biological treatment stage to BWTF in 1989. Average annual

113-82

discharges of ballast water treatment effluent are cited at 15 million gallons per day. The mixing zone is described and defined by acute and chronic effects zones. Monitoring schedules as required by the NPDES permits are outlined, and in the next section (3.11.1.2 Mitigation) it is again stated that the Valdez Marine Terminal is in compliance with all applicable NPDES permits. In addition, Alyeska is touted as using the best management practices available to minimize the volume of wastewater generated. Brief mention is even made of the technical advisory group (including ADEC [Alaska Department of Environmental Conservation], EPA, Alyeska, and PWS RCAC) to monitor and initiate changes to plant operations. There is no mention of recent PWS RCAC studies on BWTF impacts to the port (Payne et al. 2001, Salazar et al. 2002, and Payne et al. 2002). Those studies have found, that notwithstanding the fact that the measured discharge levels are well below NPDES permit requirements, the volume of treated ballast wastewater is so huge that between 0.8 and 1.6 barrels per day of ANS crude oil are discharged as finely dispersed oil droplets into Port Valdez. This should be explicitly stated in the DEIS and possible mitigation approaches considered.

113-82
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Section 3.11.2 (Trace Elements) describes the measurements of eight elements (e.g., aluminum, arsenic, chromium, cadmium, copper, mercury, nickel, and selenium) that were surveyed between 1976 and 1978. Concentrations were found to be typically in the normal to low range for clean systems (Cosnik the 1979). Regulatory requirements for wastewater discharges from the Valdez Marine Terminal do not include effluent limitations or water quality monitoring for these trace elements. The environmental impact of operations that are in compliance with environmental regulations needs to be assessed where, as there is here, evidence indicates that adverse impact is occurring.

113-83

2.10 Transparency of TAPS operational processes

Citizens have great difficulty in looking into TAPS operational and maintenance processes because Alyeska claims that such information is proprietary to its business activities. JPO has related to PWS RCAC its own difficulties in getting the information it needs to assess compliance with its regulations and the laws it is to administer. It is unclear how the environmental impact of a system as complex as TAPS can be properly assessed if complete information regarding operations and maintenance is withheld from those making the assessment. For example, it is acknowledged that the Reliability Centered Maintenance (RCM) paradigm is appropriate to TAPS; however, (1) we do not know if it has been applied in a systematic manner to all processes and subsystems; and (2) we do not know the status of action plans to implement the specific maintenance strategies identified for the systems to which the RCM methodology has been applied. Information that allows quantification of the present state of TAPS is needed to verify that the assumptions of impact cited in the DEIS remain valid.

113-84

It should be a condition of renewal, that this information be made available to regulators and citizens alike. The systems audit being proposed by Alaska Forum for Environmental Responsibility or complete implementation of a Reliability Centered Maintenance (RCM) II program for TAPS would be appropriate.

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2.11 Assumptions

The DEIS recommends a proposed action of renewal of the Federal Grant for 30 years for the Trans-Alaska Pipeline System (TAPS). This recommendation is based on the assumption that impacts would be similar for both a 30 year period and a shorter period of renewal. The analysis of potential impacts is largely predicated on an assumed significant decrease in oil throughput (e.g., Figure 4.3-2); i.e., risks of environmental impacts will remain constant or decrease because less oil will be transported. This assumption ignores the potential for additional oil production in the North Slope (e.g., further development of existing fields, or the opening and development of the Arctic National Wildlife Refuge (ANWR) and indicates that a fundamental assumption in the DEIS is flawed. It seems likely that impacts would increase with additional oil throughput, but this is not considered anywhere in the DEIS.

113-85

Page 4.3-18 states that complete use of double-hulled tankers in PWS is expected by the year 2015. This projection may not be accurate because the shippers may continue to lease single-hulled tankers. It is unclear how much of the assumptions and estimated impacts of the DEIS are based on a complete conversion to double-hulled tankers that may not occur. Additionally, the DEIS appears not consider that use of double hull tankers reduces but does not eliminate the probability of catastrophic oil spills.

113-86

Anticipated impacts associated with hypothetical spill scenarios for the Valdez Marine Terminal and Port Valdez are summarized in Section 4.4.4 5.4. However, the impacts in all instances (including "very unlikely" spills with large volumes up to 143,450 barrels) are developed for scenarios under assumptions of operationally favorable conditions (e.g., a spill volume of 143,450 barrels that would be contained within a 2 hour period under "nonextreme weather conditions"). For perspective, it would be helpful if hypothetical impact scenarios were also developed for less-than-optimal conditions (e.g., spill response/containment for response times greater than 2 hours for a spill of large magnitude under less-than-optimal weather conditions or containment scenarios).

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Section 4.3.8.1 and Table 4.5.2 make a simplistic extrapolation that impacts to the marine environment will not differ or will be less due to reduced throughput. There are multiple scenarios, none predictable, when you consider the current

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status of the marine environment, i.e., the TAPS operation does not occur in isolation. Other stressors ranging from global warming, melting glaciers, assemblage shifts, increased tourism, and changing fishery policies may exert a combined nonlinear effect that tips the system in one direction or another. In discussing the BWTF, Section 4.3.13.2.1 counters the "decreasing throughput equals decreasing impact" argument. Specifically, it states, "Efficiency of the biological processing requires a nearly constant supply of oily, relatively warm input water. Disruptions to the flow occur when severe winter storms temporarily shut down tanker loading operations. Such interruptions may increase in the future as oil throughput decreases or ballast water volume is reduced for other reasons (JPO 2000b)." The DEIS assumption of decreasing future impacts from assumed decreased throughput is not adequately supported, and the DEIS should be revised to address the potential for future increasing impacts.

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Page 4.4-21 (footnote 2) notes that evaporation of a spill based on an assumed air temperature of 15 degrees C. The basis for this assumption is not provided and may overestimate the rate of evaporation, particularly during winter months. The DEIS should include alternative scenarios that are more appropriate to Alaskan conditions.

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Section 4.4.1.3.2 discusses catastrophic events but does not discuss the potential for landslide/avalanche/tsunami impacts from a large earthquake on the tank farm or other parts of the Alyeska Marine Terminal facility.

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Section 4.7.6.2 states that the residual oiling of shorelines will be indistinguishable from background. This statement is not adequately supported, as residual oil in the subsurface of beaches is detectable over 12 years after EVOS. The DEIS should be revised to use impact assumptions that more accurately reflect the available information on EVOS impacts (see PWS RCAC Comment Section 3).

113-92

3 Specific concerns

3.1 DEIS Executive Summary

Page ES-2 implies that hazardous air pollutants (HAPs) are no longer a major concern at the Valdez Marine Terminal (VMT) because vapor from tankers and crude oil storage tanks is piped to the vapor recovery and control systems. This statement does not include all available information and is misleading. Significant quantities of benzene, toluene, and other alkyl-substituted benzenes are released from the dissolved air flotation (DAF) tank of the ballast water

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<p>treatment facility (BWTF). Payne et al. (2002) estimated that BTEX emissions might be as high as 580 pounds per day at an average 12 MGD flow rate of treated ballast water. The DEIS should be revised accordingly.</p>	<p>113-93 (Cont.)</p>
<p>The statement on page ES-3 (section 6.1.1.1) that "impacts to the marine environment are expected to be the same as those that occurred historically" seems to imply that another Exxon Valdez type oil spill can be anticipated. PWS RCAC's mission is "Citizens promoting environmentally safe operation of the Alyeska Terminal and associated tankers." Another Exxon Valdez type oil spill cannot be tolerated. Cumulative impacts to the marine environment should include the cumulative effects of the Exxon Valdez oil spill (EVOs).</p>	<p>113-94 113-95</p>
<p>On page ES-4 the risks to human health from inhalation of airborne emissions are significantly understated, and the potential for human exposure to PAH by ingestion of fish and shellfish ignores the potential transport and effects of the BWTF diffuser discharges to Port Valdez as identified by Payne et al (2001, 2002). Also, air quality concerns in Table 2-1 completely ignore benzene and other VOC emissions in Port Valdez due to the Dissolved Air Flootation (DAF) tanks and biological treatment system associated with the BWTF at the Alyeska Marine Terminal. Payne et al. (2002) estimated that approximately 580 pounds per day (or a 105 tons per year) of BTEX compounds are released to the atmosphere in Port Valdez assuming an average 12 MGD flow of treated ballast water. The DEIS should explicitly consider the impacts of these emissions.</p>	<p>113-96</p>
<p>On page ES-4 earthquake-triggered liquefaction and landslides are briefly mentioned, and it is stated that they are expected to increase with the current warming trend in Alaska. In the next sentence the authors of the DEIS contradict themselves and say that these events are very unlikely. Likewise the authors state that melting of permafrost along the ROW could change the number and size of thaw bulbs, but then they add that the number and size of thaw bulbs is expected to remain within the historical range. These contradictions and ambiguities are not in keeping with the NEPA mandate to ensure that environmental impact statements are easily understood by the lay public and other stakeholders. The Executive Summary of the DEIS should clearly state which assumptions were used, and the level of uncertainty associated with those assumptions.</p>	<p>113-97</p>
<p>The most significant impacts identified in the DEIS (ES.6.1.1.3) appear to be financial due to lost revenues from federal income tax and royalties and revenues paid to the state of Alaska. The statement that "no additional environmental justice concerns are anticipated" needs to be expanded and explained in the Executive Summary.</p>	<p>113-98</p>

<p>The effects of residual oil on salmon reproduction (Heintz et al. 1995, 1999; Marty et al. 1997) are not mentioned in the Executive Summary (ES .6.1.2; page ES-5). The DEIS should be revised to include a note that residual oil from shoreline oiling can impact salmon development and reproductive success.</p>	113-99
<p>The inhalation risks for cleanup workers at an oil spill are not mentioned in the Executive Summary (ES .6.1.2; page ES-5). The DEIS should include a discussion of potential human health risks to workers cleaning up spilled oil.</p>	113-100
<p>The statement on page ES-5 that "even if the food was not noticeably contaminated, consumption of the fish, shellfish, marine mammals would not likely cause any adverse human health effects because there would be only a small amount of oil in food" needs to be substantiated. This section does not reference any of the seafood contamination studies completed by NOAA (Varanasi et al. 1993; Field et al. 1999) following the Exxon Valdez oil spill. When evaluating the economic impacts of oil spill the DEIS should consider the loss of revenues to the fishing community caused by fisheries closures to prevent oil-contaminated or tainted fish from reaching the world's markets.</p>	113-101
<p>Section ES 6.2 and 6.3 attempt to persuade public opinion by implying adverse impacts on domestic oil production, national energy security, the balance of trade, overall economic activity, job losses to Alaskan citizens, and reductions in state services. The gross state product was predicted to decline by forty percent if the pipeline is shut down.</p>	113-102
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<p>Under Mitigation Measures (page ES-7) the earthquake protection designed for the aboveground pipeline is discussed, but nothing is mentioned about design considerations or other mitigating factors for underground or buried pipelines. Earthquake impacts to the Valdez Marine Terminal are not considered.</p>	113-104
<p>The Executive Summary of the DEIS does not adequately address impacts with past actions associated with the TAPS. For example, the DEIS implicitly assumes that TAPS has not had long-term impacts on the Alaskan environment, but there is quantitative evaluation of pre-and post TAPS impacts. Also, the Exxon Valdez oil spill only receives minimal consideration, and the citations that are most often quoted are those of Boehm et al. (1998) and other Exxon consultants.</p>	113-105
<p>3.2 DEIS Alternatives Page 2-6. Side stepping the authorization of lines by the BLM to the TAPS owners (Item 4) is not appropriate. The DEIS should justify how giving the BLM such authority would require another NEPA. Whether new rule-making</p>	113-106

<p>regulations are required, the environmental impact of impediments to regulators needs consideration. Without the authority to fine TAPS Owners, the BLM's ability to regulate is significantly diminished.</p>	<p>113-106 (Cont.)</p>
<p>Page 2-6 (item 7) Why would setting up an Escrow Account to cover TAPS Removal and ROW Rehabilitation require a NEPA analysis? And if it does, is that adequate justification for not doing it?</p>	<p>113-107</p>
<p>All estimates throughout the DEIS assume declining oil transportation (p. 2-16). What happens if ANWR comes on line or other fields are developed at greater production levels than currently projected?</p>	<p>113-108</p>
<p>An oblique reference is made to possible but very slight disruption to the movement of terrestrial mammals on page 2-17. That is the only place that this issue appears to refer to the effects of TAPS activities on mammal migration. Is it covered somewhere else? What have been the effects over the last 30 years of TAPS operation?</p>	<p>113-109</p>
<p>The DEIS appears to be trying to "have it both ways" by suggesting that the TAPS might be an historically significant structural complex eligible for listing on the National Register of Historic Places (p. 2-18). If that were the case, then removing it would violate the National Historic Preservation Act. The environmental impact of leaving it in place then needs consideration.</p>	<p>113-110</p>
<p>Loss of state revenues would lead to closure of state recreation areas, sites, and parks (p. 2-19). This assumes that use of these recreation areas requires some sort of supervision for users, an assumption that is not necessarily valid.</p>	<p>113-111</p>
<p>3.3 Valdez Marine Terminal Operations</p>	
<p>Overall the description of the infrastructure for the Alyeska Marine Terminal in Port Valdez (pp 3.1-18 to 3.1-20) is extremely cursory considering the importance of this facility for tanker loading operations and the safety and security of Port Valdez. Additional descriptions of the ballast water treatment facility and NPDES requirements would be useful for independent evaluation of the DEIS (see for example, Payne et al. 2002).</p>	<p>113-112</p>
<p>Section 3.10 on Marine Water Chemistry deals primarily with pH, alkalinity, carbon dioxide, dissolved oxygen, and nutrient levels in Port Valdez. Most of the studies cited were completed in the mid-1970s and 1980 (Hood et al. 1973; Colonell 1980). The study of both current literature and historical literature is needed to assess impacts over time. Current literature is needed to describe the present state of the water in Port Valdez and Prince William Sound.</p>	<p>113-113</p>

3.4 Normal Operations and Off Normal Operations

A considerable portion of the DEIS assumes that TAPS operates normally in accord with its design basis assumptions. The operational difficulties now occurring in the gravity separation processes at the Ballast Water Treatment Facility indicate that this facility has not been operated in full accord with its design for the previous 2 years. Maintenance of fire protection assets has been deferred to the extent that questions have been raised as to whether some of these assets will work as expected.

Off-normal operations needs consideration in the DEIS.

For example, during July 2002 the staff of PWS RCAC became aware of an ongoing problem in the operation of the Ballast Water Treatment Facility. The first stage of the treatment process is designed such that oil floats to the top of the water in the gravity separation tanks and is skimmed to the recovered crude tanks. In recent years, large accumulations of paraffin-like solids have interfered with operation of the skimmers and have resulted in considerably greater accumulation of oil being retained in the 90s tanks than that allowed by the design. Increased risks of fire and pollutant discharge are being evaluated by Alyeska. JPO has recently requested an action plan for correcting the problem.

113-114

Additionally, Alyeska has taken one of the three 90s Tanks out of service to inspect for, repair, and prevent corrosion damage. Consequently, the gravity separation process is operating at less than 50% of design. The risk of environmental impact from fire is greatly increased because the fire protection assets in place for the tank have not been designed for the greatly increased fuel loading now present in the tanks. Because more oil is likely entering the secondary stage of processing, the risk of increased pollutant discharge may also have increased. However, measurements regarding this risk appear not to have been taken. How does the DEIS address issues of off-normal operation?

The 1994 Eastern Lion oil spill (Jones 1994; KLI 1994) and 1997 BWTF overflow (Jones 1997; KLI 1997) were significant environmental events within Port Valdez. These were not mentioned in assessing cumulative impacts. The DEIS should address the impact of these and other significant spills as part of its consideration of off-normal operations.

113-115

3.5 Air quality

No mention is made of the BTEX emissions from the dissolved air flotation tank at the Alyeska Marine Terminal (Section 3.13). It is stated that the Title V permitting, which was established by the Clean Air Act Amendments of 1990, imposes some limitations of the Prevention of Significant Deterioration (PSD) regulations, however, these are not clearly specified in the DEIS. The dissolved air flotation tanks and biological treatment tanks are listed in Table 3.13-2

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(stationary emission sources installed at Valdez Marine Terminal), however, the rating capacity or product throughput for each unit is listed and not the actual atmospheric emissions. The DEIS should be revised accordingly.

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(Cont.)

Section 3.13.1.1 Criteria Pollutants indicates that the Valdez Marine Terminal is one of the largest emission sources for criteria pollutants (nitrogen oxides, VOCs, particulate matter with diameters of 10 micrometer or less (PM₁₀), sulfur dioxide, and carbon monoxide). The Valdez Marine Terminal contributes 90 percent or more of each criteria pollutant and VOCs to the total emissions in the Valdez area. This is really reflected in Table 3.13-4 on page 3.13-7. The Valdez Marine Terminal also has the largest vehicle-related emissions, with annual emission rates of 0.4, 4.8, 25.9, 0.7, and 2.4 tons per year of sulfur oxides, nitrous oxides, carbon monoxide, PM₁₀, and VOCs, respectively. It should be noted, however, that except for carbon monoxide, these emissions are small compared to the stationary sources at the Terminal.

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Section 3.13.1.2 Hazardous Air Pollutants states that in addition to the criteria pollutants, TAPS facilities also emit hazardous air pollutants (HAPs), ozone depleting substances, and greenhouse gases. Table 3.13-6 lists the potential annual emission rates of various HAPs from TAPS facilities. The largest HAPs emitter among all the TAPS facilities is the Valdez Marine Terminal. In the early periods of operation, over 42.8 tons per year of benzene was emitted from the facility with another 68 to 70 tons per year of toluene, ethylbenzene, xylene, and hexane. The cited total of 105 tons per year of BTEX in Table 3.13-6 is remarkably close to the same estimate derived by Payne et al. 2002 coming from the dissolved flotation tanks alone. Because the DEIS estimates are supposed to include other sources as well, it is highly probable that the total BTEX emissions cited in Table 3.13-6 are actually low. Ascertaining the real numbers is required to cite the real impact.

113-118

Table 3.13-8 lists ambient air quality standards, Alaskan air quality standards, and maximum allowable increments for prevention of significant deterioration for the criteria pollutants, but no limits on the HAPs are presented. Monitoring data for the Valdez Marine Terminal are presented in Table 3.13-9, and the data are compared to background concentrations in the North Slope area and Beluga Point in Cook Inlet. The DEIS states that all monitored ambient concentration data are in compliance with applicable air quality standards. This is a good example of regulatory compliance (there is no regulation) and adverse impact. However, these data are for the criteria pollutants (not a serious issue) and are not for the HAPs (which exceed EPA's major source threshold by at least a factor of 5). The DEIS should address the environmental impact of the HAPs and reconcile impact with EPA's definition of major source.

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Section 3.13.2.2 contains several paragraphs on Hazardous Air Pollutants. It cites an Alyeska-sponsored monitoring program from November 1990 through October 1991 at four stations in the Valdez area (Goldstein et al. 1992). At the time of that study the crude oil throughput was 1.8 million barrels per day. The highest concentrations of BTEX were at the east gate station near the eastern boundary of the Valdez Marine Terminal. This is not surprising since the Valdez Marine Terminal is the major emission source of these HAPs. Table 3.13-11 presents the ambient concentrations of the air pollutants measured in that program. Maximum benzene concentrations at the east gate were 1248 ug/cubic meter; with concentrations falling to 360 at old Valdez, 136 at the high school, and increasing again to 319 at the spit. It is stated in the text that these measurements were completed before the installation of the Tanker Vapor Recovery System at the Valdez Marine Terminal, and therefore, the concentrations anticipated today should be much less. The estimates for total BTEX emissions from all sources in the DEIS are around 105 tons per year, and this is the same value calculated for emissions from the Dissolved Air Flotation Tanks alone by Payne et al. (2002). Thus, it is unlikely that the BTEX concentrations around the terminal and in the city of Valdez have decreased as significantly as claimed in the DEIS. Given the carcinogenic nature of benzene, another monitoring program appears warranted at this time, and data from more than four stations should be collected. The reliability of the DEIS conclusions regarding air quality are questionable because little new data have been obtained.

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The health effects of these emissions are not assessed in this section. On page 3.13-18 it is stated that neither the EPA nor the state of Alaska has established standards for HAPs. The EPA guideline levels for these HAPs under the Clean Air Act and potential health effects are discussed elsewhere in section 3.17.2.4 (again forcing the reader to go to another section to complete the evaluation of a single topic). Our concerns with Section 3.17.2.4 are presented below. Again the DEIS should recognize that regulatory compliance is not necessarily equivalent to no adverse environmental impact.

113-121

In Section 3.17.2.4 (Hazardous Air Pollutants in Ambient Air and Potential Health Hazardous), the DEIS states that the annual operational emissions of VOCs from the Valdez Marine Terminal are four times higher than emissions from other areas along the TAPS. The DEIS then refers to the Valdez Air Health Study (Goldstein et al. 1992). In that study the estimated proportion of VOCs in ambient air attributable to the Valdez Marine Terminal was estimated by the release of a tracer gas from the Valdez Marine Terminal. Using that tracer, the study estimated that only ten percent of the VOCs exposures in Valdez were attributed to the Valdez Marine Terminal emissions. It is not stated whether the tracer study was conducted over one day, one week, one month, or many

113-122

months. It states that the tracer results are in line with prevailing winds (50 to 60 percent of the time) and that indoor air in general has higher VOC concentrations (from heating fuel, solvents, cigarette smoke, etc.) than outdoor air. Those other sources are not going to be responsible for releasing 105 tons of BTEX per year, and they wouldn't show the spatial trends observed in the outdoor monitoring program. The literature cited in the DEIS is not consistent with the purported impacts.

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(Cont.)

In the last paragraph of section 3.17.2.4, the DEIS states that "since the Valdez Marine Terminal only contributes about 10 percent to the outdoor residential area VOC concentrations, and since VOC emissions from the Valdez Marine Terminal have decreased substantially since the time of the study, is concluded that current TAPS associated emissions are not likely to lead to adverse human health impacts." This conclusion is flawed for two reasons: (1) the tracer studies cannot be used to definitively state that only 10 percent of the outdoor BTEX concentrations measured in Valdez comes from the Valdez Marine Terminal, and (2) no measurements have been made that demonstrate the VOC emissions from the terminal have decreased over the last ten years to a level without environmental impact. The presumption of substantially decreasing emissions is predicated on the un-verified assumption that the emissions from tanker loading operations without the vapor controls was the only significant source, and the fact that a vapor recovery system installed in 1998 totally eliminated this source. The validity of this assumption needs to be verified in the DEIS.

113-123

The BTEX emission estimates in the DEIS do not include emissions from the ballast water treatment facility. Payne et al. (2002) have independently estimated that BTEX emissions from the Dissolved Air Flotation Tanks alone are 105 tons per year. The text on page 3.17-10 the DEIS states "the ambient benzene levels at residential locations was lower, within the 10^{-6} to 10^{-4} (1 in one million to 1 in 10,000) increased cancer risk range level used by the EPA as an indicator of acceptable risks (EPA 1990)." A 1 in 10,000 increased cancer risk as stated in the DEIS and shown in Table 3.17-4 is not likely to be acceptable to the citizens in Valdez. Furthermore, if the emissions are substantially higher than the quantities derived from Goldstein et al. (1992), the risk could be much higher. Worker exposure at the Valdez Marine Terminal appears to not have been addressed at all. Note that the Goldstein et al. (1992) report, commonly referred to as the "Valdez Air Health Study", was controversial in its day, and it still is today. It should not be used exclusively in the DEIS to assess environmental impacts from emission of hazardous air pollutants at the Valdez Marine Terminal.

113-124

There is considerable discussion of persistent organic pollutants (POPs) and "persistent, bioaccumulative, and toxic" (PBT) chemicals in arctic marine mammals and fish, and their potential accumulation in body burdens of Alaskan Natives living along the North Slope and elsewhere in Alaska. Most of the data are for PCBs, which are believed to have accumulated from the diet of the Natives in various populations in Alaska and western Canada. There are no data, however, for Alaskan or Canadian body burdens of PAHs, although the most well studied PAH (benzo(a)pyrene) has been identified as a PBT. PAHs are components of crude oil, and as reported in the DEIS, their main adverse health effect is cancer.

Section 3.17.2.2 discusses cancer rates among Alaskan Natives. The overall age-adjusted cancer incidence rate for 1993-1997 was slightly higher among Alaskan Natives than the U.S. White population. Lung cancer rates were twice those of Whites; however this increase is attributed to increased rates of cigarette smoking. The rate of stomach cancer in Alaska Natives was three times higher than the rates in Whites. Rates of digestive system cancer's overall were about twice those in Whites. Digestive system cancers may be a particular concern because they are associated with PAH exposures. PAHs are present in crude and refined products, but exposures to cigarette smoke and smoked food products are also common. If PAH levels in shellfish collected for subsistence are elevated to begin with because of residues from the EVOS or other oil spills or effluent from the BWTF, then the Native Alaskans could be at even higher risk because of increased exposures. None of these issues are addressed in this section or anywhere else in the DEIS.

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The inset in section 4.3.9 (page 4.3-15) states that hazardous air pollutant emissions from TAPS are estimated to contribute little to the ambient contaminations in residential areas. As stated above, this statement is not exactly true for the city of Valdez. Elevated levels of BTEX were detected during the monitoring study, and the Valdez Marine Terminal is the largest generator of HAPs in the area. Within the city of Valdez the contribution of HAPs from the terminal was estimated to only be 10 percent, however that was based on tracer studies reported in an Alyeska-sponsored study (Goldstein 1992) that was not widely available for independent evaluation during the 45 day review period.

113-126

One of the more disturbing elements of the DEIS is the fact that the reader is constantly redirected to other sections to find critical information on a given issue. An example of this is on page 4.3-15, section 4.3.9 Air Quality, where the reader is directed to section 4.4.4.6 to get additional information on air quality impacts from accidental releases or spills of crude oil and petroleum products. The DEIS should be reorganized so that all information related to a given subject area is presented in one place.

113-127

In the middle of section 4.3.9.2.1 Hazardous Air Pollutants (page 4.3-18) a reference is made to Table 3.13-11 (in another section), which contains data on ambient concentrations of six HAPs collected at four monitoring sites in the Valdez area between November 1990 and October 1991. This study was completed when the TAPS average crude oil throughput was 1.8 million barrels per day and before the installation a vapor control recovery system for Berths 4 and 5. The DEIS then estimated that recovery of VOCs by the tanker vapor recovery system would result in elimination of 27,600 tons per year of VOCs containing HAPs, a value that is eight times the current estimate of potential VOCs emissions from the Valdez Marine Terminal. How can the DEIS claim credit for removal of more than is generated based on calculated efficiency alone? Furthermore, the tanker VOCs recovery system may remove a significant fraction of the VOCs from loading operations, but it does not address the issue of the BTEX released by the DAF units, an issue that is completely ignored in the DEIS.

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In the footnote on page 4.3-18, hazardous liquids are defined to include petroleum, petroleum products, or anhydrous ammonia. In other parts of the DEIS, petroleum (specifically crude oil) is not considered to be hazardous. This inconsistency should be resolved.

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On page 4.3-21 (section 4.3.11.4 Road) the DEIS states that Alyeska personnel drive over 11 million miles per year, and yet there is no air quality impact. What about wear and tear on highways? How does this level of surface transportation compare to the next largest industry in the state?

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Section 4.3.13.2.2 Hazardous Air Pollutants in Ambient Air and Potential Health Hazards (on page 4.3-39) discusses risk calculations based on the Valdez Air Health Study (Goldstein et al. 1992) but scaled to represent the varying throughput levels assumed for the duration of the thirty-year TAPS renewal project. We submit that the estimated BTEX concentrations from this analysis are low because the scaling did not take into account the BTEX emissions from the DAF units as described above. The risk analysis uses the data from Goldstein's 1992 study, and this section of the DEIS actually goes into more detail to partially describe that study. A key component of all of these analyses is the assertion that the tracer study completed as part of the Valdez Air Health Study allowed Goldstein et al. to estimate that Valdez Marine Terminal emissions only contributed up to about 10 percent of the residential area BTEX levels. The DEIS did not, however, describe the conditions under which the tracer study was completed or the study duration. This information must be presented in the final EIS to support the DEIS conclusion that no non-cancer adverse health impacts would be expected in the general public from inhalation of TAPS-associated

113-132

emissions during the renewal period. In addition, the DEIS concluded that the fence-line ambient levels and potential cancer risks were less than the EPA's level of concern of 1×10^{-4} (1 in 10,000) and that this should be protective of the general population because no one lives at the fence-line. The DEIS gave no consideration, however, to the employees working around the BWTF or in the control room near the DAF units (they are covered by OSHA and their health and safety are considered to be outside the scope of the DEIS). Finally, the DEIS concludes that because two of the four tanker berths at the Valdez Marine Terminal now have vapor control systems, which decrease the VOCs emissions by a factor of more than 10, that cancer risks would be expected to be even lower than those estimated from the 1991 Valdez Air Health Study. The DEIS still needs to address the fact that although the VOC emissions from the tanker loading operations may have been cut by a factor of 10, emissions from the DAF units and the biological treatment tanks in the BWTF are still high, contributing an estimated 580 pounds of BTEX per day (105 tons per year) to the atmosphere in the Valdez area.

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(Cont.)

On page 4.4-70 in section 4.4.4.6.2 Estimation of Emissions, the DEIS considers emission rates from crude oil spilled onto running waters. The HAPs emission rates from oil on flowing water are probably significantly underestimated if they were predicted from a rectangular slab of unspecified thickness. Oil actually spreads out onto very thin sheens in the central channels of most rivers and streams, and re-aggregates in rips and pools formed in eddies behind rocks and other obstructions. From oiled stream studies conducted in Alaska, it has been shown that evaporation is significantly enhanced for extremely thin (silver sheen) slicks, with all components below n-C 15 (including all HAPs plus several alkyl-substituted naphthalenes) released into the air within minutes (Clayton et al. 1985). This is probably not so much a factor in marine oil spills where the differential velocity of the water and oil layers is not as large. The estimates of HAPs emissions from the flowing water scenarios should be significantly increased to reflect these findings.

113-133

On page 4.4-71 (in section 4.4.4.6.3 Dispersion Modeling) the DEIS states that emissions of VOCs from crude oil spills, including HAPs, are known to be negligible for approximately 24 hours after a spill occurs. That statement is absolutely wrong. The evaporation rates are at their highest immediately after a spill occurs (Payne et al. 1984), and that is when the air quality impacts are at their highest. Inaccurate statements such as this detract from the credibility of the entire DEIS.

113-134

3.8 Water quality

Page 2-13 discusses inputs to the BWTF, but it is unclear if the BWTF would be able to handle the surfactants (and seawater) used to flush the pipeline during cleanout and decommissioning. This should be addressed in the DEIS.

113-135

There are currently 4 operating oil-loading berths at the Valdez Marine Terminal (page 3.1-18). Berths 4 and 5 have vapor-control systems and are the primary loading berths. Berths 1 and 3 are not vapor controlled but remain available for use. Berth 1 is inoperable because critical parts have been removed from it. Use of Berth 3 is limited by the provisions of the marine Vessel Loading Rule to a maximum of approximately 15,000,000 barrels of crude per year. Future use of Berths 1 and 3 is under study by Alyeska. The DEIS further states that ballast waters from incoming tankers are pumped to the BWTF for treatment before discharge to Port Valdez in accordance with federal and state permits, but no additional details are provided. It also claimed that vapor from tankers and crude storage tanks are pumped to the vapor recovery system. This may be true; however, there is no vapor recovery system for the Dissolved Air Flotation Tanks (DAF) used to treat the estimated 12 MGD of ballast water discharged to Port Valdez each day.

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113-137

Figure 3.1-4 (on page 3.1-19) fails to show the dissolved air flotation tanks for the ballast water treatment facility. The BWTF is identified, however, the component parts are not delineated. Unless considered in more depth later, this lack of detail would explain the absence of any information on atmospheric pollutant discharges associated with the BWTF. The location of the ballast water treatment facility diffuser is not indicated on the figure. In the description accompanying the figure (page 3.1-19), no mention is made of target or actual effluent limitations for the treated ballast water released from the BWTF.

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On page 3.7-11 in Section 3.7.2.5 (Surface Water Quality Along the ROW) the DEIS states that there are no data to compare water quality in the streams along the ROW with pre-pipeline conditions. Nevertheless, the DEIS states that operations have not significantly affected stream or river flows, and that existing surface water quality conditions along the ROW are expected to be similar to pre-pipeline conditions. The statements are based on ADFC measurements, observations by three watershed councils, and general compliance with NPDES permits.

113-140

On page 3.9-1 (Section 3.9 Physical Marine Environment) the DEIS describes the physical environment within Port Valdez, and briefly touches on parts of Prince William Sound through Hinchinbrook Entrance. Discussions of hydrography and circulation within Port Valdez are based on studies by Colwell (1980); however, recent reviews by Payne et al. (2001 and 2002) suggest that the

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residence time for waters within Port Valdez are considerably longer than the few weeks estimated by Colonell. Impacts from BWTF effluent to the Port, as considered in detail by Payne et al. (2001, 2002), should be considered in the DEIS.

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(Cont.)

Section 3.11.1 (Discharges from the Valdez Marine Terminal) states that the Ballast Water Treatment Facility (BWTF) and sanitary water treatment plant for the Valdez Marine Terminal are in compliance with NPDES permits that regulate discharges from the terminal to marine waters. Potential impacts of certain chemical components in the discharges (especially polynuclear aromatic hydrocarbons (PAH) associated with the BWTF) to biological resources in marine waters are not explicitly covered in the DEIS, but they were the subject of a recent review by Payne et al. (2001). In addition, components of the BWTF operations and the associated NPDES discharge monitoring program were the subject of a second review by Payne et al. (2002). The findings from both of these reviews (which determined that between 0.8 and 1.6 barrels per day of ANS crude oil are being discharged as finely dispersed oil droplets into Port Valdez) should be considered in preparing Section 3.11.1 of the final FIS. In addition, the final FIS should complete an assessment of the potential for additional future adjustment(s) to the NPDES permit for Valdez Marine Terminal discharges to the port.

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Section 3.11.3 – Hydrocarbons, states that hydrocarbons present in the waters of Port Valdez and Prince William Sound come from a number of sources including natural background from oil seeps, oily shales, and coal; historic TAPS operations and related activities; past anthropogenic sources such as spills and industrial operations; the Exxon Valdez oil spill in 1989; ongoing TAPS operations and related activities; and ongoing anthropogenic activities not related to TAPS, such as boating, fishing and atmospheric fallout. One of the largest sources of atmospheric hydrocarbons, which can be reintroduced to the marine environment through precipitation is from the dissolved air flotation tanks of the BWTF, and yet, they received almost no coverage in the DEIS.

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On page 3.11-4 (still in Section 3.11.3 - Hydrocarbons) the DEIS states that hydrocarbons measured in the water column of Port Valdez between 1976 and 1978 (before Valdez Marine Terminal operations) included pristane, heptadecane, other alkane chains, and squalene. All these components are derived from biogenic origins. After the operations began at the Alyeska Marine Terminal water samples from the area near the diffuser showed additional hydrocarbons including xylenes, alkyl benzenes, naphthalenes, and phytane (Colonell 1980). These compounds are exclusively associated with anthropogenic petroleum hydrocarbon sources. More recent water column data

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from the port are reported in Salazar et al. (2002) and Payne et al. (2001, 2002), and the DEIS should include the data from those programs to document the changes that have occurred to the port over the last 23 years.

In calendar year 2000, 705,399 gallons of treated waste water was discharged to Port Valdez from the sanitary waste treatment plant at the Valdez Marine Terminal under the NPDES permit issued jointly by the EPA and ADEC. On page 3.16-3 the DEIS states that the largest volume of wastewater generated (93 percent) is from the tanker ballast water treated by the BWTF at the Valdez Marine Terminal. In calendar year 2000, average daily effluent flows from the BWTF were 10.37 million gallons per day, and the total amount of treated water discharged was 3,785,050,000 gallons. At the NPDES approved and average measured total oil and grease content in the BWTF effluent (Payne et al. 2002), this volume resulted in over 9,270 gallons (221 barrels) of weathered Alaskan North Slope crude oil being discharged to Port Valdez over that time period. That fact, however, is not mentioned anywhere in the DEIS. This NPDES permit is currently being re-issued, and Payne et al. (2002) completed a detailed review of the permit application and BWTF discharges to Port Valdez. Also, Payne et al. (2001) evaluated over eight years of PWS RCAC I.TEMP data from Port Valdez and other PWS RCAC programs to assess the overall toxicological impacts of the BWTF effluent discharges to the Port, but neither of these critical reviews were included in evaluating the data for or preparing the DEIS.

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Section 4.1.2.7 Ballasts Water Treatment at the Valdez Marine Terminal indicates that when originally constructed in 1976, the BWTF used three 18 million gallon steel primary gravity-separator tanks and six 240,000 gallon secondary dissolved-air-flotation cells to remove oil before discharging the saline tanker ballast water to Port Valdez. The waste discharge limitations imposed on the BWTF in the NPDES permit were later revised to include a limit on BTEX. As a result, two aerated impound lagoons were replaced in 1990 by a permanent biological treatment facility consisting of two 5,500,000 gallon concrete aeration tanks equipped with a submerged-jet aeration and mixing system. To provide additional reliability and polishing, air strippers were installed downstream of the aeration tanks to remove occasional spikes of BTEX in the event of a biological upset. These systems are described fully in Payne et al. 2002.

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Page 4.1-14 states that additional discussions regarding wastewaters delivered to the BWTF and the character of the discharges from BWTF to the sound are provided in section 3.16. As noted earlier, separating these sections discourages the reader from actually finding out what happens in the treatment of waters processed through the system. This document is so large and unwieldy that referring to other sections to complete a thought or description generally discourages the reader from tracking down and finding out what really occurs.

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This is particularly true when working from the compact disk, where different sections are contained in different files. In this instance, neither section discusses the volatile emissions of BTEX associated with the dissolved air flotation units or the biological treatment system. As previously discussed in this review, these operations currently are estimated to release over 580 pounds of BTEX to the atmosphere at Port Valdez per day (Payne et al. 2002).

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There is a small inset on page 4.1-13 describing the BTEX fraction as polar organic compounds routinely present in crude oil as well as refined petroleum products. There is no mention of the carcinogenicity of benzene and the toxicity or brain damaging effects from several of the other compounds. The inset incorrectly states that BTEX fraction can often be used to identify the chemical "fingerprint" of crude oil or refined petroleum products, but it does correctly state that they have the greatest mobility in the environment. These compounds are so mobile and volatile that they do not persist in spilled crude oil or petroleum products (to assist with "fingerprinting" as alluded), and they are instead significant contaminants of concern with regard to air pollution and worker exposure. None of these considerations are addressed in the inset.

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Sections 4.2.4.1, 4.6.2.8.1, and 4.6.2.12.2 suggest that the final breakdown of the pipeline (as part of the no action alternative) will involve cleansing and scrubbing with "... a mixture of seawater and cleaning solution (e.g., alkaline solutions with chemicals such as trisodium phosphate or nonaqueous surfactant)" This mixture would also be received and treated at the Valdez Marine Terminal BWTF before ultimate discharge to Prince William Sound pursuant to NPDES permit requirements. The NPDES permit does not adequately address the functioning of the BWTF as a receptor and discharge for these materials. Therefore, the DEIS should address how the biological digester would be maintained with the input of alkaline rinse solutions.

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Page 4.3-12. The first paragraph of section 4.3.8.1 should include treated ballast water as a category of discharges from the Valdez Marine Terminal.

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In the inset on page 4.3-12 it says that Valdez Marine Terminal releases resulting from normal operations under the proposed action would not be expected to be different from historical impacts and could decrease with decreasing throughput. The DEIS should acknowledge that existing discharges contribute 0.8-1.6 barrels of dispersed Alaska North slope crude oil per day to the Port, and that hydrocarbons associated with these discharges have been detected in mussels and sediments analyzed as part of PWS RCAC LTEMP (Payne et al. 2001, 2002).

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<p>Page 4.3-13 of the DEIS includes the treated ballast water as part of the discharges, and notes that it makes up 93 percent of the discharge to the Port. The range of volume is expected between 10 million gallons per day to a low of 3.5 million gallons per day over the next ten years of operations, with the lower volume then expected to hold steady after that. The DEIS states that the discharges are within NPDES permit limitations, but the amount of contamination introduced into the water support Valdez is not specified.</p>	<p>113-152</p>
<p>Figure 4.3-2 on page 4.3-14 compares oil throughput and treated ballast water discharges in a graphical manner that shows a relationship between these values. All future impacts are predicated on a continued decline in oil throughput from the TAPS. Nowhere in the DEIS, however, is there a discussion of what discharges might look like if throughput rises because of production at new fields or if production starts at ANWR. The DEIS should also consider these potential alternatives.</p>	<p>113-153</p>
<p>Section 4.3.8.3 (page 4.3-15) states that hydrocarbon discharges are discussed in section 4.3.8.1, but the discussions are without substance. There is no mention of hydrocarbon concentrations or total hydrocarbon loadings to the port in that section. If the DEIS redirects the reader to a different section to find specific information, the information should be present at the location cited.</p>	<p>113-154</p>
<p>Section 4.3.8.4 (page 4.3-16) alludes to "small hydrocarbon emissions addressed above", and yet there is no discussion of hydrocarbon emissions in the preceding sections. There is a brief discussion of sediment studies around the terminal, however the DEIS does not address the fact that those sediment studies did not use appropriate analytical methods to accurately detect most of the specific alkylated PAH components that are associated with Alaska North Slope crude oil (Payne et al. 2002).</p>	<p>113-155</p>
<p></p>	<p>113-156</p>
<p>Section 4.3.13.2.1 Ballasts Water Treatment Facility Effluent (page 4.3-38) states that low concentrations of polycyclic aromatic hydrocarbons (PAHs) are present in untreated ballast water but have rarely been found above detection limits in the treated effluent. The analytical methods used were antiquated. More recent tests completed by Salazar et al. (2002) and Payne et al. (2001; 2002) have shown 36 ppb concentrations of PAH in the treated effluent. This is equivalent to 0.75 barrels of oil per day being introduced to Port Valdez at the current oil throughput of approximately one million barrels per day. This (or greater) concentration of NPDES-permitted hydrocarbon input has been going on day after day, week after week, month after month, and year after year for the last 25 years. Measured PAH concentrations in the mussels around the port suggest that the mixing zone is actually Port Valdez itself. It is true that BTEX in the effluent has been drastically reduced, but most of the reduction has been because</p>	<p>113-157</p>

the BTEX is released to the atmosphere by the dissolved air flotation tanks and the biological treatment system. Payne et al. (2002) estimated that 580 pounds of BTEX per day (or 105 tons per year) are introduced to the atmosphere at the Valdez Marine Terminal from the dissolved air flotation units associated with the BWTF alone. All of these findings should be addressed in the DEIS. Also, the biological treatment tank component of the ballast water treatment facility is going to be more difficult to maintain as oil throughput and concomitant ballast water volumes (also influenced by double hulled tankers) decrease as predicted throughout the DEIS. Nothing is mentioned in the DEIS as to how those problems will be addressed in the future.

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On page 4.3-63 (Section 4.3.18.1 Impacts to Spectacled and Steller's Eiders) the DEIS states that water quality impacts from the Valdez Marine Terminal effluent discharge to Port Valdez have not resulted in water quality degradation during the past 25 years of operations, and no such degradation is anticipated during the renewal period, when discharges will be substantially reduced. As mentioned above, potential water quality degradation has only recently been recognized in Port Valdez, and BWTF-sourced PAH contamination of mussels along the shorelines has now been documented; see Payne et al. (2002) for a discussion of the effectiveness of the NPDES process and associated Alyeska monitoring programs. This concern also applies to the water-quality discussions in Sections 4.3.18.2 and 4.3.18.3 on pages 4.3-63 and 4.3-64. None of the Prince William Sound RCAC studies were reviewed or cited in assessing the impacts from the BWTF discharges to Port Valdez, so it is not accurate for the DEIS to state that there have been no measurable impacts on any species. The DEIS should present a more comprehensive evaluation of water quality impacts, including citing publicly available reports sponsored by the RCAC.

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Page 4.4-107 does not provide a balanced assessment of impacts to salmon following EVO5. Only Exxon sponsored studies are cited, and genetic, pathological, and growth impacts on salmon and other resources from exposure to Alaska North slope crude oil are not cited (e.g., Carls et al. 1996; Carls et al. 1999; Heintz et al. 1995; Heintz et al. 1999; Marty et al. 1997; Murphy et al. 1999; Rice et al. 2001; Roy et al. 1999). The DEIS should be revised to present a balanced evaluation of impacts to fishery resources of PWS from a catastrophic release of oil from tankers and land-based facilities.

113-161

Page 4.7-93 states the EVO5 "probably had some impacts on fish." This statement does not accurately reflect the current science on the EVO5, which clearly indicates substantial impacts on herring and salmon in PWS occurred following the spill. See the literature cited below for scientific articles that document the adverse effects of Alaska North slope crude oil on fish.

113-162

3.7 Sediment Quality

Page 3.11-4 discusses background sources of hydrocarbons (coal, oil shale, soot, natural seeps, etc.) in Prince William Sound and (to a lesser extent) Port Valdez sediments, but it does not adequately discuss the significant elevation of hydrocarbons, including toxic polynuclear aromatic hydrocarbons (PAHs) that are released and contaminate intertidal and subtidal zones in a large-scale spill. This section also does not adequately convey that natural background PAH derived from coal, shale, soot, and other solid matrices presents a very low bioavailability form of PAHs. This is important because the text suggests that there is wide spread PAH contamination in PWS that discounts the elevation of bioavailable and toxic PAH contamination caused by a large scale spill such as EVCOS. Additionally, oil spills may cause persistent PAH contamination in ecologically sensitive areas because of trapped subsurface oil (Short et al. 2002).

On page 3.11-5 of the DEIS, sediment hydrocarbon data are reported from Port Valdez studies completed by Feder and Shaw (2000) as part of the Alyeska Environmental Monitoring Program (AEMP). It is specifically noted in the DEIS that the levels are below various sediment quality guidelines, and total aromatic hydrocarbon concentrations in the shallow sediments near the BWTF diffuser ranged from 20-50 ng/g. Values in deeper sediments ranged from 15 ng/g near the diffuser to 30 ng/g in the far field. The two-fold increase in values away from the diffuser was interpreted as possibly suggesting hydrocarbon sources in Port Valdez other than the Alyeska Marine Terminal; however, a complete set of PAH analytes (including most of the alkylated PAH homologues associated with ANS crude oil) was not analyzed by the FID GC techniques used in the Feder and Shaw (2000, and earlier) studies, so definitive source identifications were not possible. Sediment samples at the Alyeska Marine Terminal and at Gold Creek (6 km across the port) have also been analyzed as part of the PWS RCAC ITEMP (see Payne et al. (2001) for a synthesis of 8 years of data). In general, significantly higher (200-800 ng/g) total PAH concentrations were measured in the Alyeska Marine Terminal sediments by selected ion monitoring (SIM) GC/MS, which specifically identifies alkylated-PAH homologues from a larger target analyte list that allows more accurate source identification. In those samples, the majority of the hydrocarbons detected could be attributed to input from Alyeska Marine Terminal operations, with lesser contributions from biogenic sources. By way of comparison, the Gold Creek sediments ranged from 40-111 ng/g, and a mixture of sources including biogenic, background anthropogenic, and AMT discharges could be identified. None of the PWS RCAC ITEMP studies (KJJ 2000, and references therein, Payne et al. 1998, 2001, and 2002) were evaluated as part of the DEIS. As such, the final EIS should re-evaluate the results of the sediment hydrocarbon measurements available for Port Valdez and attempt to reconcile

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the differences in the measurements completed by Feder and Shaw and the PWS RCAC LTEMP to more accurately quantify the sediment impacts associated with past Alyeska Marine Terminal operations.

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Page 3.11-9 indicates that 1998 sediment levels of PAHs in Prince William Sound from the Exxon Valdez oil spill were below "low effect levels," and cites a toxicity level of 4 mg/kg total PAHs. Consensus based median effect concentrations are 1.8 mg/kg for sediments with approximately 1% organic carbon (Swartz 1999). It is unclear how a "low effect" level of 4 mg/kg can be justified in the DEIS when a median probability of adverse effects occurs at a lower level. This section of the DEIS also ignores substantial quantities of buried intertidal oil that may cause PAH exposure to intertidal and shallow subtidal organisms. The DEIS should present a more accurate view of current conditions, and the potential for exposure and toxicity from large scale oil spills such as EVO5.

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Section 3.18.3 on Prince William Sound contains a page and a half description of the islands and mainland of Prince William Sound. Most of the discussion centers on vegetation type and no consideration is given to intertidal and subtidal sediments or the infauna and epifauna of the region. Review of Section 3.19 (Fish, Reptiles, and Amphibians) revealed that intertidal organisms, and in particular, sediment infauna and epifauna are completely ignored in that section as well. Intertidal and subtidal sediments and infauna/epifauna are not considered in any detail anywhere in the DEIS. In that the intertidal regime is usually impacted to the greatest degree in the event of a marine oil spill, much more attention should be devoted to this regime in the DEIS.

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On page 4.3-51 (Section 4.3.16.1 Impacts of Alteration and Loss of Habitat) the DEIS states that discharges from the BWTF are below NPDES limits and that PAH levels in the deeper sediments near the terminal in 1999 did not exceed sediment quality guidelines (Feder and Shaw 2000). As noted above, this conclusion ignores several PWS RCAC studies showing accumulation of BWTF-sourced PAH in sediments adjacent to the terminal and in mussels at both the Valdez Marine Terminal and across the port at a control station located at Gold Creek (KLI 2000 and references therein; and Payne et al. 2001, 2002). In addition, the analytical methods utilized in the sediment studies of Feder and Shaw (2000) were not sufficiently sensitive to detect many of the alkylated PAHs associated with Alaska North Slope crude oil. As a result, the DEIS should not simply conclude that BWTF effluent is unlikely to impair sediment quality.

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3.8 Human Health and Safety

Page 2-14 indicates that the analyses used to estimate carcinogenic risk through consumption of fish or shellfish were based on antiquated analytical methods and ignored the majority of petroleum-related PAH components present in BWTF effluent (Payne et al. 2002).

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Footnote "b" to Table 3.13-11 on page 3.13-20 requires clarification. It states that one-hour, eight-hour, and 24-hour concentrations are the highest values. It then goes on to state that eight-hour and 24-hour concentrations are running averages. The DEIS should clarify how exposure concentrations were derived.

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Table 3.14-1 lists the 2001 population of the Zook subdivision of Valdez as 89. The DEIS should clarify why the entire population of Valdez wasn't used instead of a subdivision.

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The inset on page 4.3-35 (Section 4.3.13 Human Health and Safety) states that effluent from the ballast water treatment facility has not been shown to present an elevated carcinogenic risk through the consumption of fish or shellfish from Port Valdez. Then again in Section 4.3.13.2.1 – Ballast Water Treatment Facility Effluent (page 4.3-38), the DEIS concluded that human carcinogenic risk from consumption of fish and shellfish does not exceed 1 in 100,000, and that it does not exceed thresholds for mutagenic or teratogenic risks. The cancer risk threshold for residential exposures should more appropriately be 1 in one million. The statements in the DEIS were presumably based on monitoring programs executed by Alyeska, although the source of the data was not cited. It has recently been shown that the analytical chemistry methods used by Alyeska's consultants in those monitoring programs were inadequate to detect many of the compounds of concern (Payne et al. 2001 and 2002). The DEIS should be revised to reflect the most recent findings by Payne et al. cited above. In addition, measured concentrations of BWTF-sourced PAH in mussels from Port Valdez examined as part of the PWS RCAC LTFMP have been consistently higher than levels measured as part of NOAA's subsistence food monitoring program in Windy Bay following the Exxon Valdez oil spill. Those facts should also be considered in the DEIS before making statements about the lack of any impacts of the proposed action on human health and safety.

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In the same inset (on page 4.3-35), the DEIS states that human health risks from inhalation of TAPS associated emissions are below EPA levels of concern. That conclusion is based on data reported by Goldstein et al. (1992) in a Alyeska-sponsored monitoring study at four locations in Valdez. In that study, elevated levels of BTEX were measured in a gradient away from the Valdez Marine Terminal, however, the authors concluded from a gas tracer study (which was not described in any detail in the DEIS) that no more than 10 percent of the

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measured BTEX could have come from the terminal. With that caveat the cancer risk from exposure to HAPs was calculated to be between 1 in 10,000 (10^{-4}) and 1 in 100,000 (10^{-5}), which is that the high end of the range considered to be acceptable by EPA. More recent air quality studies, literature, and data such as those reported and summarized in Harvey (2002) should have also been consulted in the preparation of the DEIS.

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In section 4.3.13.1.2 Employee Safety (page 4.3-37) the DEIS states that TAPS employees have safety concerns and they have been increasing since 1996-7. Numerous workers reported they were afraid to raise concerns, and they were not satisfied with the responses received. Nevertheless, JPO concluded that 'a vast number of items (concerns) were abated in a timely manner.' The DEIS should further elaborate on the concerns raised by TAPS workers and the steps taken by Alyeska management to address them.

113-172

On page 4.4-71 there is an inset titled Impacts of Oil Spills on Human Health and Safety (in section 4.4.4.7). The air-quality/human health spill impact distances cited in the inset (and elsewhere throughout the DEIS) are too small based on the incorrect assumption that VOCs emissions (including HAPs) are negligible for approximately 24 hours after a spill. Also, in the same inset, there is a discussion about exposures from eating contaminated fish, shellfish, or marine mammals. The inset concludes by stating that unless the fish has visible oil on the surface or smells of oil, "adverse health effects would not be expected from eating fish, shellfish, or marine mammals from a spill area." Shellfish can have significant PAH loadings in spill areas even though they do not appear to be physically oiled. Stating that adverse health effects would not be expected from eating them is inaccurate and a gross oversimplification. This is particularly true for Alaskan Natives who have three times the stomach cancer rates of Whites, presumably from the higher incidence of eating smoked foods. While smoking fish and meats contributes far more PAH contamination than that associated with tainting due to oil spills, the speciation of PAHs associated with smoking processes is not the same as that released by Alaska North Slope crude oil. Any comparison would require the speciation for it to be valid. Nevertheless, it makes sense to try and limit the background PAH contamination in subsistence food diets as much as possible.

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On page 4.4-74 (in section 4.4.4.7 Human Health and Safety) the DEIS states that occupational exposures for spill cleanup workers or TAPS employees are not considered, because they are regulated under OSHA. Most of these workers are citizens of the cities or villages closest to the facilities of interest where the spills occur, and as such, their exposures should not be excluded from the DEIS.

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On page 4.4-78 (in section 4.4.4.7.2 Impacts from Inhalation Exposures Resulting from Spills) the DEIS recommends that the general population within the impact distances downwind from an oil spill be evacuated for a period of up to 24 hours until the plume could dissipate. This statement is at variance with the incorrect assumptions presented earlier in the DEIS that evaporation is limited during the first 24 hours. This inconsistency should be corrected in the DEIS by correctly characterizing the evaporation behavior, which predominates during the first 24 hours. More importantly, in the context of this section, VOC emissions are not negligible after a 24-hour period. The alkylated benzenes, two- and three-ring, PAH contaminants, and aliphatic components continue to evaporate at significant levels from thicker pools of crude oil for days to weeks after a spill (Payne et al. 1984).

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In Table 4.4-29 Inhalation Impacts of Pipeline Spills: Maximum 1-Hour Pollutant Concentrations and Impact Distances (on page 4.4-80) the DEIS notes that for hexane, the impact distances is over 1 km from the spill site. For other HAPs the distances range from 20-400 meters. Obviously cleanup workers can be seriously exposed if proper personal protective equipment (PPE) (air purifying respirators) are not used. In the case of spill cleanup workers responding to the EVCS, respirators were seldom used because they were informed that all of volatile and hazardous materials had already evaporated from the oil. The lingering health effects for EVCS-cleanup workers referred to in the DEIS suggests otherwise.

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In the subsection on Valdez Marine Terminal Spills in Section 4.4.4.7.2 -- Impacts from Inhalation Exposures Resulting from Spills (on page 4.4-82) the DEIS indicates that only the largest "very unlikely" spill would have emissions that could intersect the residential areas of Valdez (see Table 4.4-30 on page 4.4-83). In this scenario, over 6 million gallons of oil was assumed to be contained on the water of Port Valdez within booms covering 86 acres and extending approximately 1/2 mile north of the terminal. As noted above in our consideration of the Adequacy of the Spill Scenarios for Evaluation of Environmental Consequences, it is unrealistic to assume that 6 million gallons of oil could be captured and successfully contained within a boom two hours after it was spilled (as stated in the DEIS, the oil would have to have a thickness of about 2.6 inches on the water surface), and under the wind conditions specified in the scenario, large portions of the slick would easily be blown by the wind to the edge of the city where the shoreline would be heavily oiled. Under these conditions, emissions would be, a significant issue. This more realistic scenario was not evaluated in the DEIS.

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As in several other sections of the DEIS, the utilization of completely unrealistic scenarios to predict the lack of significant impacts brings into question the credibility of the conclusions reached throughout the document. If all the impact

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analyses are predicated on such unrealistic scenarios, then the entire foundation of the DEIS is flawed.

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3.9 Fire protection systems

On page 4.3-22 (section 4.3.12 Hazardous Materials and Waste Management) the DEIS notes that Halon 1301 (bromotrifluoromethane) is no longer produced because it is a Class I ozone-depleting chemical. Consequently, Alyeska must rely on its existing stocks and purchase of Halon from secondary markets to maintain its fire suppression system. As availability of Halon decreases, Alyeska may need to undertake a wholesale redesign of its fire suppression systems and replace Halon with a different fire suppressant. Are current stockpiles of Halon sufficient to ensure the safety of the Valdez Marine Terminal and pumps stations along the TAPS? The DEIS should also state to what stage the redesign or reconfiguration of the fire suppressant system at the Valdez Marine Terminal has progressed.

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The problems cited in Section 4.3.13.1.3 Fire Safety Issues (page 4.3-38) and in Section 4.3.13.1.4 Electrical Systems Issues (on the same page) suggest that maintenance and oversight of the fire control system and wiring of the vapor control system for marine tanker loading have not received the consideration from Alyeska that they should have. Although the cited deficiencies have evidently been corrected, the cursory manner in which the DEIS dealt with these issues was disconcerting. The PWS RCAC believes that fire control at the Valdez Marine Terminal and potential explosions in the vapor recovery system are very serious matters. The authors of the DEIS should interview Alyeska management to ensure that all these issues have been resolved and that steps have been taken to prevent them from reoccurring.

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3.10 Spill Response Operations and Contingency Planning

In Section 1.3 (page 1-7) it is stated that the Alyeska can shut down oil flow through electronic instructions from the pipeline control center at Valdez in a 4 to 12 minute period. What volumes of oil could be released in this 4 to 12 minutes time period? With an average flow rate of 1,000,000 barrels per day, we note that oil is flowing at the rate of 694 barrels per minute. Additionally, each mile of pipe can contain as much as 11,818 barrels of oil. Are plans in place to prevent, mitigate, and clean up the discharge of the oil contained in a single mile of pipe? Because secondary containment generally consists of structures composed of earthen dikes with a geosynthetic liner, is their volume effectively reduced by accumulation of snow and runoff water? The DEIS should explicitly address these issues.

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Table 3.1-6 TAPS Oilspill Major Contingency Equipment (page 3-17) would be more useful if the disposition of each piece of equipment along the pipeline or at the Valdez Marine Terminal were described.

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The Alyeska's oil spill contingency plan, described briefly on page 3.1-21, has been significantly upgraded since EVO5, and the improved capabilities and standby contractor's should help with the containment and cleanup of a small to moderate sized oil spill in the future. It is unlikely that there are sufficient equipment and personnel available to respond to a spill of even half the magnitude of the *Exxon Valdez*. If that is in fact the case, then it would be impossible to contain a 6 million gallon spill after it has been at sea for 2 hours, and there is no point in including that spill response option in any of the spill scenarios. Brief mention is also made of PWS RCAC participation in the design of Alyeska's new response system and training activities; however, no details of PWS RCAC involvement or citations for the numerous studies and publications completed by the PWS RCAC are listed.

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Section 3.7.1.5 (page 3.7-5) lists the rivers and streams between Glennallen and Valdez. This region is within the Copper River drainage, and all these streams and rivers eventually discharge into Prince William Sound. From the Lowe River crossing (MP 780) to the Valdez Marine Terminal, nearly all tributaries, streams, and creeks are considered to be anadromous fish habitat. They are critically sensitive from late summer into the winter in conjunction with fish spawning and overwintering. Other than listing the rivers streams and creeks, and stating that they are critically sensitive, very little discussion on the impact of an oil spill from a pipeline rupture to any these habitats is presented in the DEIS. A summary of potential concerns is presented below: erosion and sedimentation (particularly in braided streams), flooding, and surface water use along the ROW (mostly for TAPS personnel and construction/industrial use). Contingency plans in the event of a spill along a river or creek are broken up into five regions. Region 5 covers the area from the MP 648-800. Each spill contingency area has specific response plans for different stream segments based on detailed environmental characterization. More than 220 sites along the right-of-way are designated as oil spill equipment staging areas. The DEIS should delineate what equipment is available at each location.

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If water velocities in the rivers or streams exceed safe operating limits the Alyeska will monitor and track oil until an appropriate containment and recovery area becomes available. This appears to conflict with statements regarding rapid response times and cleanup efficiencies as discussed in Section 2.8 of this review on the adequacy of the spill scenarios presented in the DEIS. The plan has many of details about how to counteract the oil under different conditions, but there is very little discussion about impacts on the stream beds or

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banks or the flowing water itself. Any oil that escapes from containment by booms is assumed to form patches of sheen that evaporate, dissolve in the water column, bind with inorganic soil particles, or are removed from the water surface quickly because of vertical mixing. There is no discussion of dissolved component toxicities to fish, infauna, and epifauna.

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Section 3.17.2.5 Existing Site Contamination indicates that as of August 2001, Alyeska has a total of 87 contaminated sites from spills along the pipeline (70 sites) and at the Valdez Marine Terminal (17 sites). Twenty-seven sites along the pipeline and eight at the Valdez Marine Terminal are presently classified as active sites. Active sites are currently being assessed, monitored, or mediated, with spill volumes ranging from five gallons of thermal to 33,619 gallons of crude oil. No mention is made of any of the remaining contaminated sites within Prince William Sound from the Exxon Valdez oil spill. None of the eight actively managed sites at the Valdez Marine Terminal are believed to pose a threat to drinking water. However, there is no information provided as to whether or not groundwater might be contaminated and seeping into the waters of Port Valdez.

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Page 4.1-14 states that a maximum volume of approximately 54,000 barrels (2,268,000 gallons) has been calculated as the amount of oil that could be lost due to a spill from a postulated guillotine break in the pipeline. This amount includes both the dynamic volume (the quantity forced through a break due to pumping action) and the static volume. The static volume is supposedly designed to be less than a 50,000 barrel limit. The DEIS should state this 50,000 barrel limit compares to actual spills volumes from the pipeline, including the spill caused near MP 400 in October 2001 by the bullet hole from a high caliber rifle.

113-191

In Section 4.1.2.9.3, Transient Volume Balance (page 4.1-15), the DEIS states that the transient volume balance (TVD) system has become Alyeska's primary leak detection system. Given this level of importance, it might have been appropriate to include more than one paragraph in the DEIS to describe it.

113-192

In Section 4.1.3 Mitigation through TAPS Operation Controls, a subsection (4.1.3.1) of the DEIS, Administrative Controls, lists a number of programs and manuals that have been prepared and adopted to mitigate impacts from TAPS operations. The DEIS should discuss the following questions and provide answers thereto. What steps are taken to ensure that these procedures are being followed, that personnel are adequately trained in each procedure, and what are the consequences of failing to abide by these written procedures? What checks and balances are in place to ensure that the procedures are being and can be followed correctly?

113-193

In Section 4.1.4, Spill Prevention and Response, the spill contingency plans are listed on page 4.1-30. Separate plans have been prepared to cover the main TAPS pipeline and pump facilities, the Valdez Marine Terminal, and the tanker routes within Prince William Sound. The Pipeline Spill Contingency Plan is reviewed annually by the BLM, every three years by ADEC and every five years by DOT. It divides the 800-mile long pipeline into five regions, and separate spill contingency plans are prepared for each region. Each region is further broken down into segments, and contingency plans with seasonally dependent instructions are prepared for each segment.

The actual contents of the plans (Section 4.1.4) are not described, however, equipment used to prevent oil release (at least for the Pipeline Plan) is listed. An example for a summertime spill response in the Atigun River Contingency Area is presented. In the DEIS, it is stated that oil escaping containment booms on a river is assumed to form patches of sheen. It is assumed that the sheens would follow river currents downstream. They would evaporate, dissolve into the water column, bind with inorganic silt particles, and be removed from surface water quickly because of vertical mixing. What is not considered is contamination of stream banks and stream sediments by the oil. Likewise there is nothing said about the impacts of dissolved lower molecular weight BTEX or PAH components on exposed fish species or infauna and epifauna.

113-194

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In Section 4.1.4.2, Valdez Marine Terminal, the DEIS discusses the Valdez Marine Terminal Oil Discharge Prevention and Contingency Plan. This plan has been approved by ADEC. Generalized elements of the prevention programs, procedures, requirements, and equipment in place at the Valdez Marine terminal are then presented, including: preventive training programs, substance abuse procedures, medical monitoring programs, security programs, transfer procedures, oil storage tanks, secondary containment, and steel piping corrosion control. The DEIS contains information sufficient for only a cursory examination of these procedures; considerably more detail is required to verify whether the procedures will work during a spill and whether sufficient resources will be available. If a spill occurs, several management positions are given different levels of responsibility during the initial response. If it's a large enough spill additional response activities are assigned to 13 additional personnel each with checklists. Coordinating activities of all these positions to avoid conflicts in resources and counter productive actions requires appropriate levels of training for all involved individuals. Descriptions of procedures to ensure smooth coordination between all these groups should have been presented in the DEIS.

113-196

Specific strategies potentially available to respond to an oil spill are listed, including: containment and control, dispersants, and in situ burning. More than a single paragraph should be used to address these critical response options. The

113-197

<p>descriptions for each are incomplete. It is unrealistic to think that booms could contain a large spill. Under the category of dispersants, it says 'approval must be obtained from either the Federal On-Scene coordinator' but it doesn't say who else.</p>	<p>113-197 (Cont.) 113-198</p>
<p>In Section 4.1.4.3, Prince William Sound, the DEIS covers spills from the tanker vessel at a berth or traveling upon state waters in Prince William Sound. The section begins with a description of Ship Escort Vessel Response System (SERVS), and its role in escorting tankers within Port Valdez and through Prince William Sound to the Hinchinbrook Entrance. Responses to oil spills are described in the Prince William Sound Oil Discharge Prevention and Contingency Plan, which covers the following: vessel traffic lanes, ice navigation procedures, industry ice management procedures, maximum transit speeds, pilot and watch requirements, and weather restrictions. Given their importance in preventing a recurrence of an event such as the Exxon Valdez oil spill, more than a single paragraph should have been used to describe each of these critical elements.</p>	<p>113-199</p>
<p>While there are numerous safeguards in place for tankers transiting Prince William Sound, after the tankers have passed through Hinchinbrook Entrance and they are 17 miles beyond the Sound, there is no discussion of environmental impact in the DEIS. While the area south of Prince William Sound is characterized by more open water and the probability of groundings and/or collisions decreases significantly, a major oil spill in this region could ultimately affect Prince William Sound through entrainment of spilled oil in the Alaska coastal current. Likewise, the Copper River Delta, important for millions of migratory birds each year, could be significantly oiled by such an event. No consideration is given to continued response requirements after a vessel has departed the Sound.</p>	<p>113-200</p>
<p>A significant amount of reliance for response efforts in Prince William Sound is placed upon the use of dispersants, but there is no discussion in the DEIS of dispersant effectiveness with Alaska North slope crude oil under the conditions likely to be encountered in the event of a spill (Section 4.1.4). Likewise, the possibility of using in situ burning as a spill response countermeasure is significantly oversimplified.</p>	<p>113-201</p>
<p>3.11 Tanker operations Section 1.2 of the DEIS states that the downstream end of the TAPS extends to the end of the loading arms for crude oil located at the tanker loading berths at the Valdez Marine Terminal (page 1-7). It also states that the vapor control and</p>	<p>113-202</p>

ballast water treatment systems are considered as part of the TAPS. This is inconsistent with the TAPS including the tanker routes through Prince William Sound exiting at Hinchinbrook Entrance.

113-202
(Cont.)

Section 3.1.2.2.1 Marine Transportation System (page 3.1-21) states that there is currently a fleet of 26 tankers (3 with double hulls and 13 with double sides) that service the Valdez Marine Terminal. Based on the mandates of the Oil Pollution Act of 1990, the fleet must consist entirely of double-hull tankers by 2015. It was estimated that the fleet of tankers would decrease from the present 26 to 8-10 tankers by 2020. It is stated that reduced tanker transit, use of double-hulled tankers, and other unspecified improvements in will reduce annual probabilities of accidents and oil spills; however, these projections may change if oil production increases. No contingencies for such increased oil production are considered anywhere in the DEIS.

113-203

Page 3.11-6 discusses impacts on tanker traffic from TAPS. The discussion is largely predicated on the assumption of a reduction in tanker traffic resulting from declining oil production and TAPS throughput. In line with the previous comment, this section does not consider the potential for an increase in North Slope oil production. The DEIS should address environmental impacts under a scenario of increased oil throughput, in this section and throughout the report.

Page 3.11-8 states that the maximum speed for tankers under ice escort is six knots. How long does it take to stop or change the course of a tanker at this speed? Does having an escort vessel one-half mile ahead of the tanker to assess ice hazards really allow enough time for the tanker to maneuver to avoid ice if it is encountered?

113-204

Page 3.11-8 also states that tankers transiting through Hinchinbrook Entrance are restricted when steady wind exceeds 45 knots or when the sea state exceeds 15 feet. In the next bullet, it says that tanker transits require a third escort vessel when steady winds exceed 30 knots, and then parenthetically adds that that is the wind speed at which large tanker transits are prohibited. Which is the critical wind speed when tanker traffic is shut down? The EIS should provide this information.

113-205

In section 4.3.8.4 (page 4.3-16), the DEIS states that "transit of the tankers through Prince William Sound under normal operations has also not resulted in any observed impacts on physical marine resources." That statement is inaccurate and indicates that the authors of the DEIS are using semantics to avoid a very difficult issue; specifically, that statement reminds us of the famous quote, "that depends on what your definition of 'is' is." The impacts on the physical marine resources from the Exxon Valdez oil spill cannot be excluded from consideration

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because the spill was not part of a "normal operation." The DEIS should include the impacts of the Exxon Valdez oil spill in its assessment of marine transportation activities on the physical marine resources considered.

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(Cont.)

On page 4.3-21 (Section 4.3.11.2 Marine) the DEIS states that in 1999 an average of 37 tankers were filled per month at the VMT when the pipeline throughput averaged 1.1 million barrels per day. It then adds that this level of activity could increase or decrease with changes in oil throughput if the ROW is renewed. This is the first instance in the DEIS where it is acknowledged that tanker traffic could increase; it is inconsistent with other parts of the DEIS that insist that oil throughput will only decrease over the renewal period. The DEIS should be revised to present a consistent set of scenarios that includes the potential for increased oil throughput.

113-207

Section 4.3.2.8 states that the current size of the tanker fleet is 26 based on a possibly outdated 1991 reference source; this value is then used to speculate that the fleet will be substantially reduced in size. A more recent reference for the tanker fleet size should be cited and projected reductions in the tanker fleet should be restated based on current data.

113-208

3.12 Environmental monitoring

Section 3.3.3 Existing Contaminated Sites (page 3.3-8). Eighty-seven sites are identified primarily from release of fuels and crude oil at pumping stations and construction camps along the TAPS right away and at the Valdez Marine Terminal. The range of releases has been from < 1 gallon to 672,000 gallons. This represents about two percent of the total number of spills reported since 1977. Seventy of the eighty-seven sites are along the pipeline; 17 are at the Valdez Marine Terminal. Of the seventy contaminated sites along the pipeline, 27 are still listed as active sites that are being monitored or remediated. Of the 17 sites at the Valdez Marine Terminal, eight are still considered active. Contaminants include gasoline, diesel fuel, turbine fuel, therminol (a synthetic heat transfer fluid), and crude oil. The DEIS should address the continuing mitigation needed for these sites.

113-209

The spill volume for active sites has ranged from < 25 gallons to 33,619 gallons. The spills span the time from the mid-1970s (primarily at former construction camps and pump stations) to the most recent, including the discharge of 285,600 gallons of crude oil near MP 400 on October 4, 2001. The DEIS should clarify whether continuing mitigation is needed for these spills.

Generally surface contamination is limited to a few acres (page 3.3-7); however, contaminants have spread to subsurface water in many other sites because of the presence of permafrost and a shallow groundwater table. These sites will

113-210

probably need additional cleanup and monitoring. Table 3.3-1 (page 3.3-8) lists the 27 active contaminated sites along the TAPS. Table 3.3-2 (page 3.3-11) lists the active contaminated sites at the Valdez Marine Terminal. Based on the findings in these tables, it is apparent that continued monitoring at a number of these sites may be required for many years. The potential contamination of ground water should be examined in the DEIS.

113-210
(Cont.)

Section 3.7.2.6 contains discussion about historical spills of crude oil from the pipeline and at the Valdez Marine Terminal. Between 1977 and 1999, 4283 spills occurred. Almost all spills were either contained in a lined area or cleaned up within approximately one year. It is claimed that there have been no direct spills to surface water. Currently there are eighty-seven spill sites in Alyeska database that require management under the Alyeska Contaminated Site Management Program. Again, most of the discussion centers on treatment activities (removal of oil, excavation of contaminated soils, limited water quality monitoring, etc.) with little or no discussion of long-term impacts to the environment. On page 3.7-14 brief consideration (one paragraph) is given to a recent spill event caused when the pipeline was shot with high-powered rifle. This event released 285,600 gallons of oil, and approximately 160,000 gallons of free product has been recovered. Shallow groundwater contamination has been documented, and the DEIS states that appropriate remediation activities will be implemented. Additional discussion is presented on page 3.8-3, where the volume of heavily oiled trees, heavily oiled vegetative mat, and lightly oiled- and heavily-oiled soil removed from the spill site are documented.

113-211

Section 3.7.2.6 concludes by stating that because surface water quality has not been significantly affected, the remediation activities detailed in the TAPS contingency plan apparently have been successful. Without additional details or facts to substantiate such claims, those conclusions cannot be supported without additional development in the DEIS.

Procedures for remediation of contaminated groundwater include removal of free product and various in situ techniques including air sparging, biodegradation, and soil vapor extraction (page 3.8-3). The potential problems of air pollution or worker exposure to volatile hydrocarbons from these procedures are not addressed. Likewise, temperature constraints and the time frame for effective biodegradation are not discussed. It is stated, however, that characterization of groundwater contamination requires additional longer-term monitoring. More detail should be provided on these topics in the DEIS.

Table 3.8-1 on page 3.8-4 lists six high-priority contaminated sites along the TAPS ROW. Most of the sites required continuous monitoring for additional assessment, and one site, Toolik Camp, has required attention since the initial

113-212

spill of 13,500 gallons of diesel in 1974. All contaminated groundwater operations continue to this day, and they are not proceeding very quickly. Remediation of contaminated groundwater is very difficult, and there are not very many effective solutions. How does the DEIS address a permanent solution to these clean up problems?

113-212
(Cont.)

It is unclear why diesel fuel, gasoline, and propane are considered hazardous materials but crude oil is not [Section 3.16 ?? – no page/section provided]. In addition to those materials, glycol based coolants are also present at most TAPS facilities. Hazardous wastes are delivered to permanent treatment, storage, and disposal facilities (TSDFs) in the lower 48 by truck and barge transport. The Valdez Marine Terminal is classified as a "large quantity generator" for hazardous materials. Routinely generated hazardous wastes include spent thinners and cleaning solvents, flammable paints and coatings, corrosive acids, flammable adhesives, used oils containing chlorinated compounds, spent coolants, spent aerosol cans, and crushed fluorescent lights. Sludge and residues regularly cleaned out from pump stations and Valdez Marine Terminal equipment and sumps also normal exhibit characteristics of hazardous waste. Tank bottoms and "materials in process" that are periodically removed from equipment and bulk crude oil and refined product storage tanks also exhibit hazardous waste characteristics and represent the largest volume of hazardous wastes generated. Spill debris and contaminated media also occasionally exhibit hazardous waste characteristics. Alyeska generated approximately 142,118 pounds of hazardous waste system-wide over the period of 1998-1999. Removal of this material by truck and barge certainly represents risks to the citizens in Valdez and the Natives and the villages surrounding Prince William Sound, and yet, this is not even mentioned in this section of the DEIS. The DEIS needs to assess the actual impact from this hazardous waste.

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113-214

On page 3.16-4 it is stated that contaminated oil spill debris is covered by an ADEC-approved remediation plan and that stockpiles are always removed for thermal treatment after less than two years of storage at any one of 12 ADEC preapproved contaminated media storage areas. The largest of these stockpiles is at the Valdez Marine Terminal, and the amounts of contaminated soils awaiting treatment ranged from 237.4 tons in 1996 to 1561.9 tons in 2001. Are the stockpiles getting larger because of delays in treating the contaminated materials, or was there simply more contaminated material generated in 2001? There were no data presented on where the thermal treatment of this contaminated soil occurs, and whether there were any potential air quality impacts associated with this thermal treatment. Appendix C states that the soil was thermally treated by a facility with an Air Pollution Control District permit, but the location was unspecified.

113-215

3.13 Threatened, Endangered, and Protected Species

The decline in the Steller sea lion in the Gulf of Alaska and Prince William Sound is discussed (p. 3.22-17); however, it was concluded that declines in the 1990s could not be attributed to human activities. Possible explanations include: (1) competition for prey with large-scale commercial fisheries (isn't that a human activity?); (2) changes in prey abundance, composition, and distribution resulting from climactic change; and (3) ecosystem-level changes resulting from commercial harvest of predators such as whales and certain fishes (again, wouldn't that be considered the result of a human activity). There is one paragraph on the effect of the Exxon Valdez oil spill on the Steller sea lion; however, it is stated that the effect is not fully understood. Sea lions were observed swimming in and near oil slicks, oil was observed in numerous haulout sites, rookeries were fouled by oil at Seal Rocks and Sugarloaf Island, and the presence of hydrocarbon metabolites was detected in sea lion tissue. Nevertheless Calkins et al. (1994) concluded that population-level effects could not be demonstrated. They hypothesized that effects on Steller sea lion may have been less than for other species (e.g., harbor seals and sea otters) because the oil did not persist on sea lion rookeries and haulouts as long since they were located in areas of steep slopes and high surf activity. This discussion is an example of the uneven treatment which occurs throughout the DEIS. In some cases, oil spill affects are considered for certain species and in other cases they are not.

113-216

Alaska species of special concern listed in Table 3.22-1 that occur in Prince William Sound include: the olive-sided flycatcher, the gray-cheeked thrush, Townsend's warbler, and the blackpoll warbler. The marine mammals, listed under the Marine Mammal Protection Act include: the gray whale (ESA-D, MMPA-P), the fin whale (ESA-E, MMPA-D), the Beluga whale (MMPA-P, MMPA-D), the Minke whale (MMPA-P), humpback whale (ESA-E, MMPA-D, AK-E), killer whale (MMPA-P), Pacific white-sided dolphin (MMPA-P), harbor porpoise (MMPA-P), Dall's porpoise (MMPA-P), Steller sea lion (ESA-E, MMPA-D, AK-SC), harbor seal (MMPA-P), and sea otter (MMPA-P; more than 90 percent of the world's population occurs between the Aleutian Islands to southeastern Alaska). Different designations for the marine mammals with regard to the Endangered Species Act, the Marine Mammal Protection Act, and state of Alaska species of special concern (AK-SC) are presented in the table (E = endangered, D = depleted, and P = protected). With regard to the Steller sea lion, the DEIS states that three haulout areas in Prince William Sound have been designated as critical habitat (Perry Island, Point Fleanor, and the Needle). None of these areas are within Port Valdez, where the Valdez Marine Terminal is located. The DEIS should include a discussion of the impacts of the Exxon Valdez oil spill on species of special concern.

113-217

The inset on page 4.3-59 (section 4.3.18 Threatened, Endangered, and Protected Species) states that impacts to the listed and protected species from the proposed action would likely be within the range of those experienced over the past 25 years of operations. The range of impacts experienced over the past 25 years of operations included the Exxon Valdez oil spill. That event caused more than minor impacts of several threatened species and should be considered in the DEIS.

113-217
(Cont.)

On page 4.3-59 the DEIS states that the Eskimo curlew formerly nested in habitat crossed by the ROW, but that it has not been observed in the wild for decades and may be extinct. The DEIS should state whether the Eskimo curlew was considered in the original DEIS for the TAPS and whether the last 25 years of operations have contributed to its demise. This is a good example of how the DEIS assumes the baseline condition to be post-TAPS.

113-218

In Table 4.3-5 (Potential Impacts of the Proposed Action on Threatened, Endangered, and Protected Species) on page 4.3-60, the Steller's eider is identified as being present in Prince William Sound, and potential impacts from BWTF effluent are discounted because they are monitored and kept within permitted levels. During the winter and early spring in Port Valdez, PAH from the BWTF are believed to concentrate in the upper surface microlayer within the Port (Payne et al. 2001, 2002). Because of this possible exposure route to high concentrations of PAH, the DEIS should state whether the Steller's eider feeds on juvenile fish, eggs, or larval forms in the upper water column. In the same table a number of whale species are listed as frequenting Prince William Sound. Because of potential exposure to high concentrations of PAH in the surface microlayer within the Port, the DEIS should state whether or not any of these species frequent Port Valdez, and if so, which ones might feed on contaminated phytoplankton or larval fish. Finally, potential impacts from inhalation of PAH-contaminated microdroplets or PAH exposure from the surface microlayer during breaching should be considered.

113-219

3.14 Non-indigenous species

On page 4.3-52 (in section 4.3.16.1 Impacts of Alteration and Loss of Habitat) the DEIS states that it is unlikely that nonindigenous organisms would be introduced into Port Valdez as a result of releasing water treated in the BWTF. With the increased use of double hulled the tankers with segregated ballast water in the future less ballast water will be passed through the BWTF. Currently, many tankers discharge segregated ballast water directly into Port Valdez. The DEIS should address the possibility of introducing nonindigenous organisms from untreated segregated ballast water discharges and described possible treatment approaches to deal with this potential problem.

113-220

3.15 Seismic

Page 3.3-1 states that "a detailed analysis of liquefaction potential along the TAPS is beyond the scope of the study." The DEIS should include greater discussion of potential earthquake damage to the TAPS that may be exacerbated by thawing permafrost.

113-221

On page 4.3-6 the DEIS notes that the Great Alaska Earthquake was about 60 miles west of Valdez. The quake caused extensive ground cracks and landslides in the Chugach Mountains and the southern edge of the Copper River Lowland area (Ferrians 1966). Extensive damage was caused in the city of Valdez, and oil and asphalt products were lost from numerous tanks that were damaged by the earthquake and subsequent tsunami. Given that such an event has occurred in the recent past, it seems inadequate for the DEIS to address potential damage from a similar event in the future by stating "it is uncertain whether an earthquake as large and as close as the Great Alaska Earthquake of 1964 (also known as the Good Friday Earthquake, 9.2 moment magnitude) would damage the TAPS." The TAPS should address the potential for another earthquake in the Valdez area and the design features of the Valdez Marine Terminal that would protect it from an earthquake and possible tsunami.

113-222

3.16 Inland Oil Spills

Table 2-1 (page 2-8) lists the potential impacts of TAPS, but does not adequately summarize factors that may increase the risks of the proposed action. For example, TAPS impacts on permafrost soils are listed, but the impacts of loss of permafrost (e.g., climate warming) on pipeline stability are not mentioned. As noted on pages 3.12-12 and 3.12-13, Alaska has experienced a warming climate over the last several decades, suggesting the potential for thawing of permafrost soils. This section should include a discussion of implications for stability of the pipeline if there is thawing of permafrost soils. Also of concern, the impacts listed in Table 2-1 are restricted to physical disturbances and usage. Oil spills are not discussed in Table 2-1, although a large oil spill in the Copper River drainage could be devastating to fishery resources. Table 2-1 should be revised to include the potential impact to fish relative to the maximum volume based on a realistic, worst-case scenario of a pipeline leak.

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Section 3.19.1 discusses the fish in the rivers and streams that are crossed by the TAPS, but does not adequately discuss epifauna or infauna in the stream beds, stream banks, and waters upon which fish depend. Likewise, there are no data on oil toxicity or the impacts of oiled substrate on the reproductive and feeding behavior of any of the fish considered. Table 3.19-2 lists all of the streams and rivers, the bridge crossing type, and the fish species and sensitivity by month for the inland waters crossed by the TAPS.

113-225

Section 3.19.1.1.3 -- South of the Alaska Range -- states that 17 species of fish occur along the right-of-way in the Copper River drainage (MP 606-800). The Copper River is the major producer of sockeye and Chinook salmon in the Prince William Sound region. Other important species include Arctic grayling, Dolly Varden, rainbow trout, whitefish, sculpin, burbot, and smelt. If a break in the pipeline or spill were to occur in any of these tributaries to the Copper River, significant impacts to all of the species might be expected. The Lower River crosses the TAPS at MP 780, and nearly all the tributaries, streams, and creeks below that point are considered anadromous fish habitat. Potentially affected species include pink, sockeye, coho, and occasionally chum salmon and Dolly Varden. Each of the species would be affected by a pipeline spill upriver, and several could be affected by intertidal contamination from a spill in the Port Valdez area. Considerable literature has been written on reproductive effects of contaminated intertidal sediments on pink salmon (Heintz et al. 1999, Marty et al., 1997), and yet, no mention of any these studies is presented in the DEIS.

113-226

Much of the DEIS (e.g., Section 3.19) simply lists the habitat or potentially affected species and does not consider any of the papers on natural resource damages due to residual oil contamination in different substrate types. Likewise effects on fish and intertidal organisms have not been considered. The DEIS should include an expanded discussion of the potential impacts of spilled oil on salmonid habitat.

113-227

As discussed in Section 3.19.1.3 Prince William Sound, sockeye, pink, coho, Chinook, and chum salmon and Pacific herring have provided the greatest commercial harvest value in recent years (Morstad et al. 1999). All estuarine and marine areas used by Pacific salmon of Alaskan origin are designated as essential fish habitat (EFH). This designation extends from the area of tidal influence in stream habitat and tidally submerged habitats to the oceanic limits of the Economic Exclusion Zone for United States. On page 3.19-35 there is a citation of a substantive reference to oil effects on fish populations in Prince William Sound from the 1989 Exxon Valdez oil spill (Rice et al. 1996; Wells et al. 1995). After this initial citation, however, the DEIS then goes on to state that "studies on initial effects and subsequent recovery of fish populations following the spill have not resulted in consensus on the extent of damage and recovery rate." After that, the DEIS does at least mention that after a record harvest in 1992, the Pacific herring population has collapsed and remains depressed with reduced or no successful commercial harvest since that time.

113-228

With regard to pink salmon, the DEIS (Section 3.19) cites statistics on fisheries yields, with a marked drop in the observed population levels in Prince William Sound during 1992-1993 followed by population level rebounds in subsequent years. It speculates that the rebound is most likely the result of improved ocean

survival rates for both wild and hatchery stocks, and that this pattern led to speculation that the spilled oil was responsible for the observed declines. The DEIS then qualifies that statement by adding the caveat that there are conflicting scientific views on this, and that no direct connection has been conclusively established (Brannon et al. 2001; Rice et al. 2001).

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(Cont.)

Additional fish population statistics are cited and some discussion of life cycles of different species is presented; however, no additional discussion was presented on the effects or impacts from the Exxon Valdez oil spill (Section 3.19). The section lists the species that might be exposed to a spill, however, it contains little discussion about oil toxicity in potentially affected species. Also, it does not address how habitat oiling might affect the exposed species over time.

Table 4.4-1 lists various oil spill scenarios for TAPS. In general, this table and the accompanying text are unclear how the expected frequency of releases was calculated for various spill scenarios (p. 4.4-15). The DEIS should clarify whether the estimates were based on an analysis of small aircraft flight routes in proximity to the pipeline and the frequency of small airplane crashes in Alaska. The DEIS should also clarify if the frequency of releases from ground subsidence considered loss of permafrost from global climate change. Page 4.3-5 states that the risks of liquefaction of soils and landslides will increase, but it is unclear how an increased risk was incorporated in the scenario estimates. The DEIS should also clarify if aging of line pipe was considered in estimating the frequency of releases from corrosion leaks. The DEIS should compare the estimated spill frequency with the observed frequency of spills during the first 30 years of operation.

113-229

Page 4.4-20 discusses inland spills, but the DEIS is unclear on the number of times the TAPS crosses streams in the Copper River drainage, and the length of pipeline in proximity (e.g., 1000 feet) of streams. The DEIS should specify the number of stream crossings and length of pipeline in proximity to streams, for each drainage system traversed by the TAPS. The DEIS should also explain how this information was used in estimating the volume and frequency of oil spills into streams.

113-230

Pages 4.4-23 to 4.4-24 discusses the movement of whole product oil, but does not include an adequate discussion of ecological impacts of aqueous phase oil. Aqueous phase oil (i.e., water soluble components accommodated in the water column) is transported farther and more rapidly downstream. Additionally, minute quantities (e.g., 1 part per million of total petroleum hydrocarbons and less than 50 parts per billion of total PAHs) of aqueous phase oil can cause death

113-231

to fish and invertebrates. For example, Table 4.4-14 shows that product could travel 34 miles in Tazlina River oil spill scenario, but aqueous phase oil is not addressed.

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(Cont.)

The analysis of oil spill impacts (pages 4.4-103 to 105) is flawed because it appears to implicitly assume that the only portions of a stream that will be adversely impacted from an oil spill will be the portions that directly contact free product oil. This analysis appears to ignore partitioning of the toxic water-soluble components of oil into the water column, which does not require mixing of product and water. For example, pipeline breaks involving middle-distillate oils show that aqueous phase oil can contaminate the water column of rivers to over 30 feet deep (e.g., VSWCB, 1983), thus the statement that only the upper portion of the water column would be affected is not supported.

113-232

Page 4.4-104 states that TAPS is "unlikely to block or preclude migration" of fish. The basis of this statement is unclear because literature citations are not provided. Oil spills may impede migration of anadromous fish such as salmon that depend on olfaction to locate natal streams. This possibility should be explicitly discussed.

113-233

Section 4.7.7.2.4 of the DEIS is too focused on the containment and clean up problems of spilled oil, rather than ecological impacts, and has an apparent bias towards discounting the impacts of oil spills on fishery resources. Oil toxicity should be discussed because there is an abundance of information on Alaska species (e.g., Rice et al., 1976). Specific concerns include:

113-234

- Page 4.7-93 states that direct mortality due to oil spills has seldom been documented. This statement ignores a number of inland pipeline spills into streams that have caused mass mortality of fish and which have been directly documented through fish kill investigations (e.g., VSWCB, 1983; Catchings, 1985; SCDNR, 1996). The statement in the DEIS should be corrected.
- Page 4.7-94 states that small spills (sec 4.4.1) would be unlikely to affect fish populations. Table 4.4-1 shows that the small spill category includes a 100 bbl (4200 gallons) spill volume, but the DEIS has not provided sufficient information to determine whether a spill of this volume into a salmon spawning stream could impact the reproductive success of a year class of fish. Page 3.19-31 notes that the Copper River is the major producer of sockeye and Chinook salmon in PWS, and is important to subsistence and commercial fisheries. TAPS is in proximity to the Copper River drainage from MP 606-800, and Figure 4.4-11 shows that spills of 30,000 and 34,000 gallons have occurred.

113-235

3.17 Wildlife Impacts

There is no description of the impacts of the Exxon Valdez oil spill on intertidal infauna and epifauna, and their importance to higher trophic levels (Section 3.19). Section 3.20 of the DEIS should include a discussion of impacts on birds from oil spill impacted prey and habitat.

Page 3.20-7 discusses the bird species occurring in Prince William Sound, but does not mention avian impacts from EVOS. This is not consistent with other sections of the DEIS, where EVOS impacts to fish and marine mammals are discussed (e.g., p. 3.19-36; p. 3.22-19). Page 4.4-108 of the DEIS acknowledges that multiple species of birds were not recovered 10 years after EVOS and may be impacted by persistent oil in the environment.

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Limited discussions of impacts of the Exxon Valdez spill on fish and certain marine mammals (e.g., sea otters) are presented in Sections 3.19.1.3 and 3.22.3.5, respectively, of the general section for the Affected Environment. The associated section for birds (Section 3.20.3 for Prince William Sound) makes no mention of impacts to birds from the spill. At the same time, there is very brief mention of estimated effects of the spill to birds in Section 4.4.4.11 where it is noted that "100,000 to 300,000 birds were killed as a result of the Exxon Valdez spill" (p. 4.4-108). The latter information should be incorporated and possibly expanded upon in Section 3.20.3 to provide consistency in discussions of impacts of the Exxon Valdez spill to biological resources in the section for the Affected Environment.

Section 3.20 Birds has a comprehensive listing of birds that have important habitats at or near TAPS, the North Slope, or Prince William Sound; are important for human use; and use habitats common to other species. Threatened, endangered, and protected species are also considered. Interestingly, Table 3.21 does not include the Copper River delta as an important waterfowl concentration area (areas listed are those with portions within two miles of the TAPS ROW). While the delta is not close to the TAPS ROW, the pipeline crosses the Copper River drainage, and a spill of significant volume with subsequent oiling of the Copper River delta could have a significant impact on millions of migrating waterfowl. With some species, over 90% of the population are known to migrate through the Copper River Delta. None of these factors are taken into consideration in the DEIS, and it should be revised accordingly.

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A fairly detailed discussion of the specific populations of birds that utilize Prince William Sound and the Gulf of Alaska is presented in Section 3.20.3. However, the impact of the Exxon Valdez oil spill on birds within Prince William Sound is not even mentioned. It may be considered elsewhere, but the presentation does not logically flow, and the impacts of Exxon Valdez oil spill have not been

113-238

adequately addressed. The DEIS briefly mentions the Exxon Valdez oil spill after the section on fish and amphibians, but an analogous treatment and discussion of the impacts on birds is needed in the DEIS.

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On page 3.22-18 the DEIS states that harbor seal numbers declined by 57 percent in Prince William Sound from 1984-1992. This decline began before the 1989 Exxon Valdez oil spill and was greatest in the year of the spill. The decline in harbor seal numbers in the Sound has not yet ended. In 1989, an estimated 302 seals were "missing" from haulouts that were oiled by the Exxon Valdez oil spill. The missing seals were presumed to have died from the spill. Haulouts were oiled, treated, inspected, and studied. Seals were coated with oil, volatile hydrocarbon components were incorporated into their tissues and metabolized, as shown by biochemical indicators. The section concludes with citations that suggest that single-year reductions in seals at oiled haulouts cannot be used as an estimate of oil-spill caused mortality, so here there is some equivocation in the DEIS as to the effects of the spill.

113-239

Section 3.22.3.5 -- Sea Otter -- discusses the management strategies and different stocks tracked by the U.S. Fish and Wildlife Service, and stated that subsistence harvest continues in Prince William Sound where several hundred sea otters are taken annually. Population growth in Prince William Sound was disrupted by the earthquake in 1964 and the Exxon Valdez oil spill 1989. It was estimated that approximately 2650 sea otters were killed in Prince William Sound as a result of the Exxon Valdez oil spill; 3905 otters were estimated to have been killed as a result of the spill in Alaska as a whole. By 1990, chronic effects to sea otters may have been subsiding, and recovery of the affected population appeared to be underway (Angliss et al. 2001). Various unidentified indicators were cited as suggesting that the sea otter population in spill-affected areas was recovering a few years after the spill (Johnson and Garshelis 1995). There are still ongoing studies by NOAA and NMFS that suggests sea otter populations in selected and heavily oiled regions of the Sound have yet to recover completely. Sea otters and harlequin ducks have not recovered in the North Knight Island area, raising concerns that continued oil exposure may be affecting their survival (Ballachey et al. 2000a,b; Trust et al. 2000). Biochemical assays and mortality patterns are consistent with continuing oil exposures, but linkages between oil persistence studies and impact studies have not been complete to date (Monson et al. 2000; Esler et al. 2000). Only one (Monson et al. 2000) of the most recent NOAA and NMFS studies cited above was mentioned in the DEIS. The DEIS should be revised to include a more comprehensive consideration of oil spill impacts on wildlife.

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Section 4.3.18.2 should discuss potential noise impacts to marine mammals from tanker operations.

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On page 4.4-102 (in section 4.4.4.9 Terrestrial Vegetation and Wetlands) the DEIS once again refers to the "Very Unlikely" spill of 143,450 barrels (6 million gallons) of Alaska North Slope crude oil entering Port Valdez from a spill at the Alyeska Marine Terminal. The potential impact is minimized with the statement that "Up to two miles of shoreline might become heavily oiled, with small amounts of oil potentially reaching other shoreline areas. Oil reaching the shoreline might persist for extended periods of time and slow or reduce vegetation recovery." From experience with the Exxon Valdez oil spill, it is highly likely that if 6 million gallons of oil reaches Port Valdez, more than two miles of shoreline will be contaminated. During the EVOS event, after oil came ashore, it often washed off again and was driven by changing winds and currents to other previously uncontaminated beaches, and that same thing would occur in Port Valdez. Alyeska doesn't have enough equipment to contain or clean up a 2 million gallon spill, so the limited impacts predicted in the DEIS appear to be underestimated.

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On page 4.4-103 (in section 4.4.10 Fish) the text briefly alludes to impacts caused by oil on prey for fish, however, no details or specifics are presented. Likewise, no references are given on fish toxicity to crude oil or dissolved components from crude oil.

113-243

3.18 Prince William Sound

On page 3.11-4 (in Section 3.11.3), reference is made to the fact that Prince William Sound was generally characterized as "pristine." However, the DEIS then goes on to state that numerous oil spills occurred in the region historically during World War II and as a result of the great Alaska earthquake of 1964. Oil and asphalt storage tanks in Valdez and Whittier ruptured, and their contents spilled into Prince William Sound. Thus, the authors explicitly state that Prince William Sound was contaminated with anthropogenic oil residues 25 years before the Exxon Valdez oil spill and that those residues were still present at the time of the spill (Carlson and Kvenvolden 1996). Other major sources of hydrocarbons cited in the DEIS include atmospheric fallout, runoff from onshore, and operation of boats for military, fishing, and tourism. The DEIS needs to compare these non-TAPS hydrocarbons with those from TAPS, and include a discussion of the bioavailability of the various sources of PAHs in Prince William Sound.

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On page 3.11-5 the DEIS explicitly states that Prince William Sound has relatively high background sediment hydrocarbon concentrations; however, that statement is very misleading. The authors of the DEIS appear to have completely accepted the industry-supported argument by Buchm et al. (2001) that the oil seeps near Katalla and oil bearing shales are the major contributors to background hydrocarbon levels in Prince William Sound. In addition, after taking that

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position, they then note that coal deposits also contribute measured hydrocarbons levels through erosion and deposition in Prince William Sound sediments (e.g., Short et al. 1999). Concentration ranges of sediment hydrocarbon levels are presented from both Boehm and Short. The DEIS authors then go on to state that "although there is general agreement on the typical concentrations of hydrocarbons in sediments in Prince William Sound, there is an ongoing debate in the scientific literature on which sources -- oil seeps and shales or coal -- is the main contributor to these hydrocarbon levels (for example, see Short et al. 1999; Boehm et al. 1998, 2001; Short and Heinz 1998; Bence et al. 2000; Hostettler et al. 2000)." [As noted earlier, the reference to Short and Heinz should actually be 1997, but all of these citations were missing from the reference section of the DEIS anyway!] The DEIS then states that "the latest paper by Boehm et al. (2001) presents compelling evidence that although significant amounts of hydrocarbons found in the sediment are derived from coal deposits, the majority of the hydrocarbons found in the Prince William Sound area come from eroding organic shales and, to a lesser extent, oil seeps." To accept at face value the industry position without examining published research running contrary to the conclusion cannot be justified. The viewpoint of industry appears to be that all forms of hydrocarbons are the same in their effect on biological systems. The bioavailability of a form of hydrocarbon is extremely important regarding its effects on living systems. The DEIS needs to consider and differentiate between the bioavailability of PAH introduced from liquid sources such as crude oil or refined petroleum products vs. solid-phase materials like coal and oil shale.

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On page 3.11-8, the DEIS states that trace levels of PAHs were measured in Prince William Sound following the EVOS to depths of 15 feet. The DEIS mischaracterizes the petroleum levels measured in the water column following EVOS as "trace." Total PAH levels of 1 to 10 µg/L were reported by both Exxon and NOAA, and these levels can cause death to sensitive species such as herring larvae and zooplankton in a few days of exposure under environmental conditions (Barron et al. 2002, Duesterloh et al. in press). This fact must be explicitly acknowledged in the DEIS.

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Section 4.4.4.10.2 (beginning on page 4.4-105 deals with spill impacts from the Valdez Marine Terminal on Prince William Sound. It does not deal with spills resulting from tanker accidents (they are considered in yet another section, 4.7.4.4). On page 4.4-107 the DEIS states that in open waters (pelagic) fish have the ability to avoid a spill by going deeper in the water or further out to sea. Fish that lived closer to shore are at risk from oil that washes onto beaches or from consuming oil-contaminated prey. "In shallow waters, oil may also harm invertebrates used as food or sea grasses and kelp beds that are used for feeding, shelter, or nesting sites by many different fish species." This is the first mention

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of invertebrates used as food for fish or marine intertidal habitats. Because the intertidal zone receives the brunt of any marine oil spill, it should be given more than two or three sentences in the DEIS. This section should cite the two excellent symposium volumes on the EVOS (Wells et al. 1995; Rice et al. 1996), where additional details on intertidal impacts from oil spills in Alaskan waters can be found. This page also contains a brief discussion of pink salmon research, but the presentation appears to be biased towards Exxon-funded studies showing no effects. Work by NOAA scientists and other researchers was either ignored or dismissed as being subject to biased sampling protocols. The DEIS should be expanded to cover a broader range of published literature on impacts to fish and intertidal organisms resulting from oil spills in cold northern-latitude environments.

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On page 4.4-108 (in section 4.4.11 Birds and Terrestrial Mammals) the DEIS has one sentence that states that 100,000-300,000 birds were killed as a result of the EVOS. After all the discussion of the habitats and species encountered and ranges presented elsewhere in the DEIS, this coverage is totally inadequate. There is, at least, one paragraph devoted to Kittlitz's murrelets, where the EVOS may have caused population-level impacts, but again this level of coverage is incomplete and tends to diminish the impacts measured after that major oil spill event. The DEIS summarizes the recovery of birds from the effects of the Exxon Valdez oil spill as follows: (1) fully recovered -- bald eagle; (2) recovering/recovery clearly underway -- black oystercatcher, common murre, and marbled murrelet; (3) not recovered -- common loon, cormorants (pelagic, red-faced, and double-crested), harlequin duck, and pigeon guillemot; and (4) unknown -- Kittlitz's murrelets. In that the Exxon Valdez oil spill could be considered the archetype for "very unlikely" low-probability high-impact events, more coverage of impacts from that spill should be presented here and elsewhere throughout the DEIS.

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3.19 Cumulative Effects

On page 4.7-13 (section 4.7.3.2 Proposals Considered but Excluded) the DEIS states that ANWR development was excluded because it was not currently feasible under existing regulations and laws. Specifically, ANWR has not reached a state of development where legislative approval, regulatory review, funding, or permitting has begun. Nevertheless, transport of ANWR production can easily be foreseen. Thus, it is reasonable for the DEIS to consider the environmental impact of increasing North Slope production or longer-term operation of TAPS or both.

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On page 4.7-46 (in section 4.7.4.9.2 Tourism) the DEIS states that tourism is Alaska's second-largest industry with more than 1.4 million people traveling to Alaska in 1999 and spending about \$1 billion in the state. While this overall

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section is on cumulative effects of TAPS operations, there is no mention of the economic impacts or effects of oil spills on tourism. Likewise, on the same page (in section 4.7.4.9.3 Hunting, Fishing, and Trapping) the DEIS states that 565,000 sport fishing, hunting, and trapping licenses were sold in 2001, with 51 percent issued to nonresidents. No consideration is given to the potential impact to fishing, hunting, and trapping activities from an oil spill into any rivers or streams or Prince William Sound. Clearly, there were impacts to Alaska residents (tour guides, both charters, hunting and fishing lodges, etc.) after the Exxon Valdez oil spill, and the DEIS should have considered these in its analysis.

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On page 4.7-43 (in section 4.7.4.9.4 Commercial Fishing) the DEIS fails to mention the impacts from fisheries closures following the Exxon Valdez oil spill to operators in Prince William Sound and the Copper River District.

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On page 4.7-53 (in section 4.7.4.10.4 Prince William Sound and North Slope Spill Scenarios) the DEIS states that there have been 180 documented crude oil spills into Prince William Sound in the last 25 years and 70 diesel fuel spills over the same period. On average, that is 10 spills per year. How do those historical frequencies compare to the hypothetical spill frequencies using the various scenarios presented in Table 4.7-6 (on page 4.7-54)? In that table there are only two small crude oil spills and two small diesel spills anticipated per year. The next highest spill frequency is one moderate (60 barrel) crude oil spill and one moderate (12 barrel) diesel spill every 33 years. After that, all the other spills and the table are in the "unlikely" (one every 33 to 1000 years) or "very unlikely" (one every 1000 to one million years) frequency ranges. These hypothetical spills used for the cumulative impact analysis clearly don't reconcile with the historical record over the first 25 years of TAPS operations. Why not?

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Also, why wasn't any reference made to the Exxon Valdez oil spill (an actual spill, which did occur in the first 25 years of TAPS operations)? Likewise, why isn't its similarities or differences compared to the hypothetical scenarios described in Table 4.7-6? Almost all the hypothetical spill volumes in the table are less than the volume lost during the EVOS.

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On page 4.7-70 (in section 4.7.6.6 Physical Marine Environment) the DEIS states that potential cumulative impacts would come from tankers traveling from the Valdez Marine Terminal through Prince William Sound to the Hinchinbrook Entrance. These transits would create noise and involve the risks of petroleum spills or other accidents. The DEIS then identifies other spill risks that are cumulative with the impacts from tanker traffic, including those from commercial fishing, recreational fishing/sightseeing tours, and commercial cargo operations in Port Valdez and Prince William Sound. With the exception of the risks from larger oil spills, the cumulative impacts on the physical marine

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environment from the other activities were considered to be small and short-lived. "Small spills from all vessels are rapidly responded to and cleaned up by the spill response infrastructure supporting the oil transportation industry." In actual fact, not all small spills are cleaned up as rapidly as claimed. The diesel fuel lost from the sinking of the Vanguard near Campbell Bay on Glacier Island (Oil Spill Intelligence Report, Vol. XXIV, No. 31, 8/2/01) and the Windy Bay about 40 miles southwest of Port Valdez (Oil Spill Intelligence Report, Vol. XXIV, No. 32, 8/9/01) required several weeks each for response. Because of the prolonged nature of the releases and the water depths involved, response efforts had to be terminated before the fuel leaks from either vessel had stopped. Neither of these cases were mentioned as contributing to cumulative effects in the DEIS.

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On page 4.7-70, the DEIS states that the spill scenarios assume that from 50,000 to 290,000 barrels (2 to 12 million gallons) of Alaska North Slope crude could be released instantaneously at various locations in Port Valdez, the Valdez Narrows, and Prince William Sound, AND THAT IT WOULD SPREAD FOR SIX HOURS BEFORE RESPONSE AND CONTAINMENT! While the potential release volumes are realistic for tanker spill scenarios, the assumption that the oil would spread for only six hours before response and containment is totally unrealistic. Does Alyeska have sufficient personnel, boom, boats, and other equipment to contain a 12 million gallon spill? Based on computer-model predictions, the DEIS estimated that 90 percent of the oil after six hours would be in an almost circular ellipse that would extend about 4.5 miles in diameter from the release point. The text then acknowledges that the shape of the slick could be influenced by winds and currents, but in general, if the winds were slightly different than the model predicted, the estimated area that would encompass the oil-spill plume after six hours would be an ellipse about 10 miles in diameter. It was then further assumed (on page 4.7-71), "That at the six-hour point, the spill would be contained, and further spreading of the oil would stop." The DEIS acknowledges that it is possible that some oil would escape the initial containment and could impact other areas in Port Valdez and Prince William Sound, but that the impacts outside the initial containment area would be small and localized.

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The idea that a 10-mile diameter slick in the middle of PWS can be contained has not been demonstrated. Cleanup activities from the EVOS did not demonstrate this concept and, more recently, the cleanup activities on two small diesel spills from the Vanguard and the Windy Bay incidents did not demonstrate capability to fully contain a large spill. The DEIS needs to address whether APSC and SERVS could respond with all of their equipment to the middle of the Sound within six hours, and when they arrived whether it would be possible to corral a slick that size with their inventory of equipment.

A 4.5 miles diameter slick could require more than 14 miles of boom to contain it. A 10-mile diameter slick would require over 31 miles of boom. Deployment and control of that much boom in the open ocean is feasible only in the fairest of weather. The DEIS needs to consider the effects of foul weather in containing spilled oil in PWS. Also, it is unlikely that that much boom response equipment even exists in Port Valdez.

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The DEIS assumes that "once the oil was contained, removal actions would begin." This significantly understates the difficulty in keeping the spill oil contained and in actually skimming (30% recovery of spilled oil is viewed as excellent) the oil. There is no discussion of cleanup (oil recovery equipment) efficiency, problems with water-in-oil emulsification (mousse formation) and its effect on skimmers, rope tops, and pumps, and no discussion of what to do with recovered oil (and water).

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The DEIS then incorrectly states that Alaska North Slope crude oil does not significantly dissolve into the water column during the first 24 hours after a spill, but that portion which does dissolve could have minor local impacts. The DEIS assumes that dilution effects would limit the impacts away from the spill area. In actual fact, BTEX and lower molecular weight PAH components do dissolve into seawater (Payne et al. 1984, 1991a,b), and toxic concentrations approaching 1-10 µg/L were measured in the upper water column by both Exxon and government scientists after the Exxon Valdez oil spill (Barron et al. 2002, Doesterloh et al. in press). See the works of Wells et al. (1995) and Rice et al. (1996), and numerous papers published in 10 years of biannual International Oil Spill Conference proceedings for additional information on the limitations of response efforts and the short- and long-term effects and impacts of oil spilled into cold subarctic waters, and the Exxon Valdez oil spill, in particular. The assumptions in the DEIS on oil spill containment, cleanup efficacy, and on-water oil recovery appear to be without basis.

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On page 4.7-72 the DEIS states that releases nearshore would heavily oil shorelines and waters immediately around the area would be affected. The DEIS acknowledges that the waters of Port Valdez and Prince William Sound in the immediate area of the spill could continue to be affected for longer times after the initial release; but, because of dilution and the existing background hydrocarbon concentrations, changes in seawater hydrocarbon concentrations would be minimal and localized. This is a gross simplification. Existing or "background" hydrocarbon concentrations are orders of magnitude below levels that would be introduced from the spills considered in the various scenarios, so that changes in seawater hydrocarbon concentrations would NOT be minimal and localized. In the EVOS, over 800 miles of shoreline was oiled from a similar volume of oil to

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that described in the scenarios from the DEIS. How can that be considered localized? Impacts from dissolved components leaching from contaminated beaches are still being documented 12 years after the spill, a duration that hardly can be characterized as short-term (Short et al. 2002; Ballachey et al. 2000a,b; Munson et al. 2000; Esler et al. 2000; and Trust et al. 2000).

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On page 4.7-72 the DEIS states that mitigation for spills occurring during tanker transit from Port Valdez through Prince William Sound would include: (1) minimizing the time for response and the time required to contain the release, (2) deploying containment systems quickly, and (3) starting removal actions before weather or other adverse conditions could make containment difficult. This assumes that the spill occurs in a good weather. Most oil spills actually occur under or are driven by the worst of circumstances, when many factors (like storms, severe sea states, fog, or just darkness due to night/fall) are working together to complicate mitigation efforts. In addition, daylight hours are very short in the winter, so cleanup activities run on a 24 hour/day basis would require considerable nighttime operations. These factors need consideration in the DEIS.

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On the same page (4.7-72), the DEIS claims that under the less than-30-year renewal alternative, the impacts from a spill would be the same as those discussed for the proposed action, and that under the no-action alternative there would still be risks from other marine traffic activities. Wouldn't the probability of a spill be lower with the less-than-30-year renewal period? Risks from 'other marine traffic' are not of the same magnitude as tanker accidents, so they cannot be compared to or traded off against one another.

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On page 4.7-72 (in section 4.7.6.7 Air Quality), the DEIS fails to consider HAPs released from ongoing operations at the Valdez Marine Terminal and the ballast water treatment facility, in particular. This treatment does not consider recent research on this issue. See the findings of Payne et al. (2002), which estimated that over 580 pounds of BTEX are released per day from the LAF units at the terminal. The DEIS also does not consider those occasions when Berth 3 (without any vapor recovery system) is used for loading when Berths 4 or 5 are occupied, shut down for maintenance, or damaged. Such an event was reported in the Oil Spill Intelligence Report (Vol. XXIV, No. 32, 8/9/01) when a loading arm accident caused the shut down of Berth 4 and Berth 5 was unavailable because of scheduled maintenance. The DEIS should consider HAPs emissions from maintenance loading operations at Berth 3.

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On page 4.7-78 (in section 4.7.6.10.3 Waste Impacts Associated with Tanker Operations at the Valdez Marine Terminal) the DEIS directs the reader to Appendix C for detailed descriptions of wastes associated with TAPs operations.

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Section C.5 (the appendix) does cover details regarding the BWTF, but none of the recent RCAC studies considering BWTF impacts to Port Valdez (Payne et al. 2001 and 2002; Salazar et al. 2002) were considered in any of those discussions. The main body of the DEIS and the attendant Appendix C should be rewritten to include the findings from recent research.

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On page 4.7-78 (still in section 4.7.6.10.3) the DEIS states that double-hull requirements will dramatically reduced but not completely eliminate the volume of ballast water treated in the BWTF. Relatively high flow rates are currently required to ensure that the biological treatment system remains active and viable (with proper concentrations of hydrocarbons, nutrients, oxygen, etc. to ensure survival of the bacterial population). If the ballast water flow decreases as much as is stated in the DEIS, how will the biological treatment system at the BWTF be modified to handle the lower ballast-water flow rates?

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On page 4.7-79 (in section 4.7.6.10.4 Waste Impacts Associated with Natural Gas Pipelines) the DEIS states the proposed LNG plant would generate industrial wastewater related to plant operations as well as domestic and sanitary wastewater from support of the workforce. In addition LNG tankers visiting the LNG plant could generate bilge/ballast wastewater that would have to be treated and discharged under the auspices of an appropriate NPIFIS permit. If and when an LNG facility were to be located at Andersen Bay in Port Valdez, it would be imperative to more accurately assess the existing air and marine inputs from the Valdez Marine Terminal to correctly assess the cumulative impacts from the new facility. Current air and water column impacts from the Valdez Marine Terminal are underestimated for the reasons identified earlier.

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On page 4.7-81 (section 4.7.6.11.2 Hazards to the Public) the DEIS states that the APSC is not required to report emissions under EPA's Toxics Release Inventory (TRI) because it has a standard industrial classification (SIC) of 4612 (transportation -- crude petroleum pipelines). Table 4.7-8 (page 4.7-82) lists six TRI-reported chemicals (benzene, ethylbenzene, formaldehyde, n-hexane, toluene, and xylene) that are emitted from TAPS facilities sources; however, the emissions from the terminal itself are not provided in the table. In actual fact, emissions from TAPS facilities exceed those from the TRI-reported sources elsewhere in the state, with the majority of emissions coming from the Valdez Marine Terminal. In addition to the Valdez Marine Terminal, the Petro Star refinery at Valdez is estimated to emit about 0.65 tons/year of benzene and 2 tons/year of the other VOCs. The DEIS then states that for some unknown reason, emissions from the Petro Star refinery at Valdez were not included in the reported TRI data for the state, but that although those quantities were dwarfed by the 43 tons/year of benzene and 69 tons/year of the other VOCs from the Valdez Marine Terminal, they should be factored in to the overall cumulative

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impact to air quality in Valdez. We agree with this assessment that they should be included, but also caution that the figures presented in the DEIS for the Valdez Marine Terminal do not include emissions from the DAF units of the ballast water treatment facility.

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On the same page, the DEIS states that a cancer risk of about 3×10^{-5} has been estimated for residents of Valdez from benzene inhalation from all sources. This cancer risk is based on monitoring and modeling studies that assumed that only 10 percent of the VOCs measured in Valdez came from the VMT (Goldstein et al. 1992). That estimate was based on the results of tracer gas studies completed in 1990-1991; however, the extent of those studies (duration, wind and weather conditions, number of tracer studies, etc.) were not described in any detail in the DEIS. What would the cancer risks be if those tracer studies turned out to be inaccurate? The DEIS should consider reasonable ranges, as determined from recent research, of HAPs emissions in assessing cancer risk.

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Table 4.7-8 (on page 4.7-82) presents the toxics release inventory of reportable emissions for the state of Alaska in 1999. To put the stated benzene emissions from the Valdez Marine Terminal into a context that the public can understand, the DEIS should explicitly state that the annual benzene emissions from the terminal alone are 3.3 times higher than ALL the other sources over the entire state combined. Furthermore, as mentioned above, it is doubtful that the VMT estimates in the DEIS include the emissions from the DAF units and biological treatment tanks of the BWTF. Also, the DEIS should include a footnote to the table that states the fact that APSC and North Slope producer facilities do not have to report their emissions to the EPA Toxics Release Inventory (because of the SIC code exemption), and as a result, they are explicitly excluded from the table. Oil industry activities easily generate the highest sources of BTEX in the state, and to ignore their contributions to air pollution because of a SIC code exemption is inexcusable. Their omission from Table 4.7-8 gives an inaccurate picture of the true cumulative impacts to air quality from ongoing TAPS operations, and this should be corrected in the final EIS.

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On page 4.7-84 (in a subsection entitled Air Emissions, Accidents, and Spills) the DEIS states that adverse impacts to the general public from accidental spills is small because it is unlikely that the spills would occur at the same time and in close proximity to the public. Second, existing regulations require timely cleanup of environmental media contaminated by spills, so the possibility of prolonged human exposure would be limited. That may be the case for terrestrial spill scenarios; however, spills on water are highly mobile, and in Port Valdez they can be driven into intertidal regimes closer to the city than just the terminal itself. Therefore, the impact distances considered in the DEIS should be assessed from where the spill might end up, and not just the point of origin (or a

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limited distance from that point assuming 100 percent containment and cleanup). The DEIS needs to consider if regulations requiring timely cleanup can actually be met. It took over two years for most (but not all) of the oil to be cleaned up after the EVOs, and even a small spill in Port Valdez could affect the citizens to a much greater extent than considered in the DEIS. Oil from the Eastern Lion oil spill was observed near the Solomon Gulch refinery, off Duck Flats, near Mineral Creek, and as far away as Anderson Bay (Jones 1994), and in that instance, only 200 barrels (8,400 gallons) of oil were lost and the spill response effort was initiated in less than two hours. In the event of a spill within Port Valdez, many of the citizens from Valdez would be involved in spill cleanup response. The DEIS appears to ignore exposures those responders as well as non-workers under those circumstances by simply stating that, "Protection of these workers is regulated under the Occupational Health and Safety Act and is beyond the scope of this assessment."

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On page 4.7-85 the DEIS states that PAHs were major contaminants of concern after the Exxon Valdez oil spill, but that there was an ongoing debate about the sources of PAHs in Prince William Sound, including past anthropogenic sources and a natural background signal from oil seeps, oil shale, and coal. While the DEIS does state that oil spills have the most potential for food chain impacts because of bioaccumulation in shellfish, it should expand the discussion to state that the differentiation between the PAH sources is of more than academic interest. The source of PAHs (crude oil vs. coal and oil shale) is important because those PAH originating in oil can leach into the water column and thereby become more bioavailable. PAHs in coal and oil shale do not bioaccumulate in marine organisms. In this context, we would also like to stress that if Native Alaskans have higher incidence rates of stomach and digestive cancers (possibly associated with dietary PAH exposures from smoked foods), then an increase in PAH exposure from oil-contaminated subsistence resources may cause a greater cumulative impact in that population compared to others. This is an Environmental Justice issue that should be discussed in the DEIS?

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On page 4.7-89 (in section 4.7.7.1.4 Prince William Sound) the DEIS states that loss of terrestrial vegetation and wetlands from continued TAPS operations would be minor. Why aren't the past and continuing wetlands vegetative impacts from the EVOs included in the cumulative impact analysis?

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On page 4.7-90 (in section 4.7.7.2.1 Alteration and Loss of Habitat) the DEIS states that, "Another habitat alteration that may affect fish resources in Prince William Sound is the introduction of non-native organisms from the ballast water of oil tankers." Introduction of nonindigenous species may be a considerable problem with the newer double-hulled tanker fleet where segregated ballast water is (currently) dumped directly into the waters of Prince William Sound and Port

113-274

Valdez. While the DEIS correctly identifies this as a potentially serious cumulative impact, the document should also at least consider possible alternatives or mitigative actions to counteract this influx. Because of the difficulty in treating the large water volumes involved, just stating that "ballast water treatment would minimize this impact" does not address the issue. Should all segregated ballast water be treated? If so, how? Chemicals, ozone, filtration, pH adjustments, etc. will all potentially affect the receiving waters of Port Valdez, and potential options should be assessed in the DEIS.

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(Cont.)

On page 4.79-93 (in section 4.7.7.2.4 Effects of Oil, Fuel, and Chemical Spills on Fish) the DEIS states that direct mortality of fish due to oil spills has seldom been documented, although impacts on fish in natural environments have been inferred on the basis of laboratory studies. The DEIS then acknowledges that the Exxon Valdez oil spill probably had some impacts on fish, including pink salmon and herring; but, it is also stated in the DEIS that there is no consensus on the extent and duration of the impacts on those species. The DEIS then concludes by stating that by 1995 it appeared that fish populations and habitats had largely recovered. This treatment ignores the ongoing impact to the herring fisheries in Prince William Sound, which still have not recovered. Likewise, the impacts of oiled intertidal habitats are still causing problems with harlequin ducks and sea otters in selected areas of Prince William Sound (Short et al. 2002; Ballachey et al. 2000a,b; Monson et al. 2000; Esler et al. 2000; and Trust et al. 2000). The DEIS should not simply ignore the numerous studies that have been completed or are still underway with the blanket statement that "by 1995 fish populations and habitats had largely recovered."

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On page 4.7-102 (in section 4.7.7.4 Threatened, Endangered, and Protected Species) the DEIS as states that past and present activities that contribute to the cumulative impacts are part of the existing baseline and are described elsewhere in section 3.22. Only past activities or events whose impacts still influence the status of listed or protected species are considered in this section. Also, only petroleum spills in the "anticipated" or "likely" categories are considered in the cumulative impact and evaluation. Large spills in the "unlikely" or "very unlikely" categories are not included in the discussion. Any cumulative assessment of past, present, and future environmental impacts will be incomplete if the impacts of the largest oil spill in U.S. history (i.e., the EVOS) are ignored.

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Table 4.7-9 (on page 4.7-103) states that the 'existing baseline incorporates the effects of current ongoing activities and residual past effects (i.e., effects of past activities that continue to influence baseline conditions).' The data Table 4.7-11 appear to indicate that EVOS is now a part of the "baseline" and that very large spills are "unlikely" or "very unlikely" to occur having "impacts ranging from no

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effect to large effect depending on the location and extent of the area affected." The DEIS should address the issue, and place a separate table in this section that specifically delineates the cumulative impacts to threatened, endangered, and protected species that can be attributable to EVOS.

On page 4.7-107, the DEIS states that "anticipated" or "likely" spills are expected to be relatively small, and if existing oil spill contingency plans for response and cleanup are followed, any impacts from the spills should be short in duration. "Large spills (not included in Table 4.7-11) that are considered "unlikely" or "very unlikely" could contribute substantially to the cumulative impacts on listed and protected species in Prince William Sound." "The impacts of such a spill would depend on many factors including location, weather, time of year, and area affected." Large spills should be included in Table 4.7-11, even the one that occurred in the first 25 years of TAPS operations.

113-277
(Cont.)

On page 4.7-110 (in section 4.7.8.1 Subsistence) the DEIS states that the greatest potential impact to Prince William Sound would be caused by disruption of subsistence activities due to a tanker accident. They then qualify that statement, however, by alluding to lowered spill probabilities, the improved tanker Escort systems, and spill containment capabilities that should limit impacts. In addition the DEIS downplays the impact by stating that the size of Prince William Sound should allow adequate avoidance of spill areas in subsistence activities. Stating that people can go fish someplace else appears to be an unreasonable way of addressing this issue. The DEIS should also discuss the problems associated with the perceived impact of potentially tainted or unusable subsistence foods on Native activities.

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In Table 4.7-12 Summary of Anticipated Cumulative Impacts under the Proposed Action (on page 4.7-1 26) the DEIS states that impacts to the public from VOCs are not anticipated to be large cumulative impacts unless a new large source is located near the Valdez Marine Terminal. Also, possible negative impacts to the public might accompany spills accumulating from different actions, however, the impacts would be localized, and it is extremely improbable that spills associated with different activities would occur near human settlements. An oil spill doesn't need to occur near human settlements to have a human health impact. The DEIS should place less emphasis on the point of origin of a spill and consider the fact that containment (as assumed in most of the scenarios) is unlikely to be effective, and that winds and currents can redistribute the oil such that it can strand in intertidal zones near potentially impacted populations. Also the DEIS should not simply dismiss the exposure of citizen cleanup workers with the statement that they should be covered under OSHA. There are numerous reports on human health impacts from EVOS, and they should be given greater attention in the DEIS.

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Finally, the long-term impacts from the Exxon Valdez oil spill should have been given greater consideration in the entire section on cumulative effects of past, present, and future activities. A lot has been learned in the last 13 years of about the effects of oil spills in cold regions, and the impacts of a major oil spill in Prince William Sound in particular. The DEIS should use this information in determining cumulative impact.

3.20 Impact to Subsistence Activities

Along with numerous other stakeholders, the Prince William Sound Regional Citizens' Advisory Council represents the Natives from the villages and communities surrounding Prince William Sound. During the past several weeks of this DEIS review period, we have received a number of comments expressing concerns about the coverage of subsistence activities in the DEIS. Therefore, before continuing with our page-by-page analysis of the document, we include an e-mail received from Patience Anderson Faulkner, a Eyak Native from the Cordova area and Board Member of the PWS RCAC. This e-mail conveys the importance of subsistence activities to Native community structure and eloquently sets the tone for the page-specific comments that follow.

Tuesday, August 13, 2002

Tom,

First: in 2000 I was the person who conducted the demographic data for the Native Village of Eyak and had been collecting it since 1976. There were verifiably over 480 Alaska Native residents in the community at that time; very close to 20%. I wrote the information for a HUD grant. I had just completed the survey for the FVOS subsistence law suit.

Second: When folks participate in the subsistence activities for whatever food substance they are harvesting, they do not parade the food on the hood of their truck, nor carry it out in paper or plastic. They go from the point of harvest to home. The Sound is their grocery store.

Third: Depending on the availability of the food, it is always shared within the community and then throughout the Chugach Region (including Anchorage, etc.) with the relatives. No matter how short it is for us who live in one particular place, we share with others.

Fourth: Our subsistence gathering is primary to our lives. We subsidize it with money from jobs, investments by our corporations. It comes first. It can be a difficult task to be employed and participate in a gathering of resources, but many take time from their work to do so - our vacations are spent harvesting the subsistence foods. We also process foods into the night so that we can have the foods throughout the year. A review of the number of high school drop outs and limited number of

college graduates is indicative of how the stepping out from job oriented goals are to living with the food we have always lived with - food that greatly nourishes our bodies and souls. Look at our rate of unemployment and employable skills.

Fifth: While there are surveys by credible folks on how much subsistence foods are gathered, the number is under counted. Reason: when a surveyor asks about the foods we eat, we may respond with: "My favorite is faces and lips!" When the surveyor reacts in a manner that is not positive (we can read body language, too!); the interview continues, but is toned down. Faces and lips are fish head chowder and lipuska (fried bread).

Sixth: Many family members have a history of discrimination and have a difficulty of sharing intimate details of their daily lives. What did you eat for dinner last night? And the night before?

Seventh: Subsistence is also a process to perpetuate the cultural activities. A youth learns to share his/her harvest with his/her Elders with the first time catch/gathering. This provides an opportunity to instill a valued place in the community. The Elders have an opportunity to share their wisdom and the youth begins the long road in the rites of passage. With limited subsistence foods, the focus diminishes. The Elders die and the youth becomes distracted with neon lights of the greater society.

Good comments on RCAC's position. Hope this helps.

Patience Andersen Faulkner

In Section 3.23.5 Subsistence, only two paragraphs are devoted to the subject of subsistence fishing and hunting. While the subsistence harvest of food only represents two percent of the fish and game harvested annually in Alaska, that harvest contains about 35 percent of the caloric requirements of the rural population. In some areas, subsistence products provide more than 50 percent of the daily caloric requirement. After clearly identifying the importance of subsistence hunting and fishing to Native populations, the DEIS then attempts to equate subsistence activities to dollar value by applying three dollar and five dollar per pound replacement values. With this approach the replacement value of subsistence products is estimated to be between \$160 million and \$267 million. This approach does not consider the cultural importance of these activities toward community structure and maintaining the Native heritage as well as the importance of these traditional foods to Native health. There is no mention of the impact of TAPS and ongoing oil and gas resource development on subsistence activities, and nothing is said about the disruption to subsistence activities and community structure in the villages surrounding Prince William Sound after the Exxon Valdez oil spill.

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Page 3.23-2I notes that over the period from 1996-2001, of the total TAPS contracting expenditures of \$1.9 billion, \$0.759 billion (39 percent) was awarded to Alaska Native corporations. It appears that some type of equivalence between a cash economy and a subsistence economy based strictly upon cash is being made. Again, this ignores the cultural aspects of subsistence economies.

113-283

In Section 3.24, Subsistence, the DEIS deals exclusively with subsistence issues and their importance to the Native communities. In 1999, there were over 123,000 persons eligible (on the basis of the Federal rural residency requirement) for subsistence activities. The most important subsistence food by weight is fish (60 percent), followed by land mammals (20 percent), marine mammals (14 percent), birds (two percent), shellfish (two percent), and plants (two percent). Commercial fishing far outstrips subsistence and recreational harvests accounting for about 97 percent of total fish and game harvested during the 1990s, compared with two percent taken for subsistence by rural residents and one percent taken by recreational hunting and fishing.

In Section 3.24.1.4, Chenega Bay, the DEIS indicates that nearly 80 percent of the population in Chenega Bay is involved in fishing for subsistence purposes (1997). Subsistence collections before Exxon Valdez oil spill had declined (42 percent) from levels in the 1960s. Continuing declines in subsistence activities are occurring although they are not quantified in the DEIS. Reasons for the continued decline in subsistence activities include: persistent effects (contamination) from the Exxon Valdez oil spill; shortages of seals, sea lions, clams, octopus and some ducks; certain regulations affecting subsistence harvest of salmon; and competition for deer by non-local or recreational hunters. There is no discussion in the DEIS of impacts immediately after the Exxon Valdez oil spill in 1989 through 1993.

113-284

In Section 3.24.1.7, Cordova, the DEIS states that the population of Cordova was 2,454 in 2000, 10.4 percent of whom were Native. Wage labor dominates the economy of Cordova, with most employment associated with commercial fishing or fish processing. Nearly 80 percent of the households in Cordova fished for subsistence in 1987 with another 47 percent hunting large land mammals. The DEIS states that subsistence concerns identified by local residents included both contamination and environmental damage associated with the Exxon Valdez oil spill in 1989; however, no additional details are provided (see Fall 1999 for additional details). There was no mention of the impact to the village of Cordova due to commercial fisheries closures following the Exxon Valdez oil spill or the lack of recovery of herring since 1993.

113-285

In Section 3.24.1.16, Nanwalek, the DEIS states that the population of Nanwalek in 2000 was 177, nearly 90 percent of whom were Native. Subsistence concerns

identified by the local residents during the late 1980s and early 1990s included persistent contamination problems resulting from the Exxon Valdez oil spill; low populations of seals, sea lions, some waterfowl, sockeye salmon, and a number of marine invertebrates; and competition with nonresidents for black bear, moose, goats, salmon, and halibut. Data collected after the Exxon Valdez oil spill indicated substantial declines in subsistence activities (Fall 1999).

In Section 3.24.1.19, Port Graham, the DEIS states that the settlement of Port Graham contained 171 people in 2000, nearly 85 percent of whom were Native. The economy of Port Graham is mixed: wage employment is available in the nearby cannery and hatchery, and 15 residents held commercial fishing licenses in 2000. Subsistence plays an important role in the village economy, and fishing is the most dominant activity, contributing 220 pounds per capita in 1997. More than 90 percent of the households were involved with subsistence fishing. Subsistence concerns included persistent problems due to contamination from the Exxon Valdez oil spill; habitat destruction from logging; low populations of seals, sea lions, some waterfowl, sockeye salmon, and a number of marine invertebrates; and competition with nonresidents for black bear, moose, goats, salmon, and halibut. Subsistence activities declined for several years following the 1989 Exxon Valdez oil spill (Fall 1999).

In Section 3.24.1.23, Tatitlek, the DEIS notes that Tatitlek is located approximately 17 miles southwest of the Valdez Marine Terminal. The 2000 census recorded 107 people in Tatitlek, with more than 84 percent Native. The village economy relies on both cash income and subsistence. Seasonal wage employment is available from fish processing and oyster farming, and in 2000, three residents held commercial fishing licenses. However, subsistence activities continue to provide most of the food items and other resources used by the community. As with other coastal communities, a large variety of subsistence resources are exploited, including: marine mammals and invertebrates, fish, large and small land mammals, and birds. Fifty percent or more households participated in harvesting from each of the main resource categories except small land mammals. The subsistence harvest area for Tatitlek includes several parts of Prince William Sound in the immediate vicinity of the Valdez Marine Terminal. Subsistence concerns included persistent problems resulting from the Exxon Valdez oil spill; low populations of seals, sea lions, some waterfowl, herring, sockeye salmon, a number of marine invertebrates, and deer; and competition for salmon and herring roe with nonresidents or commercial operations. Studies focusing on subsistence changes following the Exxon Valdez oil spill indicated declines did occur for several years following the 1989 event (Fall 1999).

The Port of Valdez is not considered in section 3.24.1 covering subsistence activities.

113-286

The final section on subsistence covers the importance of improved transportation technology (Section 3.24). In that various alternatives considered in the DEIS might effect access to traditional subsistence areas, the topic of access is given additional emphasis in terms of understanding modern subsistence activities in Alaska. The issue of the necessity for cash to purchase some machines, boats with engines, rifles, etc. and maintenance of these items is also covered. "Just as the introduction of dog sleds in the Alaska of the past required increased harvest of fish for dog food, modern technology requires sufficient cash to acquire and maintain modern subsistence technology."

Section 3.24.3 Sport Harvests vs. Subsistence notes increased access via the Dalton Highway and access roads to parts of northern and interior Alaska have been seen by many Natives as a significant impact to subsistence activities over the past two to three decades. The data in Figure 3.24-2 clearly show that harvest totals for numerous species have increased over time in the vicinity of the TAPS, and this most likely results from improved access by both Native and non-Native hunters.

During public scoping meetings several individuals pointed to reduced access to caribou, primarily because of changing or disrupted migration patterns, as being important TAPS-related impacts on subsistence (Section 3.24). The DEIS claims that the data do not support changes in migration patterns that can be directly attributed to the TAPS (page 3.24-27). Studies of caribou behavior indicate that movements vary widely, and it is difficult to attribute changes in movement between years or over long periods of time to single causes (e.g., ADF&G 1986b). Many people feel that disruption of the lead animals early in the migration process has major impacts on herd movements, although there is no evidence that the TAPS ROW or Dalton Highway have had adverse effects on herd movement at the population level (TAPS Owners 2001a). Although data indicate that the size of certain caribou herds has increased considerably in recent decades, the issue of shifting location (and hence geographic availability to various subsistence hunters) remains unresolved (page 3.24-27).

Page 3.24-28 concludes by stating 'overall, as was the case with terrestrial mammals, available evidence of subsistence fishing -- notable changes in subsistence versus sport fishing over time and possible TAPS impacts -- largely are inconclusive.' It is believed, however, that monitoring and subsequent establishment of regulations to manage fisheries along the TAPS ROW largely have been successful.

Section 3.25 of the DEIS discusses Sociocultural Systems and Table 3.25-1 summarize directly affected villages in the vicinity of the TAPS (on page 3.25-6) using a breakout of sociocultural groups. Table 3.25-2 presents selected characteristics of regional sociocultural systems. Today, the Chugach Alutiiq in the vicinity of the TAPS reside primarily in Cordova. Other communities containing Chugach included Chenega and Tatitlek. All three communities have been identified as possibly experiencing TAPS-related impacts, as have other Alutiiq (Unegkurmiut) villages of Nanwalek and Port Graham on the Kenai Peninsula (BJM 2001a; see also Davis 1984). Many Chugach Alutiiq today are living primarily through wage labor, working for businesses in Cordova and other communities or pursuing commercial fishing. However, the importance of Chugach Native heritage persists, primarily in the continued pursuit of subsistence to supplement a wage-based economy and the frequent reference to kinship in social interactions. The impact of the Exxon Valdez oil spill on this cultural heritage is not adequately covered in the DEIS.

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On page 4.4-94 (in section 4.4.4.7.4 Impacts from Foodchain Exposures Resulting from Spills to Water) the DEIS concludes that after the Exxon Valdez oil spill, subsistence foodchain exposures were as follows: the PAH levels were low in finfish and marine mammals (blubber). Smoking the fish significantly increased PAH levels making the smoked fish more toxic than non-smoked EVOS-exposed fish. The upper bound lifetime cancer risk for ingesting contaminated shellfish was 2×10^{-6} versus 2×10^{-4} for ingestion of smoked salmon. In a reassessment of foodchain risks associated primarily with contaminated shellfish two data sets were used from NOAA analyses completed in 1989 and 1991. Mussel data from Windy Bay in July 1989 showed the highest levels from among the 13 subsistence use areas investigated as a result of the Exxon Valdez oil spill. The second data set evaluated in the DEIS was collected from Windy Bay in April 1991. The sum of the 15 PAHs examined in the 1989 data set was 160 ppb; the sum of the PAHs for the 1991 data set was 2 ppb (and many of the individual PAH were below the method detection limit). Clearly the mussels had undergone significant depuration over the two-year period after the initial exposure from the Exxon Valdez oil spill. By way of comparison, the TPAH attributed to the effluent from the ballast water treatment facility measured in mussels as part of the PWS RCAC LTEMP in Port Valdez ranged from 87-500 ppb (excluding samples after the Eastern Lion and BWTF oil spills) at the Valdez Marine Terminal and from 80-900 ppb at Gold Creek, 6 km across the Port. From these data, it is obvious that the "background" levels within Port Valdez are higher than the post-EVOS levels of subsistence concern measured at Windy Bay. Therefore, it is not appropriate to simply dismiss the BWTF discharges as being within NPDES limits as is done throughout the DEIS.

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To put all these values into the context of a human health perspective, the smoked salmon analyzed as part of the NOAA study had average total carcinogenic PAHs in edible tissue of 8,700 ppb (page 4.4-98). Caution must be exercised in comparing PAH contamination from smoking foods to PAH from exposure to crude oil. Cancer risk calculations include only 15 PAH whereas crude oil contains over 100 different PAH compounds (most selected-ion-monitoring GC/MS methods used in state-of-the-art chemistry laboratories today focus on 43-45 different components). The toxicological response to exposure to these more complex mixtures is more difficult to predict than from a single chemical exposure. As noted on page 4.4-98 of the DEIS, the threefold increase in stomach cancer in Alaska Natives might be associated with frequent ingestion of smoked foods. With this increased rate of stomach cancer, however, any additional exposure to PAHs should be avoided whenever possible.

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On page 4.4-122 (in Section 4.4.4.14 Subsistence) the impacts of oil spills in Prince William Sound from TAPS activities are discussed. The bulk of the discussion centers around the "very unlikely" rupture of a crude oil storage tank that allows more than 143,000 barrels (6 million gallons) of oil to reach the waters of Port Valdez at the Valdez Marine Terminal. The DEIS states that subsistence resources -- fish, invertebrate marine species, seabirds and shorebirds, and possibly certain marine mammals (e.g., sea otters) can be adversely affected by such a spill. However, the DEIS adds that "given the limited spatial dispersal of oil under this scenario, the area affected would be small relative to the entire Prince William Sound and its coastline." The inadequacy of the spill scenario and the drastic underestimation of the affected shoreline have been discussed previously in this review and they will not be considered again at this point. It is important to add, however, that even if the shoreline contamination were kept to a minimum (which is unlikely) the perception that subsistence resources are contaminated or unusable may be more important than the actual level of contamination present.

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With regard to the impacts of ongoing TAPS activities on subsistence resources, it should be pointed out that PAH contamination from BWTF discharges in intertidal mussels in Port Valdez appears to be greater than the levels measured in 1989 in Windy Bay that caused concern following the EVOCS. As such, there is a non-spill impact to subsistence activities from ongoing TAPS operations that has not been considered in the DEIS.

113-290

3.21 Waste Disposal

On page 4.3-28 the DEIS states that incineration of domestic and nonhazardous industrial solid waste at the pump stations and the Valdez Marine Terminal have played a pivotal role in solid waste management by providing for substantial volume reductions to wastes requiring disposal. Solid waste and ash from the

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incineration process is landfilled. Alyeska is a minor contributor to most landfills, and Glennallen and Valdez receive only 22 percent and 14 percent of their total waste from Alyeska, respectively. The DEIS should state what provisions are implemented to ensure that this incineration process does not introduce hazardous air pollutants to the atmosphere near Valdez. Is the ash tested for leachability of hazardous constituents before disposal at either the Glennallen or Valdez landfill?

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(Cont.)

On page 4.3-34 (section 4.3.12.6 Special Wastes) the DEIS implies that small quantities of medical wastes are currently incinerated at VMT. What provisions are implemented to ensure that complete destruction of those wastes occurs and that the ash is completely sterilized before being disposed of at the Valdez landfill?

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On page 3.4-35 the DEIS states that spill contaminated soil is subject to thermal treatment as per ADEC guidelines. Furthermore, it adds that no additional stockpiles of contaminated spill debris are expected to be necessary with the proposed action. Given the large quantities of spill debris that are generated during an oil spill cleanup, and the 1,562 tons of spill debris currently stockpiled at the Valdez Marine Terminal, the DEIS should devote more than one paragraph to the treatment and disposal of spill contaminated materials.

113-293

3.22 Economic Issues

On page 4.4-119 (in section 4.4.24.13.2 Recreation and Tourism) the DEIS should quantify the impact on lost revenues from declines in tourist and recreational fishing activities in Prince William Sound as a result of the Exxon Valdez oil spill.

113-294

3.23 Sociocultural and Environmental Justice Issues

On page 4.4-123 (in section 4.4.4.15 Sociocultural Resources) the DEIS states that even if a "very unlikely" terrestrial spill devastated a piece of ground as large as 84 acres and had large negative impacts on local bird or terrestrial mammal populations, that such an event would not directly affect any Alaska Native villages or rural non-Native communities considered in the DEIS. Specifically, "If a spill affected land relied upon by some or all members of the Alaska Native or non-Native community, those individuals could shift their activities to avoid the spill area and focus on terrestrial resources elsewhere without undue difficulty." That sounds a little bit like Marie Antoinette saying, "Let them eat cake." Likewise, the DEIS goes on to state, "The consequences of such an occurrence would not be expected to translate into impacts on sociocultural systems (changing economic orientation, kinship patterns, authority structures, etc.)." That was certainly not the case after EVOB (albeit a marine rather than land-based spill that affected much more than 84 acres), because the authority structures in many Native communities were turned upside down. Not

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surprisingly, many elders did not have any experience in oil spill response, oil toxicity, or its anticipated persistence, and as a result, their position in the community was affected. They were no longer looked to for knowledge, leadership, and guidance. None of these or other issues were addressed in the DEIS.

113-296
(Cont.)

On page 4.4-125 (in section 4.4.4.15 Sociocultural Resources) the DEIS again assumes that because only a relatively small area would be affected (even from the 143,000 barrel spill of crude oil at the Valdez Marine Terminal) that the spill would not have a large impact on sociocultural systems in the Prince William Sound area because of the "ability of peoples in the region relying on subsistence fishing, hunting and gathering, and commercial fishing to avoid the relatively confined impact area." At least in this instance the DEIS acknowledges that perceptions of tainted fish impacts to commercial and subsistence fisheries closures are in some cases equally or more important than the actual levels of contamination, and that in the future, these fears could possibly be exacerbated by prior experience with the Exxon Valdez oil spill. However, the DEIS then goes on to state that based on experience from EVOS, sociocultural impacts from another large "very unlikely" oil spill may not be large or last a long time despite the large negative effect on local economies. That statement is hard to accept at face value, and additional input from the Natives in Tatitlek, Nauwalack, or Chenega Bay should be presented in the DEIS.

113-297

On page 4.4-143 (in section 4.4.4.19 Environmental Justice) the DEIS states that there might be a short-term positive impact from an oil spill in the form of employment of local people on cleanup crews. Such activities could provide wage employment in areas where jobs paying cash are often hard to find. If individuals living close to the spill are hired, the relatively large percentage of low-income and minority residents near the TAPS, coupled with agreements for employment between Alyeska and selected Alaska Native villages, suggests that environmental justice populations would be among the beneficiaries of spill-related employment. The DEIS does not point out, however, that this employment opportunity might be offset by increased Native exposure to toxic hydrocarbons including BTEX and PAHs through both inhalation and dermal contact. Given the already cited increase in some cancer rates in Native vs. White populations, that may not be an acceptable tradeoff.

113-298

4 Conclusions and recommendations

4.1 Citizen participation in resolution of oil transportation issues affecting them

Comment Period of 45 Days is inadequate. A comment period this short, in effect, denies interested citizens the opportunity to participate in the public input process. The purpose of a public comment period is to give citizens the opportunity to provide information that might affect the decision-making processes. Many of the decisions that could benefit from citizen input already appear to have been made. We note the citizens' input process is *pro forma* in all respects and also is largely lacking in substance.

113-299

4.2 Adequacy of DEIS to 30 year renewal period

The Executive Summary notes that an additional NEPA review would be necessary to dismantle the existing TAPS. In order for all options to be properly considered the impacts of terminating the pipeline operations and dismantling the TAPS should also be addressed in greater detail in the current DEIS. The fact that this option was given less consideration reflects the bias of the DEIS authors in preparing the document. The DEIS should be revised to include a rigorous evaluation of the non-renewal alternative.

113-300

There is inadequate discussion of biological impacts from non-Exxon Valdez spills during the past approximately 30 years of routine TAPS operations. Figure 4.4-1 (page 4.4-11) summarizes information for the largest historical spills for pipeline and Valdez Marine Terminal operations over the past approximately 30 years of routine TAPS operations. Some of the latter spills are associated with large release volumes (e.g., 672,000 gallons/16,000 barrels from the pipeline near Steele Creek at MP-474 in February 1978). No discussion of potential biological impacts for these historical spills is provided in Section 4.4.1.1. A brief discussion is presented in Section 3.3.3 for the status of existing contaminated sites related to construction and operational activities of the TAPS, although the latter does not address any associated biological impacts that may have occurred at the sites. For perspective, information for biological impacts of non-Exxon Valdez spills during the past approximately 30 years of routine TAPS operations would be helpful to include in the DEIS.

113-301

Page 4.7-94 states that cumulative impacts on fish of the 30 year and less than 30 year renewal period would be similar. This statement is unclear because the probability of an oil spill likely increases with increased operating time of TAPS. Thus a reduction in the renewal period should proportionally reduce potential impacts. This statement also appears on Page 4.7-101 and should be clarified.

113-302

PWS RCAC recommends a detailed review of operations and system integrity be performed every 5 years during any renewal period to ensure the assumptions used in the DEIS are correct, including reduction in oil throughput, a transition to a 100% double hull tanker fleet, and no increase in leaks and ecological impacts due to aging of line pipe or catastrophic events (e.g., earthquakes, terrorism).

113-303

4.3 Equivalence of regulatory compliance and environmental impact.

Regulatory compliance has been cited in the DEIS as an indication of lack of environmental impact. These two concepts are not equivalent. It is important to know the environmental impact associated with an operation regardless of whether it is in compliance with existing rules and regulations. In fact, new rules and regulations originate from situations wherein an adverse environmental impact is being caused by a process that is in full compliance with existing rules and regulations. The DEIS should acknowledge the difference between regulatory compliance and environmental impact and should not cite regulatory compliance as evidence of benign environmental impact, especially when evidence to the contrary exists.

113-304

4.4 Reliability Centered Maintenance

The Reliability Centered Maintenance (RCM) paradigm is cited in the DEIS as assuring that TAPS is now well maintained and will be properly maintained throughout the lifetime of any renewal. The RCM process is formal and structured. In general, it is a very useful methodology by which to accomplish maintenance and, in concept, is appropriate for TAPS. However, it appears that the implementation of the RCM for TAPS is flawed because: (1) there is no evidence that the RCM exercises are covering all of TAPS; (2) the decision making process by which TAPS components, facilities, and subsystems are subjected to an RCM analysis has not been formalized and appears to be ad hoc; and (3) action plans regarding implementation of the maintenance activities indicated by the RCM processes have varying and undocumented levels of implementation. Consequently, one cannot use the RCM process as currently being practiced to verify that the TAPS is adequately maintained.

113-305

Consider the problems cited regarding the gravity separation process of the Ballast Water Treatment facility. Several issues are of interest: (1) the problem has been on-going for at least 2 years; (2) an RCM analysis appears to exist for the gravity separation process; (3) the draft report for reasons unknown was not available when PWS RCAC examined the other reports; and (4) the action plan resulting from the RCM for the gravity separation process appears to not have been implemented.

Section 4.1.1.7 Reliability-Centered Maintenance -- JPO Oversight into the Future. The goal of Reliability Centered Maintenance (RCM) is to identify potential maintenance problems and prevent them by focusing maintenance efforts on the systems and subsystems associated with the highest risks and biggest consequences. Unfortunately, as implemented, this approach leaves smaller maintenance issues unattended, and they can cumulatively combine to also cause major problems. See Green Report (Green 2002) for additional details.

113-305
(Cont.)

The DEIS should not be citing the RCM activities as evidence of benign environmental impact when there is evidence that indicates that the level of implementation is substantially incomplete and where there is no evidence to indicate that the RCM program will be used throughout any renewal period.

4.5 Corrosion Control.

Section 4.1.2.3, Corrosion Control Features, briefly describes cathodic protection technologies employed to mitigate corrosion of the buried pipeline. Both impressed-current and sacrificial galvanic anode technologies are used. The descriptions in the DEIS are relatively vague, however, and will not be easily understood by the average citizen as intended by NEPA. In addition, the Corrosion Control inset on page 4.1-11 contains an inaccuracy. It states that, "The metal acts as a cathode (a source of electrons) in a galvanic cell." In actual fact, reduction occurs at the cathode, and it is the anode in a galvanic cell that is in the source of electrons. That is where oxidation occurs (Mahan, 1965). Later in the same inset, the DEIS correctly indicates that sacrificial magnesium anodes connected to the pipe are oxidized (give up electrons) more readily than the iron in the pipe. This type of inconsistency in the explanation is confusing, and it is an example of how inaccuracies throughout the document bring its credibility into question. Also, the DEIS does not readily explain how "corrosion coupons" (made up of the same metal as the pipeline and buried in the same trench but not "bonded" to the pipeline) inhibit pipeline corrosion. Ultimately, there is additional discussion of the use of corrosion coupons in a footnote on the bottom page 4.1-18, but this is just another example of how unwieldy the DEIS is and how difficult it is to ferret out information on any particular topic.

113-306

4.6 Recommendations for renewal of TAPS ROW Grant and Lease

Assumptions cited or implied in DEIS and Commissioners Determination should be included as conditions of renewal and their validity needs verification every 5 years. If the assumptions are found not to be valid, re-evaluation of potential impact is to be re-done.

113-307

The DEIS should also consider cumulative and potential impact for off-normal operations such as those that have been observed in the operation of the Ballast Water Treatment Facility and in the maintenance of the fire protection assets.

113-308

Determine the present state of TAPS and ensure that its condition has been maintained to a level that assures that all of the assumptions underlying the probable impact assessments in the DEIS remain valid for 5 years.

Every 5 years the condition of TAPS shall be re-evaluated with regard to its condition and level of maintenance as a condition for continued operations.

5 Glossary

ADFC - Alaska Department of Environmental Conservation
 AFMP - Alyeska Environmental Monitoring Program
 AHC - aliphatic hydrocarbons
 Alyeska - Alyeska Pipeline Service Company
 AMT - Alyeska Marine Terminal
 APCD - Air Pollution Control District
 APSC - Alyeska Pipeline Service Company
 ANWR - Arctic National Wildlife Refuge
 BLM - Bureau of Land Management
 BOD - biological oxygen demand
 BTEX - benzene, toluene, ethyl-benzene, and xylene(s)
 BWTF - Ballast Water Treatment Facility
 D&D - decommissioning and dismantlement
 DAF - dissolved air filtration
 DEIS - Draft environmental impact statement
 DMR - discharge monitoring report
 EIS - Environmental impact statement
 EVOS - Exxon Valdez Oil Spill
 FDS - Fire Dynamics Simulator
 FID GC - flame ionization detector gas chromatography
 GC/MS - gas chromatography/mass spectrometry
 GCC - Gold Creek sampling site
 HAP - hazardous air pollutants
 IDLH - Immediately Dangerous to Life and Health
 K_{ow} - octanol/water partition coefficient
 PWS RCAC LTEMP - Long Term Environmental Monitoring Program
 MDL - method detection limit
 MGD - millions of gallons/day
 NMFS - National Marine Fisheries Service
 NOAA - National Oceanographic and Atmospheric Administration
 NOEC - no observable effect concentration
 NPDES - National Pollutant Discharge Elimination System
 PAH - polynuclear aromatic hydrocarbons

PPE - personal protective equipment
PWS RCAC - Prince William Sound Regional Citizen's Advisory Council
ROW - right of way
SERVS - Ship Escort Vessel Response System
SIM - selected ion monitoring
TAQH - total aqueous hydrocarbons
TAPS - Trans Alaska Pipeline System
TOC - total organic carbon
TON - total organic nitrogen
TPAH - total PAH
TSS - total suspended solids
UV - ultraviolet
VMT - Valdez Marine Terminal

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Responses for Document 00113

- 00113-001:** Impacts from the operation of the TAPS are addressed for routine operations in Section 4.2.1, "Factors Resulting From the Existence of TAPS Facilities," and for non-routine events in Section 4.2.5, "Non-Routine Factors—Spills Hazards under the Proposed Action." In addition, the descriptions of the affected environment in Section 3 include environmental changes that have occurred as a result of TAPS construction and past operations. Experience gained during operation of the TAPS to date in both cases is considered in the analysis of impacts in the proposed action and alternatives.
- 00113-002:** The BLM believes that all impacts of normal future TAPS operations have been addressed. This summary statement has been further responded to where specific examples are identified later in the Prince William Sound Regional Citizens' Advisory Council comment letter.
- 00113-003:** Spill scenarios, including the catastrophic guillotine break scenarios caused by the crash of a helicopter or a fixed-wing aircraft into the pipeline are discussed in Section 4.4.1 of the EIS. The estimated impacts associated with such scenarios are provided in Sections 4.4.2 through 4.4.4. In most cases the assumptions made resulted in estimates that are conservative in nature, that is, they resulted in impacts that are more severe than what would be encountered under real conditions.
- 00113-004:** As part of the application for renewal process, the applicant provides the BLM with a description of how TAPS would be operated. The description of the operation then becomes a component of the extensive impact analysis conducted by the BLM.
- 00113-005:** Thank you for your comment.
- 00113-006:** We disagree that the depth of analysis was insufficient with respect to identifying the potential impacts of inadequate system maintenance. Important impacting factors directly related to inadequate maintenance as well as impacting factors associated with the maintenance activities themselves are introduced in Section 4.1, including a discussion on how system maintenance, monitoring, and surveillance can serve to mitigate environmental impacts from TAPS operations. The existing TAPS operating record provides a unique opportunity to use empirical data to evaluate the environmental impacts from TAPS operations, including system failures due to inadequate maintenance as well as other factors. These empirical data were incorporated into analyses of environmental impacts in order to replace, to the greatest extent possible, speculation and theory with actual observation and measurement. Likewise, the operating record formed the basis for the impacts associated with waste generation and management associated with normal and off-normal TAPS conditions, as well as accidental spills and releases.

Finally, we note that JPO's oversight activities are now focused strongly on monitoring and surveillance for system integrity and on the adequacy of APSC's response to data collected through such activities. The EIS also discusses the adaptive nature of the JPO oversight authority and the various JPO directives that have been issued, some of which require modifications to existing maintenance programs to improve system reliability or the ability to track system performance. Further, in recognition of the potential adverse consequences to public health and the environment that can result from system or component failures, JPO and APSC have recently introduced a new maintenance paradigm: Reliability-Centered Maintenance (RCM). RCM will continue to place focus on maintenance for system integrity and reliability and ensure that maintenance resources are applied to those system components whose failure represents the greatest safety, health and environmental consequences.

- 00113-007:** TAPS permit and regulatory effluent and emission levels are established through a regulatory process, which includes all available scientific data as well as public participation, to ensure there are no adverse effects on the environment if those permit conditions are met. That is not to say there is no discharge or emission of contaminants from TAPS operations and no resulting impact to environmental media. The DEIS does not conclude that compliance with environmental regulations and permits results in no effects to existing environmental quality. The DEIS does address short-term and long-term impacts of the emissions and discharges from TAPS operations to the environment and public health.
- 00113-008:** The age, condition, operation, and maintenance of TAPS was considered in the preparation of the DEIS. The possibility of pipeline failure is addressed in the spill analysis. In estimating the frequencies and spill volumes for future spills, both the historical data from past spills and the potential for catastrophic spills of large consequence were considered.
- The EIS focuses its attention on those off-normal events that are expected to have public health and environmental consequences. Thirteen credible spill scenarios are identified and analyzed. Many of these spill events are precipitated by off-normal conditions within TAPS. Further, the EIS describes those design elements of the pipeline that are intended to provide controls and mitigations of impacts that can result from off-normal conditions. The surge tanks present at some pump stations that would serve as temporary storage for oil in the event that overpressure or other system failures occur are one example of such design features. The mainline RGVs and check valves are also examples of how impacts to the environment would be mitigated or limited in the event of off-normal conditions through existing design elements.
- In addition, the reader is referred to 4.1.1.8, "Coordinated Planning and Response to Abnormal Incidents."
- 00113-009:** Thank you for your comment.
- 00113-010:** The reader is referred to Section 2.5 of the FEIS, "Alternatives and Issues Considered but Eliminated from Detailed Analysis."
- 00113-011:** Thank you for your comment.
- 00113-012:** The BLM believes that the past, present, and future impacts of the proposed action have been adequately addressed. This summary comment has been addressed in detail where specific examples have been identified in later portions of the Prince William Sound Regional Citizens' Advisory Council's comment letter.
- 00113-013:** Thank you for your comment and the provided information. The referenced review comments were considered. See Section 4.1.1.7 of the FEIS.
- 00113-014:** The reader is referred to Section 2.5 of the FEIS, in which audits are addressed under Alternatives and Issues Considered but Eliminated from Detailed Analysis.
- 00113-015:** The reader is referred to Section 2.5 of the FEIS, in which audits are addressed under Alternatives and Issues Considered but Eliminated from Detailed Analysis.

- 00113-016:** To the extent possible, Sections 3.18, 3.19, 3.20, 3.21, and 3.22 contain descriptions of the impacts resulting from TAPS construction and operation. Information availability varies considerable among different species and taxonomic groups depending on the sensitivity and importance of the resource. For instance, relatively good information is available on the types of habitats that have been affected and studies of protected and endangered species provide some information on the effects of TAPS construction and operation. Information is also available on the affect of oil spills, largely as a result of the Exxon Valdez oil spill. Where the information is relevant to the reauthorization of TAPS and alternatives, it has been addressed in Section 4.7, "Cumulative Impacts." Past and present impacts are addressed to provide a basis for understanding those future impacts. The EIS does not attempt, nor is it the purpose of the EIS, to provide an exhaustive evaluation of past impacts.
- 00113-017:** The EIS mentions the cash value of subsistence only once, in Section 3.23.5, and then notes the difficulty in assessing subsistence in such a manner. In contrast, the EIS identifies three roles played by subsistence: economic (in the sense of providing important resources, not in cash terms), sociocultural, and ceremonial (Section 3.24). The latter two roles refer in particular to Alaska Natives, although subsistence is defined based on rural residency (consistent with the current federal definition). The EIS examined every rural community in the vicinity of the TAPS for which subsistence data exist with these criteria in mind. That is, for a community where the vast majority of households harvested or used a wide range of subsistence resources, the preparers of the EIS considered this community benefiting in economic, sociocultural, and ceremonial ways (the latter two again referring in particular to Alaska Natives).
- 00113-018:** The Grant/Lease holds APSC responsible for maintaining normal operating conditions throughout the Federal Grant period. The design basis for TAPS has undergone review and approval, as have any subsequent changes to the design basis. Thus, the normal operating condition of TAPS is a legitimate reference point from which to identify and evaluate environmental impacts. However, the substantial operating record of TAPS provides a unique opportunity to reflect on the environmental impacts that have resulted from past occasions of off-normal conditions, including wholesale failures that have resulted in releases of oil to the environment. These off-normal conditions and their subsequent environmental impacts were incorporated into the assessment of environmental impact, as were the design basis changes and additional controls that were established to preclude future impacts to the environment from off-normal conditions. The passage of the Oil Pollution Act and the substantial strengthening of contingency planning that it directed are examples of how adjustments have been made to past off-normal events. See the text box in 4.1.1.8 for a discussion on how the pipeline contingency plan has changed because of lessons learned as a result of the October 2001 bullet hole incident near Livengood.
- Buildup of waxy solids in tanks at the Ballast Water Treatment Facility has received considerable attention by the JPO and APSC, as well as by citizen groups such as PWS RCAC. There is concurrence on an appropriate course of corrective action. See the text box in Section 4.3.13.1.3.
- 00113-019:** If TAPS were designated as a historically significant structural complex eligible for listing on the National Register of Historic Places, dismantlement would trigger consultation with the State Historic Preservation Officer to determine appropriate mitigation measures associated with removal. It is unlikely that such mitigation would preclude removal of the pipeline, with the possible exception of representative examples. Full evaluation of dismantlement, removal, and restoration (i.e., termination) activities will require separate National Environmental Policy Act documentation. The scope of this EIS could not cover detailed termination plans. Indeed, extensive engineering and environmental data will need to be collected prior to any termination decisions. However, Chapter 2 provides the basic assumptions of no action, and these basic assumptions were used in the EIS analyses.
- 00113-020:** Text has been added to the EIS providing additional sources of information on the impact of the spill on communities, fisheries resources and tourism in the Prince William Sound area.

- 00113-021:** Although 45 days is understandably a short time to review a document of this size, the time period is consistent with the Council on Environmental Quality regulations for implementing the National Environmental Policy Act regarding the review of draft environmental impact statements. Significant effort was made to advise people of the schedule and duration of the review well in advance (one year). The DEIS was published on schedule and many substantive comments on the content of the DEIS, including yours, were received during the 45-day period.
- 00113-022:** References have been added to and deleted from the EIS in response to public comments between the draft and final. All references and citations have been cross-checked to ensure that the citations are indeed listed in the references. The 13 citations provided in the comment as being not listed in the references were referenced in Section 3.30 of the DEIS, with two exceptions; those two references have been added to the FEIS.
- 00113-023:** Although 45 days is understandably a short time to review a document of this size, the time period is consistent with the Council on Environmental Quality regulations for implementing the National Environmental Policy Act regarding the review of draft environmental impact statements. Significant effort was made to advise people of the schedule and duration of the review well in advance (one year). The DEIS was published on schedule and many substantive comments on the content of the DEIS, including yours, were received during the 45-day period.
- 00113-024:** The reader is referred to Section 2.5 of the FEIS, "Alternatives and Issues Considered but Eliminated from Detailed Analysis."
- 00113-025:** The reader is referred to Section 2.5 of the FEIS, in which audits are addressed under Alternatives and Issues Considered but Eliminated from Detailed Analysis.
- 00113-026:** The reader is referred to Section 2.5 of the FEIS, "Alternatives and Issues Considered but Eliminated from Detailed Analysis."
- 00113-027:** The reader is referred to Section 2.5 of the FEIS, "Alternatives and Issues Considered but Eliminated from Detailed Analysis."
- 00113-028:** The reader is directed to the discussion of escrow funds found in Section 2.5.
- 00113-029:** The oil spill prevention and contingency plans along the pipeline, at Valdez Marine Terminal, in Prince William Sound, and at the North Slope are summarized in Section 4.1.4 of the EIS. References are provided from Section 4.1.4 to the detailed planning documents for those four areas. Those documents are updated and reviewed by various state and federal agencies periodically—ranging from every year to every 5 years. The substantive elements of the contingency plans are controlled by ADEC rules (18 AAC 75), which include provisions for public review and comment as part of the plan update procedures. The lessons learned from occurrences such as the Exxon Valdez oil spill and the MP 400 bullet hole incident are incorporated into the documents when they are updated. It is worth noting that the federal Oil Pollution Act of 1990 was, in effect, a lessons-learned from the Exxon Valdez oil spill and has required substantially more contingency planning with respect to tanker movements in Prince William Sound. These issues addressed in the Prince William Sound Contingency Plan. The EIS team used the information that was available in the latest versions of the spill prevention and contingency plans as discussed in Section 4.1.4 and Section 4.4 of the EIS. Section 4.4 of the EIS provides the spill scenarios considered and the estimated impacts from those scenarios. The scenarios range from high frequency/low consequence events to low frequency/high consequence occurrences. The discussion includes potential impacts in the Copper River drainage area. Oil spill prevention and response capabilities and related activities specific to the Copper River drainage area are discussed more fully in a text box that has been added to Section 4.4.4.3.

00113-030: As part of the application for renewal process, the applicant provides the BLM with a description of how TAPS would be operated. The description of the operation then becomes a component of the extensive impact analysis conducted by the BLM.

00113-031: Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10. The discussion in Section 4.4.4.10.2 of the effects of the Exxon Valdez oil spill on fish resources has been expanded and includes additional citations. Text has been added to Section 4.4.4.10.1 to reiterate the importance of the Copper and Lowe Rivers for salmon production in the area and to recognize the potentially severe impacts to salmon in the event of a large spill entering those rivers. Please refer to the text box in Section 4.4.4.3 for a discussion about oil spill prevention and response capabilities and related activities specific to the Copper River Drainage area.

00113-032: Table 2.1 is a summary of direct and indirect impacts related to the three alternatives. It does not include consequences of oil spills or cumulative effects. Past events are addressed in Section 4.7, "Cumulative Effects." Section 4.7.7.3.5, "Spills," includes a discussion on the effects on wildlife of the Exxon Valdez oil spill.

00113-033: The affected environment as it exists today, includes the impacts of the past 30 years of TAPS operations. Where appropriate, the affected environment section (Section 3) of the TAPS EIS discusses these past operational impacts. The proposed action would result in continued operation of TAPS for the next 30 years. The assessment of impacts of the proposed action are, where appropriate, based on the knowledge of the past impacts of 30 years of operation, projected for 30 years into the future.

The cumulative impact assessment addresses the impacts of the next 30 years of operation (and other alternatives) added together with the impacts of other past, present, and reasonably foreseeable future actions. Where past and present actions continue to have environmental consequences into the next 30 years, these impacts have been included in the cumulative assessments in Section 4.7.

00113-034: The sentence notes that in addition to skimmers, the oil had either "left the coastal area, had evaporated, had degraded, or was stranded on the shoreline or in sediments." It does not state that skimmers removed the majority of the oil.

Section 3.11.5 is a very brief overview of the Exxon Valdez oil spill to provide background for the later discussions. It is not intended to be a comprehensive discussion of the spill and its subsequent impacts. Please refer to Section 4.4 for an extensive spill analysis for the proposed project. Various subsection of Section 4.7 (Cumulative Impacts) also address the Exxon Valdez and other historical or potential spills.

00113-035: To address the issues of intertidal and subtidal sediment contamination, a short discussion of infaunal and epifaunal invertebrates that serve as food for fish has been added to Section 3.19.1. Discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates has been added to section 4.4.4.10.2.

The discussion of the EVOS is included as background and to describe the current environment that may be affected by future pipeline operations. It is not intended to provide an extensive discussion of the EVOS or to analyze or quantify any of the impacts of the EVOS.

00113-036: To address the issues of intertidal and subtidal sediment contamination, a short discussion of infaunal and epifaunal invertebrates that serve as food for fish has been added to Section 3.19.1. Discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates has been added to section 4.4.4.10.2.

The discussion of the EVOS is included as background and to describe the current environment that may be affected by future pipeline operations. It is not intended to provide an extensive discussion of the EVOS or to analyze or quantify any of the impacts of the EVOS.

00113-037: Section 4.7.8.1 (cumulative impacts, subsistence) has been modified to discuss subsistence before and after the Exxon Valdez Oil Spill in the five villages included in the DEIS directly affected by that spill. Section 4.7.8.2 (cumulative impacts, sociocultural), in turn, has been modified to include a discussion of additional sociocultural impacts following the spill. Sections 4.4.4.14 and 4.4.4.15 (impacts to subsistence and sociocultural systems due to spills) have been modified to note disruption due to involvement of subsistence practitioners in oil clean-up activities.

Text has also been added in Section 4.7.8.3 to provide additional sources of information on the impact of the spill on communities, fisheries resources, recreation and tourism in the Prince William Sound area.

00113-038: Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10. The discussion in Section 4.4.4.10.2 of the effects of the EVOS on fish resources has been expanded and includes additional citations.

The discussion of the EVOS is included in the document as background and to describe the environment that could potentially be affected by future pipeline operations. It is not meant to be an exhaustive treatment and does not attempt to list or quantify the impacts caused by the EVOS.

00113-039: The EIS focuses its attention on those off-normal events that are expected to have public health and environmental consequences. Thirteen credible spill scenarios are identified and analyzed. Many of these spills are precipitated by off-normal conditions within TAPS. Further, the EIS describes those design elements of the pipeline that are intended to provide controls and mitigations of impacts that can result from off-normal conditions.

Buildup of waxy solids in tanks at the Ballast Water Treatment Facility has received considerable attention by the JPO and APSC, as well as by citizen groups such as PWS RCAC. There is concurrence on an appropriate course of corrective action. See the text box in Section 4.3.13.1.3.

00113-040: The impacts of a catastrophic failure, that is, a guillotine break in the pipeline, have been considered in the EIS (See Section 4.4). Corrosion is not expected to result in a catastrophic failure. The mechanisms that are in place, for example, the monitoring of the pipeline using smart pigs, are expected to detect corrosion thinning in the pipeline. If the data indicate thinning and deterioration in the pipeline, the pipeline would be repaired or rerouted to prevent catastrophic failures. Existing grant stipulations already require APSC to carefully monitor for corrosion. As discussed in Section 4.1.1.7, the JPO and APSC are in the process of applying reliability centered maintenance (RCM) protocols to all TAPS systems. Under the RCM process, a decision to reduce maintenance would result only for systems or subsystems for which the consequence of their failure would be insignificant. RCM evaluation of failure consequences would require very proactive maintenance of the mainline pipe to avert the consequences of wholesale failure due to corrosion. Data from instrument pig runs as well as monitoring and surveillance of the pipeline's extensive corrosion control system would provide the basis for determining if corrosion has progressed to a degree where it would jeopardize pipeline integrity. If that were found to be the case, repair would be directed by the JPO as a high-priority matter.

00113-041: Under the Federal Grant, APSC is responsible for maintaining and operating TAPS safely and in a manner that is sufficiently protective of public safety and the environment. (See Grant Stipulation 1.21.1.) Except for contingency planning where Alaska regulations specifically call for an evaluation of the adequacy of resources (equipment as well as personnel) by regulatory authorities, APSC alone has the responsibility for developing appropriate management practices and operating procedures and committing adequate resources to successfully implement those systems. However, in its oversight capacity, the JPO does have the opportunity to evaluate the adequacy of APSC's operating practices and does consider resource commitments (both equipment and personnel, including levels of training) as part of the root cause analyses it performs for all identified operational deficiencies. The JPO also has authority to require APSC to develop and submit for JPO approval, a corrective action plan that may also include implementing resources. It is inappropriate for the JPO to direct the application of specific types and amounts of resources for TAPS operations. APSC retains the sole responsibility for committing sufficient and appropriate resources to meet its obligations under the Federal Grant and its stipulations.

00113-042: The DEIS reported a total of 26 tankers, which is composed of 10 tankers operated by the Alaska Tanker Company, LLC; 8 tankers operated by Polar Tankers, Inc.; 6 tankers operated by SeaRiver Maritime Inc.; and 2 tankers operated by Seabulk International, Inc. The list of tankers was based on data provided by the APSC and confirmed using information collected by the British Columbia Oil Spill Task Force Prevention Project (available at <http://www.ecy.wa.gov/programs/spills/prevention/bap/TAPS%20Trade%20Tanker%20Report.htm>).

The estimate of 8 to 10 tankers by 2020 is based on a reduced TAPS throughput of 0.72 million barrels per day, which is lower than the current value of about 1 million barrels per day. As such, the annual number of tanker calls at the VMT is estimated to decrease from a value of 496 (of which 38% are double-hull tankers) to 283 tanker calls in 2020 (of which 100% are double-hull tankers). The decreased number of tanker calls coupled with the increasing use of double hull tankers can be expected to decrease the risk of a major oil spill in the Prince Williams Sound.

00113-043: Sections 3.18, 3.19, 3.20, 3.21, and 3.22 present information on biological resources in their current condition. Sections 4.3.16, 4.3.17, and 4.3.18 present information on past and future effects of TAPS construction and operations on biological resources. Information availability varies among species and taxonomic groups, depending on their sensitivity and importance. The most complete information is available on habitats and protected species.

00113-044: The EIS (Sec. 4.1.4.3) covers in detail the extensive oil spill prevention and response measures in place for tanker vessels docked at the VMT berths and for vessels traveling in waters of the Port of Valdez and PWS. These measures have substantially reduced the risk of tanker oils spills in PWS and the waters of the terminal, including a spill of the magnitude similar to the Exxon Valdez incident.

Since the March 24, 1989, Exxon Valdez incident, the Ship Escort/Response Vessel System (SERVS) has been responsible for overseeing the prevention, preparedness, and response activities for the safe transportation of oil through PWS. The capabilities of the SERVS unit have evolved from an initial emphasis on preparedness and response to a comprehensive program with notably marked emphasis and focus on spill prevention programs. Factors that have weighed heavily in moving SERVS in this direction include careful consideration of recommendations from a number of studies and experience gained in operating the system since its inception. Examples of the studies that have helped improve SERVS prevention capabilities include the PWS Alaska Risk Assessment (Det Norske Veritas et al., 1996) and the Disabled Tanker Towing Study (Bringloe et al., 1993 and Gary et al., 1994). The experiences gained from operating escort vessels and observing tanker traffic under adverse weather conditions have resulted in specific weather-related safety restrictions on vessels operating in PWS (e.g., tankers are not allowed to transit through Hinchinbrook Entrance when winds exceed 45 knots or seas exceed 15 feet). In addition, SERVS has undertaken all necessary response and prevention measures to comply with federal regulatory requirements as mandated in the Oil Pollution Prevention Act of 1990. One of the significant findings coming from the PWS risk assessment study was that the current safeguards and prevention program in place for PWS and the waters in and around the marine terminal has "removed approximately 75% of the system risk that would exist if these safeguards were not in place."

00113-045: Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10. The discussion in Section 4.4.4.10.2 of the effects of the EVOS on fish resources has been expanded and includes additional citations.

The discussion of the EVOS is included in the document as background and to describe the environment that could potentially be affected by future pipeline operations. It is not meant to be an exhaustive treatment and does not attempt to list or quantify the impacts caused by the EVOS.

00113-046: All of the TAPS historical spill record was considered in developing the 21 pipeline and 12 VMT spill scenarios analyzed in the EIS. In addition to the spills data contained in the TAPS Spills Database, the developed scenarios for the unlikely and very unlikely spill events considered available literature concerning current TAPS operations; available guidance from DOT, DOE, and the FAA; and industry-wide data. The industry-wide data included review of spill scenarios assessed in recent NEPA documents to “ensure consideration of a wide spectrum of spill scenarios consistent with current industry practice.”

00113-047: The typographical error in Table 4.4-2 has been corrected.

00113-048: The typographical error in Table 4.4-2 has been corrected.

In developing spill scenarios for the DEIS, the TAPS spills and ADEC databases were heavily relied on in developing scenarios representative of the historical TAPS spills record. These and other databases and several other resources were used in developing scenarios that would be considered low probability high consequence, but creditable events.

The EIS (Sec. 4.1.4.3) covers in detail the extensive oil spill prevention and response measures in place for tanker vessels docked at the VMT berths and for vessels traveling in waters of the Port of Valdez and PWS. These measures have substantially reduced the risk of tanker oil spills in PWS and the waters of the terminal, including a spill of the magnitude similar to the Exxon Valdez incident.

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The 1984 Eastern Lion and the 1997 ballast water treatment facility spills were moderate to relatively small spills. Spills of this magnitude and type were included in the 34 spill scenarios developed for the PWS in the cumulative impact section of the DEIS (see scenarios 1 through 4 and spill scenario 32).

- 00113-049:** The comment is incorrect in stating that no crude oil reaches open water for spill scenario 11 in Table 4.4-2. The table indicates a holdup of 50,350 barrels of crude oil on land, with 143,450 barrels of crude oil reaching the waters of Port Valdez. Approximately 306,000 barrels of crude oil are assumed to be retained by secondary containment, out of a total spill volume of 510,000 barrels.
- 00113-050:** For consistency within the document and with normally accepted practices for accident analysis, the frequency designations and volume estimates are expressed in the units shown in the EIS.
- 00113-051:** The spill duration accounts for the time required to detect a leak, locate it if not immediately obvious, shut down the pipeline, and take action, such as clamping or draining down, to limit the volume of oil spilled from the pipeline. A guillotine break of the TAPS pipeline would create a leak that is quickly detected by the TAPS leak detection system.
- Once a leak is detected, an effort will be undertaken by the APSC to mitigate the effects of the leak. In most cases, the line will be shut down, valves closed, the leak located, and the line drained down, to affect permanent repairs. In some cases, portions of the line may be left open, and active pumping applied to drain the line to tankage and limit spill volume.
- A guillotine break assumes that the entire pipeline is broken so that crude oil could flow out of the entire 48-inch diameter opening. During the phase when valves are closed and pumps are shut down, flow is driven by gravity and the spill volume is dictated by changes in elevation and valve closure. A spill duration on the order of hours was estimated based on a typical linear velocity for flowing oil.
- 00113-052:** The complex environmental interrelationships associated with the proposed renewal of the TAPS right-of-way coupled with the diversity of reader interests and needs require the assembly of large amounts of information in the EIS. Cross-referencing is a useful tool to avoid duplication while enabling readers with diverse needs to access sections of interest to them.
- 00113-053:** Scenario 5 in Section 4.4.1 assumes that the majority of the oil is contained inside the boom. The total of 500 barrels released into Port Valdez is the average of two historical spills at the VMT due to a crack in a cargo tank: a 1,700 barrel spill that occurred in 1989 and a 200 barrel spill that occurred in 1994. It may be expected that the volume of crude oil that could potentially be spilled in this scenario to decrease in the future due to the increasing use of double-hull tankers.
- 00113-054:** The frequency of a guillotine break in the pipeline from an airplane impact assumes aircraft crashes to be accidents as opposed to deliberate sabotage by aircraft. Crash frequencies were obtained from the FAA, which shows that most aircraft crashes occur during takeoff or landing. Air traffic data was also taken from FAA data for the various airports in close proximity to the aboveground portions of the TAPS.
- 00113-055:** For consistency within the document and with normally accepted practices for accident analysis, the frequency estimates are expressed in the units shown in the EIS.
- 00113-056:** The objective analysis applies to a large volume spill on a sloped area such that the land slope, artificial barriers (such as access road and highway), and water bodies would restrict the migration of a spill. Because the migration is restricted, the size of contaminated land would also be limited. If a spill is small, the parametric approach would result in a better estimate on the size of contaminated land. Please see Section 4.4.1.3.1 for the assumptions used in the objective analysis.

- 00113-057:** Section 4.4.2 describes both the parametric and objective analysis and explicitly states that loss of spilled oil due to evaporation to the atmosphere was neglected in order to provide a conservative estimate of contaminated the surface areas. The footnote was included only as an illustration of the conservativeness inherent to the estimates by ignoring evaporation. However, it should be noted that the cited evaporation rate of around 15% over a 24 hour period (@ ambient temperatures of around 15 °C) is based empirically derived data for the light end components of crude for a relatively short period after the spill. Although Fingas' power law and logarithmic fits to evaporation data for periods greater than one day may be in contention, these evaporation rate estimates (18% rate over 7 days and only about 5% over at the end of 8 weeks) for times greater than 5 to 10 days after a spill are not unreasonable estimates for the less volatile crude components. Nevertheless, by ignoring evaporation the estimates provided in the EIS would consistently overestimate the potentially contaminated surface areas for each spill scenario analyzed.
- 00113-058:** Thank you for your comment; however, the text has not been changed in Section 4.4.1.3.2 as suggested.

00113-059: The comment notes that the tank failure frequency assumed in the DEIS is 1.8×10^{-6} and challenges that assumption based on the fact that the Valdez terminal region experienced a severe earthquake in 1964. First, it should be clarified that the assumed frequency for tank rupture accounts for the frequency associated with tank foundation or weld failures and did not consider such failures initiated from any seismic considerations. None of the accident scenarios considered for the Valdez Marine Terminal postulated a seismic-induced failure of tanks or the pipeline at the terminal.

As noted in the DEIS the accident scenarios considered were bounded by frequencies ranging from anticipated events (a frequent occurrence greater than twice each year) to very unlikely events (a rare occurrence, up to a once in a million year probability). Events determined to have a less likely probability of occurrence were screened from further analysis as accidents so unlikely that they would be considered as incredible events. The essential point inferred from the comment is that the final EIS ought to include a frequency of occurrence that reflects a seismic event capable of breaching the tanks design safeguards. This would include seismic design and qualification of the tanks and equipment as well as of the secondary containment.

The following design documents were reviewed in estimating the frequency of a seismic initiated tank failure:

- 1) TAPS Criteria & Design Bases, 1973, Revised 1974, Volume 2. 4.0 Terminal
- 2) Earthquake Engineering, Basis for Seismic Design Criteria—Trans Alaska Pipeline, Nathan M. Newmark, Oct. 16, 1972, revised July 30, 1973, as found in Design Document Volume 12.
- 3) Reassessment of Seismic Design Criteria, Trans-Alaska Pipeline, D.J. Nyman & Associates, December 12, 1995.

The original seismic design criteria was intended to assure the integrity of the pipeline, stations, and terminal equipment exposed to ground motions from an earthquake with a return period of 100 to 300 years or longer. The probability of an earthquake with a 300 year return is 10% in 30 years (0.0033 per year). The Reassessment of Seismic Design Criteria found that more recent earthquake spectra for the terminal site for a 500 year return earthquake did not significantly exceed the original design spectra. That is, the terminal equipment was designed to withstand the ground motion associated with a 500 year return earthquake (probability of occurrence, 0.002). However, this does not mean that the appropriate leak frequency is 0.002. Other unlikely factors have to converge before failure will occur. These are described in the second document listed above. Thus, the expected leak frequency is the product of the following terms:

- a) Probability of sufficiently severe earthquake occurrence in any given year. $P_1=0.002$
- b) Probability of accelerations associated with that earthquake being experienced at the terminal. $P_2= 0.25$
- c) Probability that the intensity of this earthquake will exceed the design values for which the equipment is designed. $P_3 = 0.1$
- d) Probability that attenuation due to soil damping and geological structure is low enough to allow the full ground response to reach the terminal structures. $P_4 = 0.1$
- e) Probability that structural failure and leak will occur rather than energy absorption and damping through plastic deformation. $P_5 = 0.1$.

The probabilities assigned for b, c, d, and e are those recommended by Newmark. The net leak frequency is $P_1 \times P_2 \times P_3 \times P_4 \times P_5 = 5 \times 10^{-7}$. This frequency would establish a seismic initiated tank failure at the Valdez Marine Terminal as an extremely rare or incredible event. Events with such low probabilities were screened from further analysis in the TAPS EIS.

It should also be noted that previous oil spill risk assessments (Capstone or Technica) conducted for the Valdez Marine Terminal also did not include the risk of a seismic induced tank failure.

00113-060: Additional information about the rate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10. This includes a discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates.

00113-061: The detailed rationale for assuming the second tank would not fail is given on in Section 4.4.3. If one would assume that the dike fire surrounding the 2nd tank could not be contained in a manner to prevent ignition of vapors above the crude oil in this tank and if the tanks subsurface foam injection system also fails, a crude oil tank fire would result. As the tank fire burns, it continues to heat the crude oil in the holding tank eventually resulting in a “boilover” event. Due to the explosive characteristic of crude oil tank “boilovers,” the fire would likely spread outside the already raging dike fire to tanks in the adjacent diked areas of the tank farm. This could eventually result in additional boilover events and a very large fire involving the entire marine terminal.

A scenario of this magnitude was not considered for a number of reasons. First, the added mitigation system failure mode probabilities involved would lower the event frequency, which could change an already very unlikely scenario to an event which would be extremely unlikely ($< 10^{-6}$ per year). Additionally, the lack of a suitable modeling tool for simulating very large industrial fires along with the considerable level of uncertainty in parameter assumptions necessary to model such an event precluded serious consideration of this scenario. Under such circumstances, there is sufficient data to reasonably assume that existing firefighting capabilities available would not be sufficient to extinguish the dike fire, but capabilities in the form of training, equipment and water/foam capacities would be there to contain it. Because large crude oil dike fires and tank “boilover” events are rare, firefighting experience in this area is not extensive. It would therefore be presumptuous to categorically conclude that any large dike fire could be contained at the VMT. At this time it would also be presumptuous to conclude that existing firefighting capabilities currently do not exist to contain a large dike fires at the terminal and therefore to prescribe additional mitigation measures as a remedy. The EIS identifies the authority under which this issue would be most suitably addressed.

00113-062: A footnote has been added to Table 4.4-6.

Comparison of the estimated maximum public and worker impacts are given in Tables 4.4-6 and 4.4-7 with concentration levels of concern are given in Section 4.4.4.7.2 and Tables 4.4-33 and 4.4-34 of the EIS.

00113-063: Section 4.4.3 makes reference to discussion of the exposure health impacts for the estimated combustion product concentrations given in Table 4.4-19a and -19b.

00113-064: Although the analysis assumed that firefighting support from the Valdez Fire Department would be available at the terminal, not having this support would not be of serious consequence. This is the case for two reasons. First, logistic constraints would prohibit the positioning of additional engine companies beyond what could be already reasonably accommodated from deployed VMT engine company foam guns (i.e., monitors/nozzles) around the perimeter of the dike. Finally, the additional foam inventories that could be supplied by the Valdez Fire Department would be small compared with existing inventories at the terminal.

00113-065: In the EIS it was recognized that controlling a large crude oil tank farm dike fire, as postulated in VMT scenario number 10, can be a formidable challenge even for well trained, experienced, and equipped firefighters. Although a large tank farm dike fire was acknowledged as a credible event with potentially large consequences, it was also acknowledged that existing emergency response and contingency plans currently in place for the VMT (including facility evacuation) would be expected to be sufficient for ensuring protection of life and safety.

Considering the large uncertainty in knowing all of the possible outcomes of a dike fire—with current levels of VMT firefighting training, equipment and supplies—specific additional or corrective contingency planning and preparedness actions would be premature at this time. Although an accident resulting in a dike fire from a large spill of the entire contents a crude oil holding tank would have a relatively small likelihood (an expected occurrence of once in 47,620 years), the aircraft crash probability did not account for probabilities associated with deliberate acts (i.e., vandalism or terrorism).

In a post- “9/11” era, such acts are taken very seriously by government agencies and industry. In addition to ongoing APSC initiatives to enhance pipeline system security, government agencies with the appropriate oversight (e.g., JPO member agencies) are well suited for reviewing the adequacy of existing firefighting response capabilities and in providing recommendations, as necessary, to correct any deficiencies. Although the specific type, form, and level of oversight review that might be appropriate would be outside the scope of this EIS.

00113-066: Section 4.4.3 makes reference to a discussion of the exposure health impacts for the estimated combustion product concentrations given in Tables 4.4-19a and -19b.

00113-067: For a given size spill, impacts to surface waters would be greatest if the spill occurred directly to a flowing stream. Such impacts are discussed in Section 4.4.4.3 for six representative rivers that are crossed by the TAPS pipeline. Impacts to surface waters could also occur if oil is discharged to the soil and then flows into a nearby stream or river, as discussed in the comment. Because these impacts would be bounded by impacts of a direct release to water, they are not discussed further.

00113-068: As stated in Section 4.4.4.3, the effectiveness of remediation activities once a slick is either contained or diverted to an appropriate containment site is not evaluated because of highly uncertain, site- and time-specific input parameters including the velocity of the water, the presence of waves, turbulence, ice, channel morphology, sediment load, etc. Instead, the percentage of oil subject to recovery is calculated as a measure of response effectiveness. Additional text is added here to state that even under ideal conditions, it is unlikely that 100% of the oil in a river system at a containment site would be removed even if the response team were able to arrive at the site and set up its equipment prior to the arrival of the leading edge of the oil spill.

In a similar manner, the oil spill is treated as plug flow, even though oiling of the shoreline and banks occurs in a spill. As discussed in Section 4.4.4.3.2, the physical size of the contaminated zone would be larger than the length of the idealized plug because of hangup along the flow path, mixing, entrainment, and remobilization. Use of the plug-flow assumption was selected to demonstrate potential differences in impacts between spills of short and long duration. More accurate quantification of oiling is not possible without highly site and time-specific information on the conditions of the receiving water.

For completeness, additional information was incorporated in Section 4.4.2 to discuss the fate and transport of soluble components of crude oil (e.g., benzene, toluene, ethylbenzene, and xylene - BTEX).

Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10.

The response times were estimated based on detailed information for reconnaissance, response, and containment actions in the event of an oil spill provided in the TAPS Oil Discharge Prevention and Contingency Plan (CP-35-1) prepared by the APSC (2001).

Oil spill equipment is primarily located at the various pump stations along the TAPS and not at the potential spill site. A list of available oil spill equipment is provided in Table 3.1 of the TAPS Oil Discharge Prevention and Contingency Plan (CP-35-1).

The first response measures to arrive at an oil spill site would most likely be from the closest pump station or APSC facility (Fairbanks or Valdez). The time to move heavy equipment under various weather conditions is provided in Tables 1.10 to 1.12 of the previously-cited document. The equipment required for a postulated oil spill is provided in the various sections of the previously-cited document.

The estimated response times for various spill locations considered in the EIS are provided in Table 4.4-13 of the EIS.

00113-069: The spill duration accounts for the time required to detect a leak, locate it if not immediately obvious, shut down the pipeline, and take action, such as clamping or draining down, to limit the volume of oil spilled from the pipeline.

Once a leak is detected, an effort will be undertaken by the APSC to mitigate the effects of the leak. In most cases the line will be shut down, valves closed, the leak located, and the line drained down, to affect permanent repairs. In some cases, portions of the line may be left open, and active pumping applied to drain the line to tankage and limit spill volume.

The effect of lower viscosity on oil drainage due to cooling upon exposure to colder air after the pipeline break was not considered, because the temperature of the crude oil in the pipeline is not expected to decrease rapidly with time after shutdown (due to its large thermal mass) and because the primary impact of lower crude oil viscosity would be to reduce the spill volume and thereby the spill duration.

00113-070: Impacts from a catastrophic guillotine break with direct discharge to a river are analyzed in Section 4.4.4.3.2, Unlikely Spill Events, and Very Unlikely Spill Events. Impacts produced by a very unlikely spill event (produced by a helicopter crashing into the pipeline and causing a guillotine break) would be the same as those discussed for the Unlikely Spill Event (a fixed-wing aircraft crashes into the pipeline producing a guillotine break). Impacts for high-flow conditions are presented in Table 4.4-20.

00113-071: The comment appears to refer to spill scenario 11 in Table 4.4-2, which indicates a holdup of 50,350 barrels of crude oil on land based on an initial spill volume of 510,000 barrels. The amount of holdup of crude oil on land for a given spill scenario is dependent on a number of factors, including proximity to surface water. A number of scenarios were postulated that assumed that a spill occurred during tanker loading operations, with a direct spill to water.

The text box for Section 4.4.4.5.1 of the DEIS is correct in stating there are nine scenarios identified in Table 4.4-2 with releases to water. Table 4.4-2 has been revised to indicate that, in Scenario 8, 100 bbl reach the water of Port Valdez.

For spills with a frequency greater than once every thirty years, actual spill data involving small or moderate leaks provided in the TAPS Spill Database (2001) were used. Incident-rate and spill-size distribution information provided in the TAPS Spill Database (2001) were used to determine the probable return interval of various sized spills for the VMT. Based on the probable spill-size distribution curve, the spill volume was established for given spill frequency (0.5/year for an anticipated spill event, 0.03/year for a likely spill event). Therefore, the spill scenarios postulated for the VMT analysis agree with historical spill information over the first 25 years of TAPS operations. The perceived difference may be because most spills are relatively small and these tend to skew the distribution towards lower spill volumes for a given overall spill frequency.

In addition, scenario 5 assumes a total of 500 barrels released into Port Valdez, which is the average of two historical spills at the VMT due to a crack in a cargo tank: a 1,700 barrel spill that occurred in 1989 and a 200 barrel spill that occurred in 1994. It may be expected that the volume of crude oil that could potentially be spilled in this scenario would decrease in the future due to the increasing use of double-hull tankers.

00113-072: Section 4.4.2 describes both the parametric and objective analysis and explicitly states that loss of spilled oil due to evaporation to the atmosphere was neglected in order to provide a conservative estimate of contaminated the surface areas. The footnote was included only as an illustration of the conservativeness inherent to the estimates by ignoring evaporation. However, it should be noted that the cited evaporation rate of around 15 to 20 % over a 24-hour period (at ambient temperatures of around 15 °C) is based on empirically derived data for the light end components of crude for a relatively short period after the spill. Although Fingas' power law and logarithmic fits to evaporation data for periods greater than one day may be a point for contention, these evaporation rate estimates (18% rate over 7 days and only about 5% over at the end of 8 weeks) for times greater than 5 to 10 days after a spill are not unreasonable estimates for the less volatile crude components. Nevertheless, by ignoring evaporation the estimates provided in the EIS would consistently overestimate the potentially contaminated surface areas for each spill scenario analyzed.

00113-073: A similar description to the behavior of oil released to rivers and creeks is presented in Section 4.4.2 of the EIS.

- 00113-074:** While we recognize that the PWS RCAC has recommended that NPDES permit levels for the BWTF be reduced, the EIS correctly identifies that BWTF discharges are below current NPDES permit limits and that concentrations of total PAHs in sediments are below the sediment quality guidelines for marine sediments. The methods used by Feder and Shaw (2000) to detect total PAH concentrations in sediment were sufficiently sensitive to allow comparison to the sediment quality guidelines. This does not mean that there is not some accumulation of PAHs in sediments surrounding the BWTF diffuser near the VMT, just that those levels do not exceed the current sediment quality guidelines for protecting aquatic organisms. As identified in the comment, PAH accumulation was detected in mussels used to monitor water quality in Port Valdez as part of a PWS RCAC-sponsored monitoring program (Salazar et al. 2002). In that study, it was found that all measured concentrations of PAHs in water and estimated on the basis of bioaccumulation in mussel tissues indicated that the concentrations of PAHs in Port Valdez waters are in the low parts-per-trillion range, well below the levels that have been associated with adverse effects in herring and salmon embryos (Salazar et al. 2002). In addition, Salazar et al. (2002) did not detect reductions in overall growth of caged mussels that could be attributed to PAH burdens. Instead of stating that BWTF effluent is unlikely to impair sediment quality, Section 4.3.16.1 was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts.
- 00113-075:** Scenario 5 assumes that the majority of the oil is contained inside the boom. The volume of 500 barrels is the amount of crude oil assumed not to be contained within the boom placed around a tanker that is released to the water in Port Valdez.
- The total of 500 barrels released into Port Valdez is the average of two historical spills at the VMT due to a crack in a cargo tank: a 1,700 barrel spill that occurred in 1989 and a 200 barrel spill that occurred in 1994. It may be expected that the volume of crude oil that could potentially be spilled in this scenario to decrease in the future due to the increasing use of double-hull tankers.
- The spill from the Eastern Lion referred to in the comment occurred on May 22, 1994. A total of 200 barrels (8,400 gallons) of crude oil was released into the water around Berth 5, which is less than the 500 barrels assumed in this scenario.
- 00113-076:** The referenced statement from Section 4.4.4.5.3, is from a NOAA document (NOAA 2000a; see Section 4.9 of the FEIS for the reference)describing North Slope Crude oils and their behavior after a spill. No change was made.
- 00113-077:** Section 4.4.4.5.4 notes that if the assumptions used in the scenario do not occur, that larger areas could be impacted or that the impacts from the spill could be larger.
- 00113-078:** The Unlikely Spills portion of Section 4.4.4.5.4 notes that response times could differ from the assumptions and that these differences could result in larger areas being impacted by the spills. This section also notes that the response is assumed to occur during non-extreme weather conditions, and that adverse weather conditions could result in larger areas being impacted. Additional text has been added to Section 4.4.4.5.4 to clarify that if the assumptions are not met, that the impacts from the spill would be significant and affect a much larger area.

00113-079: Additional text has been added to Section 4.4.4.10 to clarify that if the assumptions are not met, that the impacts from the spill would be significant and affect a much larger area.

Assuming the wind direction does not change before the response, is conservative. Since the oil travels in only one direction during the response time it covers a larger distance and subsequently oils a larger portion of the shore line. As discussed in Section 4.4.4.10, a sensitivity of the calculation to wind direction was evaluated.

Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10. The discussion in Section 4.4.4.10.2 of the effects of the EVOS on fish resources has been expanded and includes additional citations.

The discussion of the EVOS is included in the document as background and to describe the environment that could potentially be affected by future pipeline operations. It is not meant to be an exhaustive treatment and does not attempt to list or quantify the impacts caused by the EVOS.

00113-080: The estimated response times for various spill locations considered in the EIS are provided in Table 4.4-13. The spill duration accounts for the time required to detect a leak, locate it if not immediately obvious, shut down the pipeline, and take action, such as clamping or draining down, to limit the volume of oil spilled from the pipeline. Oil spill equipment are primarily located at the various pump stations along the TAPS and not at the potential spill site. A list of available oil spill equipment is provided in Table 3.1-6 of the "Trans-Alaska Pipeline System Pipeline Oil Discharge Prevention and Contingency Plan, CP-35-1 GP," prepared by the APSC (2001).

The first response measures to arrive at an oil spill site would most likely be from the closest pump station or APSC facility (Fairbanks or Valdez). The time to move heavy equipment under various weather conditions is provided in Tables 1.10 to 1.12 of the previously-cited document. The weather conditions considered in estimation of the response times included worst-case, average, and best-case conditions. In order to avoid biasing the results, average value response times were used in all of the inland waters calculations.

As stated in Section 4.4.1, potential spill scenarios were developed by using available literature concerning current TAPS operations. Recent NEPA documents for other pipeline projects were also reviewed to ensure consideration of a wide spectrum of spill scenarios consistent with current industry practice. The developed spill scenarios took into account spill location, duration, magnitude, and frequency. A spectrum of spill scenarios were considered that spanned the frequency range from those which could be considered to be anticipated (spills estimated to occur one or more times every 2 years of TAPS operations) to very unlikely (spills estimated to occur between once in 1,000 years and once in 1 million years of TAPS operations).

As discussed in Section 4.4.2, impacts are assessed on the basis of the response team arriving at a containment site and deploying its equipment prior to the arrival of the oil in the river or stream. If the team arrives and sets up prior to the arrival of the oil, 100% of the oil is "subject" to capture. However, depending on conditions such as weather, river flow velocity, turbulence, sediment load, evaporation, dissolution, type of equipment used, and the degree of expertise of the response team, the quantity of oil recovered could be substantially less than 100%. Actual capture is not quantified because of the numerous uncertainties in the calculations. Additional text has been added to Section 4.4.4.3.2 to clarify the difference between capture and subject-to-capture efficiencies.

00113-081: Table 3.13-6 of the EIS lists the total emissions of hazardous air pollutants (HAPs) from the Valdez Marine Terminal as 122.9 tons/year (or about 673 pounds/day), which is approximately 5 times the threshold level of the HAPs emission rate for a major source.

Potential health impacts associated with ambient concentrations of benzene, toluene, ethyl benzene, and xylene (BTEX) in the Valdez area under the proposed action (at crude oil throughput levels of 0.3, 1.1, and 2.1 million bbl/day) and other alternatives were estimated on the basis of conservatively high ambient concentration estimates of BTEX and other toxic air pollutants emitted from the Ballast Water Treatment Facility (BWTF) and other sources at the Valdez Marine Terminal (Sections 4.3.13, 4.5.2.13, and 4.6.2.13). These ambient concentration estimates are based on the ambient BTEX concentrations monitored during the 1990-1991 personal and ambient monitoring studies and the tracer studies conducted in the Valdez area when vapor emissions from both the tankers and the BWTF units were being released.

00113-082: The EIS was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts (see Section 4.3.16.1).

00113-083: The EIS correctly identifies that BWTF discharges are below current NPDES permit limits. The impact of permit levels are assessed when the permits are issued.

00113-084: The reader is referred to Section 2.5 of the FEIS, in which audits are addressed under Alternatives and Issues Considered but Eliminated from Detailed Analysis.

00113-085: The assumptions that contributed to the North Slope production volumes used in all of the analyses in the EIS are described in detail in Appendix A, "Methodology Descriptions," which is Section A.15.1.4, and in Figure A-2, "Projections of North Slope Crude Oil Production." Production from all reasonably foreseeable development on the North Slope is expected to decline from 2004 to 2034. As explained in the "Cumulative Effects" section at 4.7.4.1.1, oil and gas production from the Arctic National Wildlife Refuge cannot be assumed, and is, therefore, not included in the reasonably foreseeable development scenarios.

The EIS considered 2.1 million barrels/day as the maximum throughput for the analysis.

00113-086: The hypothetical spill scenarios for Prince William Sound followed the methodology used in the "Prince William Sound, Alaska Risk Assessment Study" (Det Norske Veritas et al. 1996; see reference in Section 4.9). In addition to using expert judgment to develop relative probabilities of incidents, the methodology in the above-cited document used simulation to count how each opportunity for a vessel reliability failure or a vessel operational error will occur in a well-defined time period. 1995 was selected as the base case year and 25-year runs using the base case input data were used to produce a base case risk picture. The simulation included dynamic changes in weather conditions, ice conditions, traffic, and traffic conditions. The mix of the tanker fleet in terms of the numbers of single-hull tankers versus double-hull tankers was what existed in 1995.

The analysis in the EIS took into account the maximum and minimum average tanker capacity and annual number of tanker trips during the renewal period from 2004 to 2034 in light of the projected TAPS throughput for those years. These are considered to bracket the baseline year of 1995 regarding spill volume and accident frequency and account for changes in the number of tanker trips per year in the renewal period from 2004 through 2034. Although the tanker fleet will be completely double-hull by 2015, the analysis in the EIS for estimating the spill frequencies and volumes in the PWS did not account for this change, and thus could be considered to be conservative.

Table 4.7-6 provides a listing of spill scenarios for tanker accidents in Prince William Sound, including catastrophic spill events.

- 00113-087:** Section 4.4.4.5.4 state that is these assumptions are not met, larger areas or larger impacts could occur.
- 00113-088:** The cumulative impacts of other activities on marine resources is discussed in Section 4.7, "Cumulative Impacts."
- 00113-089:** Analysis of operations resulting from lower throughputs show that releases to the environment would be the same or less than historical releases. Based on this analysis, impacts from lower throughput would be the same or lower than those from historical operations.
- 00113-090:** Accident assessment methodologies have traditionally assumed conservative or "worst-case" conditions for estimating the potential consequences and risks. The analysis assumptions made in the EIS are consistent with this approach. The assumed air temperature for carrying out spill evaporation calculations was based upon the review of historical weather records in Alaska. This record shows that the highest monthly mean temperature in Alaska ranges from 39.3 °F at Barrow to 62.5 °F at Valdez. The calculation assumed a temperature of 60 °F (15.6 °C) as conservative estimate for VOC emissions from crude oil spills.
- 00113-091:** The commentor observes that section 4.4.1.3.2 does not include effects of "landslide/avalanche/tsunami" resulting from earthquake. A tsunami could result from an earthquake beneath the sea, possibly far removed from the site, or from a landslide within the port triggered by an earthquake. To prevent tsunami-related damage, all on-shore equipment is located above the 30-foot run-up reported by the USGS as experienced in the 1964 earthquake. Crude oil tank elevation is 400 feet. Other structures are at 50 feet, with the exception of the water pump house at 35 feet. A Tsunami warning system will give adequate warning of a tsunami generated from outside of the port for ships to leave their berths. To accommodate a tsunami generated within the port, the harbor facilities have been designed to resist a 12-foot tsunami with a ship at berth and a 20-foot tsunami with no ship at berth. This 12-foot tsunami design criteria was established by analysis performed by Marine Advisers in 1969, and is consistent with the 30 foot run-up experienced in 1964. Furthermore, because of concern about earthquakes and tidal waves, all port facilities were founded on bedrock. For these reasons, a tsunami was not considered to be a credible leak initiator at the terminal and the effects of "landslide/avalanche/tsunami" resulting from an earthquake at the VMT were considered but not analyzed in detail in the EIS. For more information on the design bases and criteria for the VMT, the reader is referred to "TAPS Criteria & Design Bases, 1973, Revised 1974, Volume 2, 4.0 Terminal: Section 4.2.1.3, Site Development Plan, and Sections 4.4.2.4, Tsunami; 4.5.2.4, Tsunami."
- 00113-092:** This statement refers to impacts to shorelines that have not been oiled. "Impacts could also occur in other areas of Port Valdez and Prince William Sound away from the release point or oiled shoreline." It notes that these "other impacted areas" would have impacts similar to historic impacts and from impacts due to the current hydrocarbon levels in these areas.
- 00113-093:** Payne (2002) states that the estimated mass removal rate of the BTEX compounds at the Dissolved Air Flootation (DAF) system of the Ballast Water Treatment Facility (BWTF) is approximately 580 pounds/day or 105 tons/year and that much of this mass is released to the atmosphere rather than collected with skimmed oil. This implies that a certain fraction of the BTEX compounds removed by the DAF system remains in the oil skimmed off and is not released to the atmosphere, and therefore the atmospheric emission rate of BTEX compounds would be less than 105 tons/year. However, Payne (2002) did not estimate the breakdown between the amount of BTEX contained in the skimmed oil and the amount emitted to the atmosphere. The atmospheric emission rate of the BTEX compounds from the BWTF estimated by APSC is about 493 pounds/day or 90 tons/year. Conservatively high ambient concentration estimates of BTEX and other toxic air pollutants emitted from the BWTF and other sources at the Valdez Marine Terminal were considered in estimating potential health impacts associated with ambient concentrations of these pollutants in Valdez area under the proposed action (at the crude oil throughput levels of 0.3, 1.1 and 2.1 million bbl/day) and other alternatives (see Section 4.3.13, 4.5.2.13, and 4.6.2.13).

00113-094: This statement is in the section evaluating normal operations. This statement does not imply that an oil spill of the size of the Exxon Valdez oil spill is expected during normal operations. The impacts from accidents to marine waters are discussed in Section 4.4.4.5.4.

00113-095: The impacts of a large oil spill are assessed in Section 4.4.4.5.4, "Unlikely Spills." Section 4.7, "Cumulative Impacts," includes the consequences of a large oil spill in appropriate sections.

00113-096: Benzene and other volatile organic compound (VOC) emissions from the Dissolved Air Flootation (DAF) tanks and biological treatment system associated with the Ballast Water Treatment Facility (BWTF) at the Valdez Marine Terminal (about 493 pounds/day or 90 tons/year) are included in the total emissions of hazardous air pollutants from the Valdez Marine Terminal (about 673 pounds/day or 122.9 tons/year) as listed in Table 3.13-6 of DEIS.

Conservatively high ambient concentration estimates of benzene, toluene, ethyl benzene, and xylene (BTEX) and other toxic air pollutants emitted from the BWTF and other sources at the Valdez Marine Terminal were considered in estimating potential health impacts associated with ambient concentrations of these pollutants in Valdez area under the proposed action (at the crude oil throughput levels of 0.3, 1.1 and 2.1 million bbl/day) and other alternatives (see Section 4.3.13, 4.5.2.13, and 4.6.2.13). These ambient concentration estimates are based on the ambient BTEX concentrations monitored during the 1990-1991 personal and ambient monitoring studies and the tracer studies conducted in the Valdez area when both the vapor emissions from tankers and the DAF units were released. The baseline ambient concentrations used in the health risk calculations were given in the Affected Environment section (Table 3.17-4); a reference to this table has been added to the footnotes of Table 4.3-4 to clarify.

The text box in Section 4.3.9 has been modified.

With respect to food chain exposure issues and BWTF diffuser discharges, the mussel tissue PAH concentrations reported in Payne et al. (2001) are total PAH concentrations. No human health risk assessment for ingestion of mussels is provided in that report. The evaluation of risk from ingestion of highly contaminated shellfish presented in Section 4.4.4.7.4 adequately characterizes potential health risks from the ingestion pathway.

00113-097: The analyses of landslides and liquefaction along the TAPS right-of-way are provided in the design document (APSC 1974, Appendix Volume 3, Geotechnical Aspects, Section 4). Reference to this document has been added to the FEIS (see Section 4.9).

With the warming trends in the last several decades in Alaska, permafrost, in general, is expected to degrade. During the design of the TAPS, APSC conducted detailed analyses of all pipeline slopes and assessed the slope stability and liquefaction potential of all slopes. In the analyses, the effect of the warming trends along the TAPS was not explicitly considered. The thawing due to heat transfer from the pipeline and the ground surface disturbance was calculated with the assumption of a 30-year time span. With the operation life of the pipeline extended for another 30 years, additional thawing of the permafrost, especially in the southern portion of the TAPS, is likely to occur. On slopes with fine-grained geologic material, soil water generated from the thawing may not be able to drain fast enough such that the pore pressure could increase. Also, new critical surfaces for sliding might emerge. These two factors can potentially cause a previously stable slope to become unstable, especially on slopes that have been assigned a design safety factor of 1 or close to 1 under dynamic loading conditions. Further, if a major earthquake occurs near these areas at a time when the water content of the soil is high, the probability of a landslide can't be ignored. When a landslide occurs, its failure plane or planes can be below the elevations of the pipeline. Under such conditions, the pipe can be carried down the slope with the slide. Therefore, it is concluded that the risk for landslides along the TAPS can increase in the next 30 years.

For the liquefaction issue, liquefaction can occur both on slopes (greater than 2 degrees) and in flat areas (less than 2 degrees) in saturated, loose non-cohesive soils (sands) under intensive shaking (a major earthquake). On sloping ground, liquefied soils tend to move down slope. In flat areas, liquefied soils result in a loss of strength. Structures that use the soils for support may fail.

In the design of the pipeline (APSC 1974, Appendix Volume 3, Geotechnical Aspects, Section 4), the areas of potential liquefied soils for the flat ground areas are estimated to be local and limited. The impact on buried pipe was considered to be less severe than that of equivalent seismic fault movement that was established to be safe. However, it is uncertain if the local and limited estimation is still valid without a detailed analysis. The original assumption of thawing due to the heat transfer from the pipeline and the ground surface disturbance was for a 30-year time period. Regional warming in Alaska was not explicitly included in the evaluation. The original design met criteria for a liquefiable body of small or large size. Sand bodies of various sizes are common because of the abundance of fluvial and lake deposits along the TAPS (e.g., the Copper River Basin and various basins within U-shaped glacial valleys). If liquefaction occurs in a sand body of intermediate dimensions, local oversteering can develop and threaten the integrity of the pipeline (APSC 2001e, Design Basis Update DB-180, 3rd ed., Rev. 3; reference in Section 4.9 of the FEIS).

In sloped areas, one of several protective measures to reduce the liquefaction threat was to bury the pipeline below a liquefiable soil layer. It is generally accepted that frozen soil is non-liquefiable. However, a previously frozen soil may thaw because of the affects of the continuous warming trend in Alaska. Under certain geologic and hydrologic conditions, the previously non-liquefiable soil may become liquefied. Without a detailed study, it is difficult to quantify the extent of the impact of the regional warming on the liquefaction potential. Therefore, a qualitative conclusion stating that "With a continuation of the current warming trend in Alaska, the risk of earthquake-triggered liquefaction and landslides is expected to increase" was made.

The returned period of a big earthquake used in the TAPS design is 500 - 1,000 years. The US Geological Survey use a return period of 500 years and 2,500 years in their seismic hazardous analysis.

The number and size of thaw bulbs along the TAPS ROW are likely to change over the renewal period. The direction of the change primarily depends on the change in throughput for the pipeline and the temperature of the oil. If the throughput and temperature decrease, the number and size of thaw bulbs is likely to decrease. Conversely, the number would increase for higher throughputs and temperatures. The maximum number and size of bulbs corresponds to the period of time in which the pipeline was flowing at full capacity. Because this condition was met years ago and the pipeline throughput can not exceed this capacity, increases in the number and sizes of bulbs would be bounded by those observed historically.

- 00113-098:** The Executive Summary has been substantially revised.
- 00113-099:** The Executive Summary has been altered extensively to reflect new information contained in the FEIS.
- 00113-100:** The protection of cleanup workers is regulated under the Occupational Health and Safety Act and is, therefore, beyond the scope of the EIS.
- 00113-101:** The executive summary only gives summary findings of the section on human health and safety impacts of spills (Section 4.4.4.7). Section 4.4.4.7.4 (Impacts from Foodchain Exposures Resulting from Spills to Water) references and discusses both the Varanasi et al 1993 and Field et al. 1999 studies (several individual chapters from Field et al. are referenced, including Bolger and Carrington 1999, Horn et al. 1999, and Fall 1999b). Section 4.4.4.7.4 provides the details on how the conclusions were reached. The references cited here can be found in Section 4.9 of the FEIS.
- 00113-102:** Text has been added to Section 4.7.8.3 of the FEIS providing additional sources of information about the impact of the Exxon Valdez oil spill (EVOS) on communities, including intangible impacts, such as psychological stress, and in the fisheries, recreation, and tourism industries in the Prince William Sound area. In addition, compressed overviews of selected impacts of the EVOS have been added to Sections 4.7.8.1 and 4.7.8.2.
- 00113-103:** Text has been added to the EIS in Sections 4.3.19.1.2 and 4.6.2.19.1 providing additional information on the assumptions used for the analysis of state and local government finances.
- 00113-104:** To the greatest extent possible, the pipeline route in earthquake-prone area was selected to avoid previous landslide areas, and soil that would be subject to liquefaction. Additional engineering practices, including placing underground pipeline segments in stable frozen soil and permissible movement and deformation of the pipelines, were also used to minimize the impact of earthquakes on the pipelines.
- The potential impacts to pipeline integrity from seismic events are discussed in Sections 4.3.3 and 4.3.2. Section 4.1.3.2 discusses monitoring for seismic events that is required by Stipulation 3.4.1.2. Seismic monitors will send signals to the control center at VMT that will initiate pipeline shutdown procedures, when warranted and if the operator fails to take the proper actions within prescribed time frames. Potential spills along the pipeline due to seismic events are discussed in Section 4.4.1.3.1.
- Please note that the November 3, 2002 earthquake resulted in an effective automatic shutdown. See Sections 3.4 and 4.3.3 for a discussion of this earthquake.
- 00113-105:** The Executive Summary summarizes the EIS. The past actions associated with TAPS are addressed as part of the description of the Affected Environment in Section 3, "Affected Environment." This section also describes the impacts of the Exxon Valdez oil spill. However, past TAPS impacts and the past impacts of other actions are not the major emphasis of this document, which must address the impacts of the proposed action, which is renewal of the federal grant for an additional 30-year period, and alternatives. In Sections 4.1-4.6, "Consequences, the Impacts of the Proposed Action" are addressed in detail, including the continuing impacts of TAPS operations. Section 4.7 addresses the impacts of other actions, including oil transportation and oil spills in Prince William Sound. The impacts of the Exxon Valdez oil spill are included in the affected environment section (Section 3), in the subsections dealing with Prince Williams Sound. Additional information provided during the comment period has been reviewed and incorporated where appropriate.
- 00113-106:** The reader is referred to Section 2.5 of the FEIS, "Alternatives and Issues Considered but Eliminated from Detailed Analysis."

00113-107: Because requiring actual cash escrow accounts for dismantlement, removal, and restoration is not within the jurisdiction of the Department of the Interior, laws and regulations would be required to provide that authority. The Department of the Interior cannot compel the Congress to pass laws, but if enabling legislation were passed, regulations to implement the law would require NEPA analysis.

The reader is directed to the discussion of escrow funds found in Section 2.5.

00113-108: The assumptions that contributed to the North Slope production volumes used in all of the analyses in the EIS are described in detail in Appendix A, "Methodology Descriptions," which is Section A.15.1.4, and in Figure A-2, "Projections of North Slope Crude Oil Production." Production from all reasonably foreseeable development on the North Slope is expected to decline from 2004 to 2034. As explained in the "Cumulative Effects" section at 4.7.4.1.1, oil and gas production from the Arctic National Wildlife Refuge cannot be assumed, and is, therefore, not included in the reasonably foreseeable development scenarios.

The EIS considered 2.1 million barrels/day as the maximum throughput for the analysis.

00113-109: Information has been added to Sections 3.21.1.2 and 4.7.7.3.2 on the effect of the oil industry on caribou. A discussion on the potential obstruction to wildlife movements related to TAPS can be found in Section 4.3.17.4. Section 4.7.7.3.4 addresses cumulative impacts on wildlife movements. While some delays or reluctance to cross TAPS have been noted for a few individuals, no adverse impacts have occurred to caribou herds or other wildlife populations.

00113-110: The issue of the TAPS being potentially eligible for listing on the National Register of Historic Places is addressed in Section 3-26.4. If the pipeline is evaluated and found eligible then removing it could be an adverse effect that would require mitigation. However, a formal evaluation of the pipeline's significance has not been made.

00113-111: The text in Table 2-1, Section 4.3.24.1, and Section 4.6.2.24.1 has been modified to clarify the potential impacts on state recreation facilities.

00113-112: Infrastructure for the VMT is described in Section 3.1.2.1.8 of the EIS. Additional details about the Ballast Water Treatment Facility and other facilities and operations that could result in waste generation and discharges to the environment at the VMT are provided in Appendix C of the EIS.

00113-113: To our knowledge, no comprehensive studies of background levels of these chemicals have been completed since Colonell (1980). Where appropriate and available, more recent studies were cited for specific chemicals or areas such as Salazer et al. (2002) in Section 4.3.16.1. See Section 4.9 for these references.

00113-114: Buildup of waxy solids in tanks at the Ballast Water Treatment Facility has received considerable attention by the JPO and APSC, as well as by citizen groups such as PWS RCAC. There is concurrence on an appropriate course of corrective action. See the text box in Section 4.3.13.1.3.

00113-115: Cumulative effects result from the incremental impact of a proposed action and alternatives when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can include consequences of historic oil spills if the oil spill had not been remediated and long-term adverse effects on the environment and human health persist. This appears not to be applicable in the case of the 1994 Eastern Lion oil spill nor in the case of the 1997 ballast water spill from the Ballast Water Treatment Plant at the VMT.

With respect to the 1994 Eastern Lion oil spill, the following was abstracted from "Oil and Hazardous Materials Response Reports, October 1993-September 1994," prepared by the National Oceanic and Atmospheric Administration (February 1995, available at <http://response.restoration.noaa.gov/oilands/spillreps/OHMRRF94.pdf>).

On May 21, 1994, Marine Safety Office Valdez (USCG) received a report from the master of tank vessel (T/V) Eastern Lion (on lease to British Petroleum [BP]) of oil in the water around the vessel loading at berth 5 of the VMT. APSC (SERVS) response crews immediately began conducting cleanup operations; however, the shorelines on Saw Island and near berths 4 and 5 were lightly impacted. The small slick created by the escaping oil was largely contained in the terminal area, with significant sheens to the east and west. Weather throughout the incident was mild with relatively calm winds.

Sheens from the spill moved east and west with the tidal current, extending from the Soloman Gulch Salmon Hatchery on the east to Anderson Bay on the west, about 9 miles. Sheens were also reported on the north side of the Port of Valdez near Duck Flats and the mouth of Mineral Creek. Cleanup personnel recovered 1,366 barrels of oily liquids, containing 78 barrels of oil. Approximately 5,700 bags and drums of solid waste were recovered. Approximately 30% of the oil evaporated. The small amount of shoreline impacted near berth 5 was a rocky shoreline for which no cleanup was recommended.

After taking care of all the surface oil, BP instituted a formal shoreline assessment (SCAT process) for the entire Port of Valdez. Only light oiling near berth 5 was noted and no shoreline cleanup was recommended. BP established a wildlife center in Valdez and activated the Anchorage wildlife facility. Although some birds, seals, and otters were sighted in light sheens, none were in distress or captured. Precautionary booming was implemented around the hatchery and in front of Duck Flats. The USCG and the State of Alaska were heavily involved in the response, which lasted three days.

On January 10, 1997, approximately 300 gallons of ballast water residue (oil, other) was spilled from the VMT Ballast Water Treatment Plant (BWTP).

The Prince William Sound RCAC has a long term monitoring program in place to assess pollution problems in and around VMT facilities, as well as other regions of Prince William Sound and the adjacent Gulf of Alaska.

The BWTP spill sampling in January 1997 and the subsequent sampling showed somewhat elevated total polycyclic aromatic hydrocarbons (TPAH) levels, although these values were again within the range of historical values seen at this site. As reported elsewhere, statistical comparisons of the BWTP spill sampling with historical data from this site failed to show significant differences between sampling times, nor were the fingerprints from tissues from the BWTP sampling indicative of contamination from the spilled oil (<http://www.pwsrcac.org/oldsite/Ltemp/LTEMP%20reports/Ltemp98.html>).

00113-116: The BTEX emissions from the Dissolved Air Flootation (DAF) tanks and biological treatment system associated with the Ballast Water Treatment Facility (BWTF) at the Valdez Marine Terminal (about 493 pounds/day or 90 tons/year) are included in the total emissions of hazardous air pollutants from the Valdez Marine Terminal (about 673 pounds/day or 122.9 tons/year) as listed in Table 3.13-6 of DEIS. This will be reflected in Table 3.13-6 of FEIS.

The 4th paragraph of Section 3.13.1 of DEIS states that some equipment at Pump Stations #2 and #7 and Valdez Marine Terminal are also subject to various limits of the Prevention of Significant Deterioration (PSD) regulations. These equipment at Pump Stations #2 and #7 and Valdez Marine Terminal are described in the PSD permit applications submitted to Alaska Department of Environmental Conservation (APSC 1990a, b, and Fluor and TRC 1995) and the limitations imposed by the PSD regulations are described in the Alaska Administrative Code 18 AAC 50.020. These references are in Section 3.30 of DEIS. The DEIS (Section 3.13) correctly notes that all TAPS facilities have applied for Title V operating permits. Some equipment is also subject to PSD regulations.

Table 3.13-2 presents actual emissions from Valdez Marine Terminal. No revision is needed.

00113-117: The text in Section 3.13.1.1 has been revised.

00113-118: The BTEX quantity (approximately 580 pounds/day or 105 tons/year) estimated by Payne (2002) is the mass removal rate of the BTEX compounds at the Dissolved Air Flootation (DAF) system of the Ballast Water Treatment Facility (BWTF), not the rate of the BTEX emissions to the atmosphere from the BWTF. Although much of this mass is released to the atmosphere, a certain fraction of the BTEX removed by the DAF system remains in the oil skimmed off. Therefore, the rate of BTEX released to the atmosphere would be less than 105 tons/year. The atmospheric emission rate of the BTEX compounds from the BWTF estimated by APSC is about 493 pounds/day or 90.0 tons/year.

00113-119: Ambient standards for the HAPs are not presented because neither the U.S. Environmental Protection Agency nor the State of Alaska has established ambient HAP standards. (Section 3.13.2.2).

The last sentence of the comment states that “the DEIS should address the environmental impact of the HAPs and reconcile impact with EPA’s definition of major source.” Section 4.3.13.2 of the DEIS presents the assessment of potential health impacts of HAPs released from the Trans-Alaska Pipeline System (TAPS) facilities, including the Valdez Marine Terminal. The 25 tons per year value is merely a threshold value used to define a “major” source of HAPs,” not the upper limit of the HAPs emissions that the law (Clean Air Act) allows.

00113-120: The 105 tons/year of BTEX estimated by Payne et al. (2002) is not the rate of atmospheric emissions from the DAF system. Rather, the value is the mass removal rate by the DAF system, consisting of the amount of BTEX contained in the skimmed oil and the amount released into the atmosphere. The current atmospheric emission rate of the BTEX compounds from the Valdez Marine Terminal estimated by APSC is about 105.7 tons/year (Table 3.13-6 of DEIS). The atmospheric emission rate of BTEX from the Valdez Marine Terminal prior to the installation of vapor recovery system (during 1990-1991 period when the crude oil throughput was about 1.8 million bbl/day) was estimated to be about 900 tons/year (Goldstein et al. 1992), which is more than 8 times the current estimate (105.7 tons/year) of atmospheric emissions of BTEX from the Valdez Marine Terminal. Therefore, it can be estimated that the BTEX concentrations around the Terminal would have decreased substantially and those in the city of Valdez would have also decreased to some extent.

00113-121: Thank you for your comment.

00113-122: The tracer study was conducted for 10 days during the summer (August) of 1990 and 10 days during the winter (February – March) of 1991. The DEIS did not claim that the other [indoor] sources are responsible for releasing benzene, toluene, ethyl benzene, and xylene (BTEX) emissions from the Valdez Marine Terminal and that these sources would be responsible for the spatial trends observed in the outdoor monitoring program. The DEIS states that the tracer study (which determined the % of ambient outdoor VOC concentrations in Valdez area that is attributable to Valdez Marine Terminal emissions) combined with the measurements of VOC exposures of Valdez residents using personal monitoring devices (which reflect actual inhalation exposures indoors and outdoors by the Valdez residents) showed that only about 1 to 10% of VOC exposures of Valdez residents were attributable to Valdez Marine Terminal emissions.

There are many studies that report that indoor air has higher VOC concentrations than outdoor air, even in highly industrialized areas. For example, a large EPA study conducted in 7 cities in the late 1980s called Total Exposure Assessment Methodology TEAM found that indoor air in the home and at work far outweighs outdoor air as a route of exposure to toxic chemicals (U.S. EPA, Office of Acid Deposition, Environmental Monitoring and Quality Assurance, Office of Research and Development, EPA 600/S6-87/002, September 1987).

Regardless of the source of the VOC compounds in ambient air in Valdez, the risk assessment methodology used in the EIS generally used the ambient VOC levels present in Valdez at the time of the 1991 sampling effort to estimate human health risks. Ambient VOC levels have been decreasing in the past decade in many U.S. cities (see <http://www.epa.gov/airtrends/toxic.html>).

00113-123: 1) Tracer study can be used because it was conducted simultaneously with the personal and indoor/outdoor ambient concentration monitoring during the summer and winter monitoring periods in 1990 and 1991, respectively. (2) The approach used in estimating the emission reduction is sound because it is based on (a) the measured concentrations of VOC in the gas phase in the crude oil storage tank saturated with the vapor from the crude oil, (b) the actual measured concentrations of VOC in the power boiler stack exhaust during the time the VOC emissions from tanker loading is collected by the tanker vapor recovery system and burned in the power boiler furnaces, and (c) the volume of tanker gas replaced by the crude oil loaded.

00113-124: Although the Payne et al. (2002) study estimated a theoretical emission of 105 tons BTEX per year, from the Dissolved Air Flotation Tanks, the emissions from this facility are included in site-wide, permitted emissions. Even including the dissolved air flotation tank emissions, the total BTEX emissions have decreased more than 10-fold since installation of the tanker vapor recovery system in 1998 (see Section 3.13.2.2 for details).

The estimated risk of 3×10^{-5} for the Valdez residential area was only very slightly linked to the emissions from the Valdez Marine Terminal; 90% of the calculated risk was from the 1991 measured ambient benzene level of 4 to 5 ug/m³, as reported in the Valdez Air Health Study (VAHS) by Goldstein et al. (1992). Only 10% of benzene value was considered attributable to Valdez Marine Terminal emissions, so the risk was mainly calculated on the basis of the ambient levels at the time, regardless of their source. The increased lifetime cancer risk for Valdez residential areas due to ambient benzene levels was about 3×10^{-5} .

The Valdez ambient air benzene value is similar to, but on the high side of, current ambient benzene values in large U.S. metropolitan areas. For example, the 2001 ambient benzene values in Anchorage, Portland, Chicago, and New York ranged from about 1 to 3.5 ug/m³; the values for Los Angeles ranged from 1 to 5 ug/m³. Ambient benzene concentrations have been decreasing in major cities in the past decade; an EPA study shows a 47% decrease at 95 urban monitoring sites between 1994 and 2000 (<http://www.epa.gov/airtrends/toxic.html>). EPA attributes the decrease to stricter car emissions standards, required use of cleaner burning gasoline, and standards requiring emission reductions at oil refineries and chemical plants. Based on these data, it is likely that ambient benzene levels in Valdez have also decreased in the time since the 1990/91 air monitoring effort. However, no new ambient air benzene data are available at this time; such data would be useful in estimating potential long term health impacts.

In order to avoid statements on "acceptable" risks, the text in Section 3.17 has been changed.

The protection of VMT workers is regulated under the Occupational Safety and Health Act and is, therefore, beyond the scope of the EIS.

00113-125: The text in Section 4.4.4.7.4 (Impacts from Foodchain Exposures Resulting from Spills to Water) discusses the increased stomach cancer rates of Native Alaskans in comparison with the U.S. white population, and that this may be due to frequent ingestion of smoked foods. The text also states that any additional exposures to PAHs should be avoided where possible.

00113-126: The inset of Section 4.3.9 has been modified.

00113-127: The complex environmental interrelationships associated with the proposed renewal of the TAPS right-of-way coupled with the diversity of reader interests and needs require the assembly of large amounts of information in the EIS. Cross-referencing is a useful tool to avoid duplication while enabling readers with diverse needs to access sections of interest to them.

00113-128: The removal of 27,600 tons per year of VOCs was the amount eliminated by the tanker vapor recovery system and is greater than the current potential VOC emissions from Valdez Marine Terminal. The current potential emissions reflect the reductions made by the tanker vapor recovery system.

The DEIS did not ignore the issue of the BTEX released by the Dissolved Air Floatation (DAF) units of Ballast Water Treatment Facility (BWTF). Benzene and other VOC emissions from the DAF tanks and biological treatment system associated with the BWTF at the Valdez Marine Terminal (about 493 pounds/day or 90 tons/year) are included in the total emissions of HAPs from the Valdez Marine Terminal (about 673 pounds/day or 122.9 tons/year) as listed in Table 3.13-6 of DEIS. Conservatively high ambient concentration estimates of BTEX and other toxic air pollutants emitted from the BWTF and other sources at the Valdez Marine Terminal were considered in estimating potential health impacts associated with ambient concentrations of these pollutants in Valdez area under the proposed action (at the crude oil throughput levels of 0.3, 1.1 and 2.1 million bbl/day) and other alternatives (see Section 4.3.13, 4.5.2.13, and 4.6.2.13). These ambient concentration estimates are based on the ambient BTEX concentrations monitored during the 1990-1991 personal and ambient monitoring studies and the tracer studies conducted in the Valdez area when both the vapor emissions from tankers and the DAF units were released. The baseline ambient concentrations used in the health risk calculations were given in the Affected Environment section (Table 3.17-4); a reference to this table has been added to the footnotes of Table 4.3-4 to clarify.

00113-129: Unfortunately, the apparent inconsistency is a product of separate regulatory definitions that apply. The definition of a hazardous material, hazardous chemical or hazardous liquid often depends on the regulatory context in which it is being discussed. The footnote in Section 4.3 indicates that under Department of Transportation regulations (49 CFR) hazardous liquids include petroleum and petroleum products. In the introduction to hazardous materials management (Section 3.16), the regulatory definition of "hazardous material" is the one promulgated by the Occupational Safety and Health Administration (OSHA) in 29 CFR and applied by EPA in its regulations in 40 CFR implementing the Emergency Planning and Community Right-To-Know Act (EPCRA). Crude oil is not discussed as a "hazardous material" because under the Section 313 of EPCRA, crude oil is not considered a hazardous chemical. In addition, under EPCRA, petroleum products in transportation (e.g., traveling in the pipeline) are not being stored or used at the facility and do not have to be reported under the Toxic Chemical Release Inventory (TRI) provisions of EPCRA. However, as shown in Table C-1, the crude oil in storage at the VMT is listed on the EPCRA TRI report (p. C-10, footnote g). Under EPA guidance for Petroleum Terminals and Bulk Storage Facilities, (EPA 745-B-00-002, February 2000), petroleum terminals and bulk storage facilities must determine what EPCRA Section 313 chemicals are present in the products in bulk storage and estimate and report the Section 313 chemicals based on the quantities of crude oil being stored. However, crude oil itself is not a hazardous chemical under Section 313 of EPCRA.

00113-130: The estimated air pollutant emissions from the vehicles used for TAPS operation in 2001 are listed in Table 3.13-5 for various TAPS facilities where vehicles were assigned or the roadway segments where vehicles were used. The assessment of the significance of these emissions is presented in Section 3.13.1.1 (DEIS page 3.13-5).

00113-131: The impacts to highways from TAPS related activities is provided in Section 4.3.11.4.

00113-132: The scaling to various crude oil throughput levels was based on the ambient BTEX concentrations obtained from the ambient data monitored during the 1990-1991 personal and ambient monitoring studies and the tracer studies conducted in the Valdez area when both the vapor emissions from tankers and the DAF units were released. The conditions under which the tracer study was conducted and the study duration will be provided in the FEIS.

- 00113-133:** The rates of HAPs emissions from the crude oil spilled on flowing water (Yukon River at Mile Post 353-354) were not underestimated. The thickness of oil slicks estimated for assumed spills of four frequency ranges (50 bbl - anticipated, 10,000 bbl - likely, 21,246 bbl - unlikely and very unlikely) are very small (approximately 0.08, 0.03, and 1 mm, respectively) and all HAPs contained in the spilled crude oil were estimated to have evaporated in relatively short time periods after spill (e.g., 4 minutes for benzene).
- 00113-134:** The text in Section 4.4.4.6.3 has been revised.
- 00113-135:** In Section 4.6.2.12.2 there is a more in depth discussion of the treatment of purge waters to be flushed through the pipeline and ultimately treated in the VMT. The EIS does not speculate as to the exact technology changes that may have to be implemented to ensure the flushing wastewater is properly treated before discharge to Prince William Sound. Under federal and state regulations, all discharges would have to either meet the current effluent limitations under the NPDES Permit (AK-002324-8) or, if there are any activities that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in the current permit, and if that discharge may reasonably be expected to exceed the highest of the "notification levels" listed in the current Permit, the ADEC and the EPA must be notified (AK-002324-8, Section III.L). In addition, under the current Permit, the permit may be modified, or alternatively, revoked and reissued, to address the application of different permit conditions, if new information, such as future water quality studies or waste load allocation determinations, or new regulations such as changes in water quality standards, indicate the need for different conditions (AK-002324-8, Section V.M).
- 00113-136:** The DEIS provides extensive details about ballast water delivered to and treated at the BWTF. Specifically, Appendix C Section C.5 provides substantial details regarding the generation and management of wastewaters throughout TAPS, including the generation and treatment of ballast water in the BWTF at the Valdez Marine Terminal. Table C5 itemizes all the influent wastewaters to the BWTF, including ballast waters.
- 00113-137:** The DEIS did not state that there is a vapor recovery system for the Dissolved Air Flotation (DAF) Tanks.
- 00113-138:** Section 3.1.2.1.8 was intended to provide only a broad overview of the BWTF. See Appendix C for a more in-depth discussion of the BWTF operation. The DAF is discussed in C-5. In response to the remainder of the comment, the text of C.5 has been amended to include the effluent limitations.
- 00113-139:** The effluent limits contained in the NPDES permit have been incorporated into the text of Section C.5.
- 00113-140:** As discussed in the text on page 3.7-11, three arguments are presented that justify the conclusion that pipeline operations have not significantly affected surface water quality along the TAPS ROW. These arguments are: no impaired waters have been linked to pipeline operations, observations by nonprofit organizations have not identified degradation of water quality attributable to TAPS operations, and pipeline discharges are regulated by appropriate discharge permits. The text was changed to state that there have been no comprehensive water quality studies performed along the TAPS ROW since about 1975. The reference to comparisons of water quality along the TAPS ROW to State of Alaska water quality standards or pristine waters was deleted.
- 00113-141:** While we recognize that the PWS RCAC has recommended that NPDES permit levels for the BWTF be reduced, the EIS correctly identifies that BWTF discharges are below current NPDES permit limits and that concentrations of total PAHs in sediments are below the sediment quality guidelines for marine sediments. This does not mean that there is not some accumulation of PAHs in sediments surrounding the BWTF diffuser near the VMT, just that those levels do not exceed the current sediment quality guidelines for protecting aquatic organisms.

00113-142: While we recognize that the PWS RCAC has recommended that NPDES permit levels for the BWTF be reduced, the EIS correctly identifies that BWTF discharges are below current NPDES permit limits and that concentrations of total PAHs in sediments are below the sediment quality guidelines for marine sediments. The methods used by Feder and Shaw (2000) to detect total PAH concentrations in sediment were sufficiently sensitive to allow comparison to the sediment quality guidelines. This does not mean that there is not some accumulation of PAHs in sediments surrounding the BWTF diffuser near the VMT, just that those levels do not exceed the current sediment quality guidelines for protecting aquatic organisms.

Instead of stating that BWTF effluent is unlikely to impair sediment quality, the EIS was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts.

00113-143: Dissolved air flotation tanks of the BWTF are mentioned in Section 3.13.1, "Existing Emissions" (Table 3.13-2).

00113-144: The EIS was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts. (See Section 4.3.16.1).

00113-145: The description as it appears is sufficient to describe the current situation with respect to the BWTF. It is understood that facility changes may have been required in response to changes to influent conditions or changes to water quality criteria. It is further understood that future changes may also be necessary. The NPDES permit anticipates this and requires APSC to give notice to EPA and to ADEC when changes to infrastructure or operation procedures are anticipated. This provides the regulatory authorities the opportunity to determine the necessity of amending current permit conditions or even requiring that a new NPDES permit be established.

00113-146: The complex environmental interrelationships associated with the proposed renewal of the TAPS right-of-way coupled with the diversity of reader interests and needs require the assembly of large amounts of information in the EIS. Cross-referencing is a useful tool to avoid duplication while enabling readers with diverse needs to access sections of interest to them.

00113-147: The BTEX emission estimate (105.7 tons/year) for the Valdez Marine Terminal is listed in Table 3.13-6 includes the emissions from the BWTF (90.0 tons/year). The 580 rate of BTEX estimated emissions by Payne et al. (2002) is not the rate of atmospheric emissions from the DAF system. Rather, the value is the mass removal rate by the DAF system, consisting of the amount of BTEX contained in the skimmed oil and the amount released into the atmosphere.

00113-148: Because of their inherent volatility, the chemicals that comprise the BTEX fraction will exhibit a tendency to evaporate to the atmosphere after a spill of crude oil or refined petroleum products. Ambient conditions dictate both the rate and the extent of BTEX evaporation. However, BTEX chemicals also exhibit appreciable solubility or miscibility in water. Thus, competing equilibria are also routinely present at any oil/water interface that would allow some BTEX fraction to be extracted into the water phase. Because BTEX chemicals are easily identified in water samples, surface or groundwaters impacted by a spill are routinely monitored for the presence of BTEX fractions as an indicator of the extent to which components of the spilled material have migrated from the spill site.

The environmental fate of BTEX fractions is, indeed, important from the perspective of exposures of spill response workers to the BTEX chemicals. The potential for carcinogenic and other health effects due to exposures to BTEX compounds is addressed in Sections 3.17.2.4 and 4.3.13.2.2. A reference to these sections has been added to the inset. Finally, although "fingerprinting" can sometimes be done with sufficient precision to identify the source of a spill among many potential sources, it can also be used in a less rigorous way to track migration of spilled petroleum. It was the intent of the inset to show that potential. The text of the inset has been modified to eliminate any confusion.

00113-149: In Section 4.6.2.12.2 there is a more in-depth discussion of the treatment of purge waters to be flushed through the pipeline and ultimately treated in the VMT. The EIS does not speculate as to the exact technology changes that may have to be implemented to ensure the flushing wastewater is properly treated before discharge to Prince William Sound. Under federal and state regulations, all discharges would have to either meet the current effluent limitations under the NPDES Permit (AK-002324-8) or, if there are any activities that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in the current permit, and if that discharge may reasonably be expected to exceed the highest of the "notification levels" listed in the current Permit, the ADEC and the EPA must be notified (AK-002324-8, Section III.L). In addition, under the current Permit, the permit may be modified, or alternatively, revoked and reissued, to address the application of different permit conditions, if new information, such as future water quality studies or waste load allocation determinations, or new regulations such as changes in water quality standards, indicate the need for different conditions (AK-002324-8, Section V.M).

Although seawater (e.g. ballast water) and unspecified cleaning agents are already permitted influents under the current NPDES permit (see Table C-5), the scale of the pipeline flushing effort and the volumes of rinsates generated would no doubt trigger the notification requirements in the permit. Such notifications would also specify any changes to treatment technologies that are being proposed. This notification would allow the regulators the opportunity to concur in any proposed alternative treatment methodologies and further amend the permit or revoke it and reissue a new permit to more comprehensively address pipeline flushing activities. Changes have been made to the text of Section 4.6.2.12.2 to reflect the concerns raised in the comment.

00113-150: Treated ballast water is included in the industrial wastewater category already listed.

00113-151: Instead of stating that BWTF effluent is unlikely to impair sediment quality, the EIS was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts (Section 4.3.16.1).

00113-152: The EIS correctly identifies that BWTF discharges are below current NPDES permit limits. The discharge limits in the NPDES permit, as well as the actual discharges reported by APSC to the EPA are displayed in Appendix C, Section C.5.

00113-153: The best available estimates of future production and transport of oil by TAPS indicate declining throughput. That being said, the EIS recognizes that there is a range of possibilities and assesses the bounding impacts associated with a range of throughput. This range included throughput up to historical high values. It should be noted that development and production of oil is not considered to be reasonably foreseeable in the current legal environment; thus oil development and production in ANWR was not included in the cumulative impact assessment in Section 4.7.

00113-154: The EIS correctly identifies that BWTF discharges are below current NPDES permit limits and that concentrations of total PAHs in sediments are below the sediment quality guidelines for marine sediments.

00113-155: No change was made to Section 4.3.8.3.

00113-156: The EIS correctly identifies that BWTF discharges are below current NPDES permit limits and that concentrations of total PAHs in sediments are below the sediment quality guidelines for marine sediments. The methods used by Feder and Shaw (2000) to detect total PAH concentrations in sediment were sufficiently sensitive to allow comparison to the sediment quality guidelines. This does not mean that there is not some accumulation of PAHs in sediments surrounding the BWTF diffuser near the VMT, just that those levels do not exceed the current sediment quality guidelines for protecting aquatic organisms.

Instead of stating that BWTF effluent is unlikely to impair sediment quality, the EIS was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts.

00113-157: While we recognize that the PWS RCAC has recommended that NPDES permit levels for the BWTF be reduced, the EIS correctly identifies that BWTF discharges are below current NPDES permit levels and that concentrations of total PAHs in sediments are below the sediment quality guidelines for marine sediments. The methods used by Feder and Shaw (2000) to detect total PAH concentrations in sediment were sufficiently sensitive to allow comparison to the sediment quality guidelines. This does not mean that there is not some accumulation of PAHs in sediments surrounding the BWTF diffuser near the VMT, just that those levels do not exceed the current sediment quality guidelines for protecting aquatic organisms. As identified in the comment, PAH accumulation was detected in mussels used to monitor water quality in Port Valdez as part of a PWS RCAC-sponsored monitoring program (Salazar et al. 2002). In that study, it was found that all measured concentrations of PAHs in water and estimated on the basis of bioaccumulation in mussel tissues indicated that the concentrations of PAHs in Port Valdez waters are in the low parts-per trillion range, well below the levels that have been associated with adverse effects in herring and salmon embryos (Salazar et al. 2002). In addition, Salazar et al. (2002) did not detect reduction in overall growth of caged mussels that could be attributed to PAH burdens. Instead of stating that BWTF effluent is unlikely to impair sediment quality, The EIS was revised to state that sediment concentration of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts. See Section 4.3.16.1

00113-158: The DEIS does not speculate as to the exact technology changes that may have to be implemented to ensure that the decreased influent associated with double-walled tankers does not impact the operation of the BWTF. Under federal and state regulations, all discharges from the BWTF would have to either meet the current effluent limitations under the NPDES Permit (AK-002324-8) or, if there are any activities that would result in the discharge (on a routine or frequent basis) of any toxic pollutant that is not limited in the current permit, and if that discharge may reasonably be expected to exceed the highest of the "notification levels" listed in the current Permit, the ADEC and the EPA must be notified (AK-002324-8, Section III.L). In addition, under the current Permit, the permit may be modified, or alternatively, revoked and reissued, to address the use of alternative treatment technologies or the application of different permit conditions, if new information, such as future water quality studies or waste load allocation determinations, or new regulations changing water quality standards, show the need for different conditions (AK-002324-8, Section V.M).

00113-159: Steller's eiders have been occasionally reported in Prince William Sound, but not Port Valdez. Significant impacts of routine operations of the Valdez Marine Terminal and associated permitted discharges into Port Valdez are not expected to have an effect on this species.

The work of Payne et al. has been very useful in identifying the significance of the risks of effluent discharge from the Ballast Water Treatment Facility on aquatic organisms in Port Valdez. These studies have demonstrated that the effluent poses no risk or very low risk to the species examined. Recently, Payne et al. have hypothesized the potential for higher risks associated in the surface microlayer of the water column. Until data are available regarding actual concentrations in this layer, it would be speculative to characterize the associated risk.

00113-160: The EIS correctly identifies that BWTF discharges are below current NPDES permit limits and that concentrations of total PAHs in sediments are below the sediment quality guidelines for marine sediments. The methods used by Feder and Shaw (2000) to detect total PAH concentrations in sediment were sufficiently sensitive to allow comparison to the sediment quality guidelines. This does not mean that there is not some accumulation of PAHs in sediments surrounding the BWTF diffuser near the VMT, just that those levels do not exceed the current sediment quality guidelines for protecting aquatic organisms.

Instead of stating that BWTF effluent is unlikely to impair sediment quality, the EIS was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts.

00113-161: Section 4.4.4.10.2 includes an analysis of potential impacts associated with 143,000 bbl of crude oil entering Port Valdez at the Valdez Marine Terminal due to a catastrophic rupture of a crude oil storage tank. We concluded that fish in deeper areas had a lower likelihood of being harmed by such a spill, but fish and invertebrates in nearshore and intertidal areas that could become oiled (estimated at up to 2 miles from the source) were at risk and that such an oil spill could affect returning adult salmon or out-migrating juvenile salmon. The discussion in Section 4.4.4.10.2 of the effects of the Exxon Valdez oil spill on fish resources has been expanded to include additional citations and to include additional information about potential effects of oil on salmon and other aquatic resources. While there is general discussion of the potential impacts of spilled oil, the evaluation of the potential effects of specific tanker spills remains outside the scope of the proposed action. However, tanker spills are considered as part of the cumulative action discussion in Section 4.7.7.2.4. The conclusion was that large marine spills resulting from a tanker accident could have large impacts on fish and other marine organisms. Additional discussion and citations pertaining to effects of oil on fish resources have been added to Section 4.4.4.10.

00113-162: The discussion in Section 4.4.4.10.2, to which readers are referred for information about the effects of the Exxon Valdez oil spill on fish resources, has been expanded to include additional citations and to include additional information about sublethal effects of oil.

00113-163: Section 3.11.3 discusses the possible origins of hydrocarbons in Port Valdez and PWS and the current scientific debate on this subject.

The methods used by Feder and Shaw (2000) to detect total PAH concentrations in sediment were sufficiently sensitive to allow comparison to the sediment quality guidelines. This does not mean that there is not some accumulation of PAHs in sediments surrounding the BWTF diffuser near the VMT, just that those levels do not exceed the current sediment quality guidelines for protecting aquatic organisms. Instead of stating that BWTF effluent is unlikely to impair sediment quality, the EIS was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts.

00113-164: The low effect level cited is from the referenced literature.

The discussion of the Exxon Valdez oil spill is included in the document as background and to describe the environment that could potentially be affected by future pipeline operations. It is not meant to be an exhaustive treatment and does not attempt to list or quantify the impacts caused by the Exxon Valdez oil spill. Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10 and the discussion in Section 4.4.4.10.2 of the effects of the Exxon Valdez oil spill on fish resources has been expanded and includes additional citations. Discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates has also been added.

- 00113-165:** A short discussion of infaunal and epifaunal invertebrates that serve as food for fish has been added to Section 3.19.1. Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10 along with a discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates.
- 00113-166:** While we recognize that the PWS RCAC has recommended that NPDES permit levels for the BWTF be reduced, the EIS correctly identifies that BWTF discharges are below current NPDES permit limits and that concentrations of total PAHs in sediments are below the sediment quality guidelines for marine sediments. The methods used by Feder and Shaw (2000) to detect total PAH concentrations in sediment were sufficiently sensitive to allow comparison to the sediment quality guidelines. This does not mean that there is not some accumulation of PAHs in sediments surrounding the BWTF diffuser near the VMT, just that those levels do not exceed the current sediment quality guidelines for protecting aquatic organisms. As identified in the comment, PAH accumulation was detected in mussels used to monitor water quality in Port Valdez as part of a PWS RCAC-sponsored monitoring program (Salazar et al. 2002). In that study, it was found that all measured concentrations of PAHs in water and estimated on the basis of bioaccumulation in mussel tissues indicated that the concentrations of PAHs in Port Valdez waters are in the low parts-per-trillion range, well below the levels that have been associated with adverse effects in herring and salmon embryos (Salazar et al. 2002). In addition, Salazar et al. (2002) did not detect reductions in overall growth of caged mussels that could be attributed to PAH burdens. Instead of stating that BWTF effluent is unlikely to impair sediment quality, Section 4.3.16.1 of the EIS was revised to state that sediment concentrations of PAHs in sediments and water due to BWTF operations are not expected to change substantially as a result of the proposed action and to cite and discuss results of the recent monitoring efforts.
- 00113-167:** Table 2-1 has been revised. However, the table does not address the analytical methods used to draw conclusions. Methods are either discussed in the text or in the referenced materials. The shellfish tissue data used in the EIS to support risk calculations were those reported in Varanasi et al. (1993), a research group from the National Oceanic and Atmospheric Administration (NOAA). The discussion of "Method Shortcomings" in Payne et al. (2002) states that the NOAA methods are the preferred methods for analysis of hydrocarbons in tissues. The fish and shellfish tissue analytical data used were produced by a very credible institution and were published in peer-reviewed sources (see EIS references in Sections 3.30 and 4.9).
- 00113-168:** It means that the eight-hour and 24-hour concentration values listed are the highest running averages. The text has been clarified in the footnote to Table 3.13-11.
- 00113-169:** Only the population of Zook subdivision of City of Valdez is provided because this subdivision is closest to the Valdez Marine Terminal and, therefore, potential impacts, if any, of the noise generated from sources at the Valdez Marine Terminal would be the highest. All other subdivisions are further away and, therefore, potential impacts due to noise sources at the Valdez Marine Terminal at these subdivisions would be less.
- 00113-170:** Effluents from the Ballast Water Treatment Facility are discussed in Section 4.3.13.2.1 of the DEIS, based on data from the Mixing Zone Application for NPDES Permit Renewal (APSC 1995, as cited in the section).
- The mussel tissue PAH concentrations reported in Payne et al. (2001) are total PAH concentrations. No human health risk assessment for ingestion of mussels is provided in that report. The total PAH concentrations also cannot be directly compared with the carcinogenic PAH concentrations measured by NOAA and reported in the EIS for the assessment of foodchain impacts from oils pills (Section 4.4.4.7.4). The total PAH concentrations measured by NOAA were much higher, comparable to the Payne et al. data. However, for the type of risk analysis conducted for the EIS, only the carcinogenic PAH concentration would be relevant.

00113-171: Harvey 2002 (Valdez Marine Terminal Air Quality Oversight Project Phase I), reviews the permitted emissions from the VMT. An 86% decrease in hazardous air pollutant emissions since the installation of vapor emission controls for the marine vessel loading facilities in the mid-1990s is reported in Harvey (2002). This information is in agreement with information on emissions reported in the EIS (see Section 3.13.2.2).

For the EIS, the risk results of the Goldstein et al. 1992 Valdez Air Health Study (see Section 4.9 of the FEIS for reference) were not used to draw conclusions on risk levels. The EIS used only data from the study on maximum measured ambient concentrations of the most hazardous VOCs at the VMT fence line and in Valdez residential areas. These data were used as input for independent risk calculations using conservative (i.e., high) exposure assumptions. For example, it was assumed that exposure would be 24 hours per day for a 70 year lifetime, and that a residence could be located at the VMT fence line.

The estimated risk in Valdez residential areas of 3×10^{-5} , based on 1991 data, was only very slightly linked to the findings of the tracer study. In the Valdez Air Health Study (VAHS) by Goldstein et al. (1992—see Section 3.30 for reference), the annual average ambient benzene concentration at 3 Valdez residential area monitoring locations ranged from 4 to 5 ug/m³ (based on hourly sampling for one year from Nov 1990 through Oct 1991). Because the VAHS concluded that only 10% of the residential area benzene concentration was contributed by Valdez Marine Terminal emissions, only 10% of the ambient level was scaled with projected future throughputs. Therefore, the actual range of residential area benzene concentrations assumed for varying throughputs in the risk calculations was very narrow, from 4.6 to 5.1 ug/m³ (corresponding to increased cancer risks of from 3.0 to 3.2×10^{-5} , see Table 4.3-4).

The Valdez ambient air benzene value is similar to, but on the high side of, current ambient benzene values in large U.S. metropolitan areas. For example, the 2001 ambient benzene values in Anchorage, Portland, Chicago, and New York ranged from about 1 to 3.5 ug/m³; the values for Los Angeles ranged from 1 to 5 ug/m³. Ambient benzene concentrations have been decreasing in major cities in the past decade; an EPA study shows a 47% decrease at 95 urban monitoring sites between 1994 and 2000 (<http://www.epa.gov/airtrends/toxic.html>). EPA attributes the decrease to stricter car emissions standards, required use of cleaner burning gasoline, and standards requiring emission reductions at oil refineries and chemical plants. Based on these data, it is likely that ambient benzene levels in Valdez have also decreased in the time since the 1990/91 air monitoring effort. However, no new ambient air benzene data are available.

00113-172: The BLM and the agencies within JPO acknowledge both that there have been legitimate issues related to APSC's employee concerns program (ECP) and that APSC has undertaken considerable efforts to improve and refine their ECP program. The BLM and JPO expects to continue to evaluate the effectiveness of APSC's ECP through confidential survey that will seek input from all TAPS employees (see Section 4.8.4 of the FEIS). Like the three prior surveys, this effort can provide broad measures of the confidence that TAPS workers have in APSC's ECP and can suggest areas needing improvement.

Safety-related concerns and allegations that have been raised in the past by TAPS workers include National Electrical Code (NEC) compliance, work order initiation, unqualified workers, and insufficient inspection. Text has been added to clarify JPO's recent conclusions regarding the requirement for APSC to immediately abate any health or safety hazards, including those raised by employee concerns.

00113-173: The comment says the DEIS incorrectly assumes that VOC emissions are negligible for about 24 hours after a spill. This is exactly the opposite of what the EIS analyses and supporting text actually assume, which is that "VOC emissions from a crude oil spill are generally negligible about 24 hours after the initial spill." In effect, this meant that the analyses estimated the highest concentrations that would occur in the first 24 hours after a spill, and compared these with health risk-based short-term concentrations limits. Since air concentrations after 24 hours would be less, this was a protective evaluation method.

With respect to foodchain impacts, the extensive text of section 4.4.4.7.4 provides support for the statement that, for food that is not noticeably contaminated, adverse health effects would not be expected from eating fish, shellfish, or marine mammals from a spill area. For fish and mammals, this conclusion is reached on the basis of rapid and extensive metabolism of PAH compounds by these species, so that concentrations in edible tissues are generally non-detectable or very low within a short time after the exposure occurs. Shellfish, however, do not metabolize the PAH compounds, and therefore could more plausibly present increased cancer risk for individuals regularly ingesting shellfish meals. This increased cancer risk was evaluated using data from references suggested in the comment (i.e., Varanasi et al. 1993; Field et al. 1999—see Section 3.30 of the FEIS for references). Although the U.S. FDA had previously evaluated the increased cancer risk associated with contaminated shellfish ingestion, a re-analysis of the data was conducted for the EIS incorporating newer risk factors that would increase the risk estimates. The conclusion was that the highest possible increased cancer risk from ingestion of contaminated shellfish was somewhat less than the lower bound of increased cancer risk from ingestion of smoked salmon (see Table 4.4-35). The speciation of the PAHs associated with the smoking process is not significant for this analysis, because only the 15 PAHs listed in Footnote 'a' of Table 4.4-35 have enough available toxicity data to include in a quantitative risk evaluation.

The text in Section 4.4.4.7 discusses the increased stomach cancer rates of Native Alaskans in comparison with the U.S. white population, and that this may be due to frequent ingestion of smoked foods. The text also states that any additional exposures to PAHs should be avoided where possible.

00113-174: Although the protection of cleanup workers is regulated under the Occupational Health and Safety Act and is, therefore, beyond the scope of the EIS, potential public health impacts from spills are evaluated in the EIS. In particular, Section 4.4.4.7.2 assesses the potential for adverse health impacts resulting from inhalation of contaminants volatilized from spills along the pipeline, spills at the Valdez Marine Terminal, spills during transportation accidents, and spills to rivers along the pipeline.

00113-175: Considering the spill magnitudes assumed in the assessed EIS spill scenarios along with the relatively slow rates of evaporation, it is likely the spill response team would have sufficient time to limit any significant evaporation levels of heavy crude components after 24-hours.

00113-176: It is agreed that cleanup workers could experience adverse health impacts if PPE is not used during cleanup operations, particularly within the first 24 hours after a spill occurs. If spills occur in the future (particularly large volume spills), a procedure to address the concerns expressed in the comment could be to monitor ambient air to determine when concentrations of toxic air pollutants have fallen below health-based levels of concern.

As a point of clarification, in Section 4.4.4.7 of the EIS, the text states that some former EVOS cleanup workers claim that oil and solvent exposures resulted in adverse health impacts, and that "out of 15,000 workers involved in the cleanup, 25 have filed suit for damages." It is beyond the scope of the EIS to determine whether the EVOS cleanup activities caused adverse health impacts in individual cleanup workers.

- 00113-177:** The assumptions used to model a spill of approximately 143,450 barrels (6 million gallons) into Port Valdez were based on a scenario considered in the "Valdez Marine Terminal Oil Discharge Prevention and Contingency Plan, CP-35-2, 4th Ed., Rev. 2 (July 2001)". This contingency plan addressed a Scenario 5 (pages 589 through 597), which specified the assumption of a 1.6 gal/ft² oil thickness on the surface of the water. Section 4.4.4.7.2 of the EIS assesses the impacts from inhalation exposures resulting from spills. For the assessment of inhalation impacts of spills into surface waters (e.g., Port Valdez), assumptions on the surface area of the spill on water are needed to estimate volatilization and air concentrations; therefore, a higher amount of volatilization was estimated by assuming the entire spill volume was contained by booms within two hours (that is, the estimated air concentrations and inhalation impacts were maximized using this assumption). Section 4.4.4.5.4 of the EIS (Physical Marine Environment Spill Impacts) also addressed the overall impacts of this hypothetical large oil spill into Port Valdez. This section estimated that 2 miles of shoreline at the VMT would be heavily oiled by such a spill, and also discussed the possibility that not all the oil would be contained within 2 hours, resulting in a larger area being impacted.
- 00113-178:** See Appendix A, "Methodology Descriptions," in the EIS, which describes the methodologies used to analyze the environmental consequences of implementing the alternatives presented in the EIS, including the formulation and development of spill scenarios, even "worst case" scenarios.
- 00113-179:** There is no evidence to suggest that current stockpiles of Halon at APSC are insufficient to maintain the Halon-based fire suppression system. However, APSC has a continuing responsibility under Grant Stipulations to maintain critical subsystems of the TAPS in operable condition, and the adequacy of those systems is subject to review and evaluation by JPO through its oversight authority. When conditions are such that the current fire suppression systems cannot be maintained, JPO will require APSC to submit a work plan for transition to alternative fire suppression strategies. See also the text box in Section 4.3.13.1.3.
- 00113-180:** The history and current status of issues relating to electrical system controls and fire safety were summarized in Section 4.3.13.1. JPO has monitored this issue and additional details can be found in their reports, which are also cited in the EIS. BLM and JPO are committed to ensuring the APSC continues to take aggressive steps in continuing compliance with the National Electrical Code and in rapidly resolving any other fire safety issues that may remain at the terminal. One issue that may still remain which was identified in an RCAC requested fire safety review for the terminal dealt with concerns about the level or adequacy of fire protection at berths 4 and 5. As a part of the safety review a fire protection engineering study was recommended (Slye and Semenza 2001—see Section 4.9 of the FEIS for reference). Resolution of issues pertaining to the specific type, form, and level of oversight review that might be required to address specific fire safety issues would be outside the scope of this EIS. These issues would be more appropriately handled by reviewing agencies with the appropriate oversight (e.g., JPO member agencies). These agencies would be much better suited to review the adequacy of existing fire fighting response capabilities and in providing recommendations, as necessary, to correct any deficiencies.
- 00113-181:** As described in Section 4.5.1.2.2 of the EIS, the spill volume in a guillotine break scenario is estimated on the basis of two considerations: (1) the dynamic volume, which makes up the quantity of oil that would be pumped through the break until the pumps upstream are shut down and the mainline valves are closed, and (2) the static volume, which could result from oil draining from the pipeline if the break occurred at a relatively low elevation. The dynamic volume is proportional to the throughput whereas the static volume is dependent on the location of the break. Check valves that were placed strategically at various locations in the pipeline when it was constructed close automatically to limit the amount of backflow from higher elevations downstream from the break location. Both components of the spill were considered when the spill volumes were calculated for the guillotine break scenarios discussed in Sections 4.4.1 of the EIS. Calculations were performed for thousands of locations along the pipe. The largest volume estimated to be released was approximately 54,000 barrels. The spill volume for most areas along the pipe was much less than that amount.

- 00113-182:** As indicated in response to the previous comment (Response 113-181), the estimates for spilled oil volume from a guillotine break scenario take into account both the dynamic and the static volume. The static volume is dependent on the location of the break, in particular, its elevation in relation to upstream and downstream along the pipe. The plans are to respond to any amount of spill irrespective of the location and the volume of the spill.
- 00113-183:** Major spill response equipment available along the TAPS is summarized in Table 3.1-6 in the EIS. Detailed information on equipment available and procedures in place at various locations along the pipeline is given in the TAPS Oil Discharge Prevention and Contingency Plan (CP-35-1) (APSC 2001g), which is available to the public through various libraries in several major cities in Alaska, including Anchorage, Fairbanks, and Valdez.
- 00113-184:** Involvement of the PWS RCAC in the development of APSC's new response system and training activities is briefly described in Section 3.1.2.2.1 of the EIS. Citations to various studies conducted previously by RCAC and other organizations on EVOS and potential effects of oil spills in PWS are provided throughout the EIS as appropriate.
- The current text in Section 4.4.4.5.4 acknowledges the possibility that the spill may not be contained, due to inclement weather or other unforeseen circumstances. Under those conditions, the text notes that the impacts would be significant.
- 00113-185:** Involvement of the PWS RCAC in the development of APSC's new response system and training activities is briefly described in Section 3.1.2.2.1 of the EIS. Citations to various studies conducted previously by RCAC and other organizations on the Exxon Valdez oil spill and potential effects of oil spills in PWS are provided throughout the EIS as appropriate.
- 00113-186:** Depending upon the timing and the quantity of oil, it is true that major impacts could occur to salmon in the Copper River if a substantial amount of oil from a pipeline break were to reach the Copper River. Spills into the Gulkana and the Tazlina Rivers (both tributaries of the Copper that are crossed by the TAPS) were considered as part of the spill scenario analyses in Section 4.4.4.10.1. Text has been added to Section 4.4.4.10.1 to reiterate the importance of the Copper and Lowe Rivers for salmon production in the area and to recognize the potentially severe impacts to salmon in the event of a large spill entering those rivers.
- 00113-187:** Major spill response equipment available along the TAPS is summarized in Table 3.1-6 in the EIS. Detailed information on equipment available and procedures in place at various locations along the pipeline is given in the TAPS Oil Discharge Prevention and Contingency Plan (CP-35-1) (APSC 2001g), which is available to the public through various libraries in several major cities in Alaska, including Anchorage, Fairbanks, and Valdez.
- 00113-188:** As discussed in Section 4.4.4.3.2, oil would affect surface water and adjoining beds and banks. These impacts are discussed qualitatively because quantitative analyses would require a great deal of site- and time-specific information not available until an actual release occurs. However, impacts to the river system would be major in the case of a catastrophic guillotine break that releases crude oil directly to a river or stream.
- Cleanup efficiencies were not quantified in the EIS because of site- and time-specific input parameters that would not be known until a spill occurred. Rather, efficiency was equated to the ability of the response team to arrive at an appropriate containment site and deploy their equipment prior to the arrival of the leading edge of the spill. Even under ideal conditions, it is unlikely that 100% of the spilled oil could be recovered because of such factors as high velocity water, turbulence, sediment load, ice, dissolution, etc. Additional text to clarify the difference between capture and subject-to-capture efficiencies has been added to Section 4.4.4.3.2.

- 00113-189:** Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10. Discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates has also been added to Section 4.4.4.10.
- 00113-190:** The Exxon Valdez oil spill is not known to have caused groundwater contamination. There are definitely still some areas of beaches and mussel beds that are contaminated from the Exxon Valdez oil spill. This remaining contamination was acknowledged in Section 4.4.4.7, and was used as justification for assuming a prolonged potential exposure period of from 10 to 70 years for the subsistence ingestion risk that was assessed. However, it is actually highly unlikely that a single individual would ingest mussels from a single contaminated area (or even several contaminated areas) over such a long time period.
- 00113-191:** The requested comparison of the static and dynamic spill volumes with historical spill events is provided in Section 4.4 of the EIS (see, for example, Table 4.4-1 and Map 4.4-1). Footnote 3 refers the reader to Section 4.4.
- 00113-192:** The Transient Volume Balance leak detection system is briefly described in Section 4.1.2.9.3 of the EIS. More detailed information on the TVB system can be found in Section 3.1.8.3.2 of the TAPS Oil Discharge Prevention and Contingency Plan (CP-35-1) (APSC 2001g—see Section 3.30 of the FEIS for reference), which is available during public review periods through various libraries in several major cities in Alaska, including Anchorage, Fairbanks, and Valdez.
- 00113-193:** With the notable exception of contingency planning, neither the Grant/Lease nor applicable federal or state regulations speak directly to TAPS management procedures, except to clearly establish that it remains APSC's responsibility to develop and implement management systems that are sufficient to satisfy performance standards contained in grant stipulations or applicable regulations or permits. However, it is important to note that the JPO's oversight function looks not only at the conditions of TAPS systems, but also evaluates the adequacy and completeness of attendant management systems, including efforts to repair deficiencies. Comprehensive monitoring reports issued by the JPO not only discuss certain aspects of TAPS from engineering or compliance perspectives, but also include root cause analyses of identified deficiencies. Such analyses can extend to an evaluation of resources, as well as personnel training. That said, however, APSC retains the primary responsibility for providing adequate resources (including appropriately trained personnel) necessary for safe TAPS operations. It is within the JPO's authority to ask APSC to demonstrate the adequacy of its resource commitments, especially in the face of identified deficiencies and the appropriateness of its management procedures; but it is beyond JPO authority, and indeed inappropriate, for the JPO to dictate levels and types of resource commitments or specific operating procedures that must be followed or to assume responsibility for developing TAPS management systems. Evaluations of adequacy or execution of extant management systems are also outside the scope of this EIS.
- 00113-194:** As discussed in Section 4.4.4.3.2, the physical size of a contaminated zone would be larger than the length of a plug-flow slick because of hangup along the flow path, mixing, entrainment, and remobilization. Without detailed site and time-specific information on the receiving water and weather, such calculations can not be credibly performed. Rather, the plug-flow assumption was made to highlight the potential differences between spills of long and short duration.
- 00113-195:** Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10. Discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates has also been added to Section 4.4.4.10.
- 00113-196:** The spill prevention and response measures employed at the VMT are described briefly in Section 4.1.4.2 of the EIS. Details on the equipment available and procedures in place are given in the Valdez Marine Terminal Oil Discharge Prevention and Contingency Plan (CP-35-2) (APSC 2001h), which is available to the public through various libraries in several major cities in Alaska, including Anchorage, Fairbanks, and Valdez, when the plans are under public review prior to ADEC approval.

- 00113-197:** The spill prevention and response measures employed at the VMT and the PWS are described briefly in Sections 4.1.4.2 and 4.1.4.3 of the EIS, respectively. Details on the equipment available and procedures in place are given in the Valdez Marine Terminal Oil Discharge Prevention and Contingency Plan (CP-35-2) (APSC 2001h) for the VMT and the Prince William Sound Oil Discharge Prevention and Contingency Plan (Prince William Sound Tanker Plan Holders 1999) for the PWS. Both documents are available to the public through various libraries in several major cities in Alaska and are sent directly to the PWS RCAC during the time of plan review. The EIS acknowledges that the booms may not contain all the oil spilled. In fact, Section 4.4.4.5.4 states that if assumptions are not met, a larger area could be affected or larger impacts could occur.
- 00113-198:** The referenced sentence in Section 4.1.4.3 has been revised to clarify the approval process regarding the use of dispersants in PWS spill response. The substantive elements of the PWS Contingency Plan are directed by Alaska regulations. Those rules also require that the Plan undergo routine review and updating and provide for public comment within the context of that review process.
- 00113-199:** The spill prevention and response measures employed at the VMT are described briefly in Section 4.1.4.2 of the EIS. Details on the equipment available and procedures in place are given in the Valdez Marine Terminal Oil Discharge Prevention and Contingency Plan (CP-35-2) (APSC 2001h), which is available to the public through various libraries in several major cities in Alaska, including Anchorage, Fairbanks, and Valdez at times the plan is subject to public review.
- 00113-200:** The EIS has been revised to include additional discussion addressing impacts of oil transportation beyond Prince Williams Sound into the Gulf of Alaska and the Pacific Ocean, including impacts on wildlife and marine resources.
- 00113-201:** The use of dispersants in response to spills of crude oil or petroleum products into PWS is addressed in detail in the PWS contingency plan. The elements of that plan are discussed in Section 4.1.4.3.
- 00113-202:** Tanker routes through the Hinchinbrook Entrance to Prince William Sound are part of the cumulative analysis, although they are not part of TAPS.

00113-203: Analysis of the economic impacts of renewal used throughput rates based on forecasts of annual production by DOE-EIA. The forecasts include anticipated production from fields currently producing oil, production from anticipated development of identified fields and production from technically recoverable but as yet undiscovered oil resources. As there are probabilities associated with production in each category, there is a bounding range for production in each year. The mean value of all potential production in each category was used in the analysis. Included in the evaluation was production from existing producing and developing fields, and additional oil from the Prudhoe Bay/Central Area Northeast NPR-A and West NPR-A. Based on these forecasts, production levels are expected to increase slightly between 2000 and 2005, and begin a steady decline over the remainder of the renewal period. Tanker traffic and the demand for tankers are likely to decline correspondingly.

In order to include the impact of different production levels due to physical factors (recovery success rates), and economic factors (changes in world oil prices and pipeline transportation costs), the analysis of changes in throughput rates was included in the EIS (see Section 4.3.19.4.1). Impacts of throughput at the 5% and 95% probability levels from the DOE-EIA forecasts were used to provide an upper and lower bound for the impacts of production levels different from those in the mean forecast.

For marine transportation-related spills, the TAPS throughput primarily affects the estimated spill frequency (the expected outfall is primarily a function of the vessel type and oil capacity). Thus the impacts of increased crude oil throughput would only be observed in the frequency of a given spill scenario.

The spill analysis computed frequencies for each scenario and each scenario was assigned a likelihood category (i.e., anticipated, likely, unlikely, and anticipated). An increase in the TAPS throughput by a factor of two to three from current levels would not result in an increased frequency such that a scenario would shift from one frequency category to another. Thus the effect of increased throughput would be minimal.

00113-204: Tanker speed is limited on the basis of analyses performed in the development of PWS contingency plans. See the text box in 4.7.4.10.4.

00113-205: SERVS and tanker operations are discussed briefly in this section. As noted, the U.S. Coast Guard has the authority to make decisions regarding tanker operations. As noted in the text, depending on the type of operation and existing conditions, tanker operations can be restricted.

00113-206: Oil spills are discussed in Section 4.4 of the EIS.

00113-207: The EIS analyzes three throughputs. Three flow rates were considered: 300,000, 1.1 million, and 2.1 million barrels per day. Depending on the throughput, the number of tankers at the VMT could either increase or decrease as stated in the text. No text change is required.

00113-208: The EIS reported a total of 26 tankers, which is composed of 10 tankers operated by the Alaska Tanker Company, LLC; 8 tankers operated by Polar Tankers, Inc.; 6 tankers operated by SeaRiver Maritime Inc.; and 2 tankers operated by Seabulk International Inc. The list of tankers was based upon data provided by the Alyeska Pipeline Service Company and confirmed using information collected by the British Columbia Oil Spill Task Force Prevention Project (available at <http://www.ecy.wa.gov/programs/spills/prevention/bap/TAPS%20Trade%20Tanker%20Report.htm>).

The estimate of 8 to 10 tankers by 2020 is based upon a reduced TAPS throughput of 0.72 million barrels per day, lower than the current value of about 1 million barrels per day. As such, the annual number of tanker calls at the VMT is estimated to decrease from a value of 496 (of which 38% are double-hull tankers) to 283 tanker calls in 2020 (of which 100% are double-hull tankers).

00113-209: The active sites are sites that require continuous assessment, monitoring, or remediation. All assessment, monitoring or remediation activities are under the oversight of the Alaska Department of Environmental Conservation (ADEC) and occur in accordance with the provisions of an ADEC site-specific remediation plan. An active site can become a closed site only after the regulators of ADEC concur that the site presents little to no risk to human health or the environment and does not need further remediation. It is outside the scope of EIS to specify the need for continuing mitigation of the active sites.

00113-210: A discussion on historical groundwater contamination at the contaminated sites and ongoing cleanup activities is presented in Section 3.8. Impacts of direct spills to groundwater are discussed in Section 4.4.4.4. Because spills to the surface would produce less severe impacts to groundwater than a direct release to an aquifer, indirect spills to groundwater are not analyzed in the document.

00113-211: The DEIS text was revised in Section 3.8 to discuss groundwater conditions and cleanup at the VMT, and the text was changed to discuss a spill event that eventually led to oil reaching the Atigun River. Additional details were also provided in Section 4.1.1.8 on the MP 400 spill recently caused by a rifle shot .

As discussed in Section 3.7.2.5, water quality impacts have not significantly affected streams or rivers as inferred from observations by nonprofit organizations, a lack of ADEC defined impaired water that can be attributed to pipeline operations, and regulation by appropriate NPDES permits.

00113-212: An error in Table 3.8-4 was corrected. The Check Valve 92 site is rated as medium priority; the others are all high priority (See Table 3.3-1). The DEIS describes conditions at these sites and discusses remediation activities taking place. It is beyond the scope of the DEIS, however, to address permanent solutions to these groundwater clean-up problems.

00113-213: The definition of a hazardous material, hazardous chemical or hazardous liquid often depends on the context and the regulatory scheme being applied. The footnote to Section 4.3.9.2 indicates that, under Department of Transportation regulations, hazardous liquids include petroleum and petroleum products. In the introduction to hazardous materials management (Section 3.16), crude oil is not discussed as a "hazardous material" because under the Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA), crude oil is not considered a hazardous chemical. In addition, under EPCRA, petroleum products in transportation (e.g., traveling in the pipeline) are not being stored or used at the facility and do not have to be reported under the Toxic Chemical Release Inventory (TRI) provisions of EPCRA. However, as shown in Table C-1, the crude oil in storage at the VMT is listed on the EPCRA TRI report (p. C-10, footnote g). Under EPA guidance for Petroleum Terminals and Bulk Storage Facilities, (EPA 745-B-00-002, February 2000), petroleum terminals and bulk storage facilities must determine what EPCRA Section 313 chemicals are present in the products in bulk storage and estimate and report the Section 313 chemicals based on the quantities of crude oil being stored. However, crude oil itself is not a hazardous chemical under Section 313 of EPCRA.

00113-214: The definition of a hazardous material, hazardous chemical or hazardous liquid often depends on the context and the regulatory scheme being applied. On page 4.3-18 the footnote indicates that under Department of Transportation regulations hazardous liquids include petroleum and petroleum products. In the introduction to hazardous materials management (Section 3.16), crude oil is not discussed as a "hazardous material" because under the Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA), crude oil is not considered a hazardous chemical. In addition, under EPCRA, petroleum products in transportation (e.g., traveling in the pipeline) are not being stored or used at the facility and do not have to be reported under the Toxic Chemical Release Inventory (TRI) provisions of EPCRA. However, as shown in Table C-1, the crude oil in storage at the VMT is listed on the EPCRA TRI report.

The assessment described in Section 4.4.4.7.2 was based on hazardous materials in storage at TAPS facilities, as reported by APSC to state and federal planning authorities (see Section 3.16.1 and Appendix C). The VMT reported having up to 28,000 lb ethylene glycol (often the main toxic component of antifreezes and coolants) in storage; antifreeze was reported as being in storage at many other TAPS facilities. Although ethylene glycol is categorized as potentially toxic for the spill assessment (TEEL-1 value = 50 mg/m³), it is not very volatile, so risks to the general public from accidental releases is low.

As discussed in Appendix C (Section C.3), APSC contractors collect hazardous waste from the accumulation areas and transport it to out-of-state RCRA-permitted TSDFs. The waste is shipped under proper manifests to a rail terminal in Anchorage and then by rail to a ship terminal in Anchorage, where it is transported by ship or barge to a rail yard in the State of Washington. According to these manifests, all of the transporters are properly licensed under RCRA and all wastes are transported in containers meeting DOT specifications. No spills or losses of APSC hazardous waste shipments have ever been reported (e.g., no exception reports for APSC manifested waste shipments between APSC facilities and the ultimate RCRA TSDF have been filed with the ADEC).

Spills of hazardous waste were not specifically assessed, because it was assumed that these wastes would be more dilute than the hazardous materials stored for use at the TAPS facilities, and that therefore spills of these substances would result in lower health impacts.

00113-215: The management of contaminated debris is discussed in more detail in Appendix C. The size of the contaminated soil stockpiles is dependent on the amount generated each year. As stated in Appendix C, soil can be stockpiled at the Valdez Marine Terminal for up to four years or until sufficient volumes have been aggregated to allow for cost-effective transport to a subcontractor for thermal treatment, most recently, to a facility located in North Pole, Alaska.

Air emissions from contaminated soil piles were incorporated into the air impact analyses for APSC facilities. However, once the contaminated soils are removed by the contractor and go out of APSC control, the subsequent management and any related environmental impacts related to soil treatment and disposal are addressed by the permit under which the treatment/disposal facility operates and are not within the scope of the EIS. The text of Section 3.16.5 has been revised to remove the confusion represented in the comment.

00113-216: The factors listed in the comment were identified by Kruse et al. as possible explanations for the decline that occurred in the 1970s to 1980s. They concluded that human activities were not likely the cause of further declines that occurred in the 1990s.

00113-217: The comment refers to a summary of the impacts of routine operations of TAPS on threatened and endangered species. The impacts of oil spills on these species is presented in Section 4.4.4.12.

00113-218: The last documented sighting of an Eskimo curlew was in Texas in 1962, prior to construction of the TAPS. It is generally believed that overhunting is the most important cause of the decline for this species. Section 3.22.1.3 has been modified to indicate when the last Eskimo curlew was observed.

- 00113-219:** Steller's eiders have been occasionally reported in Prince William Sound, but not Port Valdez. Significant impacts of routine operations of the Valdez Marine Terminal and associated permitted discharges into Port Valdez are not expected to have an effect on this species. Similarly, the two endangered whale species discussed in Section 4.3.18, the humpback whale and fin whale, are found in Prince William Sound, but have not been reported in Port Valdez.
- Based on these distributions alone it is unlikely that routine Valdez Marine Terminal operations and effluent discharges could affect any of these species. The work of Payne et al. has been very useful in identifying the significance of the risks of effluent discharge from the Ballast Water Treatment Facility on aquatic organisms in Port Valdez. These studies have demonstrated that the effluent poses no risk or very low risk to the species examined. Recently, Payne et al. have hypothesized the potential for higher risks associated in the surface microlayer of the water column. Until data are available regarding actual concentrations in this layer, it would be speculative to characterize the associated risk.
- 00113-220:** The possibility of the introduction of nonindigenous organisms via untreated segregated tanker ballast water is addressed as part of the analysis of cumulative effects in Section 4.7.7.2.1. A reference to this section has been added to the discussion in Section 4.3.16.1. Possible treatment approaches are now identified in Section 4.7.7.2.1.
- 00113-221:** The impact of such events are described in Section 4.4 (Spills Analysis for Proposed Action).
- 00113-222:** The Valdez Marine Terminal was built on bedrock, which is less vulnerable to earthquakes. Because the terminal is not in a permafrost region, the impact of permafrost thawing is not an issue. Major earthquakes have been recognized in the design of the terminal. The storage tanks of crude oil are at an elevation more than 400 ft above sea level. The tanks and other critical facilities are at elevations beyond the run up of tsunamis.
- 00113-223:** Table 2-1 summarizes environmental impacts while Section 4.2 addresses impacting factors, which include findings that affect pipeline operations (e.g. changes in soil conditions).
- 00113-224:** The reader is referred to a text box in Section 4.4.4.3 on oil spills (scenarios, impacts, response) for the Copper River Drainage.
- 00113-225:** A short discussion of infaunal and epifaunal invertebrates that serve as food for fish has been added to Section 3.19.1. A discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates has been added to Section 4.4.4.10.
- 00113-226:** Depending upon the timing and the quantity of oil, it is true that major impacts could occur to salmon in the Copper River if a large amount of oil from a pipeline break were to reach the Copper River. Spills into the Gulkana and the Tazlina Rivers (both tributaries of the Copper that are crossed by the TAPS) were considered as part of the spill scenario analyses in Section 4.4.4.10.1. Text has been added to Section 4.4.4.10.1 to reiterate the importance of the Copper and Lowe Rivers for salmon production in the area and to recognize the potentially severe impacts to salmon in the event of a large spill entering those rivers. The discussion of potential effects of intertidal oil contamination on reproduction of pink salmon has been expanded to include additional references.
- 00113-227:** A short discussion of infaunal and epifaunal invertebrates that serve as food for fish has been added to Section 3.19.1. Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10 along with a discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates

00113-228: We believe that the EIS fairly presents the status of the debate over ongoing impacts of the Exxon Valdez oil spill on fish populations in Prince William Sound. Additional references and discussion have been added to Section 3.19.1.3, including information reported by the Exxon Valdez Trustee Council that sockeye and pink salmon are considered “recovering,” while Pacific herring is considered “not recovering.”

00113-229: Discussion of the assumptions and how the expected frequencies reported in Table 4.4-1 were derived are covered in Section 4.4 of the EIS.

Since the historical record on TAPS spills reported in the TAPS oil spills database was used or factored into the estimated spill scenario frequencies provided in Table 4.4-1; comparison of the estimated spill frequencies with the frequency of the TAPS historical record would have little value.

00113-230: The Copper River Basin physiographic unit encompasses the Gulkana Uplands and the Copper River Lowlands provinces, and extends from Isabel Pass (TAPS milepost 610) to Tonsina (TAPS milepost 720). The Gulkana Uplands consists of rounded east-trending ridges separated by lowlands 2 to 10 miles wide extending from Isabel Pass to the south end of Paxson Lake (TAPS milepost 635). The Copper River Lowlands is a broad plain 1,000 to 2,500 feet in elevation that is incised by the Copper River and its tributaries. The TAPS pipeline is several miles west of, and generally parallels, the Copper River and crosses several large tributaries including the Gulkana, Tazlina, and Klutina rivers.

There appears to be a total of 35 stream crossings for the TAPS within mileposts 610 to 720. Between MP 610 and MP 720, there are 14,393 meters of TAPS which fall within 1000 ft of a hydrographic feature (stream or lake). Of these, 11,145 meters are above ground and 3,248 meters are buried. These estimates are based on the linear pipeline data supplied by APSC and hydrographic features from Census TIGER data.

The methodology used to estimate the volume and frequency of crude oil spills along the TAPS pipeline is provided in Section 4.4 “Spills Analysis for Proposed Action.”

In general, the spill analysis for the TAPS provides screening-level results on a mile-by-mile basis. For each mile, worst-case conditions were applied to represent the entire mile, even though the conditions may only apply for a few hundred feet or less. As an example, for the various vulnerabilities, the worst-case conditions for a specific hazard, such as a stream crossing, for a pipe joint (typically a 40-60 foot section of pipe) were assigned to the entire mile-long section. This is somewhat conservative but considered to be appropriate. In addition, this spill analysis combined the risks from all hazards, not only flooding at stream crossings, at each mile, and thus is generalized.

Estimating the volume of oil spilled in a leak scenario is a complex task, given the number of random variables included in the calculation, such as weather conditions and operator response times. To account for these uncertainties, the volume calculations were carried out using best-estimate information; therefore, results were compiled for ranges of spill volumes, rather than quantitative values. The ranges of spill volumes are however consistent with the maximum spill volumes for various pipeline segments given the document entitled “Trans-Alaska Pipeline System Pipeline Oil Discharge Prevention and Contingency Plan, General Provisions, CP-35-1 GP,” prepared by the APSC (2001).

00113-231: Additional information about the fate and potential effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10.

Additional information about the fate and transport of light components of a crude oil spill (e.g., benzene, toluene, ethylbenzene, and xylene, collectively known as BTEX) has been added to Section 4.4.2.

00113-232: Additional information about the fate and potential effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10.

00113-233: Text has been added to Section 4.4.4.10.1 to present the possibility that oiling of a stream might affect salmon migration because of the dependence on olfaction to locate natal streams.

In addition, temporary delays in fish migration are likely to occur from use of oil spill response technology. APSC uses temporary structures such as dams, portable Dunklee dams, inclined culverts, deflection booming (at culverts), underflow devices, and overflow dams to intercept spilled oil and facilitate recovery.

00113-234: Text has been added to Section 4.4.4.10.1 to present the possibility that oiling of a stream might affect salmon migration because of the dependence on olfaction to locate natal streams. In addition, temporary delays in fish migration are likely to occur from use of oil spill response technology. APSC uses temporary structures such as dams, portable Dunklee dams, inclined culverts, deflection booming (at culverts), underflow devices, and overflow dams to intercept spilled oil and facilitate recovery.

00113-235: Additional discussion of the identified and ongoing impacts of oil contamination on intertidal invertebrates and fish from the Exxon Valdez oil spill has been added to the Section 3.19.1.3 of the EIS.

The identified text on page 4.7-93 of the DEIS referred to the fact that direct mortality due to oil spill has seldom been documented for marine spills. Text has been added to clarify the statement.

Depending upon the timing and the quantity of oil, it is true that major impacts could occur to salmon in the Copper River if a substantial amount of oil from a pipeline break were to reach the Copper River. Spills into the Gulkana and the Tazlina Rivers (both tributaries of the Copper that are crossed by the TAPS) were considered as part of the spill scenario analyses in Section 4.4.4.10.1. Text has been added to Section 4.4.4.10.1 to reiterate the importance of the Copper and Lowe Rivers for salmon production in the area and to recognize the potentially severe impacts to salmon in the event of a large spill entering those rivers. The discussion of potential effects of intertidal oil contamination on reproduction of pink salmon has been expanded and includes additional references.

00113-236: Discussion of observed (including the Exxon Valdez oil spill (EVOS)) and potential effects of oil on infaunal and epifaunal invertebrates has been added to Section 4.4.4.10. A discussion on the impacts of oil spills (including EVOS) on birds is presented in Section 4.4.4.11. Section 3.20 primarily addresses the birds that occur along the ROW, with lesser discussion of birds along the North Slope and within Prince William Sound; as this section is an “affected environment” section related mainly to TAPS. Impacts to birds are presented in Sections 4.3.17 (proposed action), 4.4.4.11 (oil spills), and 4.7.7.3 (cumulative impacts).

00113-237: Section 3.20.3 mentions the importance of the Copper River for shorebirds and other species. Your concerns about the potentially adverse impacts of an oil spill into the Copper River are noted. Please refer to the text box in Section 4.4.4.3 entitled “Oil Spill Planning for the Copper River Drainage” for information on oil spill prevention and response capabilities and related activities specific to the Copper River Drainage area.

00113-238: Impacts from the Exxon Valdez oil spill on birds are addressed in Section 4.4.4.11. The decision was made to address the impacts in that section in order to provide comparative information within the spills analysis discussion. The spills analysis for all ecological resources can be found in Sections 4.4.4.8 thru 4.4.4.12.

00113-239: The text of Section 3.22.3.4 has been modified to present the conclusion of Hoover-Miller et al. (2001) that the effects of the spill were limited and transitory and overshadowed by the overall continuing decline in the harbor seal population. The harbor seal is now considered “not recovering” by the Exxon Valdez Trustee Council (2002) because they continue to decline since the spill in both the oiled and unoiled parts of Prince William Sound.

- 00113-240:** Additional discussion of oil spill impacts on wildlife has been added to Sections 4.4.4.11 and 4.4.4.12 of the EIS. The description of the current status of the sea otter has been revised in Section 3.22.3.5 to indicate that the species is considered to be recovering because aerial and boat surveys in Prince William Sound show statistically significant evidence of sea otter population increases following the oil spill (1993-98). However, in the most heavily oiled bays in the western sound, such as those on northern Knight Island, the aerial surveys indicate that recovery is not complete.
- 00113-241:** Section 4.3.18.2 discusses the impacts of routine operations of TAPS. Tanker traffic and its impacts (including the effects of noise on marine mammals) are considered in the cumulative impact analysis (Section 4.7.7.4).
- 00113-242:** Results of the models used in the spill analysis (discussed in Section 4.4.4.5.2 and 4.4.4.5.4), and the assumed response time, were used to estimate the potential extent of shoreline contamination. Section 4.4.4.5.4 discusses the effects of inclement weather or other unforeseen circumstances on the success of response actions and the potential for a larger impact area.
- 00113-243:** A short discussion of infaunal and epifaunal invertebrates that serve as food for fish has been added to Section 3.19.1. Additional information about the fate and effects of aqueous phase oil has been added to the discussion of impacts from spilled oil in Section 4.4.4.10 along with a discussion of observed and potential effects of oil on infaunal and epifaunal invertebrates.
- 00113-244:** A discussion of hydrocarbons in Port Valdez and Prince William Sound is found in Section 3.11.3. References to recent work on determining the source of the hydrocarbons are also discussed.
- 00113-245:** The EIS presented both sides of the current scientific debate on the origins of hydrocarbons in PWS. We recognize that different PAHs have different bioavailabilities. Section 4.7.6.11.2 identifies that oil spills have the most potential for foodchain impacts related to bioaccumulation. The references for both volumes are found in Volume I. The references noted as missing are present.
- 00113-246:** The discussion of the EVOS is included in the document as background and to describe the environment that could potentially be affected by future pipeline operations. It is not meant to be an exhaustive treatment and does not attempt to list or quantify all the impacts caused by the EVOS.
- 00113-247:** Discussion of the importance of infaunal and epifaunal invertebrates as food for fish has been added to Sections 3.19.1 and 3.19.1.3. Discussion of observed and potential effects of oil spills on infaunal and epifaunal invertebrates has been added to Section 4.4.4.10.
- 00113-248:** Potential impacts of oil spills on birds are addressed in Sections 4.4.4.11 and 4.7.7.3.5. Additional discussion on the impacts of an event such as the Exxon Valdez oil spill (EVOS) have been added to both sections. However, the potential of such an event occurring again is unlikely to very unlikely, especially considering modifications and practices that have, or will, be put into place since EVOS (e.g., SERVS, double-hull tankers, and improved spill response capabilities).

00113-249: In the TAPS EIS, the assessment of oil transportation by TAPS for the next 30 years is assessed based on the best available estimates of the ranges of total North Slope oil production and transportation requirements during that period. This includes increases in production by new fields as well as decreases in production by older fields.

There are many possible scenarios for the future of North Slope oil development and production. For this reason, the assessment of the impacts of oil transportation by TAPS includes consideration of a range of throughput, from less than the most likely throughput to greater than the most likely throughput. The range of throughputs considered was intended provide an upper bound for the impacts of oil transport by TAPS during the renewal period. The volumes of transportation by TAPS should remain within those bounds with the development of new production areas, even ones that now seem unlikely.

For the purposes of cumulative impact assessment, where the impacts of the proposed action and alternatives are added to other past, present, and reasonably foreseeable actions, petroleum production in ANWR is not considered reasonably foreseeable. Exploration and development in ANWR is not possible without Congressional approval. Likewise, other speculative North Shore development was also not considered reasonably foreseeable.

00113-250: Section 4.7.4.9.2 identifies and describes tourism as one of the other actions that is included in the cumulative impact assessment. The impacts of all actions on tourism-related activities, such as land use, recreation, wilderness, and aesthetics are briefly addressed in Section 4.7.8.5 and 4.7.8.6. Additional brief descriptions of the affect of spills on these topics have been added to these sections.

The economic effects of oil spills have been addressed in Section 4.7.8.3. Text has been added to the EIS providing additional sources of information on the impact of the spill on communities, fisheries resources and tourism in the Prince William Sound area.

00113-251: The effect of oil spills on fish and wildlife species is addressed in detail in the EIS in Sections 4.4.4.10, Fish; 4.4.4.11, Birds and Terrestrial Mammals; and 4.4.4.12, Threatened and Endangered Species. Briefly summarized, the effects of large but unlikely spills on fish populations could be significant in the area affected and for an extended period of time and therefore could adversely affect the associated recreational activities of sport fishing and tourism. By comparison, terrestrial species would be less affected both spatially and temporally as would their associated recreational activities of hunting, trapping and tourism.

The impact of a major spill in Prince William Sound has been added to Section 4.7.8.6.1, which discusses cumulative impacts on recreation, including fishing and tourism.

00113-252: Section 4.7.4.9.4 describes commercial fishing as an other action which should be included in the cumulative impact assessment.

While it is clear that the costs of the spill measured in terms of losses to the recreation, tourism and fishing industries have been significant, these have been outweighed by the economic benefits associated with spending by the large number of cleanup workers involved, producing additional employment and income impacts in the local area and in the state as a whole (see Section 4.7.8.3). There were also additional offsetting economic benefits from compensation claims as it is likely that a portion of the cash from compensation payments has been spent in local communities directly affected by the spill and in the state as whole. The long-term effects of the spill on the environment in Prince William Sound have yet to be fully established and the potential costs of compensatory claims for additional environmental damages may still significantly increase the overall monetary cost of the spill.

Text has been added to the EIS providing additional sources of information on the impact of the spill on communities, fisheries resources and tourism in the Prince William Sound area.

00113-253: An approach similar to that applied in the Yellowstone Reroute Pipeline EIS (1999) was used in the EIS to estimate the probable spill size distribution of crude oil and refined petroleum products in the anticipated and likely frequency ranges.

For spills with a frequency greater than once every thirty years, actual spill data involving small or moderate leaks provided in the TAPS Spill Database (2001) were used. Incident rate and spill size distribution information provided in the TAPS Spill Database (2001) were used to determine the probable return interval of various sized spills for the Prince William Sound. Based on the probable spill size distribution curve, the spill volume was established for given spill frequency (0.5/year for an anticipated spill event, 0.03/year for a likely spill event). Therefore, the spill scenarios postulated for the cumulative impact analysis agree with historical spill information over the first 25 years of TAPS operations. The perceived difference may be because most spills are relatively small and these tend to skew the distribution towards lower spill volumes for a given overall spill frequency.

A different approach was applied for spill scenarios with frequencies in the unlikely and very unlikely frequency ranges where historical spill information is unavailable; the hypothetical spill scenarios for these scenarios involving the Prince William Sound followed the methodology used in the Prince William Sound, Alaska Risk Assessment Study (Det Norske Veritas et al., 1996).

00113-254: Section 4.7.4.10 has been revised:

00113-255: The sections that analyze spills assume that a spill response will be successful, that sufficient equipment is available, and that it is deployed and operates correctly. This section further assumes that weather conditions at the time of the spill would not significantly change the effectiveness of the spill response action. If these conditions are not met, the potential impacts from an oil spill could be larger, and the impacted area larger, than those presented in the analysis for the various accident scenarios. For the larger volume spill events analyzed, unfavorable weather conditions could result in any spill response action being ineffective; this would result in significant impacts over very large areas. The text in Section 4.4.4.5 was changed to emphasize the possibility of significant impacts if a spill response is not successful.

00113-256: Section 4.4.4.5 acknowledges that the spill is assumed to occur in non-extreme weather. The section further states that under inclement weather conditions, the areas impacted and the spill impacts would be significantly larger.

00113-257: The spill prevention and response measures employed in PWS are described briefly in Section 4.1.4.3 of the EIS. Details on the equipment available and procedures in place are given in the Prince William Sound Oil Discharge Prevention and Contingency Plan (Prince William Sound Tanker Plan Holders 1999), which is available to the public through various libraries in several major cities in Alaska at times the plan is subject to public review.

00113-258: The statement in question was taken from a NOAA description of how North Slope Crude oil behaves after an oil spill (NOAA 2000, NOAA 2000a). No change was made.

00113-259: The sections that analyze spills assume that a spill response will be successful, that sufficient equipment is available, and that it is deployed and operates correctly. This section further assumes that weather conditions at the time of the spill would not significantly change the effectiveness of the spill response action. If these conditions are not met, the potential impacts from an oil spill could be larger, and the impacted area larger, than those presented in the analysis for the various accident scenarios. For the larger volume spill events analyzed, unfavorable weather conditions could result in any spill response action being ineffective; this would result in significant impacts over very large areas. The text in Section 4.4.4.5 was changed to emphasize the possibility of significant impacts if a spill response is not successful.

00113-260: The spill prevention and response measures employed in the PWS are described briefly in Section 4.1.4.3 of the EIS. Details on the equipment available and procedures in place are given in the Prince William Sound Oil Discharge Prevention and Contingency Plan (Prince William Sound Tanker Plan Holders 1999), which is available to the public through various libraries in several major cities in Alaska.

The text in Section 4.4.4.5.4 states that there is a potential for the response action to not be successful due to the spill occurring during extreme weather, in which case the impacts from the spill would be much more significant.

00113-261: The impacts on seawater hydrocarbon concentrations, amount of shoreline affected, etc. from an oil spill would be similar for the less-than-30-year renewal alternative compared with the proposed action. However, the overall probability of a spill (which is the product of the spill frequency multiplied by the number of years) will be lower with the less-than-30-year renewal period. Section 4.7.6.6 has been revised.

With respect to the No-Action Alternative, the risk (defined to be the product of the spill frequency multiplied by the consequence or environmental effects of the spill) of a spill in the Prince William Sound would still exist. Currently, the APSC Pipeline's Ship Escort/Response Vessel System (SERVS) responds to calls for assistance in the Prince William Sound by the United States Coast Guard. This spill emergency response infrastructure may not be maintained after closure of the TAPS. In this event, the environmental effects of a spill of crude oil or refined petroleum product destined for the Valdez Petro Star Refinery or other facilities in the area of the Prince William Sound could be larger than those under the proposed action due to the reduction in spill response equipment.

00113-262: The DEIS did not ignore the hazardous air pollutants (HAPs) released from ongoing operations at the Valdez Marine Terminal, including the Ballast Water Treatment Facility (BWTF). The benzene, toluene, ethyl benzene, and xylene (BTEX) emissions from the Dissolved Air Floatation (DAF) tanks and biological treatment system associated with the BWTF at the Valdez Marine Terminal (about 493 pounds/day, or 90 tons/year) are included in the total emissions of hazardous air pollutants from the Valdez Marine Terminal (about 673 pounds/day, or 122.9 tons/year), as listed in Table 3.13-6 of DEIS. This is reflected in Table 3.13-6 of FEIS.

The BTEX quantity (approximately 580 pounds/day, or 105 tons/year) estimated by Payne et al. (2002) is the mass removal rate of the BTEX compounds at the Dissolved Air Floatation (DAF) system of the BWTF, not the rate of the BTEX emissions to the atmosphere from the BWTF. Although much of this mass is released to the atmosphere, a certain fraction of the BTEX removed by the DAF system remains in the oil skimmed off. Therefore, the rate of BTEX released to the atmosphere would be less than 105 tons/year. The atmospheric emission rate of the BTEX compounds from the BWTF estimated by APSC is about 493 pounds/day, or 90.0 tons/year.

Conservatively high ambient concentration estimates of BTEX and other toxic air pollutants emitted from the BWTF and other sources at the Valdez Marine Terminal were considered in estimating potential health impacts associated with ambient concentrations of these pollutants in Valdez area under the proposed action (at the crude oil throughput levels of 0.3, 1.1, and 2.1 million bbl/day) and other alternatives (see Sections 4.3.13, 4.5.2.13, and 4.6.2.13). These ambient concentration estimates are based on the ambient BTEX concentrations monitored during the 1990-1991 personal and ambient monitoring studies and the tracer studies conducted in the Valdez area when both the vapor emissions from tankers and the DAF units were released. The baseline ambient concentrations used in the health risk calculations were given in the Affected Environment section (Table 3.17-4); a reference to this table has been added to the footnotes of Table 4.3-4 to clarify.

00113-263: Appendix C was intended to provide an overview of the amounts and types of wastes generated as a result of TAPS operations and to provide a discussion of their respective management schemes. Appendix C, therefore, provides data that can serve as a basis for evaluations of environmental impacts associated with waste generation and management that are provided in other sections of the EIS. Specifically, the impacts of BWTF discharges to PWS are discussed in Section 4.3.8.1. Potential impacts to public health from BWTF discharges to PWS are discussed in Section 4.3.13.2.1.

- 00113-264:** The DEIS does not speculate as to the exact technology changes that may have to be implemented to ensure the decreased influent associated with double-walled tankers does not impact the operation of the BWTF. Under federal and state regulations, all discharges from the BWTF would have to either meet the current effluent limitations under the NPDES Permit (AK-002324-8) or, if there any activities that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in the current permit, and if that discharge may reasonably be expected to exceed the highest of the "notification levels" listed in the current Permit, the ADEC and the EPA must be notified (AK-002324-8, Section III.L). In addition, under the current Permit, the permit may be modified, or alternatively, revoked and reissued, to address the application of different permit conditions, if new information, such as future water quality studies or waste load allocation determinations, or new regulations such as changes in water quality standards, show the need for different conditions (AK-002324-8, Section V.M).
- 00113-265:** Federal regulations would require that any discharges of wastewaters to Prince William Sound from a new LNG plant obtain a NPDES permit for liquid waste discharges, as well as an air permit for air emission releases. At this point in time, because particular specifications of any LNG plant have not been established, a more quantitative analysis of impact to air and water quality is impossible. However, such analyses can be expected to be part of deliberations in advance of any NPDES or air emissions permits. If, for any reason, a review under the National Environmental Policy Act (NEPA) were required, cumulative impacts for air and water emissions would be addressed.
- 00113-266:** The emissions from the Valdez Marine Terminal itself are not included in Table 4.7-8 (page 4.7-82) because the table lists only the TRI-reportable emissions (EPA 2002) and the emissions from the TAPS facilities are not required to report to TRI. (See the Response to Comment 00113-269.)
- 00113-267:** The benzene, toluene, ethyl benzene, and xylene (BTEX) emissions from the Dissolved Air Floatation (DAF) tanks and biological treatment system associated with the Ballast Water Treatment Facility (BWTF) at the Valdez Marine Terminal (about 493 pounds/day or 90 tons/year) are included in the total emissions of hazardous air pollutants from the Valdez Marine Terminal (about 673 pounds/day or 122.9 tons/year) as listed in Table 3.13-6 of DEIS. This is reflected in Table 3.13-6 of FEIS.
- 00113-268:** The estimated risk of 3×10^{-5} was only very slightly linked to the findings of the tracer study. In the Valdez Air Health Study (VAHS) by Goldstein et al. (1992), the annual average ambient benzene concentration at 3 Valdez residential area monitoring locations ranged from 4 to 5 ug/m³ (based on hourly sampling for one year from Nov 1990 through Oct 1991). Because the VAHS concluded that only 10% of the residential area benzene concentration was contributed by Valdez Marine Terminal emissions, only 10% of the ambient level was scaled with projected future throughputs. Therefore, the DEIS risk calculations assumed exposure to all the ambient benzene, regardless of its source. The risk results for the residential area would not change even if the tracer study results were wrong. The actual range of residential area benzene concentrations assumed for varying throughputs in the risk calculations was very narrow, from 4.6 to 5.1 ug/m³ (corresponding to increased cancer risks of from 3.0 to 3.2×10^{-5} , see Table 4.3-4).
- The Valdez ambient air benzene value is similar to, but on the high side of, current ambient benzene values in large U.S. metropolitan areas. For example, the 2001 ambient benzene values in Anchorage, Portland, Chicago, and New York ranged from about 1 to 3.5 ug/m³; the values for Los Angeles ranged from 1 to 5 ug/m³. Ambient benzene concentrations have been decreasing in major cities in the past decade; an EPA study shows a 47% decrease at 95 urban monitoring sites between 1994 and 2000 (<http://www.epa.gov/airtrends/toxic.html>). EPA attributes the decrease to stricter car emissions standards, required use of cleaner burning gasoline, and standards requiring emission reductions at oil refineries and chemical plants. Based on these data, it is likely that ambient benzene levels in Valdez have also decreased in the time since the 1990/91 air monitoring effort. However, no new ambient air benzene data are available for Valdez at this time; such data would be useful in estimating potential long term health impacts.

00113-269: The 13 tons of benzene emissions from 7 sources in the State of Alaska in 1999 listed in Table 4.7-8 (page 4.7-82) include only those Toxic Release Inventory-reportable emissions, which do not include benzene emissions from all other emission sources, including the TAPS facilities. As pointed out in Section 4.7.6.11.2, industrial sources are estimated to contribute only about 14% of benzene emissions in the United States and not all industrial sources are required to report. Therefore, it would be misleading to state that the annual benzene emissions from the Valdez Marine terminal alone are 3.3 times higher than ALL the other sources over the entire state combined.

The benzene, toluene, ethyl benzene, and xylene (BTEX) emissions from the Dissolved Air Flootation (DAF) tanks and biological treatment system associated with the Ballast Water Treatment Facility (BWTF) at the Valdez Marine Terminal (about 493 pounds/day or 90 tons/year) are included in the total emissions of hazardous air pollutants from the Valdez Marine Terminal (about 673 pounds/day or 122.9 tons/year) as listed in Table 3.13-6 of DEIS. This is reflected in Table 3.13-6 of FEIS.

A footnote has been added to Table 4.7-8.

00113-270: Although the protection of cleanup workers is regulated under the Occupational Health and Safety Act and is, therefore, beyond the scope of the DEIS, potential public health impacts from spills are evaluated in the DEIS. In particular, Section 4.4.4.7.2 assesses the potential for adverse health impacts resulting from inhalation of contaminants volatilized from spills along the pipeline, spills at the Valdez Marine Terminal, spills during transportation accidents, and spills to rivers along the pipeline.

00113-271: Section 3.11.3 discusses the current debate about the origin of hydrocarbons in Prince William Sound.

00113-272: The text in Section 4.4.4.7.4 (Impacts from Foodchain Exposures Resulting from Spills to Water) extensively discusses the potential cancer risk that could occur from consumption of contaminated shellfish if a large spill to PWS were to occur. Because shellfish do not metabolize PAH compounds, they could more plausibly present increased cancer risk for individuals regularly ingesting food obtained from PWS than could fish or mammalian species that do metabolize PAHs. The potential increased cancer risk was evaluated using data from references suggested by the commentors (i.e., Varanasi et al. 1993; Field et al. 1999). The conclusion was that the highest possible increased cancer risk from ingestion of contaminated shellfish was somewhat less than the lower bound of increased cancer risk from ingestion of smoked salmon (see Table 4.4-35). Both the text of Section 4.4.4.7.4 and the Cumulative Impacts Human Health section (Section 4.7.6.11.2) discuss the increased stomach cancer rates of Native Alaskans in comparison with the U.S. white population, and that this may be due to frequent ingestion of smoked foods. The text also states that any additional exposures to PAHs should be avoided where possible. However, no cumulative impact has occurred, because it is not known whether the increased stomach cancer rate of Native Alaskans actually is due to smoked food ingestion, and because no large spill to PWS in association with TAPS operations has occurred.

Although there may be a high and adverse health (i.e., stomach cancer) to Alaska Natives, its causes are not well established. In lieu of better established causes—notably causes associated with the TAPS or as cumulative impacts that involve the TAPS—the EIS identified no environmental justice impacts for this particular issue.

00113-273: Although both past and present impacts have been considered in the cumulative impact analysis, additional text has been added to Section 4.7.7.1.4 for clarification.

00113-274: The introduction of non-native species into Prince William Sound as a result of the release of ballast water is recognized as a potential impact by BLM. At this time, BLM does not have regulatory oversight on the release of ballast water. Regulatory oversight is provided by the U.S. Coast Guard and Department of Transportation. The BLM will continue to work with these organizations to develop plans or studies that could reduce this potential impact.

- 00113-275:** The statement that fish populations had largely recovered has been revised. Additional references and discussion have been added to Section 4.4.4.10, and 4.7.7.2 regarding the status of fish populations potentially affected by Exxon Valdez oil spill and identify that while some species (e.g., pink salmon) appear to have recovered, the status of some species remains uncertain, and herring apparently have not recovered.
- 00113-276:** The impacts of the Exxon Valdez oil spill are included in the existing baseline. Only anticipated or likely oil spills are included in the cumulative impact analysis, because they are “reasonably foreseeable” and therefore included as required by NEPA implementing regulations.
- 00113-277:** The impacts of the Exxon Valdez oil spill are included in the existing baseline and are described in Section 3.22 for those species for which data are available. Table 4.7.9 incorporates residual impacts of the Exxon Valdez oil spill into the existing baseline values. Only anticipated or likely oil spills are included in the cumulative impact analysis, because they are “reasonably foreseeable” and therefore included as required by NEPA implementing regulations. Larger future spills are not included in the cumulative impact analysis because the probability of their occurrence is very low and they are therefore not reasonably foreseeable.
- 00113-278:** Text in Section 4.7.8.1 has been revised to discuss the potential impacts of a large tanker spill in Prince William Sound in greater detail.
- 00113-279:** Sections 4.7.8.1 and 4.4.4.14 discuss the issue of impacts from perceived damage to subsistence resources.
- 00113-280:** For the EIS spills assessment, ranges of containment were assumed to reflect both effective and ineffective containment. For spills to land, a range of containment was assumed, resulting in assumed oil pool depths of from 3 inches (corresponding to good containment) to 1 inch (corresponding to poor containment). Similarly, for spills to rivers a range of oil slick sizes was assumed based on low-flow vs. high-flow conditions, average response times and varying pipeline throughputs (see Section 4.4.4.3).
- For the spill impact assessment for short-term inhalation effects, some containment of spills into Port Valdez was assumed, in order to calculate a reasonable oil surface area for volatilization estimates. The assumption was that booms would be used to contain the oil to a concentration of about 1.7 gal/ft² based on APSC oil spill contingency planning. However, in estimating the potential foodchain impacts from oil spills, a somewhat different approach was taken of assuming that the contamination and impacts from the very large and minimally contained Exxon Valdez Oil Spill would bound the impacts of spills that could occur in the future. The assessment accounted for the possibility that spilled oil could be present in tidal zones and sediments for long periods of time by assuming that the most highly contaminated shellfish could be ingested for up to 10 years. Based on shellfish tissue data obtained to investigate the impacts of the Exxon Valdez Oil Spill, this is an overestimate, because shellfish contaminant levels from the most contaminated fishing areas had decreased substantially by 2 years after the spill.
- Although the protection of cleanup workers is regulated under the Occupational Health and Safety Act and is, therefore, beyond the scope of the EIS, potential public health impacts from spills are evaluated in the EIS. In particular, Section 4.4.4.7.2 assesses the potential for adverse health impacts resulting from inhalation of contaminants volatilized from spills along the pipeline, spills at the Valdez Marine Terminal, spills during transportation accidents, and spills to rivers along the pipeline.
- 00113-281:** Additional references have been added to the EIS regarding the impacts of oil spills, including the Exxon Valdez oil spill.

- 00113-282:** The referenced section (3.23.5) focuses on economics. However, a series of sections in the EIS focus explicitly on subsistence—including Sections 3.24, 4.3.20, 4.4.4.14, 4.5.2.20, 4.6.2.20, and 4.7.8.1, as well as Appendices D and E. The issues mentioned in the comment are addressed in these other sections, where the sociocultural and ceremonial roles of subsistence are discussed in addition to its economic (measured in terms of resources provided, not monetarily) role.
- 00113-283:** The text in Section 4.3.19.7 of the EIS has been changed to reflect the fact that many subsistence activities have great cultural significance to Alaska Natives. These activities are not necessarily replaced by higher levels of participation in the market economy as personal income increases in Alaska Native communities, and decreases in income do not necessarily affect the productivity of subsistence activities.
- 00113-284:** Section 3.24.2.4.1 in the EIS has been revised to address impacts of the Exxon Valdez oil spill on Chenega Bay. Section 4.7.8.1 also has been revised to discuss in greater detail impacts of the spill on subsistence in Prince William Sound.
- 00113-285:** Sections 4.4.4.14 and (especially) 4.7.8.1 have been modified to discuss the impacts of the Exxon Valdez oil spill on subsistence in greater detail. In addition, supplemental data on subsistence change over time in Prince William Sound rural communities have been provided in Section 3.24.2.4; these data include information pre- and post spill years. Discussions of potential impacts of the spill include references to herring and pink salmon stocks.
- 00113-286:** Section 3.24.2 notes that Valdez lies in a nonrural portion of Alaska, as defined by the Federal Subsistence Board, and as a result is not considered for subsistence under the federal definition of the practice (see also Section 3.24.1).
- 00113-287:** Discussions of sociocultural impacts of the Exxon Valdez oil spill on peoples in Prince William Sound have been expanded in Sections 3.24.2.4.1, 3.24.2.4.2, 3.24.2.4.5, 4.4.4.15, and 4.7.8.2.
- 00113-288:** For the FEIS, the foodchain risk results have been corrected. The changes do not change the basic conclusions about risk drawn in the EIS.

The total of 15 carcinogenic PAHs measured in the Windy Bay samples (Varanasi et al. 1993—see Section 4.9 of the FEIS for reference) cannot be directly compared with total PAH levels in mussels from the Valdez Marine Terminal and Gold Creek areas as part of the PWS RCAC LTEMP (Payne et al. 2001). Measurement of total PAHs includes many more substances.

The text in Section 4.4.4.7 addressed the fact that crude oil contains over 100 different PAH compounds. Only those that have been found to be carcinogenic in toxicity testing are included in cancer risk calculations. The uncertainties associated with the evaluation of mixtures and the lack of data on condensed thiophenes are acknowledged in Section 4.4.4.7.4. Although there currently is not a definitive method to address these uncertainties, the risk assessment method used for the EIS calculations intentionally overestimated the intake of the carcinogenic PAH compounds with the intent of compensating for the lack of toxicity data on all the PAHs. For example, it was assumed that all the shellfish consumed by an individual would be mussels, although surveys show that mostly the less contaminated butter clams are consumed by Alaskan Natives (Reference: Appendix 3 of Field et al. 1999).

The text also discusses the increased stomach cancer rates of Native Alaskans in comparison with the U.S. white population, and that this may be due to frequent ingestion of smoked foods. The text also states that any additional exposures to PAHs should be avoided where possible.

- 00113-289:** The discussion of subsistence impacts from a catastrophic tank failure at the Valdez Marine Terminal have been revised slightly to describe subsistence impacts more completely (see Section 4.4.4.14). Section 4.7.8.1 (cumulative impacts to subsistence) also has been revised, and now discusses in much greater detail impacts of a large tanker spill on Prince William Sound, referring to impacts experienced due to the Exxon Valdez oil spill (see also Sections 3.24.2.4.1, 3.24.2.4.2, and 3.24.2.4.5).
- 00113-290:** The total of 15 carcinogenic PAHs measured in the Windy Bay samples (Varanasi et al. 1993) cannot be directly compared with total PAH levels in mussels from the Valdez Marine Terminal and Gold Creek areas as part of the PWS RCAC LTEMP (Payne et al. 2001). Measurement of total PAHs includes many more substances. Also, the source of the PAHs in the mussels has not been conclusively determined to be the BWTF. Therefore, data are not sufficient to characterize the PAHs in mussels obtained from near the VMT or Gold Creek as an adverse non-spill impact.
- 00113-291:** As stated in Appendix C, Section C.4, the solid waste incinerators operate under ADEC-issued air quality operating permits. The permits address all stationary air emission sources at the pump station, including the incinerators. The permits establish any limits for hazardous air pollutants that may be emitted from the pump station facilities, including the incinerators. In addition, Appendix C states that statistically relevant sampling over time of incinerator ash has shown the ash to be nonhazardous, provided waste segregation controls remain in effect. However, the City of Valdez and the Boroughs of North Star and North Slope require laboratory analyses verifying nonhazardous character for each delivery of ash to their facilities. Consequently, each shipment of ash from incinerators at PS 1 and 2 and the Valdez Marine Terminal is sampled for hazardous characteristics before delivery to designated landfills. Ash from all other incinerators is sampled annually.
- 00113-292:** Under Alaska regulations (18 AAC 60.030), landfill operators may accepted treated medical waste. A very small amount of medical waste is incinerated at the pump station and VMT incinerators (0.026% of the total quantity of solid waste so treated) (See, Table C-10). The APSC-operated Solid Waste Disposal Site (landfill) permits simply state: "Prohibit the disposal of unsterilized medical waste. Medical waste must be decontaminated or sterilized, and then packaged to prevent a health hazard before disposing of in the landfill." There is no requirement in the landfill permit to sample or monitor ash waste. Appendix C (Section C.4, page C-15), states that statistically relevant sampling over time of incinerator ash has shown the ash to be nonhazardous, provided waste segregation controls remain in effect (APSC 2000c). However, the City of Valdez and the Boroughs of North Star and North Slope require laboratory analyses verifying nonhazardous character for each delivery of ash to their facilities. Consequently, each shipment of ash from incinerators at PS 1 and 2 and the Valdez Marine Terminal is sampled for hazardous characteristics before delivery to designated landfills. Ash from all other incinerators is sampled annually.
- 00113-293:** The text in Section 4.3.12.6 has been changed to address the concerns raised in this comment.
- 00113-294:** Text has been added to Section 4.7.8.3 of the FEIS providing additional sources of information about the impact of the Exxon Valdez oil spill (EVOS) on communities, including intangible impacts, such as psychological stress, and in the fisheries, recreation, and tourism industries in the Prince William Sound area. In addition, compressed overviews of selected impacts of the EVOS have been added to Sections 4.7.8.1 and 4.7.8.2.

00113-295: Section 4.4.4.15 and Appendix D have been modified to address some of the concerns presented in the comment more clearly. The former discusses the nature of subsistence impacts from a terrestrial spill in greater detail. The latter, in turn, now includes the size of subsistence use area for each community for which the EIS examines subsistence, to provide an increased appreciation of how small the affected area would be. The message of the EIS continues to be that Alaska Native sociocultural systems could overcome localized and temporary adverse effects by exploiting similar resources elsewhere, assuming that the area affected was actually important to subsistence for a particular year prior to the spill. This does not imply that there would be no hardship as a result of a spill, only that the fundamentals of Alaska Native sociocultural systems, such as language, kin ties, and exchange of relationships would survive such a spill.

00113-296: No terrestrial spill considered in the EIS, even the largest, would affect anywhere near the resources affected by the Exxon Valdez oil spill. As a result, the kinds of sociocultural stresses experienced should be different than those experienced following the Exxon Valdez spill, and their magnitude not be as great. Section 4.4.4.15 has been revised to acknowledge sociocultural impacts resulting from the Exxon Valdez spill.

00113-297: Section 4.4.4.15 has been reworded to take into account the concerns expressed by local communities following the Exxon Valdez oil spill. Those revisions include discussion of the nature and duration of impacts, and the relationship of these impacts to other issues (such as subsistence impacts).

With regard to input from the cited communities, all three were contacted by certified letter in April 2002 to solicit their input to this EIS. To date, none of the three has responded to that invitation.

00113-298: The potential health and safety impacts from exposures to BTEX through inhalation discussed by the commentor are discussed in Section 4.4.4.7. Dermal contact has not been an exposure pathway addressed in detail; it is assumed that cleanup workers would be provided with adequate dermal protection, and that dermal contact by members of the general public would not be extensive. The increase in stomach cancer rates in Native Alaskans is speculated to be associated with ingestion of high amounts of smoked foods containing high PAH concentrations. If a large spill occurred, the PAH exposures of Native Alaskans might theoretically increase if they ingested large amounts of contaminated mussels, but this would not necessarily result from employment on a cleanup crew. Although the stomach cancer association is not conclusive, the text of Section 4.4.4.7.4 (Human Health Impacts of Spills) states that any additional exposures to PAHs should be avoided where possible. That stated, because the human health analysis did not identify specific impacts associated with the sorts of PAH and BTEX exposure that might accompany participation on a cleanup crew, the environmental justice analysis did not identify this activity as a concern.

00113-299: Although 45 days is understandably a short time to review a document of this size, the time period is consistent with the Council on Environmental Quality regulations for implementing the National Environmental Policy Act regarding the review of draft environmental impact statements. Significant effort was made to advise people of the schedule and duration of the review well in advance (one year). The DEIS was published on schedule and many substantive comments on the content of the DEIS, including yours, were received during the 45-day period.

While comments on the DEIS had to be received by the end of the 45-day comment period in order to be addressed in the Final EIS, additional provisions for involvement in the decision-making process apply to Tribal governments and Native organizations. The process of government-to-government consultation allows these groups to continue dialogue with the Bureau of Land Management.

- 00113-300:** The alternative to not renew the federal grant of right-of-way receives extensive analysis in the EIS. For example, please see Section 4.6, No-Action Alternative Analysis. A description of the termination activities that would be required and a general description of what would be involved in implementing a decision to not renew the federal grant are used for the purpose of the analysis in this EIS. However, if the grant is not renewed a more specific and detailed proposal for dismantling, removal, and restoration of the TAPS would have to be submitted by the TAPS owners and that would become the subject of a separate EIS.
- 00113-301:** Relatively little information is available on the biological impacts of spills that have occurred along TAPS during its operational history. Observed effects on vegetation have included initial mortality of most plants followed by recovery of a number of species (see Section 3.18).
- ADF&G personnel are not aware of wildlife mortality from any TAPS oil spills (a reference to this has been added to Section 4.4.4.11). The maximum expected land-based oil spill (the potential for which is very unlikely) could impact up to 84 acres. While such a spill could cause the death of some wildlife, no population-level impacts would be expected. Sections 4.4.4.11 and 4.7.7.3.5 discuss oil spill impacts to wildlife.
- 00113-302:** While it is true that a renewal of less than 30 years would proportionally reduce the probability of an oil spill, occurring over the renewal period, the annual risk would be similar, assuming comparable levels of maintenance, and the overall cumulative impacts of the 30-year and less-than-30-year alternatives would still be similar. This is primarily because the likelihood of a large spill that might be expected to significantly affect fish populations already has a low probability of occurrence.
- 00113-303:** The reader is referred to Section 2.5 of the FEIS, in which audits are addressed under Alternatives and Issues Considered but Eliminated from Detailed Analysis.
- 00113-304:** The reader should note that a clear distinction is made between regulatory compliance (Section 4.1) and impacting factors (Section 4.2). Impacting factors are used to evaluate environmental effects.
- The BLM and member agencies of the JPO use an adaptive management approach to evaluate the effectiveness of stipulations and regulatory oversight. Ongoing monitoring programs, as identified in the 12 Comprehensive Monitoring Reports published since 1996, provide BLM and JPO with the necessary information to evaluate the effectiveness of stipulations in the Grant and Lease.
- The reader is referred to Section 4.1.1 (JPO oversight) and specifically to Sections 4.1.1.2 (Adaptive Nature of the Grant in Compliance Monitoring), 4.1.1.3 (Risk-based Compliance Monitoring), 4.1.1.4 (JPO Comprehensive Monitoring Program), and 4.1.1.8 (Coordinated Planning and Response to Abnormal Incidents) for more information on the role of adaptive management as a JPO business practice.
- 00113-305:** Reliability centered maintenance (RCM) is discussed in Section 4.1.1.7, including the manner in which RCM methodologies are being made available to the public for review and comment.
- 00113-306:** Appropriate changes have been made to Section 4.1.2.3, its associated text box and footnote.

00113-307: The BLM and member agencies of the JPO use an adaptive management approach to evaluate the effectiveness of stipulations and regulatory oversight. Ongoing monitoring programs, as identified in the 12 Comprehensive Monitoring Reports published since 1996, provide BLM and JPO with the necessary information to evaluate the effectiveness of stipulations in the Grant and Lease.

The reader is referred to Section 4.1.1 (JPO oversight) and specifically to Sections 4.1.1.2 (Adaptive Nature of the Grant in Compliance Monitoring), 4.1.1.3 (Risk-based Compliance Monitoring), 4.1.1.4 (JPO Comprehensive Monitoring Program), and 4.1.1.8 (Coordinated Planning and Response to Abnormal Incidents) for more information on the role of adaptive management as a JPO business practice.

00113-308: The EIS focuses its attention on those off-normal events that are expected to have adverse public health and environmental consequence. Thirteen credible spill scenarios are identified and analyzed. Many of these spill events are precipitated by off-normal conditions within TAPS.

Further, the EIS describes those design elements of the pipeline that are intended to provide controls and mitigations of impacts that can result from off-normal conditions. The surge tanks present at some pump stations that would serve as temporary storage for oil in the event that overpressure or other system failures occur are one example of such design features. The mainline RGVs and check valves are also examples of how impacts to the environment would be mitigated or limited in the event of off-normal conditions through existing design elements.

For example, there is no evidence that the alleged off normal operations in the BWTF 90s tanks have resulted in off-normal effluent discharges from the BWTF, which have had an adverse impact on the environment or public health and safety. The Alyeska Annual Data Report for June 2000-May 2001, filed with the EPA and ADEC pursuant to Part III.B.6 of NPDES Permit No. AD-002324-8, shows the effluent from the BWTF did not exceed the specific limits established in the Permit. See Appendix C, Section C.5 for operational details. Since the effluent limits in the Permit are established by the EPA, and certified by the ADEC, at levels expected to prevent adverse effects on receiving waters, it is reasonable to conclude that when these effluent limits are met there is no significant adverse effects to existing water quality of Port Valdez from BWT effluent discharges regardless of certain less than optimum plant operations.

00113-309: The reader is referred to Section 2.5 of the FEIS, in which audits are addressed under Alternatives and Issues Considered but Eliminated from Detailed Analysis.