4.5 Less-Than-30-Year Renewal Alternative Analysis

4.5.1 Summary Description of the Less-Than-30-Year Renewal Alternative

4.5.1.1 Introduction

The alternative of renewing the Federal Grant for the TAPS ROW for less than 30 years evaluates the consequences of continuing TAPS operation for a shorter period than has been proposed. It provides an assessment of environmental impacts or issues that could be time dependent (i.e., that could have a greater or lesser effect if the renewal period was less than 30 years). This alternative is not functionally different from the proposed action alternative. Implementation (e.g., mitigating factors, laws, regulations, or oversight) by the federal government of a renewal period for less than 30 years would be no different than for the proposed action.

4.5.1.2 Spill Scenarios under the Less-Than-30-Year Renewal Alternative

The principal parameters that characterize spills are the frequency of occurrence and the quantity of crude oil or other substances released to the environment. This section discusses those parameters for postulated spills for the pipeline, the Valdez Marine Terminal, the North Slope, and tanker transport in Prince William Sound for the less-than-30-year renewal alternative. Although the length of the renewal period (which determines whether the pipeline is assumed to operate for another 30 years or for some shorter period) could affect both frequency of spills and quantity spilled, the analysis summarized in this section indicates that for the periods of time being considered, the duration of the renewal period would not significantly alter the results presented for the 30-year renewal alternative. Therefore, the scenarios discussed in Section 4.4.1 can also be used to characterize the spill events for a renewal period of less than 30 years.

4.5.1.2.1 Factors Affecting Frequency of Spills.

Pipeline. The frequency of spills along the pipeline can be affected by changes in throughput, the age of the pipeline, changes in climate, or other external factors such as changes in population along the pipeline and accessibility of the pipeline to more people. Age-related factors include corrosion of the pipeline, frequency of maintenance activities, and potential for metal fatigue.

Throughput: The current TAPS throughput (the volume of crude oil pumped through the pipeline) is about 1.1 million bbl/d. The highest capacity throughput at which the TAPS can operate is 2.1 million bbl/d. For the 30-year renewal period, it is estimated that throughput would decline gradually to about 0.75 million bbl/d in 2019 (15-year renewal) and about 0.3 million bbl/d in 2031 (DOE 2001a). If other factors remained unchanged, the annual frequency of spills would be expected to remain the same or be reduced as the throughput declined. For spills initiated by natural causes, such as earthquakes, the frequency would not be expected to change because of changes in throughput. However, for some events that are initiated by human activity, such as a truck or an airplane crashing into the pipeline, the frequency may be reduced when the throughput is reduced because there may be less occurrence of the activity (i.e., reduced TAPS-related truck and aircraft traffic near the pipeline because of the decline in support needed for the TAPS with declining throughput, although this decline may be offset by a potential increase in tourism in Alaska). However, such differences are expected to be small. Therefore, for the purposes of analyses in this EIS, it is assumed that the annual spill frequencies would remain the same as the throughput changes. The net effect of this assumption would be that the

likelihood of occurrence of spills would be proportional to the length of the renewal period regardless of throughput level; for example, a spill would be twice as likely to occur over a 30-year renewal period as it would over a 15-year renewal period.

Age of the Pipeline: As the pipeline ages, both the physical conditions of the pipeline and the activities on the part of the owners to maintain the pipeline could change. One of the main physical changes is related to pipeline corrosion. The pipeline is known to have corroded in certain sections. For example, an 8.5-mi section of the pipeline was rerouted in the Atigun River valley region in 1991 because of excessive corrosion. Since then, the monitoring and surveillance activities have increased with the use of smart pigs, cathodic protection, and other techniques that both monitor and prevent corrosion along the pipeline (see Sections 4.1.2.3 and 4.1.3.2 for more detail). In addition, the recently initiated Reliability-Centered Maintenance (RCM) program is intended to prevent failure of the pipeline, including failure from corrosion. Because of the heightened awareness and increased monitoring and prevention programs in place, it is not expected that the annual frequency of spills resulting from pipeline corrosion would increase. In fact, it may be expected to decrease because of these precautions. However, for the purposes of analysis it is conservatively assumed that it would stay the same.

The increased surveillance and monitoring activities and potential increases in remediation activities that could result could themselves cause the annual frequency of spills to increase. On the other hand, if the maintenance and prevention programs (e.g., RCM and cathodic protection) were successful, there would be less need to conduct remediation activities, which would reduce the likelihood of spills. Therefore, the annual frequency of spills resulting from surveillance, monitoring, and maintenance activities along the pipeline could be either higher or lower at the end of 30 years compared with the renewal period of less than 30 years. These changes, however, are expected to be relatively small. The frequencies over any renewal period of 30 years or less are not expected to change enough to shift the frequency designations of the spill scenarios discussed in Section 4.4.1.

Another age-related phenomenon that could increase the frequency of spills along the pipeline is metal fatigue (cracking and/or breaking of metal parts because of repeated stresses, such as by flexing or bending). Certain sections of the pipeline are subjected to repeated forces that could cause metal fatigue. For example, a small section of the pipeline in the Thompson Pass region in the past vibrated under certain slack-line conditions (a condition in a downhill section of the pipeline where the oil does not completely fill the pipeline, and part of the pipeline is filled with hydrocarbon vapors). The back pressure in the pipeline downstream from Thompson Pass has been adjusted and the vibrations have stopped. This modification was implemented in 1997 through the installation of a back-pressure control system at the Valdez Marine Terminal (APSC 2000a). However, as the throughput in the pipeline decreases with time, as currently projected (see above), the number of places where slack-line conditions could occur and their frequency may increase.

Vibrations also occur in the piping near the main-line pumps. It is reported that potential slack-line areas, such as Thompson Pass, have been studied and either fatigue life has been determined to be unlimited or corrective actions have been implemented (APSC 2001m). It is also reported by APSC (2001m) that operators routinely check for fatigue damage to piping near the main-line pumps and implement corrective measures as required to maintain system reliability. Because of these actions, it is assumed that the frequency of spill events caused by metal fatigue will not change between the 30-year renewal and less-than-30-year renewal options. However, as stated above, the frequency of maintenance activities and the frequency of spills caused by maintenance activities may change slightly. Twenty-five years of performance data on Western European cross-country oil pipelines indicate no evidence to show that the aging of the pipeline system increases either the frequency or the volume of spills (CONCAWE 1998).

Climate Change: Changes in climate could affect the integrity of the pipeline; for example, by increases in frost jacking, subsidence, or

landslides in areas of unstable permafrost, or by increases in flooding and washout in valleys and river crossings. As discussed in Section 3.12.7, there is some evidence to indicate that regional warming has occurred over the last several decades in Alaska. The estimated increase in surface air and permafrost temperatures varied from less than a degree to a few degrees Celsius. It is not clear if the same trend would continue over the ROW renewal period. If it did, it may be expected that the temperature would increase by a few degrees or less above current values. The direct impact of such warming on the pipeline is not quantifiable at this time. However, the pipeline is continuously being monitored. Any variations in temperature because of climate change and its effects on the pipeline would be gradual. If the trends indicated deterioration in the condition of the pipeline, necessary corrective measures would be taken to remedy the situation or the pipeline would be shut down.

Population Changes and Accessibility of the Pipeline: It is likely that the population in regions along the pipeline will increase and that the pipeline will be more accessible to people, particularly north of Fairbanks, in the future. It is also likely that these changes would be greater over a 30-year period than over a period of less than 30 years. The U.S. Bureau of the Census projects that Alaska's total population will increase from 653,000 in the year 2000 to 885,000 in year 2025, an increase of 35% in 25 years, or somewhat greater than the projected national increase of 23% for the same time period (U.S. Bureau of the Census 2002a). This population increase could increase or decrease the frequency of certain spill scenarios (e.g., the sabotage and vandalism scenario). However, such changes are not expected to be sufficiently large to alter the frequency designations for the postulated pipeline accidents in Section 4.4.1.

Valdez Marine Terminal. As discussed above for the pipeline, changes in throughput over time can also affect the frequencies of certain spill scenarios at the Valdez Marine Terminal. Throughput would affect a certain number of unit operations at the Valdez Marine Terminal, including the loading of tankers. As a result, annual frequency of spills during tanker loading operations, such as the spill scenario entitled "Failure of Loading System between Dock and Ship" in Section 4.4.1, could decrease with decreasing throughput. Also, the number of employees at the Valdez Marine Terminal could decrease as the throughput decreased. This reduction in employees could cause the frequency of postulated spills resulting from aircraft crashes into tanks to be reduced at lower throughputs because less staff at the Valdez Marine Terminal could mean fewer flights in and out of Valdez Airport. Frequencies of spills in the anticipated and likely frequency categories, which were derived from operating experience at the Valdez Marine Terminal, can also be expected to be lower because of lower throughput . However, such changes would not have a significant effect on the frequencies, and the frequency designations for the scenarios described in Section 4.4.1.1 at the Valdez Marine Terminal would not change.

Prince William Sound. The spill frequencies in the Prince William Sound would be affected mainly by two anticipated future changes: (1) the decline in the pipeline throughput quantities, and (2) the move from a fleet currently made up of mostly single-hulled tankers to a fleet of all double-hulled tankers by 2014. Declining throughput would mean less tanker traffic and smaller frequency for all scenarios considered in Section 4.7.4.10. Double-hulled tankers are less prone to spills in the case of collisions or structural damage, and, therefore, their use results in a smaller frequency of spills for the same types of initiators compared with single-hulled tankers. Some of the decrease in frequency of spill events because of a smaller tanker fleet may be offset by other factors, such as a potential increase in tourism-related marine traffic in Prince William Sound. The frequencies and frequency category designations of spill scenarios described in Section 4.7.4.10 are based on analyses that take into account both of the factors mentioned above. The frequencies are given as "high," corresponding to current throughput and fleet, and "low," corresponding to projected throughput and fleet at the end of the renewal period. The renewal period assumed in Section 4.7.4.10 is 30 years. For any period less than 30 years, the low end of the frequency range would be higher than that given in Section 4.7.4.10 but still below

that of the high end of the frequency range (i.e., current throughput and reliance primarily on single-hulled tankers).

North Slope. The main factor that may influence the frequency of spills in the North Slope is throughput as it relates to the number of wells and pipelines in operation at the North Slope. In general, the more oil being pumped from the ground, the more likely the occurrence of spills. However, the estimates provided in Section 4.7.4.10 are based on historical data or information from sources that did not take into account lower production potential at the North Slope. As a result, the frequency estimates given in Section 4.7.4.10 are conservative for future operations under either a 30-year renewal or a less-than-30-year renewal alternative.

4.5.1.2.2 Factors Affecting Volume of Spills.

Pipeline. The only time-dependent factor that could affect the volume of oil spilled from the pipeline is throughput. In most scenarios, the throughput plays little or no role in determining the spill volume. However, in scenarios involving a large break in the pipeline, such as a guillotine break, throughput becomes a factor.

The spill volume in a guillotine break accident is estimated on the basis of two considerations: (1) the dynamic volume — the quantity of oil that would be pumped through the section of the pipe where the break occurs from the time of the break until the pumps upstream are shut down and the main-line valves are closed, and (2) the static volume — the amount of oil spilled from the break because of hydraulic heads established at elevations higher than the break location. The first component is proportional to the throughput (i.e., the spill volume decreases with decreasing throughput), whereas the second component is independent of the throughput.

As the throughput decreases and because of economic and technical considerations, the TAPS Owners may shut down some of the main-line pump stations. For example, when the guillotine break scenario spill volumes were estimated for a 0.3 million bbl/d throughput under the proposed action alternative, it was assumed that the currently operating PS 7 and 12 would be shut down. It was also assumed, as required by JPO Stipulations, that appropriate main-line valves would be installed in place of the removed pump stations so that the static spill volumes would remain about the same. As discussed below, the net effect was that the maximum spill volume was estimated to be less for a 0.3 million bbl/d throughput than for either a 1.1 million or 2.1 million bbl/d throughput. Removal of a pump station would alter the internal pressure in the pipeline in certain sections. The pressure could be higher or lower, depending on the location; however, it would always be within the allowable design limits of the pipeline. As a result, the changes in the estimated spill volumes for any of the spill scenarios would be relatively small.

For the proposed action alternative, three throughputs were considered: 2.1 million bbl/d (maximum TAPS design value with the use of drag reducing agent), 1.1 million bbl/d (current value), and 0.3 million bbl/d (estimated minimum throughput for the TAPS under the current operating conditions, which is also the projected North Slope production value in DOE [2001a] for the year 2031). The maximum estimated release was about 54,000 bbl for the 2.1 million bbl/d and 1.1 million bbl/d throughputs. When the throughput was reduced to 0.3 million bbl/d, the maximum estimated spill volume was about 52,000 bbl. If the grant renewal was for a period less than 30 years, according to the DOE projections (DOE 2001a), the pipeline throughput is likely to be between 1.1 million and 0.3 million bbl/d. For example, the projected throughput in 2019 (15-year renewal) is about 0.75 million bbl/d. For reasons mentioned above, the estimated maximum spill volume for a guillotine break scenario would be between about 54,000 bbl and 52,000 bbl for throughputs between 1.1 million bbl/d and 0.3 million bbl/d, respectively.

As the throughput decreases over time, there is greater likelihood of slack-line conditions developing along the pipeline. Leak detection in slack areas is more difficult, and minimum detection levels are generally higher. Therefore, if there is a relatively small, not easily detectable, leak in the pipe, the quantity of oil released would probably be greater in a slack

area than in other parts of the pipeline. This situation would mean that the volume of oil spilled could be larger for longer renewal periods during scenarios that involve small holes in the pipeline.

Valdez Marine Terminal. The spill volume estimates given in Section 4.4.1 for scenarios considered at the Valdez Marine Terminal would be the same regardless of the renewal period, unless lower throughputs result in closure of portions of the Valdez Marine Terminal. For example, it may be possible that crude oil storage at the Valdez Marine Terminal would only occur at the West Tank Farm at low throughputs. However, such changes are difficult to quantify and are not expected to be sufficiently large to alter the spill volume estimates at the Valdez Marine Terminal at low throughputs.

Prince William Sound. The quantity of oil spilled from a double-hulled tanker is estimated to be less than the volume spilled from a single-hulled tanker for a given severity accident (National Research Council 2001). After 2014, all tankers carrying crude oil from the Valdez Marine Terminal are expected to be double hulled. As a result, one would expect that the spill volumes from the postulated accidents in Prince William Sound would decrease after 2014, when the complete tanker fleet is scheduled to be double hulled. In estimating the spill volumes given in Table 4.7-6 (Section 4.7.4.10.4) for the cumulative impacts analysis, that distinction was not made, and it was conservatively assumed that the spill volumes from double-hulled tankers would be similar to those from single-hulled tankers.

North Slope. The spill volume estimates given in Table 4.7-4 (Section 4.7.4.10.3) for scenarios considered at the North Slope would be the same irrespective of the pipeline ROW renewal period.

4.5.1.2.3 Summary and Conclusions. The renewal period could cause slight modifications to the estimated frequencies and spill volumes for the postulated spill scenarios along the pipeline, at the Valdez Marine Terminal, at the North Slope, and during tanker transport through the Prince William Sound. Table 4.5-1 summarizes these changes and indicates the relative importance of such changes compared with the values for the 30-year renewal period. Because of the conservative nature of assumptions made in estimating the spill parameters under the proposed action alternative, the same estimates can be used to describe the spill events that could occur under a less-than-30-year renewal alternative without significantly affecting the estimates of the impacts of the TAPS on the human and natural environment.

4.5.2 Impact Analysis of the Less-Than-30-Year Renewal Alternative

4.5.2.1 Physiography and Geology

Several impacting factors involved with the operation of the TAPS are time dependent, including the removal of geologic resources and the influence of a regional warming trend in Alaska on mass-wasting geologic processes. The removal of sand, gravel, and quarry stones would continue with the operation of the TAPS. Similarly, mass-wasting processes would increase with the general warming trend in Alaska, potentially impacting the integrity of the TAPS. However, because the impacts evaluated for the 30-year renewal period would be either insignificant or mitigated (see Section 4.3.1), impacts associated with a shorter renewal period would be correspondingly smaller.

4.5.2.2 Soils and Permafrost

The impacts on soils and permafrost from TAPS operations are closely related to excavation and the use of heavy equipment. These activities are regularly involved in maintenance tasks in pipeline rerouting, corrosion digs, valve replacements, and repairs of buried pipe. Because the number of maintenance jobs would increase with time, the impacts on soils and permafrost are time dependent. In addition, with the general warming trend in Alaska, the degradation of permafrost along the TAPS would also potentially increase

TABLE 4.5-1 Summary of the Effects of the Renewal Period on Spill Scenarios

	Frequency		Spill Volume	
Location	Potential Effect	Relative Importance[a]	Potential Effect	Relative Importance
Pipeline	The annual frequency of occurrence could increase with time for some scenarios but decrease for others.	Low. The changes are expected to be small, and the frequency range designations for the scenarios are not expected to change. (See Section 4.4.1 for definitions of frequency categories.)	For guillotine break scenarios, the spill volume is expected to be reduced with declining throughput over time. If slack-line conditions develop in some parts of the pipeline because of declining throughput and if a small leak occurs in those areas, the spill volume could be higher.	Low
Valdez Marine Terminal	The frequencies of some scenarios could be slightly less for longer times because of expected reductions in throughput.	Low	No change	Low
Prince William Sound	The frequencies of occurrence are expected to decline with time because of expected decline in throughput and changes in the composition of the tanker fleet.	Low to moderate. Declining throughput and the replacement of all single-hulled tankers with double-hulled tankers after 2014 is expected to reduce the frequency of spills.	The spill volume is expected to be lower for double-hulled tankers than for single-hulled tankers.	Moderate
North Slope	Reductions in production would be expected to reduce the frequency of spills over time.	Low	No change	None

[a] Relative to estimates provided in Sections 4.4.1 and 4.7.4.10 under the proposed action.

with time. Therefore, the magnitudes of the impacts associated with a shorter renewal period would be less than those for the proposed 30-year renewal period (see Section 4.3.2), and those impacts that did occur would be small and local.

4.5.2.3 Seismicity

The time-dependent impacting factor that is related to seismicity results from the combined effects of earthquakes and the degradation of permafrost along the TAPS with time. With potential progressive degradation of permafrost, the area potentially susceptible to earthquake-triggered landslides and liquefaction increases. As a result, the risk associated with a shorter renewal period would be smaller than the risk for the full renewal period (see Section 4.3.3). However, the impacts of spills caused by earthquake-triggered landslides and liquefaction events would be the same whether the renewal period was 30 years or less, but the likelihood of occurrence of such a spill is less over the TAPS life.

4.5.2.4 Sand, Gravel, and Quarry Resources

The quantities of sand, gravel, and quarry stone used for TAPS maintenance activities are time dependent. Because less of these materials would be needed for a shorter renewal period, the total magnitude of impacts associated with the extraction of these materials (see Section 4.3.4) would be less with a shorter renewal period than with the full 30-year renewal period. The impacts that would occur would be small and local.

4.5.2.5 Paleontology

Impacts associated with the less-than-30-year renewal alternative would be essentially the same as those described under the proposed action (see Section 4.3.5). Over a shorter time period, the likelihood of discovering new paleontological resources is lessened. No adverse effects on known paleontological resources are expected regardless of the length of the renewal period.

4.5.2.6 Surface Water Resources

Several impacting factors that could affect surface water resources are time dependent. These factors include use of water for continued operations and maintenance activities, disposal of wastes from continued operations (e.g., land spreading of wastewater), and planned maintenance. All of these impacting factors would have effects that increase with time. Impacts associated with a shorter renewal period would be accordingly smaller than the small and local impacts projected for the proposed action alternative (see Section 4.3.6).

4.5.2.7 Groundwater Resources

Impacting factors that can affect groundwater resources include the continued use of groundwater wells to supply water for continued operations and planned maintenance activities and disposal of wastes from continued operations (e.g., land spreading of wastewater and the use of septic systems) and planned maintenance. All of these impacting factors would have effects that potentially increase with time. Impacts associated with a shorter renewal period would be accordingly smaller than the small and local impacts projected for the proposed action (see Section 4.3.7).

4.5.2.8 Physical Marine Environment

Several impacting factors that could affect physical marine resources are time dependent. These factors include continued operation of the BWTF and other activities at the Valdez Marine Terminal. The effects of these impacting factors would increase with time. Impacts associated with a shorter renewal period would be accordingly smaller than the negligible to small and local impacts projected for the proposed action (see Section 4.3.8).

Tanker traffic associated with the TAPS is also time dependent. The current fleet serving the Valdez Marine Terminal consists of 26 tankers (National Research Council 1991), including 3 with double hulls, 13 with double sides, and 10 with single hulls and single sides.

The number of tankers is expected to decrease substantially from the present 26 tankers to 8 to 10 tankers by the year 2020; tanker transits are also expected to decrease (TAPS Owners 2001a). According to this schedule, the last of the present tankers will be phased out by the end of the year 2013, and the fleet will consist exclusively of double-hulled tankers beginning in 2014. Double-hulled tankers offer environmental advantages in terms of a reduced likelihood and volume of potential oil spills (National Research Council 1991, 1998).

A smaller tanker fleet would require fewer berths at the Valdez Marine Terminal. There are four berths at present; one is a floating berth, and three are fixed-platform berths. One or two of these berths might be shut down in the future. The two berths with tanker vapor control facilities would remain in operation (TAPS Owners 2001a).

4.5.2.9 Air Quality

This section describes estimated potential impacts of air quality and AQRVs for the less-than-30-year renewal alternative with respect to ambient air quality (criteria and hazardous air pollutants), visibility, acid deposition, and accumulation of CO_2 in the atmosphere.

Air pollutants, once emitted from a source, travel downwind as they are dispersed horizontally and vertically by air turbulence. While they are being transported and dispersed, the pollutants are converted to different species by chemical reactions in the atmosphere, and eventually they are removed from the atmosphere by dry and wet deposition onto the earth's surface. Therefore, potential impacts of air pollutants emitted by TAPS-related activities on ambient air quality and visibility at downwind receptors would be of a transient nature and would cease a short time after the pollutants were emitted from the source (less than a few days to tens of days for criteria and hazardous air pollutants). The difference in potential impacts on ambient air quality and visibility between the proposed action (30-year renewal period) and the less-than-30-year renewal alternative would be in the duration of impacts, that is, 30 years versus less than 30 years. The level of potential impacts on ambient air quality and visibility would be the same while those impacts were occurring.

Acidic species are formed in the atmosphere by chemical conversion of precursors, such as SO_2 and NO_x. Potential impacts of acid deposition on sensitive lakes could accumulate over time, depending on the acid-neutralizing capacity of the water body. Acidic deposition rates in Alaska are very low (see Section 3.13.2.4), and the TAPS-related precursor emission rates are relatively small in comparison with the overall precursor emissions in Alaska (see Table 3.13-4). Therefore, potential accumulation of impacts on sensitive receptors in Alaska from acidic deposition resulting from TAPS-related emissions is estimated to be minor regardless of the duration of future operation of the TAPS.

Potential impacts of CO_2 emissions from TAPS-related activities on the global CO_2 concentration level would be cumulative because of CO_2's long residence time[1] in the atmosphere (about 15 years). Therefore, the difference in potential impacts on the global CO_2 concentration level between the proposed action (30-year license renewal period) and less-than-30-year renewal alternative would be in (1) the duration of CO_2 addition to the atmosphere, (i.e., 30 years versus less than 30 years), and (2) cumulative impacts, which would be higher and persist longer under the proposed action than under a less-than-30-year renewal alternative. However, potential impacts due to accumulation of TAPS-related CO_2 emissions on the global CO_2 concentration level are estimated to be minor regardless of the duration of future operation of TAPS, because the TAPS-related CO_2 emission rate is very small in comparison with the global CO_2 emission rate (see Section 3.13.1.3).

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1 Residence time of an air pollutant species is the length of time that the pollutant remains in the atmosphere in its original form.

4.5.2.10 Noise

Noise is quickly dissipated in the atmosphere, and the noise at a receptor location in the vicinity of a noise source exists only for the time it is emitted. Therefore, impacts of TAPS-related noise would not accumulate and would cease to exist almost immediately after the termination of the noise-generating activities. The difference in potential noise impacts between the proposed action (30-year renewal period) and a less-than-30-year renewal alternative would be in the duration of noise emissions from TAPS facilities (i.e., 30 years versus less than 30 years).

4.5.2.11 Transportation

Transportation impacts from a less-than-30-year renewal period would be the same as those discussed for the proposed action in Section 4.3.11. TAPS operations would continue, and the transportation network would be capable of supporting pipeline activities at any anticipated pipeline throughput level.

4.5.2.12 Hazardous Materials and Waste Management

Relative to the types of hazardous material used or wastes generated, very few differences would be expected between the less-than-30-year renewal alternative and the 30-year renewal. The major sources of the wastes generated from TAPS operations include maintenance, repairs, and responses to accidental releases of crude oil or hazardous materials. Other major wastes include solid wastes and domestic and sanitary wastewaters associated with support of the workforce that resides at TAPS facilities. Waste-generating activities are expected to remain generally the same under the less-than-30-year renewal alternative. Further, except for technological advancements, the techniques used to accomplish maintenance and repairs can be expected to remain the same, and, thus, hazardous materials supporting such activities would also be unchanged. However, opportunities would still exist to reduce hazardous material usage (and hazardous waste generation) through pollution prevention initiatives.

While the character of the wastes that would be generated is expected to be the same as that for the proposed action, shorter periods of operation would affect the amounts of wastes produced. The majority of waste produced is related to pipeline and infrastructure maintenance. Such maintenance activities occur on a cyclical basis. Assuming these maintenance “cycles” are not otherwise affected by RCM protocols under development, the number of maintenance cycles may be less for operational periods of less than 30 years, and, thus, the total amount of maintenance-related waste would be reduced. In addition to wastes resulting from scheduled maintenance, some waste may result from repair actions dictated by results of ongoing TAPS monitoring or surveillance activities. For example, data collected from instrument pig runs may dictate closer inspection and possibly repairs or replacement of pipeline corrosion control coatings, resulting in the generation of associated wastes. The frequency of occurrence of such “as-needed” or “as-directed” repair actions is not predictable, although it is intuitive that shorter periods of TAPS operation would reduce the probability of repair actions being required and thus reduce the volumes of associated wastes.

As discussed in Section 4.5.1.2, annual spill frequencies would be approximately the same under the 30-year and less-than-30-year alternatives. Therefore, the annual qualities of wastes generated as a result of spills would be the same for either alternative. However, the total quantity of spill-related waste generated over the renewal period would be expected to be proportionally higher under the 30-year alternative than the less-than-30-year alternative. In addition, on the basis of throughput projections, the volume of oil potentially at risk for release from any point in the pipeline would decrease over time.

Frequencies of tanker spills and volumes of crude oil released can also be expected to decrease between now and January 2015 and continue at that lower level because of the reconfiguration of the tanker fleet to intrinsically

safer double-hulled design. Volumes of remediation wastes resulting from any release would depend on many circumstantial factors. Thus, while the decreasing frequencies of some spill events may be predicable, changes to the volumes of remediation wastes are not.

Finally, Section 4.3.12 discusses the potential impacts to hazardous material usage and waste generation that would result from the completion of the planned pump station and Valdez Marine Terminal upgrades. While the precise schedule for initiating and completing those upgrades has not been set, the net result is expected to be a general decrease in the amounts of maintenance-related wastes (for both TAPS equipment and infrastructure), as well as a decrease in wastes associated with workforce support. Those reductions would be realized upon completion of the upgrades and continuously thereafter. Decreases in volumes of maintenance-related wastes would be realized only if TAPS upgrades were completed before the expiration of any less-than-30-year operating period.

4.5.2.13 Human Health and Safety

4.5.2.13.1 Occupational.

Section 4.3.13.1 discussed potential impacts to health and safety for workers from routine operation of the TAPS for a 30-year period. Specifically, the industrial risks of injuries and fatalities from physical hazards to operations and maintenance workers were evaluated. The expected annual number of worker fatalities and injuries for specific industry types was calculated on the basis of BLS and NSC rate data and on the estimated number of annual full-time equivalent workers required for operations and maintenance activities along the pipeline. Under the less-than-30-year alternative, the annual incidence of fatalities and injuries for operation of the TAPS remains the same for a given year. However, the total number of fatalities and injuries for a period of time less than 30 years would be less, that is, roughly proportional to the reduction in the number of years.

4.5.2.13.2 Public. Section 4.3.13.2 discussed potential impacts to health and safety for the general public from routine operation of the TAPS for a 30-year period. Specifically, potential impacts from BWTF effluents to Port Valdez and from air emissions from the Valdez Marine Terminal were evaluated. These impacts were considered to be bounding impacts for emissions from normal operations along the entire ROW (see Section 4.3.13.2 for supporting rationale).

With respect to human health risk associated with water effluents from the BWTF to Port Valdez, risks from fish and shellfish consumption are directly related to length of exposure. However, contaminants may be persistent in sediments; thus, exposures may not end when TAPS operations end. Overall, it is expected that the less-than-30 year alternative would not substantially change the risk estimated for the BWTF in Section 4.3.13.2.1 (i.e., fish and shellfish consumption risk not exceeding 1×10^{-5}).

Air emissions from the Valdez Marine Terminal would be expected to decrease if throughput decreased. Also, inhalation cancer risk is related to the total length of exposure, so that decreasing the length of operations would decrease risk. As detailed in Section 4.3.13.2, the increased cancer risk in residential areas from Valdez Marine Terminal emissions would be below guideline levels under the proposed 30-year renewal. Risks would be somewhat lower still for the less-than-30-year alternative.

Section 4.5.1.2 provides an in-depth discussion of how spill scenarios might change under the less-than-30-year alternative. It is concluded that the number of spills would be roughly proportional to the length of the renewal period. For example, spills would be twice as likely to occur over a 30-year renewal period as over a 15-year renewal period. With respect to spill volumes, these are partially dependent on throughput, which would likely remain higher in the near term (staying at about 1 million bbl/d out to about the year 2020) and then decrease to about 0.3 million bbl/d by 2031 if a 30-year renewal is granted. Similar maximum spill

volumes are predicted for guillotine breaks along the pipeline for both of these throughput rates. The conservative nature of the human health impact estimates from spills for the proposed 30-year renewal (see Section 4.4.4.7) would make those estimates also applicable for the less-than-30-year renewal alternative.

4.5.2.14 Biological Resources Overview

Impacts of the less-than-30-year renewal alternative on biological resources would be similar to those of the proposed action because operations, monitoring, and maintenance activities are, for the most part, independent of the length of the renewal period. The actual impact of this alternative would depend on the length of the renewal period and the ultimate disposition of TAPS and the ROW (i.e., the nature of termination activities).

If, at the end of the less-than-30-year renewal period, a decision were made to terminate TAPS, the impacts of this alternative on biological resources would be less than those of the proposed action. Any reduction in impacts resulting from a shorter renewal period would be small.

The probability of large spills would decrease with a shorter renewal period. However, under the proposed action, the probability of such a spill occurring is low, and this difference in probability does not provide a meaningful discriminator between the two alternatives.

4.5.2.15 Terrestrial Vegetation and Wetlands

This section evaluates the direct and indirect impacts of the less-than-30-year renewal alternative on vegetation and wetlands. Terrestrial and wetland vegetation communities and their component species may be affected by factors associated with the existence of TAPS facilities, normal operations, monitoring, and maintenance. Impacts to vegetation under this alternative would be similar to those under the proposed action (see Section 4.3.15); however, the impacts evaluated under this alternative would occur for a shorter period of time because of the reduced renewal period. In general, impacts to vegetation during the shorter time period evaluated under this alternative would be the same as those for that same portion of the 30-year renewal period.

Impacts associated with the existence of TAPS facilities would occur under the less-than-30-year renewal alternative. While the initial loss and alteration of vegetation communities would persist throughout the renewal period, vegetation established under past revegetation efforts within the ROW and other disturbed areas would continue to increase in cover and diversity of species. However, by the end of the less-than-30-year renewal period, the distribution and abundance of native species in these areas, the establishment of vegetation on poorly vegetated sites, and the development of natural communities would generally not reach the levels expected by the end of the 30-year renewal period.

Sedimentation impacts caused by erosion of the ROW may also occur under the less-than-30-year renewal alternative and may result in the degradation of wetland and terrestrial plant communities downgradient of the ROW. However, these events are expected to be very infrequent, and fewer such events would likely occur under a less-than-30-year renewal period than under the proposed action. The development of temporary impoundments because of the blockage of surface water crossings of the ROW, and subsequent impacts to terrestrial and wetland vegetation communities, would also be expected to be fewer under this alternative than under the proposed action. However, the frequency of occurrence of erosion and blockage events would be similar to that under the proposed action.

Impacts associated with the normal operation, monitoring, and maintenance of TAPS facilities would occur under the less-than-30-year renewal alternative. Normal operations and monitoring activities would be similar to those of the past and would not differ from those of the proposed action. Therefore, as under the proposed action, these activities would result in negligible additional impacts to vegetation.

Deposition of airborne dust generated by vehicle traffic along the Dalton Highway would be expected to occur at levels similar to current levels and those anticipated for the proposed action. Adverse impacts to vegetation would be expected to continue in reduced vegetation growth and altered species composition of affected communities. Communities along the Dalton Highway would thus remain in a disturbed condition.

Ground-disturbing activities related to routine maintenance, such as excavation and grading within the ROW, would be similar to those under the proposed action. These activities would include the removal of vegetation, primarily within the ROW, and subsequent restoration efforts. As under the proposed action, wetland areas within the ROW may be filled and wetlands may be temporarily drained or subject to sedimentation, and maintenance of slopes outside the ROW may result in the disturbance of previously undisturbed vegetation. Excavations for corrosion repairs are expected to increase over time, from about 15 per year at the start of the renewal period to possibly about 20 per year under the proposed action. Therefore, under a less-than-30-year renewal period, the average number of excavations per year may be fewer than under the proposed action. Impacts to vegetation from maintenance and repair of the buried gas line would be similar to those under the proposed action; annual levels of disturbance are expected to remain steady (several hundred feet per year).

Activities related to the vegetation management program and revegetation program would continue to be a part of routine maintenance. As under the proposed action, the control or brushing of woody species would maintain plant communities in portions of the ROW in early successional stages, although native shrubs would continue to increase in tundra areas.

Preventive maintenance and remedial measures would be expected to occur under the less-than-30-year renewal alternative at levels similar to the proposed action. These activities would include the placement of riprap in stream channels or along banks; construction of guidebanks, revetments, and new spurs; or stream channel stabilization. These may result in adverse impacts to terrestrial and wetland vegetation communities; however, impacts would be similar to those expected under the proposed action.

The expansion of material sites or development of new material sites would be expected under this alternative; however, the total demand for materials would likely be lower than that under the proposed action. The resulting impacts to terrestrial and wetland vegetation may include the removal of previously undisturbed communities within the sites, or alteration of adjacent or downstream communities from changes in drainage patterns or sedimentation.

4.5.2.16 Fish

Most of the potential impacts to fish from routine use of the TAPS (Section 4.3.16) are continuous impacts that would be ongoing during any period that the TAPS was in operation. As a consequence, it is anticipated that the impacts during a renewal period shorter than 30 years would not differ substantially from those described for the 30-year renewal period in Section 4.3.16.

Habitat alteration impacts caused by maintenance activities, erosion, and thermal irregularities at pipeline crossings and in floodplain areas (Section 4.3.16.1) would be expected to continue during any period of TAPS operation and would not be expected to have significant effects on fish populations as long as monitoring and regulatory mechanisms remain in place. Similarly, blockage of fish at stream crossings because of vehicular traffic, deterioration or improper maintenance of culverts and low-water crossings, or water withdrawals is not expected to be affected by a shorter renewal period for the ROW.

Impacts to fish from increased human access are a function not only of providing access points (e.g., maintenance roads and stream crossings) from which fish populations can be exploited, but also are a function of the size of the human population and societal pressures for people to utilize fish resources. Although the number and locations of access

points to fish populations would not differ greatly over the course of the proposed 30-year renewal period or over a shorter renewal period, it is possible that the size of the human population and the pressures for people to utilize fish resources could differ in a nonlinear fashion over time. In the past, maintenance of fish of desired sizes and at desired population levels has been largely accomplished through regulations established by the Alaska Board of Fish and enforced by the ADF&G. As a consequence, it is anticipated that for a shorter renewal period, the impacts of increased human access to fish populations would be minor and would not differ substantially from those anticipated for the proposed action.

Spills resulting from human error are not considered to be time-dependent and, therefore, under a shorter renewal period would be expected to have impacts similar to those analyzed for a 30-year renewal period (Section 4.2.5). However, as discussed in Section 4.2.5, there would be a slightly reduced probability of occurrence for some spill scenarios, especially the larger spills, if the renewal period was for less than 30 years. This conclusion is based on the facts that some of the factors involved in equipment failure are time-dependent and the throughput of oil for the TAPS is projected to change over time. As a consequence, there would be a slightly decreased probability of a major oil spill (e.g., those scenarios described as unlikely or very unlikely to occur in Section 4.4.1) if the renewal period was shorter. If a large spill of crude oil was released into a freshwater environment or into Prince William Sound, the impacts (as described in Section 4.4.4.10) would be the same regardless of the length of the renewal period.

4.5.2.17 Birds and Terrestrial Mammals

Impacts to birds and terrestrial mammals from normal operation, monitoring, and maintenance of TAPS under a less-than-30-year renewal alternative would be similar to those for the proposed 30-year renewal period (Section 4.3.17).

The number of excavations per year for corrosion repairs would be less in the short term (i.e., about 15 per year), but could increase to 20 per year by the year 2034 (TAPS Owners 2001a). Therefore, under the less-than-30-year renewal alternative, the average number of yearly excavations for corrosion control would be less than for the proposed action. Assuming that the size of corrosion digs averages 50 by 200 ft, the extra five digs per year would only temporarily disturb a little more than 1.1 acres of habitat.

Similarly, yearly excavations for cathodic protection might increase in the later portion of the proposed 30-year renewal. However, less than 5 mi of pipeline is expected to require repair to cathodic protection systems over the 30-year period (TAPS Owners 2001a). In most cases, these repairs would involve excavations similar to those performed for corrosion repairs. The difference in temporary habitat loss per year for the less-than-30-year renewal alternative compared with the proposed 30-year renewal would be negligible (e.g., yearly differences would likely be within the same order of magnitude).

The presence of workers would also cause localized, short-term disturbance and displacement of wildlife from the work sites. However, the yearly difference between the two alternatives would be considered negligible (e.g., differences would likely be within the same order of magnitude) because of the limited area and relatively short amount of time required for each maintenance activity.

The potential for oil spills to occur over the less-than-30-year renewal period would be proportionately less than for the proposed 30-year renewal period because of the shorter period of pipeline operation. On the basis of information presented in Section 4.5.1.2, the spill volume for a guillotine break would decrease as throughput decreases, while the volume of a spill for a small, not easily detected leak could be higher if it occurred in a slack-line area. However, the relative importance of these differences between the alternatives would be low (Table 4.5-1). Therefore, potential impacts from an oil spill to birds and terrestrial mammals for the less-than-30-year renewal alternative would be considered the same as those

presented for the proposed action (Section 4.4.4.11), although not as likely to occur.

4.5.2.18 Threatened, Endangered, and Protected Species

The characteristics and magnitudes of impacts of the less-than-30-year alternative on threatened, endangered, and protected species would be similar to those of the proposed action (see Section 4.3.18). This similarity results from the nature of TAPS operations, monitoring, and maintenance activities, which are for the most part independent of the length of the renewal period. TAPS operations, maintenance, and monitoring activities and their associated impacts are ongoing and, aside from spills, occur at a relatively constant rate.

If, at the end of the less-than-30-year renewal period, a decision was made to terminate TAPS, the impacts of this alternative on threatened and endangered species would be less than the proposed action. Any reduction in impact resulting from a shorter renewal period would be very small. The probability of a large spill also would decrease with a shorter renewal period. The probability of such a spill occurring is already very small under the proposed action, and this difference in probability does not provide a meaningful discriminator between the two alternatives.

4.5.2.19 Economics

The economic impacts of renewing the Federal Grant for less than 30 years would differ from those expected to occur during the corresponding years of a 30-year renewal (see Section 4.3.19). The difference would result from the impact that a less-than-30-year renewal period would have on oil company investment decisions for new North Slope production. Because of the high cost of oil field exploration and development, a fairly long production period is required to recover the substantial initial cost of North Slope petroleum projects. With a renewal period shorter than 30 years, investment in new North Slope production and the TAPS throughput level would be reduced as a result of the riskier business environment in which oil companies would be operating (Goldsmith 2002).

Private investment programs at the local and state levels are often only possible with modest and predictable growth in economic activity over a fairly long period. In the absence of these conditions, many private investment programs would be less likely to be funded, thus, affecting many areas of the local and state economy. Long-term, fairly predictable economic growth in Alaska has produced some degree of economic diversification in the state, resulting in less dependence on oil and gas as the primary source of growth and development. While industries such as seafood, tourism, and air cargo would continue to provide alternative sources of growth, a shorter renewal period would likely reduce the prospect of further diversification by creating a riskier business investment climate. This condition would result in less predictable employment prospects, slower income growth, and slower growth in population.

Public-sector investment and expenditure programs also rely on stable and predictable growth in tax revenues over a fairly long period. To be cost effective, many state and local programs requiring a considerable commitment of funds in the initial stages of development require a fairly long operating period. A shorter renewal period would reduce the flow of funds into state and local governments, thereby reducing their ability to implement a wide range of programs requiring longer operating lives. This situation would especially be the case in the pipeline corridor region, where public expenditures and investment programs are closely related to the size and duration of oil-related tax revenues.

Compared with the 30-year renewal period, renewal for less than 30 years would have adverse impacts on the local, state, and national economies. However, because the length of a shorter renewal period has not been specified, the difference between the impacts of the 30-year renewal and shorter renewal period cannot be determined. The magnitudes of the impacts of the shorter renewal period would be between those of renewal for 30 years and those of nonrenewal. Compared with the 30-year

renewal, at the state and local level a shorter renewal period would reduce growth rates in population, gross state product, employment, and income and would reduce tax revenues from North Slope production, increasing annual state budget deficits. At the national level, lost oil production resulting from a shorter renewal period would adversely affect domestic oil production, national energy security, balance of trade, and overall economic activity.

4.5.2.20 Subsistence

The assessment presented in Section 4.3.20 for impacts to subsistence under the proposed action concluded that any negative impacts on subsistence would likely be very small. The evaluation of impacts for a renewal of less than 30 years leads to a similar conclusion that any negative impacts on subsistence for a shorter renewal period would be very small, in all probability smaller than those under the proposed action.

The evaluation of the less-than-30-year renewal alternative considered the same potential effects as were considered under the proposed action (Section 4.3.20). The conclusions drawn for the proposed action rest on two considerations concerning impacts of the TAPS that also are pertinent here for a shorter renewal period:

- Limited access to (very small) parts of certain traditional subsistence harvest areas; and
- The continued use of the Dalton Highway to maintain TAPS operations along with the continued use of various access roads and airspace over the TAPS, and continued human activity around the TAPS — possibly disrupting the movement of small numbers of terrestrial mammals.

If the Federal Grant for the TAPS ROW was renewed for less than 30 years, both of these potential impacts likely would be less than was anticipated for the proposed action.

4.5.2.21 Sociocultural Systems

As discussed in Section 4.3.21, impacts to Alaska Native and rural non-Native sociocultural systems anticipated under the proposed action in a sense are expected to accumulate over time with continued modernization in Alaska. The oil industry has been central to this modernization over the past three decades, and because of the importance of the TAPS to Alaskan oil production, modernization ultimately is linked inextricably to the pipeline system. Renewing the Federal Grant for less than 30 years would likely yield sociocultural impacts less in magnitude than those anticipated under the proposed action, because the changes that surround Alaska Native and rural non-Native sociocultural systems would have accumulated to a lesser degree than they would have over the full 30-year period. Certain complicating factors make it impossible to determine precisely how much less in magnitude the impacts would be, and if the change would be in impacts related specifically to the TAPS.

Identifying and measuring variables precisely in sociocultural systems is difficult. First, the variables of potential interest are often qualitative (beliefs, behavioral patterns, etc.) and difficult to gauge or evaluate in terms of levels at a particular point in time and rate of change over time. Second, the contribution to modernization in Alaska by the TAPS (as opposed to other sources) is unclear, as it is under the proposed action. That is to say, although modernization in Alaska is clearly linked to the oil industry, and by extension to the TAPS, many changes occur by way of indirect economic development or changes brought about by this indirect development. Attributing a precise proportion of modernization, assumed to be a major vehicle of sociocultural change, to the TAPS under a 30-year renewal or a renewal of less than 30 years is a very uncertain process. Third, the nature of the rate of impact accumulation is unclear. For example, it is unclear if sociocultural change caused by a TAPS ROW grant renewal is constant or occurs in a different manner over time — perhaps more slowly earlier

and more rapidly as changes in surrounding lifestyles accumulate (or vice versa).

Finally, the discussions and treatment of sociocultural impacts have, in a sense, dealt with sociocultural *systems* as a single sort of entity, when in fact there are several systems to deal with in the vicinity of the TAPS. Although there is a clear distinction between Alaska Native and non-Native sociocultural systems, there are also key differences among the various Native sociocultural systems. The impacts of the TAPS on one sociocultural system may differ considerably from its impacts on another, as may the accumulations on rates of change. As discussed in Section 3.25, all of the sociocultural systems considered in this EIS have changed considerably over the past century.

Some impacts to Alaska Native and rural non-Native sociocultural systems are anticipated under a ROW grant renewal of less than 30 years. Certain impacts possibly associated with modernization would be positive, such as access to improved health care, modern education, and other public services and programs on which rural sociocultural systems in Alaska have come to rely. Other impacts possibly in some way associated with modernization would be negative; increased substance abuse, high suicide rates, and social disruption accompanying increased participation in wage labor are examples discussed for the proposed action. In all cases, these changes appear to be linked to continued exposure to outside influences, growing importance of a cash economy, and increased integration into a modern market-based Euro-American society of people who, until the second half of the 20th century, often were largely isolated from continuous outside influence. The magnitude of sociocultural impacts would likely increase with time — that is, the impacts to sociocultural systems from a 25-year renewal likely would be greater than the impacts from a 15-year renewal. When all considerations are weighed, impacts to Alaska Native and rural non-Native sociocultural systems under a less-than-30-year alternative probably would be negative but very small.

4.5.2.22 Cultural Resources

The impacts associated with the less-than-30-year renewal alternative would be the same as those described for the proposed action (see Section 4.3.22). Adverse effects on known cultural resources are possible regardless of the length of the renewal period. Mitigation of the adverse effects is possible and would be determined on a case-by-case basis through consultation with the Alaska SHPO and any affected Alaska Native Tribes, as appropriate.

4.5.2.23 Land Uses and Coastal Zone Management

4.5.2.23.1 Land Use. The effects on land use or ownership under the less-than-30-year renewal alternative would not differ from those for the proposed action (Section 4.3.23.1). Some effects on federal, state, and private land use or ownership would likely occur, regardless of the length of renewal. None of the impacting factors associated with renewal of the ROW or the effects that could potentially result would be time dependent.

4.5.2.23.2 Coastal Zone Management. The effects on coastal zone under the less-than-30-year renewal alternative would be the same as those of the proposed action (Section 4.3.23.2). The TAPS has been a permitted activity consistent with both the North Slope Borough and Valdez CMPs and in compliance with enforceable policies in both CMPs. The TAPS has also been a coastal zone development activity consistent with applicable ACMP statewide standards. On September 10, 2002, ADGC determined that the TAPS Owner's application was consistent with applicable CMPs. In addition, the BLM notified the TAPS Owners on October 14, 2002, that the consistency requirement had been satisfied by the state determination.

4.5.2.24 Recreation, Wilderness, and Aesthetics

4.5.2.24.1 Recreation. The effects on recreation resources from renewal of the Federal Grant for less than 30 years would not differ from those for the proposed action (Section 4.3.24.1). Some effects on recreation are likely on federal or state lands in the vicinity of the pipeline, regardless of the length of renewal, but would last for a shorter period.

4.5.2.24.2 Wilderness. The effects on wilderness from renewal of the Federal Grant for less than 30 years would be the same as those for the proposed action (Section 4.3.24.2). The currently existing indirect effects on wilderness would likely continue, regardless of the length of renewal. The potential for direct or indirect effects from a large volume spill would remain (Section 4.4.4.18); however, the risk would be less with a shorter time period.

4.5.2.24.3 Aesthetics. The effects on aesthetics from renewal of the grant for less than 30 years would not differ from those of the proposed action (Section 4.3.24.3). Localized impacts to visual resources would be expected to continue as long as the TAPS is in place.

4.5.2.25 Environmental Justice

Evaluations of anticipated environmental consequences under a grant renewal of less than 30 years do not identify any impacts under normal operating conditions that could be considered high and adverse (see Table 2.1). In the absence of such impacts, no environmental justice impacts are expected, regardless of the presence of disproportionately high percentages of minority and low-income populations in areas that might experience effects from the TAPS (see Section 3.29).

4.6 No-Action Alternative Analysis

4.6.1 Summary Description of the No-Action Alternative

4.6.1.1 Description of Termination Activities and Long-Term Restoration of the TAPS ROW

The no-action alternative represents a decision not to renew the Federal Grant of ROW for the TAPS. Operation of the pipeline would cease, and termination activities would be instituted. Termination activities are generally defined as the dismantlement and removal of the TAPS and the initial restoration of the TAPS ROW. Termination would be followed by activities for long-term-restoration of the ROW. No specific plans or designs for termination activities currently exist, they would have to be developed before specific actions could be taken. Any decision on how termination would occur would be subject to further NEPA analysis of the available options. For purposes of impact analysis, however, experiences during the construction and operation of the TAPS and the policies and stipulations of the BLM and the State of Alaska can be used as the bases for the following broad assumptions regarding termination activities:

- All stipulations and regulations applicable to the TAPS, the TAPS ROW, and associated facilities and activities would be met.
- No new facilities would be constructed for termination activities.
- Existing transportation means (e.g., air strips, roads, railways, and ports) would be used to support the termination activities. The most likely port facilities for use in termination activities would be Valdez, Whittier, and Seward.
- All aboveground sections of the pipeline, valves, and their supporting structures would be removed to a depth of 1 ft below the existing grade or to the existing grade and covered with 2 ft of fill material.
- Pump stations would be used as work camps and staging areas for termination activities.
- Gravel pads and currently disturbed surface soils (e.g., access roads and workpads) would be left in place and restored to the extent possible by methods such as contouring and hydroseeding, subject to AO and SPC approval.
- Culverts and stream crossings would be removed and regraded. All other stream or river structures would remain in place.
- Belowground pipeline components would be cleared and cleaned of oil and residues, capped, and left in place in those sections where they would not interfere with other termination activities or planned land uses.
- Residual, surplus, and scrap materials would be reused or recycled to the extent possible, and waste materials would be disposed of in accordance with applicable regulations.
- Soil, water, and air resources would be protected in accordance with applicable regulations (e.g., storm-water controls and fugitive dust controls would be implemented).
- The Valdez Marine Terminal would be removed, and the area would be converted for other uses.
- Modification to the TAPS, the TAPS ROW, and associated facilities before current operations cease would be limited to routine maintenance and those changes required by stipulations and regulations.

It is estimated, on the basis of the time required to construct the TAPS and effort involved in common construction practices, that the termination activities would require about 6 years to complete. (Monitoring and maintenance in restored areas would continue

for an extended period as follow-on actions.) Years 1 and 2 of termination activities would be devoted primarily to planning and design, with some limited preparatory field activities (e.g., preparing staging areas). The next 3 years (Years 3, 4, and 5) would involve dismantlement and removal of the TAPS and the Valdez Marine Terminal (beginning with purging and cleaning of the pipeline in Year 3) and initial restoration of the ROW. The final year (Year 6) would be used to close out the dismantlement and removal operations, to restore any remaining land areas, and to demobilize the remaining termination labor force. The restoration process would continue as a follow-on action for many years after termination was complete. Other follow-on activities would include monitoring and maintenance of any mitigation measures.

The termination activities would occur concurrently over various sections of the TAPS. No one area would be disturbed longer than needed to complete termination activities within that area. Access within the TAPS ROW would continue to be limited in areas where termination activities were in progress.

It is assumed that the TAPS would continue to operate until the end of the current ROW grant in 2004. It is further assumed that the planning and design for termination activities would begin following a decision not to renew the current TAPS ROW. Therefore, the actual beginning of dismantlement and removal would occur after Federal Grant termination in 2004. This timing would place the completion of termination activities in the year 2007 or beyond. The phases and possible time periods of the termination activities are summarized in Table 4.6-1.

4.6.1.2 Spill Scenarios under the No-Action Alternative

In assessing spill impacts for the no-action alternative, it was assumed that the pipeline and marine transportation aboveground facilities related to the TAPS would be removed during a 6-year termination period over four phases (see Table 4.6-2). During that time, major activities would involve the physical removal of equipment and subsequent transportation to disposal sites. The first phase of termination (Years 1 and 2) is for planning and design; therefore, the annual frequency of an oil spill would be the same as that under normal operations, as discussed for the proposed action, and is not repeated in this section. Phase 2 of termination would involve the cessation of the oil supply from the North Slope and the purging of the remaining crude oil from the pipeline. This would be implemented, by using kerosene as a solvent to clean the pipe of crude oil residue and then by using seawater with additives as a final wash. The kerosene would be transported to Prudhoe Bay for later injection into the TAPS. Although the shipments would take several months, the actual pipeline purge process is estimated to take less than 1 month. The final purge would be with seawater.

TABLE 4.6-1 Possible Durations of Termination Activities and Long-Term Restoration under the No-Action Alternative

Year	Phase	Description	Possible Dates
1	1	Planning and design	2002–2003
2	1	Planning and design	2003–2004
3	2	Purging and cleaning	2004
3	3	Dismantlement, removal, and restoration	2004–2005
4	3	Dismantlement, removal, and restoration	2005–2006
5	3	Dismantlement, removal, and restoration	2006–2007
6	4	Demobilization, closeout, and end of termination activities	2007–2008
Beyond Year 6		Follow-on restoration, mitigation, monitoring, and maintenance	2009 and beyond

TABLE 4.6-2 Summary of Spill Scenarios for the No-Action Alternative

Scenario No.	Scenario Description	Location	Estimated Frequency (1/year)	Frequency Range: Anticipated (>0.5/yr)	Likely (0.03 to 0.5/yr)	Unlikely (10^{-4} to 0.03/yr)	Very Unlikely (10^{-6} to 10^{-4}/yr)	Release (spill): Chemical Form	Spill Volume (gal)	Release Duration	Release Point
Spill Scenario during Cleaning and Purging Stage of Termination (Phase 2: Year 3)											
1	*Tanker truck transport rollover:* Spill caused by a tanker truck overturning	On the road between the North Pole Refinery and Prudhoe Bay	7.8	X				Kerosene	8,000	Instan-taneous	Above ground, on land
Pipeline Spill Scenarios during Three-Year Demolition Stage of Termination (Phase 3: Years 3 to 5)											
2	*Tanker truck transport rollover:* Spill caused by a tanker truck overturning.	Generally, somewhere on the haul road	6.2×10^{-1}	X				Diesel fuel	3,000	Instan-taneous	Above ground, on land
3	*Fuel handling:* Spill caused by tank overfill, due to worker negligence or inattention.	Pump stations and/or camps where the fuel is stored.	1.8	X				Diesel fuel	250	Instan-taneous	Above ground, on land
4	*Fuel distribution:* Spill caused by failures of shutoff valves, fittings, etc., in storage facilities, distribution lines, and fuel trucks.	Pump stations and/or camps where the fuel is stored.	7.3	X				Diesel fuel	20	Instan-taneous	Above ground, on land
5	*Demolition Activity:* Spills caused during demolition, such as a bulldozer breaking a fuel line or a oil barrel falling off a moving truck)	Near the workpad.	1.2×10^{1}	X				Diesel fuel	50	Instan-taneous	Above ground, on land

TABLE 4.6-2 (Cont.)

Scenario No.	Scenario Description	Location	Estimated Frequency (1/year)	Frequency Range: Anticipated (>0.5/yr)	Likely (0.03 to 0.5/yr)	Unlikely (10^{-4} to 0.03/yr)	Very Unlikely (10^{-6} to 10^{-4}/yr)	Release (spill): Chemical Form	Spill Volume (gal)	Release Duration	Release Point
6	*Construction Equipment Failures:* Caused by mechanical failures of fuel lines, gaskets, hydraulic hoses, etc., of heavy equipment and vehicles.	Near the workpad	1.4×10^{1}	X				Diesel fuel	50	Instan-taneous	Above ground, on land
Transportation Spill Scenarios during Three-Year Demolition Stage of Termination (Phase 3: Years 3 to 5)											
7	*Rail transport:* Diesel fuel spill during routine transport operations	Option 1 – Scrap material transport to Seward (rail)	6.8×10^{-1}	X				Diesel fuel	162	Instan-taneous	Above ground, on land
8	*Rail transport:* Diesel fuel spill during *routine transport* operations	Option 2 – Scrap material transport to Whittier (rail)	6.1×10^{-1}	X				Diesel fuel	162	Instan-taneous	Above ground, on land
9	*Rail transport:* Engine lube oil spill during routine transport operations	Option 1 – Scrap material transport to Seward (rail)	4.2×10^{-1}		X			Engine lube oil	14	Instan-taneous	Above ground, on land
10	*Rail transport:* Engine lube oil spill during routine transport operations	Option 2 – Scrap material transport to Whittier (rail)	3.8×10^{-1}		X			Engine lube oil	14	Instan-taneous	Above ground, on land
11	*Rail transport:* Hydraulic oil spill during routine transport operations	Option 1 – Scrap material transport to Seward (rail)	6.5×10^{-1}	X				Hydraulic oil	26	Instan-taneous	Above ground, on land
12	*Rail transport:* Hydraulic oil spill during routine transport operations	Option 2 - Scrap material transport to Whittier (rail)	5.8×10^{-1}	X				Hydraulic oil	26	Instan-taneous	Above ground, on land

Although no pipeline kerosene or seawater spill events would be credibly foreseeable, a transportation spill from tanker truck shipments of kerosene from the North Pole Refinery to Prudhoe Bay would be an anticipated spill. The termination activities conducted during Phase 3 would take around three years and could involve a variety of possible petroleum spills to the environment.

Possible spill events during all four phases of pipeline termination were evaluated. Since no segment of the pipeline has ever been subject to termination activities, no record of spill events was available for review. However, because termination would essentially be a large-scale construction project in reverse (TAPS Owners 2001a), the construction period for the pipeline was used as a surrogate for developing spill scenarios. Data from the environmental surveillance of the TAPS during construction were used to develop a representative set of spill scenarios for termination of the pipeline. The only activities meeting the screening criteria for credible events identified in Section 4.4.1 were those that would be planned for Phases 2 and 3 of termination. Spill scenarios were developed for purging and cleaning and demolition activities that would occur starting in 2004 (the expiration year for the current Federal Grant of ROW) and ending in 2007. All the developed termination activity spill scenarios have frequencies that would characterize these events as “anticipated” or “likely” occurrences. None are considered to have “unlikely” or “very unlikely” frequencies as defined in Table 4.6-2. This is consistent with available published EISs covering the termination of oil and gas pipelines that have not addressed unlikely or extremely unlikely spills. Data were considered on activities prior to initiating crude oil pipeline transport, in addition to the use of these materials during TAPS facility operations. Similarly for spills under the proposed action, the analysis of termination-related spills under the no-action alternative considered spills of crude oil and refined petroleum products (e.g., gasoline, diesel fuel, and turbine fuel). Other specific materials that were known to be required for carrying out termination activities or incidentally used during those activities were also factored into the spills analysis. This included the need for and the projected use of kerosene and various fuels during termination activities, the large amounts of kerosene needed for purging and cleaning the pipeline, and various hydraulic and lubricating oils.

Table 4.6-2 summarizes the 12 TAPS termination-related spill scenarios considered in this FEIS. Scenario 1 covers the period during the cessation of product flow and system washout (i.e., cleaning and purging stage). Scenarios 2 through 5 pertain to the removal of aboveground facilities (i.e., demolition stage). The table provides (1) a brief description of each spill scenario, (2) best estimate of frequency, (3) frequency range, (4) description of the material spilled (chemical form), (4) spill volume, (5) release duration, and (6) release point (above or belowground). The given spill scenario frequencies are specific to the entire length (i.e., 800 mi) of pipeline during the termination period. Frequencies were computed for each pipeline scenario, and each scenario was assigned a likelihood category with the specific assigned frequencies and frequency ranges given in Table 4.6-2. The assigned frequencies were estimated on the basis of TAPS construction statistics that were weighted by the ratio of the amount of diesel fuel that would be used during TAPS termination to the amount that was used during TAPS construction. For all 12 spill scenarios, it is estimated that the release would occur very quickly, with a duration on the order of 1 hour or less. Such quick releases are designated as instantaneous releases. All spill scenarios represent aboveground land-based events. Ten of the 12 termination spills evaluated would be attributable to human error. The remaining two, Scenarios 4 and 6, would be caused by equipment failure.

An estimated volume of over 7 million gal of kerosene needed for pipeline purging and cleaning would be shipped to the North Slope by liquid kerosene tanker trucks. A total of over 900 shipments in 8,000-gal bulk containers would be needed. The largest spill (Scenario 1) analyzed would be caused by human error, which would result in an accident involving a fuel truck carrying kerosene from the Williams North Pole Refinery to Prudhoe Bay. The truck veers off the highway, overturns, and spills the solvent on the ground. With a truck accident frequency of about eight per year, a spill involving

8,000 gal of kerosene would be anticipated. The spill would be projected to occur on an approximately 450-mi stretch of highway connecting the refinery and North Slope. In addition to the kerosene highway transportation spill, a total of 11 other credible spill events are possible for termination activities conducted during Phase 3. Seven are due to transportation vehicle accidents, two from fuel handling and distribution, and one during demolition activities. One of the remaining transportation spills (Scenario 2) involves a highway diesel oil spill from a haul road tank wagon rollover. The six other transportation events involve rail shipments of pipeline scrap material to either Seward or Whittier, Alaska. These spills would involve relatively small quantities of diesel fuel (around 160 gal), hydraulic oil (less than 15 gal), and engine lubricating oil (less than 30 gal). The spills would occur near the rail track and would have frequencies of either an anticipated or likely event, on the basis of examination of historical Alaska rail accidents (Alaska Railroad 2002).

The fuel handling accident (Scenario 3) would be caused by worker distraction or negligence. The error causes a tank to overfill, resulting in a spill of 250 gal of diesel oil. The event presumably occurs at a pump station and/or camp where the fuel is stored. The event frequency is 7.4 per year. The remaining human error initiated spill (Scenario 5) occurs during demolition activities involving a bulldozer breaking a fuel line or an oil barrel falling off a moving truck, resulting in a 50-gal diesel fuel spill. The spill event presumably occurs near a work pad with a relatively high event frequency of 50 per year.

The last two termination activity scenarios (Scenarios 4 and 6) are due to an indirect human initiator. These include one spill involving equipment failure and one involving fuel handling or distribution. The equipment failure spill (Scenario 4) is caused by a mechanical failure in a fuel line, gasket, or hydraulic hose connection with heavy equipment on a workpad. As in Scenario 3, the fuel handling accident, Scenario 4 also presumably occurs at a pump station and/or camp where the diesel fuel is stored. This event, however, involves a spill of only 20 gal of fuel, but with a likelihood that would be over a factor of 3 greater than the tank overflow spill (Scenario 3). The construction equipment failure spill event (Scenario 6) would be caused by failures of shutoff valves or fittings in storage facilities, or distribution lines or fuel trucks. This event would presumably occur near a workpad and would also have a relatively small spill size of around 50 gal of diesel fuel. The estimated frequency of this event is very high, over 50 per year.

Catastrophic spill scenarios of the type assessed for the proposed action alternative were also considered to be extremely rare and, therefore, were screened from further analysis as incredible events.

4.6.2 Impact Analysis of the No-Action Alternative

4.6.2.1 Physiography and Geology

Under the no-action alternative, the physiography along the TAPS ROW would not be altered. Thus, this alternative would have no impact on physiography during the entire extent of termination activities.

Impacts of No-Action Alternative on Physiography and Geology

During the first two years of preparatory work for termination activities, the impact on geological resources would not be changed measurably from that expected for the proposed action. The dismantlement and removal of the TAPS would cause minor change in geological processes and in the removal of geologic material along the TAPS ROW.

The impact on geology during the first two years of termination activities would be comparable to those of the proposed action. During that initial period, the activities in the field would be limited to minor preparatory work and regular maintenance. The preparatory activities in the field would not be expected to disturb the ground surface. Geologic material removed from

TAPS facilities would be used for regular maintenance. The geological processes along the TAPS would not be changed measurably.

During the dismantlement and removal of the TAPS, some activities — such as dismantling the aboveground pipeline, pump stations, and Valdez Marine Terminal; contouring pump station gravel pads and access roads; and contouring the terminal pad and access roads — would involve movements of heavy equipment and disturbance of the ground surface. These activities would increase soil erosion locally along the aboveground pipelines, pump stations, and Valdez Marine Terminal. The impacts would be minor and localized.

4.6.2.2 Soils and Permafrost

During the preparatory phase (Years 1 and 2) of termination activities, the slopes, VSMs, and workpads would be maintained as usual (TAPS Owners 2001a) and preparatory work in the field would be minimal. Excavations for rerouting pipeline, corrosion digs, replacing valves, repairing buried pipe, and refurbishing pipeline coating would continue as part of routine maintenance for the TAPS. The impacts on the soils and permafrost would be about the same as those from the proposed action, and the affected areas would also be the same. The impacts would be local and small.

During the actual dismantlement and removal of TAPS (Years 3 through 5), heavy equipment would be used along the aboveground portions of the pipeline. The pump stations would be used as staging areas. The traffic involved with moving heavy equipment along the TAPS ROW, the dismantlement operations to remove aboveground structures, and regrading would destroy previously stabilized local vegetation (also see Section 4.6.2.15). These activities would also affect the soils and degrade previously stabilized permafrost, thereby producing soil compaction, soil erosion, siltation, altered soil hydrology, ponding, thermokarst, and slope stability problems. Best management practices would be used, including installing silt fences, settling basins, and water bars. Water bars are 2- to 3-ft high, diagonal ridges built of dirt on sloped ground intended to slow runoff water and direct it to areas of soil that are not bare, thereby reducing surface soil erosion (West Virginia University Extension Service 2002). Additional practices should be used to minimize disturbance of vegetative cover. The extent of the impacts would likely be local, limited to areas adjacent to the aboveground portions of the pipeline and access roads.

The area of land that would be disturbed is estimated to be 4,525 acres, including the aboveground pipeline workpad (3,151 acres), access roads (534 acres), stream banks and valve sites (190 acres), gravel pads at pump stations (300 acres), and the Valdez Marine Terminal site (350 acres) (Folga et al. 2002). The disturbed land is expected to be rehabilitated by regrading and, if necessary, reseeding. The regrading activities would temporarily increase soil erosion and siltation in nearby water bodies. Because most of the aboveground pipeline is located in permafrost-unstable areas that may have reached thermal equilibrium after 25 years of operation, the dismantlement and removal of TAPS would

Impacts of No-Action Alternative on Soils and Permafrost

During the preparatory phase of termination, the impacts on soils and permafrost would be about the same as those from the proposed action – local and small. During TAPS dismantlement and removal, impacts would likely be local, limited to areas adjacent to aboveground portions of the pipeline and access roads. The area of land that would be disturbed is estimated to be 4,525 acres. Restoration of the disturbed land would involve regrading and, if necessary, reseeding. The regrading would temporarily increase soil erosion and siltation in nearby water bodies. In addition, the dismantlement and removal of TAPS components would redisturb the thermal regime of the surface soil. With time, the belowground pipeline segments left in place would become corroded and collapse. Ground depressions might be created above such collapses. The potential impacts of spills on soils would be much smaller under the no-action alternative than under the proposed action.

redisturb the thermal regime of the surface soil. These areas would be exposed to lowering of the permafrost table, melting of ground ice, increased soil saturation, and possible surface ponding. Thermokarst topography may result.

After the crude oil stopped flowing, heat transfer from the warm oil in the belowground pipeline to its surroundings would cease. In permafrost areas, thaw bulbs that had originally formed around the pipeline would shrink, and permafrost would aggrade slowly. The aggradation would also be affected by the nature of soil materials and the magnitude of ground surface disturbance during the dismantlement. Permafrost aggradation generally would be much greater on the northern part of the pipeline. Frost heaving would occur in soils near the TAPS, especially in areas where fine-grained material was dominant in the subsurface and water was available.The aggradation and frost heaving processes would be reduced by the warming climate changes in Alaska. It is estimated that the impact on soils from the change of heat flow in the belowground pipeline would be local and minor.

With time, the belowground pipeline segments left in place would become corroded and collapse, likely after more than 30 years. Ground depressions might be created above such collapses. In areas where the groundwater table was shallow or surface drainage water collected, water might pond in the depressions. It is also possible that the deteriorating belowground pipeline would provide an additional conduit beside the surrounding gravel for groundwater movement.

Accidental spills and leaks could affect the environment. In the first two years under the no-action alternative, the potential impacts on the environment caused by spills would be the same as those for the proposed action (see Sections 4.3.2 and 4.4.4.1). Six spill scenarios are identified for the cleaning and purging and demolition stages (see Table 4.6-2).

The spills analyzed for the no-action alternative would involve kerosene and diesel fuel. Kerosene is volatile. If a spill of kerosene occurred, a substantial amount of it would evaporate into the air. Because the spill volumes would be much smaller and the products involved in the spills would be more volatile under the no-action alternative than under the proposed action, the potential impacts of spills on soils would be much smaller under the no-action alternative.

4.6.2.3 Seismicity

Seismicity-related issues of concern would be earthquake-triggered events that could threaten the integrity of the pipeline and storage facilities while they still contained oil, causing environmental contamination. Once the pipeline was drained of oil and cleaned and once storage facilities were removed (as outlined in TAPS Owners 2001a), the threat of TAPS-related spills caused by earthquakes would be eliminated.

4.6.2.4 Sand, Gravel, and Quarry Resources

Under the no-action alternative, the demand for sand, gravel, and quarry stones used to maintain the TAPS in the first 2 years of termination activities might be more than the annual requirement under the proposed action, but these materials would no longer be needed after the preparatory phase of the termination activities. Therefore, the impacts from removing these materials would be much smaller for the no-action alternative than for the proposed action.

The material sites may remain active after the TAPS termination and be used by the State of Alaska. Top soil resources may be required for revegetation of some disturbed areas, depending on site-specific conditions. (See Section 4.6.2.15 for additional information on revegetation.)

4.6.2.5 Paleontology

No adverse effects on paleontological resources are anticipated under the no-action alternative. Although 11 localities with paleontological resources have been found within a quarter mile of the ROW, and sections of the ROW closely parallel scientifically important fossil-bearing strata, no localities with paleontological resources are known to exist in

Impacts of No-Action Alternative on Paleontological Resources

No adverse effects on paleontological resources are anticipated under the no-action alternative, although ground disturbance during dismantlement might damage or obscure previously undiscovered, scientifically important paleontological resources.

the ROW and associated areas. Under Federal Grant Stipulation 1.9.2, APSC would have to immediately contact the JPO Authorized Officer and an archaeologist if any known or previously undiscovered paleontological resources were encountered during termination activities. Alaska's Historic Preservation Statute 41.35 also protects paleontological resources that might be encountered on state-administered land during termination. The likelihood of encountering paleontological resources is low because ground disturbance during termination activities would be limited largely to lands already disturbed during TAPS construction. Lesser, but still adverse, effects could include obscuring or damaging previously unknown paleontological resources during pipeline removal efforts. However, the absence of the pipeline would remove the need for continual ground-disturbing activities along the TAPS and associated areas, as well as eliminate the threat of an oil spill requiring cleanup activities, ultimately lessening the likelihood of adverse impacts to paleontological resources.

4.6.2.6 Surface Water Resources

Under the no-action alternative, fresh surface water resources along the TAPS ROW could be affected by activities associated with the termination activities — dismantling the pipeline system, removing the dismantled pieces, and restoring the area by contouring and hydroseeding. Accidental releases of oil or other materials would be possible during these processes. Cleaning and purging the pipeline would start in Year 3, after a 2-year planning period. Dismantling the pipeline, pump stations, and Valdez Marine Terminal, and disposing of scrap would occur during Years 3–5. Impacts during the first 2 years are assumed to be the same as those for the proposed action. It is assumed that the constraints described in Section 4.6.1.1 would apply during pipeline termination.

Relative to surface water resources, the main impacting factors of the termination would include water use along the ROW, digging to remove some underground components of the pipeline, removing segments of the aboveground pipeline and other aboveground facilities, spills, and other accidental releases. These impacting factors could:

- Modify rivers and streams by erosion, deposition, migration, and flow restriction;
- Create ponding and flooding;
- Drain and create thaw lakes;
- Degrade surface water quality;
- Reduce surface water resources;
- Spread surface contamination;
- Disturb permafrost;
- Change the number, size, and connectivity of thermokarsts along the ROW; and
- Remove geologic resources.

During the termination activities, the physical environment could also affect the TAPS. Impacting factors would include the following:

- Earthquakes;
- Glacial movements (surges and retreats);
- Solifluction (i.e., a slow-motion debris flow caused by seasonal freeze/thaw of the active layer interacting with the pull of gravity downslope);
- Mud flows;
- Increased permafrost temperatures resulting from general warming of Alaska; and
- Other hazards such as debris flows, landslides, rock falls, slumps, and floods.

Impacts of No-Action Alternative on Surface Water Resources

Direct impacts to surface water resources along the TAPS ROW for the no-action alternative could result from water use and spills. Groundwater wells along the ROW would not be able to provide all of the water needed for termination activities. For the peak year, about 500 gal/min of surface water would be needed. If withdrawn from a river such as the Tanana, which has a flow range of 110,000 to 450,000 gal/min, the withdrawals would be a small fraction of the water available. In addition, the withdrawals would be made under the guidelines of a permit, ensuring that the impacts on the quantity of surface water would not adversely affect the environment. During the termination process, impacts from spills would be the same as those for the proposed action until the oil is removed from the pipeline. Because many miles of river banks and beds could be coated with oil, the impacts could be large. Once the oil is removed from the pipeline, the most severe accident postulated would involve an 8,000-gal release of kerosene. Because evaporation of the spilled kerosene would limit the extent of contamination, impacts from this type of accident are considered to be minor.

Indirect impacts to surface water resources for the no-action alternative could occur by discharging water to the land, with subsequent runoff to nearby surface water bodies. The quality of the runoff water would be regulated under appropriate permits, and best management practices would be used to limit the quantities of contaminants leaving construction sites. Impacts to water quality would be similar to those that occurred during construction of the pipeline. These impacts would be local and temporary.

Impacts from these processes would be the same as those discussed previously for the proposed action (Section 4.3.6).

The water use anticipated for the termination activities is listed in Tables 4.6-3 (potable uses) and 4.6-4 (process uses). Most of the water use would occur during actual cleaning and purging of the pipeline; dismantling the pipeline, pump stations, and Valdez Marine Terminal; and disposing of scrap. The greatest use would occur in the third year of termination activities. Table 3.1-1 shows that the groundwater well system along the TAPS ROW could provide a total of about 277,000 gal/d of potable water. This quantity of water would be insufficient to meet the average demand during the third and fourth years of termination and would provide only about one-third of peak-day consumption (about 700,000 gal/d) during the third year. Additional water would probably be obtained from surface water resources by pumping it into tanker trucks and hauling it to the locations needed. An additional 5,000 gal/d of process water would be required for dust suppression and seeding and sodding (Table 4.6-4). This water also would be obtained from surface water resources and trucked, as needed. Because the amount of excess water needed for termination activities would be small (about 500 gal/min for the peak day during the third year) and would be withdrawn under the guidelines of a permit, impacts on the quantity of surface water would be negligible.

During termination activities, surface water quality could be affected by runoff from construction areas, and by surface spills and other accidental releases. Dismantling the pipeline and removing some buried pipeline sections adjacent to river training structures could increase the quantity of sediment in nearby water bodies. Removal activities would be regulated by the linewide NPDES, Wastewater General Permit, and the NPDES Permit for Storm Water Discharge from Construction Activities Associated with Industrial Activity discussed in Section 3.7.2.5 (Surface Water Quality along the ROW). Impacts from removal activities are expected to be temporary, particularly in high-sediment-load streams, because best management practices would be used. These practices could include installing settling basins and silt fences, keeping roads and machinery out of streams and floodplains, placing culverts at stream crossings, stabilizing disturbed stream banks, using dust suppression, and, as required, installing water bars. (See Section 4.6.2.2 for a definition of water bar.)

TABLE 4.6-3 Anticipated Potable Water Use during Termination Activities

Year	Average Day (gal/d)	Peak Day (gal/d)	Annual (gal)
1	23,000	31,000	4,700,000
2	55,000	74,000	14,000,000
3	520,000	700,000	130,000,000
4	330,000	450,000	80,000,000
5	190,000	260,000	48,000,000
6	56,000	75,000	14,000,000
Total	1,174,000	1,590,000	290,700,000

Source: Folga et al. (2002).

TABLE 4.6-4 Anticipated Process Water Use during Pipeline Dismantlement and Removal Phase (Years 3–5)

	Water Use (gal) by Location					
Activity	Southern Section[a]	Central Section[b]	Northern Section[c]	Valdez Marine Terminal	Total	Water per Acre (gal/acre)
Dust suppression	1,257,000	1,594,000	1,324,000	350,000	4,525,000	1,000
Seeding and sodding	269,000	323,000	132,000	350,000	1,074,000	1,000
Total	1,526,000	1,917,000	1,456,000	700,000	5,599,000	NA[d]
Annual use (for Years 3–5)	509,000	639,000	485,000	233,000	1,866,000	NA

[a] Southern Section refers to the section of the pipeline between MP 494 and 799.

[b] Central Section refers to the section of the pipeline between MP 244 and 493.

[c] Northern Section refers to the section of the pipeline between MP 0 and 243.

[d] NA = not applicable.

Source: Folga et al. (2002).

Activities involving removal of dismantled TAPS components during termination could also impact surface water quality by providing sources of contamination that could be mobilized by precipitation and transported overland to nearby water bodies. Possible contaminants would include fuels, lubricants, bitumens, organic compounds, hazardous construction material, and cleaning materials. The quality of the runoff water from the removal areas would be regulated by the above NPDES permits, and best management practices would again be used to limit the quantity of contaminants leaving the construction sites. Some possible best management practices include storing construction material away from nearby surface water bodies and their floodplains, covering construction materials to minimize interaction with rainfall, thoroughly cleaning up any spills as soon as they occur, placing fueling and vehicle

service areas away from nearby surface water bodies and berming the areas to minimize transport by runoff, and disposing of waste materials properly (USDA 2000). Impacts are expected to be local and temporary.

The no-action alternative could also result in some long-term impacts (in 20 or more years) on surface water resources. In areas where belowground portions of the pipeline were left in place, corrosion could cause a collapse of the pipeline and draining of adjacent wetlands as the breached pipe filled with water. The quantity of water that would be lost from the surface would depend on the length of the buried pipe that would fill with water. For a 1-mi section of pipe, about 1.5 acre-ft of water (1 acre of surface area covered by water to a depth of 1 ft) could be lost from the surface. The magnitude of this loss would be negligible compared with the quantity of water occurring along the TAPS ROW.

Spill scenarios have been proposed for the no-action alternative. These accidents are described in Table 4.6-2. All of the accidents would have an occurrence frequency of greater than 0.5/yr. In the most severe accident, a tanker truck carrying kerosene from the Williams North Pole Refinery to Prudhoe Bay would overturn, spilling 190 bbl (8,000 gal) of kerosene. Kerosene is a common type of fuel oil and is a crude-oil product. The release is assumed to be instantaneous. This type of accident could impact surface water resources, especially if the kerosene was spilled directly into the water.

The impacts of this accident would be similar to those previously evaluated for an instantaneous release of crude oil from the pipeline at an elevated river crossing resulting from a small leak (anticipated spill event). For the anticipated spill scenario, the volume of fluid released to the streams and rivers would be about the same: 50 versus 190 bbl. Recovery response times for the truck rollover incident would be the same as those used for the anticipated spill scenario. If the spill occurred into one of the six previously evaluated rivers and creeks (Section 4.4.4.3), potential recovery of the kerosene at the designated containment sites would occur for the Gulkana River and Minton Creek under low-flow conditions. At the other rivers (Sagavanirktok, Yukon, Tanana, and Tazlina), the entire contents of the spilled truck would move past the containment site before initiation of recovery activities under conditions of plug flow and no degradation.

Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water. Spills of products such as kerosene, gasoline, and diesel fuel, which contain lighter components, might evaporate completely within a few hours (American Petroleum Institute 2002). Because of its low density (about 0.8 g/cm^3) and low solubility in water, the released kerosene would float on the water surface and move downstream (Baker 2001). Emulsification, which could increase the kerosene's effective life, would not be expected to occur (Hayes et al. 1992). As the kerosene moved downstream, a substantial amount would evaporate before reaching the containment site. This degradation would significantly reduce the impacts of the spill on the surface water resources; impacts would then be limited to a short distance downstream from the location of the spill.

Following dismantling of the pipeline and other surface facilities, the ground would be rehabilitated to the extent possible by methods such as contouring and hydroseeding. The process of hydroseeding would begin with seeds of native plants, fertilizer, a tackifier (basically a glue), and some medium such as cellulose or wood fiber (or a 50/50 mix of these two) being combined in a machine. This mixture would then be force-applied to the soil in an effort to keep the mixture in place until the seeds germinated. The root structure of the plants would then bind the soil together, preventing wind or rain erosion. The process is particularly well suited to hillsides or slopes, where rills and ruts induce further wind and rain erosion. Surface water impacts associated with this portion of the termination process would be negligible and would primarily relate to the amount of process water needed. Once the land surfaces were restored, there would be no further adverse impacts on surface water resources.

4.6.2.7 Groundwater Resources

If the no-action alternative was selected, groundwater resources along the TAPS ROW could be impacted by termination activities that would include dismantling the pipeline system, removing the dismantled pieces, and restoring the area by contouring and hydroseeding. Cleaning and purging the pipeline would start after a 2-year planning and preparation process. Dismantling the pipeline, pump stations, and the Valdez Marine Terminal and disposing of scrap would start 3 years after the beginning of the termination process and would continue for 3 years. Impacts during the first 2 years would be the same as those for the proposed action. During pipeline termination, the constraints described in Section 4.6.1.1 would apply.

Relative to groundwater resources, the main impacting factors of the termination process would include water use along the ROW, digging to remove some underground components of the pipeline, removing segments of the aboveground pipeline and other aboveground facilities, and potential spills and other accidental releases. These impacting factors could (1) change the depth to groundwater, (2) modify its direction of flow, (3) deplete the quantity available, and (4) degrade its quality.

The physical environment could also affect the TAPS during termination activities and produce groundwater impacts for the no-action alternative. Impacting factors include the following:

- Earthquakes;
- Glacial movements (surges and retreats);
- Solifluction (i.e., a slow-motion debris flow caused by seasonal freeze/thaw of the active layer interacting with the pull of gravity downslope);
- Mud flows;
- Global warming; and
- Other hazards such as debris flows, landslides, rock falls, slumps, and floods.

Impacts on groundwater from these processes would be the same as those discussed previously for the proposed action (Section 4.3.7) and would be limited to the preparatory period of the termination process when oil or kerosene and seawater would still be flowing in the pipeline. Once the flow in the pipeline ceased, these impacting factors would no longer be applicable.

As discussed in Section 4.6.2.6, water would be needed for the no-action alternative (Table 4.6-3). Most of the water use would occur during the actual cleaning and purging of the pipeline; dismantling of the pipeline, pump stations, and the Valdez Marine Terminal; and the disposal of scrap. The greatest use would

Impacts of No-Action Alternative on Groundwater Resources

Under the no-action alternative, direct impacts on groundwater resources could result from extraction of groundwater for operational needs. Because the groundwater that would be used for termination activities would be obtained from existing wells, without changes to the number of wells pumping or their extraction rates, impacts to groundwater resources would be similar to those for the proposed action and historical operations. These impacts would be minor and local.

Indirect impacts on groundwater resources for the no-action alternative could occur through infiltration of contaminated surface water and water from septic fields. Historically, groundwater impacts from surface contamination have been local because of the presence of permafrost that limits deep percolation of contaminated water, the assimilation properties of the groundwater, and adherence to guidelines specified in the linewide NPDES permit. Because the activities associated with the no-action alternative would produce impacts similar to those observed historically, the impacts would also be similar.

Historically, septic fields have been used to dispose of sanitary wastewater at PS 7, 9, 10, and 12. Impacts on groundwater from these systems have been local, and other groundwater users along the TAPS ROW have not been affected. Use of these facilities during the termination process would produce similar impacts.

occur in the third year of termination activities. Most of this water would be obtained from surface water; the remainder would come from wells. Table 3.1-1 shows that the groundwater well system along the TAPS ROW could provide a total of about 277,000 gal/d of potable water. Because the quantity of groundwater that would be used for termination activities would be supplied by the existing TAPS wells, without modification to the number of wells pumping or their extraction rates, groundwater conditions (i.e., depth to groundwater, flow direction, and quantity available) would not be affected. At the end of the termination period, water would no longer be needed, and extraction would cease.

Although the impacts to underlying aquifers would not change as the result of termination activities, liquid groundwater in the form of thaw bulbs along the TAPS ROW would be lost as the water refroze in the absence of heat from the warm oil flowing in the pipeline. However, because the water in the thaw bulbs is not used as a resource outside of TAPS, its loss would have no impact on any external users.

As discussed above, the physical properties of the groundwater along the TAPS ROW would not be impacted during the termination period; however, its chemical composition could be indirectly affected by infiltration of contaminated surface water from construction areas and from locations of surface spills and other accidental releases. There would be no direct impacts to groundwater quality because there are no plans for disposing of contaminated water in wells.

Section 4.6.2.6 discusses the impacts of removal activities during pipeline termination. These activities could impact surface water quality by providing sources of contamination that could be mobilized by precipitation and transported overland to nearby water bodies. Possible contaminants include fuels, lubricants, bitumens, organic compounds, hazardous construction materials, cleaning materials, and sanitary wastewater disposed of in septic fields. Contaminated surface water could then infiltrate the ground and affect groundwater resources. However, the quality of the runoff water from the removal areas would be regulated by NPDES permits, and best management practices would be used to limit the quantity of contaminants leaving the construction sites in the dissolved phase. Some possible best management practices include storing construction material away from nearby surface water bodies and their floodplains, covering construction materials to minimize interaction with rainfall, thoroughly cleaning up any spills as soon as they occur, locating fueling and vehicle service areas away from nearby surface water bodies and berming the area to minimize transport by runoff, and disposing of waste materials properly (USDA 2000). Implementation of these best management practices would minimize impacts to the groundwater. In addition, use of septic fields during the termination process would produce impacts similar to those that have historically occurred. Those impacts have been local and have not affected other groundwater users along the TAPS ROW.

Spill scenarios have been proposed for the no-action alternative. These accidents are described in Table 4.6-2. In the most severe accident scenario, a tanker truck carrying kerosene from the Williams North Pole Refinery to Prudhoe Bay is assumed to overturn and spill 190 bbl (8,000 gal) of kerosene. Kerosene is a common type of fuel oil and is a crude-oil product. The release is assumed to be instantaneous. This type of accident could indirectly impact groundwater resources through infiltration of the kerosene.

Because of its high volatility, kerosene (and other light diesel fuels) would quickly evaporate following a rollover spill (American Petroleum Institute 2002). By quickly cleaning up any remaining kerosene and contaminated surface soil after the spill, indirect impacts to underlying groundwater would not be measurable.

Following dismantling of the pipeline and other surface facilities, the ground would be rehabilitated to the extent possible. Such methods as contouring and hydroseeding would be used. If the reseeded areas were watered artificially, infiltration and recharge to the underlying groundwater could increase. Because the volume of water anticipated for reseeding is small relative to the total quantity of water needed, these increases would produce a negligible impact on existing groundwater resources.

4.6.2.8 Physical Marine Environment

Physical marine resources could be affected by activities associated with the termination process under the no-action alternative. The areas considered in this analysis are Port Valdez, Prince William Sound, and nearby locations that have the potential to be affected, such as the Port of Seward. Direct impacts considered are impacts that would be caused by the no-action alternative and occur at the same time and place. Indirect impacts would also be caused by the no-action alternative, but they would occur later in time or be located farther in distance from the associated activities.

Relative to the physical marine environment, the main impacting factors associated with termination activities would include processing of waste and wash water at the Valdez Marine Terminal; accidents and spills that could result in releases to the marine environment; digging to remove structures, which could increase erosion and sediment transport into the marine environment; dock and ship operations for the transport of waste and scrap from the ports of Valdez, Whittier, and Seward; potential marine accidents during the transport of waste and scrap; and removal activities associated with the Valdez Marine Terminal docks that could potentially disturb marine sediments. These impacting factors could:

- Increase sediment releases to Port Valdez,
- Disturb sediments and mobilize contaminants in Port Valdez,
- Release hydrocarbons to Port Valdez, and
- Release sediments and other contaminants to the marine environments near the ports of Valdez, Whitier, and Seward.

During the termination activities, the physical environment could also affect the TAPS and Valdez Marine Terminal. Impacting factors would include:

- Earthquakes,
- Storm events (flooding) that could accelerate runoff and sediment release,
- Tsunamis, and
- Glacial calving in Prince William Sound that could impact marine traffic associated with termination activities.

4.6.2.8.1 Discharges from the Valdez Marine Terminal. Discharges at the Valdez Marine Terminal during the termination activities for the terminal and TAPS could impact physical marine resources. The materials that could be discharged from the Valdez Marine Terminal during termination activities can be divided into the following categories: industrial wastewater, domestic sanitary wastewater, and storm water, which includes sediment from termination activities. It is assumed that the BWTF at the Valdez Marine Terminal would continue to operate and treat waste and wash water resulting from the termination activities. The sanitary water treatment plant would also continue to operate. Regulatory permits govern

Impacts of No-Action Alternative on Physical Marine Environment

Impacts from Valdez Marine Terminal releases resulting from termination activities under the no-action alternative would be generally smaller than historical impacts. However, while historical releases have been continuous, releases under the no-action alternative would be temporary and cease with the completion of termination activities.

The impacts to physical marine resources from scrap metal transport would be short-lived and would cease with the completion of termination activities.

Major accidents that could occur under the no-action alternative would be similar to those discussed for the proposed action. The potential for tanker accidents to occur would end once oil shipments ceased.

the types, quantities, and methods of treatment or best management practices applicable to each wastewater discharge, as discussed in Section 3.16.4. These permits would have to be modified to address the new influent source (purge water) for the BWTF. The two permitted outfalls from the Valdez Marine Terminal are from the BWTF and the sanitary wastewater treatment plant, both of which discharge into Port Valdez and are covered by an NPDES permit (see Section 3.1.2.1.3). Treated wastewater is discharged into Port Valdez through a diffuser near the bottom of the fjord. The diffuser mixes the discharged wastewater with the surrounding waters. Effluent limitations for these outfalls are established for flow rate, biochemical oxygen demand (BOD_5, which is BOD measured over a 5-day period), TSS, and pH. The NPDES permit also establishes a mixing zone and effluent monitoring requirements.

During the third year of the termination activities, 397 million gal of seawater would be used to clean the pipeline (Folga et al. 2002). The resulting wastewater, containing about 0.02% by volume crude oil, would be treated at the BWTF. This waste would be similar to the oily bilge water currently treated by the BWTF. The treated effluent from this wastewater would be released to Port Valdez. In addition, slightly more than 2 million gal of an alkaline solution with various surfactants would be used to clean residual oily waste from the pipeline. This wastewater would also be treated at the BWTF. The alkaline solution would be mixed with chemicals such as trisodium phosphate, nonaqueous surfactants, and aqueous surfactants at 10% by weight (Folga et al. 2002).

The current capacity of the BWTF would be sufficient to treat this volume of water, and the storage tanks at the Valdez Marine Terminal could be used, if needed, for temporary storage. The total BWTF effluent flow for the year 2000 was 3.785 billion gal, about 10.3 million gal/d (see Appendix C), with historical maximum monthly volumes of about 15 million gal/d.

Under the no-action alternative, effluent volumes from the BWTF would be significantly reduced from current and historic levels. For the first 2 years, releases would continue similar to historic volumes, and in the last 3 years of termination activities, no treated water would be released. In the third year of termination activities, water related to purging, cleaning, and removing the pipeline would be treated. The volume released in the third year would be approximately one-tenth of existing release volumes with similar constituents. The sanitary water treatment plant would continue to operate throughout the termination period; its release levels would be similar to historical release levels.

The impacting factors for this treated wastewater resulting from termination activities would not differ significantly from those associated with historical operations. After treatment, the effluent would be released through the existing diffuser into the waters of Port Valdez and monitored under a modified NPDES permit.

Termination activities at the Valdez Marine Terminal and along the TAPS could increase sediment loads in surface runoff during construction activities near Port Valdez. These impacts would be largest during Years 3–5 of the termination period, structures and facilities at the Valdez Marine Terminal would be removed and the site would be regraded and vegetated. Approximately 350 acres would be regraded and seeded at the Valdez Marine Terminal during termination activities under the no-action alternative (Folga et al. 2002).

The impacts from the increase in sediments resulting from termination activities and subsequent regrading and reseeding under the no-action alternative could be minimized by following standard construction practices and following the stipulations in the required construction permits. As discussed in Section 3.7.2.5, storm-water runoff that could carry sediments from these activities is regulated under the EPA Storm Water Multi-Sector General NPDES Permit. This permit is intended to ensure that storm-water runoff has no significant adverse impact on the environment. The termination activities would also be governed by the NPDES permit for Storm Water Discharge from Construction Activities Associated with Industrial Activity, which applies to construction activities that disturb more than 5 acres, do not involve excavation dewatering, and have a potential to impact waters of the

United States. Specific notices of intent must be submitted to the EPA, and projects that meet the criteria for coverage under this permit must comply with the stipulations contained in the permit.

Impacts from Valdez Marine Terminal releases resulting from termination activities under the no-action alternative would be generally smaller than historic impacts. However, while historical releases have been continuous, releases under the no-action alternative would be temporary and cease with the completion of termination activities. Treated wastewater volumes would be reduced in the third year of termination to approximately one-tenth of historical annual volumes, with no releases in Years 4–6. However, the wastewater resulting from pipe cleaning operations would contain various additives, such as trisodium phosphate and various aqueous and nonaqueous surfactants, that could affect treatment procedures at the BWTF (Folga et al. 2002).

Future impacts from Valdez Marine Terminal releases during normal operations under the no-action alternative would be short-lived: 2 years of normal operations, 1 year for releases of treated wastewater effluent from pipe purging, and 6 years for releases from the sanitary water treatment plant. The impacts from sediment loads would occur in Years 4–6 of termination activities and continue until vegetation was sufficiently established to minimize erosion from disturbed areas.

4.6.2.8.2 Impacts at Ports. Some of the scrap metal resulting from termination of the TAPS would be transported to the ports of Valdez and Seward (or Whittier) and loaded on ships for marine transport to disposal or processing locations. At the ports of Seward and Valdez, 70-acre scrap yards would be used to store scrap metal prior to shipment (Folga et al. 2002). Operation and construction of these scrap yards could generate sediments that could impact the marine environment. In addition, any chemical or fuel spills that occurred in these yards could potentially reach the marine environment.

The impacts of these potential releases could be mitigated if the scrap yards operated in accordance with all applicable permits. The potential impacts from additional sediments or other contaminants resulting from operation and construction of the scrap yards would cease with the completion of termination activities and removal of the accumulated scrap.

4.6.2.8.3 Termination-Associated Marine Transportation. The amounts of scrap metal that would be sent to ports for transport during the termination period are expected to be slightly more than 10,000 tons per year at Seward and slightly less than 10,000 tons per year at Port Valdez. Potential impacting factors to physical marine resources from this transportation would include small hydrocarbon emissions that could be released by ships in the marine environment, dock operations, the physical transit of the ships through coastal waters such as Prince William Sound, and docking at Port Valdez and the Port of Seward.

The annual tonnage of scrap metal would not significantly increase ship traffic at either port, and the minor increases would be short-lived, lasting only during Years 4–6 of termination activities. In addition, tanker visits to the Valdez Marine Terminal would cease with the beginning of termination activities, significantly reducing TAPS-generated marine traffic in Prince William Sound and Port Valdez.

The impacts to physical marine resources from scrap metal transport would be short-lived and would cease with the completion of termination activities.

4.6.2.8.4 Accidents. Major accidents that could occur under the no-action alternative are similar to those discussed for the proposed action in Section 4.4.4.5. The potential for a large oil spill would be mitigated once oil delivery was completed and the storage tanks at the Valdez Marine Terminal were emptied. Both events would occur near the beginning of termination activities. The potential for tanker accidents would also cease to exist once oil shipments had ceased.

4.6.2.8.5 Impacts of the Physical Environment on the TAPS. Several environmental factors could impact TAPS under the no-action alternative. These factors would include tsunamis, earthquakes, floods or high rainfall events, and icebergs from glacier calving that could affect marine traffic. In general, the impacts from these factors would be the same as those under the affected environment (Section 3.9). The potential for these impacts would decrease as termination activities progressed.

Once oil deliveries had ceased and the storage tanks at the Valdez Marine Terminal were emptied, TAPS-related marine tanker traffic would cease. Some minimal marine traffic involved in the transport of scrap metal could potentially be impacted by icebergs, but those impacts would be short-lived and would cease with the completion of termination activities and the removal of the scrap.

The potential impacts from earthquakes and tsunamis would continue, but when storage tanks and the pipeline were drained of oil, the risks associated with any of these events would decrease below current levels. These impacts would cease with the completion of termination activities.

4.6.2.9 Air Quality

This section describes the estimated potential impacts on air quality (in terms of criteria pollutants and HAPs) and on the AQRVs of visibility and acid deposition that could occur in the vicinity of TAPS facilities (pipeline, pump stations, and Valdez Marine Terminal) during the 6-year termination activity period under the no-action alternative.

During Years 1 and 2, before the pipeline would be shut down, activities that would result in emissions would include the normal operation of TAPS facilities and planning, mobilization, and preparatory construction for dismantling and removing TAPS facilities. Air quality and AQRV impacts resulting from TAPS-related emissions during this 2-year period would be similar to those during current TAPS operation, as described in Section 4.3.9.

During Years 3 through 5, the termination activities for TAPS facilities would include cleaning and purging the pipeline, dismantling aboveground facilities along the pipeline and at pump stations and the Valdez Marine Terminal, removing wastes and scrap materials for recycling or disposal, and restoring disturbed land. Because the level of activities that would result in emissions would probably be highest during the third year of the termination activities (Folga et al. 2002, Tables VE1 and HP1), the estimated potential impacts during the third year of the termination activity period are described here.

Activities during Year 6 would involve the demobilization of equipment and personnel. Potential emissions and resulting impacts during this period would be substantially less than those from the termination activities during Years 3 through 5. At the end of the 6-year period, all emissions resulting from TAPS-related activities would cease for all practical purposes, and, as a result, there would be no more air quality and AQRV impacts from the TAPS.

Impacts of No-Action Alternative on Air Quality

The potential impacts on air quality and air quality-related values (AQRVs) — visibility and acid deposition — resulting from emissions associated with TAPS during termination activities are estimated to be (1) similar to those estimated for the proposed action during the first 2 years of termination (when TAPS facilities would be operated normally); (2) less than those estimated to result under the proposed action during Years 3 to 5 of the termination activities because emissions would be less; and (3) much less than those estimated to result under the proposed action during Year 6 of termination activities, when emissions would be limited to those associated with demobilization of equipment and personnel utilized in termination activities.

Emission sources of criteria pollutants, HAPs, and volatile organic compounds (VOCs) during the third year of termination activity would include the following:

- Exhaust emissions from turbine generators at pump stations during pipeline cleaning and purging,
- Exhaust and fugitive dust emissions from heavy equipment during dismantling and restoration,
- Exhaust emissions from incinerators operated to dispose of municipal solid waste generated by the termination activity workforce, and
- Exhaust and road dust emissions from vehicles and locomotives used to transport workers, supplies, wastes, and scrap materials.

4.6.2.9.1 Criteria Pollutants. Data on estimated potential emissions of criteria pollutants (SO_2, NO_x, CO, and PM_{10}) and VOCs from equipment exhaust gas and from the fugitive dust generated by various termination activities are presented in Table 4.6-5 as annual total emissions from three pipeline sections,[1] pump stations, and the Valdez Marine Terminal. For vehicle-related emissions, they are listed according to the types of items transported or roads traveled on.

The largest emission source category during termination activities (excluding the period of pipeline cleaning and purging) would be the exhaust gas from heavy equipment used in dismantling and restoration. Dismantling processes would include removing fiberglass insulation and clamping insulation modules; cutting and lowering pipe and clamping pipe assemblies to the ground; removing and stockpiling radiators; and removing and stockpiling VSMs and heat pipes. Restoration processes that would immediately follow dismantling would include regrading and reseeding. The exhaust gas from vehicles and locomotives used to transport workers, wastes, and scrap materials would be the next largest category of emission sources. Emissions from the remaining source category (exhaust gas from the main-line turbine generators and other fuel uses during pipeline cleaning and purging) would be relatively small when compared with the emissions from the other two source categories. Estimated potential air quality and AQVR impacts resulting from each source category are described below.

Cleaning and Purging the Pipeline. Cleaning and purging of the pipeline would start at the beginning of Year 3 and last for only about 1 month. During this period, levels of activities that would result in emissions would be similar to levels during normal TAPS operation involving crude oil transport. Although kerosene (for cleaning) and seawater (for purging) rather than crude oil would be moving through the pipeline, emissions from the main-line turbine generators would not exceed the permitted potential maximum emissions from these sources. Other emissions from pump stations and Valdez Marine Terminal operations would be similar to or less than the emissions during normal TAPS operation (see Table 4.6-5). Therefore, it is estimated that potential air quality and AQVR impacts during this period would be similar to or less than impacts occurring during the period of normal TAPS operation.

Dismantling and Restoration. Termination activities that would occur after the cleaning and purging of the pipeline are assumed to be performed at three pipeline sections — northern, central, and southern — and at the Valdez Marine Terminal. Two separate crews would be involved at each of the three pipeline sections and at Valdez Marine Terminal. At each pipeline section, termination activities would progress southward, with one crew starting from the northern end of the section and the other starting from the middle. At Valdez Marine Terminal, termination activities would be performed at two different parts of the site. Thus, there would be eight separate emission source locations (i.e., termination

[1] Termination activities that would occur after the cleaning and purging of the pipeline are assumed to be simultaneously performed at three pipeline sections — northern, central, and southern — and at the Valdez Marine Terminal.

TABLE 4.6-5 Estimated Potential Average Annual Emissions of Criteria Pollutants and Volatile Organic Compounds from Termination Activities

Termination Activity	Emission Type and Source	Location or Activity Type	Annual Emission Rate (tons/yr)				
			SO_2	NO_x	CO	PM_{10}	VOCs
Cleaning and purging pipeline[a]	Exhaust emissions from turbine generators and other TAPS facilities	All pump stations and Valdez Marine Terminal	544.3	966.1	350.3	101.8	318.4
Dismantling and restoration[b]	Exhaust emissions from fuel used for heavy equipment and other miscellaneous purposes	Northern	25.3	186.5	92.5	15.0	15.6
		Central	24.8	184.2	86.3	16.5	18.8
		Southern	18.8	132.4	65.3	12.2	13.1
		Valdez Marine Terminal	30.5	222.0	115.6	20.1	22.0
		Total	99.4	725.1	359.7	63.9	69.5
	Fugitive dust from land being disturbed during regrading and reseeding	Northern	–[c]	–	–	4.8	–
		Central	–	–	–	5.7	–
		Southern	–	–	–	4.5	–
		Valdez Marine Terminal	–	–	–	1.3	–
		Total	–	–	–	16.3	–
	Exhaust emissions from municipal solid waste incineration		28.8	28.8	2.6	3.1	–
	Total dismantling and restoration		128.2	753.9	362.3	83.3	69.5
Removal and transport[b]	Exhaust emissions from vehicles and locomotives	Workers by truck	0.5	4.1	33.9	0.9	2.3
		Waste by truck	1.1	15.7	24.2	1.6	2.7
		Scrap materials by truck	1.4	20.0	30.9	2.1	3.4
		Scrap materials by rail[d]	31.3	292.0	43.6	11.0	17.3
		Total	34.3	331.8	132.6	15.6	25.7
	Road dust from vehicles	Paved road	–	–	–	358	–
		Unpaved road	–	–	–	3,152	–
		Total	–	–	–	3,510	–
	Total removal and transport		34.3	331.8	132.6	3,526	25.7
Total			706.8	2,051.8	845.2	3,711.1	413.6

[a] Emissions during 1-month period of pipeline cleaning and purging are assumed to be one-twelfth the annual emission values for normal TAPS operation presented in Table 3.13-3. These estimates are conservatively high because all TAPS facilities would not be operating at full load during this period.

[b] Peak-year emissions can be estimated by increasing average-year emissions by 33.3%.

[c] A dash indicates no emissions or data not available.

[d] For rail transport to Seward.

Source: Folga et al. (2002, Tables CE1, CE2, IE1, and VE1).

activity sites). Potential annual emissions from one of the two termination activity sites in each pipeline section and the Valdez Marine Terminal would be approximately half of those listed in Table 4.6-5 for dismantling and restoration activities. Therefore, the highest annual emissions at any of the six termination activity sites along the pipeline (two sites at each of the northern, central, and southern sections as specified in Table 4.6-5) would be approximately 13, 93, 46, 8, and 9 tons/yr for SO_2, NO_x, CO, PM_{10}, and VOCs, respectively. These values are on the same order of magnitude as the lowest potential annual emissions of each pollutant among all pump stations under TAPS operation, at 2.1 million bbl/d of crude oil throughput (i.e., 12, 175, 50, 33, and 8 tons/yr for SO_2, NO_x, CO, PM_{10}, and VOCs, respectively; see Table 3.13-3). The total estimated potential annual emissions at the two termination activity sites within the Valdez Marine Terminal would be approximately 31, 222, 116, 21, and 22 tons/yr for SO_2, NO_x, CO, PM_{10}, and VOCs, respectively (Table 4.6-5), corresponding to about 2, 14, 85, 8, and 0.6%, respectively, of the potential annual emissions from the Valdez Marine Terminal under TAPS operation, at 2.1 million bbl/d of crude oil throughput.

The termination activity sites along the TAPS pipeline would be moving continuously, and those within the Valdez Marine Terminal would also be moving around within the terminal boundary during the termination activity period. On the basis of approximately 420 mi of aboveground pipeline, two termination activity sites per pipeline section, and 3 years with 240 working days per year, the termination activity sites along the pipeline would be moving southward at an average rate of about 0.1 mi (510 ft) per day, or 2.9 mi (15,400 ft) per month. (This estimate ignores the time needed for termination activities at pump stations. Thus, the time available for pipeline termination activities would be shorter, and, consequently, the actual rate of the termination activity site movement along the pipeline would be faster while pipeline termination activities were actually being performed.) Because of the continuous movement of termination activity sites along the pipeline, any given receptor along the pipeline would be subjected to peak air quality impacts resulting from emissions from termination activities for only a short period.

The magnitude of potential emissions of each criteria pollutant from each termination activity site along the pipeline or the termination activity sites at Valdez Marine Terminal would be smaller on a monthly basis than those from the TAPS main pipeline replacement project at the upper Atigun River floodplain performed over a 4-month period in 1990 (see Section 4.3.9.1). That project required more extensive earth moving than would the dismantling and restoration activities under the no-action alternative. Thus, potential impacts on ambient air quality at a given receptor location that would result from emissions from individual termination activity sites would be short term, would be limited to the immediate vicinity of the activity sites, and would not cause ambient air quality to exceed applicable ambient air quality standards.

Removal and Transport. Sources of emissions associated with the transport of workers, wastes, and scrap materials for recycling and disposal would include light-duty and heavy-duty vehicles and freight trains. Workers involved in termination activities would be transported daily on buses between termination activity sites and living quarters at pump stations, the Valdez Marine Terminal, and other temporary housing units. Various waste materials generated from the dismantling processes would be shipped by truck to commercial landfill sites, ADEC-approved disposal sites, or special out-of-state disposal sites, depending on the type of waste. For this analysis, it is assumed that scrap materials from north of MP 492 would be trucked to Fairbanks and then shipped by rail to Seward (or Whittier), Alaska, and that scrap materials from south of MP 492 would be trucked directly to Valdez. The scrap materials consolidated at scrap yards in Seward (or Whittier) and Valdez would be loaded on ships for disposition at locations outside Alaska.

Table 4.6-6 presents the estimated number of round trips, round-trip distances, emission factors, and annual exhaust and road dust emissions of criteria pollutants and VOCs for the vehicles and locomotives that would be used to

TABLE 4.6-6 Estimated Potential Average Annual Emissions of Criteria Pollutants and Volatile Organic Compounds from Vehicular and Rail Traffic[a]

Transport Mode	No. of Round Trips	Round Trip Distance (mi)	Emission Type	Emission Factor[b] (g/mi)					Annual Emission Rate (tons/yr)				
				SO_2	NO_x	CO	PM_{10}	VOCs	SO_2	NO_x	CO	PM_{10}	VOCs
Workers by bus	83,912	92	Exhaust	0.06	0.41	2.56	0.11	0.13	0.5	4.1	33.9	0.9	2.3
			Road dust	–[c]	–	–	–	–	–	–	–	1,314	–
Waste by truck	8,518	370	Exhaust	0.31	4.51	6.96	0.47	0.77	1.1	15.7	24.2	1.6	2.7
			Road dust	–	–	–	–	–	–	–	–	807	–
Scrap materials by truck	10,908	370	Exhaust	0.31	4.51	6.96	0.47	0.77	1.4	20.0	30.9	2.1	3.4
			Road dust	–	–	–	–	–	–	–	–	1,165	–
Scrap materials by rail[d]	219	960	Exhaust	19.1	178	26.6	6.7	10.5	31.3	292.0	43.6	1.6	17.3
			Road dust	–	–	–	–	–	–	–	–	224	–
Total exhaust emissions									34.3	331.8	132.6	6.2	25.7
Total road dust emissions									–	–	–	3,510	–
Total emissions									34.3	331.8	132.6	3,516.2	25.7

[a] For transporting workers, wastes, and scrap materials. Peak-year emissions can be estimated by increasing average-year emissions by 33.3%.

[b] Emission factors for rail locomotives are in g/gal of diesel fuel consumed. Fuel efficiency for the locomotive is assumed to be 0.14 mi/gal.

[c] A dash indicates no emissions or data not available.

[d] Emissions from transport to the scrap yard at Valdez. Emissions from transporting scrap materials to Whittier would be less (about 90% of the values for the Valdez case).

Source: Folga et al. (2002, Table VE1).

transport the workers, wastes, and scrap materials during termination activities. The annual numbers of round trips during the third year of termination activities are estimated to be 83,912 to transport workers by bus, 8,518 to transport wastes by truck, 10,908 to transport scrap materials by truck, and 219 transport scrap materials by rail.

On the basis of eight termination activity crews and 240 working days per year with one 12-hour shift per day, the 83,912 round trips per year for transporting workers represent about 44 round trips per day (22 in the morning and 22 in the evening) on the road between each termination activity site and pump station or temporary housing unit living quarters. If all morning or evening commuting took place in 1 hour, the number of commuting vehicles on this road would average approximately one vehicle per minute during that hour. At the Valdez Marine Terminal, with its two termination activity crews, this number would double. By assuming two destinations (Fairbanks and Valdez) and 240 working days per year with 12 hours of operation per day, the 8,518 and 10,908 round trips per year to transport wastes and scrap materials, respectively, by truck represent an average of about 18 and 23 round trips per day, or approximately 2 round trips per hour for both cases, on the roads between the termination activity sites and Fairbanks or Valdez.

The numbers of vehicles traveling on a per-day or per-hour basis estimated above are small. Therefore, potential air quality impacts caused by emissions from these vehicles would be hardly measurable in terms of hourly or daily average ambient concentrations. Although it is estimated that the frequency of rail traffic for shipping scrap materials from Fairbanks to Seward (or Whittier) would be much less than the frequency of truck traffic for transporting wastes and scrap materials (about 2.4 one-way trips per day or 1.2 round trip per day, respectively), estimated annual emissions of criteria pollutants and VOCs from rail traffic would be on the same order of magnitude as the emissions from truck traffic. Thus, potential air quality impacts caused by emissions from rail traffic would be on the same order of magnitude as those due to truck traffic.

4.6.2.9.2 Hazardous Air Pollutants.

Table 4.6-7 presents the estimated potential emissions of HAPs (benzene, toluene, ethyl benzene, xylene, n-hexane, trimethyl pentane, acrolein, acetaldehyde, formaldehyde, naphthalene, and 1,3-butadiene) from equipment exhaust gas associated with various termination activities. The estimated HAPS emissions resulting from dismantling, restoration, removal, and transport activities during the termination period would be small fractions of the estimated potential annual emissions of HAPs from normal operations of TAPS facilities (Table 3.13-6), except for acetaldehyde, formaldehyde, and 1,3 butadiene. However, it is estimated that ambient impacts of these emissions would be small because the estimated annual emission rates would be very small in absolute terms (less than 2 tons/yr at each termination activity site along the pipeline or at Valdez Marine Terminal) and because they would be released over a large area.

4.6.2.9.3 Visibility.

Water vapor emitted from equipment and vehicle operations at termination activity sites would have the potential to contribute to periodic episodes of ice fog, which can occur during the winter when ambient temperatures are −20°F or colder. Ice fog can cause serious problems in areas prone to it, such as the Fairbanks/North Pole area. However, the termination activity sites where equipment and vehicles would be operated would be in remote, uninhabited areas most of the time. Even when the sites would be near population centers, the probability of the ambient temperature reaching −20°F or less would be very small. Thus, although the combination of a low temperature of −20°F or colder and the presence of one of the termination activity sites near an area prone to ice fog could occur, the probability of such an occurrence would be very small.

During Year 3 of termination activities, estimated potential emissions of SO_2 and NO_x (precursors of aerosols that cause visibility impairment) would be only small fractions of the estimated potential emissions of those materials during normal operations of TAPS facilities under the proposed action. The emissions of SO_2 and NO_x during Year 3 of termination would

TABLE 4.6-7 Estimated Potential Average Annual Emissions of Hazardous Air Pollutants from Termination Activities

Termination Activity	Source of Exhaust Emissions	Location or Activity Type	Annual Emission Rate (tons/yr)											
			Benzene	Toluene	Ethyl Benzene	Xylene	n-Hexane	Trimethyl-pentane	Acrolein	Acet-aldehyde	Form-aldehyde	Nephtha-lene	1,3-Buta-diene	Total
Cleaning and purging pipeline[a]	Turbine generators and other TAPS facilities	All pump stations and Valdez Marine Terminal	4.16	3.54	0.31	1.93	3.69	1.51	0.003	0.06	0.76	0.50	0.003	16.47
Dismantling and restoration[b]	Fuel used for heavy equipment and other purposes	Northern	0.32	0.23	0.05	0.16	0.02	–[c]	0.18	1.16	2.33	0.001	0.03	4.48
		Central	0.38	0.28	0.06	0.20	0.03	–	0.22	1.39	2.81	0.001	0.03	5.40
		Southern	0.27	0.20	0.04	0.14	0.02	–	0.15	0.98	1.96	0.001	0.02	3.78
		Valdez Marine Terminal	0.45	0.33	0.07	0.23	0.03	–	0.25	1.63	3.28	0.001	0.04	6.31
		Total dismantling and restoration	1.42	1.04	0.22	0.73	0.10	1.51	0.80	5.16	10.38	0.004	0.12	19.97
Removal and transport	Vehicles and locomotives	Workers by truck	0.03	0.01	0.00	0.01	0.01	–	0.01	0.08	0.22	0.000	0.02	0.39
		Waste by truck	0.03	0.01	0.01	0.01	0.01	–	0.01	0.10	0.26	0.000	0.02	0.55
		Scrap materials by truck	0.04	0.01	0.01	0.02	0.02	–	0.01	0.12	0.33	0.000	0.03	0.59
		Scrap materials by rail	0.16	0.05	0.05	0.03	0.09	–	0.06	0.15	2.46	0.027	0.25	3.36
		Total removal and transport	0.26	0.08	0.08	0.05	0.13	–	0.09	0.45	3.27	0.027	0.32	4.80
Total			5.84	4.66	0.58	2.78	3.92	1.51	0.89	5.67	14.41	0.531	0.443	41.23

[a] Emissions during 1-month period of pipeline cleaning and purging, which are one-twelfth the annual emission values for normal TAPS operation presented in Table 3.13-3. These are conservatively high estimates because all TAPS facilities were assumed to be operating at full load during this period.

[b] Peak-year emissions can be estimated by increasing average-year emissions by 33.3%.

[c] A dash indicates no data are available.

Source: Folga (2002, Table HP1).

amount to an estimated 710 and 2,050 tons/yr (respectively), compared with releases of 6,500 and 11,600 tons/yr, respectively, during normal TAPS operations (Tables 3.13-3 and 4.6-5).

Excluding ground-level emissions of road dust, the estimated potential emissions of particulate matter (PM_{10}) from termination activities (about 200 tons/yr) would also be a small fraction of PM_{10} emissions from TAPS facilities under the proposed action (about 1,200 tons/yr). Therefore, it is estimated that any potential impacts of visibility-impairing pollutant emissions that would result from termination activities would be less than those that would occur under the proposed action, which were predicted not to cause any adverse visibility impacts at visibility-sensitive Class I and Class II areas in the vicinity of TAPS facilities (Section 4.3.9.3.2).

4.6.2.9.4 Acid Deposition. Acid deposition results from the long-range transport and chemical conversion of precursors (primarily SO_2 and NO_x) and deposition of the resulting acidic species (primarily sulfate and nitrate). Thus, the level of precursor emissions from TAPS facilities serves as a good indicator of the degree of impacts that TAPS could have on acid deposition at sensitive receptors in the vicinity of TAPS facilities. Potential emissions of acid deposition precursors from the termination activities under the no-action alternative are estimated to be only a small fraction of the precursor emissions from all existing TAPS facilities under the proposed action. As indicated above, it is estimated that potential emissions from all termination activities during the peak emission year under the no-action alternative would be about 710 tons/yr of SO_2 and 2,050 tons/yr of NO_x (Table 4.6-5), while those emissions from all TAPS facilities under the proposed action would be about 6,500 tons/yr of SO_2 and 11,600 tons/yr of NO_x (Table 3.13-3). Section 4.3.9.4 concludes that acid deposition from TAPS facilities under the proposed action would be minor. It is estimated that potential impacts on acid deposition caused by precursor emissions from termination activities under the no-action alternative would be even smaller.

4.6.2.10 Noise

This section describes the estimated potential noise and vibration impacts that could occur in the vicinity of TAPS facilities (pipeline, pump stations, and Valdez Marine Terminal) as a result of termination activities under the no-action alternative. During the 6-year termination period, the activities that would result in the highest level of noise and vibration would occur during the third year (Folga et al. 2002, Tables UT1, WF1). Thus, the estimated potential noise impacts during the third year of termination activities are described here. Potential impacts during the remaining years of termination would be less. At the end of the termination activities, all noise and vibration from TAPS-related activities would cease.

Impacts of the No-Action Alternative on Noise

The activities affecting ambient noise levels in the vicinity of TAPS facilities would be at their peak during Year 3 of the 6-year termination period under the no-action alternative. The potential impacts on noise during Year 3 are estimated to be similar to those occurring during normal TAPS facility operation and construction (for repair, maintenance, and system upgrades) under the proposed action. Noise impacts resulting from TAPS termination activities during other years of the 6-year termination period would be less. Blasting large concrete structures at Valdez Marine Terminal with explosives during Years 3 to 5 of the termination activities would cause ground vibration and airblast overpressure (manifested in the blast wave from an explosion). No damages to structures or impacts on animals from airblast overpressure are anticipated.

During the third year of termination activities when pipeline cleaning and purging would occur, noise emissions from TAPS facilities would be similar to those under the proposed action. After completion of cleaning and purging, dismantling and restoration activities are assumed to start at

six sites along the pipeline and at two sites within the Valdez Marine Terminal (Section 4.6.2.9.1). Noise emitted from equipment and vehicles operated at each of these sites would be similar to noise emitted from typical large construction sites. Potential impacts of such noise would be similar to impacts caused by noise emitted from construction activities associated with TAPS repairs, maintenance, and future system upgrades under the proposed action, as described in Section 4.3.10.

Upon completion of the pipeline cleaning and purging process, pipeline operation and use of fixed-wing aircraft and helicopters for surveillance would cease, eliminating those noise sources.

As part of termination activities, large concrete structures at the Valdez Marine Terminal would be demolished with explosives. These structures include containment walls at the East and West Tank Farms and at the fuel tanks in the Power/Vapor Recovery Area, and the retaining wall at the Ballast Water Treatment Facility. About 10,000 linear ft of concrete walls would be demolished at these locations (Folga et al. 2002, Table E1) during Years 3 through 5 of termination. The potential impacts of the blasting at the Valdez Marine Terminal on ground vibration and airblast overpressure were estimated by assuming 112 blasts would be set off at a time delay of 8-millisecond intervals for a 1 lb unit charge of dynamite per hole with a diameter of 2 in. and a depth of 2 ft.

The peak particle velocity (PPV) or the velocity of ground movement is generally accepted as the best indicator of the potential for structural damage. The results of the analysis using the procedures described in Appendix A, Section A.4.2 indicate that the PPV at a receptor location beyond 20 ft from the blast site would not exceed 2 in. per second, a value considered safe for poor plaster. The PPV at the residential area about 2 mi east of the Valdez Marine Terminal is estimated to be 0.0002 in. per second; therefore, no impacts from ground vibration would be anticipated as a result of the blasting of concrete structures at the Valdez Marine Terminal.

The airblast overpressure is estimated to be equal to or less than 0.0001 psi for the case of the base zone (the zone most likely to be along the propagation path) at the residential area about 2 mi east of the Valdez Marine Terminal. This value is about one-hundredth of the threshold value that may cause damage to farms or wildlife (0.02 psi). Therefore, no impacts from airblast overpressure would be anticipated from the blasting of concrete structures at the Valdez Marine Terminal.

4.6.2.11 Transportation

Termination activities, as described in Section 4.6.2.1, would require logistics support (including transportation) similar to that needed for pipeline construction. The current pump stations would serve as bases of operations for restoring the ROW, as did the original work camps for constructing the TAPS. However, rather than construction materials being shipped to work site locations, scrap and waste materials would be shipped from work site locations.

Impacts of No-Action Alternative on Transportation

The current transportation infrastructure in Alaska is adequate to handle termination activities. The highway and rail networks that provide support to TAPS operations would be expected to experience lower levels of traffic during termination activities except for the immediate vicinity of current operations. Air traffic to areas north of Fairbanks might increase slightly during this period to handle the transport needs of the increased workforce. After termination activities have been completed, air and highway traffic north of Fairbanks would be greatly decreased because of the reduced support needs for TAPS operations. Rail operations in the state would also be reduced since fuel trains from the Fairbanks area to Anchorage would be significantly reduced because of a decline in refinery operations associated with TAPS oil.

During the first two years of termination activities in preparation of dismantling and removing the pipeline, transportation-related impacts would be the same as those described for normal operations under the proposed action. The sixth year would focus on demobilization and close-out activities. Therefore, the following discussion of transportation-related impacts of termination focuses on activities during Years 3 through 5.

4.6.2.11.1 Aviation. An additional work force of approximately 3,300 people beyond the current average workforce of about 1,800 people required for total pipeline-related activity would be needed at one point during termination activities (APSC 2001i). Most of these personnel would need to be flown to and from the pump stations for termination activities. Air transport of some supplies might also be required.

After termination activities were finished, airports near the pipeline north of Fairbanks — especially Deadhorse Airport — would be greatly affected, since much of their operations have been geared toward support of pipeline activities.

4.6.2.11.2 Marine. As discussed further in Section 4.6.2.11.4, scrap metal from dismantling the pipeline would eventually be shipped back to the Lower 48 States via the ports at Valdez, Seward, and possibly Whittier. Materials and supplies for pipeline operations do not constitute a significant portion of goods that pass through the various Alaskan ports. Thus, operations in the major ports of Seward and Anchorage would not be significantly affected by a pipeline shutdown. On the other hand, shutdown of the pipeline would have a major impact on the Port of Valdez and operations in the Prince William Sound area. Tanker traffic would be eliminated, and the supporting service vessel operations, including SERVS, would be reduced or eliminated. SERVS is highly integrated with the local fishing communities and, aside from its tanker escort duties, provides emergency response capabilities for aiding vessels in distress.

4.6.2.11.3 Rail. The termination activities themselves would not have a significant impact on railroad operations. Current railroad activities in support of pipeline operations are few, as would be those in support of proposed shipments during termination (mentioned in the following section on road transport). However, the shutdown of the pipeline would have a significant overall impact on the railroad caused by a significant reduction in the amount of crude oil processed at the refineries in the Fairbanks area and at Valdez because the primary source of crude (TAPS) would no longer be available. As discussed in Section 4.3.11.3, approximately one-third of the Alaska Railroad's annual revenue is derived from petroleum shipments that are a direct result of the refinery operations in Alaska.

4.6.2.11.4 Road. Following its shutdown, the pipeline would be cleaned by running separate passes of kerosene and then seawater through it. Approximately 7,350,000 gal of kerosene would be needed for this effort (Folga et al. 2002, Table UT1); thus, about 565 tanker truck shipments of 13,000 gal each would need to be made to PS 1 before pipeline dismantlement.

Once dismantlement of the pipeline began, workers would need to be transported an average of 46 mi each way by bus from the pump stations to the work sites. It is estimated that about 83,912 round trips to and from the work sites would take place on an annual basis (Folga et al. 2002, Table VE1).

It is assumed for analysis, that salvageable steel from the pipeline north of MP 492 would be sent by truck to a scrap metal yard near Fairbanks. From Fairbanks, the scrap metal would be shipped by rail to Seward or possibly Whittier for eventual shipment by barge to the Lower 48 States. Approximately 4,664 truck shipments to Fairbanks (at an average distance of 185 mi per shipment) and 219 rail shipments of four railcars each from Fairbanks to Seward (a distance of 476 mi) would be required annually (Folga et al. 2002, Table VE1). It is also possible that a portion of this scrap might be sent to Whittier rather than Seward. It is assumed that salvageable steel from the pipeline south of MP 492, including the Valdez Marine Terminal,

would be shipped to a scrap metal yard near Valdez for eventual shipment by boat to the Lower 48 States. Approximately 4,231 truck shipments (at an average distance of 185 mi per shipment) would be required (Folga et al. 2002, Table VE1).

Each year, wastes generated by pipeline removal operations — primarily liquid sanitary wastes (see Table 4.6-8) — would require approximately 8,518 shipments at an average distance of 185 mi per shipment (Folga et al. 2002, Table VE1). Demolished concrete from termination activities at TAPS facilities, including the Valdez Marine Terminal, would result in another 2,013 shipments annually (Folga et al. 2002, Table WT1).

The amount of road traffic from the pipeline termination would fall below current levels during pipeline operations. If all of the above-mentioned traffic were on Dalton Highway alone, it would represent about 20% of the current annual mileage on Dalton Highway. Thus, except for a short period of time (e.g., a few days) at a given point along the pipeline where termination activities were taking place, traffic along the highway network would be less than it is under present conditions. When termination activities were complete, the amount of traffic along Dalton Highway would be much less than the amount under current conditions.

TABLE 4.6-8 Annual Waste Shipments during Pipeline Termination Activities

Waste Type	No. of Annual Truck Shipments
Sanitary liquid waste	7,663
Noncombustible solid waste	559
Incinerator ash	108
Fiberglass	102
Polyurethane	73
Hazardous solids	2
Hazardous liquids	11
Total	8,518

Source: Folga et al. (2002, Table WT1).

4.6.2.12 Hazardous Materials and Waste Management

4.6.2.12.1 Hazardous Materials Management.

Hazardous materials currently used in support of TAPS operations are present in various storage facilities at pump stations and at the Valdez Marine Terminal and off-ROW warehouses. They are also present in process equipment. Section 3.16.1 provides an overview of hazardous materials used in TAPS operations. Appendix C, Section C.2 provides detailed descriptions of hazardous material distribution throughout the TAPS. These chemicals would become superfluous once TAPS operations cease. However, many of the same chemicals used to support TAPS operations and maintenance activities would also likely be used to support the termination process. It is reasonable to expect, therefore, that existing hazardous material supplies in stock would be used to support termination activities. This is especially likely to be the case for vehicle and equipment fuels and for cleaning agents. For the chemicals in storage, adequate logistical planning against a scheduled termination event should allow the majority of existing supplies of usable hazardous materials to be depleted before termination operations cease. Amounts of hazardous materials that are not applicable to termination operations after TAPS operations cease may be recycled or transferred to other industries (perhaps through the Alaska statewide material reuse Web site) that can use these materials. Therefore, it is anticipated that no substantial waste generation would result from hazardous materials remaining in storage at the end of TAPS operations.

Substantial quantities of hazardous materials would be present in TAPS equipment at the time TAPS operations cease. It is expected that all such materials in process equipment would be removed during the cleaning and purging phase of termination and recycled. Such materials would include

Hazardous Waste Management under the No-Action Alternative

Under the no-action alternative, amounts of hazardous materials used to support TAPS operations would be reduced to zero once termination activities were completed. Hazardous waste generation could increase during the period of equipment cleanout but would be reduced to zero thereafter. Hazardous waste would be delivered to out-of-state facilities for treatment and/or disposal. Solid waste generation would increase during termination activities, primarily as the result of the increased work force and the dismantlement of TAPS facilities. Domestic solid wastes and nonhazardous solid wastes from facility dismantlement would be disposed of in APSC-operated landfills (after incineration) or in municipal landfills (after incineration in some cases). Scrap metal and other salvageable materials would be recycled at out-of-state locations to the greatest extent possible. Domestic and sanitary wastewaters would increase during termination activities primarily because of the increased work force but would then be reduced to zero as TAPS facilities were dismantled. Industrial wastewater treated at the Valdez Marine Terminal would decrease with the reduction in tanker traffic. It would then increase dramatically because of the flushing of the pipeline with seawater and surfactants during cleanout. Such wastewaters would be treated at the BWTF and discharged into the Port of Valdez pursuant to the Valdez Marine Terminal NPDES permit. Volumes of special wastes (primarily asbestos and PCBs) could increase slightly with the dismantlement of pipeline components and facilities. Some special wastes, for example, tanker garbage, would decrease with the reduction in tanker traffic at the Valdez Marine Terminal. All special wastes would be managed in accordance with existing procedures and regulations.

anhydrous ammonia recovered from heat pipes, glycol-based coolants, fire suppression agents, and some lubricants. However, brine solutions from the main line refrigeration units may have to be managed as a liquid industrial waste. Excess fuels removed from TAPS facilities as they are closed are likely to be resold in local markets. When such materials are not eligible for recycling or reuse, they would become waste streams associated with termination activities. The probability of occurrence and the impacts of those waste streams are discussed in the following sections.

4.6.2.12.2 Waste Management. On the basis of the no-action scenario described in Sections 4.2.4 and 4.6.1.1, the analysis of waste generation and management impacts is presented in two phases. The first phase addresses wastes associated with the emptying and stabilization of the TAPS, and the second phase addresses wastes directly related to system dismantlement. The generation and management of wastes during termination activities would have to comply with all applicable regulations to protect public safety, prevent environmental degradation, and minimize the risk to the environment and the public (e.g., new or modified operation permits may have to be obtained or new contingency plans developed).

It is assumed that crude oil emptied from TAPS facilities would be a potentially saleable product and would be recovered from TAPS equipment to the greatest extent possible and delivered to the Valdez Marine Terminal via the pipeline, or other means, for storage and ultimate shipment. The same is assumed for the kerosene used as the initial rinsing agent, which would also be recovered at the Valdez Marine Terminal. Wastes related to each major action, their probable character, and their most likely dispositions are discussed below. Only those actions resulting in substantial volumes of waste, wastes with hazardous characteristics, or wastes requiring special handling and disposal are included.

Unless otherwise specified, estimates of waste volumes and generation rates were derived from Folga et al. (2002).

Wastes Associated with Stoppage of Product Flow and System Cleaning.

Hazardous Wastes. At the pump stations and the Valdez Marine Terminal, cleaning of TAPS equipment and sumps, purging of transfer lines, removal of tank bottoms and scale, and removal of condensates would result in wastes. Similar wastes resulting from

TAPS operations have routinely exhibited characteristics of hazardous waste and are disposed of through a hazardous waste contractor at out-of-state Resource Conservation and Recovery Act (RCRA)-permitted TSDFs. It is assumed that the same procedures would be applied to wastes from emptying and cleaning during the termination process. Additional hazardous waste can be expected from the cleaning of ancillary fuel storage tanks. Excess hazardous materials and refined petroleum products that cannot be recycled would be characterized and, if necessary, would be managed as hazardous waste. Some discarded materials would also qualify as "listed hazardous waste" at the time a decision was made to discard them. Finally, some remediation wastes (i.e., spill debris) from responses to accidental spills of some refined petroleum products as hazardous material might also be characteristic hazardous waste. All hazardous waste would need to be transported to out-of-state RCRA-permitted treatment or disposal facilities.

Solid Wastes. Small amounts of nonhazardous industrial solid wastes would be generated as a result of emptying and cleaning TAPS equipment. The majority of the solid wastes generated during the purging and cleaning stage would be domestic wastes resulting from the increased workforce. It is assumed that these domestic wastes would be identical in character to domestic wastes generated during operations and that the management systems currently in place would continue at least through this stage. This includes the solid waste incinerators at the pump stations and the Valdez Marine Terminal, as well as portable incinerators that may be staged at pump stations or work sites during this period. It is assumed that municipal landfills and the APSC-operated landfills that currently support solid waste disposal would continue to be available.

Wastewater. During purging and cleaning of the pipeline, substantial quantities of industrial wastewater would result from flushing the system with seawater. Flushing water would be introduced at PS 1 and travel south via the pipeline to the Valdez Marine Terminal. It is assumed all such wastes would be processed at the BWTF and then discharged to Prince William Sound. The current NPDES permit for the BWTF allows treatment of raw and potable water and seawater that may contain residual products. It is expected that the seawater flushes would have an estimated average concentration of 0.02% crude oil by volume (Folga et al. 2002). The character of the seawater flushes is expected to be similar to that of the tanker ballast, which currently makes up 93% of the influent to the BWTF. Since there would be a significant reduction in the number of tanker visits to the Valdez Marine Terminal during the no-action period, the volume of ballast water being treated at the BWTF would also be reduced, thus freeing up additional capacity. Tankers are expected to visit the Valdez Marine Terminal for some period of time after oil ceases to flow in the pipeline in order to receive volumes of crude oil that are in storage at the terminal (including oil recovered in the BWTF during treatment of seawater flushes). Therefore, it is assumed that BWTF capacity would be sufficient to treat the volume of seawater used to flush the system. However, the capacity of the BWTF to accept influents is exceeded if seawater flushes arrive at a rate that is substantially higher than the rate at which ballast waters inflow to the BWTF.

The BWTF is equipped with three influent water storage tanks, each with an effective storage volume of 430,000 bbl. Maximum rates of inflow to these tanks is limited to 100,000 bbl because of their venting capacities. Peak daily flow rate through the BWTF is limited to 30 million gal/d (APSC 2000e). Therefore, the time period over which pipeline flushing will occur will be controlled by these BWTF design features. Alternatively, additional interim storage for rinsates may need to be established at the Valdez Marine Terminal. Crude oil storage tanks that have been emptied may serve this purpose.

It is estimated that a total of 399.1 million gal of seawater would be used to flush the system during termination activities; virtually all of it generated during the third year of the 6-year no-action period. Of the total volume of flushes, 2.1 million gal would have alkaline detergents and surfactants introduced to enhance cleaning capabilities. The presence of these additives can be expected to reduce the efficiency of the phase separation process at the BWTF. Therefore, a smaller percentage of crude oil

would be recoverable than is normally the case during the oil water separation phase. However, it is assumed that the BWTF technology is suitable for treating the seawater flushes used to clean the pipeline, including any alkaline agents or surfactants that may be introduced, before discharge to Prince William Sound.

Finally, as discussed in Appendix C, the reconfiguration of the tanker fleet, to be completed by the year 2008, may result in changes to basic treatment technologies at the BWTF.[2] Without more information on the alternative technologies that may be implemented, it is difficult to determine what impact a new technology or configuration would have on the ability of the BWTF to process and treat flushes during the no-action period. Changes to technologies employed at the BWTF may also be appropriate for more efficient management of pipeline flushings. Although seawater flushings and ballast water have essentially the same characteristics, the differences in the mean concentrations of hydrocarbons, detergents, and surfactants in some fraction of the flushings may argue for the introduction of alternative or complementary treatment technologies. It is reasonable to conclude that seawater flushings can be successfully treated so that the effluents discharged to Prince William Sound would meet all the specifications and discharge limits in the NPDES permit.

During TAPS operations, sludge from the BWTF is characterized and disposed of in a local landfill. It is assumed that the BWTF sludge resulting from the treatment of the flushing of the pipeline would be similar in character and, therefore, similar management and disposal is expected.

Domestic wastewaters would be produced at accelerated rates by virtue of the increase in labor populations. Discharges are expected to increase at each site up to the design capacity of existing sanitary wastewater treatment facilities during periods of extensive termination field effort (see Appendix C). Secondary biological sewage treatment and effluent disposal to tundra wetlands are expected to continue for the MCCFs and PS 5 and 6. Because design capacities of the facilities are expected to reflect full occupancy of the housing facilities, the volumes of discharges from these treatment facilities would be within existing permit limits. Therefore, it is assumed that the discharges would be managed the same as during TAPS operations. However, injection of wastewater plant effluents into stacks at PS 1, 3, and 4 requires sufficient stack temperatures to ensure vaporization, volatilization, and disinfection. Elimination of turbine-powered crude-oil pumping systems would preclude the use of pump engine exhaust stacks for wastewater disposal; therefore, alternative wastewater treatment would be employed at these pump stations (e.g., package plants). The septic systems that are currently used for disposal of sanitary wastewater at PS 7, 8, 9, 10, and 12 may be inundated by volumetric increases as a result of increases to resident populations. Portable package plants may be necessary for wastewater treatment throughout the construction (dismantlement) phase of termination. Enhancement of existing sanitary treatment facilities at the Valdez Marine Terminal may be needed to accommodate increased staffing and facility use during the termination period. Leach field replacement or use of package sewage treatment plants may be necessary to accommodate termination labor crews.

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2 Some portion of the tanker fleet visiting the Valdez Marine Terminal is already of double-hulled design. Decisions and schedules for tanker reconfiguration are driven primarily by the provisions and compliance schedules in the Oil Pollution Act (OPA). However, it is possible that a no-action decision on the TAPS ROW renewal would influence the decisions and schedules of owners of tankers that visit the Port of Valdez that have not already been reconfigured to double-hulled design.

Special Wastes.[3] No special wastes are anticipated as a result of the emptying and stabilization of TAPS systems.

Wastes Associated with Removal of Aboveground Facilities.

Hazardous Wastes. Very small amounts of hazardous wastes would be generated from the maintenance of vehicles and equipment used during the dismantlement and removal of aboveground facilities. It is estimated that approximately 70 yd^3 of hazardous solid wastes (e.g., mercury lamps and lead-acid batteries) and approximately 27,000 gal of liquid hazardous wastes (e.g., lubricants and solvents) would be generated from system dismantlement and the maintenance of vehicles and equipment used during the six-year termination period (Folga 2002, Table HW1). Although contractors would perform most termination activities, it is assumed that the management, transportation, and disposal of hazardous wastes would be under existing APSC management systems. Some components removed from the system may contain coatings or linings that would require characterization and possible management as hazardous waste. However, the majority of corrosion control coatings on TAPS equipment and pipeline segments are nonhazardous.

Solid Wastes. To the greatest extent feasible, nonhazardous solid wastes generated during the dismantlement of TAPS equipment and buildings would be recycled, including scrap metal and concrete. It is estimated that 105,000 tons of recovered metals annually would be recycled through Fairbanks (shipped out of either Whittier or Seward), and an additional 95,000 tons annually would be recycled through Valdez (Folga et al. 2002, Table WT1) (see Section 4.2.4.2 for a description of the management of recycled materials). Collectively, approximately 45 tons of concrete or cement building products would be recovered for reuse as fill or road base. Such materials are expected to be delivered to existing APSC or Alaska DOT material yards (Folga et al. 2002, Table WT1).

Both nonhazardous industrial wastes and domestic solid wastes would be generated during removal of aboveground facilities. The largest volumes of nonhazardous industrial wastes would result from the fiberglass insulation removed from around the pipe and from the waste polyurethane insulation removed from equipment. Fiberglass wastes are expected to be generated primarily during Years 3–5 of termination activities at an average amount of 135,800 yd^3 per year. A total of 407,000 yd^3 would result. Notwithstanding contamination from crude oil, fiberglass waste is expected to be manageable in municipal landfills. Likewise, polyurethane wastes are expected to be generated at a rate of 209,867 yd^3 per year during Years 3–5 of the termination activities, with a total amount of 629,000 yd^3 generated (Folga et al. 2002, Table NHW1). Again, notwithstanding unexpected contamination, polyurethane wastes are expected to be disposed of in municipal landfills.

Although both fiberglass and plastic wastes are eligible for disposal in APSC-operated landfills, these landfills have Class III operating permits that limit the volumes of wastes they can receive. Both the fiberglass and polyurethane waste streams would exceed the permit limitations of the APSC landfills. Therefore, these waste streams would have to be disposed of in local municipal landfills. As discussed in Section 4.3.12, during TAPS operation, solid wastes represent a minor fraction of the solid wastes received at municipal landfills (see Table 4.3-2). Although the volumes of solid wastes from routine TAPS operation delivered to municipal landfills represent only small fractions of the total waste volumes received at those sites, the ability of some of the landfills to accommodate the substantially increased rates of solid waste generated during dismantlement is suspect. Relatively small-scale operations (e.g., Glennallen and Delta Junction) might be

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3 "Special wastes" are identified in Section 3.16.5. Special wastes are those for which special handling and disposal procedures have been developed, especially in federal or state regulations. Special wastes associated with the TAPS include PCBs, asbestos, pesticide wastes, drag reducing agent, spent glycols, tanker garbage, medical waste, spent sandblast media, asphalt removed from roads or workpads, and radioactive wastes.

overwhelmed and might choose to not provide increased disposal services, because doing so might necessitate amendments to operating permits and would prematurely exhaust landfill capacity, requiring these communities to undertake the costly exercise of siting near landfills.[4] It is also important to recognize that dismantlement of the North Slope and Deadhorse facilities is also likely to generally coincide with dismantlement of the TAPS. Consequently, the Oxbow Landfill might also find it difficult to accommodate these multiple increased needs for solid waste disposal. Notwithstanding these localized logistical and capacity problems, the collective capacities of Alaska landfills located within reasonable distances of the TAPS are sufficient to meet the disposal needs that would result from TAPS dismantlement. However, all but the largest of the landfills that would choose to participate might be required to apply to ADEC for amended operating permits.

It is estimated that 57,000 yd^3 of noncombustible solid wastes (e.g., construction debris and rock cuttings generally generated during structure demolition) would be generated during the six-year termination period, with peak generation during Years 3 and 4 (25,000 and 16,000 yd^3, respectively) (Folga et al. 2002, Table NHW1). Although these wastes are eligible for disposal in APSC-operated landfills, as discussed above, permit limitations at the APSC landfills may require that these waste streams be disposed of in local municipal landfills.

Volumes of domestic solid wastes would increase substantially during the no-action period, especially during Years 3–5 because of increases in workforce populations. Incinerators currently operated at the pump stations and the Valdez Marine Terminal are assumed to continue to work to their capacities until they, themselves, are dismantled. It is expected that portable incinerators would be put into service and that nonhazardous, combustible solid wastes, primarily domestic wastes would continue to be incinerated throughout the 6-year termination period. APSC-operated landfills would continue to receive ash from the incinerators within their permit limits. The remaining ash would be delivered to municipal landfills. It is estimated that 8,100 yd^3 of incinerator ash would be generated over the entire 6-year period; the majority would be generated during the third through fifth years (Folga et al. 2002, Table NHW1). As in the past, with adequate controls, the ash should be nonhazardous.

It is reasonable to expect that the APSC-operated landfills would be used to the extent of their permits. If the APSC-operated landfills are closed, provisions in the operating permits would require the establishment of a final cover, the submittal to ADEC and execution of a revegetation plan, and filings with the State Recorder's Office encumbering the deed to prevent disturbance of the waste disposal cells by future owners. Visual inspection is required for at least five consecutive years following closure to check for signs of damage from settlement or erosion.

Wastewater. Minimal volumes of industrial wastewater would be generated during the termination process. Pipeline dismantlement would involve some excavation to remove valves at above- and belowground transition segments, and river crossings. It is assumed that any necessary dewatering activities and attendant discharges would be managed similar to those conducted during past TAPS operations under the linewide NPDES and Alaska permit. In addition, discharges would continue from containment areas and other facilities covered by the linewide NPDES and Alaska permit that remain active during some portion of the dismantlement period (e.g., existing diesel storage tanks kept active to support vehicles and equipment used during dismantlement). In addition, the EPA Multi-Sector General permit would continue to cover any industrial site discharges (e.g., material storage sites) that remain active to support dismantlement activities. Demolition and dismantlement activities may be governed by the EPA general permit for discharges from construction activities.

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[4] However, a permit application renewal application currently under review by ADEC for the Glennallen Landfill indicates the landfill's intention to expand service from a Class III to a Class II facility (Stockard 2002).

As discussed above, domestic wastewaters would be produced at accelerated rates by virtue of the intensive labor effort involved. Therefore, the design capacity of existing domestic wastewater treatment facilities may be exceeded, and alternative treatment procedures may be necessary (see wastewater section above under system cleaning). In addition, final closure of any wastewater treatment facility at the pump stations or the Valdez Marine Terminal, including septic tanks and holding tank systems, would be in compliance with ADEC-approval conditions.

Special Wastes. Limited amounts of special wastes would result from system dismantlement, primarily generated at the pump stations and the Valdez Marine Terminal. Waste dielectric fluids containing PCBs would be generated when capacitors at the Valdez Marine Terminal are dismantled, since it is assumed that these capacitors are sufficiently large to require drainage prior to shipment. PCBs would also be present in capacitors removed at the North Pole metering station. Throughout the system, light ballasts removed as part of system dismantlement may contain PCBs. It is assumed that the procedures in place for managing PCBs during operations would be followed. PCB wastes would be shipped to out-of-state facilities.

Where asbestos-containing materials (ACM) are present in building components, appropriate ACM removal actions would be conducted prior to demolition. Currently, ACM removal is conducted by licensed contractors. The resulting ACM waste would be delivered to an appropriately permitted landfill (e.g., Palmer or South Cushman municipal landfills). Similar procedures would be in effect to remove ACM from TAPS equipment (e.g., pipeline gaskets) during dismantlement to ensure proper disposal. Building components containing radioactive elements (e.g., smoke detectors and self-illuminated EXIT signs) would be removed prior to demolition and managed in the same manner as during TAPS normal operations.

Ongoing remediation of contaminated media would continue in accordance with the ADEC-approved remediation plans. Management procedures for existing remediation sites, including stockpiles at three pump stations, are assumed to continue. However, additional remediation efforts necessary because of termination activities would have to have ADEC-approved remediation plans.

4.6.2.13 Human Health and Safety

This section discusses the potential consequences on human health and safety that could occur if the grant of ROW was not renewed and TAPS facilities were removed under the no-action alternative. Two types of impacts are addressed and discussed: (1) the industrial or occupational risk to workers from physical hazards and (2) the risk to the general public from chemical exposures associated with termination activities.

Impacts of No-Action Alternative on Human Health and Safety

Operations, maintenance, and construction workers at any facility are subject to risks of fatalities and injuries from physical hazards. During the termination activities under the no-action alternative, the estimated annual number of fatalities for TAPS workers is less than one, while the total number of fatalities over the 6-year period is approximately one. The estimated annual numbers of recordable injuries (43–409) and lost time injuries (20–204) represent upper-bound ranges on the physical hazard risks of injuries to TAPS construction, transportation, and service workers over the 6-year period of pipeline planning and removal activities.

Criteria pollutants or hazardous air pollutants emitted from transportation vehicles used for termination activities would not cause adverse public health impacts. Health and safety impacts from a transportation-related spill were also assessed. For this spill, the maximum impact distance estimated was 0.02 km. People who remain present within this area could experience serious health effects from this or a similar spill.

4.6.2.13.1 Occupational Risks.

At any facility, there are risks of injuries and fatalities to operations, maintenance, and construction workers from physical hazards. While such occupational hazards can be minimized when workers adhere to safety standards and use protective equipment as necessary, fatalities and injuries from on-the-job accidents can still occur. Rates of accidents have been tabulated for all types of work, and risks can be calculated on the basis of historical industrywide statistics. When possible, these statistics were used to estimate the extent of risk from physical hazards to workers under the no-action alternative.

The BLS and NSC maintain statistics on the annual number of injuries and fatalities by industry type. NSC (2000) summarizes statistics from its member companies; NSC (2001) summarizes BLS statistics. The expected annual numbers of worker fatalities and injuries for specific industry types were calculated on the basis of BLS and NSC rate data and the number of annual FTE workers that would be required for construction, transportation, and service activities during pipeline termination. In addition to the workforce required for the continuing operation of the pipeline during Years 1 and 2 (as addressed under the proposed action), it is estimated that TAPS would employ 232 workers for termination activities during Year 1, and that the number would rise to a maximum of 5,219 in Year 3, then drop to 561 by Year 6 (TAPS Owners 2001a). Since it is assumed that the general types of activities required of these employees would be similar to those carried out by employees in the construction, transportation and public utility, and industrial services sectors, those fatality and injury rates were used to estimate annual risks. Specific incidence rates for fatalities, recordable injuries (defined as total recordable cases by the Occupational Safety and Health Administration [OSHA]), and lost time injuries (defined as total lost workday cases) are included in Table 4.6-9.

Annual fatality and injury risks were calculated as the product of the appropriate incidence rate and the maximum number of FTE employees working during ROW termination: (a 2-year planning and design phase and a 4-year period for purging and cleaning of the pipeline, the actual dismantling of the pipeline, and demobilization). The annual fatality and injury estimates for construction, transportation, and service-related activities are shown in Table 4.6-9. No further distinctions among categories of workers (e.g., supervisors, laborers) were made because the available fatality and injury statistics by industry are not sufficiently refined to warrant analysis of worker rates in subcategories.

The estimated maximum annual number of fatalities for TAPS workers during pipeline termination activities would be less than one (specifically, between 0.06 and 0.60 per year). The total number of fatalities over the 6-year period would be approximately one. In contrast, incidents related to construction of the pipeline resulted in 31 lives lost, but the total work force was almost six times larger (APSC 2001i).

The estimated maximum annual number of injuries during both the planning and removal phases (i.e., the entire termination period) would range from 43 to 409 (total recordable cases) and 20 to 204 (total lost workday cases). These results are based on industrywide statistics for the construction, transportation and public utility, and services sectors from the BLS (NSC 2001). For comparison, the number of injuries was also estimated by using the incidence rate for more specific industry classifications of “heavy construction, except building,” “trucking and warehousing,” and “engineering and management services” (NSC 2000). The overall estimated maximum annual number of injuries on the basis of this subset of self-reported data from NSC member companies was somewhat lower, ranging from 13 to 190 recordable injuries and 5 to 92 lost time injuries. Therefore, the BLS-based estimated maximum annual number of recordable injuries (43–409) and lost time injuries (20–204) would be expected to represent upper bounds on the risks of injuries from physical hazards to construction, transportation, and service workers over the 6-year period of termination activities.

TABLE 4.6-9 Maximum Annual Occupational Hazards Associated with Termination Activities under the No-Action Alternative

Phase (Time Period)	Termination Activity	Impacts to Workers[a] FTEs[b]	Fatalities[c]	Recordable Injuries[d] BLS	Recordable Injuries[d] NSC	Lost Workday Injuries[d] BLS	Lost Workday Injuries[d] NSC
Planning (Years 1 and 2)	Demolition	415	0.06	36	11	17	4
	Transportation	0	0	0	0	0	0
	Services	138	0.002	7	2	3	1
Removal (Years 3–6)	Demolition	3,653	0.50	314	93	153	36
	Transportation	783	0.09	57	83	34	50
	Services	783	0.01	38	14	17	6

a All employees and contractors involved in pipeline termination activities were included in the physical hazard risk calculations.

b The maximum annual number of full-time equivalent workers (FTEs) for each time period were based on the assumed annual average employment for termination activities taken from the Environmental Report (TAPS Owners 2001a).

c Fatality incidence rates used in the calculations are the latest (2000) industrywide statistics from the BLS for the overall industry divisions of construction, transportation and public utilities, and services. They are 13.6, 11.5, and 1.3 fatalities, respectively, per 100,000 full-time workers (NSC 2001). Unlike injury incidence rates (see footnote d below), fatality incidence rates for more specific industry classifications, based on reports of NSC member companies, are not provided in NSC (2000).

d Injury incidence rates used in the calculations are the latest (1999) industrywide statistics from the BLS for the overall industry divisions of construction, transportation and public utilities; and services. They are, respectively, 8.6, 7.3, and 4.9 recordable injuries per 100 full-time workers, and 4.2, 4.4, and 2.2 lost time injuries per 100 full-time workers (NSC 2001). For comparison, the numbers of injuries shown in parentheses were estimated by using the latest (1999) incidence rate for more specific industry classifications of "heavy construction, except building," trucking and warehousing," and "engineering and management services." They are, respectively, 2.55, 10.58, and 1.79 recordable injuries per 100 full-time workers, and 0.98, 6.43, and 0.71 lost time injuries per 100 full-time workers (NSC 2000). While this second set of NSC data may be more applicable to TAPS than the first set of BLS data, it is based on reports of NSC member companies only, so the data not be representative of termination-related industries.

The calculation of risks of fatality and injury from industrial accidents was based solely on historical industrywide statistics, which assume that any activity would result in some estimated risk of fatality and injury. The use of best management practices to achieve occupational health and safety compliance should reduce future fatality and injury incidence rates.

4.6.2.13.2 Risks to the Public

Risks from Pollutants in Ambient Air. During Years 1 and 2 of the termination period, the pipeline would be operating and human health risks would be the same as those discussed in Section 4.3.13. Following the 2-year planning and design phase, there would

be a 3-year period during which existing facilities (i.e., the pump stations, Valdez Marine Terminal, and aboveground portions of the pipeline) would be dismantled. During this period, pollutants would be emitted from dismantling activities and operation of related transportation vehicles. After this limited period of termination activities ended, emissions from TAPS operations would stop.

The main emissions of concern for human health that would result from dismantling existing facilities would likely be criteria pollutants and some HAPs generated from the excavation activities and operation of heavy equipment. Section 4.6.2.9.1 discusses the impacts of these emissions that would be associated with no-action alternative activities. For criteria pollutants, ambient air quality standards would not be exceeded, and no adverse human health impacts would be expected. For HAPs, ambient air quality standards do not exist, but impacts to human health would be low or none because of low emission rates over a relatively short time period and releases over a large area.

Risks from Spills. Under the no-action alternative, a 3,000-gal diesel spill scenario in the *anticipated* frequency category was assessed. The cause of the spill would be a tanker truck rollover, which could occur anywhere along the Haul Road. The methods used to assess the spill were the same as those used for assessing spills under the proposed action (see Section 4.4.4.7.2).

Because this spill volume is relatively small, only a 1-in. diesel pool depth was modeled. For this spill under maximum hazard weather conditions (F stability, 1.5-m/s wind speed), concentration of only the n-hexane would exceed the comparison concentration at the edge of the spill area in the first hour after the spill, with the maximum impact distance extending to 0.02 km (0.01 mi) downwind of the spill area. Maximum concentrations of benzene and toluene in the first hour after the spill (300 and 180 mg/m^3, respectively) would exceed the comparison levels for mild adverse effects at the edge of the spill area, but the concentrations of both would be less than the comparison values for serious effects at the edge of the spill area. Under more typical, minimum hazard weather conditions (D stability, 3-m/s wind speed), the maximum concentrations of benzene and toluene would decrease to 150 and 87 mg/m^3, respectively, and the concentration of n-hexane would dissipate to less than the TEEL-2 value at the edge of the spill area.

Potential for Exposure to PBT Chemicals. Of the persistent, bioaccumulative, and toxic substances (see Section 3.17), only radionuclides may be associated with deconstruction activities under the no-action alternative. Naturally occurring radioactive material may be deposited in oil production pipes and vessels as the temperature and pressure of oil and water brought to the surface decreases. When equipment is taken out of production, actions are taken to avoid hazards from NORM exposure (BP Amoco Alaska 2001). Although contamination with NORM is more likely to occur in equipment used at North Slope production wells, it is possible that some NORM has been deposited in TAPS equipment as well. When the pipeline is dismantled, equipment will be surveyed for the presence of NORM. If NORM is present at sufficient levels, the equipment will be segregated, secured, and properly disposed of through a licensed NORM contractor, in order to prevent exposures of workers or the general public.

4.6.2.14 Biological Resources Overview

Direct and indirect effects of the no-action alternative on biological resources are discussed in the sections that follow (through Section 4.6.2.18). The region of influence subject to direct impacts from termination activities under the no-action alternative would be the same region as that discussed for the proposed action (Section 4.3), that is, the "footprint" and vicinity of the 800-mi-long TAPS ROW and other facilities that are associated with pipeline operations. Those associated facilities include the Valdez Marine Terminal, pump stations, material sites (quarries), disposal areas, previously contaminated sites, support facilities (e.g., airports, access roads, and work camps), and the gas fuel line that supplies gas to PS 1 to 4. (These facilities are described in Section 3.1.2.1.) The region of influence subject

to indirect impacts on biological resources from termination activities includes adjacent areas that would be affected secondarily by termination activities within the project footprint.

Termination activities associated with the no-action alternative that could affect biological resources include the dismantlement process, purging and cleaning of pipe and other structures left in place, generation of waste materials, regrading of project areas, revegetation activities, and accidental releases (spills) of oil or other materials. The termination process would leave certain portions of the TAPS in place (e.g., workpad, river training structures), and their continued presence would affect biological resources. In general, the no-action alternative could affect biological resources by altering habitat characteristics and the species supported by these habitats. For the most part, the short-term adverse impacts from termination activities would be followed by an eventual return to conditions more similar to those that existed before the TAPS was built. However, many Arctic region fish grow and develop slowly because of low primary and secondary productivity, short growing seasons, and low water temperature. As a consequence, recovery for fish may take longer in the Arctic region than in other areas.

Descriptions of the no-action alternative and associated impacting factors upon which the assessment of biological impacts is based are presented in Sections 4.6.1 and 4.2.4, respectively.

4.6.2.15 Terrestrial Vegetation and Wetlands

The limited field activities conducted during the first 2 years of termination under the no-action alternative would likely result in only minor impacts to terrestrial vegetation and wetlands. Otherwise, impacts are expected to be the same as those discussed for the proposed action. During Years 3 through 5, the dismantling and removal of aboveground structures under the no-action alternative would involve a variety of ground-disturbing activities; however, ground disturbance would be minimal over most of the 380 mi of buried pipe. Removal of pipe, vertical support members, valves, and other components would likely result in damage to or removal of vegetation within areas of the ROW disturbed by the operation of heavy equipment. Such disturbance might include the displacement of soil or workpad gravel and would require extensive regrading. Regrading following culvert removal and establishment of low-water crossings would also remove vegetation within the ROW in the immediate vicinity of crossings. Operation of heavy equipment might also result in soil compaction and alter soil hydrology. Activities along stream and river margins, such as the removal of bridges and abutments, would remove and disturb riparian vegetation. In permafrost areas, disturbance to vegetation might result in the development of thermokarst, which could impact adjacent vegetation communities by inundation.

Termination activities might result in disturbances to wetland areas, especially where the ROW does not presently contain a gravel pad and where wetland communities may be extensive, or areas where buried pipe adjacent to river training structures or valves would be removed. In locations where buried pipe would be removed, wetland areas might be excavated and drained during removal operations. Wetlands would not be filled under this alternative, and impacts generally would be minor and temporary. Most activities would affect previously disturbed and replanted areas of the ROW.

Up to 260 acres of land would be required for temporary storage of scrap metal (Folga et al. 2002). These storage areas would consist of previously used material sites and disposal

Impacts of No-Action Alternative on Vegetation

Under the no-action alternative, the ROW, pump station sites, and other TAPS areas would eventually become vegetated with stable terrestrial and wetland vegetative communities. These communities would have many similarities to adjacent undisturbed communities; however, differences in their structure and species composition would likely remain over the long term.

sites, as well as available urban land. Vegetation communities in these areas would already be disturbed because of previous activities. Staging areas and work camps would be located at pump stations and also would affect only previously disturbed areas.

Disturbed areas would be restored by methods currently used for restoration associated with maintenance activities (APSC 2001j). Revegetation methods and procedures for disturbed areas would require evaluation and approval by the AO and the SPC for each location. The methods used for revegetation would be modified and adjusted according to site-specific conditions. Disturbed areas would be restored as soon as practical. Restoration would have to meet performance requirements, which include the following: "remove all contaminated material; to the extent possible, return a disturbed site to its original or normal physical condition and natural biological productivity and diversity with reestablishment of native plant and animal species; prevent erosion; conform to the adjoining land forms and approximate the original land contours; maintain pipeline system integrity; remove improvements as required by the appropriate authority; and provide for public safety" (Brossia and Kerrigan 2001).

Disturbed areas would be revegetated primarily with native species occurring in adjacent natural areas. Approximately 3,151 acres of the workpad (917 acres north of MP 243, 1,128 acres between MP 244 and MP 493, and 1,106 acres south of MP 494) and 300 acres of pump station gravel pads would undergo natural revegetation. Diverse communities of local native species would develop on the restored areas. Soil compaction from the use of heavy equipment might alter soil moisture characteristics and soil structure and initially hinder the reestablishment of native species. However, revegetated areas would eventually support an effective cover of biologically diverse communities of herbaceous and woody species (McKendrick 2002).

Restoration

Restoration is "returning a disturbed site … to its original or normal physical condition and natural biological productivity and diversity by means of best practical protection, stabilization, erosion control, habitat reconstruction, and revegetation techniques with the intent of reestablishing native plant and animal species" (Brossia 2001).

Some areas, such as those that might be more susceptible to erosion or more difficult to revegetate, would be seeded with native perennial grasses (such as native varieties of red fescue and Bering hairgrass) and nonpersistent annual ryegrass, and they would be mulched if necessary. In addition, 534 acres of access road surface; 190 acres of streambanks, valve sites, and road crossings; and 350 acres at the Valdez Marine Terminal would be regraded and seeded. Extended periods of time might be required for local native species to successfully invade seeded areas and for native communities to become well established. Because native seed would be used for revegetation, the introduction of nonnative species would be limited (although nonnatives might become introduced in mulch).

Soil disturbance associated with dismantling and removal activities might result in the erosion of soil or gravel and subsequent deposition of sediment in surface waters and wetlands downgradient from the work areas. Sediments could cover plant leaf surfaces, reduce the amount of oxygen available to roots, or alter soil chemistry or soil moisture levels, thereby possibly killing vegetation or resulting in reduced growth and reproduction. The composition of the vegetative community might be altered, or vegetation might be eliminated entirely in heavily impacted areas. Excessive sediment input might reduce the capacity of wetlands to improve water quality and might cause wetland areas to convert to upland. Culvert removal, regrading, and restoration might also result in sedimentation of downstream surface water bodies; however, mitigation and monitoring would minimize the impacts. The erosion that is occasionally associated with culvert flows would be reduced or eliminated. Activities along stream and river margins, such as the removal of bridges and their abutments or buried pipe near river training structures or the regrading of workpads, might also result in sedimentation of surface waters.

Dismantling and removal activities, as well as increased vehicle traffic along the ROW and

Dalton Highway during the cleaning, purging, and removal period, would generate airborne dust. Over the 3-year cleaning and removal period, that dust would become deposited on terrestrial and wetland vegetation. However, the effects would be temporary and would not be expected to alter the composition or function of the vegetative community in the long term. Vehicle traffic associated with maintenance and monitoring activities and the transportation of workers and materials would be greatly reduced following TAPS decommissioning. Therefore, the amount of dust generated from traffic along Dalton Highway and the ROW would also likely be greatly reduced.

Accidental spills or leaks could occur during the termination period. Spills during the first two years would be similar in magnitude and frequency to those assessed under the proposed action, since pipeline operations during those years would be similar to proposed action operations. Spill scenarios evaluated for Years 3 through 5 of the no-action alternative are considered *anticipated* events (frequency greater than 0.5/yr), except for two small spills in the *likely* range (Section 4.6.1.2). Catastrophic spills are considered incredible events under this alternative and were not analyzed. The largest spill evaluated would result from the overturning of a tanker truck along the Haul Road during Year 3 (cleaning and purging stage) of pipeline termination activities. Under this scenario, 8,000 gal of kerosene would be spilled on land. A large portion of the spilled fuel would likely evaporate because of its high volatility, and impacts on land would be limited to a relatively small area (less than 0.3 acre). A portion of the fuel might enter nearby surface waters, such as wetlands. However, because of evaporation the impacts to surface water would be limited to a short distance from the spill (Section 4.6.2.6). Terrestrial vegetation and wetlands could be adversely impacted by a kerosene spill, similar to the effects of a diesel fuel spill. Vegetation in the area of the spill that came in contact with the kerosene would be killed, and recovery of vegetation would be very poor without soil remediation (Walker et al. 1978). Submerged wetland vegetation would be less affected by a spill and would likely recover.

Under the no-action alternative, control of ROW vegetation (which includes cutting woody vegetation) would cease following decommissioning, allowing native shrubs and trees to grow and increase in density within the ROW. Native species present within adjacent undisturbed communities would continue to colonize the ROW, resulting in an increase in the distribution and abundance of native species and an increased similarity between ROW communities and nearby undisturbed communities. Vegetative cover would continue to increase on most portions of the ROW that currently lack complete cover. However, the differences in substrate characteristics between the ROW and adjacent undisturbed areas might prevent the establishment within the ROW of mature communities identical to those of nearby undisturbed areas. Many impacts on vegetation associated with the initial construction of the TAPS, such as the loss or alteration of mature terrestrial and wetland communities, would continue.

Over time, vegetative communities would naturally change, as exposed areas were initially colonized by herbaceous pioneer species adapted to disturbance conditions. As the process of succession proceeded, species that are less tolerant of disturbance (often shrubs) would become established, benefiting from the conditions created by the pioneer species, which would then be expected to decline. Mature, stable communities adapted to local climatic, soil, and moisture conditions would eventually become established.

Disturbed areas within the lowland tundra portion of the ROW might initially become vegetated with grasses, such as alkaligrass (*Puccinellia* spp.) or tufted hairgrass

Differences between ROW and Surrounding Areas

Within the TAPS ROW, gravel, moisture, nutrients, organic material, and thickness of the surface organic mat differ from the surrounding undisturbed areas. The TAPS ROW generally has a high gravel content and lower moisture level, lower organic matter, and reduced organic mat thickness.

(*Deschampsia caespitosa*) (McKendrick 1999, 2002). Forbs such as dwarf fireweed (*Epilobium latifolium*) would subsequently become common. Eventually, shrubs such as willow (*Salix* spp.) would likely become dominant, along with forbs, grasses, and sedges (*Carex* spp. and *Eriophorum* spp.) (McKendrick 2002). The colonization by native shrubs would continue to increase in portions of the ROW not disturbed by dismantling and removal activities.

Disturbed areas of the upland tundra zone would follow a similar successional pattern. Polargrass (*Arctagrostis latifolia*) might initially colonize an area, with forbs such as dwarf fireweed and starwort (*Stellaria longipes*) increasing subsequently. Shrub species, including heath shrubs such as bog blueberry (*Vaccinium uliginosum*), along with willows and dryas (*Dryas* spp.), would eventually become dominant (McKendrick 2002). Native shrubs would continue to increase in areas not disturbed by dismantling and removal activities.

Herbaceous species, such as bluejoint (*Calamagrostis canadensis*) and fireweed (*Epilobium angustifolium*), would initially colonize disturbed areas in the boreal forest zone. Shrubs would subsequently become dominant and would primarily include willows and alder (*Alnus crispa*). Poplar (*Populus balsamifera*) and aspen (*Populus tremuloides*) trees would also become common components of mid-successional communities. Trees that are dominant in the adjacent mature forests, such as white spruce (*Picea glauca*) and black spruce (*Picea mariana*), would gradually colonize these areas (McKendrick 2002). Communities in the ROW presently dominated by shrub and herbaceous species in the boreal forest zone would eventually become populated with these tree species.

Pioneer Species

Pioneer plant species are adapted to soil and light conditions that often result from disturbance. They typically appear following disturbances that eliminate vegetative cover, such as avalanches or floods along rivers that create new sand and gravel bars or mud flats. Pioneer species quickly colonize these unvegetated areas and establish a vegetation cover.

Initially, disturbed areas in the coastal forest zone would also become vegetated by herbaceous species, with shrubs and broadleaf trees later becoming dominant. Trees such as Sitka spruce (*Picea sitchensis*), which are dominant in the adjacent mature forests, would gradually colonize these areas (McKendrick 2002). Communities in the ROW presently dominated by shrub and herbaceous species in the coastal forest zone would eventually become populated with these trees.

Maintenance of the workpad and pipe would cease after termination activities were completed. As long as the workpad and other disturbed areas in the ROW remained unvegetated, vegetation downgradient from the workpad or other disturbed areas might receive sediments from storm-water runoff. Erosion of the ROW from high or redirected stream flows might result in the degradation of wetlands and terrestrial communities and the potential exposure of buried sections of the pipe. Because the construction of guidebanks and revetments would cease following decommissioning, erosion of streambanks near the ROW and stream channel migration (which occasionally occurs at sharp river bends) would no longer be restricted. Materials eroded from the ROW might cover existing vegetation or be dispersed downstream, causing impacts on streamside wetlands or floodplain communities. Vegetation might be injured or killed by eroded materials, thereby reducing total vegetative cover or changing the composition of the vegetative community.

Surface water drainages crossing the ROW might become blocked by debris, such as fallen trees, or by beaver activity. Such blockages might create impoundments along the ROW, resulting in the development or alteration of wetland communities and the loss of upland communities, or they might create scouring (APSC 2001j). Inundation might also result in the

Maintenance Activities

Examples of maintenance activities that would cease include brush cutting, vegetation restoration, workpad repairs, construction of guidebanks and revetments, removal of debris from drainages, and corrosion repairs.

development and expansion of thermokarst, causing further losses of terrestrial communities.

Buried sections of the pipeline might eventually corrode, allowing the entry of groundwater into the pipe. Extensive drainage of groundwater might alter the hydrologic characteristics of wetlands, resulting in changes in the composition and function of the vegetative community. However, because groundwater levels would generally stabilize over time, such hydrologic disturbances would generally result in short-term impacts to wetlands. Corroded sections of pipe might eventually collapse and create a large, linear ground surface depression. Resulting changes in surface water drainage patterns could alter vegetative communities both within and outside the ROW, creating wetter conditions in some areas and drier conditions in others.

The continued existence of the workpad and access roads would continue to create an opportunity for human access on or adjacent to the ROW. Recreational use of the ROW might increase after aboveground structures were removed, although the growth of woody vegetation and removal of culverts would likely inhibit the extensive use of vehicles. Although the impacts resulting from human access would likely be minor, effects of vehicle use could include the injury to or destruction of vegetation, loss of vegetative communities, or changes in community structure.

4.6.2.16 Fish

In the short term, TAPS termination activities could impact fish populations and habitats in ways similar to those documented for TAPS construction (Section 3.19). Impacts to fish during Years 1 and 2 of the termination period would be similar to those described under the proposed action (Section 4.3.16) because the pipeline would continue to operate while termination activities were being planned and initiated. Removal of the aboveground portions of the pipeline would be a major construction action that would increase the number of workers and amount of vehicle movement along roadways and the workpad. In the long term, impacts on fish after completion of termination activities would likely be less than impacts from the proposed action, largely because of the decreased amount of maintenance traffic along the ROW. However, there might also be some long-term impacts associated with the deterioration of belowground pipeline components left in place.

As discussed in Section 4.3.16 for the proposed action, activities that would be most likely to affect fish would be those that would create barriers to fish movement, change water surface flow patterns, deposit sediment in surface water bodies, change water quality or temperature, contaminate water, or change human access to water bodies. The descriptions of the impacts on fish from the no-action alternative are broadly grouped into impacts that would result from (1) alteration or loss of fish habitat, (2) obstructions to fish passage, or (3) increased human access.

Impacts of No-Action Alternative on Fish

For the no-action alternative, there would be an increased potential for impacts to fish habitat during the pipeline removal phase because of increased traffic and construction activity. In the long term, impacts would be less than those from the proposed action because there would be less maintenance traffic along the pipeline ROW.

4.6.2.16.1 Alteration and Loss of Habitat. Activities related to the removal of pipeline components in the active floodplain during termination would alter fish habitat by removing vegetative cover or increasing sedimentation and erosion. During the removal of culverts and other pipeline components, there would also be the potential for increased sediment loads, alteration of instream and riparian habitat, and contamination from oil or other chemicals. Removal of cover along and within a stream could substantially reduce the carrying capacity of the altered stream reach, both by affecting the abundance and composition of some invertebrate prey and by making the area unsuitable for refuge from predators (especially terrestrial predators, such as birds and bears). Removal of stream cover could also affect the ability of some fish

predators, such as northern pike, to capture prey. South of the Brooks Range, large woody debris in streams provides important cover for many fish species. Cut banks and boulders provide additional cover. North of the Brooks Range, large woody debris is less abundant, and cover is provided primarily by cut banks and boulders. Although activities in and around the active channel would likely avoid loss of these cover features, some cover would still be affected by termination activities, and localized short-term impacts on fish could occur. Although restoration of disturbed areas would include establishing vegetation and streambed contours to achieve conditions appropriate for the affected areas, the impacts on vegetative cover could persist for several years after the initial disturbance.

As during current or proposed maintenance activities (Section 4.3.16), pipeline removal operations would also need to avoid the disturbance, dewatering, or degrading of fish overwintering areas. The potential for fish mortality would increase because termination activities (e.g., culvert excavation and removal) would be required at a large number of stream crossings. As described in Section 4.6.2.6, termination activities would not be expected to affect the volume of surface water flow. However, turbidity and sediment deposition would increase if excavation occurred in streams or floodplains. Impacts on fish overwintering areas would be minimized by adhering to the current permitting process and by scheduling work to be done in streams at nonsensitive or noncritical periods for fish when possible. Fish use of affected habitat would be expected to resume once termination activities were completed. Because the pipeline components that remained buried would be cleaned before being capped, no adverse impacts would be expected from the contamination that can result when uncleaned buried pipeline components deteriorate. It is difficult to anticipate the potential long-term impacts that might occur as buried pipeline in overwintering areas would become exposed as a result of the movement of sediments and the deterioration of the remaining pipeline components. Exposure of buried pipeline components could cause changes in localized deposition or scour rates, which could result in long-term increases or decreases in the availability of overwintering areas.

The spill analysis for the no-action alternative (Section 4.6.1.2) indicates that the occurrence of a catastrophic oil spill during termination activities would be highly unlikely. Consequently, it is considered unlikely that very large volumes of oil would be introduced into waterways as a result of termination activities. The most damaging spill presented in the spill analysis for the no-action alternative was associated with an accident involving the rollover of a tanker truck transporting diesel fuel for use by heavy equipment during the purging and cleaning stage of termination. It is estimated that one or two such accidents might occur during the termination period and that up to 3,000 gal of diesel fuel or 8,000 gal of kerosene could be released. The potential impacts on fish from such a release would depend on how much of the spilled fuel entered a stream, the size of the stream, the species of fish present, and the timing of the spill relative to the life cycles of those species. Although such a spill could lead to mortality of fish in a particular stream segment, it is anticipated that (1) the effects would not persist for more than a few days because of the volatilization of the diesel fuel or kerosene from the water's surface and dilution by mixing with the water and (2) the fish community would recover. Other spills of diesel fuel or kerosene considered in the spill analysis (Section 4.6.1.2) were of smaller volume (20 to 250 gal) and could occur several times a year. However, it is anticipated that the effects of such spills would be relatively minor compared with the 3,000- to 8,000-gal spill scenarios discussed above even if the spill reached fish streams.

As discussed in Section 4.3.16, increased levels of turbidity and sedimentation could adversely affect fish populations. Under the no-action alternative, termination activities such as removing culverts, regrading stream crossings, and excavating pipeline components located near water bodies could increase the amounts of sediment in nearby water bodies. Removal of pipeline components during termination activities would be regulated by (1) the linewide NPDES permit; (2) the Wastewater General Permit; (3) the NPDES Permit for Storm Water Discharge from

Construction Activities Associated with Industrial Activity, as discussed in Section 3.7.2.5 (Surface Water Quality along the ROW); and (4) fish habitat permits. In addition, as is typical practice, construction activities would be avoided during winter months in areas where overwintering fish might be affected (Section 4.3.16). As long as termination activities complied with stipulations of those permits, impacts on fish from removal activities would be expected to be minor and temporary.

Under the no-action alternative, discharges into Prince William Sound from the BWTF and the sanitary water treatment plant at the Valdez Marine Terminal would eventually cease. Since discharges from both of those facilities currently are in compliance with permit requirements (Section 4.3.8.1), no measurable difference in impacts on fish in Prince William Sound is anticipated from the no-action alternative compared with the proposed action.

4.6.2.16.2 Obstruction of Fish Passage.

The potential for blockage of fish passage would increase as culverts were removed. Barriers to fish movement might be created during removal of culverts and by increased traffic across low-water crossings. Increased traffic could lead to severe rutting of streambeds, which could, in turn, create ridges and spread flow, thus causing barriers to fish movement at low flows. Low-water crossings would need more frequent maintenance during the removal period to ensure that fish passage was maintained. The removal of culverts and road casings would need to be planned and monitored to ensure that proper erosion control methods were used and that the contour of regraded streambed crossings was consistent with the natural topography. Impacts associated with fish passage obstructions — such as migrating fish being unable to move to spawning, feeding, or overwintering areas — could be reduced by not scheduling termination activities during sensitive times for fish (Table 3.19-2).

Activities that could obstruct fish movements would continue to be reviewed under the ADF&G Title 16 and fish habitat permit processes as termination activities occurred. As would occur under the proposed action, effective use of these review processes during removal activities would likely minimize obstructions to fish movement along the TAPS ROW (SPCO 1993, 1995), and only minor impacts on fish would be anticipated. After removal of pipeline components and regrading of stream crossings to reflect natural contours, the rates at which blockages to fish passage would occur at the former stream crossing areas would, in most cases, probably be similar to natural rates of fish blockage. An exception would be in spots where buried pipeline that crossed a stream remained in place. In some cases, deterioration of the buried pipeline, followed by the subsidence of overlying substrate or the exposure of buried pipeline components through sediment scouring, could result in long-term impacts on fish passage as the contour of the stream segment was altered.

Although exposure of buried pipe periodically occurs now and would also occur under the proposed action, ongoing surveillance programs identify problems, and corrective actions are taken. Under the no-action alternative, it is assumed that surveillance activities would be discontinued once termination was completed; however, the level of surveillance following termination would be determined by the Authorized Officer at the time of termination. Approximately 210 belowground pipeline stream crossings occur along the TAPS ROW (Table 3.19-2). Seventy-four of these crossings occur in anadromous fish streams, where maintenance of fish passage is considered especially important. Thus, deterioration and exposure of belowground pipe could possibly affect about 68% of the crossings of anadromous fish streams (i.e., 74 of 109 designated anadromous fish stream crossings). If even a small proportion of these stream crossings became impassable to migrating fish for an extended period, these could be a substantial impact on anadromous fish populations in the affected streams and an adverse impact on essential fish habitat. The potential would also exist for adverse effects on the resident populations of some fish species in nonanadromous fish streams if movement between overwintering and spawning or feeding areas was prevented. Of the 210 belowground crossings, the number that would become impassable to fish is unknown. Probably only a small percentage would be affected; however,

loss of fish passage in even some of these streams could have a measurable impact on fish populations.

Minor incidences of entrapment due to the attraction of fish to water heated by the pipeline would cease under the no-action alternative because warm oil would no longer be flowing through any remaining buried sections of pipe. The small numbers of fish currently lost in streams where instream pipeline burial causes such temperature problems (e.g., the Atigun, North Fork Chandalar, Dietrich, and Middle Fork Koyukuk Rivers, as discussed in Section 4.3.16) would no longer be affected.

4.6.2.16.3 Human Access.

Overharvest would probably not be a concern during termination, since termination activities would be of relatively short duration and would not create new access. However, fishing pressure by workers during the expected 3 years of peak activity might be heavy in some localized areas. After TAPS operations ceased and termination activities were complete, the increased harvests from a variety of sources (i.e., legal, illegal, sport, subsistence, and commercial) could have a potentially important impact on fish. The termination of TAPS would likely be accompanied by significant reductions in statewide employment and incomes (Section 4.6.2.19). If residents used wild foods to compensate for the loss of income, this impact could increase pressure on fish (e.g., through sport, commercial, and subsistence fishing). If decreased state revenues also resulted in less enforcement of fish regulations, this pressure could be intensified. It is also possible that the human population (and fish harvests) would decrease in response to the anticipated economic decline. Removal of some bridges and water crossings would probably reduce access through time, thereby reducing the harvest of fish in some areas.

Human Access

A small temporary increase in impacts to fish might result from increased human access to fishing areas during TAPS removal activities.

4.6.2.17 Birds and Terrestrial Mammals

The potential effects of the no-action alternative on wildlife can be grouped into five general categories: (1) habitat loss, alteration, or enhancement; (2) disturbance and/or displacement; (3) mortality; (4) obstructions to movement; and (5) spills. The magnitude of the impacts on wildlife from termination activities could approach the level that occurred during TAPS construction. For this discussion, "termination activities" pertain to Phases 2–4 that would be conducted following the end of the current grant termination in 2004 (Table 4.6-1). Impacts during Phase 1 would be the same as those discussed for the proposed action. Adverse impacts from termination activities would be minimized through JPO oversight, adherence to federal and state laws and regulations, adherence to the Environmental Management System Compliance Manual (APSC 2000b), and resource agency monitoring.

Impacts of No-Action Alternative on Birds and Terrestrial Mammals

Adverse impacts to birds and terrestrial mammals from the no-action alternative would primarily occur during the period of termination activities. Impacts would be similar to those that occurred during TAPS construction. Termination activities at the aboveground segments of the pipeline system would have the higher level of impacts because of the more intensive activities and longer time required to dismantle and dispose of the pipeline components. Following termination activities, the pipeline corridor would be restored to habitat conditions comparable to surrounding areas. Achieving this level of restoration could take several years to several decades. No direct population-level adverse impacts to any species would be expected from the no-action alternative. Indirect adverse impacts could potentially occur from adverse socioeconomic impacts associated with the no-action alternative (e.g., increased wildlife loss from subsistence hunting).

This adherence would involve complying with regulations, restricting hunting by employees, protecting habitats within zones of restricted activity, and training employees about wildlife concerns.

4.6.2.17.1 Habitat Loss, Alteration, or Enhancement. During termination activities, habitat alteration would result from (1) ground disturbance, such as VSM and aboveground pipe removal and other earthwork during termination activities, (2) dust fallout along Dalton Highway from increased traffic associated with termination activities, and (3) waste discharges and accidental oil and fuel spills. Habitat along the ROW would be disturbed during the removal of the aboveground sections of the pipeline and the regrading of the workpad. Temporary habitat loss would also result from the regrading of access roads and stream banks (Folga et al. 2002, Table DL1). However, the impacts of termination activities on habitat would be less than what occurred during TAPS construction, because the buried portions of the pipeline would not be removed.

Areas where the aboveground structures would be removed and the workpad would be regraded would have the greatest potential for impact. Such areas would occur in several wildlife habitat concentration areas (Table 4.6-10). Wildlife would avoid portions of the ROW and adjacent areas where termination activities would be taking place. These habitat losses would be short term. To the extent practicable, pipeline removal and workpad regrading would be conducted during periods when wildlife habitat concentration areas were not being used.

The TAPS ROW and associated facilities have enhanced the habitats of several bird species (e.g., gyrfalcons, common ravens, swallows, snow buntings) by providing structures for nests, perching, and resting (Section 3.20.1). With the removal of the aboveground sections of the pipeline and dismantling of facilities during termination activities, those artificial nesting structures would be eliminated, reducing nesting opportunities for these species (TAPS Owners 2001a).

Cessation of vegetation control along the TAPS ROW would allow natural succession and the eventual return toward the vegetation found in surrounding areas (Section 4.6.2.15). However, it might take more than 20 years for signs of the pipeline ROW to disappear in some areas (TAPS Owners 2001a). Revegetation of sloped areas with grasses might create grazing areas for Dall sheep, caribou, and geese that would last until the palatability of the grass diminished (about 5 to 10 years). Growth of browse, which is currently limited on the workpad by regular mowing, would increase food resources or habitat for wildlife such as moose and hares (TAPS Owners 2001a).

The loss or alteration of some important habitat or use areas could result from termination activities. Calving areas and mineral licks have been identified as critical areas for caribou, Dall sheep, moose, and bison along the TAPS ROW. Many of these sensitive habitats have been protected by implementing BLM-designated ACECs (BLM 1989). Activities in all identified sensitive habitats for terrestrial mammals in the vicinity of TAPS are regulated by federal and state mitigation stipulations, which are in place to minimize adverse impacts on wildlife. If all stipulations and mitigation measures currently in place were to continue, as expected, during active termination activities, the no-action alternative would not adversely affect these important habitats.

The effect of termination activities on the occurrence of impoundments is difficult to predict. Gravel pads would remain in place and cause some snow drifts and water impoundments along the workpad. Persistent snow drifts or impoundments would reduce habitat availability during early summer and could reduce breeding near roads and pads. Planned removal of culverts along access roads would help restore natural cross drainage and prevent impoundment. Culvert removal would result in species-specific adverse or beneficial impacts, depending on the species and the conditions that developed following culvert removal. Impacts of water impoundments on wildlife are discussed in Section 4.3.17.

TABLE 4.6-10 Estimated Sizes of Areas in Which the Aboveground Pipeline and Associated Workpad Are Located in Important Wildlife Habitats

Type of Wildlife Habitat Concentration Area[a]	Area of Aboveground Pipeline and Workpad (acres)		
	Northern Section (MP 0 to 243)	Central Section (MP 244 to 493)	Southern Section (MP 494 to 800)
Waterfowl nesting	22	–[b]	–
Waterfowl spring seasonal use	15	–	–
Waterfowl migration route	–	–	44
Trumpeter swan nesting and brooding	–	–	307
Sharp-tailed grouse display area	–	–	29
Bison movement area	–	–	73
Bison calving area	–	–	51
Black bear use	–	66	–
Brown bear spring and berry use	307	22	–
Caribou winter use	88	–	219
Caribou migration	416	–	–
Caribou movement	15	–	–
Caribou calving	88	–	80
Moose winter	161	321	328
Moose rutting	–	22	–
Moose calving	–	44	117
Total area within pipeline/ workpad section[c]	1,106	1,128	917

[a] Habitat concentration areas may overlap (e.g., caribou and moose concentration areas).

[b] A dash indicates that there is no aboveground pipeline or workpad in these areas.

[c] Column entries do not add to totals because of overlap of habitat areas.

Source: APSC (1993) and references cited therein and Folga et al. (2002, Table DL1).

Impacts on wildlife from dust fallout along unpaved roads (e.g., earlier occurrences and higher densities due to early vegetation green-up) are discussed in Section 4.3.17. The magnitude of dust fallout could increase during termination activities because of the higher traffic volume. This increase might benefit wildlife during the years required to remove the pipeline along the Dalton Highway.

After termination activities, traffic levels on the Dalton Highway would likely decline substantially, particularly during winter, reducing dust fallout and the correspondingly advanced (up to 2 weeks early) snowmelt in the dust shadow adjacent to roads and pads. The loss of the spring dust shadow and its associated open water and tundra would affect the distribution and movement of birds along the road. Without the dust shadow and its snow-free habitats, birds flying north through the TAPS region in spring would move in a more natural pattern, following naturally occurring snow-free zones along the Sagavanirktok River and Franklin Bluffs (TAPS Owners 2001a).

4.6.2.17.2 Disturbance and/or Displacement. Equipment noise, vehicles, pedestrians, aircraft operations, and other

activities associated with termination activities would disturb wildlife. Roads could alter animal behavior by causing changes in home range, movement, reproductive success, escape response, stress, and other and physiological states; roads could also increase passive harassment as a result of increased human presence (Trombulak and Frissell 2000). In general, the level of disturbance to waterfowl increases as the traffic rate increases; as the number of large, noisy vehicles increases; and as the birds' distance from locations of disturbance (such as the Dalton Highway and pump stations) decreases (Murphy and Anderson 1993). Traffic as infrequent as one trip per 1.5 days can cause individuals to avoid an area up to 0.6 mi from the road. However, since most species are dispersed over a large area, no population-level effects would be expected (BLM 1998).

Generally, wildlife disturbance would be greater during termination activities than during normal operations. However, Phases 2–4 of the termination activities, as discussed in this section, would last for a total period of only 4 years, and localized areas of the TAPS ROW would be disturbed for only a short period of time. For example, more than 2 mi of the workpad could be regraded within 1 day (Folga et al. 2002, Table DL1). The sensitivity of wildlife to disturbance depends on a number of factors; the season in which the disturbance occurs can be especially important if it relates to a critical life history stage (e.g., calving, denning, or nesting). For example, brown bears are less sensitive to disturbance from mid-November to the end of April (during denning), caribou are less sensitive from November to mid-March (during winter range occupancy), and waterfowl and shorebirds are less sensitive from October to mid-May (when they are generally not in the area). However, other species, such as muskox, are sensitive to disturbance year-round (ACS 1999). Table 4.6-10 lists important wildlife habitats within which aboveground portions of the TAPS are located. Scheduling of pipeline removal during winter or other less critical periods would minimize disturbance, particularly to migratory birds. After termination activities, localized improvements in these habitats would occur when vegetation was established within the workpad area.

Additional disturbance would probably result from the increase in the work force during termination activities. Wildlife near areas of termination activities could be harassed by humans. These impacts could be mitigated by compliance with lease stipulations. The number of humans on foot around pump stations would be greater during termination activities than during normal operations. Restricting foot traffic to gravel pads would minimize disturbance to wildlife that were using adjacent habitats.

Aircraft activity would occur at irregular intervals during termination activities, presumably less often than the weekly flights that would occur during the continued operation and maintenance of the TAPS under the proposed action (TAPS Owners 2001a). In general, flight restrictions that would limit low-flying aircraft during the more sensitive periods for birds (e.g., nesting and brood-rearing periods) could minimize the magnitude of impacts. Aircraft disturbance associated with the no-action alternative would not likely affect terrestrial mammal populations in the vicinity of the TAPS ROW, assuming that flights followed the stipulations of the *Environmental Management System Compliance Manual* (APSC 2000b).

Noise associated with termination activities could disturb wildlife in the habitats adjacent to facilities being removed. Because facilities along the TAPS have operated for more than 20 years, it is likely that some wildlife have become habituated to the constant sources of noise, but the activities associated with termination activities would increase noise levels. However, unlike during the proposed action, when facility noise could cause wildlife to reduce their use of areas being constantly disturbed for a long time, during Phases 2–4 of the termination activities, the associated displacement of wildlife would last for a relatively shorter time (4 years or less for all termination activities), and noise sources would be eliminated once facilities were removed. After termination activities, habitats that had been avoided by wildlife during pipeline operation because of the close proximity of facilities and humans (e.g., the pump stations and Valdez Marine Terminal) would be reinhabited.

During termination activities, animal feeding and nuisance animal issues might become problematic because of the presence of an increased number of workers who might have less training in the environmental aspects of the project and have a shorter-term view of the consequences of their actions. Problem animals (e.g., bears and wolves) might have to be deliberately displaced to protect lives and property, either through harassment or live-trapping and releasing. However, continued enforcement of the APSC policy on garbage management and intentional animal feeding, in addition to the education of workers on the adverse effects of feeding wildlife, should prevent this problem from reaching important levels (APSC 2000b). Beavers could continue to cause flooding and would need to be trapped and moved as long as drainage patterns through culverts were maintained (TAPS Owners 2001a).

After termination activities, the workpad would provide attractive camp sites for tourists, hunters, and other recreationists. In addition, the use of the TAPS ROW as a travel corridor for snow machines and all-terrain vehicles could increase substantially with the end of access restrictions. Wildlife would be disturbed by these uses, particularly by vehicles.

4.6.2.17.3 Mortality. With the removal of the aboveground sections of the pipeline and pump station facilities, the potential for birds to collide with these structures would be eliminated. However, increased traffic levels during termination activities would probably result in increased roadkills, especially in the northern portion of the ROW, where the effect of the dust shadow is more prominent. As previously mentioned, wildlife concentrate near unpaved highways during spring snowmelt, and increased roadkills are observed during that period. Ptarmigan, grouse, and passerines are the primary species groups of birds that are killed by vehicle collisions. Raptors (e.g., rough-legged hawks and short-eared owls) have not often been identified as collision victims along the Dalton Highway, especially in the northern portion. Big game species are also killed by vehicles. Each year, about 760 moose and 50 Sitka black-tailed deer throughout Alaska die as a result of collisions. The vast majority of these roadkills do not occur near the TAPS or the North Slope (Cronin 2002). Six or fewer roadkills per species are reported annually throughout the state for caribou, bison, Dall sheep, bears, and wolves (TAPS Owners 2001a). The small mammals and furbearers that are most likely to be struck by vehicles include foxes, ground squirrels, and porcupines (TAPS Owners 2001a). After completion of termination activities, traffic along the Dalton Highway would be reduced from current levels, although public use for recreation and tourism would likely increase (BLM 1998; Jeffrey 1993). Thus, some roadkills could be expected after termination activities.

As previously mentioned, predators and scavengers could be attracted by food and garbage or by handouts in areas of human activity. In some instances, control measures might include shooting the offending animals. This solution occurred during pipeline construction, has continued at a low level during the operational lifetime of the TAPS, and could be expected to be required during termination activities.

The increased work force associated with active termination activities might increase hunting pressure on terrestrial mammals in the vicinity of the ROW and across the state. However, the *Environmental Management System Compliance Manual* (APSC 2000b) restricts hunting by employees. Changes in the harvest of game bird species near the TAPS ROW have not been well-documented, but access by hunters has increased along the route since construction. After termination activities, with the opening of the entire ROW, the level of harvest would be expected to increase further, particularly by hunters previously deterred by APSC's requirements for accessing the ROW (TAPS Owners 2001a). After termination activities were complete, a potentially important impact on birds would be increased harvests from a variety of sources (i.e., legal, illegal, sport, and subsistence). The termination of TAPS would be accompanied by significant reductions in statewide employment and income (see Section 4.6.2.19). If residents used wild foods to compensate for the loss of income, sport and subsistence hunting might increase pressure on birds. If decreased state revenue resulted in less enforcement of game

regulations, this pressure could be intensified. However, it is also possible that the human population (and bird harvests) would decrease in response to the economic decline. Regulation and monitoring by the appropriate agencies would be needed to manage this potential impact (TAPS Owners 2001a).

4.6.2.17.4 Obstructions to Movements.

During termination activities, localized obstruction of wildlife movement across the TAPS ROW could occur in the areas where the pipeline was being dismantled. The presence of humans and machinery and the stockpiling of pipeline and other scrap materials could impede wildlife movement. In addition, the volume of traffic along Dalton Highway could be greater in areas undergoing dismantlement. This traffic would limit the ability of some brood-rearing waterfowl to cross the road. Higher traffic volumes (usually more than 10 vehicles per hour) and larger, heavier, and unusual-profile vehicles (e.g., boom cranes) would disturb brood-rearing waterfowl more than would lower traffic volumes and lighter-weight vehicles (Burgess and Ritchie 1987, 1990, 1991; Murphy and Anderson 1993). Removal of the pipeline and regrading of the workpad during winter would minimize impacts, since few birds are present then.

As addressed in Section 4.3.17, the combination of pipelines and roads could obstruct or delay movements of female caribou with calves. This impact could be mitigated by restricting traffic volumes during the calving period (mid-May to early June). While aboveground sections of pipeline were being dismantled, care would need to be taken to avoid piling pipes on the ground in areas known to be regularly used by terrestrial mammals for movement. Morgantini (1985) reported that pipe acted as a visual and physical barrier to the free movement of moose and deer.

Removal of aboveground sections of pipe would ensure free passage of terrestrial mammals after termination activities were completed. Furthermore, revegetation would increase habitat diversity. Traffic levels along the Dalton Highway would also decrease dramatically (Section 4.6.2.11). Roads and other corridors that received little human use might be attractive to wolves and other wildlife as easy travel routes (James and Stuart-Smith 2000). Thus, following termination activities, wildlife use of the workpad, access roads, and, to a lesser extent, Dalton Highway might increase.

4.6.2.17.5 Spills.

During the period that the pipeline is purged of remaining oil, small-volume oil spills could occur. A large oil spill would be extremely unlikely. Once the pipeline was flushed of oil prior to dismantlement, there would presumably not be any further potential for a crude oil spill. The minimal impacts on wildlife from a small oil spill and from subsequent cleanup activities during the early period of termination activities would be similar to the impacts discussed for a small spill in Section 4.4.4.11. During termination activities, some fuel (e.g., diesel) and chemical spills could occur, but they would generally be confined to gravel roads and facilities. The probability that terrestrial mammals would be exposed to such spills would be small and limited to a few individuals. After termination activities were complete, there would be no oil, fuel, or chemical spills associated with the TAPS.

4.6.2.18 Threatened, Endangered, and Protected Species

Six species listed under the ESA as threatened or endangered or under the MMPA as depleted occur in the vicinity of the TAPS and could be affected by the no-action alternative and associated termination activities. These six species are the same as those that could be affected by the proposed action (see Section 4.3.18) and include spectacled eider, Steller's eider, fin whale, humpback whale, beluga whale, and Steller sea lion. Anticipated impacts to these species are described in this section and summarized in Table 4.6-11. The impacts on other protected marine mammals and State-listed species are also presented in Table 4.6-11. None of the listed and protected species that occur within the Beaufort Sea would be affected by termination activities because these activities are not expected to affect the waters of the Beaufort Sea. Following termination activities, an increase in harvest of

TABLE 4.6-11 Potential Impacts of the No-Action Alternative on Threatened, Endangered, and Protected Species

Species	Status[a]	Time of Year	Locations	Potential Impacts
Spectacled eider	ESA-T AK-SC	May–Sept.	Wetlands and ponds of coastal plain (MP 0–40)	Increased impacts could result from disturbance in the immediate vicinity of the ROW during the termination process. Erosion of work areas could affect adjacent eider habitat until a vegetation cover became established. After completion of termination activities, decreased human activity and cessation of facility operation would reduce impacts on the species.
Steller's eider	ESA-T AK-SC	May–Sept. along ROW; winter in Prince William Sound	Wetlands and ponds of coastal plain (MP 0–40); Prince William Sound	Same as above along the ROW. In Prince William Sound, very slight potential benefit may result from eliminating effluent discharge from the Valdez Marine Terminal, but current operations already are thought to have little or no effect on this species.
Eskimo curlew	ESA-E AK-E	NA	NA	No impacts are anticipated because the species is probably extinct. It previously nested in arctic tundra of Alaska and Canada.
American peregrine falcon	ESA-DM AK-SC	April–Sept.	Near rivers and lakes south of Brooks Range (MP 240–800)	Disturbance in the immediate vicinity of the ROW could result from noise and human activity associated with termination activities. Removal of facilities and restoration of the ROW would eliminate adverse impacts.
Arctic peregrine falcon	ESA-DM AK-SC	April–Oct.	Near Sagavanirktok River (MP 0–110)	Same as above.
Olive-sided flycatcher	AK-SC	April–Oct.	Coniferous forest south of Brooks Range (MP 240–800)	Same as above.
Gray-cheeked thrush	AK-SC	May–Oct.	Coniferous and mixed forest south of Brooks Range (MP 240–800)	Same as above.
Townsend's warbler	AK-SC	April–Oct.	Coniferous forest in Yukon River valley (MP 330–380) and southern Alaska (MP 540–800)	Same as above.

TABLE 4.6-11 (Cont.)

Species	Status[a]	Time of Year	Locations	Potential Impacts
Blackpoll warbler	AK-SC	April–Oct.	Coniferous and mixed forest south of Brooks Range (MP 240–800)	Same as above.
Gray whale	ESA-D MMPA-P	Late spring and early fall	Prince William Sound	Very slight potential benefit could result from eliminating effluent discharges from the Valdez Marine Terminal to Prince William Sound, but current operations already are thought to have little or no effect on this species.
Fin whale	ESA-E MMPA-D	April–June	Prince William Sound	Same as above.
Beluga whale	MMPA-D	Winter	Prince William Sound	Same as above.
Minke whale	MMPA-P	Summer	Prince William Sound	Same as above.
Humpback whale	ESA-E MMPA-D AK-E	Summer	Prince William Sound	Same as above.
Killer whale	MMPA-P	All year	Prince William Sound	Same as above.
Pacific white-sided dolphin	MMPA-P	All year	Prince William Sound	Same as above.
Harbor porpoise	MMPA-P	All year	Prince William Sound	Same as above.
Dall's porpoise	MMPA-P	All year	Prince William Sound	Same as above.
Steller sea lion	ESA-E MMPA-D AK-SC	All year	Prince William Sound	Same as above.
Harbor seal	MMPA-P	All year	Prince William Sound	Same as above.
Sea otter	MMPA-P	All year	Prince William Sound	Same as above.

[a] Notation: ESA = listed under the Endangered Species Act with the following qualifiers: E = endangered, T = threatened, D = delisted, DM = delisted but being monitored, AK-SC = Alaska species of special concern. MMPA = listed under the Marine Mammal Protection Act, with the following qualifiers: D = depleted, P = protected. NA = not applicable.

Impacts of No-Action Alternative on Threatened, Endangered, and Protected Species

Under the no-action alternative, impacts on listed and protected species would result from ground-disturbing activities, equipment noise, and human disturbance during termination activities. These impacts would be greater than those of the proposed action for the duration of the termination process but would decrease to less than those of the proposed action as operations ceased, natural succession occurred in previously disturbed areas, and the effects of past development diminished. Impacts would not be expected to produce population-level effects that are distinguishable from natural variation in numbers.

threatened, endangered, and protected species might occur because of increased economic reasons to pursue subsistence (see Section 4.6.2.20). However, increased harvests of protected species are expected to be negligible (i.e., would not be expected to produce population-level effects).

4.6.2.18.1 Impacts on Spectacled and Steller's Eider. Impacts of termination activities on the spectacled and Steller's eider would be qualitatively similar to those of the proposed action (see Section 4.3.18). Overall, the potential for interaction between these species and termination activities is relatively low because of the distribution and density of the eider populations in the project area. Although termination activities would temporarily increase human activity along the TAPS ROW on the North Slope where eiders occur, these impacts would eventually lessen as operations ceased, natural succession occurred on the ROW, and the effects of past development diminished (see Section 4.6.2.15).

Human activities associated with termination activities would occur along the ROW for a period of up to 4 years (Years 3-6). These activities would include dismantling of aboveground facilities, excavation of VSMs, culvert removal, regrading, extraction and transport of gravel and other materials, and revegetation. These actions and the noise generated by equipment operation could disturb eiders, especially during the nesting period.

Sensitivity of the spectacled eider and Steller's eider to disturbance would vary according to season. Eiders are attracted to North Slope impoundments during the pre-nesting and brood-rearing period but not during nesting (Warnock and Troy 1992). Increased human activity along the ROW during termination activities could increase disturbance to eiders and cause them to avoid the ROW area if those activities occurred during the spring, summer, or fall. However, subsequent decreases in the level of termination activities and the eventual cessation of facility operations (including pump stations and other facilities) could cause eiders to return to previously avoided areas.

Under the no-action alternative, ground-disturbing termination activities could affect spectacled and Steller's eiders in the vicinity of the TAPS by affecting their habitats. Most of these activities would be limited to the existing workpad and facility sites; however, runoff from construction areas could affect adjacent habitats. Spectacled eiders use roadside impoundments (like those that occur near the TAPS) during the pre-nesting and brood-rearing periods (Warnock and Troy 1992). Any degradation of these habitats caused by sedimentation or runoff could have an adverse impact on eiders. Erosion control practices identified in the *Trans-Alaska Pipeline Maintenance and Repair Manual* (APSC 2001j) and subject to the approval of the Joint Pipeline Office would minimize sedimentation effects during termination activities. Regrading, slope stabilization, and revegetation would greatly reduce these impacts, and natural successional processes would eventually eliminate the adverse impacts from termination activities.

4.6.2.18.2 Impacts on Fin Whale, Humpback Whale, Beluga Whale, and Steller Sea Lion. The fin, humpback, and beluga whale and Steller sea lion all occur in

Prince William Sound at various times of the year. These species could be affected by normal operations under the proposed action if effluent discharged from the Valdez Marine Terminal BWTF and sanitary wastewater treatment plant into Prince William Sound degraded the water quality. The no-action alternative would eliminate these discharges once termination activities are complete and could potentially benefit species in the Sound, but current operations already are thought to have little or no effect on these species.

4.6.2.18.3 Impacts on Other Species. A number of other protected species or species of concern exist along the TAPS ROW or in Prince William Sound (Table 4.6-11). The American peregrine falcon, Arctic peregrine falcon, olive-sided flycatcher, gray-cheeked thrush, Townsend's warbler, and blackpoll warbler occur in various habitats and locations along the TAPS ROW and could be disturbed by termination activities associated with the no-action alternative. For the most part, these disturbances would be expected to only temporarily displace individuals until project activities ceased after the 6-year period of termination activities. Once TAPS operations ceased, facility noise and activities would be eliminated, and adjacent habitats that had been avoided by these species could be reoccupied.

Several species of protected marine mammals occur in Prince William Sound (gray whale, minke whale, killer whale, Pacific white-sided dolphin, harbor porpoise, Dall's porpoise, harbor seal, and sea otter). None of these species is considered rare or is listed as depleted under the Marine Mammal Protection Act (MMPA). Impacts of the proposed action could occur if discharges from Valdez Marine Terminal facilities degraded water quality in Prince William Sound. Elimination of these discharges once termination activities are complete under the no-action alternative could potentially benefit species in the Sound, but current operations already are thought to have little or no effect on these species.

4.6.2.18.4 Spills. During Years 1 and 2 of the termination activity period, oil would continue to flow through the pipeline, and the potential for an oil spill would be the same as that described under the proposed action. During purging and cleaning of the pipeline in Year 3, the potential volume of oil spills would decrease. Spills that might occur would be small and localized. Therefore, impacts to threatened, endangered, and protected species would be negligible to none (on the basis of potential effects from small spills assessed in Section 4.4.4.12). Also during termination activities, some fuel (e.g., diesel) and chemical spills could occur, but they would generally be confined to gravel roads and TAPS facilities. The probability that threatened, endangered, and protected species would be exposed to such spills would be negligible as well. Following termination activities, no spills associated with the TAPS would occur.

4.6.2.19 Economics

The analysis of the no-action alternative considers both direct and indirect impacts from pipeline termination activities and from lost pipeline operation, lost oil production, and associated changes in transportation over the period 2004 to 2034 on the economy of the nation, state, and pipeline corridor region.

Impacts of No-Action Alternative on Population, Gross State Product, Employment, and Income

Loss of North Slope oil production, oil industry support activities, and state and local tax revenues with the termination of TAPS would have substantial consequences for the economy of the state, producing significant losses in GSP over the period 2004 to 2008. Smaller losses would occur in total population, employment, and personal incomes over the same period. These losses would only be partially offset by the expansion of the economy during TAPS termination activities. Although moderate growth in the non-oil sectors after 2008 would allow population, employment, and personal income to fully recover by 2015, GSP would not regain 2003 levels until 2021. Fairly rapid growth in the Alaska Native population would continue throughout the period 2004 to 2034.

Appendix A, Section A.8 describes the methodology used to calculate these impacts. The impacts of pipeline removal and lost oil production on Alaska Native corporations and subsistence activities are also considered.

4.6.2.19.1 Assumptions Used in the Analysis. Various assumptions were made in order to conduct the analysis, including assumptions about the pipeline termination itself and about other activities in the Alaska economy — in particular, activities in key sectors that are important sources of potential future employment: seafood, tourism, air cargo, and state and local government.

Assumptions about Pipeline Operation and Termination. Termination assumptions are as follows:

- *North Slope oil production*. No North Slope oil production would occur beyond the end of 2003, and the last crude oil would flow through the TAPS at the beginning of 2004. In-state refineries dependent on North Slope oil would cease operations.

- *Pipeline operations*. Pipeline operations employment of 1,828, including contract workers and special project employment, would end with the end of oil throughput in the beginning of 2004 (TAPS Owners 2001a).

- *Pipeline termination*. Termination activities would last for 6 years (2002 through 2007), and for the purposes of analysis, would begin in 2002 (which would allow sufficient time for an adequate planning process to occur if termination activities began immediately upon expiration of the Federal Grant and cessation of oil throughput). The 2-year period of planning would include an environmental review, supply deployment, and preparatory construction and would occur during 2002 and 2003. This would be followed by 3 years (2004, 2005, and 2006) of field activities, including pipeline cleaning and pumping, removal of the pipeline and pump stations and Valdez Marine Terminal, and scrap disposal. Demobilization activities would take an additional year (2007). Peak termination employment of 5,219 would occur in 2004, with a relatively large work force also being employed in 2005 (3,350) and 2006 (1,922) (TAPS Owners 2001a).

- *Oil field development activities*. All oil exploration, development, and production in the North Slope fields; construction of oil field equipment and supplies; and manufacture of replacement double-hulled tankers for the Alaska market would cease by 2004.

- *Government oversight of pipeline operations*. Employment in these activities would end with the conclusion of pipeline termination activities.

Assumptions about Other Activities in the Alaska Economy. These assumptions are as follows:

- *Key sectors*. Activities in the Alaska economy with significant employment growth potential (in particular, seafood processing, tourism, and air cargo) on average would continue to grow throughout the removal and postremoval period even though growth trends in some industries, notably seafood, can be cyclical in nature. Military employment would remain constant throughout the period. Employment in federal and state government, which is already significant, would grow slightly throughout the period 2004 to 2034.

- *State and local government finances*. Beginning in 2004, no additional North Slope oil revenues would be available to state and local governments; oil royalties paid to the Alaska Permanent Fund and any settlement payments made by oil companies to the Constitutional Budget Reserve Fund (CBRF) would also cease. While the analysis assumed that the CBRF would be used to cover the deficit through 2003, the absence of almost all state oil revenues would mean that significant additional sources of funds would be needed by the state to cover slowly increasing General Fund expenditures at the state and local levels. A sales tax, reinstitution of a state personal income tax, a cap on the Permanent Fund Dividend, changes in petroleum sector tax rates, reductions in state and local expenditures,

and the use of some portion of the earnings of the Permanent Fund are all being considered by the state legislature to cover increasing deficits. While a number of these, notably a personal income tax and the use of some portion of the earnings from the Permanent Fund, have already been proposed by various parties to address current state budgetary problems, the analysis does not include any of these options because of the uncertainty surrounding the likely use and timing of any particular fiscal policy option. While for analysis purposes it is assumed that funding will be found to maintain the increasing level of services, policymakers may also choose to bridge the budget gap at least in part by making budget cuts. The selection of any one, or combination, of policy options to address the budget deficit was, therefore, considered to be beyond the scope of this analysis.

4.6.2.19.2 National Economic Impacts.

The economic impacts of the no-action alternative on the national economy would be in the areas of domestic oil production and national energy security, balance of trade, federal tax revenues, marine transportation, and overall economic activity in the United States.

Impacts of No-Action Alternative on National Economy

North Slope oil production currently contributes about 18% of domestic oil production, and although this contribution would have been expected to fall to about 14% by 2020 with the renewal of TAPS, the impact of the no-action alternative over the period 2004-2034 would still be substantial. In addition to a loss of domestic production, the no-action alternative would impact national energy security and the U.S. balance of trade in oil and would remove an important source of federal tax revenues. The no-action alternative would also impact the domestic marine transportation and shipbuilding industries.

Domestic Oil Production and National Energy Security. Continued operation of the TAPS and North Slope fields through 2034 is projected to have contributed an additional 8 billion bbl of crude oil to U.S. domestic production (DOE 2001a). Even though the contribution of North Slope crude domestic oil supplies would have declined from 18% in 2004 to 14% in 2020 (DOE 2001b), North Slope production would still have made a substantial contribution to the reduction of U.S. dependency on foreign oil supplies. The no-action alternative, therefore, would substantially increase U.S. dependency on oil from outside the United States. U.S. dependency on foreign oil could create significant foreign policy issues if the countries supplying it were politically and/or economically unstable.

Balance of Trade. The United States will continue to be a net importer of crude oil over the period 2004 to 2034, with steady growth in domestic consumption and declining domestic production (DOE 2001b). The no-action alternative would worsen the U.S. balance of trade in oil. World oil price forecasts by DOE for each year in the period 2004 to 2020 indicate that North Slope production over this period would be valued at $137 billion in 2000 dollars (DOE 2001b). Despite the worsening negative trade balance that the United States has in oil, production from North Slope over the period 2004 to 2034 would have reduced the increasing U.S. dependency on foreign oil from 9.9 to 8.8 million bbl/d by 2004, a reduction of 11%, and from 11.2 to 10.5 million bbl/d by 2020, a reduction of 6% (DOE 2001b).

Federal Tax Revenues. Federal income taxes and royalties on federal lands would have generated significant tax revenues for the federal government with continued operation of the TAPS and North Slope production. Under the no-action alternative, it is estimated that approximately $11.4 billion in federal revenues in 2000 dollars would be lost (ECA 1999a).

Marine Transportation. Under the proposed action, replacement of the current single-hulled fleet was expected to have created a demand for nine additional 125,000-ton double-hulled tankers by 2014 (ECA 1999b). Approximately $1.6 billion in 2000 dollars would

have been spent in U.S. shipyards to accommodate North Slope transportation demand, thereby producing approximately 1,000 shipyard jobs per tanker (GAO 1999), with additional jobs being created in the various industries that supply shipyards with equipment, materials, and services. Maintenance activities would have also provided additional shipyard employment. Marine transportation would have also resulted in employment, with approximately 1,330 U.S. personnel required in 2004, a level that would have fallen to 530 by 2034 (TAPS Owners 2001a).

Overall Economic Activity. Current North Slope oil production has a smaller impact on the U.S. economy as a whole than it does on the U.S. oil production and transportation sectors. In the absence of North Slope production, the widespread availability of suitable oil from other sources (from either U.S. production or foreign suppliers) would enable refinery production and refinery product customer industries to continue. The cost savings to U.S. consumers and to the federal government occurring when North Slope oil is cheaper than imported oil would disappear, however.

4.6.2.19.3 State Economic Impacts.

TAPS termination and the loss of North Slope production would affect the economy of Alaska by affecting the population (including net migration), gross state product, employment and unemployment, personal income, and state and local tax revenues. Population and economic impacts were estimated using the MAP Model (see text box). Loss of oil North Slope production, oil industry support activities, and state and local tax revenues with the termination of TAPS would have substantial consequences for the economy of the state, producing significant losses in GSP over the period 2004 to 2008. Smaller losses would occur in total population, employment, and personal incomes over the same period. These losses would only be partially offset by the expansion of the economy during TAPS termination activities. Although moderate growth in the non-oil sectors after 2008 would allow population, employment, and personal income to fully recover by 2015, GSP would not regain 2003 levels until 2021. Fairly rapid growth in the Alaskan Native population would continue throughout the period 2004 to 2034. Figures 4.6-1 through 4.6-4 show the extent of the losses in economic activity over the period 2004 to 2008 and the extent and timing of the recovery in the economy of the state later in the TAPS termination period.

Economic Impact Assessment

As described in Appendix A, Section A.8, the Man in the Arctic Program (MAP) computer model developed at the University of Alaska-Anchorage, Institute for Social and Economic Research, was used to assess potential economic impacts of the no-action alternative. The model uses three modules — an economic module, a demographic module, and a fiscal module — to evaluate possible impacts in those areas over the range of changing conditions being examined. The results discussed here for the no-action alternative are projections for the 30-year period 2004-2034 (the same period covered by the proposed Federal Grant renewal).

Population. With the termination of TAPS and the end of North Slope production, the total population in the state is projected to decline by 2.3% over the period 2004 to 2008 (Table 4.6-12) (Figure 4.6-1). Population out-migration would begin to occur in 2005 and continue until 2009, with a peak in 2007 when more than 13,000 people would leave the state. The Alaska Native population would continue to grow during the period immediately following TAPS termination. Over the period 2008 to 2034, there would be moderate growth in population in the state, with a slightly higher growth rate between 2019 and 2034, mainly as a result of rapid growth in the Alaska Native population. Beginning in 2011, in-migration of population to the state would occur, although the relative importance of in-migration to state population growth would decline over the remainder of the period.

Gross State Product. GSP, which is the sum of value added in the production of all goods and services in a year, measures the level of economic activity in the state. Table 4.6-13

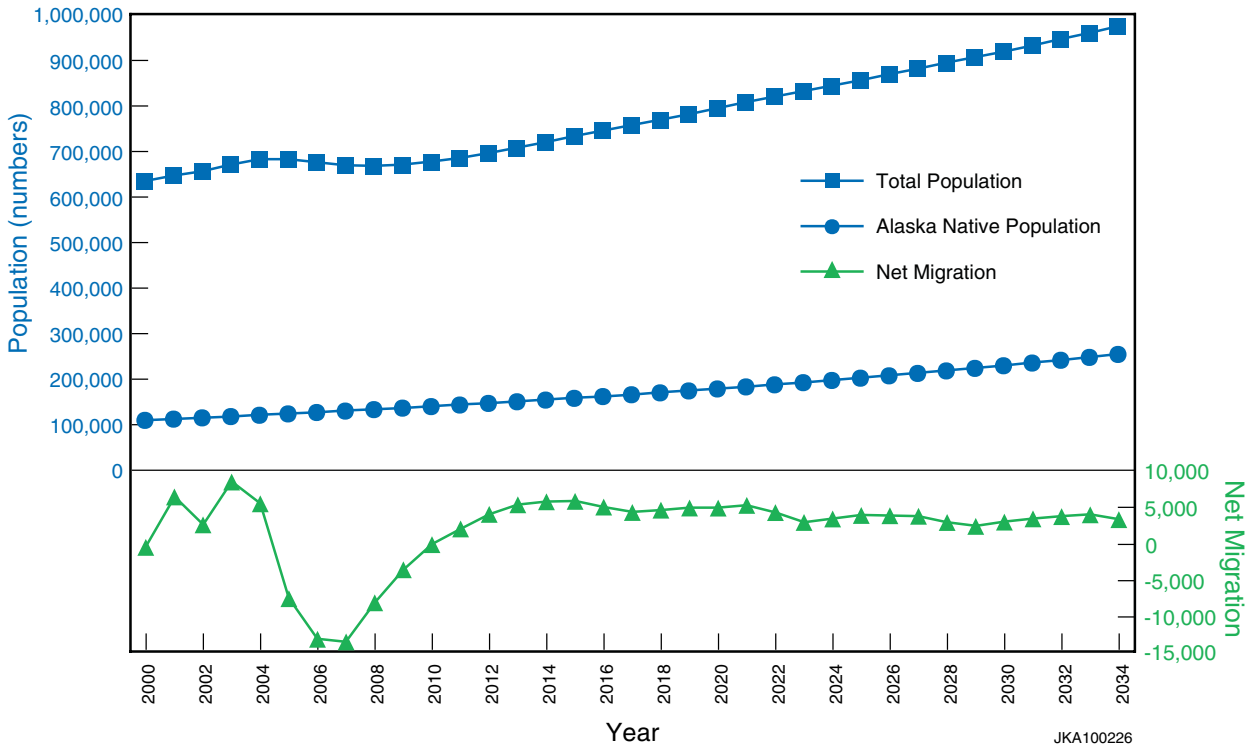

FIGURE 4.6-1 Projected Population with TAPS Termination

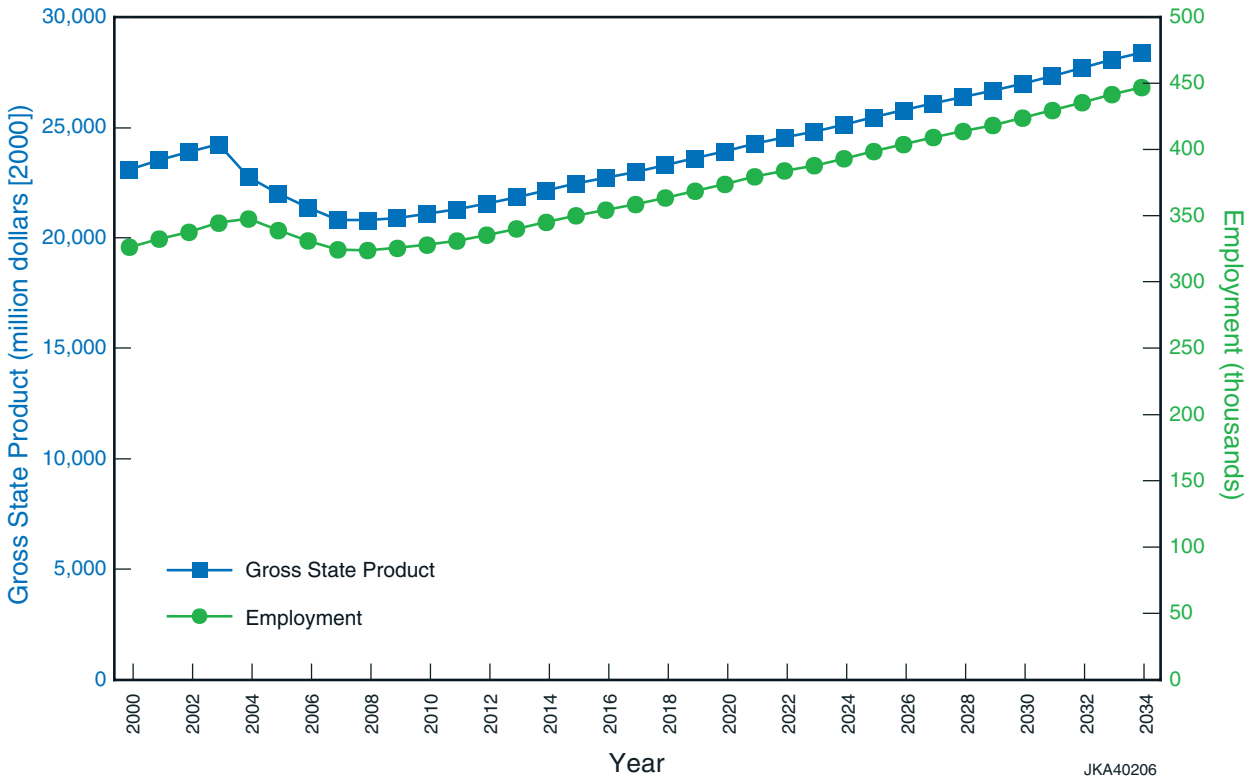

FIGURE 4.6-2 Projected Alaska Gross State Product and Employment with TAPS Termination

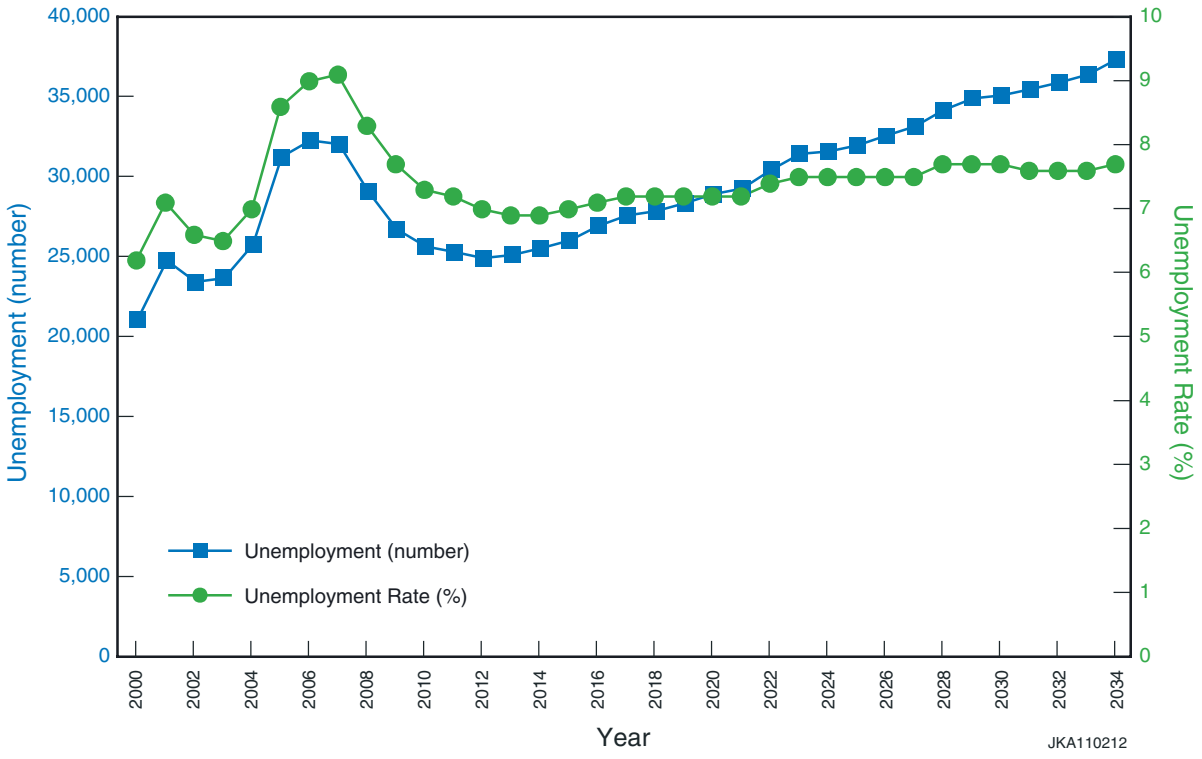

FIGURE 4.6-3 Projected Unemployment with TAPS Termination

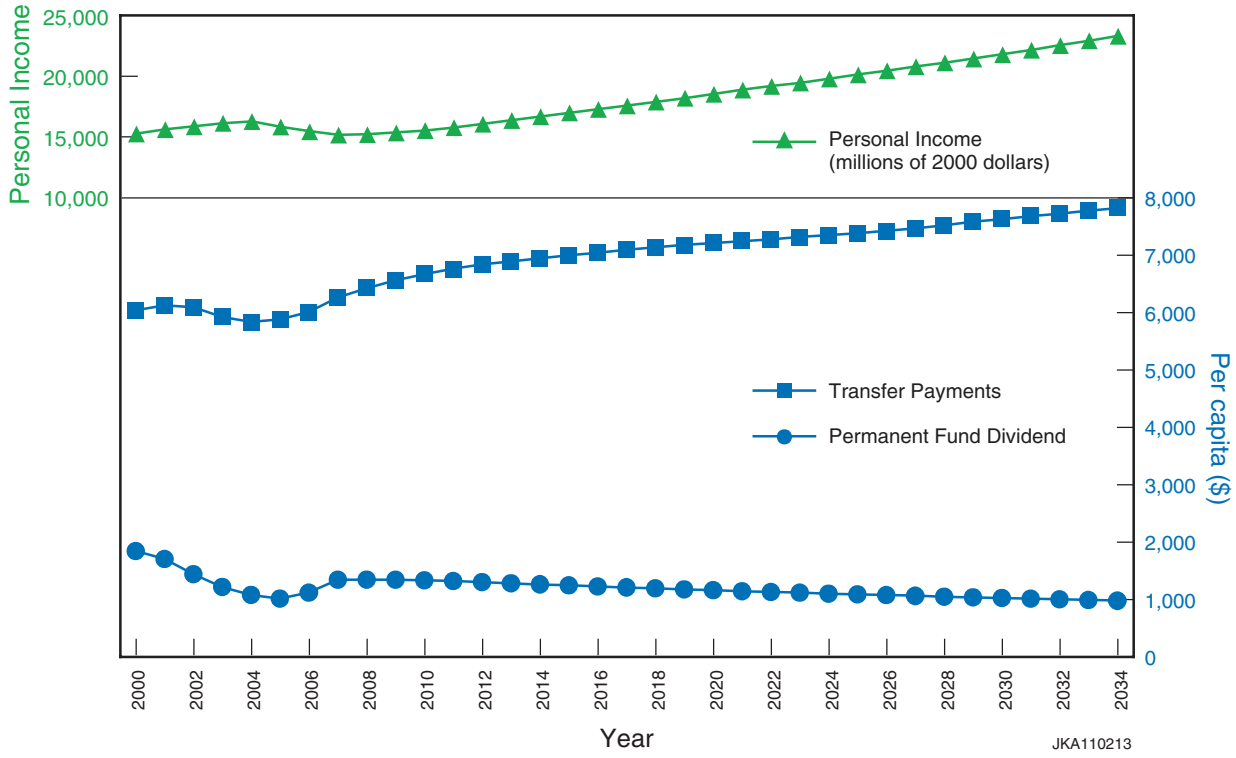

FIGURE 4.6-4 Projected Personal Income with TAPS Termination

TABLE 4.6-12 State Population Projections

Item	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Alaska	670,692	682,887	667,452	781,773	974,183	-0.6%	1.4%	1.5%	1.2%
Non-Native	508,574	517,864	490,059	563,335	675,593	-1.4%	1.3%	1.2%	0.9%
Native	117,873	120,778	133,148	174,193	254,345	2.5%	2.5%	2.6%	2.5%
Military[a]	44,245	44,245	44,245	44,245	44,245	0.0%	0.0%	0.0%	0.0%
Net migration	8,558	5,568	-8,021	4,992	3,394	-0.7%	-195.8%	-2.5%	-1.6%
Net migration percent (%)	1.3%	0.8%	-1.2%	0.6%	0.3%	-1.6%	-194.4%	-4.0%	-2.8%

[a] Includes active-duty personnel and their dependents.

Source: MAP model (see Appendix A, Section A.8).

and Figure 4.6-2 present GSP in terms of constant dollars, which are used to exclude the effects of inflation in the economy and fluctuations in natural resource prices when GSP is compared over time. GSP in Alaska, measured in constant 2000 dollars, is projected to decline 8.6% (an annual decline of 2.2%) between 2004 and 2008 with the loss of oil production and state oil revenues. While the economy of the state is expected to recover to a certain extent, with a moderate overall annual increase in GSP of 1.2% over the period 2004 to 2034, GSP would still not have reached its 2003 level by 2019.

Despite increases in some sectors during termination activities in 2004, the loss of oil production with TAPS termination is projected to create widespread declines in GSP in individual industries in the state during the period 2004 to 2008 (Table 4.6-13). Mining (including oil and gas) would suffer a 73% loss in GSP between 2003 and 2004 following the end of North Slope production, with moderate annual growth of 1.1% from a much lower base after 2004. Following a 53% expansion in the sector between 2003 and 2004 associated with pipeline termination activities, the construction sector would decline 23% between 2004 and 2005 and would continue to decline at a more moderate pace until 2008. In the remaining sectors in the Alaskan economy, loss of North Slope oil production and state tax revenues would lead to steadily declining GSP over the period 2004 to 2008, with annual declines of between 1% and 2% for many industries. Annual growth would continue during this period in a number of sectors not dependent on the oil and gas sector, notably tourism (2.9%), and agriculture, forestry and fisheries (0.1%). Federal government and military employment would not be affected by TAPS termination.

After 2008, growth in GSP related to individual industries is projected to occur, despite the loss of the oil sector and supporting industries. Growth would be concentrated among industries responding to continuing population growth in the state, especially communications, public utilities, trade, finance, and services. Growth in these sectors would average between 1.2 and 1.3% per year. Growth in tourism (1.8% per year during the period 2008 to 2019) and to a lesser extent transportation, which includes air cargo (1.7% per year during the period 2008 to 2034), would occur independently of the decline in oil and gas

TABLE 4.6-13 Projected Alaska Gross State Product by Industry (millions of 2000 dollars)

Industry	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Alaska	24,218	22,746	20,789	23,593	28,375	-2.2%	1.2%	1.2%	0.7%
Mining (including Oil and Gas)	3,173	861	901	973	1,024	1.1%	0.7%	0.3%	0.6%
Agriculture, Forestry, and Fisheries	598	599	602	613	620	0.1%	0.2%	0.1%	0.1%
Construction	1,414	2,167	931	999	1,122	-19.0%	0.6%	0.8%	-2.2%
Manufacturing	1,183	1,187	1,160	1,238	1,367	-0.6%	0.6%	0.7%	0.5%
Transportation[a] (including Air Cargo)	2,864	2,821	2,713	3,276	4,246	-1.0%	1.7%	1.7%	1.4%
Communications and Public Utilities	1,377	1,390	1,297	1,549	1,975	-1.7%	1.6%	1.6%	1.2%
Wholesale and Retail Trade[a]	2,694	2,734	2,604	3,117	3,991	-1.2%	1.6%	1.7%	1.3%
Finance	2,030	2,053	1,893	2,325	3,058	-2.0%	1.9%	1.8%	1.3%
Services[a]	3,149	3,203	3,063	3,667	4,720	-1.1%	1.7%	1.7%	1.3%
Tourism[a]	1,084	1,128	1,265	1,541	1,971	2.9%	1.8%	1.7%	1.9%
Federal Civilian	1,624	1,627	1,629	1,666	1,686	0.0%	0.2%	0.1%	0.1%
State Government	1,144	1,160	1,114	1,174	1,305	-1.0%	0.5%	0.7%	0.4%
Local Government	1,688	1,666	1,602	1,723	1,992	-1.0%	0.7%	1.0%	0.6%
Military	1,280	1,279	1,279	1,272	1,268	0.0%	0.0%	0.0%	0.0%

[a] Tourism total includes activity also included in Transportation, Trade, and Services. Data in Tourism row is not included in Alaska total.

Source: MAP model (see Appendix A, Section A.8).

and the overall increase in state population, with the stimulus for these industries coming primarily from outside the state. Among the resource-based industries, forestry and fishing would experience growth rates lower than the state rate. Mining is projected to grow at a moderate rate between 2008 and 2019, however, reflecting fairly rapid development of the non-oil-and-gas portion of the sector.

Moderate growth would be experienced by the construction sector after 2008, especially between 2019 and 2034 (0.8%).

GSP related to federal government activity is projected to grow slightly over the entire period, with an annual rate of 0.1%; state and local GSP activity would each grow, with annual increases of 0.4 and 0.6%, respectively. Slightly lower federal GSP growth would be experienced during the second half of the period, with a

moderate increase in both state and especially local government GSP growth projected to occur during this period.

Employment. A small overall gain of employment in Alaska is projected with the end of North Slope oil production in 2004, with the impact of lost North Slope production offset by increases in employment associated with termination activities. Employment would then fall over the period 2004 to 2008 at an annual rate of 2.2% before increasing after 2008, averaging 1.2% annual growth during the remainder of the period 2008 to 2034 (Table 4.6-14; Figure 4.6-2).

In individual industries in the state, employment is generally projected to fall during the period 2004 to 2008, despite increases in some sectors during termination activities in 2004. Mining (including oil and gas) would suffer a 57% loss in employment between 2003 and 2004 following the end of North Slope production, with moderate annual growth of 1.1% from a much lower base after 2004. Pipeline termination activities would produce a 38% increase in construction employment between 2003 and 2004, followed by a 20% decline in sectoral employment between 2004 and 2005, with continued moderate annual declines until 2008. Elsewhere in the Alaskan economy, the period 2004 to 2008 would bring steadily declining employment, with annual declines of between 1% and 2% for many industries following the loss of North Slope oil production and state tax revenues. For those sectors not dependent on the oil and gas sector, annual growth would continue during this period, particularly in tourism (2.9%), and agriculture, forestry and fisheries (1.0%). Federal government and military employment would not be affected by TAPS termination.

After 2008, a number of industries are projected to outpace the state rate, including transportation, trade, finance, services, and tourism, each of which would grow between 1.6 and 1.9% each year over the entire period. With the exception of tourism, each of these industries would experience higher growth rates during the second half of the period. The natural-resource-based industries, such as mining (which includes the oil and gas sector), agriculture, forestry, and fishing, would all grow at close to the state average rate for the entire nonrenewal period and would all experience higher growth rates during the first half of the period.

The construction sector would experience moderate employment growth between 2008 and 2034, reflecting growth rates in the economy of the state as a whole.

Employment in federal, state, and local government is projected to produce less employment growth than would be the case for the state as a whole, with overall rates of 0.6% for local government, 0.4% for state government, and 0.1% for federal government employment. Higher state and local government employment growth rates are expected during the period 2019 to 2034, with falling rates for federal government employment.

Unemployment. TAPS termination and the loss of North Slope oil production is projected to increase unemployment in the state beginning in 2004, with the rate reaching 8.3% in 2008. For the remainder of the period 2008 to 2034, the unemployment rate would remain between 7.0% and 7.8%, with slightly higher rates within this range toward the end of the period (Table 4.6-15; Figure 4.6-3).

It is likely that the unemployment impacts underestimate the number of people who are projected to want to work, because the unemployment rate only includes persons who would be registering for unemployment benefits. During the nonrenewal period, the number of employment opportunities in many Alaskan communities is likely to continue to be limited, meaning that additional people would not be actively searching for employment.

Personal Income. Real personal income (which excludes the effects of inflation on personal incomes over time) is only projected to be moderately affected by the loss in oil production and oil revenues. After falling 1.7% annually between 2004 and 2008, personal incomes would be expected to grow, increasing at an annual average rate of 1.2% over the entire period, with a higher rate in the second half of the period (Table 4.6-16; Figure 4.6-4). Per capita incomes would fall slightly over the period 2004 to 2008 before rising over the period 2008

TABLE 4.6-14 Projected Employment in Alaska by Industry

Industry	2003	Year 2004	2008	2019	2034	Average Annual Rate of Growth (%) 2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Alaska	344,484	347,566	323,829	368,523	446,725	-1.8%	1.2%	1.3%	0.8%
Mining (including Oil and Gas)	10,157	4,329	4,531	4,895	5,149	1.1%	0.7%	0.3%	0.6%
Agriculture, Forestry, and Fisheries	1,991	2,011	2,096	2,370	2,546	1.0%	1.1%	0.5%	0.8%
Construction	16,963	23,485	12,160	13,128	14,901	-15.2%	0.7%	0.8%	-1.5%
Manufacturing	15,449	15,465	15,405	15,683	16,059	-0.1%	0.2%	0.2%	0.1%
Transportation[a]	20,997	20,683	19,903	23,961	30,919	-1.0%	1.7%	1.7%	1.3%
Communications and Public Utilities	6,415	6,456	6,157	6,951	8,206	-1.2%	1.1%	1.1%	0.8%
Wholesale and Retail Trade[a]	64,014	65,000	62,138	74,363	95,171	-1.1%	1.6%	1.7%	1.3%
Finance	12,638	12,781	11,759	14,531	19,268	-2.1%	1.9%	1.9%	1.4%
Services[a]	75,460	76,789	73,352	88,187	114,199	-1.1%	1.7%	1.7%	1.3%
Tourism[a]	18,651	19,422	21,770	26,510	33,922	2.9%	1.8%	1.7%	1.9%
Federal Civilian	17,560	17,604	17,630	18,126	18,401	0.0%	0.3%	0.1%	0.1%
State Government	21,413	21,710	20,851	21,985	24,514	-1.0%	0.5%	0.7%	0.4%
Local Government	33,462	33,009	31,725	34,166	39,595	-1.0%	0.7%	1.0%	0.6%
Military	18,054	18,054	18,054	18,054	18,054	0.0%	0.0%	0.0%	0.0%
Proprietors	29,912	30,192	28,066	32,123	39,743	-1.8%	1.2%	1.4%	0.9%

[a] Tourism total includes activity also included in Transportation, Trade, and Services. Data in Tourism row is not included in Alaska total.

Source: MAP model (see Appendix A, Section A.8).

TABLE 4.6-15 Projected Labor Force Participation and Employment and Unemployment Rates

	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Total population	670,692	682,887	667,452	781,773	974,183	-0.6%	1.4%	1.5%	1.2%
Potential labor force	465,454	473,001	453,409	514,545	634,885	-1.1%	1.2%	1.4%	1.0%
Labor force	362,468	368,007	349,522	395,224	483,465	-1.3%	1.1%	1.4%	0.9%
Labor force participation rate (%)	78%	78%	77%	77%	76%	-0.3%	0.0%	-0.1%	-0.1%
Employment[a]	338,771	342,209	320,433	366,858	446,088	-1.6%	1.2%	1.3%	0.9%
Unemployment rate (%)	6.5%	7.0%	8.3%	7.2%	7.7%	4.4%	-1.3%	0.5%	0.3%

[a] Employment of Alaskan residents; does not include nonresidents.

Source: MAP model (see Appendix A, Section A.8).

TABLE 4.6-16 Projected State Personal Income and Alaska Permanent Fund Dividend (2000 dollars, except where noted)

	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Total personal income (millions of 2000 dollars)	16,114	16,255	15,180	18,167	23,235	-1.7%	1.6%	1.7%	1.2%
Personal income per capita	24,026	23,804	22,743	23,238	23,851	-1.1%	0.2%	0.2%	0.0%
Transfer payments per capita	5,920	5,832	6,421	7,177	7,821	2.4%	1.0%	0.6%	1.0%
Transfer payments share of personal income (%)	24.6%	24.5%	28.2%	30.9%	32.8%	3.6%	0.8%	0.4%	1.0%
Permanent Fund Dividend per capita (2000$)	1,208	1,069	1,336	1,166	965	5.7%	-1.2%	-1.3%	-0.3%
Permanent Fund Dividend share of personal income (%)	5.0%	4.5%	5.9%	5.0%	4.0%	6.9%	-1.4%	-1.4%	-0.3%

Source: MAP model (see Appendix A, Section A.8).

to 2034. The contribution of transfer payments to personal incomes would grow from almost 25% of incomes in 2004 to more than 32% by 2034.

With the end of North Slope oil production and pipeline operation, Alaska Permanent Fund Dividend payments (the per capita annual payment to individuals by the state from earnings on the investment of royalty payments made to the state by oil companies), would still be made. The size of the Permanent Fund Dividend depends on the performance of the stock market and the extent to which investment earnings are also used to cover state General Fund expenditures. Assuming no increase in the current portion of earnings going to the General Fund, the Permanent Fund Dividend is projected to contribute 4.5% of personal income in 2004, with an increase in the contribution of the per capita payment by 2008, with the fall in personal income following termination. As population growth in the state exceeds growth in the size of the Permanent Fund later in the period 2008-2034, the contribution of the payment to personal income falls.

State and Local Tax Revenues. The largest impact of not renewing the Federal Grant would be on tax revenues. Oil revenues currently contribute almost one-third of total state revenues and have been a major source of revenues used to support a wide range of expenditure programs. In 2004, total state oil revenues are projected to fall to less than 10% of their level in the last year of pipeline operations in 2003 (Table 4.6-17). The loss of production taxes and corporate income taxes would also be significant; they would fall to less than 5% of their 2003 levels. The overall impact on the state budget would be a reduction of more than 25% in state revenues by 2004.

Impacts of No-Action Alternative on Tax Revenues

Loss of North Slope oil would have a substantial effect on state tax revenues in 2004, reducing oil revenues by more than 90% and oil production and oil-related corporate income tax revenues by more than 95%. Overall state revenues would fall by 25%, but with a less than 10% decline likely at the local level with the loss of property tax revenues. Although some growth in state revenues would be expected from nonpetroleum sources, these sources would not be enough to cover projected expenditures.

While small annual increases in nonpetroleum revenues of 0.4% over the entire nonrenewal period would be partially expected to offset the loss in oil revenues, it is projected that overall tax revenues in the state would decrease at an annual average rate of 1.5% over the 30-year period. The rate of decline in total revenues would be larger without the benefit of earnings on the investment of general revenues. By 2034, these earnings are projected to disappear, with some spending of the principal likely. If the projected level of state and local expenditures occurs (see below), increasingly large annual budget deficits are likely during the nonrenewal period if, as it is assumed, the current means of generating revenue in the state continue.

Options for Addressing the Deficit

Various fiscal policy options have been identified as a means of addressing current revenue shortfalls, including a sales tax, reinstitution of a state personal income tax, a cap on the Permanent Fund Dividend, changes in petroleum sector tax rates, state and local expenditure reductions, and the use of a portion of the earnings on the Permanent Fund, currently used for the Permanent Fund Dividend. While a number of these, notably a personal income tax and the use of some portion of the earnings from the Permanent Fund, have already been proposed to address current state budgetary problems, the analysis does not include any of these options in the estimation of the impact of not renewing the Federal Grant on state and local tax revenues because of the uncertainty surrounding the use and timing of any particular fiscal policy option. The selection of any one, or a combination of, these policy options to address the budget deficit was considered to be beyond the scope of this analysis.

The loss of oil production and the end of pipeline operations would only have a moderate impact on the ability of local governments to maintain existing service levels. This conclusion is reached because the analysis assumed that

TABLE 4.6-17 Projected State Revenues (millions of 2000 dollars)

Revenue Source	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Petroleum bonuses	17	1	1	2	2	1.2%	4.4%	-1.2%	1.2%
Petroleum rents	16	16	16	16	17	0.0%	0.2%	0.2%	0.2%
Petroleum property taxes	39	2	2	1	1	-7.0%	-7.2%	-2.5%	-4.9%
Petroleum royalties	699	57	56	74	56	-0.6%	2.6%	-1.8%	-0.1%
Petroleum production taxes	407	16	22	33	26	7.5%	4.1%	-1.8%	1.6%
Petroleum corporate taxes	151	2	2	1	0	-7.2%	-7.9%	-3.0%	-5.4%
Miscellaneous petroleum revenues	113	0	0	0	0	NA[a]	NA	NA	NA
Federal-state shared petroleum revenues	11	11	11	11	11	0.0%	0.2%	0.2%	0.2%
Total oil revenues	1,451	106	108	138	113	0.7%	2.2%	-1.4%	0.2%
Non-petroleum revenues	451	452	420	457	516	-1.8%	0.8%	0.8%	0.4%
Investment earnings	1,874	1,873	1,710	1,100	-101	-2.3%	-3.9%	-185.3%	NA
Federal grants	1,224	1,277	1,371	1,560	1,862	1.8%	1.2%	1.2%	1.3%
Total state revenues	5,001	3,707	3,609	3,256	2,389	-0.7%	-0.9%	-2.0%	-1.5%

[a] NA = not applicable.

Source: MAP model (see Appendix A, Section A.8).

state transfers to local governments would not be affected by the loss of state oil revenues with the nonrenewal of TAPS. Although increasingly large state budget deficits are projected with the current means of generating revenue (see above) and although there is considerable uncertainty regarding the choice of any particular option to increase revenues or reduce expenditures at the state level and the consequent impact on state transfers to local governments, the analysis assumed that the necessary state revenues would be found to support projected local government expenditures over the nonrenewal period. On the basis of this assumption, overall revenues at the local level are projected to fall by 10% between 2003 and 2004. The largest loss would be to taxes levied on oil property, which would fall to only 6% of their 2003 level by 2004 (Table 4.6-18). The share of oil-related property tax revenues would continue to fall during the termination period, from 2.3% of total property tax revenues in 2004 to 0.3% by 2034.

Overall, losses are not expected to be as significant at the local level as they are at the state level, although losses would be large in some areas, such as the North Slope Borough, where petroleum taxes account for a large share of revenues. Local tax revenues are projected to grow at an annual average rate of 0.7% over the entire period, with larger increases occurring over the second 15 years (Table 4.6-18). Federal and state transfers to local government, which together would constitute about 45% of total local revenues over the entire period, are

TABLE 4.6-18 Projected Local Revenues (millions of 2000 dollars, except where noted)

Revenue Source	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Property taxes[a]	697	529	514	604	810	-0.8%	1.5%	2.0%	1.4%
Petroleum	189	12	9	4	3	-7.6%	-7.2%	-2.3%	-4.8%
Non-petroleum	508	517	505	601	807	-0.6%	1.6%	2.0%	1.5%
Petroleum percent of total property taxes	27	2.3	1.8	0.7	0.3	-6.9%	-8.5%	-4.2%	-6.2%
Other taxes	156	159	152	185	249	-1.2%	1.8%	2.0%	1.5%
State transfers	971	975	932	996	1,098	-1.1%	0.6%	0.7%	0.4%
Federal transfers	134	136	141	161	192	1.0%	1.2%	1.2%	1.2%
Local revenues[b]	1,958	1,799	1,738	1,947	2,349	-0.9%	1.0%	1.3%	0.9%
Charges and miscellaneous revenue	740	636	635	646	666	0.0%	0.2%	0.2%	0.2%
Total general revenues	2,699	2,435	2,373	2,593	3,015	-0.6%	0.8%	1.0%	0.7%

[a] Property taxes are the sum of petroleum and non-petroleum property taxes.

[b] Local revenues are the sum of property and other taxes, plus state and federal transfers.

[c] Total general revenue is the sum of local revenues and charges and miscellaneous revenues.

Source: MAP model (see Appendix A, Section A.8).

expected to grow at a relatively stable rate — a rate only slightly less than the overall growth rate in general revenues at the local level.

State and Local Expenditures. Total and per capita expenditures at the state level are projected to decline 9.3% over the period 2004 to 2008, an annual drop of 2.4%. Capital and debt service expenditures would fall by more than 26% over this period (an annual decline of 7.3%), while expenditures elsewhere at the state level would fall an average of 4.3% (an annual average decline of 1.1%), with smaller losses in social services and larger declines in transportation. State government expenditures are expected to grow at an annual rate of 0.3% over the entire nonrenewal period, with higher growth during the period 2019 to 2034 (Table 4.6-19). Expenditures on education are projected to remain about one-fifth of overall state spending between 2008 and 2034. These expenditures would grow at an annual rate of 0.5% over the period 2004 to 2034, with higher growth between 2019 and 2034. General government (0.5%) and social services (0.9%) are also expected to grow slightly faster than overall state expenditures, also with higher growth between 2019 and 2034. Despite the growth in education spending, education expenditures are not expected to keep pace with population growth.

Overall state per capita expenditures would be expected to increase at an annual rate of 0.4%. At the local level, declining debt service expenditures are projected to form a significant

TABLE 4.6-19 Projected State Government Expenditures (millions of 2000 dollars)

Item	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
General government	895	898	859	925	1,046	-1.1%	0.7%	0.8%	0.5%
Education	1,804	1,809	1,731	1,868	2,114	-1.1%	0.7%	0.8%	0.5%
Social services	902	907	872	976	1,170	-1.0%	1.0%	1.2%	0.9%
Transportation	523	523	498	517	552	-1.2%	0.3%	0.4%	0.2%
Environment	339	340	325	349	392	-1.1%	0.6%	0.8%	0.5%
Capital outlay and debt service	1,387	1,324	976	1,008	1,161	-7.3%	0.3%	0.9%	-0.4%
Total state expenditures	5,849	5,801	5,259	5,643	6,435	-2.4%	0.6%	0.9%	0.3%
Expenditures per capita (2000 $)	8,720	8,495	7,709	8,271	9,521	-2.4%	0.6%	0.9%	0.4%

Source: MAP model (see Appendix A, Section A.8).

part of the decline in total and per capita expenditures over the period 2004 to 2008. There would be a 25.3% fall in interest payments by local governments over this period, an annual average decline of 7%. A smaller average decline of 5.2% (an annual average decline of 1.3%) would occur elsewhere at the local level, with expenditures on education declining by 4.7% (1.2% on average annually), with slightly larger decreases in noneducation expenditures and personnel. After 2008, growth in educational expenditures (0.8%) is expected to be higher than the overall rate of local expenditure growth (0.5%) (Table 4.6-20). As a result, educational expenditures would continue to make up a large portion of total expenditures, increasing from 51% of all expenditures in 2008 to 54% in 2034. As is the case at the state level, however, expenditures on education are not expected to keep pace with population growth.

Overall local per capita expenditures are expected to increase at an annual rate of 0.5%.

4.6.2.19.4 Pipeline Corridor Regional Economic Impacts. TAPS removal and lost North Slope oil production would affect the economy of the pipeline corridor region by affecting the population (including net migration), employment, personal income, and local government revenues and expenditures and public service employment. Economic activity in the pipeline corridor as a whole would be affected slightly more than it would be at the state level with the loss of TAPS. This is because of the impact of lost spending associated with pipeline operating employment and lost property tax revenues in communities along the pipeline route and in Anchorage. Transfers to local jurisdictions from the state and federal government are projected, however, to continue to create significant local employment and income.

The analysis assumed that state transfers to local governments would not be affected by reductions in state oil revenues with lost TAPS throughput. While increasingly large state budget deficits are projected with the current means of generating revenue, a number of fiscal policy options have been considered by various parties to address the current and likely future fiscal situation (see above). Given the uncertainty surrounding the use and timing of any particular option to increase revenues or reduce expenditures, however, and the

TABLE 4.6-20 Projected Local Government Expenditures (millions of 2000 dollars, except where noted)

Item	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Education	1,261	1,271	1,212	1,354	1,613	-1.2%	1.0%	1.2%	0.8%
Non-education expenditures	932	929	874	922	965	-1.5%	0.5%	0.3%	0.1%
Personnel expenditures	201	201	191	200	197	-1.2%	0.4%	-0.1%	-0.1%
Interest on debt	274	157	117	139	204	-7.0%	1.5%	2.6%	0.9%
Total expenditures	2,667	2,558	2,395	2,615	2,979	-1.6%	0.8%	0.9%	0.5%
Expenditures per capita (2000 $)	3,977	3,746	3,510	3,833	4,407	-1.6%	0.8%	0.9%	0.5%

Source: MAP model (see Appendix A, Section A.8).

consequent impact on state transfers to local governments, the analysis assumed that the necessary state revenues would be found to support projected local government expenditures over the nonrenewal period.

Population. Some variation in population growth is expected within the pipeline corridor region following TAPS termination and the loss of North Slope oil production. Between 2003 and 2004, population in the pipeline corridor as a whole is projected to increase 2.2% as termination activities provide opportunities for in-migrants from outside the region (Table 4.6-21). Pipeline termination activities would also produce population gains in the majority of areas within the region itself, with large gains in Valdez-Cordova (19.4%), and smaller increases in Southeast Fairbanks (3.3%) and Fairbanks-Northstar (2.0%). In the North Slope Borough, out-migration associated with the end of oil production would lead to a loss in population of 0.2%.

Between 2004 and 2008, with the end of in-migration associated with ongoing termination activities, the region as a whole is projected to lose 3.6% of its population, an annual decline of 0.9%. Falling population would be concentrated in those areas that would lose employment in oil production, pipeline, and marine transportation activities in 2004. The largest losses would be in Valdez-Cordova, which would experience a 26.5% decline in population over the period 2004 to 2008, an average annual rate of loss of -7.4%, with smaller losses in the North Slope, which would lose 6.2% of its population, and in Anchorage, where population would fall by 4.1% over the period. Elsewhere in the region, there would be small gains in population between 2004 and 2008, mainly due to the increase in the Alaska Native population. These gains would occur in Yukon-Koyukuk, where population growth would average 1.5% in each year between 2004 and 2008, and Southeast Fairbanks, where the annual gain would be 0.7%. Smaller gains would occur in the Fairbanks Northstar Borough.

Over the entire period 2004 to 2034, slightly lower growth rates are projected for the pipeline corridor (1.1%) than for the state as a whole (1.2%). Within the pipeline corridor, annual average growth rates would range from 0.1 to 1.4%, with slightly higher rates expected for Anchorage, the Southeast Fairbanks Census Area, and the Yukon-Koyukuk Census Area and lower rates expected for the Valdez Cordova Census Area. Larger growth rates are expected throughout the pipeline corridor region in the second half of the non-renewal period. Higher rates of migration from rural to urban Alaska might also be expected as employment

TABLE 4.6-21 Projected Populations in Pipeline Corridor Region[a]

Location	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Total pipeline corridor region	402,973	411,724	397,068	465,212	577,866	-0.9%	1.5%	1.5%	1.1%
Anchorage	281,679	286,191	274,507	326,602	409,012	-1.0%	1.6%	1.5%	1.2%
Fairbanks North Star Census Area	86,933	88,669	88,935	100,559	121,938	0.1%	1.1%	1.3%	1.1%
North Slope Borough	7,462	7,445	6,986	7,782	9,670	-1.6%	1.0%	1.5%	0.9%
Southeast Fairbanks Census Area	7,452	7,701	7,919	9,019	11,010	0.7%	1.2%	1.3%	1.2%
Valdez Cordova Census Area	11,082	13,237	9,724	10,944	13,473	-7.4%	1.1%	1.4%	0.1%
Yukon-Koyukuk Census Area	8,366	8,481	8,997	10,306	12,762	1.5%	1.2%	1.4%	1.4%

[a] The MAP model results are shown for census area population projections up to 2025. For the period 2026 to 2034, the pipeline corridor population estimates were determined by using the annual state population growth rates for that period.

Source: MAP model (see Appendix A, Section A.8).

opportunities in the region lag behind population growth.

Employment. Employment in the pipeline corridor region is projected to increase 1.0% during 2004, the peak year of pipeline termination activities (Table 4.6-22). Large gains in employment would also occur in some areas within the region, notably Valdez-Cordova (21.3%) and to a lesser extent Fairbanks-Northstar (3.8%). Employment losses would occur in the North Slope Borough (a decline of 16.6%) with the end of oilfield production activities.

After gaining significant employment from termination activities in many parts of the region in the peak year (2004), employment in the region is projected to fall 9.3%, an annual average decline of 2.4%, between 2004 and 2008. Within the region, losses would be concentrated in the North Slope Borough, where employment would decline 43.8% between 2004 and 2008, an annual average decline of 13.4%, with the continuing contraction of the economy of the borough following the loss of oil production. Valdez-Cordova would also suffer employment losses of 32.7%, or 9.4% average annually, during this period, with steadily declining employment in pipeline termination activities in the area. Smaller losses would come in Fairbanks-North Star and in Anchorage. Small employment gains would be registered in the Southeast Fairbanks and Yukon-Koyukuk Census Areas. Moderate employment growth of 0.8% would occur in the pipeline corridor as a whole between 2004 and 2034. Slightly higher-than-average rates of growth over the entire

TABLE 4.6-22 Projected Pipeline Corridor Employment[a]

Location	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Total pipeline corridor region	221,980	224,219	203,312	233,116	284,039	-2.4%	1.3%	1.3%	0.8%
Anchorage	162,746	163,488	152,146	176,514	218,723	-1.8%	1.4%	1.4%	1.0%
Fairbanks North Star Census Area	42,804	44,431	40,282	44,674	51,410	-2.4%	0.9%	0.9%	0.5%
North Slope Borough	8,511	7,097	3,987	4,310	4,993	-13.4%	0.7%	1.0%	1.2%
Southeast Fairbanks Census Area	2,011	2,035	2,072	2,289	2,624	0.4%	0.9%	0.9%	0.9%
Valdez Cordova Census Area	5,908	7,167	4,825	5,329	6,290	-9.4%	0.9%	1.1%	0.4%
Yukon-Koyukuk Census Area	3,122	3,140	3,146	3,499	4,074	0.0%	1.0%	1.0%	0.9%

[a] Components may not exactly add up to total because of independent rounding.

Source: MAP model (see Appendix A, Section A.8).

period are expected in the Southeast Fairbanks and Yukon-Koyukuk Census Areas and in Anchorage.

Personal Income. Personal incomes are projected to decline 0.5% in the pipeline corridor between 2003 and 2004, with larger losses within the region, particularly in the North Slope Borough, where personal incomes would decline 9.9% with the loss of oil production and pipeline operations employment. Smaller declines would be experienced elsewhere in the region. Incomes would increase by 8.9% in the Valdez-Cordova area, and by 1.0% in Fairbanks-North Star, reflecting increases in employment during termination activities in these areas. Per capita incomes in both areas would decline, however, as income growth would lag behind population growth. Between 2004 and 2008, the North Slope Borough and Valdez-Cordova would suffer larger declines in incomes (20.9% and 19.8% declines, respectively) with the continued contraction of the economy of North Slope following the loss of oil production, and the decline in termination activity employment in Valdez-Cordova. Smaller losses in personal income would occur in the remainder of the corridor region, while there would be small increases in income in the Yukon-Koyukuk Census Area. Personal income in the pipeline corridor as a whole would increase slightly, on average, over the entire period 2004 to 2034, with slightly larger increases in personal income in the Yukon-Koyukuk Census Area and in Anchorage (Table 4.6-23).

Local Government Revenues and Expenditures and Public Service Employment. Population, employment, and personal incomes in the pipeline corridor region are generally expected to experience moderate

TABLE 4.6-23 Projected Pipeline Corridor Personal Incomes (millions of 2000 dollars, except where noted)

Component	Year					Average Annual Rate of Growth (%)			
	2003	2004	2008	2019	2034	2004 to 2008	2008 to 2019	2019 to 2034	2004 to 2034
Total Pipeline Corridor									
Personal income	10,086	10,033	9,488	11,329	14,415	-1.4%	1.6%	1.6%	1.2%
Personal income per capita ($)	25,029	24,367	23,896	24,352	25,019	-0.5%	0.2%	0.2%	0.1%
Permanent Fund Dividend share of personal income (%)	4.8%	4.4%	5.6%	4.8%	3.9%	6.2%	-1.4%	-1.4%	-0.4%
Anchorage									
Personal income	7,632	7,558	7,180	8,639	11,139	-1.3%	1.7%	1.7%	1.3%
Personal income per capita ($)	27,096	26,407	26,157	26,452	26,961	-0.2%	0.1%	0.1%	0.1%
Permanent Fund Dividend share of personal income (%)	4.5%	4.0%	5.1%	4.4%	3.6%	6.0%	-1.3%	-1.4%	-0.4%
Fairbanks									
Personal income	1,759	1,778	1,684	1,964	2,369	-1.3%	1.4%	1.3%	1.0%
Personal income per capita ($)	20,239	20,047	18,939	19,528	20,223	-1.4%	0.3%	0.2%	0.0%
Permanent Fund Dividend share of personal income (%)	6.0%	5.3%	7.1%	6.0%	4.8%	7.2%	-1.5%	-1.5%	-0.4%
North Slope									
Personal income	140	127	100	115	146	-5.7%	1.2%	1.6%	0.5%
Personal income per capita ($)	18,818	17,002	14,333	14,741	15,256	-4.2%	0.3%	0.2%	-0.4%
Permanent Fund Dividend share of personal income (%)	6.4%	6.3%	9.3%	7.9%	6.3%	10.3%	-1.5%	-1.5%	0.0%
Southeast Fairbanks									
Personal income	144	142	141	166	201	-0.3%	1.5%	1.3%	1.2%
Personal income per capita ($)	19,348	18,475	17,787	18,397	18,971	-0.9%	0.3%	0.2%	0.1%
Permanent Fund Dividend share of personal income (%)	6.2%	5.8%	7.5%	6.3%	5.1%	6.7%	-1.5%	-1.5%	-0.4%
Valdez-Cordova									
Personal income	248	270	216	244	307	-5.4%	1.1%	1.5%	0.4%
Personal income per capita ($)	22,365	20,381	22,251	22,335	23,206	2.2%	0.0%	0.3%	0.4%
Permanent Fund Dividend share of personal income (%)	5.4%	5.2%	6.0%	5.2%	4.2%	3.4%	-1.3%	-1.5%	0.8%
Yukon-Koyukuk									
Personal income	162	159	166	201	253	1.1%	1.7%	1.5%	1.6%
Personal income per capita ($)	19,376	18,737	18,485	19,477	20,269	-0.3%	0.5%	0.3%	0.3%
Permanent Fund Dividend share of personal income (%)	6.2%	5.7%	7.2%	6.0%	4.8%	6.1%	-1.7%	-1.5%	0.6%

Source: MAP model (see Appendix A, Section A.8).

growth over the period 2008 to 2034. At the state level, the loss of TAPS throughput is expected to contribute to a steadily worsening state deficit. However, the analysis assumed that the required revenue from various possible sources would be found to fund state expenditures, including state transfers to local governments. With the availability of state funds for local expenditure programs, together with moderate population and economic growth in the pipeline corridor region, the impact of not renewing the Federal Grant on local public finances and public service employment in the region is, therefore, not expected to be significant.

4.6.2.19.5 Alaska Native Corporations. A number of Alaska Native corporations provide contracting services to the pipeline (see Section 3.23.6). These services would no longer be provided upon the termination of the pipeline, thus significantly impacting the employment and incomes of members of these Alaska Native corporations. A moderate decline in the size of the Permanent Fund Dividend per capita, as growth in the Alaskan population exceeds growth in the size of the Fund, would have a minor effect on personal incomes of corporation shareholders. Earnings on investments made by some of the corporations have the potential to partially offset the slight decline in personal incomes.

4.6.2.19.6 Subsistence. Many subsistence activities have cultural significance to Alaska Natives, and these activities may not necessarily be replaced by greater participation in the market economy with increases in personal income in Alaska Native communities. Lost oil production and oil revenues in 2004 and beyond might affect subsistence through the slight decline in per capita Permanent Fund Dividend support to personal incomes in the Alaska Native community as growth in the Alaska population as a whole is projected to exceed the growth of the Permanent Fund. Income from the dividend has led to some changes in the way subsistence activities (in particular, hunting and fishing) have been undertaken by further encouraging the use of modern equipment to supplement more traditional forms of subsistence. Losses in personal income with the slight decline of the Permanent Fund Dividend could affect the productivity of subsistence activities and create other socioeconomic impacts.

4.6.2.20 Subsistence

It is likely that the no-action alternative would result in small positive impacts on subsistence. This conclusion is based on the consideration of separate consequences that individually could lead to either an improvement or a deterioration in subsistence but that likely would, in sum, result in a very slight net improvement. Each of these consequences is examined below.

Impact of No-Action Alternative on Subsistence

Implementation of the no-action alternative could result in (1) reduced financial ability to pursue recreational hunting and fishing, (2) reduced access to subsistence hunting and fishing areas by nonlocals, (3) reduced ability to use the Dalton Highway (although the highway would remain), (4) increased economic reasons to pursue subsistence, (5) reduced restrictions to very small portions of traditional subsistence use areas, and (6) reduced activity on the Dalton Highway and near the TAPS that has disrupted the movement of small numbers of terrestrial mammals.

One of the main concerns among rural Alaskans pursuing subsistence as part or all of their means of survival is the depletion of resources by nonlocal competition. This nonlocal competition requires certain preconditions if it is to pose a serious threat:

- The number of nonlocal people fishing, hunting, or trapping would have to be large enough to deplete resources noticeably.
- Harvest locations, which were previously isolated or at least generally inaccessible to nonlocal competitors, would have to be adequately accessible to enable noticeable depletion of resources or disruption of subsistence activities.

It has long been viewed by individuals involved in subsistence activities that the TAPS provides both of these preconditions (e.g., Holly 1992; Ned 1992), although the relationship of the TAPS with those preconditions is largely indirect. Many believe that large numbers of people come from other locations in Alaska, often identified as cities such as Fairbanks or Anchorage, to pursue game or fish that also serve as key subsistence resources. TAPS employees have also been accused by subsistence practitioners of competing for fish and game (see Section 3.24), although no evidence exists to indicate that such competition (if present) results in harvest of enough resources to be a threat worthy of concern (see also Section 4.3.20). Increased access, in turn, is seen to result primarily from the Dalton Highway, and secondarily from TAPS-specific access roads.

As noted elsewhere in this FEIS, the Dalton Highway currently is owned and maintained by the State of Alaska, and it was the state that decided to open this road to public use in 1996. The no-action alternative is not anticipated to change public access, although traffic could decline on this road for three reasons if the ROW is not renewed. One would be the reduction in commercial traffic that services the TAPS and North Slope oil fields. A second reason would be the declining road conditions resulting from reduced state revenues under the no-action alternative. Reduced revenues would likely lead to a reduction in maintenance on a road requiring frequent attention. The third reason for reduced traffic on Dalton Highway under the no-action alternative would be a decline in the financial resources of Alaska residents who might use it, a result of the adverse economic impacts anticipated to accompany the closure of the TAPS (see Section 4.6.2.19).

Population is anticipated to grow slowly under the no-action alternative, after a slight decline (through 2008), both in the state as a whole and in the corridor (see Tables 4.6-12 and 4.6-15). Growing population in general likely would lead to increased pressure on subsistence resources (for subsistence as well as recreational purposes). Economic conditions anticipated under this alternative, in turn, likely would yield mixed effects on subsistence. One impact would be increased pressure on subsistence as an economic activity in place of reduced alternatives for wage labor. Such pressure logically would lead to increased subsistence activity, at least by those individuals living in rural parts of the state. In contrast, reduced access to cash due to anticipated slight declines in per capita personal income (see Tables 4.6-16 and 4.6-23) would compromise at least to some degree modern subsistence activities. As discussed in Section 3.24.2, subsistence in the 21st century often involves the use of some sort of modern transportation technology along with some type of modern harvesting equipment. Many of these resources likely would be less available because of declines in income. Finally, under the no-action alternative, presumably fewer Alaska residents would be able to afford recreational hunting or fishing, reducing what today many subsistence practitioners view as a major source of competition. Ultimately then, economic conditions under the no-action alternative would yield a greater impetus to pursue subsistence resources, but a reduced ability to do so, and a slightly increased inability to pursue recreational hunting or fishing.

Finally, the no-action alternative would remove two of the direct effects of the TAPS that likely have slight negative impacts on subsistence:

- Limited access to (very small) parts of traditional subsistence use areas (because of the presence of TAPS infrastructure and activities); and
- The continued use of the Dalton Highway to maintain TAPS operations, along with various access roads and airspace over the TAPS, and continued human activity around the TAPS — possibly disrupting the movement of small numbers of terrestrial mammals.

If the Federal Grant was not renewed, both of these impacts would disappear, likely producing a very slight positive effect on subsistence.

The results of the above considerations need to be weighed against each other. Economic conditions under the no-action alternative would produce an increased need to

pursue subsistence as a means of acquiring key resources. Demographic conditions similarly would indicate increased pressure on subsistence resources as population slowly increased. Statewide, however, there would be a reduced ability to harvest fish and game, either for sport or subsistence. Moreover, access to the TAPS area would likely decline slightly, although it would not revert to conditions anywhere close to those that existed prior to opening the Dalton Highway to public use. Finally, restrictions on access to small portions of subsistence harvest areas and activities along the Dalton Highway and near the TAPS that might very slightly disrupt the movement of terrestrial mammals would cease, presumably yielding slight improvements to subsistence. Although available data do not permit a quantitative analysis (or weighing) of subsistence impacts for the no-action alternative and arrive at clearcut conclusions regarding net effects, the evidence present seems to indicate very slightly improved subsistence conditions.

4.6.2.21 Sociocultural Systems

Impacts of No-Action Alternative on Sociocultural Systems

The overall impacts of the no-action alternative on sociocultural systems would likely be negative and large enough to be detectable.

Possible positive consequences would include (1) short-term access to cash employment in areas close to the TAPS; and (2) reduced pace of modernization that possibly has contributed to social problems among Alaska Native sociocultural systems.

Possible negative consequences include (1) short-term increased exposure to relatively large numbers of nonlocal people in the vicinity of the TAPS, along with any social disruption that might accompany them during termination activities; (2) reduction or termination of state-funded programs and public services important to many rural communities and to both Native and non-Native sociocultural systems, because of declining state revenues; and (3) reduced access to wage employment, an important component of mixed rural economies.

4.6.2.21.1 Alaska Native Sociocultural Systems.

In certain impact areas, this FEIS anticipates high and adverse consequences under the no-action alternative, particularly those associated with the economic effects of discontinuing the TAPS. As discussed in detail in Section 4.6.2.19, both because of Alaska's heavy reliance on the oil industry and the central role that the TAPS plays in this industry, the entire state would experience economic impacts of considerable magnitude as a consequence of terminating the TAPS, particularly in declining gross state product and state tax revenues. One major long-term impact of the no-action alternative on Alaska Native sociocultural systems would be the reduction of many state-funded programs and infrastructure development (or maintenance), upon which many Alaska Natives rely (see Section 4.6.2.19). Another important negative impact would be the removal of some of the cash available to these sociocultural systems, thereby negatively affecting their mixed economies. However, these impacts would occur following a brief but considerable infusion of cash associated with TAPS termination activities. The latter activities would generate short-term impacts expected to have both positive and negative consequences, particularly for Alaska Native sociocultural systems close to the pipeline and its facilities.

The short-term impacts on Alaska Native sociocultural systems under the no-action alternative likely would be complex, with both positive and negative components in certain ways similar to those experienced by Natives in the proximity of the TAPS during its construction (Reckord 1979; Strohmeyer 1997). The arrival of large numbers of nonlocal peoples, largely non-Native, had a disruptive effect on the Alaska Native sociocultural systems in the vicinity of the TAPS during its construction. In particular, the infusion of large numbers of nonlocal peoples rapidly introduced new ideas and desires that often were difficult to assimilate in Alaska Native sociocultural systems, as well as problems with crime that affected Natives and non-Natives near the TAPS.

Fewer impacts from non-Native ideas and desires are anticipated during termination activities than occurred during construction, because Alaska Natives in the 21st century generally are much more aware of the non-Native world through increased contact, greater mobility, improved communication, and access to information through a range of media. However, the influx of many nonlocals and the problems that accompanied their arrival (such as crime and disruption of many daily activities), likely would resemble the construction period. Of course, the increased activity associated with termination activities would generate a large increase in available cash, some of which should be directly available to local and nonlocal Alaska Natives under the APSC's Native hiring provisions (APSC 1998c), and indirectly available through other wage-based employment. As discussed in Section 3.25.1.3, the effects of cash on Alaska Native sociocultural systems can be both positive and negative. Under the no-action alternative, these effects likely would be intensified in the short-term, both with the rapid infusion of wages and with their rapid disappearance once termination activities were complete.

It is likely that fewer impacts to Alaska Native sociocultural systems would occur in urban settings close to the TAPS than in rural settings, with the overall changes probably similar to those described for Fairbanks during TAPS construction (Dixon 1978; Strohmeyer 1997). The anticipation of lessened impacts in cities stems primarily from greater familiarity of Alaska Natives in such settings with non-Native society and economy. The short-term increase in crime in urban settings that may accompany the no-action alternative would affect Alaska Native sociocultural systems negatively, particularly if Natives themselves were involved.

Although of short duration, the potential short-term impacts to Alaska Native sociocultural systems in the vicinity of the TAPS under the no-action alternative likely would be negative and noticeable. Such systems struggle in the modern world to maintain themselves and their identity. Exposure to another boom-bust cycle of in-migration, accelerated economic activity, intense competition for work, out-migration, and economic decline quite possibly would compromise this maintenance.

Long-term impacts on Alaska Native sociocultural systems under the no-action alternative also would be mixed, but unlike short-term consequences likely would be experienced throughout the state. The description of Alaska Native sociocultural systems presented in this document depicts a collection of indigenous peoples who had developed remarkable abilities to survive throughout the many ecological challenges provided by the Alaskan natural environment (see Section 3.25.1). As also discussed, however, those systems have changed considerably over the past century or two. With the exception of groups on the north and south coasts (where bands relocated less frequently prior to the onset of heavy Euro-American influence), all Native sociocultural systems examined here were originally composed of small nomadic bands that frequently changed composition as well as geographic location in their struggle for survival. This is no longer the case. If one views such systems as the primary means by which humans adapt to their physical and social surroundings, then the modern sociocultural systems of Alaska Natives are adaptations to a partially traditional and partially modern set of natural and social challenges (see Section 3.25).

Although many Alaska Natives continue to rely heavily on subsistence, all of these economies are mixed, and cash plays an important role. Access to cash, primarily through wage employment (when available) and the Permanent Fund Dividend, is important in maintaining such economies. Per capita personal income is anticipated to decline under the no-action alternative (see Section 4.6.2.19). It is likely that Alaska Natives would experience reductions in personal income along with the rest of the state's population. Moreover, throughout rural areas (and many urban settings as well) Alaska Natives make heavy use of various public services, programs, and infrastructure provided by the state but ultimately funded in large part by oil revenues. State-funded programs and services include a range of assistance under the state revenue sharing program, the safe communities (municipal

assistance) program, legislative grants, and capital project matching grants, which provide funds to eligible communities for infrastructure development, infrastructure maintenance, and public services (ADCBD 2002a,b). Public expenditures likely would be greatly reduced under the no-action alternative. Given the rapid and dramatic economic and related changes expected to accompany the no-action alternative, the adaptive capabilities of modern Alaska Native sociocultural systems would be challenged — even acknowledging that in a very real sense these systems would be returning to situations closer to their traditional roots.

One of the greatest challenges faced by any adaptive system, including sociocultural systems, is the need to adjust to rapidly changing conditions. Such has been the world of many Alaska Native sociocultural systems for at least the past half-century. The no-action alternative ultimately would reduce the pace of change once new economic conditions were established, helping to remove some of the strain of continually adjusting to shifting social surroundings. Although it is uncertain, the reduced pace of change under the no-action alternative might also remove some of the causes of several social problems experienced by Alaska Natives, such as suicides that often are associated with substance abuse (Hlady and Middaugh 1988; Kettl and Bixler 1991). However, the uncertain consequences of removing much of the cash from Alaska Native economies are such that social problems may continue — the need to compete and adapt to rapid change and unfamiliar social challenges in a sense replaced by a materially and economically more difficult life with fewer options and a diminished ability to acquire the goods and services desired (Mitchell 2001).

In lieu of examples of similar situations, the long-term impacts on Alaska Native sociocultural systems under the no-action alternative likely would be negative and large enough to be detectable. This conclusion is founded in part on impacts in those components of Native economic systems relying on wages. The disappearance of direct and indirect sources of income and the reduction of public services are anticipated to have an adverse effect on economies that rely on an infusion of cash to supplement subsistence activities and that rely on public expenditures to provide necessary services (particularly in rural settings).

4.6.2.21.2 Non-Native Sociocultural Systems.

It is likely that non-Native sociocultural systems also would experience short- and long-term impacts under the no-action alternative. Short-term impacts would occur during the termination activities associated with discontinuing the TAPS and likely would be both intense and feature positive and negative components. These brief impacts would result from the temporary relocation of nonlocal workers to rural areas to participate in termination activities. Termination activities would generate more opportunities for cash income, both through employment on TAPS-related projects and as a result of the indirect economic benefits produced by growth in spending throughout local economies. As wage labor is both relatively difficult to secure in rural Alaska and an important component in non-Native mixed economies outside of the cities, additional wage labor would be a positive consequence of the no-action alternative.

However, the no-action alternative also would have negative short-term consequences for rural non-Native sociocultural systems. As discussed in Section 3.25.2, these systems have their roots in the pioneers, missionaries, and gold prospectors of the 19th and 20th centuries (Haycox 2002). They tend to consist of fairly isolated, closed communities of peoples who have chosen rural Alaska over more conventional geographic and social settings in America. The no-action alternative would generate short-term changes to rural Alaskans near the TAPS through introducing large numbers of nonlocal people to work on termination activities. Many of the impacts documented for the largely Native community of Copper Center during TAPS construction — such as an increased pace of life and a need to integrate unfamiliar nonlocal people within the local community (Reckord 1979) — likely would also occur in non-Native sociocultural systems under the no-action alternative. Such impacts occurred to a certain degree in the largely non-Native rural community of Wiseman during TAPS construction (Scott 1998).

Long-term impacts on non-Native sociocultural systems under the no-action alternative would hinge on the considerable economic impacts anticipated to accompany the discontinuation of the TAPS (see Section 4.6.2.19). The out-migration from Alaska anticipated to accompany rapid economic decline shortly after TAPS closure could have serious impacts on the rural non-Native sociocultural systems for those who remain, if outmigrants include many rural residents. The impacts expected include the interruption of social interaction patterns and established behavior patterns that extend beyond purely economic effects. Large reductions in government revenues predicted under the no-action alternative would reduce the ability of the state to provide much needed public services in rural areas, as discussed in Section 4.6.2.21.1. Despite such likely impacts, because these non-Native sociocultural systems tend to be less well-defined social networks than collections of individuals with a history of self-reliance (Lounsbury 1992; Scott 1998), the magnitude of impacts may in a sense be dampened. This conclusion acknowledges that rural non-Natives live where they do by choice and share a heritage of individuality and survival under difficult conditions.

The short-term impacts on non-Native sociocultural systems under the no-action alternative likely would be negative and small. Unlike Alaska Native sociocultural systems, the non-Native sociocultural systems of rural Alaska have their roots in Euro-American sociocultural systems. Often this association is not so much in sharing certain distant historic roots as it is in actual connection with more conventional settings — particularly through recent migrants to rural places. As documented for Wiseman (Scott 1998), although changes occurred during TAPS construction, most were localized in time and space, and the community and the sociocultural system underlying it adjusted accordingly.

Long-term impacts on non-Native sociocultural systems likely would be negative and noticeable. This conclusion rests primarily upon the anticipated effects of the considerable widespread economic downturn expected to accompany the no-action alternative. Rural non-Native sociocultural systems tend to rely on cash to complement subsistence activities and on public expenditures to provide certain services deemed necessary even in rural settings, such as schools. Both would be compromised under the no-action alternative, contributing reduced though unknown amounts to these systems. Moreover, the widespread out-migration from Alaska projected for the state as a whole possibly would affect rural non-Native settings as well, if indeed it affects rural settings, primarily in the form of increased difficulty of maintaining rural sociocultural systems.

4.6.2.22 Cultural Resources

The no-action alternative could have an adverse effect on potentially significant cultural resources. The TAPS itself might be eligible for listing on the NRHP for its value as an example of engineering and construction achievement and its importance in the history of Alaska and the United States. Thus, if the TAPS is listed as a historically significant structural complex on the NRHP, its dismantling and removal could

Impacts of No-Action Alternative on Cultural Resources

Two separate categories of impacts to cultural resources could result from the no-action alternative. The first category would be the impacts on the pipeline itself from dismantlement and removal of the aboveground TAPS components. The development of the TAPS was a massive engineering and construction accomplishment, and the pipeline has played a historically important role in Alaska and in U.S. domestic oil production. As such, the pipeline itself may be eligible for listing on the National Register of Historic Places. In addition, the activities associated with dismantlement and removal would have the potential to damage other cultural resources, both known and unreported, in the vicinity of the ROW.

In both cases, consultation with the Alaska SHPO and any affected Alaska Native Tribes, as appropriate, would be needed on a case-by-case basis to mitigate potential impacts to specific resources that are considered significant.

constitute an adverse impact. Under Section 106 of the NHPA (16 USC §470(f)), before any removal activities, APSC would have to coordinate with the Alaska SHPO to determine whether the TAPS is eligible as a significant property, and what, if any, mitigation procedures would be necessary.

Other than the possible adverse effect on the TAPS itself as a significant historic property, the issues of concern with regard to cultural resources under the no-action alternative would be essentially the same as those described for the proposed action (see Section 4.3.22). The activities involved in the dismantlement and removal of the pipeline components would have the highest likelihood of affecting cultural resources; this likelihood would decrease significantly once the pipeline was removed. The absence of a functioning pipeline would remove the need for ground-disturbing activities in many areas along the ROW, thus lessening the probability of adverse impacts on cultural resources once termination activities were completed. However, the absence of the pipeline would also reduce the amount of monitoring of known cultural resources, which could lead to increased impacts on cultural resources from recreational activities and vandalism on and in the vicinity of the former ROW.

4.6.2.23 Land Uses and Coastal Zone Management

Under the no-action alternative the TAPS ROW would not be renewed, and termination activities, including the dismantling and removal of TAPS facilities and restoration of the land, would be conducted. The impact assessment for the no-action alternative was based on the assumptions discussed in Section 4.6.1.1. In addition, it was assumed that both access to and recreational use within the ROW corridor likely would be restricted during termination activities, even if the current security restrictions were eliminated.

4.6.2.23.1 Land Use

Land Ownership. No additional land would be needed under the no-action alternative. Valid ROWs for termination activities exist on all parcels except one, which is currently under negotiation. No impacts on land ownership categories (federal, state, and private) would occur as a result of a decision to not renew the TAPS ROW.

Land Use. The no-action alternative would have effects on federal, state, local, and private

Impacts of No-Action Alternative on Land Uses and Coastal Zone Management

Land Uses: No impacts on land ownership would result if the TAPS ROW was not renewed. Any effects on federal, state, and private land use in the vicinity of the pipeline would be local in nature. The current rate of commercial, municipal, and residential development would be expected to decline. A decision to not renew the Federal Grant would not preclude continuation of wildlife habitat conservation or of military, mining, agricultural, and subsistence activities that currently occur in the vicinity of the pipeline. However, recreational use of the TAPS ROW corridor would likely be temporarily restricted during termination activities. Land use conflicts that have occurred on Native lands near the pipeline and its access roads would end after completion of termination activities.

Coastal Zone Management: Termination activities conducted under the no-action alternative would comply with the ACMP statewide standards and with the enforceable policies in both the North Slope Borough and Valdez CMPs. Nonrenewal of the TAPS would represent the loss of activities associated with TAPS and related facilities that are currently permitted under the ACMP statewide standards and the two local CMPs. Upon completion of termination activities, land previously occupied by the TAPS and associated facilities would be available for other development activities, consistent with ACMP statewide standards and enforceable policies of the North Slope Borough and Valdez CMPs.

land use in the vicinity of the pipeline. The current rate of commercial, municipal, and residential development would be expected to decline. (See Section 4.6.2.19 for a discussion of the economic impacts of the no-action alternative.) The no-action alternative would not preclude continuation of activities related to the conservation of wildlife habitat or the military, mining, agricultural, or subsistence activities that currently occur in the vicinity of the pipeline. However, recreational use of the TAPS ROW corridor would likely be temporarily restricted during termination activities. Land use conflicts that have occurred on Native lands near the pipeline and its access roads would end after completion of termination activities.

Federal and state lands in the vicinity of the pipeline include National Parks; federally designated Wilderness Areas; National Wildlife Refuges; National Wild and Scenic Rivers; and state recreation areas, sites, and parks. These lands are used primarily for recreation, wildlife habitat conservation, and the protection and preservation of ecological resources. Past operation and maintenance of the TAPS have neither interfered with these land uses nor affected protected resources in ACECs managed by the BLM. Consequently, past trends indicate that dismantlement and removal of the pipeline and subsequent revegetation of the corridor would not be likely to interfere with or otherwise impact federal or state land uses, except for the imposition of a temporary restriction on recreation within the ROW corridor during these termination activities. Upon completion of termination activities, land use within the former TAPS ROW would be subject to BLM, state, and/or private policies and management (depending on ownership).

The operation and maintenance of the TAPS also have not interfered with military, mining, or agricultural activities. The pipeline crosses Fort Greely, Eielson AFB, and Fort Wainwright. Although termination activities could possibly have a short-term impact on military activities, interference with mining or agricultural activities would be unlikely. (See Section 4.6.2.20 for a discussion of impacts on subsistence from the no-action alternative.)

Access and use conflicts have occurred on Native lands along the southern half of the pipeline owned by Ahtna, Incorporated, and Chugach Corporation. Ahtna, Incorporated, which owns land south of Paxson, has experienced an increase in trespassing since the construction of the pipeline across its land (Hart 2002). Chugach Corporation, which owns land in the Valdez area, has been concerned that the existence of the TAPS on its land precludes other uses (Rogers 2002). Although continued trespassing on Ahtna land could occur during termination activities, it would be less likely because there would be access restrictions. Chugach's concern about the TAPS' precluding other uses on its lands could also continue under termination activities. However, upon completion of termination activities, trespassing on Ahtna land via former TAPS access roads would be reduced or eliminated, and the potential for precluding other use on Chugach's land would no longer exist.

The 400-mi Dalton Highway (built to service the TAPS), which increased access to remote areas north of the Yukon River, would remain whether or not the TAPS ROW was renewed. Airstrips constructed for TAPS development and maintenance would also likely remain in place, regardless of renewal status.

During termination activities, a spill of crude oil or some other petroleum product could occur and affect land use. The severity of the impact would be largely determined by the volume and location of the spill. Twelve potential spill scenarios developed for the no-action alternative are presented in Table 4.6-2.

The spill scenario with the greatest potential release is the rollover of a tanker truck carrying kerosene from the Williams North Pole Refinery to Prudhoe Bay. In this scenario, 8,000 gal (about 190 bbl) of kerosene would be released instantaneously. This type of spill has the potential to occur one or more times every 2 years at some point along the pipeline. If it occurred on land, kerosene would cover about 12 acres at a depth of 1 in. A spill into a water body would result in contamination problems downstream, with the extent largely determined by response efforts.

In both cases, minimal effects on land use would be expected to occur. Because kerosene volatilizes more quickly than most components

of crude oil and is less persistent in the environment, the effects on land use would be similar to, but less severe than, those described in Section 4.4.4.17.1 for a spill of crude oil. The potential for future impacts on land use from a TAPS-related spill would no longer exist after completion of termination activities.

4.6.2.23.2 Coastal Zone Management.

The TAPS ROW begins in the North Slope Borough coastal zone, which includes about 110 mi of the pipeline and related structures. The TAPS ends in the Valdez coastal zone, which encompasses about 25 mi of the pipeline and the Valdez Marine Terminal. In compliance with the ACMP, both coastal zones have fully approved CMPs that include enforceable policies to regulate development activities (State of Alaska 2001). Activities must also be consistent with applicable statewide ACMP standards. Implementation of the no-action alternative, which would include termination activities, would result in the loss of activities associated with the TAPS and its related facilities (including the Valdez Marine Terminal) as permitted activities within the North Slope Borough and Valdez coastal zones. Termination activities would comply with ACMP statewide standards and the enforceable policies in both the North Slope Borough and Valdez CMPs (North Slope Borough 1988; Valdez 1988). No new development, facilities, or activities would be associated with the no-action alternative (TAPS Owners 2001a). Upon completion of termination activities, land previously occupied by the TAPS and its related facilities would be available for other development activities, consistent with ACMP statewide standards and the North Slope Borough and Valdez CMPs.

Termination activities would entail the possibility that a spill of crude oil or some other petroleum product could occur and affect coastal resources. Both the North Slope Borough and Valdez CMPs recognize the risk of spills and require oil spill response plans (North Slope Borough 1988; TAPS Owners 2001a). The North Slope Borough CMP also requires risk analysis for various spill scenarios (North Slope Borough 1988). The TAPS complies with these requirements.

Twelve potential spill scenarios have been developed for the no-action alternative (Table 4.6-2). As discussed for land use above, the spill scenario with the greatest potential release during termination activities is the rollover of a tanker truck carrying kerosene from the Williams North Pole Refinery to Prudhoe Bay. Because kerosene volatilizes more quickly than most components of crude oil and is less persistent in the environment, the potential effects on coastal resources would be minimal and less severe than those described in Section 4.4.4.17.2 for a spill of crude oil. The potential for future impacts on coastal resources from a TAPS-related spill would no longer exist after completion of termination activities.

4.6.2.24 Recreation, Wilderness, and Aesthetics

Under the no-action alternative, the TAPS ROW would not be renewed, and termination activities, including dismantlement and removal of certain TAPS facilities and site restoration, would be conducted. The impact assessment for the no-action alternative was based on the assumptions discussed in Section 4.6.1.1. In addition, it was assumed that both access to and recreational use within the ROW corridor likely would be restricted during termination activities.

4.6.2.24.1 Recreation.

Implementation of the no-action alternative would have mostly local and temporary impacts on recreation at federal and most state lands, but it would have long-term impacts on recreational opportunities at some state recreation areas, sites, and parks in the vicinity of the pipeline. Existing access to public lands would remain, but access to, and recreational use of, the TAPS ROW corridor likely would be restricted during termination activities. Current recreational opportunities in the vicinity of the pipeline would continue on federal lands and most state lands. However, recreational opportunities at state recreation areas, sites, and parks could diminish as a result of a decrease in funding due to lost oil revenues. Consequently, the trend of increased recreational use on federal lands along the length of the pipeline would likely continue under the no-action alternative, but the

Impacts of No-Action Alternative on Recreation, Wilderness, and Aesthetics

Recreation: Implementation of the no-action alternative would have mostly local and temporary impacts on recreation at federal and most state lands. It could have long-term impacts on recreational opportunities at some state recreation areas, sites, and parks near the TAPS because of reduced state funding (resulting from the loss of oil-related revenue) that could force the closure of some state recreation areas, sites, and parks. Existing access to public lands would remain, but access to, and recreational use of, the TAPS ROW corridor likely would be restricted during termination activities. The trend of increased recreational use on federal lands along the length of the pipeline likely would continue under the no-action alternative. Pipeline viewing opportunities would be lost after completion of termination activities unless one or more segments of the pipeline were preserved for historical purposes. Currently existing visual and noise impacts experienced by recreationists would be eliminated upon completion of termination activities.

Wilderness: Implementation of the no-action alternative would have no direct impacts and mostly temporary indirect impacts on the wilderness area within Gates of the Arctic NPP. During termination activities, machinery and personnel would be within sight and sound of the ridgelines at some points along the eastern wilderness boundary. Noise from vehicle traffic on the Dalton Highway and aircraft and helicopter traffic would increase and probably add to the noise currently audible in the wilderness area. However, these effects would be localized and temporary, and they would end upon completion of termination activities, as would the currently existing visual and noise impacts from the TAPS.

Aesthetics: Aesthetic impacts along the entire 800-mi length of the pipeline would temporarily increase during termination activities because of the presence of machinery and personnel and the disturbance of the soil surface during dismantlement and removal operations. However, upon completion of termination activities and as vegetation becomes reestablished on disturbed ground, these impacts would cease. In addition, for individuals who consider the presence of the pipeline to be a visual intrusion, that impact would be eliminated with removal of aboveground portions of the TAPS.

use of some state recreation areas, sites, and parks could decrease because of reduced state funding. If the state reduces funding for state recreation areas, sites, and parks because of reduced oil revenue, maintenance of these facilities may be reduced, thus diminishing the attraction and use of them, or they may be closed because of the state's inability to maintain sanitation, health, and safety conditions of public facilities at acceptable levels.

Most pipeline viewing opportunities would be lost after completion of termination activities. However, one or more segments of the pipeline could be retained for historical preservation.

The construction of the Dalton Highway, which was an indirect effect of the construction of the TAPS, has increased access to public lands north of the Yukon River, increased recreational opportunities, and caused a minor increase in recreational use in some areas (BLM 2001b). Whether or not renewal of the Federal Grant occurs, the Dalton Highway would remain open to the public, as would the BLM-maintained recreational facilities along the highway. The airports near the TAPS ROW corridor would also likely remain and could possibly continue to provide air access to remote recreational areas (TAPS Owners 2001a). Consequently, since current air access and road and BLM site maintenance could continue regardless of whether renewal occurred, the historical trend of increased recreational opportunities and use in some areas would also be expected to continue.

On BLM lands along the Dalton Highway and the TAPS ROW corridor, the current recreational opportunity spectrum classes of "roaded natural," "roaded modified," and "rural" would remain under the no-action alternative, along with their associated management objectives. The past trend of an increasing number of visitors at Coldfoot Visitor Center, Marion Creek Campground, and the Yukon Crossing Contact Station would likely continue (BLM 1989, 1991). Gates of the Arctic NPP, including the Wilderness Area within it, and the Arctic, Yukon Flats, and Kanuti NWRs have all experienced a small increase in recreational use in the last 25 years, which would also be

expected to continue. Recreational use of White Mountain NRA, which has increased steadily over the past 15 years, would also likely continue.

Recreationists at some of the afore-mentioned areas would likely experience increased noise from machinery and personnel during termination activities. Coldfoot Visitor Center, Marion Creek Campground, and the Yukon Crossing Contact Station are within sight and sound of the pipeline, as are some ridgelines along the eastern boundary of the wilderness area within Gates of the Arctic NPP. Increased noise might also be heard on some state lands near the TAPS. However, noise from termination activities would likely not be heard within the Arctic, Yukon Flats, and Kanuti NWRs or the White Mountains NRA because of their distance from the pipeline. Aesthetic and noise impacts would be local and temporary and would end upon completion of termination activities. In addition, any existing noise and aesthetic impacts currently experienced by recreationists from normal operations and maintenance of the TAPS and related facilities would no longer exist if the TAPS ROW was not renewed.

The Richardson Highway, which existed as a paved highway decades before construction of the TAPS, would continue to provide access to public lands in the vicinity of the southern half of the TAPS. Under the no-action alternative, the BLM likely would continue to manage for the "roaded natural," "semiprimitive motorized," and "semiprimitive nonmotorized" recreational opportunity spectrum classes currently available on BLM lands along the southern half of the pipeline.

Currently existing recreational opportunities on the Delta and Gulkana National Wild and Scenic Rivers (WSRs) would not be affected by not renewing the TAPS ROW. However, because some portions of the pipeline come within one-half mile of both rivers and because the TAPS crosses the Gulkana River at one point, recreationists would likely experience increased noise from machinery and personnel during termination activities. This minor effect would be local and temporary, and it would end upon completion of termination activities.

The no-action alternative, including termination activities, would not interfere with the objectives of the BLM's river management plans (BLM 1983a,b) and would not entail construction of any impoundments, structure, or diversions on either river (TAPS Owners 2001a). However, once the TAPS was removed and the corridor was restored, recreationists would no longer experience the current visual or noise impacts from the TAPS. Increased recreational use of both the Delta and Gulkana WSRs would be expected to continue, as indicated by past trends.

Current recreational opportunities would continue at Wrangell-St. Elias NPP and Chugach NF and most state lands, but they would decline at state recreation areas, sites, and parks as a result of reduced funding for operations and maintenance. Since Wrangell-St. Elias NPP has not documented an increase in recreational use since its creation after construction of the TAPS, implementation of the no-action alternative would not be expected to affect future use. Past trends indicate that the amount of recreational use at Chugach NF (near the Valdez Marine Terminal) would also be unaffected by a decision to not renew the TAPS ROW (Behrends 2002). Use levels at state recreation areas, sites, and parks along the southern half of the pipeline likely would decline, and some state facilities would probably close as a result of decreased revenue (Panarese 2002). Recreationists at Wrangell-St. Elias NPP and Chugach NF would be unlikely to experience increased noise from machinery and personnel during termination activities because of their distance from the pipeline; however, recreationists on some state lands could be affected. Any currently existing noise or visual impacts experienced by recreationists would be eliminated under the no-action alternative.

APSC visitor sites and viewing stations along the length of the TAPS would likely be removed along with the pipeline under the no-action alternative, resulting in a loss of this type of recreational experience. However, if segments of the pipeline were retained for historical purposes, some APSC visitor sites and/or viewing stations would also probably be retained. APSC would likely restrict recreational use within the TAPS corridor during termination

activities. After removal and restoration activities were completed, recreation within the former TAPS ROW corridor would be subject to BLM and ADNR policies and management.

Termination activities would entail the possibility of a spill of crude oil or some other petroleum product that could affect recreation resources. Twelve potential spill scenarios have been developed for the no-action alternative and are presented in Table 4.6-2.

The spill scenario with the greatest potential release is the rollover of a tanker truck carrying kerosene from the Williams North Pole Refinery to Prudhoe Bay. In this scenario, 8,000 gal (about 190 bbl) of kerosene would be released instantaneously. This type of spill has the potential to occur one or more times every 2 years at some point along the pipeline. If the release occurred on land, kerosene would cover about 12 acres at a depth of 1 in. A spill into a water body would result in contamination problems downstream, with the extent largely determined by response efforts.

In both cases, minimal effects on recreation resources would be expected. Because kerosene volatilizes more quickly than most components of crude oil and is less persistent in the environment, the effects on recreation would be similar to, but less severe than, those described in Section 4.4.4.18.1 for an anticipated spill of crude oil. The potential for future impacts on recreation from a TAPS-related spill would no longer exist after the completion of termination activities.

4.6.2.24.2 Wilderness. No federal or state designated or proposed Wilderness Areas exist within or adjacent to the TAPS ROW corridor (ADNR 2001d; APSC 1993; Delaney 2001). However, the eastern boundary of the federally designated Wilderness Area within Gates of the Arctic NPP is within 2 to 3 mi of the TAPS at its closest point (Ulvi 2001).

Implementation of the no-action alternative would have no direct impacts and only temporary indirect impacts on the wilderness area within Gates of the Arctic NPP and on the values that qualify it for wilderness designation. Currently, the pipeline is visible from some points along the easternmost ridgelines of the Wilderness Area, and some noise from Dalton Highway vehicle traffic and from aircraft flying over the TAPS corridor can be heard. During termination activities, machinery and personnel would be within sight and sound of the ridges at some points along the eastern wilderness boundary. Vehicle traffic on the Dalton Highway and aircraft and helicopter traffic would likely increase to support termination activities. Consequently, some increase in noise and visual impact would occur along the eastern boundary of the Wilderness Area in Gates of the Arctic NPP. However, these effects would be localized and temporary, and they would end upon completion of termination activities.

The currently existing minor visual impacts on the Wilderness Area would be reduced after dismantling and removal of the pipeline, since the pipeline would no longer be visible. The visual effects from the previous ROW would continue to lessen over time as revegetation occurred.

Current noise impacts on the wilderness area from vehicles on Dalton Highway and aircraft flying over the TAPS corridor would also decrease after completion of termination activities. However, some noise would continue to be heard along the eastern boundary of the Wilderness Area because Dalton Highway would remain open to the public. In addition, noise from the snowmachines, motorboats, and airplanes currently and historically used within the Wilderness Area would continue. Such usage is allowed in Alaskan wilderness areas pursuant to the Alaska National Interest Lands Conservation Act (ANILCA) of 1980.

The increased access to the wilderness area that has resulted from construction of the Dalton Highway and airports within the TAPS corridor would continue under the no-action alternative, since the Dalton Highway would remain open and airports within the TAPS corridor would also likely remain in place. Therefore, the minor increase in recreational use that has occurred since construction of the Dalton Highway in the eastern portion of the Wilderness Area within Gates of the Arctic NPP and has been noted by the National Park Service, likely would continue under the no-action alternative (Ulvi 2001).

In 1980, neither the visibility of the pipeline from the easternmost ridges of the wilderness area nor the minor traffic or aircraft noise audible there precluded the designation of the area as a wilderness area. The minor and temporary increased visual and noise impacts from termination activities would not affect the area's qualification as wilderness.

Even with implementation of the no-action alternative, including removal of the pipeline and subsequent revegetation of the corridor, the TAPS ROW corridor would not meet the criteria for federal wilderness designation as defined by the Wilderness Act of 1964. Both the TAPS corridor and adjacent areas would still have been altered by man and would not offer outstanding opportunities for solitude and primitive recreation because of their proximity to the highway(s). Since the areas would not meet these essential criteria, federal wilderness designation would not be possible (Overbaugh 2001). Consequently, implementation of the no-action alternative would not affect the suitability of the TAPS corridor for wilderness designation.

Implementation of the no-action alternative would also not affect state wilderness designation near the pipeline. The existence of the TAPS has not precluded state designations of wilderness in Alaska in the vicinity of the pipeline, and termination activities would not affect the potential for future designations (Mylius 2002).

Termination activities would entail the possibility of a spill of crude oil or some other petroleum product that could affect the wilderness area within Gates of the Arctic NPP. As discussed for recreation above (Section 4.6.2.24.1), the spill scenario with the greatest potential release is the rollover of a tanker truck carrying kerosene from the Williams North Pole Refinery to Prudhoe Bay.

The potential for impacts to the Wilderness Area is minimal because it is 2 to 3 mi west of the pipeline at its closest point, and a spill would have to occur between MP 139 and 266 to affect the area. The distance precludes the possibility of direct effects from a land-based spill, although easternmost ridgelines could be indirectly affected by the noise from cleanup activities. A spill directly into the Koyukuk River (between MP 139 and 266) could potentially reach the wilderness area where the Koyukuk River flows west along the southeastern boundary of the wilderness. Effects would be similar to, but less severe than, a similar volume spill of crude oil because kerosene volatilizes more quickly than most crude oil components and is less persistent in the environment. The potential temporary effects include damage to reparian vegetation along the Koyukuk River and loss of solitude near the affected area because of noise and personnel from cleanup activities. No potential for future impacts on Gates of the Arctic Wilderness Area from a TAPS-related spill would exist after completion of termination activities.

4.6.2.24.3 Aesthetics. The TAPS ROW passes through areas that contain outstanding visual resources. About half of the 800-mi length of the TAPS is above ground and clearly visible from the air, and most of the aboveground segments, including pump stations and related structures, are visible from adjacent public roads. The pipeline is within sight of some BLM sites and state recreation areas, sites, and parks, and it is visible from ridgelines along the eastern boundary of the Wilderness Area within Gates of the Arctic NPP. The TAPS is also visible from some BLM-managed ACECs and at a few points within the Delta and Gulkana WSR corridors, including locations where it is suspended above the Gulkana River. The pipeline is also suspended above the Tanana River within sight of Richardson Highway, and it is above the Yukon River on the same bridge that carries the Dalton Highway. In addition, the Valdez Marine Terminal is clearly visible from the City of Valdez (TAPS Owners 2001a; APSC 1993). These localized existing aesthetic impacts would be largely eliminated upon completion of dismantlement and removal of the aboveground components of the TAPS under the no-action alternative, and the impacts would be completely eliminated after revegetation of disturbed areas (see below). However, because aesthetics involve a value judgment, some visitors could perceive the removal of the TAPS and its related facilities to be an improvement to the visual landscape, while others could perceive it as detrimental.

During termination activities, aesthetic impacts along the entire 800-mi length of the

pipeline would temporarily increase as a result of the presence of machinery and personnel and disturbance of the soil surface. In particular, the digging associated with cleaning and capping the belowground segments of the pipeline would result in temporary mounds of soil, and disturbed areas would remain as bare ground until vegetation became reestablished. Compliance with existing stipulations in the Federal Grant would minimize visual impacts.

The occasional, minor, and temporary visual air impacts that occurred in the past during tank-vent flaring at PS 1 would be eliminated under the no-action alternative. Mitigation measures for dust control would be used during termination activities to control any construction-related local and temporary air impacts that might occur.

Under the no-action alternative, portions of the former TAPS corridor would still lie within a BLM-designated utility corridor. Class IV VRM objectives, which allow major modifications to the existing landscape, would still apply.

A spill of crude oil or some other petroleum product during termination activities could potentially affect visual resources in the vicinity of the pipeline. The severity of the impact would be largely determined by the location of the spill. A spill visible from a public road, recreation site, or river would have a greater impact on aesthetics than one that is not as visible. Historically, most spills have been relatively small and have resulted in localized and temporary effects generally not visible to visitors except by air (TAPS Owners 2001a).

As discussed for recreation above (Section 4.6.2.24.1), the spill scenario with the greatest potential release during termination activities is the rollover of a tanker truck carrying kerosene from the Williams North Pole Refinery to Prudhoe Bay. Because kerosene volatilizes more quickly than most components of crude oil and is less persistent in the environment, the potential effects on aesthetics would be similar to, but less severe than, those described in Section 4.4.4.18.3 for an anticipated spill of crude oil. The potential for future impacts on visual resources from a TAPS-related spill would no longer exist after completion of termination activities.

4.6.2.25 Environmental Justice

This EIS anticipates impacts under the no-action alternative that may be considered high and adverse, specifically those associated with economic effects at the state and local levels as a result of discontinuing the TAPS (see Table 2-1). As discussed in detail in Section 4.6.2.19, both because of Alaska's heavy economic reliance on the oil industry and the central role that the TAPS plays in the Alaskan oil industry, the entire state would experience substantial economic impacts as a consequence of terminating the TAPS. In addition, short-term negative impacts to rural sociocultural systems may be high and adverse during termination activities, because of the influx of outside workers into communities near the TAPS. For purposes of understanding anticipated environmental justice impacts under the no-action alternative, the following discussion presents impacts at two levels of geographic focus: the entire state of Alaska and communities in the vicinity of the TAPS.

No-Action Alternative and Environmental Justice

Environmental justice impacts would be expected because of economic consequences and socioeconomic effects that can be judged as high and adverse:

- Large reduction of state revenues and hence reduced ability of the state to provide programs and public services relied upon by many minority or low-income populations in rural areas.
- Large, short-term influxes of nonlocals into rural communities close to the TAPS during termination activities.

For the state, environmental justice impacts under the no-action alternative are anticipated for both minority and low-income populations. As noted in Section 3.29, both populations occur in disproportionately high percentages in census block groups covering much of the geographic extent of Alaska. As a result of the combined presence of high and adverse impacts and disproportionately high representation of minority and low-income populations, noteworthy

environmental justice impacts would accompany the no-action alternative. These impacts would occur precisely where the disproportionately high representations of the two environmental justice populations occur, thus giving the environmental justice impacts a geographic correlate for each population type (see Maps 3.29-1 and 3.29-2).

In describing the affected environment, this FEIS interprets the term "disproportionality" in geographic terms; namely, as the percentage of a particular sector of the population in a specific geographic unit being higher than some reference figure (in this document, the percentage of that population in the state as a whole). However, the nature of anticipated economic impacts under the no-action alternative introduces another possible interpretation: adverse effects that are more serious for minority or low-income populations than for the remaining state residents, regardless of the geographic distribution of these populations. In the case of minority populations, the severe economic impacts anticipated likely would reduce or eliminate various state and local programs available to residents throughout the state through General Fund community support programs. Examples include the state revenue sharing program, the safe communities (municipal assistance) program, legislative grants, and capital project matching grants, which provide funds to eligible communities for a range of infrastructure development and maintenance activities and public services (ADCBD 2002a,b). Much of the assistance from these programs goes to rural locations to provide infrastructure and services that rural communities otherwise could not afford. Reduced revenues from taxes levied by the North Slope Borough on oil production would have severe localized impacts on public services and programs funded by that local government. As shown in Table 3.29-1, many of the rural communities examined in this document contain high percentages of minority populations, particularly Native peoples. Although state and local programs would suffer in general under the no-action alternative, by virtue of their heavy reliance on such programs, minority populations in rural communities would experience greater negative impacts than the state population as a whole.

For the low-income population, the consequences of economic impacts under the no-action alternative would be similar to those for Alaska's minority population. Once again, one of the most serious impacts would be reduced access to state and local government programs — programs upon which low-income populations, because of their reduced financial means, rely more heavily than does the population as a whole.

Economic impacts with environmental justice implications under the no-action alternative in communities close to the TAPS would be similar to those discussed above for the state as a whole. However, they would be timed differently and follow a brief financial windfall. As discussed in Section 2.4 under the no-action alternative, the TAPS would be shut down and decontaminated, and aboveground sections of pipeline and supports would be removed. These termination activities would occur over 6 years and require as many as 5,219 (peak year) employees to work on various aspects of the termination process (TAPS Owners 2001a; see also Section 4.6.2.19.1). Many of these individuals likely would be hired from communities located close to the TAPS — providing direct income to individuals who likely would include minority and low-income persons because of their heavy representation in these communities. Local Alaska Natives in particular should experience a surge in employment, and thus income, because of the provision outlined in Section 29 of the Federal Grant that provides for Native Utilization Agreements to establish levels of Native hires, coupled with their proximity to the TAPS. Moreover, the additional wages earned near the TAPS during termination activities would provide indirect income to various sectors of the local economy (see Section 4.6.2.19). Once again, some of these indirect impacts likely would benefit the disproportionately large percentages of minority and low-income individuals in communities close to the TAPS.

The positive economic benefits of the no-action alternative to local communities would be temporary. Eventually, the short-term economic gains would disappear, and the minority and low-income populations close to the TAPS would experience the same types of adverse economic impacts projected for the remainder of the state.

The analysis of impacts to sociocultural systems under the no-action alternative concludes that high and adverse impacts of a type similar to those experienced during TAPS construction likely would accompany the anticipated influx of nonlocal workers. That stated, because isolation of rural areas in proximity to the TAPS is considerably less now than during construction, impacts to sociocultural systems should be less during termination activities than during construction. In addition to increased inconvenience — for example, increased traffic, competition for services, and strains on local businesses to meet the surge in demand, all of which change the character of a particular community — both rural and urban settings experienced increased crime, including increased substance abuse, when the TAPS was built (Dixon 1978; Reckord 1979). Such changes likely would affect low-income and minority populations differently, particularly Alaska Natives, than they would the population as a whole. In the case of impacts in urban settings, notably Fairbanks, as in the 1970s Natives from the interior often use this city as a hub for transportation and social gatherings. Increasing difficulties in finding adequate services, such as lodging, and growth in crime, would affect these people in a negative manner — in many cases, greater than they would affect the remaining population because of the frequent financial constraints of Alaska Natives. Additional exposure to crime, particularly substance abuse, may add to such problems in a sector of society already disproportionately affected by it. Finally, the influx of nonlocal workers likely would interrupt the normal flow of sociocultural relationships within Alaska Native communities because of the addition of large numbers of outsiders, similar to what occurred in Copper Center during TAPS construction (Reckord 1979).

The surge of short-term migrants relocating to work on activities related to the no-action alternative likely would have disproportionately high and adverse impacts on low-income populations in the vicinity of the TAPS as well. As occurred during TAPS construction, supply and demand for housing and many goods and services drove prices up in the vicinity of the pipeline and related facilities (Dixon 1978). Such localized inflation would particularly affect the low-income population, those most unable to pay, although negative impacts may in part be countered by growing employment opportunities in the proximity of TAPS during termination activities. Localized inflation also would have a disproportionately high impact on minorities in local communities, since this population also tends to have lower income than the remainder of society and thus would be more sensitive to increased prices. In the case of Alaska Natives, hiring under Native Utilization Agreements considered via Section 29 may reduce the impacts of localized inflation more than for the low-income population as a whole, the latter lacking any such hiring provision.

As discussed in Section 4.6.2, all long-term impacts anticipated under the no-action alternative are not necessarily negative. For example, improvements in subsistence may occur through the out-migration of many individuals who compete with rural residents for subsistence resources, and the emergence of an economy that is not necessarily as conducive to sport hunting and fishing as the present economy. Similarly, the out-migration and economic conditions anticipated under no action may yield a situation that is less disruptive to Alaska Native and rural non-Native sociocultural systems than is currently the case, thereby producing a type of improvement in this impact area. However, the adverse impacts associated with removing the key component of the state economy likely would have short-term high and adverse impacts on environmental justice populations. Focusing attention on both economic and sociocultural impacts likely would help to reduce impacts. Prioritizing support for state-funded programs and services most important to minority and low-income Alaskans, for example, would help to continue those programs contributing the greatest good to environmental justice populations, until state revenues recover sufficiently to reinstate increased funding. Similarly, carefully planning

for local sociocultural impacts during TAPS termination activities — through sensitizing incoming workers to such issues, providing adequate temporary housing to reduce housing impacts, and adding law enforcement personnel to areas experiencing particularly rapid influxes of nonlocals — would help to reduce negative effects in certain areas while the TAPS is disassembled.