ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Air Permits Program

TECHNICAL ANALYSIS REPORT
for
Air Quality Control Minor Permit No. AQ0231MSS01

Trident Seafoods Corporation
Akutan Seafood Processing Facility

TITLE I PERMIT CHANGES

Prepared by: Sally A. Ryan, P.E.
Date: Preliminary – October 1, 2009

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Abbreviations/Acronyms

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AQC	Air Quality Control
AS	Alaska Statutes
ASTM	American Society of Testing and Materials
C.F.R.	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
MR&R	Monitoring, Recordkeeping, and Reporting
N/A	Not Applicable
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NSPS	New Source Performance Standards
ORL	Owner Requested Limit
PS	Performance Standard
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
TAR	Technical Analysis Report

Units and Measures

bhp	brake horsepower or boiler horsepower
gr./dscf	grains per dry standard cubic feet (1 pound = 7,000 grains)
dscf	dry standard cubic foot
gph	gallons per hour
hp	horsepower
kW	kiloWatts (electric)
lbs	pounds
mmBtu	million British thermal units
ppm	parts per million
ppmv	parts per million by volume
ppmw	parts per million by weight
tph	tons per hour
tpy	tons per year
wt%	weight percent

Pollutants

CO	Carbon Monoxide
HAPS	Hazardous Air Pollutants
H_2S	Hydrogen Sulfide
NO_X	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NO	Nitric Oxide
PM	Particulate Matter
PM-10	Particulate Matter with an aerodynamic diameter less than 10 microns
S	Sulfur
SO_2	Sulfur Dioxide
VOC	Volatile Organic Compound

Permit Specific

Section 1. Introduction

This Technical Analysis Report (TAR) provides the Alaska Department of Environmental Conservation's (Department's) basis for issuing Air Quality Control (AQC) Minor Permit No. AQ0231MSS01 to Trident Seafoods Corporation for the Akutan Seafood Processing Facility (Plant) to change previously established Title I permit conditions. The Department received Trident's March 1, 2007 minor permit application on March 19, 2007, and received application supplements through April 14, 2008.

The application includes a request that the Department "coordinate" this minor permit with the necessary Title V permit revision. This term is not included in 18 AAC 50. The Department has verified with Trident that they want the Department to conduct and integrated review of the Title I (minor) and Title V permits under 18 AAC 50.326(c)(1). The Department notes that provisions of 18 AAC 50.326(c)(2) are not appropriate in this case because some of the revisions the Trident requested in the application cannot be accomplished in the minor permit. In addition Trident did not submit the $110 fee necessary to incorporate the minor permit into the Title V permit by administrative amendment under 18 AAC 50.326(c)(2).

Because the Department is conducting an integrated review of the minor and Title V permit, the Department did NOT include state implementation plan (SIP) standards for any of the existing emission units. However, The Department did include the initial compliance demonstration requirements for the SIP standards for new and revised units, as required under 18 AAC 50.544(c)(2) (see section 6.3.2).

Section 2. Stationary Source Description

Trident processes crab, cod, and Pollock by cleaning and freezing in preparation for shipping from the Plant.

The Plant is subject to emission limits for Prevention of Significant Deterioration- (PSD-) major stationary source classification avoidance for both oxides of nitrogen (NO_X) and sulfur dioxide (SO_2), and to ambient air quality protection requirements for NO_2, SO_2, and Particulate Matter (PM).

Section 3. Application Description

In their application and application supplements, Trident requested the following principal changes to previous Title I permit terms and conditions. The Department established the terms and condition in Permit No. 231CP03, Revision 2, except as otherwise noted.

1. revise the emission unit inventory and fuel sulfur requirements in phases as indicated in **Table 1** (in the table bold font indicates changes);
2. remove outdated requirement to post air quality warning sign at the Trident Akutan dock (this is a Title I provision established in a pre-1997 permit-to-operate, Permit No. 9325-AA001, condition 15); and
3. change the required fuel meter accuracy.

Table 1 – Emission Unit and Fuel Sulfur Changes

Phase 0 (existing)	Phase 1	Phase 2	Phase 3	Phase 4
4b	4c (new)	4c	4c	4c
5a	5b (was 4b)	5b	5b	5b
6a	6b (modified)	6c (new)	6c	6c
28	28b (was 5a, will remove 28)	28b	28b	28b
29	29	29b (was 6b, will remove 29)	29b	29b
0.29 wt%S	0.29 wt%S	0.29 wt%	0.26 wt%S	0.21 wt%S

Table Notes:

[a] Trident was previously authorized to replace Unit 28 (Cat D379) with Unit 28a (Cat D3516B). They never accomplished this (see Section 8 of the Stationary Source ID form in the application). Trident will replace Unit 28 (Cat D379) with Unit 28b (C175-16), without the interim Unit 28a (Cat D35126B).

[b] Trident was previously authorized to replace Unit 29 (Cat D379) with Unit 29a (Cat D3516B). According to Earl Hubbard (see Section 8 of the Stationary Source ID form in the application), they never accomplished this. Trident will replace Unit 29 (Cat D379) with Unit 29b (C175-16), without the interim Unit 29a (Cat D35126B).

The Department decided to rescind Construction Permit No. 231CP03, and reinstate all of its provisions (except as revised) in Minor Permit No. AQ0231MSS01. The Technical Analysis Report for Permit No. 231CP03 describes the basis for all of the provisions established in Permit 231CP03. This TAR (for AQ0231MSS01) only address the *revisions* to these provisions. For reference, the Department included the applicable portions of TAR for Permit 231CP03 as an attachment to this TAR.[1]

The Departments' findings regarding the application are listed in Section 5.

Section 4. Emissions Summary

Trident provided an "Emission Summary Form" in their May 2007 application. Trident did not show emission calculations for units that are not changed in this permit action. This is acceptable, as minor permit applicability depends only on the change in emissions. However, Trident did not show the existing Potential-to-Emit (PTE) for each unit that is changed as part of this permit action either. Rather they referred to emission estimates in Title V permit No. AQ0231TVP02, which are based on calculations in Permit 231CP03, Revision 2. Without the calculations used in Permit 231CP03, Revision 2, this presentation makes it is difficult to tell if Trident is making the appropriate comparisons (for instance, do those calculation use the same fuel density, and fuel consumption rates?). They also did not show emission increases for each phase.

Because the application is unclear, the Department has prepared emission calculations independently of the application. The Department has summarized the SO_2 PTE for the units affected by Phases 1 and 2 of the project in **Table 4**, and the PM PTE in **Table 5**. There will not

[1] The Department removed sections of the TAR for 231CP03 that have been totally replace by this TAR, or are not necessary for understanding the technical basis for permit conditions. For instance, the attachment does not include the original Coastal Project Questionnaire.

be any increase in emissions in Phase 3 and 4 because the only change in those phases is a decrease in fuel sulfur. The Department did not include NO_X estimates in the PTE tables for permit applicability, because all units will continue to be subject to the existing stationary source-wide NO_X emissions cap. The Department used the following assumptions:

(1) SO_2 emissions based on mass balance (see Equation 1), assuming a fuel density of 7.1 pounds fuel per gallon.

Equation 1: $$SO_2 = \left(\frac{(wt\%S)lb\ fuel}{100\,lb\ fuel}\right)\left(\frac{7.1lb}{gallon}\right)\left(\frac{2\,lb\,SO_2}{lb\,S}\right)\left(\frac{ton\,SO_2}{2{,}000\,lb\,SO_2}\right)(FC)$$

Where SO_2 = SO_2 emission in tons per year
FC = Fuel consumption in gallons per year at worst case load (**Table 2**)
Wt%S = Percent sulfur in fuel, by weight (**Table 1**)

(2) PM emissions calculated using Equation 2.

Equation 2: $$PM = (EF)(FC)(1/2000)$$

Where PM = PM emission in tons per year
EF = PM emission factor in lb per gallon at worst case load (**Table 3**)
FC = Fuel consumption in gallons per year at worst case load (**Table 2**)

Table 2 – Fuel Consumption Rates

Units	Description	Fuel Consumption (gallons/hour)	Basis	Maximum Fuel Consumption (gallons/year
4b, 5b	Cat D3516B-Quad Turbo Low NOX (1,655 kW-e)	108.9	S.T. @ 100% load, low BSFC, AST May 2005 (Application, Appendix F, Attachment 2, page F-11)	953,964
5a, 6b, 28b, 29b	Cat D3512B-Quad Turbo Low NOX (1,360 kW-e)	91.46	S.T. @ 100% load, low BSFC, AST May 2005 (Application, Appendix F, Attachment 2, page F-17)	801,190
6a	Cat D3512B-Quad Turbo Low NOX (1,240 kW)	88.4	Regression Equation (March 2004 Application – Calculation of Stack Parameters for Source ID 6)[b]	774,384
4c, 6c	Cat D175-16 (2,775.3 kW-e)[c]	155.1	Vendor @ 100% load (Application, Appendix F, Attachment 1, page F-3)	1,358,676
28, 29	Cat D379 (420 kW)	34.3a	S.T. at 99.6% load (March 2004 application - Summary of June 2000 Source Testing for PM-10)	300,468

[a] This differs from the fuel rate in Exhibit A of Permit No. 231CP03, Revision 2, which showed maximum fuel rate of 31.0 gal/hr. The June 2000 source test data for PM-10 shows a maximum fuel consumption rate of 34.3 gal/hr.

[b] The application Appendix F pages F-18 through F-23 are labeled as source test data for "Unit 6a". However, Unit 6a has a maximum (100% load) capacity of 1,240 kW, and the data on page F-23 indicates a maximum capacity of 1,366 kW for the unit tested. As indicated on page 9 of the September 15, 2004 modeling Memorandum "Trident conducted a source test on Unit 6 (D3512B-Twin Turbo) with a 1,240-kW electric generator in October of 2003, however, they wish to reconfigure the engine with a Quad Turbo Low NO_X engine. Trident will continue to operate the engine with the existing 1,240 kW electric generator. Trident used regression equations to determine stack parameters" and fuel consumption rate. Permit No, 231CP03, Revision 2, Exhibit B reflects this fuel consumption rate of 88.4 gal/hr for Unit 6a.

[c] Engine rating at 100% load of 2,775.3 from vendor data submitted by email on April 11, 2008. This supersedes vendor data in Appendix F, Attachment 1, page F-3 of application, which indicates maximum rating of 2,504 bKW, and information in Table 4 of the application, which indicates 2,250 ekW). (Note, the fuel consumption rate **is not** be maximum, as 155.1 gal per hour is for 2,504 bkW, from page F-3 of the application.)

Table 3 – PM Emission Factors

Units	Description	PM Emission Factor	Basis
4b, 5b	Cat D3516B-Quad Turbo Low NOX (1,655 kW-e)	0.00227 lb/gal	S.T. @ 100% load, AST 2000 (Application, Appendix F, Attachment 5, page F-50)
5a, 6b, 28b, 29b	Cat D3512B-Quad Turbo Low NOX (1,360 kW-e)	0.00434 lb/gal	S.T. @ 100% load, AST 2000 (Application, Appendix F, Attachment 5, page F-50)
6a	Cat D3512B-Quad Turbo Low NOX (1,240 kW)	0.00434 lb/gal	S.T. @ 100% load, AST 2000 (Application, Appendix F, Attachment 5, page F-50)
4c, 6c	Cat D175-16 (2,250 kW-e)	0.156 g/hp-hr (0.006 lb/gallon)[a]	Vendor at 100% load (Application, Appendix F, page F-4)
28, 29	Cat D379 (420 kW)	0.00540	S.T. @ 100% load, AST 2000 (Application, Appendix F, Attachment 5, page F-51)

[a] 0.156 g/hp-hr at 2,504 hp and 155.1 gal/hr equals 0.006 lb/gallon.

As shown in Table 4 the increase in SO_2 emissions between existing and Phase 1 is 22.5 tons per year (86.7 – 64.2), and between existing and Phase 2 is 21.9 tpy (108.6 – 86.7). Therefore, both Phase 1 and Phase 2 of this project exceed the minor permit threshold in 18 AAC 50.502(c)(3)(A) for SO_2. (The Department calculated the SO_2 emission assuming low-BSCF for Units 4b, 5a, 5b, 6b, 28b, and 29b. Because minor permitting is triggered using this assumption, the Department did not calculate using the low-NO_X configuration.)

Table 4 – Summary of SO_2 PTE by Unit for Permit Applicability

Unit	Existing	Phase 1	Phase 2
4b	19.6		
4c		28.0	28.0
5a	16.5		
5b		19.6	19.6
6a	15.9		
6b		16.5	
6c			28.0
28	6.1		
28b		16.5	16.5
29	6.1	6.1	
29b			16.5
Total	64.2	86.7	108.6

As shown in Table 5, the increase in PM emissions between existing and phase 1 is 3.4 tons per year (9.4 – 6), and between existing and phase 2 is 6.0 tpy (12.0 – 6). Therefore, neither Phase 1

nor Phase 2 of this project exceed the minor permit threshold in 18 AAC 50.502(c)(3)(A) for PM.

Table 5 – Summary of PM PTE by Unit for Permit Applicability

Unit	Existing	Phase 1	Phase 2
4b	1.1		
4c		4.1	4.1
5a	1.7		
5b		1.1	1.1
6a	1.6		
6b		1.7	
6c			3.4
28	0.8		
28b		1.7	1.7
29	0.8	0.8	
29b			1.7
Total	6.0	9.4	12.0

Assessable emissions changes due to this minor permit are included in the Title V permit revision.

Section 5. Department Findings

Based on a review of the application, the Department finds that:

(1) The requested emission unit inventory changes requires a minor permit under 18 AAC 50.502(c)(3)(A)(ii) for an increase in emissions greater than 10 tpy of SO_2.

(2) As described in 18 AAC 50.540(c)(2)(A), an application for a minor permit classified under 18 AAC 50.502 must include a demonstration showing that the proposed increase in PTE will not interfere with the attainment or maintenance of the ambient air quality standards for each pollutant for which a permit is required under 18 AAC 50.502(c)(1) or (3). The Departments review of Trident's ambient air quality analysis for SO_2 is included in Attachment A of this TAR.

(3) The requested revisions to existing Title I permit terms and conditions require a minor under 18 AAC 508(6).

(4) Under 18 AAC 50.540(k), an application for a permit classified under 18 AAC 50.508(6) must include the effect of the change on "other permit terms". The effect of changes are described in Section 6.4.

(5) All new and revised industrial processes and fuel burning equipment authorized in this minor permit are subject to state Air Quality Control emissions standards in 18 AAC 50.055(a)(1) for visible emissions, 18 AAC 50.055(b)(1) for PM emissions, and 18 AAC 50.055(c) for SO_2 emissions. Because the Department is conducting an integrated review of the Title V and minor permit, this minor permit contains only the initial performance test requirements (see Section 6.3.2).

(6) Akutan is located in the Aleutians East Coastal Resource District. The project is consistent with the Alaska Coastal Management Program (ACMP) through AS 40.040(b)(1). The

Department notified the local district and resource agencies of the permit action on June 7, 2007. The local district and resource agencies did not request additional ACMP review.

(7) Trident's application and subsequent submittals for a minor permit contain the elements listed in 18 AAC 50.540.

Section 6. Technical and Regulatory Basis for Permit Requirements

State regulations in 18 AAC 50.544 describe the elements that the Department must include in minor permits. This section of the TAR provides the technical and regulatory basis for the permit requirements in Minor Permit No. AQ0231MSS01, which is classified under **18 AAC 50.502(c)(3)**, and **18 AAC 508(6)**.

1.1. Cover Page

The cover page identifies the stationary source, the project, the Permittee, and contact information. This information is required for each minor permit issued under 18 AAC 50.542, as described in 18 AAC 50.544(a).

1.2. Assessable Emissions

The Department is conducting an integrated review of the Title permit and the minor permit. Therefore, the Department did not include the assessable emissions in Minor Permit AQ0231MSS01.

1.3. Terms and Conditions for an Air Quality Protections Minor Permit

The requirements for a minor permit issued under 18 AAC 50.502(c) are shown in 18 AAC 50.544(c). Alaska Regulations in 18 AAC 50.544(c) require terms and conditions as described below.

1.3.1. Ambient Air Quality

As described in 18 AAC 50.544(c)(1), a minor permit classified under 18 AAC 50.502(c) must include terms and conditions as necessary to ensure that the proposed stationary source will not cause or contribute to a violation of any ambient standard or the standards of 18 AAC 50.110, or to impose a limit under 18 AAC 50.201. (18 AAC 50.201 is not applicable in this case.) This section also requires terms and conditions for monitoring equipment, emission sampling, and source test reports, record keeping, and periodic reporting (this is an abbreviated list, refer to the regulations for exact requirements).

The Departments review of Tridents ambient assessment showing compliance with the standards of 18 AAC 50.110 for this minor permit is in Attachment A. The Department has included the necessary provisions to protect air quality in the permit.

The Department has also included the necessary terms and conditions for monitoring equipment, emission sampling, and source test reports, record keeping, and periodic reporting.

1.3.2. Performance Tests for SIP standards

As described in 18 AAC 50.544(c)(2), a minor permit classified under 18 AAC 50.502(c) must include performance tests for emission limits under 18 AAC 50.055 (state emission standards).

Visible Emissions – The applicant did not include a visible emissions initial compliance demonstration for the new units 4c and 6c (both Cat C175 engines), so the Department included this requirement in the permit.

Particulate Matter – The applicant did not include a PM initial compliance demonstration for the new units 4c and 6c (both Cat C175 engines), so the Department included this requirement in the permit.

Sulfur Dioxide – No initial compliance demonstration is necessary, as the fuel sulfur limits for ambient air quality protection and SO_2 PSD avoidance are less than 0.75 weight percent sulfur (wt%S). The Department has previously determined that liquid fuel with a sulfur continent less than 0.75 wt%S will always comply with the state sulfur compound emission limit.

1.3.3. Maintenance Requirements

As described in 18 AAC 50.544(c)(3), a minor permit classified under 18 AAC 50.502(c) must include maintenance provisions.

The Department has included the maintenance provisions in the permit.

1.4. Terms and Conditions for a Minor Permit to Revise or Rescind a Previous Title I Permit

A minor permit issued under 18 AAC 50.508(6), to revise or rescind previous Title I permit terms and conditions, requires terms and conditions as necessary to ensure that the Permittee will construct and operate the source or modification in accordance with 18 AAC 50. Tridents application also includes the following requests. After each request the Department describes the requirements to ensure compliance.

1.4.1. Portable Generator Capacity

Permit 231CP03 authorized portable generators with a total capacity of 1,050 kW-electric. The permit contained a provision that "The sizes for Units 25a, 31, and 32 may be three 350 kW-e generators, two 525 kW-e generators, or one 1,050 generator." Trident asked that the condition indicate that capacity of all portable generators be limited to less than 1,050 kW-e. With the revision, the permit will continue to ensure that the Permittee will continue to comply with 18 AAC 50.

1.4.2. Fuel Measurement Accuracy for Used Oil Authorization

Permit 231CP03 allows Trident to burn used oil in boilers and heaters. In order to show compliance with the PM standard, Permit 231CP03 requiring Trident to blend used oil with fuel oil or fish oil at a 1 to 6 ratio, measured using a fuel metering system accurate to plus or minus two percent. The basis for this condition is described in the TAR for Permit 231CP03 (included in Attachment B, see section 5.1.2 and Appendix B.1.b).

In summary, the Department found that the Trident must blend at a ratio of 1 to 6, assuming an ash content of one percent. In the application for Permit 213CP03, Trident had indicated a "typical" ash content of 0.89 percent. The Departments assumption of one percent ash content allowed for a margin of compliance of about 10 percent provides for zero inaccuracy in the fuel measurement. The Department notes that for Permit 231CP03, Trident did not want to measure

ash content (see Departments response to comment on Permit 231CP03[2]). In development of that permit requirement, the Department considered Tridents past problems in complying with fuel blending requirements, and the Departments desire for a simple compliance method.

In the permit application, Trident has indicated that the blending ratio provides them with a 10 percent margin of error in fuel measurement. This statement is not accurate. They have some margin of error in the ash content, but NO margin of error in their fuel measurement technique. The request to revise the fuel measurement accuracy to 10 percent for used oil blending (only boilers and heaters) will not ensure compliance with 18 AAC 50. The Department will not revise this requirement as requested without an alternative proposal that ensure compliance.

1.4.3. Fuel Metering Accuracy for Engines

Permit 231CP03, Revision 2 contained a fuel metering system accurate to plus or minus to two percent. The Department originally established to ensure compliance with NO_X avoidance. Two percent accuracy is not necessary for NO_X PSD avoidance. The Department has previously asserted that the two percent fuel meter accuracy was also necessary for short-tem SO_2 increment protection, as the source had no margin of compliance. Upon reconsideration, the Department now **does not** assert that two percent accuracy for short-term SO_2 increment is necessary, as Trident has shown compliance with the increment using maximum short-term emission rates through the modeling analysis. (Note that the fuel metering system for the boilers and heaters is still two percent, to ensure compliance with the state PM standard.) Therefore, the Department agrees that two percent is not necessary NO_X PSD avoidance or for other ambient protection requirements. The Department has revised to five percent, which is typical for most Department permits, and is commonly available.

1.4.4. Sampling Port Specification

Permit 231CP03 contained a provision requiring installation of sampling ports that comport with 40 C.F.R. 60, Appendix A Method 1, Section 2.1. This requirement is listed under PSD avoidance for NOX. Trident requested that the Department change to "sampling ports that comport with 40 C.F.R. 60 Appendix B, Performance 2. With the revision, the permit will continue to ensure that the Permittee will continue to PSD for NOX.

Permit 231CP03 contained a similar condition under SO2 Ambient Protection Requirements (except that it applies to ALL IC engines – not just those with SCR.) As the permit does not require stack testing for sulfur emissions, the Department finds this condition unnecessary and has deleted it.)

1.4.5. As Built Drawings of Modified Stacks

Permit 231CP03 required Trident to submit as-built drawings and photographs for modified/installed stacks and sampling ports for certain units within 60 days of installation. Trident requested that the requirement be changed to "before source testing". With the revision, the permit will continue to ensure that the Permittee will continue to comply with 18 AAC 50. For ease of compliance tracking, the Department required that it be submitted with the source test plan.

[2] See Response to Comment on Permit 231CP03 dated January 10, 2005.

1.4.6. Requirement to Post Warning Signs

Trident requested that Department remove requirement to post warning signs. In their application, Trident indicates that this is a Title V permit revision. This cannot be changed through the Title V permit because the Department established it in a previous Title I permit for ambient air quality protection. Trident had previously only modeled a boat width away from the dock. Current modeling indicates compliance with the standard on the dock, so the Department has removed the condition.

1.5. Recordkeeping, Reporting, and Certification Requirements

All air quality control permits must contain procedures for recordkeeping, reporting, and certification.

Information request and certification requirements are specifically required under 18 AAC 50.200 and 18 AAC 50.205, respectively.

1.6. Terms to Make Permit Enforceable

The minor permit contains these requirements to ensure that the Permittee will construct and operate the stationary source or modification in accordance with 18 AAC 50, as described in 18 AAC 50.544(i).

Section 7. Permit Administration

Trident has requested a coordinated review of the Title 1 permit with the Title V permit significant revision. Trident may operate in accordance with this permit upon issuance of the Title V permit that incorporates them.

Attachment A

Modeling Review Memorandum

MEMORANDUM

State of Alaska
Department of Environmental Conservation
Division of Air Quality

TO: File
DATE: August 17, 2007

THRU:
FILE NO: AQ0231MSS01 - Modeling

PHONE: 465-5100
FAX: 465-5129

FROM: Alan Schuler, P.E.
Environmental Engineer
Air Permits Program

SUBJECT: Review of Trident's 2007
Ambient Analysis of the
Akutan Seafood Processing Plant

This memorandum summarizes the Department's findings regarding the ambient analysis submitted by Trident Seafoods Corporation (Trident) in support of their March 2007 minor permit application (AQ0231MSS01) for the Akutan Seafood Processing Plant. As described in this memorandum, Trident's analysis adequately shows that operating their emission units within the requested constraints will not cause or contribute to a violation of the Alaska Ambient Air Quality Standards (AAAQS) provided in 18 AAC 50.010 or the maximum allowable increases (increments) listed in 18 AAC 50.020.

BACKGROUND

The Akutan Seafood Processing Plant (Akutan Seafoods) is an existing stationary source located in the Aleutians near Akutan, Alaska. Trident is operating this source under Operating Permit AQ0231TVP02 - Revision 1 as a "synthetic minor" source with respect to the Prevention of Significant Deterioration (PSD) program. The Operating Permit includes restrictions to protect the AAAQS and increments. These restrictions were previously established in Construction Permit 231CP03 - Revision 2.

Trident wishes to relax some of their ambient restrictions and revise/expand their operations. The Department received Trident's minor permit application and initial modeling assessment on March 20, 2007. The Department provided several questions regarding the assessment on June 19, 2007. Trident provided a partial reply to these questions on July 7, 2007.

Trident informed the Department on July 12th that the two existing Caterpillar D379 engines (Units 28 and 29) have already been removed from the facility. Based this information, the Department allowed Trident to remove these units from the ambient analysis and to withdraw the concurrent operating restrictions for these units. The Department will still list these units in the emissions inventory, but will note that they have been removed and may not be reinstalled and operated. Trident addressed the remaining questions, amended their requested fuel sulfur limits, and provided several revised modeling files on July 16th, July 17th, and August 10th.

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Trident plans to phase the requested changes. Trident would first contract the southern portion of their ambient air boundary from "two-boat widths" of the dock to the dock proper. Trident is making this change in order to remove the permit-required ambient air warning signs in the dock area. They would also change the operation of several emission units. Trident has identified these changes as "Phase 0."

Trident would next revise/expand their emission unit inventory in four additional phases (identified as Phases 1 – 4). Phases 2, 3 and 4 each include successive reductions in the maximum allowed fuel sulfur limit. The specific items associated with each phase, as amended by the July submittals, are summarized below in Table 1.

Table 1: Project Summary

Phase	Description
0	Fuel sulfur limit = 0.29%
	Redesignate Units 11 and 24 as "primary" units
	Increase the stack height for Unit 27 to 9.1 meters (30 feet) above grade
	Contract ambient air boundary – remove warning signs at dock
1	Fuel sulfur limit = 0.275%
	Relocate Unit 5a (Cat D3512B) to previous location of Unit 28 –> redesignate as Unit 28a
	Relocate Unit 4b (Cat 3516B) to previous location of Unit 5a –> redesignate as Unit 5b
	Install new Cat C175-16 generator set at previous Unit 4b location –> designate as Unit 4c
	Upgrade generator capacity for Unit 6a (Cat D3512B) from 1,240 ekW to 1,360 ekW –> redesignate as Unit 6b
2	Decrease fuel sulfur limit to 0.26%
	Relocate Unit 6b (Cat D3512B) to previous location of Unit 29 –> redesignate as Unit 29a
	Install second Cat C175-16 generator set at previous Unit 6b location –> designate as Unit 6c
	Redesignate Unit 27 as a "primary" unit, with the caveat that Units 11 and 27 can not operate concurrently
3	Decrease fuel sulfur limit to 0.22%
	Remove concurrent operating limit for Units 11 and 27
	Install Unit 33 (Cat D3516B)
4	Decrease fuel sulfur limit to 0.20%
	Install Unit 34 (Cat D3516B)

The overall project triggers minor permit review for the following two reasons:

1) the project emissions exceed the threshold in 18 AAC 50.502(c)(3) for sulfur dioxide (SO_2); and
2) the application includes a request under 18 AAC 50.508(6) to revise terms and conditions of an existing Title I permit.

Applicants subject to 18 AAC 50.502(c)(3) must provide an ambient AAAQS analysis for the triggered pollutants per 18 AAC 50.540(c)(2). Applicants subject to 18 AAC 50.508(6) must show the effect of revising or revoking the permit term or condition per 18 AAC 50.540(k)(3). The existing Construction Permit for Akutan Seafoods contains provisions to protect the nitrogen dioxide (NO_2), SO_2, and particulate matter (PM-10) AAAQS and increments. Therefore, Trident was required to demonstrate compliance with the NO_2, SO_2, and PM-10 AAAQS and increments for each phase.

Trident based much of their current ambient assessment on the approach used in support of previous permit applications. The Department's findings regarding the most recent prior assessment is described in the September 15, 2004 memorandum, *Review of the Trident Akutan March 8, 2004 Ambient Assessment (revised).*

Trident submitted a modeling protocol to highlight the particular aspects of this project on October 12, 2006. The Department corresponded with Trident's consultant, Steigers Corporation (Steigers), via telephone and electronic mail (e-mail) regarding various aspects of the protocol through November 15, 2006. The protocol review was never brought to formal closure.[3] However, the Department did provide the following findings during its protocol review:

1. The Department encouraged Trident to select a maximum fuel sulfur level and minimum stack height, rather than continuing their past approach of varying the required stack height with changes in fuel sulfur content. The Department noted that continuing the past practice of allowing the minimum stack height to be correlated to the maximum fuel sulfur content expands the modeling matrix in a multi-phase project. This would in turn lead to cumbersome permit conditions and potential confusion for all parties.

2. Trident's current permit restricts concurrent operation of various emission units. This restriction allowed Trident to limit the modeled inventory to the "primary" emission units. While reviewing the emission unit inventory in light of the proposed changes, the Department decided that "secondary" **Unit 27** should be included in future short-term assessments. The Department made this change since **Unit 27** is located in a completely different area from the other units and since it has a much shorter stack (6 m) than the linked primary units (~21 m).

APPROACH

Trident used computer analysis (modeling) to predict the NO_2, SO_2 and PM-10 ambient air quality impacts. They first conducted a load analysis for the new units to determine the worst-case stack parameters. They then conducted a cumulative impact assessment for each of the five phases (0 – 4).

Concurrent Operations

Trident previously requested concurrent operating limits between "secondary" and "primary" emission units. Trident incorporated these restrictions in their previous assessments of short-term impacts. In the application for AQ0231MSS01, Trident redesignated two of the five secondary units (**Units 11** and **24**) as primary units. They also indicated that two other secondary units (**Units**

[3] The Department never finalized its review of the protocol due to a heavy workload and a sense from Steigers that the application would be submitted prior to formal closure.

28 and **29**) have been removed. The fifth secondary unit (**Unit 27**) was modeled as a primary unit per Department request (see the discussion in the *Background* section of this memorandum.) Therefore, the previously established secondary/primary unit restrictions are no longer needed and as such, are not included in AQ0231MSS01.

While Trident is no longer using the "secondary" and "primary" designations, they did assume that **Units 11** and **27** do not concurrently operate during Phase 2. Trident made this assumption in order to protect the 3-hour and 24-hour SO_2 increment. AQ0231MSS01 therefore prohibits concurrent operation of **Units 11** and **27** during Phase 2. This restriction is not needed during Phases 3 and 4.

Increment Modeling in Complex Terrain

EPA's complex terrain policy prohibits applicants from using ISCST3 to estimate increment credits at receptors located above plume centerline. Therefore, Trident conducted two types of ISCST3 runs: one with simple terrain receptors which included increment credits; and the other with complex terrain receptors which did not include increment credits. Trident's approach is consistent with past submittals. It is an appropriate manner for complying with EPA's complex terrain policy.

Model Selection

There are a number of air dispersion models available to applicants and regulators. The U.S. Environmental Protection Agency (EPA) lists these models in their *Guideline on Air Quality Models* (Guideline).

Trident continued to use EPA's *Industrial Source Complex Short-Term 3* (**ISCST3**) model for most parts of their assessment. They used EPA's **SCREEN3** model to assess the potential cavity zone impacts. Trident used the current version of each model. The use of these models continues to be acceptable.[4]

ISCST3 tends to provide very conservative results in complex terrain. This conservative nature lead to modeled violations in *previous* assessments at several mountaintop locations. Trident previously resolved those violations by reassessing the impacts at those locations with EPA's **CTSCREEN** model. Trident used this dual approach of modeling with both ISCST3 and CTSCREEN in the initial AQ0231MSS01 application. However, the CTSCREEN runs turned out to be unnecessary since Trident was able to demonstrate compliance at all complex terrain locations with ISCST3. Therefore, the Department is not commenting on the CTSCREEN assessment or reporting the CTSCREEN results in this memorandum.

Meteorological Data

ISCST3 requires user-provided hourly meteorological data to estimate plume dispersion. SCREEN3 use program-generated worst-case meteorological parameters.

Trident continued to use one year (1992) of site-specific surface data for running ISCST3. The measured parameters include: wind speed/direction, temperature, and solar radiation. They also derived hourly sigma-theta values from the wind data. Trident used concurrent upper air data from the nearest available source, the National Weather Service (NWS) station in Cold Bay, Alaska.

[4] EPA replaced ISCST3 with the newer AERMOD modeling system in their current (November 2005) version of the Guideline. However, the Department has not yet updated the adoption by reference in State regulation. Therefore, ISCST3 is still considered as a Guideline model when used in support of the Department's minor permit program.

Trident's surface data does not meet PSD quality assurance requirements.[5] However, ADEC has allowed, and is continuing to allow Trident to use these data for this non-PSD permit application. ***ADEC continues to encourage Trident to collect PSD-quality meteorological data for use in subsequent ambient assessments. ADEC further notes that PSD-quality data will be <u>required</u> in future applications subject to PSD review and/or in future assessments using the AERMOD modeling system***.

EPA allows applicants to compare the high second-high (h2h) modeled concentration to the short-term air quality standards if at least one year of temporally representative site-specific, or five years of representative off-site data, are used. When these criteria are not met, then applicants must use the high first-high (h1h) concentration. In all cases, applicants must compare the h1h modeled concentration to the annual average standards. The Department allowed Trident to compare the h2h concentration to the short-term AAAQS/increments since they used site-specific data.

Emission Unit Inventory
As previously discussed, Trident is making changes to the emission unit inventory. The changes are summarized in Table 1. The complete inventory is listed in the application and permit.

Emission Rates and Stack Parameters
The assumed emission rates and stack parameters have significant roles in an ambient demonstration. Therefore, the Department checks these parameters very carefully.

<u>Annual Operations</u>
Trident used the maximum short-term emission rates to demonstrate compliance with the annual average SO_2 and PM-10 AAAQS and increments. Therefore, annual restrictions are not needed in order to protect the SO_2/PM-10 AAAQS and increments. However, this is not the case in regards to Trident's NO_2 analysis.

The unrestricted NOx emissions at Akutan Seafoods are 993 tons per year (tpy).[6] However, Trident intends to maintain their current 240 ton per year (tpy) facility-wide NOx limit in order to avoid classification as a PSD-major stationary source. Trident also used this 240 tpy NOx cap in their NO_2 modeling analysis.

Trident used the expected level of operation of each emission unit to apportion the 240 tpy into unit-specific emission rates. In using this approach, some units (e.g., **Units 24** and **Unit 11**) were completely excluded from the NO_2 analysis, while other units were modeled at well under (up to an order of magnitude less than) their unrestricted emission rate.

The above types of *assumed* annual operating levels can warrant additional permit restrictions to protect the annual average AAAQS and increments. The Department therefore conducted a

[5] The PSD quality wind sensor was destroyed by Bald Eagles before Trident was able to collect one year of meteorological data. ADEC therefore allowed Trident to substitute wind data from a less precise, but more durable sensor. ADEC has never fully reviewed the other components of Trident's met data, and therefore, can not confirm whether the other components of the monitoring program meet PSD quality assurance requirements.

[6] Trident provided the unrestricted NOx value in terms of grams per second (g/s), which are the terms used in modeling. The value is 28.6 g/s (per Appendix F, page F-85 of their application), which equates to 993 tpy.

sensitivity analysis for Phase 0 to see if additional annual operating restrictions are warranted. The assumed that one emission unit from each of the following groups is operating at their *unrestricted* NOx emission rate (Pollock Generators, Pollock Boilers, Cod Generators, and Cod Boilers). The selected units were: **Unit 1** (Pollock Generator #4); **Unit 8** (Pollock Boiler #1); **Unit 28** (Cod Generator #4); and **Unit 11** (Cod Boiler #2). The Department also included **Unit 24** (Falcon Boiler).[7]

The selection of **Unit 28** made the sensitivity analysis extremely robust since it was a high emitting unit and had a 7-meter stack height instead of the typical 20.6 – 21.5 meter stack height for engines located at this facility (see Table 2). The unrestricted NOx emissions are 0.866 g/s, which is much greater than the 0.011 g/s rate used by Trident. The inclusion of **Unit 11** was appropriate since Trident desires the ability to operate both Cod Boilers. The unrestricted NOx emissions are 0.094 g/s, which is much greater than the 0.018 g/s used for the other Cod Boiler (**Unit 10**).

The total increase in modeled NOx emissions equaled 50 tpy. The maximum NO_2 AAAQS impact increased from 12.5 micrograms per cubic meter ($\mu g/m^3$) to 30.4 $\mu g/m^3$. The maximum NO_2 increment impact increased from 5.93 $\mu g/m^3$ to 7.7 $\mu g/m^3$. While these are substantive increases in modeled impacts, they are still well below the 100 $\mu g/m^3$ AAAQS and the 25 $\mu g/m^3$ Class II increment. Essentially all of the increase was due to **Unit 28**, which as previously noted, has already been decommissioned and removed.

Similar findings would be expected for the other phases. Therefore, there is no need to impose additional annual operating limits on the various groups of emission units in order to protect the NO_2 AAAQS and increment. The 240 tpy facility-wide NOx limit is adequate.[8]

SO_2 Emissions

SO_2 emissions are directly related to the amount of sulfur in the fuel. As indicated in Table 1, Trident reduced the assumed the fuel sulfur content each phase. The maximum stated value (Phase 0) is 0.29 percent, by weight. The lowest value (Phase 4), as amended in Trident's July 16th submittal, is 0.20 percent, by weight. Except as noted below, the Department is including the phase-specific fuel sulfur assumptions as permit conditions.

Trident's Phase 1 fuel sulfur assumption, as amended on July 16th, is 0.275 percent, by weight. The Department questions whether fuel sulfur measurements are accurate to three-significant digits. The Department therefore rounded the Phase 1 value down to 0.27 percent, by weight, in AQ0231MSS01.

Stack Heights

In past permit actions, Trident has needed to increase the stack height for a number of emission units in order to demonstrate compliance with the AAAQS/increments. In this permit action,

[7] The Department conducted the NOx sensitivity analysis prior to receiving Trident's notification that Unit 28 had already been removed.

[8] While the Department's sensitivity analysis shows that Trident could still comply with the NO_2 AAAQS and increment at 290 tpy of facility-wide NOx emissions, it is unlikely that they could still comply at the 993 tpy unrestricted level. Therefore, a facility-wide limit at *some level* less than 993 tpy is needed to protect the NO_2 AAAQS and increment. The Department selected Trident's PSD-avoidance limit of 240 tpy to avoid potential confusion and to provide consistency within the permit.

Trident is likewise proposing to increase the stack height for **Unit 27** (Freshwater Pump Generator) from 6 meters to 9.1 meters. The Department is therefore imposing stack height requirements to protect the AAAQS/increments. The required stack heights are summarized below in Table 2.

The Department will allow Trident 60-days from permit issuance to make the stack change for **Unit 27**. This is an existing, secondary unit that was previously excluded from the ambient demonstration due to its infrequent operation. Therefore, an immediate stack change is not warranted for this situation. The stacks for all other emission units must comply with the heights listed in Table 2 prior to the start of operation.

The Department is imposing an initial stack height compliance demonstration for new emission units, as well as stack changes associated with equipment relocations. The situations where an initial demonstration would be required are summarized by phase in Table 2.[9]

Horizontal/Capped Stacks

The presence of non-vertical stacks or stacks with rain caps requires special handling in an ISCST3 analysis. However, none of the modeled proposed, existing, or baseline emission units have capped or horizontal stacks. Therefore, Trident did not need to adjust the stack parameters to reflect these conditions. Due to the critical nature of the stack orientation/outlet assumption, the minor permit includes a condition that requires the use of vertical stacks, without rain caps, for all listed emission units (including the portable generators).

Table 2: Minimum Stack Height Requirements [a]

Unit Permit ID	Name	Description	Minimum Stack Height (m)
1	Pollock Generator #4	Cat D3516B	20.6
2a	Cod Generator #1	Cat D3512B	21.5
3a	Cod Generator #2	Cat D3512B	21.5
4b	Pollock Generator #1	Cat D3516B	20.6
4c	Pollock Generator #1	Cat C175-16	20.6
5a	Pollock Generator #2	Cat D3512B	20.6
5b	Pollock Generator #2	Cat D3516B	20.6
6a	Pollock Generator #3	Cat D3512B – 1,240 ekW	20.6
6b	Pollock Generator #3	Cat D3512B – 1,360 ekW	20.6
6c	Pollock Generator #3	Cat C175-16	20.6
7b	Cod Generator #3	Cat D3512B	21.5
8	Pollock Boiler #1	CB NCB 100-400	27.5
9	Pollock Boiler #2	CB NCB 100-400	27.5
10	Cod Boiler #1	Johnston 516 AC	21.5
11	Cod Boiler #2	Johnston 516 AC	21.5
12	Fish Meal Dryer	Pedar Halvorsen	27.5

[9] Table 3 would have included Unit 28a. However, Trident already submitted this demonstration on July 20, 2007.

23a	Boiler	Furnace CB 200-500-150	19.0
24	Boiler	Falcon Boiler	11.2
25	Sealand Engine	Detroit Series 60	7.6
26	Compressor Engine	Cat 3508B	20.6
27	Freshwater Pump House Gen	Cat D3512A	9.1
28a	Cod Generator #4	Cat D3512B	21.5
29a	Cod Generator #5	Cat D3516B	21.5
30	Trash Incinerator	Therm Tec G-50	8.3
31	Portable Generator	Detroit Diesel 60	7.6
32	Portable Generator	Detroit Diesel 60	7.6
33	Cod Generator #6	Cat D3516B	21.5
34	Cod Generator #7	Cat D3516B	21.5

[a] Table 2 lists emission units that may exist during any of the 5 phases. A required stack height is only applicable when the associated emission unit is present (i.e., the stack height requirement is not applicable prior to installation, or upon removal, of the associated emission unit).

Table 3: Expected Stack Height Compliance Demonstrations

Phase	Unit	
	Permit ID	Name
0	27	Freshwater Pump
2	29a	Cod Generator #5
3	33	Cod Generator #6
4	34	Cod Generator #7

Baseline Emission Units at Akutan Seafoods

Applicants may take credits in their increment analysis for removed baseline emission units. Akutan Seafoods started operation in June 1982,[10] which predates the 1988 NO_2 baseline date, but not the 1979 SO_2 and PM-10 baseline dates. Therefore, Trident may take credit in their NO_2 increment analysis for the removal of units that operated during the 1988.

At the time of Trident's initial submittal, they were planning to remove two NO_2 baseline engines (**Unit 28** and **29**) during future phases. Trident was going to remove **Unit 28** during Phase 1 and **Unit 29** during Phase 2. Trident therefore included credits for the removal of these units *starting* with the applicable phase. As previously noted, Trident has already removed these units. Therefore, since Trident could have taken additional credits in the Phase 0 and 1 NO_2 increment assessments, their results are conservative.

The Department initially questioned the emission rates and stack parameters that Trident used to characterize these baseline units. Trident assumed both units operated 5,000 hours per year during the baseline year. The resulting NOx emission rate is 0.494 grams per second (g/s) per unit, which in total equals 0.99 g/s or 38 tons per year (tpy).

[10] The June 1982 startup date for "shoreplant" operations was stated in an August 30, 1990 letter from Joseph Plesha (Trident) to Kay Gouwans (Assistant Attorney General – State of Alaska).

Trident's assumption and resulting emission rate is *greater* than the values used by Trident in a 1994 submittal. According to a number of documents provided by Trident between 1990 and 1994, Trident operated *three* Cat D379 engines at the "Old Power Plant" in 1988. Trident has apparently already removed one of these units since it is no longer part of the emission inventory (the Department did not search the file to determine when this removal occurred). Trident indicated in November 1994 that the *cumulative* NOx baseline emissions for the three D379 units were 0.72 g/s (25 tpy).[11] This is a slight decrease from the cumulative 0.78 g/s (27 tpy) rate that Trident submitted in June 1993. The Department found no records supporting a 0.99 g/s (38 tpy) baseline rate. The equivalent rate when prorating the 0.72 g/s cumulative emissions between two units is 0.36 g/s per unit.

Trident used the current stack height of 7.02 meters (23-feet) and the current stack diameter of 0.203 meters (8-inches) for characterizing the baseline units. Trident *should have* used the stack parameters that existed during the baseline year. The information Trident provided to EPA on February 28, 1991 indicated the stack height for the D379 units had been 18-feet (5.5 meters) and the stack diameter had been 0.254 meters (10-inches). The larger stack diameter also leads to a smaller exit velocity: 35.5 meters per second (m/s) instead of the current value of 55.4 m/s.

The Department reran the ISCST3 portion of the Phase 4 NO_2 increment analysis using the 1991/1994-circa information (see Table 4). The conclusions did not change. It turns out that the simple terrain NO_2 increment analysis is driven by the credits associated with the floating seafood processors (see discussion under Off-Site Impacts). Either approach shows that the NO_2 increment is protected. Similar findings would be found in the Phase 1 – 3 increment demonstrations. ***Trident should nevertheless use the corrected NO_2 baseline values for Units 28 and 29 in future increment assessments***.

Table 4: Correct Baseline Stack Parameters for Units 28 and 29

Parameter	Value
NOx Emissions	0.36 g/s (per unit)a
Stack Height	5.5 m
Stack Diameter	0.254 m
Exit Velocity	35.5 m/s

[a] The total NOx emissions for the baseline D379 units equals 0.72 g/s (25 tpy).

Ambient NO_2 Modeling

The modeling of ambient NO_2 concentrations can sometimes be refined through the use of ambient air data assumptions. Trident used the national default ambient NO_2-to-NOx ratio of 0.75, as provided in the Guideline, to refine the estimated ambient NO_2 concentrations. The 0.75 ratio is appropriate for this analysis.

Ambient Air Boundary

[11] Trident's consultant, McCulley Frick & Gilman, Inc. provided a NOx baseline emissions inventory in their November 21, 1994 submittal.

For purposes of air quality modeling, "ambient air" means outside air to which the public has access. Ambient air typically excludes that portion of the atmosphere within a stationary source's boundary. However, there may be exceptions if there are portions of the property that are used for off-duty housing. This is the case at Akutan Seafoods. Trident therefore continued to treat the worker housing area as ambient air.

As previously discussed, Trident is moving the southern portion of their ambient boundary from "two-boat widths" (60-feet) south of the dock to the actual dock face. Trident is making this change in order to support their request to remove the adverse air quality warning signs that were required when the ambient boundary was located beyond the dock. The western, northern, and eastern portions of Trident's ambient boundary remain unchanged. The ambient air boundary is illustrated in Figure 2 of Trident's application and repeated as Figure 1 of this memorandum. The western, northern, and eastern portion of the boundary coincides with the "Trident Property" line. The southern portion runs along the shoreline or in places where there is a dock, along the face of the dock.

Trident is leasing the northern portion of their property from Akutan Corporation. As discussed in the Department's September 15, 2004 memorandum, Trident is leasing this property to eliminate potential air quality violations. The leased area includes a currently unused road easement.

Trident submitted a Public Access Control Plan (Plan) with their previous permit application (see Appendix H of their March 2004 application) which describes how they will preclude public access within their ambient air boundary.[12] The Plan states that Trident will post signs approximately 200 feet apart along the "upland" border of the boundary area. Trident will inspect these signs annually and repair or replace them, as needed. The Plan describes the size and wording of the signs.

The Department previously developed permit conditions requiring Trident to comply with the Plan, or a subsequent Department-approved revision of the Plan. The Department is including a variation of these conditions in minor permit AQ0231MSS01. The variation includes a copy of Figure 1 since it contains an updated description of the ambient air boundary. The conditions also note that Trident must immediately cease operations if the holder of the road easement demands or exercises access to the portion of the easement that traverses the lease.

Receptor Grid

Trident used four different receptor grids in their *initial* ISCST3 submittal. Trident conducted a separate set of ISCST3 runs for each grid. Each of these grids is described below:

- Grid "C" – contains the previously discussed complex terrain receptors. These are receptors that are located at elevations above the stack height of the baseline vessels (15 meters).
- Grid "S" – contains the "simple terrain" receptors (i.e., receptors with elevations at or below 15 meters) that are *located at or beyond the previous ambient air boundary*. The receptor spacing is described in Section 7.3 of Trident's application.
- Grid "F" – contains receptors at the worker housing locations (Galley, Puffin Inn, Gull Towers, Raven View, Eagle Crest, Falcons Nest, and North Bunkhouse).
- Grid "W" – contains receptors located every 25 meters along the dock face.

[12] The Plan submitted with Trident's March 2004 permit application is dated July 29, 2003.

Three of the grids (C, S and F) are identical to Trident's March 2004 submittal, with one exception. The previous F grid included "flagpole" receptors at the worker housing locations. Flagpole receptors are no longer required per an October 8, 2004 Department policy (Ambient Air Quality Issues at Worker Housing), since the buildings do not contain balconies or flat-roofs that are accessible by off-duty workers. Therefore, the current F grid no longer contains flagpole receptors. The W grid is new to this application.

Upon the Department's recommendation, Trident combined the S, F and W grids in their July submittal. The Department made this recommendation since the receptors in all three of these grids have elevations at or below 15 meters. None of the grids contain flagpole receptors, or contain any other difference that warrants special treatment. Combining the grids reduced the number of runs, which made the assessment easier to review.

The Department still recommends that Trident "fill in" a couple of "holes" that existed between the S and W grids. Bases on checks conducted by the Department, none of the maximum impacts from the current analysis occur at these receptor holes. However, Trident should nevertheless place receptors in these "holes" to avoid future questions.

Downwash

Downwash refers to conditions where nearby structures influence plume dispersion. Downwash can occur when a stack height is less than a height derived by a procedure called "Good Engineering Practice," as defined in 18 AAC 50.990(42). The modeling of downwash-related impacts requires the inclusion of dimensions from nearby buildings.

EPA has established specific algorithms for determining which buildings must be included in the analysis and for determining the profile dimensions that would influence the plume from a given stack. EPA has incorporated these algorithms into the following computer programs "Building Profile Input Program" (BPIP). Trident used the current version of BPIP (version 04274) to determine the building profiles needed by ISCST3.

<u>Cavity Zone Impacts</u>

ISCST3 will not calculate impacts at receptors that could be located within the "cavity" downwash region of a building. It instead provides a listing of the unit-receptor combinations for which no calculations are made. In the case of the Akutan Seafood analysis, ISCST3 did not calculate impacts at 46 unit-receptor combinations (total from all phases).

The rejected combinations occurred at ten locations (receptors). Trident used SCREEN3 to assess the potential cavity zone impacts for the units of concern. Most of the units have sufficiently tall enough stacks that there are no cavity zone impacts. The only units that have actual cavity zone impacts are **Unit 24** (Falcon Boiler), and **Units 25**, **31** and **32** (Portable Generators). None of the units have cavity zone impacts at more than one receptor. **Units 25** and **32** have cavity zone impacts at the same receptor. **Unit 24** has a cavity zone impact at a second receptor and **Unit 31** has a cavity zone impact at a third receptor. For each of the three cavity zone receptors, Trident added the applicable SCREEN3 impact(s) to the ISCST3 concentration for that receptor. They then

compared the SCREEN3 plus ISCST3 impacts for those receptors, to the maximum impacts for all other receptors, and reported the highest value.[13]

The Department found a slight stack height error in the SCREEN3 run for **Unit 5a**. The Department corrected this error, but found the same results of no cavity zone impacts. The Department likewise ran SCREEN3 for **Units 10** and **11** after erroneously telling Trident that a SCREEN3 run was not needed. These units likewise do not have any cavity zone impacts.

SCREEN3 provides 1-hour concentrations which must be scaled to the averaging period of concerned. The scaling factors are listed in EPA's *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised* (EPA-454/R-92-019). Trident's initial submittal did not include the scaling factor adjustments that are applicable to downwash conditions. Trident corrected this oversight in their July 17th submittal.

Off-Site Impacts

In a cumulative impact analysis, the applicant must include impacts from large sources located within 50 km of the applicant's SIA. These impacts from "off-site" sources are typically assessed through modeling.

Prior to 1995, floating processors routinely operated in Akutan Harbor. Since the floating processors no longer operate in Akutan Harbor, Trident claimed the emissions from these vessels as increment expanding in the increment demonstrations. Trident characterized these vessels in the same manner as previously approved. The Department's September 15, 2004 memorandum provides additional details regarding these off-site sources.

There currently are no industrial-size sources operating in the area other than Akutan Seafoods. Therefore, Trident did not include any off-site sources in the AAAQS assessment. This approach continues to be appropriate.

Background Concentrations

The background concentration represents impacts from sources not included in the modeling analysis. Typical examples include natural, area-wide, and long-range transport sources. The background concentration must be evaluated on a case-by-case basis for each ambient analysis. Once the background concentration is determined, it is added to the modeled concentration to estimate the total ambient concentration.

Trident continued to use the same previously approved background concentrations. The NO_2 value, 4 micrograms per cubic meter ($\mu g/m^3$), is the maximum concentration measured at Pyramid Valley in Unalaska. The 24-hour and annual average PM-10 values, 33 $\mu g/m^3$ and 6.5 $\mu g/m^3$ respectively, are the maximum concentrations measured near Beluga in Cook Inlet. The SO_2 values, 10 $\mu g/m^3$ for each of the averaging periods, are Department estimates for this location.

[13] Trident did not update the SCREEN3 plus ISCST3 results in a revised PM-10 analysis that they submitted on August 10th. The Department therefore took the worst-case SCREEN3 results (i.e., the Unit 25 and 32 impacts) and added them to the maximum ISCST3 results for all receptors. This approach provides conservative results since the impacts are unpaired in space. The resulting cumulative impacts still comply with the applicable PM-10 AAAQS and increments.

RESULTS AND DISCUSSION

The maximum NO_2, SO_2 and PM-10 AAAQS impacts that occurred during any phase of the proposed project are shown in Table 5. The background concentrations, total impacts, and ambient standards are also shown, along with which phase(s) provided the worst-case impacts. The total impacts are well below the AAAQS. Therefore, Trident has demonstrated compliance with the AAAQS.

Table 5: Maximum AAAQS Impacts

Air Pollutant	Avg. Period	Worst-case Phase	Maximum Modeled Conc ($\mu g/m^3$)	Bkgd Conc ($\mu g/m^3$)	TOTAL IMPACT: Max conc plus bkgd ($\mu g/m^3$)	Ambient Standard ($\mu g/m^3$)
NO_2	Annual	0	8.5	4	**13**	100
SO_2	3-hr	2	535	10	**545**	1,300
	24-hr	2	93	10	**103**	365
	Annual	0	16	10	**26**	80
PM-10	24-hr	0 - 4	26	33	**59**	150
	Annual	1 - 4	4.3	6.5	**11**	50

The maximum NO_2, SO_2 and PM-10 increment impacts that occurred during any phase of the proposed project are shown in Table 6. The Class II increments, along with which phase(s) provided the worst-case impacts, are also shown. The maximum impacts are less than the Class II increments. Therefore, Trident has demonstrated compliance with the increments.

Table 6: Maximum Increment Impacts

Air Pollutant	Avg. Period	Worst-case Phase	Maximum Modeled Conc ($\mu g/m^3$)	Class II Increment ($\mu g/m^3$)
NO_2	Annual	2, 3, 4	**6**	25
SO_2	3-hr	2	**505**	512
	24-hr	1	**90**	91
	Annual	2	**11**	20
PM-10	24-hr	0 - 4	**26**	30
	Annual	0 - 4	**3**	17

It is important to note that since ambient concentrations vary with distance from each emission unit, the maximum value represents the highest value that may occur within the area. The concentrations at other locations within the area are less than the values reported above.

CONCLUSION

The Department reviewed Trident's modeling analysis for Akutan Seafoods and concluded the following:

1. The NOx, SO_2 and PM-10 emissions associated with operating the Akutan Seafood emission units will not cause or contribute to a violation of the AAAQS listed in 18 AAC 50.010 or the increments listed in 18 AAC 50.020.

2. Trident's modeling analysis fully complies with the showing requirements of 18 AAC 50.540(c)(2).
3. Trident conducted their modeling analysis in a manner consistent with EPA's *Guideline on Air Quality Models*.

The Department developed conditions in Minor Permit AQ0231MSS01 to ensure Trident complies with the AAAQS and increments. These conditions are summarized below. The conditions are listed as "general" ambient air conditions (i.e., applicable to all phases) or as a phase-specific condition (i.e., only applicable during the indicated phase). The Department is also including a footnote to the emission unit inventory that Units 28 and 29 have already been removed, and may not be reinstalled and operated.

General Ambient Air Conditions

- Maintain the ambient air boundary illustrated in Figure 1 of this memorandum using the provisions of the July 29, 2003 Public Access Control Plan (which was provided in Trident's March 2004 permit application). The Department is including Figure 1 in Minor Permit AQ0231MSS01, along with the key provisions of the Public Access Control Plan. The conditions note that Trident must immediately cease operations if the holder of a road easement demands or exercises access to the portion of the easement that traverses Trident's property.
- Construct and maintain:
    - Exhaust stacks that meet the minimum stack height requirements listed in Table 2. Except as noted under Phase 0, compliance with the minimum stack height is required prior to operating the associated emission unit. Submit an initial compliance demonstration for all stack changes.
    - Vertical, uncapped exhaust stacks for all emission units listed in the permit and for all portable generators. This condition does not preclude the use of flapper valve rain covers, or other similar designs, that do not hinder the vertical momentum of the exhaust plume.
- In order to protect the NO_2 AAAQS and increment, comply with the 240 tpy NOx PSD-avoidance limit.

During Phase 0

- The fuel sulfur content may not exceed 0.29 percent, by weight.
- Within 60-days of permit issuance, increase the stack height for **Unit 27** to 9.1 meters above grade. Submit the initial stack height compliance demonstration with the next operating report.

During Phase 1

- The fuel sulfur content may not exceed 0.27 percent, by weight.

During Phase 2

- The fuel sulfur content may not exceed 0.26 percent, by weight.
- Do not concurrently operate **Unit 11** and **Unit 27**.

During Phase 3

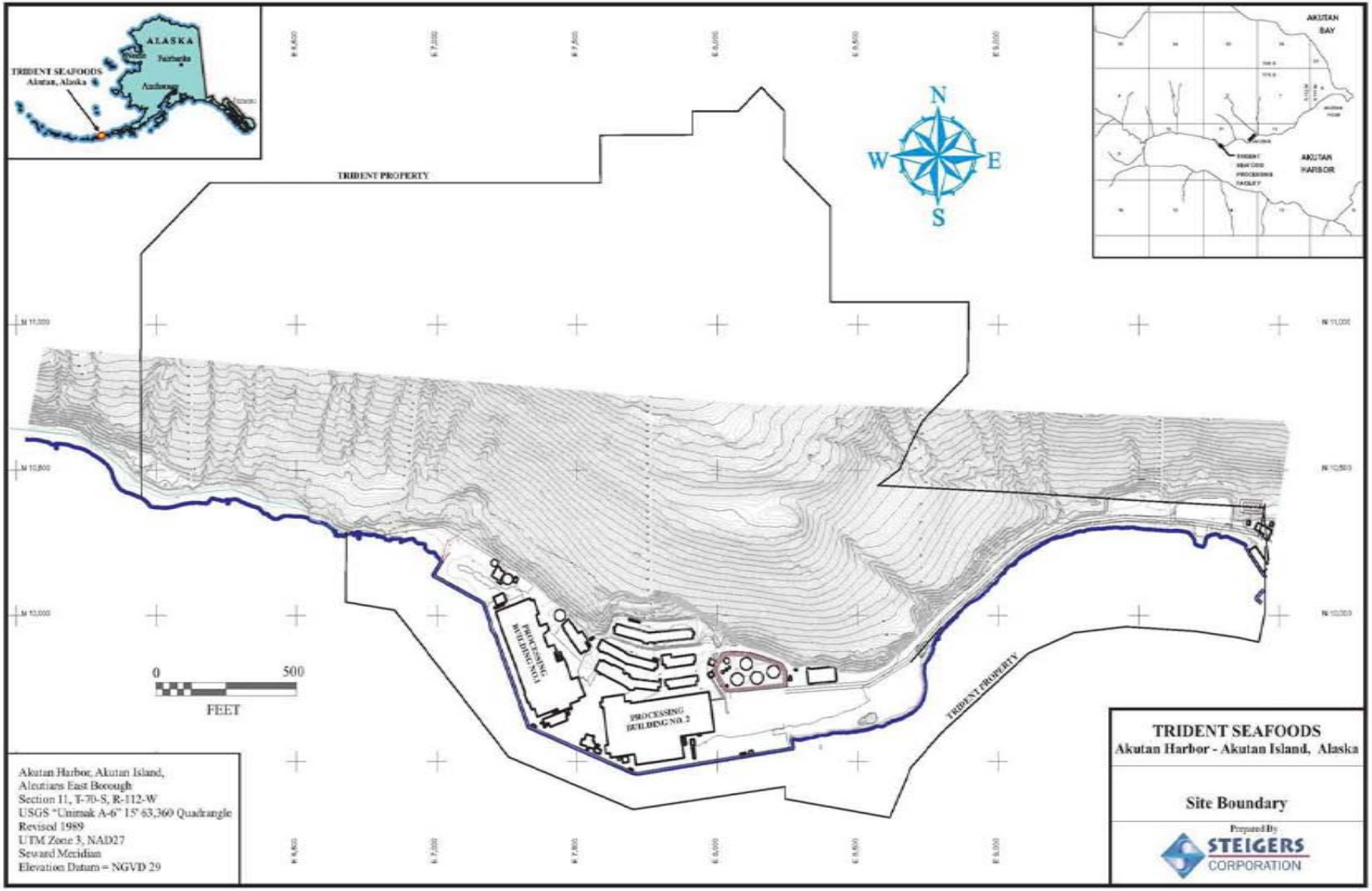
- The fuel sulfur content may not exceed 0.22 percent, by weight.
- May now concurrently operate **Unit 11** and **Unit 27**

During Phase 4

- The fuel sulfur content may not exceed 0.20 percent, by weight.

Figure 1 – Ambient Air Boundary at Akutan Seafoods

The western, northern, and eastern portion of the ambient air boundary coincides with the "Trident Property" line. The southern portion runs along the shoreline or in places where there is a dock, along the face of the dock.



Attachment B

Permit 231CP03 TAR (partial)

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Air Permits Program

TECHNICAL ANALYSIS REPORT
FOR AIR QUALITY CONTROL CONSTRUCTION PERMIT NO. 231CP03
PROJECT X-188

TRIDENT SEAFOODS CORPORATION
AKUTAN SEAFOOD PROCESSING FACILITY

NO_X Emission Control Project

Prepared by Sally A. Ryan

Supervisor: Bill Walker
Date: Final - January 10, 2005

List of Abbreviations Used in this Permit

AAC .....Alaska Administrative Code
ADEC.....Alaska Department of Environmental Conservation
AS .....Alaska Statutes
ASTM .....American Society of Testing and Materials
bhp.....brake horsepower or boiler horsepower [14]
CEMS.....Continuous Emission Monitoring System
C.F.R. .....Code of Federal Regulations
COMS .....Continuous Opacity Monitoring System
dscf.....Dry standard cubic feet
EPA.....US Environmental Protection Agency
gr./dscf .....grain per dry standard cubic feet (1 pound = 7000 grains)
GPH.....gallons per hour
HHV.....Higher heating value
ID .....Source Identification Number
kW.....kilowatts
MACT.....Maximum Achievable Control Technology
Mlb.....thousand pounds
MMBtu.....Million British Thermal Units
NAICS .....North American Industry Classification System
NESHAPs .....Federal National Emission Standards for Hazardous Air Pollutants [as defined in 40 C.F.R. 61]
NSPS.....Federal New Source Performance Standards [as defined in 40 C.F.R. 60]
ppm .....Parts per million
ppmv .....Parts per million volume
PS .....Performance specification
PSD .....Prevention of Significant Deterioration
RM .....Reference Method
SIC .....Standard Industrial Classification
TPH.....Tons per hour
tpy .....Tons per year
Wt% .....weight percent

Pollutants

CO.....Carbon Monoxide
HAPS .....Hazardous Air Pollutants [as defined in AS 46.14.990(14)]
H_2S.....Hydrogen Sulfide
NO_X.....Oxides of Nitrogen
PM-10 .....Particulate Matter [as defined in 18 AAC 50.990(70)]
SO_2.....Sulfur Dioxide
VOC.....Volatile Organic Compound [as defined in 18 AAC 50.990(103)]

[14] 1 boiler horsepower = 33,472 Btu-fuel per hp-hr divided by the boiler's efficiency. Approximately 7000 Btu-fuel per bhp-hr is required for an average diesel IC engines.

1.0 Introduction

Trident Seafoods Corporation (Trident) submitted a construction permit application to the Alaska Department of Environmental Conservation (the department) dated May 2003, revised in July, 2003, and revised again in March, 2004, requesting authorization of physical and operational changes at the Akutan Seafood Processing Facility (Plant), including the addition of several emission units. Trident submitted this application in response to Consent Decree No. 1JU-02-1073C1, Item 36, lodged with the Superior Court on December 5, 2002. Trident also desires to change terms and conditions of the Plant's prior construction permit.

Trident has requested concurrent processing of the construction permit and revised operating permit as allowed under 18 AAC 50.310(b). The Department will publish its intent to incorporate the terms of the construction permit into the operating permit as an administrative revision. The Department will process the operating permit as an administrative revision after the 45 day EPA review period under AS 46.14.220.

Because the Department is processing the construction and operating permits concurrently, the construction permit contains Title V obligations for new and revised units.

1.1 Stationary Source Description

Trident processes crab, cod, and pollock by cleaning and freezing in preparation for shipping from the Plant.

The Plant is self-sufficient concerning electrical power and heating requirements. Trident uses a variety of fuel oil fired combustion sources that emit air pollutants: fuel-oil fired boilers for process heat and space heating, driers for processing fish meal, and diesel engines for electrical generation.

1.2 Project Description

In summary, Trident has requested that the Department authorize Trident to make the following changes at the Plant.[15] The Department has previously authorized some of these changes (shown in regular font) in the consent decree, as an administrative revision, or in construction permit 231CP02 (as noted). **Items in bold are new requests.** The Department's review of these new requests is contained in this technical analysis report (TAR).

(1) Provide for previously accomplished and anticipated installations of Selective Catalytic Reduction (SCR) systems as post-combustion NO_X emission control to Units 1 through 6 (or replacement units for 1 through 6), and alternate engine-generators (consent decree).

(2) **Replace the 1,135-kW rated capacity electric generators associated with Units 2 and 3 with new generators rated at 1,360-kW (redesignate as Units 2a, 3a)**.

(3) Replace Unit 4 (Caterpillar (Cat) D3512A engine), with Unit 4a (Cat D3512B Quad Turbo Low NO_X engine) (administrative revision). Replace Unit 4a (Cat D3512B Quad Turbo engine) with Unit 4b (Cat D3516B Quad Turbo Low NO_X engine) (Permit No. 231CP02).

[15] Trident refers to the equipment as Source IDs. ADEC has revised these source IDs to the Emission Unit numbers that are used in the construction permit.

(4) Replace Unit 5 (Cat D3512A engine) with a Cat D3512B Quad Turbo Low NO_X engine.[16] **Replace the 1,135-kW rated capacity electric generator with new generator rated at 1,360-kW (redesignate as Unit 5a)**.

(5) Replace Unit 6 (Cat D3512A engine) with a Cat D3512B Twin Turbo Low NO_X engine generator rated at 1,240 kW).[17] **Replace the twin turbocharger with a quad turbocharger (generator to remain at 1,240 kW) (redesignate as Unit 6a).**

(6) Replace Unit 7 (Cat D3512A engine) with Unit 7a (Cat 3512B Quad Turbo engine) (administrative revision). **Replace the 1,135-kW rated capacity electric generators associated with a new generators rated at 1,360-kW (redesignate as Unit 7b)**.

(7) Remove Unit 13 ("old" incinerator) and add Unit 30 (new trash incinerator) (both authorized under consent decree).

(8) Add Unit 27 (Cat D3512A engine –engine freshwater pump house generator) to the inventory (consent decree).

(9) Add Units 28 and 29 (Cat D379 engines - Cod Generators No. 4 and 5) to the inventory (consent decree).

(10) **Replace Unit 25 (Portable Generator No. 1) with 25a.**

(11) **Add Units 31 and 32 (Portable Generators No. 2 and 3) to the inventory**.

(12) **Except as indicated in items (13) and (14), lower the maximum fuel sulfur content from 0.39 percent sulfur by weight (wt% S) to 0.35 wt% S for all emission units**.

(13) **For Unit 30, limit the fuel sulfur to no more than 0.50 wt% S.**

(14) **Install up to four more Cat D3516B Quad Turbo Low NO_X engines, each equipped with a 1,655-kW electric generator at the Cod Plant. Trident will redesignate Units 28 and 29 (Cat D379s) as Units 28a and 29a, respectively, upon installation of the first two Cat D3516B engines. Trident will designate the other two new Cat 3516B engines as Units 33 and 34 when installed and fitted with SCR. Trident is proposing to sequentially install the four Caterpillar D3516B engines. To offset the increased SO_2 impacts from the new units, Trident requested tiered fuel sulfur restrictions. The resulting fuel sulfur fuel limits will range from the base case of 0.35 weight percent sulfur (wt% S), to 0.24 wt% S for four additional engines.[18] Trident also requested alternative fuel sulfur limits, if they increase the stack height for select units.**

(15) **Remove erroneous NSPS requirements for Units 8, 9, and 23**.

(16) **Revise PSD avoidance terms and conditions of existing permit to provide for additional operational flexibility at the Plant, specifically replace the fuel and source groupings-based limits with a stationary source-wide rolling 12-month aggregate NO_X emission**

[16] This change occurred prior to the consent decree. For purposes of this permit the department is assuming a "current" inventory as indicated in the departments May 13, 2004 full compliance evalutation, which includes changes authorized in the consent decree. This "current" inventory is shown in Table 1 of the permit.

[17] See Footnote 16.

[18] Trident proposed fuel sulfur restrictions containing three significant digits. Standard fuel sulfur measurements are not accurate to this level. Therefore, the department rounded down the requested restrictions to two significant digits. The Department rounded down because Trident has not shown compliance with the SO_2 air quality standards and increments at the rounded up values.

limit using unit–specific fuel consumption figures to calculate each unit's NO_X emissions.

(17) **Allow Trident to combust used oil at 1:5 used oil to distillate fuel blending ratio in order to comply with Condition 5 of Permit No. AQ0231TVP01. The 1:5 ratio is based on Trident's calculation in 40 C.F.R. 60. Appendix A, Performance Test Method 19 and is provided in Appendix G of the application. Trident proposes to determine ash content from a representative sample of each batch of used oil and adjust the blending ratio for used oil dependant on Performance Test Method 19 calculations**.

(18) **Allow Trident to use fish oil as a supplemental engine fuel contingent on Trident fulfilling certain procedural requirements and securing ADEC approvals**.

(19) Make other administrative revisions to the existing permit.

Trident has submitted a modeling demonstration that shows that the Plant, as proposed, complies with ambient air quality standards and increment for NO_2, SO_2 and PM-10.

1.3 Permit History

Trident is currently operating under Construction Permit No. 9825-AC010 (November 24, 1999), Consent Decree 1JU-02-1073C1 (December 5, 2002), Operating Permit No. AQ0231TVP01, Revision 2 (December 20, 2002), and Construction Permit No. 231CP02 issued December 9, 2003.

Summary of Consent Decree:

Trident installed the units listed in Table 1 without obtaining pre-construction authorization through a pre-1997 air quality permit to operate or through a construction permit. The Department discovered installation during a 2001 inspection of the Plant. Absent owner-requested emission or operation limits, these units should have gone through PSD pre-construction review for NO_X.

Table 1 – Units Installed Without a Construction Permit

Unit	Trident's Name	Description	Serial Number	Date Installed
27	Freshwater Pump House Generator	Caterpillar D3512A	24Z01359	4/96
28	Cod Generator #4	Caterpillar D379	34Z00770	6/82
29	Cod Generator #5	Caterpillar D379	34Z00771	6/82
30	Trash Incinerator	Therm Tec G-50	7916	6/02

The Department and Trident lodged Consent Decree 1JU-02-1073C1 on December 5, 2002. The decree outlined the conditions under which Trident could operate the units prior to authorization under a construction permit.

The consent decree included NO_X emission limits and monitoring requirements for PSD avoidance. The consent decree required Trident to calculate NO_X emission based on equations, and install SCR on at least one emissions unit. As indicated in the Department's May 13, 2004

Full Compliance Evaluation, Trident has installed SCR on Units 1, 2, and 4.[19] The consent decree also required Trident to submit an updated ambient assessment and a construction permit application.

The construction permit application contains a NO_X PSD avoidance strategy for a stationary source-wide NO_X emissions limit.

1.4 Department Findings[20]

Based on a review of the application, the Department finds that:

1. The Plant is classified as an ambient air quality stationary source under 18 AAC 50.300(b)(1)(A) as it contains an industrial process with a throughput greater than five tons per hour. With no operational or emission limits, the Plant would also be classified as a PSD-Major stationary source under 18 AAC 50.300(c)(1) for NO_X. However, Trident has elected to restrict NO_X emissions to avoid this classification by limiting NO_X emissions to less than 250 tons per year (tpy) as allowed under 18 AAC 50.305(a)(4).
2. With no restrictions, the Plant would also be classified as PSD-Major for SO_2. The NO_X PSD avoidance limits will not prevent classification for SO_2 because Trident can use SCR to reduce NO_X emissions. Therefore, the permit contains provisions requiring Trident to stay below 250 tpy, and report emissions to the Department.
3. The requested modification is classified under 18 AAC 50.300(h)(2) because it will increase actual emissions beyond the Plant's current allowable emissions (see section 1.3).
4. Under 18 AAC 50.310(n)(2), Trident is required to prepare an ambient air quality assessment for a modification classified under 18 AAC 50.300(h)(2).
5. The permit contains provisions to protect ambient air quality for SO_2, NO_X and PM-10.
6. The project's fuel burning equipment is subject to the state Air Quality Control Regulations 18 AAC 50.055(a)(1) for visible emissions, 18 AAC 50.055(b)(1) for particulate matter, and 18 AAC 50.055(c) for sulfur compound emissions.
7. The incinerator is subject to state Air Quality Control Regulations in 18 AAC 50.050 for visibility. It is not subject to a PM standard because it is less than 1,000 pounds per hour.
8. The Plant is located in the Aleutians East Coastal Resource District. The project is consistent with the Alaska Coastal Management Program (ACMP) through AS 46.40.040(b)(1). The Department notified the local district and resource agencies of the project on June 7, 2004. The local district and resource agencies did not request additional ACMP review through 6 AAC 50.810.
9. Trident's application satisfies the applicable requirements set out in 18 AAC 50.310 and 315(e) except as indicated in item 10.

[19] *Air Quality Full Compliance Evaluation* prepared by Jeanette Brena, May 13, 2004, page 9.

[20] The Department has new air quality control regulations effective October 1, 2004. The Department is processing permit applications that were submitted prior to October 1, 2004 under the previous regulations. Therefore all regulatory citations in this TAR refer to the regulations that were effective prior to October 1, 2004.

10. The application did not include vendor data supporting the use of fish oil blended fuels with SCR-equipped units.

11. Trident included a list of requested "administrative revisions" to the operating permit in Form K of Appendix E of the construction permit application. If appropriate (i.e. if they are actually administrative revisions), the Department will address these changes as part of the administrative revision of the operating permit. The Department notes that it does not consider the request to remove Condition 16 (requires posting of warning signs) of the operating permit to be an administrative revision. The Department does not intend to authorize removal of this requirement in this construction permit action. The application states that the ambient boundary is two boat widths from the dock. Trident has not shown compliance with ambient standards and increments for the area between the dock and the ambient boundary. Until Trident demonstrates compliance for this area, the Department will not authorize removal of the signs.

12. In their application, Trident indicated that they would like to switch out new Emission Units 25a, 31, and 32 (three 350 kW portable generators) from time to time. As indicated in the footnote to Table 1 of the construction permit, the information in the table is for identification purposes only. Therefore, the permit allows them to switch out units subject to administrative procedures. The Department has spelled out these administrative procedures in the permit. In the application, Trident used a Detroit Diesel Model 6067-GU60 as a surrogate for the portable engines for PM-10, VOC, and CO emissions factors. Instead of the manufacturers' emission rate of 0.2405 lb NO_X per gallon, Trident used a more conservative emission factor of 0.4 lb NO_X per gallon, at the Departments request for the ambient air quality demonstration. Table 2 shows emissions data from the application at 100 percent load. The Department has found that the surrogate units meet applicable state emission standards and ambient standards. As long as any substitute units emissions rates are equal to or less than the rtes assumed in the application, the Department will assume that substitute unit will also comply.

Table 2 – Emission Data for Portable Engine Generators used in Application

Pollutant	Vendor Emission Data (g/bhp-hr)	Emission Factor (lb/gal)[a]
NO_X	4.8	0.2405 (revised to 0.4)
PM	0.19	0.0095
HC	0.1	0.0050
CO	2.3	0.1152

Table Notes
[a] Based on a fuel rate of 18.7 gph (at 1,800 rpm and 425 bhp)

1.5 Emissions Summary

Trident has estimated the potential Plant emission increase from their proposals. Plant emissions, as provided in Trident's application and revised by the Department, are shown in Table 3. These estimates assume fuel use less than the maximum possible for continuous operation. Trident used emission factors from previously conducted emission source tests, calculations, and AP-42. They calculated potential sulfur emissions using a fuel sulfur content of 0.35 percent sulfur by weight (wt% S) for all units except for the incinerator, for which they assumed a fuel sulfur content of 0.50 wt% S. See Table A-1 of the application for more details.

The Department agrees with the calculations, for volatile organic compound (VOC) emissions for Unit 30 (the Therm-Tec incinerator). Trident used the vendor's Hydrogen Chloride emission estimate to assess incinerator VOC emissions. The vendor did not provide VOC emission estimates. Therefore, for the Unit 30, the Department revised the VOC emissions using the 3 lb VOC/ton trash emission factor from AP-42 Table 2.1-12 for multiple chamber industrial/commercial incinerators burning other than municipal waste. The maximum trash throughput for the incinerator is 750 lb trash per hour, but according to the application, Tridents average throughput is 400 of trash per hour. Trident assumed a throughput of 400 lb of trash per hour in the emission calculations in Table A-1 of the application, so the Department assumed this throughput as well.[21] Using 400 lb of trash per hour, the VOC emissions are 2.6 tpy, as shown in Equation 1, rather 0.61 tpy as provided in Trident's application.

Equation 1 $$\frac{3\,lb\,VOC}{ton\,trash}\times\frac{ton\,VOC}{2000\,lb\,VOC}\times\frac{400\,lb\,trash}{hour}\times\frac{ton\,trash}{2000\,lb\,trash}\times\frac{8{,}760\,hr}{year}=\frac{2.6\,ton\,VOC}{year}$$

Table 6 – Emissions Summary (tpy)

Pollutant	Existing Allowable Emissions	Total Potential Emissions[a]					
		Add 0	Add 1	Add 2	Add 3	Add 4	Increase
NO_X	220.1	240.0	240.0	240.0	240.0	240.0	19.9
CO	107.8	153.2	161.7	169.7	176.9	183.7	45.4 to 75.9
PM-10	12.3	12.9	13.1	13.2	13.4	13.5	0.6 to 1.21
VOC	113.1	29.5	33.3	36.8	40.0	42.0	(71.1 to 83.6)
SO_2	87.1	133.2	139.0	144.5	149.5	154.1	46.1 to 67.0
Total	540.4	577.8	594.1	611	626.8	641.3	

Table Notes:
[a] Emissions are based on 400 lb trash per hour, and 19.0 gallons of fuel per hour for the incinerator.

2.1 Ambient Assessment

This modification is classified under 18 AAC 50.300(h)(2). Therefore, Trident was required to conduct an ambient assessment for NO_2, SO_2, and PM-10. The Department memorandum describing its review of Tridents assessment is included in Appendix A. The Department's findings and conclusions are repeated below, along with several highlighted items.
The Department concluded:

1. The NO_2, SO_2, and PM-10 emissions associated with operating the stationary source within the operating limits in the permit will not cause or contribute to a violation of the Alaska

[21] As described in section 4.1.3, because Trident used 400 lb trash per hour in its emission calculations, the Department assumed the 400 lb trash per hour is an owner requested limit for limiting NO_X emissions. The department included this limit in the permit for NO_X PSD avoidance, but it affects other pollutant emissions as well. The Department notes that this limit of 400 lb per hour is not actually necessary for NO_X PSD avoidance, because Trident is tracking NO_X emissions on a unit-by-unit basis and is required to keep the stationary source-wide 12 month rolling total below 240 tpy.

Ambient Air Quality Standards (AAAQS) provided in 18 AAC 50.010, or the maximum allowable increases (increments) provided in 18 AAC 50.020.

2. The Trident assessment fully complies with the showing requirements of 18 AAC 50.315(e)(2).
3. Trident conducted the assessment in a manner consistent with EPA's *Guideline on Air Quality Models.*

The Department included the following provisions (or equivalent) in the permit to ensure compliance with the ambient air quality standards and increments. The project's 3-hour and 24-hour SO_2 impacts are extremely close to the increment. Trident requested a tiered SO_2 monitoring strategy for when they add engines. They also requested alternative sulfur limits if they elect to raise stacks to show compliance with the SO_2 ambient standards and increments. These requests have also been incorporated into the permit.

(1) Build the stationary source as proposed in the application; except if the permit is different than the application, then comply with permit requirements.

(2) Replace Unit 4 with a Cat D3516B Quad Turbo Low NO_X engine with a 1,655-kW generator.

(3) Replace Unit 6 Twin Turbo with Quad Turbo within 90 days of permit issuance.

(4) Increase the stack heights for existing Units 10, 11, 25, and 25a to no less than the heights indicated in Table 2 of the modeling memorandum.

(5) Install stacks that are at least 7.6 meters above grade for portable Units 31 and 32.

(6) Install stacks that are at least 21.5 meters above grade for Units 28a, 29a, 33 and 34 ***(or 27.6 meters above grade for the raised stack height alternative.)***

(7) ***For the raised stack height alternative, increase the stack height for existing Unit 23 to at least 25.1 meters above grade prior to running Units 29a, 33 or 34.***

(8) Prior to installation of Units 28a, 29a, 33 and 34, use fuel with a maximum sulfur content of 0.35 percent, by weight, except as noted for Unit 30.

(9) If one new engine is added, use fuel with a maximum sulfur content of 0.32 percent, by weight, except as noted for Unit 30.

(10) If two new engines added, use fuel with a maximum sulfur content of 0.29 percent ***(or 0.30 percent for the raised stack height alternative)***, by weight, except as noted for Unit 30.

(11) If three new engines added, use fuel with a maximum sulfur content of 0.27 percent ***(or 0.28 percent for the raised stack height alternative)***, by weight, except as noted for Unit 30.

(12) If four new engines added, use fuel with a maximum sulfur content of 0.24 percent ***(or 0.26 percent for the raised stack height alternative)***, by weight, except as noted for Unit 30.

(13) Limit fuel sulfur for Unit 30 to 0.50 percent by weight.

(14) Do not concurrently operate Units 10 and 11.

(15) Do not operate Unit 24 unless Unit 8, 9 or 23 is off-line.

(16) Do not operate any secondary unit (Units 27 through 29) unless one comparable primary unit is off-line for each operating secondary unit. Comparable units are listed in Table 4.

Table 4 – Comparable Primary Units

Secondary Unit	Comparable Primary Units
27, 28, 29	1 – 7, 26, 28a, 29a, 33 and 34

(17) Install SCR on Units 1, 2 and 4.

(18) Install SCR on Units 28a, 29a, 33 and 34 upon installation.

The demonstration of compliance with ambient air quality standards and increments is based on these permit terms and conditions. These conditions should not be changed without assessing whether the project as permitted will still comply with the ambient air quality standards and increments.

Trident has proposed two options for complying with the SO_2 PSD increment. The Department has included in the permit fuel sulfur monitoring requirements that include tracking fuel sulfur in each tank. The Department finds that refined monitoring is necessary, because of the narrow margin of compliance for the three-hour SO_2 increment. This strategy also makes it possible for the Department to track compliance should Trident switch compliance strategies.

The permit requires Trident to restrict access to areas within the ambient air boundary assumed in the modeling as described in the public access control plan contained in the March 2004 application. The ambient air boundary assumed in the modeling is shown and described in emails submitted to the Department on June 9, 2004, June 14, 2004, and December 23, 2004.

The ambient air boundary assumed in the modeling is larger than Trident Akutans property boundary. In order to restrict access to area within the assumed ambient air boundary, the Department required Trident to enter into a lease agreement with Trident Akutan Corporation, the owner of the hillside north of the plant that. The lease agreement dated January 7, 2005 describes a 28 foot wide road right-of-way. The lease gives Trident the authority to preclude access to the road right of way. Akutan corporation is required to notify Trident well in advance of revoking Tridents authority to preclude access to the right-of-way.

Should Trident wish to change the ambient air boundary assumed in the modeling in any way, Trident will need to prepare and submit a permit revision and revised ambient demonstration showing compliance with ambient air quality standards and increments as necessary.

As noted in the modeling memorandum, the Department allowed Trident to use their site-specific meteorological data even though it does not meet PSD quality assurance requirements. ***However, the Department is encouraging Trident to collect PSD-quality meteorological data for use in future ambient assessments, and notes that PSD-quality data will be <u>required</u> in future applications subject to PSD review and/or in future assessments using the AERMOD dispersion model***.

3.0 Emission Standards

For each new stationary source or modification subject to construction permitting, the applicant must show that the proposed emission units comply with state and federal emission standards. The Department has adopted federal New Source Performance Standards (NSPS) and National

Emission Standards for Hazardous Air Pollutants (NESHAP), by reference in 18 AAC 50.040. In addition, the Department has emission unit-specific emission standards listed in 18 AAC 50.050-090.

3.1 New Source Performance Standards (NSPS)

The new and replacement emissions units are not subject to federal NSPS, except for the incinerator. Federal new source performance standards have not been established for stationary diesel industrial engines.

Based on the name-plate, Unit 30 (the Therm-Tec Incinerator) was constructed May 20, 2001. However, Unit 30 is exempt from the standards set out under 40 CFR 60 Subpart CCCC because it is a municipal waste incinerator that burns less than 35 tons of refuse per day that is at least 30 percent municipal waste.

Based on the vendor specifications provided with the application, the incinerator is rated at 750[22] pounds of refuse per hour (equivalent to nine tons per day). Trident's application indicates that the incinerator burns greater than 30 percent municipal solid waste or refuse-derived fuel, as defined in 40 CFR 60, Subparts Ea, Eb, AAAA, and BBBB.

However, to qualify for the exemption, 40 CFR 60.2020 paragraphs (c)(2)(i) and (ii) require Trident to:

(i) Notify the Administrator that the unit meets these criteria. (Trident notified the EPA of their exemption on September 8, 2003.)

(ii) Keep records on a calendar quarter basis of the weight of municipal solid waste burned, and the weight of all other fuels and wastes burned in the unit. This requirement is included in the permit.

3.2 National Emission Standards For Hazardous Air Pollutants

The application does not mention if any equipment added as a part of this project is subject to NESHAPS.[23] Trident did not provide any documentation for whether the Plant is classified as a hazardous air pollutant- (HAP-) major source of air pollution, nor is there an estimate of hazardous air pollutant emissions in Operating Permit No. AQ0231TVP01 or its statement of basis. The Department notes that should the Plant be a HAP-major source of air pollution, then the compression ignition diesel generators would be subject to maximum achievable control technology (MACT) standards for reciprocating internal combustion engines (RICE), 40 CFR 63, Subpart ZZZZ.

3.3 Alaska Emission Standards

Industrial processes and fuel-burning equipment at the Plant are subject to specific visible emission, particulate matter, and sulfur compound emission standards as listed in 18 AAC 50.055. Trident's project does not pertain to open burning prohibitions as listed in 18 AAC 50.065, and fugitive dust prohibitions listed in 18 AAC 50.045(d). Therefore, the Department assessed only the fuel burning equipment and incinerator emission standard provisions for new or modified units.

[22] Note that the permit limits the incinerator to 400 pounds of refuse per hour – see section 4.1.3.

[23] EPA promulgates National Emission Standards for Hazardous Air Pollutants (NESHAPs). 18 AAC 50.040 adopts the federal hazardous air pollutant regulations, 40 C.F.R. 61 and 40 C.F.R. 63, by reference.

3.1.1 Visible Emissions

This permit authorizes installation of and replacement of fuel burning equipment and camp waste incinerator that are subject to a state visible emission standard of "no more than 20 percent opacity averaged over any six consecutive minutes in any one hour," listed in18 AAC 50.050(a) and 50.055(a)(1). This standard supersedes the previous standard of "no more than 20 percent for greater than three minutes in any one hour."

However, the "three minute in any one hour standard" is still incorporated by reference in 40 C.F.R. 52.96 as part of the State Implementation Plan (SIP) under the Federal Clear Air Act. Therefore, the superseded standard is still effective under the SIP until EPA adopts the new regulation into the SIP.

Trident did not provide a visible emission compliance demonstration for the modified or new diesel engines or the replacement incinerator. Because liquid fuel-fired sources and the replacement incinerator have the potential to emit visible emissions, the Department has included a requirement for initial visible emission source tests for each possible fuel including diesel, used oil fuel blend, and fish oil blend in the construction permit and an initial visible emission surveillance for the replacement incinerator. After the initial source test, Trident is required to comply with ongoing visible emission monitoring, recordkeeping, and reporting requirements as listed in the Trident Plant's Operating Permit No. AQ0231TVP01 for liquid fuel-fired equipment.

3.1.2 Particulate Matter (PM)

This permit authorizes installation or modification of fuel burning equipment that is subject to the state PM standard. The standard is 0.05 grains per dry standard cubic foot of exhaust gas (gr./dscf), as listed in 18 AAC 50.055(b)(1).

The incinerator is not subject to the state PM standard 18 AAC 50.050(b) as it has a rated capacity of less than 750 pounds of trash per hour.

Engines (diesel, diesel/fish oil, and diesel/used oil): Trident did not include a particulate matter compliance demonstration for the modified or new diesel engines for either diesel or for diesel/fish oil blends. Trident is not authorized to use used oil in the engines so a compliance demonstration for used oil in the engines is unnecessary.

For diesel fuel and diesel/fish oil, the Department estimated the PM exhaust concentration to be 0.04 gr./dscf using 40 C.F.R. 60, Appendix A, Method 19, Table 19-1, assuming excess oxygen of **nine** percent. This calculation shows compliance with the state standard. The Department's calculations for compliance with the state PM standard are included in Appendix B.1.a.

Boilers (diesel/used oil): Trident requested a used oil:fuel oil blend ratio of 1:5 based on an assumed used oil ash content of 0.89 percent, to be adjusted for each used oil fuel analysis for combustion in the boilers. Trident's assessment, shown in Appendix G of the application, is based on external combustion emission factors from AP-42, Section 1.3-1, and three percent excess oxygen. During its review of the construction permit application the Department advocated a simpler monitoring strategy that does not involve adjusting the blending ratios. Trident agreed but did not want to measure ash content. The Department determined that a blending ratio of 1:6 is required for a used oil ash content of one percent, as shown in Appendix B.1.b. Trident provided site-specific data showing that 0.89% is representative of used oil ash

content at this location. Assuming an ash content of one percent should provide an adequate margin of safety for actual used oil ash content. Therefore, additional ash content monitoring is not necessary.

Note that Condition 12 of the Operating Permit 231TVP01, Revision 2 restricts Trident to a used oil:fuel oil ratio of 1:1. The construction permit application request for a 1:5 ratio is more stringent than the current limit. Therefore, Trident would not have required the Department's construction permit finding under 18 AAC 50.315(e) that the practice will comply with state emission standards.

However, as part of its review of the construction permit application, the Department found that the 1:1 blending ratio is not protective of the PM emission standard for the boilers and heaters. To correct this, the Department has included in this construction permit a requirement for Trident to blend used oil to fuel oil at a 1:6 ratio.

Boilers (diesel/fish oil): Trident did not provide in the application a demonstration of compliance with the grain loading emission standard for the boilers burning diesel/fish oil blend. For external combustion sources, absent AP-42 emission factors for fish oil, the Department used distillate fuel oil factors for blended fuel emission estimates.

For fuel oil-fired external combustion sources, the Department determined, based on AP-42 emission factors and 40 C.F.R. 60, Appendix A, Method 19, that potential PM emissions are 0.015 grains per dscf. This provides an adequate margin of compliance so the Department did not impose an initial performance test obligation for these sources. The Plant's operating permit contains standard permit conditions for visible emissions and PM emission testing. These conditions trigger a PM emission source test if visible emissions exceed the listed visible emission thresholds equivalent to the PM emission standards. Therefore, the Department did not impose additional particulate emission testing of the boilers and heaters.

3.1.3 Sulfur Compounds

This permit authorizes Trident to establish new, modified and replacement fuel burning equipment, some of which Trident already installed. The new and replacement equipment is subject to the state sulfur compound emission standard as set out in 18 AAC 50.055(c). Sulfur compound emissions from fuel-burning equipment, expressed as SO_2, may not exceed 500 ppm averaged over a period of three hours.

Trident did not provide a sulfur compound compliance demonstration for the new and modified diesel engines for which Trident's application requests authorization. The Department has previously calculated that fuel oil having a sulfur content of 0.76 percent sulfur by weight or less will comply with the state sulfur compound emission standard using a conservative approach that assumes no combustion air in excess of the minimum necessary for complete combustion. Therefore, compliance with 18 AAC 50.055(c) is assured for fuel oil, used oil and fish oil blends by complying with the ambient air quality sulfur limit of 0.35 percent sulfur by weight (and 0.50 wt% S for the incinerator). Note that Trident is requesting additional reductions in this 0.35 wt% S limit for ambient air quality protection as Trident adds new diesel engine emission units to the Plant. The Department included its sulfur compound compliance demonstration in Appendix B of this report.

4.0 Limits to Avoid Classification as PSD-Major Stationary Source

As indicated in Section 1.4, with no controls, the Plant has the potential to be PSD-Major for both NO_X and SO_2. Trident's application includes a NO_X emission limit to prevent the Plant from classification as a PSD-Major stationary source. Trident proposed in their application to use SCR to control NO_X. Because SCR does not control SO_2, the Department has included in the permit a condition requiring Trident to track and report SO_2 emission as well.

4.1 NO_X Limit

4.1.1 Engine Monitoring, Recordkeeping, and Reporting (MR&R)

The Department is capping Trident at 240 tpy to keep them from classification as PSD-Major. Tridents original proposal, the Departments assessment of Tridents original proposal, the Department's findings, and other issues regarding the monitoring, recordkeeping, and reporting strategy are described below.

Description of Trident's Original Proposal

In their application, Trident proposed to cap emissions at 249 tpy. They proposed to track engine NO_X emissions on a rolling 12-month basis using emission factors developed from source tests and fuel consumption. They also proposed to reduce NO_X as needed using SCR.

Trident proposed using parametric equations that vary by load, to determine emission factors. Trident based the parametric equations on uncontrolled emission factors from source tests. They would also adjust the emission factors based on SCR effectiveness. They proposed to measure SCR effectiveness using an MSI 150 or equivalent hand held analyzer. They proposed taking measurements once every seven operating days.

Selective Catalytic Reduction

As of the application date, Trident had installed three SCR units on engines. The application requested approval for future SCR installations as requested. In subsequent submittals, Trident notified the Department that they had installed six SCR units.

The SCR units are equipped with a reagent injection system that includes reagent flow metering, control valves, dosing pump, and instrumentation. The SCR units are also equipped with alarm systems and monitoring function screens that display major SCR function parameters, including ammonia slip. Tridents QA/QC Plan describes the monitoring equipment. The SCR injection control system controls and monitors all major SCR functions. The vendor and operator determine the load-curve and implement the load-based reagent dosing for the SCR control system. The vendor and operator developed the load curve during source tests with SCR in October of 2003. Trident is using aqueous urea solution as the SCR reagent.

Hand Held Analyzer

Trident has been using an MSI 150 Pro 2-i hand-held analyzer to measure NO_X emissions since the December 5, 2002 consent decree. On September 26, 2003, Trident notified the Department that the NO_2 sensor on the NO_X monitoring system had deteriorated due to SCR ammonia slip.

They can still measure NO. Trident requested Department concurrence to assume that the NO_2 is five percent of the total NO_X. Trident calculated NO_2, and estimated NO_X as follows.[24]

$$NO_2 = NO\left(0.05 \diagup 0.95\right)$$

$$NO_X = NO + NO_2$$

On January 21, 2004, Trident indicated that they were continuing to use the five percent ratio for estimating NO_2. On March 31, 2004, the Department stated that the five percent assumption was temporarily acceptable until the Department could fully address the issue through a construction permit.

Department Assessment

The Department must have the ability to verify compliance with permitted emission limits. As stated in AS 46.14.180, monitoring requirements "must be reasonable and based on test methods, analytical procedures, and statistical conventions approved by the federal administrator or the Department or otherwise generally accepted as scientifically competent."

Tridents original proposal contains the following sources of uncertainty in emissions estimation:

(1) Same Engine Over Time Variability – The parametric equations requested by Trident vary by load only. However, variables other than load (e.g. ambient conditions, fuel property variables, and operation and maintenance of engine) affect emissions. There is potential for substantial variation in emissions from the same unit over time, as shown in Table 5.

Table 5- Comparisons of Source Test Data

Emission Unit	Variability, in percent	
	Same engine, different time, similar load	Same type engine, same time, similar load
KGCMC - Caterpillar Model 3516B	27	Not available
KGCMC - Ruston Model 12RKC	43	6 to 13
Cominco Red Dog Mine – Wartsila	Not available	18 to 19

(2) Engine-to-Engine Variability – Trident only tested one engine for each group of similar engines, so one source test would determine the emission factors for up to six engines. This approach adequately protects the limit only if each engine has identical emissions or if Trident conducted the source test on the highest emitting unit. Trident has not provided us any assurance that either case is true. There is potential for substantial variation in emissions from similar units, as shown in Table 5.

[24] See compliance status report dated September 13, 2004, included as Appendix C of this report.

(3) Representativeness of weekly hand held analyzer measurements - Trident proposed measuring relative SCR removal effectiveness once every seven days using a hand-held analyzer. This does not account for variability between hand held unit measurements, so may not be adequately representative of actual effectiveness. SCR effectiveness depends on the operator maintaining proper catalyst bed temperature and urea dosage, and could vary greatly within a week.

(4) Potential for Human Error – Human error can be a factor for all non-automated systems. Trident's history includes inaccurate recordkeeping and reporting. Accurate results depend on the operator, but the reporting must also be accurate.

Department Findings

During the proposed permit preparation, the Department considered proposing a Continuous Emissions Monitoring (CEMS) to address the areas of uncertainty listed above. Trident considered the cost of CEMS to be onerous, so prepared a counter proposal that addresses the Departments concerns. Based on this counter proposal, the final permit contains the following requirements:

(1) To address "same engine over time variability", Trident is required to use worst-case uncontrolled NO_X emission factors for a given load range, as determined from October 2003 source tests for each group of similar engines. This method provides a "worst case step-wise" method for determining emission factors. This method provides the Department more assurance that a given emission factor represents the actual emission factor for that load range, than is provided using parametric equations. Table C.1 in Appendix C of this TAR cites the bases for the uncontrolled NO_X emission factors shown in Table A.1 of the permit. (This requirement was not part of Tridents counter proposal.)

(2) When the stationary source NO_X emissions total more 230 tpy, Trident is required to conduct daily hand held analyzer measurements rather than weekly. This will address the potential variability in between measurements.

(3) To address "engine-to-engine" variability, Trident is required to source test each internal combustion engine when stationary source NO_X emission reach 235 tpy, unless Trident has source tested a unit within the previous 12 months.

(4) Finally, the permit caps emissions at 240 tpy. This provides a margin of compliance to perform corrective action, or in case of human error. The lower emission cap addresses a fifth area of concern for the Department, which is enforceability of the permit. The Department must have the ability to verify compliance with permitted emission limits. The closer a Permittee is to a regulatory threshold, the closer the Department must look at the supporting data. This permit already has a complicated ambient sulfur limit.

(5) The SCR units will be effective as long as Trident maintains appropriate operating temperature and urea dosage. Fuel sulfur affects SCR catalyst performance and life expectancy. This is not expected to be a problem at Trident given the permitted (0.39 wt% S and less) fuel sulfur limits at the Plant.

(6) Ammonia slip is an indication of proper SCR operation, and a factor in effective life expectancy of the SCR. Excess ammonia can saturate the catalyst bed with ammonia salts rapidly, causing degradation of the SCR unit that they are depending on for NOX control. The Department strongly recommends that Trident measure ammonia slip, even though the permit does not require them to report it to the Department.

(7) Trident based the five percent assumption on source tests conducted in October of 2003 without SCR. The Department's review of the source tests indicate that the five percent ratio is valid upstream of the SCR unit. The Department could not use source test data to verify the ratio downstream of the SCR unit. To verify the ratio downstream of the SCR unit, the Department reviewed the "instrument accuracy verification test" prepared by Trident as part of their October 2003 source tests. Trident found that the measured NO2 downstream of the SCR unit was zero percent. Based on this, the Department concludes that the five percent ratio is conservative and acceptable to the Department for purposes of this construction permit.

Other Issues

Trident did not conduct source tests at multiple loads for emission Unit 26. For this reason, Trident is required to limit the load for Unit 26 to no more than 79 percent - the average load at which Trident conducted the tests. The corresponding fuel rate is 62.6 gallons per hour as indicated in the October 2003 source test. Trident is required to track load in gallons per hour as they are tracking fuel usage not power usage.

As an alternative to tracking fuel as described above, Trident may substitute the monthly PTE as listed in Exhibit A of the permit for a given unit.

4.1.2 Non-Engines (Except Incinerator)

The compliance strategy for the non-engines includes monitoring NO_X emissions based on fuel consumption and unit-specific emission factors. For the non-engines except the incinerator, Trident is required to track fuel and calculate NO_X emission monthly. The non-engine emission factors are not based on load.

Alternatively, Trident may substitute the monthly PTE as listed in Exhibit A of the permit for a given unit.

4.1.3 Incinerator

The compliance strategy for the incinerator includes monitoring NO_X emissions based on fuel consumption and trash combusted.

The permit includes a trash throughput limit of 400 lb of trash per hour. This is the average trash throughput assumed by Trident in their application. The permit requires Trident to calculate NO_X emissions monthly. A throughput of 400 lb trash per hour is equivalent to 146 tons of trash per month as follows:

$$\frac{400\,lb\,trash}{hour} \times \frac{8{,}760\,hr}{year} \frac{ton\,trash}{2000\,lb\,trash} \times \frac{year}{12\,months} = \frac{146\,ton\,trash}{month}$$

According to vendor data in Appendix G of the permit application, NO_X emission from combusting waste are 25 ppm, and from No. 2 fuel oil are 150 ppm. The data indicates that total NO_X emissions are 3.7 lb NO_X per hour.

The Department calculated the emissions from trash combustion and fuel combustion separately as follows:

$$\frac{3.7\,lb\,NO_X}{hr} \times \frac{25}{175} \times \frac{hr}{400\,lb\,trash} \times \frac{2000\,lb\,trash}{ton\,trash} = \frac{2.6\,lb\,NO_X}{ton\,trash}$$

$$\frac{3.7\,lb\,NO_X}{hr} \times \frac{150}{175} \times \frac{hr}{19.0\,gal} = \frac{0.2\,lb\,NO_X}{gal}$$

As an alternative to tracking fuel and waste Trident may substitute a monthly PTE of 1.4 tons per month. The Department calculated the PTE of 1.4 tpm, assuming a limit of 400 lb trash per hour, as follows

$$\frac{3.7\,lb\,NO_X}{hour} \times \frac{8{,}760\,hr}{year} \frac{ton\,trash}{2000\,lb\,trash} \times \frac{year}{12\,months} = \frac{1.4\,tons\,NO_X}{month}$$

Trident assumed 400 lb trash per hour in its emission calculations, so the Department assumed the 400 lb trash per hour is an owner requested limit for limiting NO_X emissions. The Department included this limit in the permit for NO_X PSD avoidance. The Department notes that this limit of 400 lb per is not actually necessary for PSD avoidance, because Trident is tracking NO_X emissions on a unit-by-unit basis and is required to keep the 12 month rolling total below 240 tpy.

4.2 SO_2 monitoring

The permit contains a straightforward SO_2 emission calculation for PSD avoidance, based on fuel consumption and fuel sulfur content. As with the NO_X emission calculation, Trident may substitute the PTE for a given unit. Exhibit B of the permit lists only the PTE for the higher sulfur content of 0.35 wt% S. The permit provides for recalculation of this PTE for different fuel sulfur content.

5.0 Permit Administration

This section contains a summary of the rationale for permit conditions and summarizes construction permitting procedures.

5.1 Permit Terms and Conditions

This stationary source operates under Construction Permit No. 9825-AC010, Operating Permit No. AQ0231TVP01, Revision 2, and Construction Permit No. 231CP02. Construction permit 231CP03 contains terms and conditions under which Trident is authorized to establish larger replacement units and additional emission units at the stationary source.

5.1.1 Fish Oil Authorization

In their application, Trident requested that the Department authorize Trident to use fish oil blends as an alternative fuel in all diesel reciprocating engines at the Plant. The Department recognizes some positive aspects of blended fish oil/fuel oil combustion such as the reduction in

environmental risk from transporting fuel to the Plant, and lower sulfur compound emissions from fish oil.

In its review of this request, the Department considered (1) a fish oil study[25] conducted for UniSea noted the greater potential for fuel injector wear for fish oil than diesel fuel; and (2) Source testing[26] for UniSea demonstrated the potential for greater NO_X emission per gallon of fuel blends than for diesel fuel

Trident has not conducted mapping for fish oil use in SCR equipped engines. In addition, Trident did not provide vendor data or approvals for the use of fish oil with SCR-equipped engines. The Department has concerns that fish oil use in SCR-equipped engines may void any vendor emission and performance guarantees, cause fouling and mask the SCR catalyst beds. Therefore, the permit requires Trident to provide assurance to the Department that fish oil/fuel oil blend will not cause or contribute to an accelerated decrease of SCR performance.

The Department notes potential for increased preventive maintenance, or absent increased maintenance, potential for engine smoke from worn injectors in non-SCR-equipped engines. However, the Department has no air quality control rationale to restrict or prohibit use of blended fuel oils in non-SCR-equipped engines. Therefore, the Department authorizes the use of blends contingent upon Department-approved emission source tests to determine the actual emission factors for each make and model of non-SCR-equipped engines.

5.1.2 Used Oil Authorization

Trident requested a variable blending ratio based on ash content of the used oil. In consideration of Trident's problems with complying with blending requirements in the past, the Department has included a simpler blending ratio of 1:6 in the permit for compliance with the state PM standard.

For a description of used oil blending requirements to meet the state PM standard, please refer to Section 3.3.2.

5.1.3 Standard Conditions

Standard permit conditions listed in 18 AAC 50.346(a) applicable to operating and construction permits, specifically emission fees, air pollution prohibited obligations, excess emission and permit deviation reports, and notification form are already listed in Operating Permit No. 231TVP01, Revision 2. With the exception of the assessable emission standard condition, this project does not trigger any changes to these conditions so they are not included in this construction permit. The assessable emissions will increase. The Department will include the revised assessable emissions in the operating permit's administrative revision.

5.1.4 Alaska Coastal Management Program

The Plant is located in the Aleutians East Coastal Resource District and has previously been subject to review under the Alaska Coastal Management Plan (ACMP). The Plant's operations

[25] ICE-Vol 26-3 "Fish Oil as an Alternative Fuel for Internal Combustion Engines" Neil X. Blythe. Analysis of deposits on liner exhaust ports found carboxylic acids, which are oxidized by-products of triglycerides contained in fish oil. Transesterification with methyl or ethyl alcohol removes glycerol, a component of the deposit forming triglycerides, and improves combustion properties.

[26] From Steigers fish oil as an alternative fuel report attached to 10/13/2002 email from John A. Steigers (Steigers Corporation) to Jim Baumgartner (department) and others.

have previously been found consistent with the ACMP. The ACMP review participants have not requested additional project modification consistency review under 18 AAC 6.810(f). Under AS 46.40.040(b)(2), this permit action will constitute the project consistency finding for the emissions from the project modification.

5.2 Construction Permitting Procedures

The Department's Title V Team has oversight for all reports, surveillance, records, and inspections of permitted stationary sources. Therefore, all plans, reports except excess emission reports, and notices required under this permit should be submitted to the Team's Fairbanks Office, as provided for in Section 10 "General Recordkeeping, Reporting, and Compliance Certification Requirements," of Operating Permit No. 231TVP01, Revision 2.

The terms and conditions of this permit do not preclude any action by the state or EPA, or the Federal Land Manager to mitigate any material violation of the permit, or the mitigation of any secondary effect of the emissions from the stationary source.

Appendix A: MODELING MEMORANDUM

<September 15, 2004 memorandum not attached – superseded by August 17, 2007 memorandum>

Appendix B: COMPLIANCE DEMONSTRATIONS

1. Particulate Matter Compliance Demonstration

The Department used Equation 19-1 from Method 19 of Appendix A to 40 C.F.R. 60 to calculate PM emissions.

40 C.F.R. 60, Appendix A, Equation ***19-1*** $$E = C_d F_d \left(\frac{20.9}{20.9 - \%O_{2d}} \right)$$

where,

E	=	Fuel Specific Emission Rate, lb/MMBtu
F_d	=	Dry exhaust volume per Btu fuel burned. F_d for various fuels is listed in Table 19-1 of Method 19.
$\%O_{2d}$	=	percent oxygen by volume in dry exhaust gas (assumed to be nine percent based on emission source test data for large industrial engines on file with the Department)
C_d	=	Pollutant Concentration, lbs-pollutant/dscf-exhaust

Solving Method 19 Equation 19-1 for pollutant concentration (C_d)

Equation 2 $$C_d = \frac{E}{F_d \left(\frac{20.9}{20.9 - \%O_{2d}} \right)}$$

To convert to C_d to grains/dscf:

Equation 3 $$\frac{\text{grains}}{\text{dscf}} = (C_d)(7{,}000 \text{ grains/lb})$$

a. Fuel Oil and Fish Oil Combustion in Diesel-Fired Engines > 600 hp (Units 1, 2, 2a, 3a, 4b, 5, 5a, 6, 6a, 7a, 7b, 25a, 27, 28, 28a, 29, 29A, 31, 32, 33, 34)

Assumptions:
- PM emission factor for diesel fuel = 0.1 lb/MMBtu (AP-42, Table 3.4-1, greater than 600 hp capacity) (assume the emission factor is the same for fish oil),
- F_d = 9,190 dscf/MMBtu for fuel oil Table 19-1 of Method 19

Using Equation 2: $$C_d = \frac{0.1 \text{ lb/MMBtu}}{(9{,}190 \text{ dscf/MMBtu}) \left(\frac{20.9}{20.9 - 9} \right)} = 6.196\,10^{-6} \text{ lb/dscf}$$

Using Equation 3: $\left(6.196\ 10^{-6}\ (\text{lb/dscf})\right)\ (7{,}000\ (\text{grains/lb})) = 0.04$ gr./dscf

0.04 grain/dscf is below the 0.05 gr/scf standard, so complies.

b. Used Oil Combustion in Boilers and Heaters (Units10 through 24)

Assumptions:
- PM emission factor = 64A lb /1,000 gallons (AP-42, Table 1.11-1),

- External Combustion Sources only
- A is the ash content = **1 percent by weight** (this is about a 10 percent safety factor over the typical used oil ash content of 0.89% provided in Appendix G of the application); therefore PM emission factor = 64 lb/1,000 gal
- Heat Content = 150,000 btu/gal (approximate value, Application Appendix G)
- F_d = 9,190 dscf/MMBtu for used oil (40 C.F.R. 60, Appendix A, Method 19, Table 19-2, for residual oil)
- PM emission factor for diesel is 0.01 gr/scf (Using AP-42 emission factor of 2 lb/1,000 gallons and Method 19)

Converting emission factor

Fuel specific PM emission rate: $E = \dfrac{64\ lb\,PM/1{,}000\,gal}{0.15\,MMBtu/gal} = 0.427\ lb\,PM/MMBtu$

Using Equation 2: $C_d = \dfrac{0.427\ \text{lb PM/MMBtu}}{(9{,}190\ \text{dscf/MMBtu})\left(\dfrac{20.9}{20.9-9}\right)} = 4.0\times10^{-5}\ \text{lb PM/dscf}$

Using Equation 3: $\left(4.0\times10^{-5}\ \text{lb/dscf}\right)\left(7{,}000\ \text{gr./lb}\right) = 0.278\ \text{gr./scf}$

0.16 grain/dscf is above the 0.05 gr./scf standard, so does not comply.

To meet the PM standard, blend used oil with fuel oil (0.01 gr./dscf) at a ratio of 1:X as follows:

$$\frac{0.278 + 0.01X}{1 + X} = 0.05$$

$$X(0.01 - 0.05) = 0.05 - 0.278 \quad \Rightarrow X = 5.7\ (\sim 6)$$

2. Sulfur Compound Compliance Demonstration

Given that all of the sulfur in fuel oil will be converted completely to SO_2 when burned, every mole of sulfur contained in the fuel oil will produce a mole of sulfur dioxide. Since an exhaust concentration of 500 ppm SO_2 implies that there are 500 scf SO_2 for every million scf exhaust, the corresponding fuel sulfur content can be found by dividing the total weight of the sulfur in the 500 scf SO_2 by the weight of fuel required to produce one million scf exhaust. The weight of fuel to produce one million scf exhaust can be found using Method 19 in 40 CFR 60 Appendix A if given the higher heating value of the fuel oil and exhaust oxygen content. The weight of sulfur in 500 scf exhaust can be found given that the molecular weight of sulfur and the Ideal Gas Law, PV= nRT.

Assuming that:

1) the higher heating value of fuel oil is 20,000 Btu/lb.
2) from the ideal gas law, 1 mole of a gas at 68^{o}F and atmospheric pressure is equal to 385.3 ft^3, MW sulfur = 32 lb per lb-mole
3) from Table 19-1 of Method 19, at least 9,190 dscf exhaust is produced for every million Btu fuel oil burned.

Percent weight sulfur =

$$\left(\frac{(500\,\text{scf})}{(10^6\ \text{scf exhaust})}\right)\left(\frac{1\,\text{mole}}{385.3\,\text{scf}}\right)\left(\frac{32\ \text{lb-S}}{1\ \text{mole}}\right)\left(\frac{9190\,\text{scf exhaust}}{10^6\ \text{Btu}}\right)\left(\frac{20{,}000\,\text{Btu}}{1\,\text{lb fuel}}\right)$$

$$= 0.007632 \text{ lb-sulfur per lb fuel}$$
$$=0.76\% \text{ sulfur by weight}$$

This calculation is conservative since it assumes there is **no** additional air to provide excess oxygen. Actual combustion requires additional air to ensure complete combustion, which would dilute the SO_2 exhaust concentration. Underestimating the heating value of the fuel used would also result in a more conservative estimate.

Trident will limit liquid fuel sulfur at the Plant to less than 0.35% sulfur by weight for ambient air quality protection, and therefore will comply with the state sulfur dioxide standard for diesel fired emissions units.

Appendix C: NOX EMISSION FACTOR BASES

Table C.1 –Basis of NO_X Emission Factors Used in Exhibit A of Permit

Unit	Source Description	Basis of Emission Factor
1, 4b, 28a, 29a, 33, 34	Caterpillar Model D3516B Quad Turbo Low NO_X Diesel Electric Generator (1,655 kW)	October 2003 Source Test for "Source ID 1-Pollock Generator #4" [a]
2, 3, 5a, 7a	Caterpillar Model D3512B Quad Turbo Low NO_X Diesel Electric Generator (1,135 kW)	October 2003 Source Test for "Source ID 3 - Cod Generator #2" [a]
2a, 3a, 5b, 7b	Caterpillar Model D3512B Quad Turbo Low NO_X Diesel Electric Generator (1,360 kW)	October 2003 Source Test for "Source ID 5 - Pollock Generator #2" [a]
6a	Caterpillar Model D3512B Twin Turbo Low NO_X Diesel Electric Generator (1,240 kW)	October 2003 Source Test for "Source ID 6 - Pollock Generator #3" [a]
6b	Caterpillar Model D3512B Quad Turbo Low NO_X Diesel Electric Generator (1,240 kW)	Regression Equations[b]
8, 9	Cleaver Brooks Model 400 Steam Boiler	AP-42[b]
10, 11	Johnston Steam Boiler	AP-42[b]
12	Pedar Halvorsen Furnace	AP-42[b]
23	Cleaver Brooks Model 500 Steam Boiler	AP-42[b]
24	Falcon Boiler	AP-42[b]
25, 31, 32	Portable Detroit Diesel Series 60 Diesel Electric Generator	Portable Engine Data[b]
26	Caterpillar Model D3508B Twin Compressor Engine	October 2003 Source Test for "Source ID 26 - Compressor Engine" [a] @ 79% load
27	Caterpillar D3512A	March 2002 Source Test for "SID04" [c]
28, 29	Caterpillar D379	June 2000 Source Test for "Source ID 4" [d]

Table Notes

[a] Refer to December 26, 2003 update to the original November 25, 2003 report (the original report and the application have incorrect summary tables)

[b] see Appendix G of the application

[c] Included in Appendix G of the Application as "Summary of June 2000 Source Testing for NO_X" (Should be labeled "Summary of March 2002 Source Testing for NO_X" per June 3, 2004 from Tom Gibbon to Sally Ryan)

[d] Refer to *Final Summary Report for Particulate and NO_X Emissions Testing Trident Seafood Inc. Akutan Facility* August 20, 2000 (the summary copies in Appendix G of the application are different than the actual report)