TASK 1

Evaluation of Federal and Alaska State Regulations and Guidelines for Erosion Control, Restoration and Aesthetics with Discussion on Standard ECR&A Engineering Practices

prepared for:
FLUOR NORTHWEST, In

contract no. 468085·9·k054

LAND DESIGN NORTH

August 1979

LAND DESIGN NORTH
LANDSCAPE ARCHITECTURE
RESOURCE/RECREATION PLANNING
1709 S BRAGAW ST., SUITE J
ANCHORAGE, ALASKA 99504
(907) 277-7122

August 31, 1979

FLUOR

468085-9-K054-1-0

Mr. W. D. Fisch, Manager
Contracts Administration
Fluor Northwest, Inc.
1001 Noble Street
P.O. Box 60089
Fairbanks, AK 99706

Re: Contract No. 468085-K054
Erosion Control, Restoration and Aesthetics Planning Services
TASK ONE REPORT: FINAL

Dear Mr. Fisch:

By way of this letter we are transmitting revised Task One Report. This final report has been written to reflect review comments contained in your letter FI/LDN-014 dated 8 August, 1979, and discussions held in Anchorage with Mr. Otis Abbott.

Should you have any questions regarding the above, please contact me at your earliest convenience.

Very sincerely,

LAND DESIGN NORTH

Bruce G. Sharky, ASLA
Principal

BGS:mm

TABLE OF CONTENTS

TABLE OF CONTENTS, Continued

1.0 LEGAL REQUIREMENTS FOR ECR & A

1.1 FEDERAL AND STATE LAWS AND REGULATIONS

1.2 ANNOTATED DISCUSSION OF APPLICABLE LAWS AND REGULATIONS BY AGENCY

1.0 LEGAL REQUIREMENTS FOR ECR & A

The purpose of this section is to identify existing federal and state agencies which have codes, regulations and guidelines involving erosion control, restoration and aesthetics (ECR & A) requirements which are applicable to gas pipeline construction in arctic and sub-arctic areas. The ECR & A related laws and regulations governing the actions of these governmental agencies are presented along with their applicable guidelines. In addition, an annotated catalog of the pertinent laws and regulations is included and summarized by agency.

1.1 BASIC LEGAL AND PROCEDURAL CONCEPTS

The material in this section briefly identifies the legal basis for ECR & A requirements. This discussion of requirements is followed by an explanation of how non-permitting agencies will see that the permittee will be required to satisfy their requirements for ECR & A. The concept of single window permitting is then discussed followed by a discussion on determining compliance with ECR & A requirements.

1.1.1 ECR & A REQUIREMENTS BY LAW AND REGULATION

Several laws or regulations exist which directly address ECR & A. Examples would be 33CFR Part 320 where aesthetics is mentioned as a consideration for any U. S. Army Corps of Engineers permit; 33 CFR Part 328, where erosion control is specifically mentioned regarding Section 404 permits of the U.S. Army Corps of Engineers; and AS 38.35.100 where erosion control, restoration and revegetation are specifically identified in regard to right-of-way permits from the Alaska Department of Natural Resources. Broad requirements for ECR & A are to be found in the draft federal and state stipulations. Finally, several agencies indicated that they would put stipulations (or ask for stipulations in the case of reviewing agencies) covering ECR & A in the various permits to be issued by the regulatory agencies. It is apparent that every activity involved in the construction and operation of the gasline will be closely scrutinized regarding ECR & A.

1.1.2 PERMITTING AGENCIES VERSUS REVIEW AGENCIES

The involvement of the various government agencies can be broken down into two broad areas - those that have direct permitting requirements and those that have input through the review of the permits prior to issuance. Many of the requirements for ECR & A will result from the input of the reviewing agencies requiring stipulations to be placed on permits issued by the permitting agencies. An example of the role of the permitting versus reviewing agency relationship would be that between the Army Corps of Engineers and the U.S. Fish and Wildlife Service. Under the Fish and Wildlife Coordination Act and subsequent Executive Orders and Memoranda of Understanding the Corps of Engineers must consider all suggested stipulations of the Fish and Wildlife Service before issuing any permits. Although the Corps of Engineers permits may be only for matters impacting navigation, the Fish and Wildlife recommendations may cover anything from endangered species to wildlife habitat restoration.

The above was used as only one example. Most federal permitting agencies are required by law to accept the recommended stipulations of other federal agencies when tied to their mandated missions. The same situation exists within state government. Therefore, one must realize that, for example, a Coast Guard permit for a bridge across navigable waters could address not

only matters pertaining to navigation but in all likelihood ECR & A.

1.1.3 "SINGLE WINDOW" PERMITTING

The present process of having the permitting agencies obtain comments from the various agency offices and then compiling these comments into permit stipulations may be cumbersome, resulting in long delays. Realizing the potential of long delays both the federal and state governments are considering a "single window" process whereby applications for all federal permits would be processed through the Federal Inspector's Office and applications for all state permits would be processed through the State Pipeline Cooordinators Office. The "single window" approach could be used two ways. In one the entire permit review and issuance procedure would be done in the inspector's office. In the other the inspector's office would merely act as a funnel to pass the permits on to the appropriate permitting and reviewing agencies. If the respective state and federal pipeline offices have in-house representatives from the various permitting and reviewing agencies it would seem advantageous to both governments and to the permittee to have the permit review and issuance all done in the Federal Inspectors' offices for federal permits and State Pipeline Coordinators Office for state permits.

Regardless of which "single window" system is used, some of the regulatory problems that occurred during the oil line construction will be avoided. Since the permits were being handled entirely by the various agencies the Alaska Pipeline Office (APO) and the State Pipeline Coordinator Office (SPCO) would sometime issue NTP's before all necessary permits were issued.

1.1.4 CRITERIA FOR COMPLIANCE

Few significant advances have been identified indicating that any of the agencies have yet developed ECR & A guidelines that may be applied to determine compliance. Typically the permittee will submit an ECR & A design for the agency approval. Upon review by the agency an agreed upon plan will result. The problem that develops is not so much the adequacy of the design submitted, but in determining if the field implementation of the design complies with the agreed upon plan. For example, did sufficient willow plantings survive? Is there an acceptable grass cover per square acre? These questions of adequacy are presently answered as "judgement calls" made in the field by agency personnel without standard compliance or performance criteria. It would be to everyones advantage to have what constitutes compliance resolved during the development of the ECR & A program or at least at the time of ECR & A plan approval, certainly not after.

1.2 FEDERAL AND STATE AGENCY INVOLVEMENT

A discussion of specific agency involvement in ECR & A is presented on the following pages. The Federal Inspector's Office and the State Pipeline Coordinator's Office are not included. The stipulations that will define the regulatory powers of these two offices have not been finalized nor have the final decisions yet been made as to how these offices will function in relation to the other regulatory agencies.

Local governments (i.e. North Slope Borough), Native landowners, other private land owners and military land owners were not contacted during this Task One

study. ECR & A requirements could be placed upon the project by these various organizations and land owners, however, there do not appear to be any established regulations or guidelines specifically addressing ECR & A.

1.2.1 U.S. BUREAU OF LAND MANAGEMENT (BLM)

BLM's basic authority stems from the Federal Land Policy and Management Act (FLPMA - The Organic Act) and the Mineral Leasing Act. These acts involve the agency in all facets of ECR & A for activities on federal lands. FLPMA specifically directs management on a basis of multiple use and sustained yield to protect scientific, scenic, environmental, air, water resources and provide habitat for fish, wildlife and domestic animals.

The agency becomes involved in ECR & A when land use permits are required for activities on federal lands. The application for these permits must include plans for ECR & A. The permit handling process to be used on the gasline has not been finalized at this time. Tentative plans are for a one window application point. Permits or NTP's for permanent facilities would be handled entirely in the Federal Inspector's staff. Applications for temporary use permits would be reviewed at the District Area Office level of BLM. Environmental Analysis Records (EAR's) would be prepared for each permit application and plans for ECR & A would be evaluated in these EAR's. Again, guidelines for ECR & A are not available and the review of specific plans will be on a case-by-case, individual reviewer basis.

The area of visual resource management (VRM) has been addressed at some length by BLM. (See BLM Manuals 8400 & 8411, Appendices A & B.) Using FLPMA as a basis, BLM is just undertaking a program to evaluate the pipeline corridor for visual resources. Areas within the corridor will be put in any of five Visual Resource Management Classes. These classes are described in Section 8411.6 of the previously mentioned manual. The two most restrictive classes are Class I and Areas of Critical Environmental Concern for Scenic Values (ACEC's). The least restrictive is Class V with Classes II, III, and IV providing incremental relaxation of requirements between I and V. Federal lands in the pipeline corridor from Sagwon to Livengood have been tentatively classified under the VRM program. ACEC's have not been identified as regulations for doing so are still a year or so from finalization.

1.2.2 U. S. ARMY CORPS OF ENGINEERS (COE)

The COE involvement in ECR & A will be through stipulations of conditions included in their permit programs. The permit programs are for Section 10 of the Rivers & Harbors Act of 1899 and Section 404 of the Clean Water Act of 1977. 33 CFR Park 320 covers federal regulatory policies of the COE. Section 320.4 states that no permit will be granted unless it is found to be in the public interest. Among factors to be considered are aesthetics, general environmental values, fish and wildlife values. These allow ample room to address ECR & A concerns in any COE permit.

The Section 10 permits are required for any construction activity in navigable waters and was intended for the protection of navigation. However, the scope of issues addressed in the permit review process and the conditions attached to these permits has been as exhaustive as the areas of interest of the many state, federal and private reviewers. The U.S. Fish and Wildlife Service intends to use this mechanism for insuring that ECR & A is adequately covered.

During the construction of TAPS, the COE used the Pipeline Authorization Act as a basis for limiting comments on Section 10 permits to matters pertaining to navigation only. This approach does not appear likely for the gas line although no final determination has been made at this time.

The Corps has prepared a list of the navigable rivers that may be impinged upon by the gasline. This list is attached as Appendix C.

Section 404 permits are required for the discharge of dredged or fill material to navigable waters. In this case, navigable waters includes tributaries of navigable waters up to the headwaters and wetlands. The list provided in Appendix C does not include those waters requiring permits under Section 404.

The most interesting aspect of Section 404 is the provision of National permits for certain activities. The gasline is presently permitted under this provision in 33 CFR 323.4-3(a)(1). Management practices are listed in 33 CFR 323.4-3(5)(b)(c) with erosion control specified as one of the requirements.

Again, ECR & A requirements would be based on the permit stipulations and conditions of the COE and the reviewing agencies and no guidelines are apparently available. The permit stipulations would vary from agency to agency and the interests and experience of the reviewing officials within each agency.

These permits are required regardless of land jurisdiction or ownership any time the definitions of navigable waters, etc., apply. They apply to all project activities in the defined areas. New regulations are expected within the next six months - primarily increasing the number of national permits.

1.2.3 U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Any direct regulatory power that EPA has in ECR & A would be for erosion or erosion control and would stem from Section 402 of the Clean Water Act. This section requires a permit to discharge pollutants to navigable waters and EPA's authority is based on enforcing the effluent limitations contained in the permit. Permits are not required, however, for non-point sources of pollutants; and since erosional problems by their nature are not point source discharges, permits are not required. Even if these non-point sources result in violation of water quality standards, EPA has no enforcement powers because there are no permit violations. Only if the discharge could be considered as a point source discharge without a permit would the agency be able to undertake any enforcement action.

Traditionally, the agency has attempted to exercise influence in this area by getting stipulations included in permits issued by other regulatory agencies. EPA will have staff in the Federal Pipeline Inspector's office. It is to be expected that EPA's efforts in erosion control will be based upon getting stipulations to protect water quality standards in permits issued by the Inspector's office.

EPA may also become involved in ECR & A in the environmental impact statement (EIS) review process. This involvement is mandated by section 309 of the Clean Air Act. Section 309(a) directs the Administrator of EPA to review

EIS's. Section 309(b) reads, "In the event the Administration determines that any such legislation, action, or regulation is unsatisfactory from the standpoint of public health or welfare or environmental quality, he shall publish his determination and the matter shall be referred to the Council on Environmental Quality." Input through this mechanism would be reflected in the federal stipulations which are still in draft form.

1.2.4 NATIONAL MARINE FISHERIES SERVICE (NMFS)

NMFS direct legal involvement in the gasline would relate to anadromous fish, marine mammals, and endangered species in the marine environment. They will have no permitting requirements in these areas of responsibility that would involve ECR & A. Their primary imput for ECR & A would be through reviewing permits of other federal agencies under the aegis of the Fish and Wildlife Coordination Act. Permit stipulations or conditions could be recommended on the basis of this act.

1.2.5 U. S. FISH & WILDLIFE SERVICE (FWS)

The FWS involvement in ECR & A is primarily in reviewing other federal permits. Their direct authority relates to migratory waterfowl and endangered species and control over wildlife refuges or ranges. The Fish & Wildlife Coordination Act mandates their review of any federal permits required for any aspect of the pipeline project. Various executive orders and memoranda of Understanding (MOU's) with the permitting agencies insure their permit review and consideration. These MOU's spell out the means for resolving conflicts which include involvement all the way to the Washington D.C. level. Their comments and recommended permit conditions or stipulations will be how they address ECR & A.

FWS has very strong and direct controls that would include ECR & A if any activities impact Federal Wildlife Refuges. FWS can require about anything in these areas. Depending on final resolution of the "D-2" issue this may or may not be a factor in the gas line. The two potential areas were described as the Atigun River if the Atigun Gorge is included in the Arctic Wildlife Range and the proposed Tetlin Wildlife Refuge.

1.2.6 ALASKA DEPARTMENT OF FISH & GAME (ADF & G)

ADR & G is involved in regulating ECR & A efforts by direct permitting activities of the agency and through review of NTP's and permits issued by other agencies. Their basic permitting authority is from AS 16.05.870 whereby permits are required for any activity taking place in anadromous fish streams or stream beds or in the tributaries of these anadromous streams if activities in the streams could affect the downstream fishery. This department has also used AS 16.05.840 to extend their regulatory powers to all fish streams - not just those important to anadromous fish.

ADF & G also uses the water quality standards for recommending erosion control requirements. Any ECR & A efforts relating to wildlife are based on the contractural stipulations for the pipeline right-of-way permit - not law. Whether by direct permit or by review, the input to ECR & A is by stipulations

contained in the Department's direct issue permits or by recommended stipulations to permits and NTP's of other agencies or the SPCO. Again, guidelines defining acceptable ECR & A programs are not available.

Application forms are available from ADF & G relating to material sites. They are in the process of developing an application form for water removal and other instream activities to be available in a few months. The material removal application form is attached as Appendix D. Part F of the form requires the submittal of a rehabilitation and restoration plan.

To date, permits have been required under AS 16.05.870 for activities in stream beds. The definition of "stream bed" has been interpreted as between the vegetated banks of the stream. Regulation changes are in process to change this definition to include the area inundated by the 25 year flood. A 30 day lead time is also being proposed for permit applications for "significant" activities. Field permitting on a real time (immediate) basis is expected to continue for the less significant activities.

The list of streams over which ADF & G claims jurisdiction under AS 16.05.870 is presented in Appendix E. Additional streams from Delta to the U.S. - Canadian border are in the process of being identified.

1.2.7 ALASKA DEPARTMENT OF NATURAL RESOURCES (ADNR)

ADNR has direct permitting authority for pipeline right-of-way and other miscellaneous land uses on state lands and is one of the prime state reviewing agencies to see that state pipeline stipulations are met. ECR & A will be addressed in both their permitting and review functions.

The Right-Of-Way Leasing Act specifically directs the Commissioner of ADNR to determine, ". . . whether or not . . . (3) the applicant has the technical and financial capability to take action to the extent reasonably practical to (A) prevent any significant adverse environmental impact, including but not limited to, erosion of the surface of the land and damage to fish and wildlife and their habitat; (B) undertake any necessary restoration or revegetation; . . . " (AS 38.35.120 requires that covenants be included in the lease to cover these areas of concern.

For construction or pre-construction activities requiring temporary land use permits such as material site use that might not be included in a right-of-way permit, ECR & A could be covered by stipulation under such catch-all provisions as are in AS Title 38, Article 4, Disposal of Timber Materials. Section 38.05.120 states in part, "The Director, with the approval of the Commissioner, may impose conditions, limitations and terms which he considers necessary and proper to protect the interests of the state."

The Department has no guidelines to specify what constitutes an acceptable ECR & A program.

1.2.8 ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION (ADEC)

At this time, it appears that ADEC will use the review process to address ECR & A. There appear to be few direct permitting activities for this agency

that would address ECR & A. Material disposal sites would be the one exception. "After the fact" erosion control would be by enforcement of the Alaska Water Quality Standards (Title 18, Alaska Administrative Code, Chapter 70) which are attached in Appendix F.

A final organizational plan for the state pipeline monitoring effort does not exist. ADEC presently sees its most direct involvement in reviewing all state permits, NTP's, etc., required for the project.

Should erosion result in a violation of water quality standards for turbidity or sediment, the Department may issue, in the field, notices of violation and compliance orders to control the erosion. In those areas where erosion is unavoidable and may be anticipated, 18 AAC 70.015 allows the Department to allow a short-term variance from the water quality standards. Depending on whether or not a public notice is issued, requests for variances will take from 30 to 60 days to be cleared or denied by the Department. Requests for variances "must contain the location(s), time, duration, and type of activity requiring the variance; reasons why the activity is required; the geographical extent and quantified degree of variance from the applicable area required; detailed plans of construction or operation techniques proposed; and an estimate of the impact of the activity on the uses of the waters involved, including growth and propagation of fish, shellfish, other aquatic life and wildlife, including sea birds, waterfowl and furbearers. (18 AAC 70.015(c)). Obtaining this information would greatly extend the 30 to 60 day lead time described in the regulations.

1.2.9 ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES (DOTPF)

DOTPF permits are required for access roads connecting to state highways, encroachment onto state highway right-of-ways, for utility crossings of state highways and so forth. The department also is afforded a chance to review permits of other state agencies including the SPCO. A specific interest in ECR & A would be in erosion control where pipeline activities would lead to erosional problems with highways, bridges and so forth.

1.3 ANNOTATED CATALOGUE OF LAWS AND REGULATIONS FOR PERMITTING AGENCIES

Specific laws and regulations of the agencies having significant involvement in ECR & A are presented in this section. Tables are also included to describe agency involvement based on land ownership and by pipeline segment.

1.3.1 U. S. BUREAU OF LAND MANAGEMENT

Basic Authority

Federal Land Policy and Management Act
Mineral Leasing Act

Pertinent Requirements and Regulations

Stipulations for the Alaska Natural Gas Transportation System
BLM Manual Sections 8400 & 8411
43 CFR Part 23 Surface Exploration and Reclamation of Lands

STIPULATIONS

Discussion

It is realized that the stipulations are only in draft form and are to be administered by the Federal Inspector but BLM was heavily involved in developing the draft "stips", therefore, they are included here. Stipulation 1.6.1 requires plans and programs for erosion control, restoration and visual resources in applications for NTP's.

BLM MANUAL SECTIONS 8400 & 8411

Discussion

These manuals are presented in Appendices A & B. They describe the procedures by which visual resources on public lands may be identified, mapped, evaluated, and managed.

BLM is presently evaluating lands under their jurisdiction in the pipeline corridor for visual resource management.

43 CFR PART 23

Discussion

This regulation is included because it was frequently cited during the construction of TAPS for requiring mining plans for material sites. These plans were specifically required to address ECR & A.

1.3.2 U. S. ARMY CORPS OF ENGINEERS

Basic Authority

Rivers and Harbors Act of 1899, Section 10
Clean Water Act, Section 404

Pertinent Regulations

33 CFR Part 320	General Regulatory Policies
33 CFR Part 321	Permits for Dams or Dikes in Navigable Waters of the United States
33 CFR Part 322	Permits for Structures or Work in or Affecting Navigable Waters of the United States
33 CFR Part 323	Permits for Discharges of Dredged or Fill Material into Waters of the United States
40 CFR Park 230	Navigable Waters - Discharge of Dredged Material

Note: See Appendix G entitled Regulatory Program of the Corps of Engineers for the 33 CFR regulations listed above. 40 CFR Part 230 is in Appendix H.

33 CFR Part 320 GENERAL REGULATORY POLICIES

Discussion

Section 320.1 lists activities requiring permits and refers to the applicable procedures of 33 CFR which are listed above. Section 320.1(c) specifically calls attention to the difference between "navigable waters" for purposes of Section 10 permits and "waters of the United States" for Section 404 permits. Section 320.2 lists authorities to issue permits - the two pertinent to this project are the laws listed above. Section 320.3 notes related regulation and 320.3(e) specifically notes the need for consultation with FWS, NMFS and the head of the appropriate state agency exercising administration over the wildlife resources. Section 320.4 lists general policies for evaluating permit applications. Aesthetics, fish and wildlife values and water quality are only a few of the factors listed for consideration to determine if a permit is in the public interest.

33 CFR Part 321 PERMITS FOR DAMS OR DIKES IN NAVIGABLE WATERS OF THE UNITED STATES

Discussion

Permits are required only for dams or dikes that completely span a navigable water of the United States. Navigable waters for the gasline project are listed in Appendix C.

33 CFR Part 322 PERMITS FOR STRUCTURES OR WORK IN OR AFFECTING NAVIGABLE WATERS OF THE UNITED STATES

Discussion

Section 10 and Section 404 (if discharge of dredge or fill material) permits are required for the activities listed in Section 322.2(b) and (c) or when done in navigable waters (see Appendix C). Any pipeline crossing, erosion control structure, material site, etc., in a navigable water would require a permit and ECR & A would be covered from the requirement of the general policies previously described. National permits have been issued but the gasline does not fit any of the categories for Section 10 permits. The District Engineer may issue a general permit for activities similar in nature and that will cause minimal adverse impact when performed spearately or cumulatively.

33 CFR Part 323 PERMITS FOR DISCHARGES OF DREDGE OR FILL MATERIAL INTO WATERS OF THE UNITED STATES

Discussion

Based on Section 404 of the Clean Water Act and the Act's definition of the "waters of the United States", this regulation expands the COE's permitting authority to tributaries of navigable waters and to wet lands. Section 323.2 defines these waters and rigorously interpreted would require Section 404 permits for a very high percentage of the permanent pipeline facilities as well as many of the temporary construction activities.

Section 323.4 gives catagorical 404 permits for various activities. Section 323.4-3(a)(1) grants such a permit for the gasline. Section 10 permits are still required and Section 404 permits would appear to be required for non-permanent facilities and certain construction activities (disposal sites,

access roads, etc.). Erosion control is specified in the conditions attached to the general permit for management practices. ECR & A would also be covered per 33 Part 320 previously discussed.

40 CFR Part 230 NAVIGABLE WATERS - DISCHARGE OF DREDGED MATERIAL

Discussion

These regulations were adopted to provide guidance in evaluating proposed discharges of dredge or fill materials into navigable waters. ECR & A is not mentioned per se but the general considerations of Section 230.5(a)(1-8) are broad enough to allow almost all facets of ECR & A to be considered.

1.3.3 ALASKA DEPARTMENT OF FISH & GAME

Basic Authority

Alaska Statutes, Title 16, Fish & Game

Pertinent Section of Law and Regulations:

Section 16.05.840	Fishway Required
Section 16.05.870	Protection of Fish & Game
Section 16.10.010	Interference with salmon spawning streams and waters
5 AAC 95.010	List of waters important to anadromous fish

16.05.840 FISHWAY REQUIRED

Discussion

Based on this section, ADF & G may require a fishway and a device for efficient passage of downstream migrants for a dam or other obstruction across a stream frequented by salmon or other fish. The requirement is not restricted to anadromous fish as are the requirements of Section 16.05.870.

16.05.870 PROTECTION OF FISH & GAME

Discussion

ADF & G must be notified before any activity can take place in streams or stream beds important to anadromous fish or in tributaries where the activity may cause disturbances that will eventually reach the identified important streams. The stream bed is identified as the area between the vegetated banks of the stream. (NOTE: Proposed regulation would change this to the area covered in a 25 year flood.) ADF & G may require "full plans and specifications for the proper protection of fish and game in connection with the construction or work, or in the connection with the use and the approximate date and the construction, work, or use will begin . . . ". ECR & A is required by ADF & G in these plans.

16.10.010 INTERFERENCE WITH SALMON SPAWNING STREAMS AND WATERS

Discussion

This section is specific for salmon and makes it unlawful to render waters inaccessible or uninhabitable for salmon. A list of prohibited actions are presented which could include turbidity or sediment from erosion. Permits

may be obtained from ADEC if the section of law must be violated.

5 AAC 95.010 LIST OF WATERS IMPORTANT FOR ANADROMOUS FISH

This section of the AAC adopts the list prepared pursuant to AS 16.05.870. A copy of the list for Region 3, which includes the pipeline route, is in Appendix E.

1.3.4 ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Basic Authority: Alaska Statutes, Title 46, Water, Air and Environmental Conservation

Pertinent Regulations: Alaska Administrative Code, Title 18

Chapter 15: Administrative Procedures
Chapter 60: Solid Waste Management
Chapter 70: Water Quality Standards
Chapter 72: Wastewater Disposal

Chapter 72 WASTEWATER DISPOSAL

Discussion

Section .010 of this chapter requires a waste disposal permit for any operation which results in the disposal of wastewater into or upon the waters or the surface of the land. Turbid runoff resulting from the various construction activities may by considered as wastewater. If so, a permit would be required via the procedures listed in Chapter 15.

Chapter 15 ADMINISTRATIVE PROCEDURES

Discussion

Section .020 (d)(3) requires that application for a permit be made 60 days before commencement of the operation for a wastewater discharge permit. A public notice is required with public hearings optional (Sections .050 & .060) but a decision must be made within the 60 day period (Section .080). The department (ADEC) has the discretion to attach terms and conditions to the permit that it considers necessary to insure that all applicable criteria are met (Section .090).

Chapter 70 WATER QUALITY STANDARDS

Discussion

Section .020 establishes protected water uses and criteria. All waters potentially impacted by the project are in the most restrictive classification except for the Chena River downstream of Chena Slough (Section .050). The water quality parameters of concern are turbidity and sediment. The applicable criterion for turbidity states, "Shall not exceed 5 NTU (Nephelometric Turbidity Units) above natural conditions when the natural turbidity is 50 NTU or less, and not have more that 10% increase in turbidity when the natural condition is more than 50 NTU not to exceed a maximum increase of 15 NTU. Shall not exceed 5 NTU over natural conditions for all lake waters."

(Section .020). The applicable criterion for sediment is, "No measurable increase in concentrations of sediment above natural conditions." (Section .020). The applicable criterion for sediment is, "No measurable increase in concentrations of sediment above natural conditions." (Section .020). Section .015 allows the department to allow a short-term variation from the criteria of Section .020 for non-point sources (turbidity or sediment from erosion would generally be considered non-point sources). This section also specifies the information required to apply for a variance and specifies that the department is to reach a decision within 30 to 60 days of receipt of the application. Section .055 provides a procedure for reclassification of particular waters of the state and could provide a means of establishing less stringent criteria than listed above.

Chapter 60 SOLID WASTE MANAGEMENT

Discussion

This chapter is listed only for its peripheral relation to erosion control. Section .020 requires a permit to establish, modify or operate a solid waste disposal facility. Section 130 defines overburden disposal sites as a solid waste disposal facility. Section .030 allows the establishment of operating requirements which could include provisions for erosion control.

1.3.5 ALASKA DEPARTMENT OF NATURAL RESOURCES

Basic Authority

AS 38.05	Article 4, Disposal of Timber and Materials
AS 38.05.330	Permits
AS 38.36	Right-Of-Way Leasing Act

Pertinent Requirements and Regulations

Stipulations
11 AAC, Chapter 76
11 AAC, Chapter 80
11 AAC, Chapter 96

STIPULATIONS

Discussion

These are in draft form and are to be administered by the SPCO. They speak directly to ECR & A.

AS 38.05, Article 4

Discussion

AS 38.05.120 allows the Director to " . . . impose conditions, limitations, and terms which he consideres necessary to protect the interests of the state, "for controacts for material sales. ECR & A would be addressed in these conditions or terms of contract. No specific regulations are available on ECR & A.

AS 38.05.330

Discussion

This section authorizes miscellaneous land use permits and special land use permits that would not be covered in a right-of-way permit. Chapters 76 and 96 are the regulations covering the issuance of such permits. No guidelines or regulations exist for ECR & A and the stipulation or permit condition approach is used.

AS 38.35 Right-of-Way Leasing Act

Discussion

11 AAC, Chapter 80 relates to granting right-of-way for the pipeline project. Stipulations to the right-of-way permit will control ECR & A.

1.3.6 PERMITTING AGENCIES BASED ON LAND OWNERSHIP AND PIPELINE SEGMENT

The permitting agencies for ECR & A by land ownership are presented in Table 1. ADEC is shown as being involved in all areas because all recent national environmental legislation specifically states that all state requirements, both substantive and procedural must be met on federal lands. ADF & G also exercises its regulatory authority regardless of land ownership. The Federal Inspector's Office is not shown. As noted in the table that office may also have authority regardless of land ownership for pipeline integrity.

Listed in Table 2 are the landowners and permitting agencies by pipeline segment. For the reasons stated previously in Section 1.2, requirements of the Boroughs, Native Associations, military agents have not been included in this report.

The permittee should involve the various permitting agencies in the ECR & A effort as early as possible. This involvement would continue from planning through design, permitting and construction.

TABLE 1

Permitting Agencies for ECR & A
by Land Ownership

LAND OWNERSHIP

Agency	North Slope Boro	State of AK	United States	Private	Misc. Boro	FBX NS Boro	Native Assoc.
ADEC	X	X	X	X	X	X	X
ADF & G	X	X	X	X	X	X	X
ADNR		X			X		
BLM(1)			X				
COE	X	X	X	X	X	X	X

(1)BLM is shown having authority for ECR & A only on federal lands. Once the Federal Inspector's Office is established, the authority for erosion control and restoration may be extended for the entire pipeline in relation to the issue of pipeline integrity.

TABLE 2

Land Ownership and Permitting Agencies
by Pipeline Segment

Pipeline Segment	Ownership	Regulatory Agencies
Pump Station 1 to Alignment Sheet #3	North Slope Borough, Selection	ADF & G, COE
A.S. #3 to Sagwon	State of Alaska	ADNR, ADF & G, COE
Sagwon to Wickersham Dome	U.S.	BLM, ADF & G, COE
Wickersham Dome to Murphy Dome Road	State of Alaska	ADNR, ADF & G, COE
Murphy Dome Road to Eielson AFB	85% Private, 15% Misc. Borough	ADF & G, COE, ADNR
Eielson AFB to Chena Lakes	U.S.	BLM, ADF & G, COE
Chena Lakes to French Creek	U.S.	BLM, ADF & G, COE
French Creek to Rosa Creek Pass	State of Alaska (Fairbanks North Slope Borough)	ADNR, ADF & G, COE
Rosa Creek Pass to Tanana River	State of Alaska	ADNR, ADF & G, COE
Tanana River to 2 miles past Clear Water Remington Road	75% Private, 10% U.S., 15% State of Alaska	BLM, ADF & G, COE, ADNR

Table 2 Continued

Pipeline Segment	Ownership	Regulatory Agencies
To Dot Lake	State of Alaska	ADNR, ADF & G, COE
To Robertson River	U.S. (selected by Dot Lake Native)	BLM, ADF & G, COE
To Cathedral Rapids	State of Alaska	ADNR, ADF & G, COE
To Tanacross Airport	U.S. (selected by Tanacross Village)	BLM, ADF & G, COE
To Tok River	State of Alaska	ADNR, ADF & G, COE
To Midway Lake	U.S. (selected by Tetlin Village)	BLM, ADF & G, COE
To Gardner Creek	U.S. (selected by Northway Village)	BLM, ADF & G, COE
To 7 miles east of Gardner Creek	U.S. (State selection pending)	BLM, ADF & G, COE
To U.S. - Canada Border	U.S. (Tetlin Emergency Withdrawal)	BLM, ADF & G, COE

2.0 STANDARD ECR & A PRACTICES

2.1 DEFINITIONS

2.2 TEMPORARY AND PERMANENT EROSION CONTROL

2.3 EROSION AS A PROCESS

2.4 EROSION CONTROL PRACTICES

2.5 RESTORATION

2.6 AESTHETICS

2.0 Discussion on Standard ECR & A Practices

The following narrative contains a general discussion on the subject of ECR & A. The discussion is intended as a review, outlining general background on the "what" of the subject of ECR & A and the "how" insofar as standard ECR & A engineering practices as they may apply to arctic and sub-arctic conditions.

2.1 Definitions

The permittee will be required by Alaska State and Federal regulations and stipulations to construct the gas pipeline in a manner which will minimize on and off-site disturbances of land surfaces and water bodies. These disturbances as a result of site preparation (such as vegetative clearing), earthwork (including cut/fill or embankment construction), pipeline system construction may cause soil erosion problems, siltation of streams, slope instabilities and unacceptable impoundment of water or visual disruption.

Further, the state and federal regulations will require the permittee to include programs as an integral component of the planning, design, construction and operations of the gas pipeline system that will address erosion and sedimentation control, restoration and aesthetics (ECR & A).

The following definitions are intended to serve as the basis for understanding ECR & A practices - the primary topic of this report section discussion.

Erosion

Natural and man-induced process in which land surfaces are worn down, broken up or transported away by moving water, wind, ice, geological movement including the processes of gravitational creep. The following terms are generally used to describe different types of erosion, principally water induced erosion:

Accelerated Erosion: Erosion much more rapid than normal, natural, or geologic erosion, primarily as a result of the influence of the activities of man or, in some cases, of animals or natural catastrophies that expose basè surfaces, for example, fires.

Geological Erosion: The normal or natural erosion caused by geological processes acting over long geologic periods and resulting in the wearing away of mountains, the building up of flood plains, coastal plains, etc. Also called natural erosion.

Gully Erosion: The erosion process whereby water accumulates in narrow channels and, over short periods, removes the soil from this narrow area to considerable depths, ranging from 1 to 2 feet to as much as 75 to 100 feet.

Natural Erosion: Wearing away of the earth's surface by water, ice, or other natural agents under natural environmental conditions of climate, vegetation, geologic process, etc.

Thermal Erosion: Erosion or slope instability caused by exposure of predominately fine-grained, frozen soils with high ice content. Instabilities directly related to the removal of vegetative mat overlying frozen soils or direct exposure as a result of embankment cuts.

Normal Erosion: The gradual erosion of land used by man which does not greatly exceed natural erosion.

Rill Erosion: An erosion process in which numerous small channels only several inches deep are formed; occurs mainly on recently cultivated or bare exposed soils.

Sheet Erosion: The removal of a fairly uniform layer of soil from the land surface by runoff water.

Splash Erosion: The spattering of small soil particles caused by the impact of raindrops on wet soils. The loosened and spattered particles may or may not be subsequently removed by surface runoff.

Sedimentation

The process or action of depositing sediment. Sediment being solid material - both mineral and organic - that is in suspension, is being transported or has been moved from its original site by the action of wind, water, gravity or ice.

Restoration

An often used term having conflicting implications ranging from restoring site conditions as they were prior to construction to returning site to a comparable state to pre-construction conditions but in no way achieving exact replacation of natural conditions. The definition most in keeping with the intent of various government regulations is: the process or returning of construct disturbed sites to a comparable state and in conformity with surrounding land physical features. Restoration activities generally include producing a stable state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values. Time is an important aspect of the restoration process, often involving a long-term time frame.

Aesthetics

The term aesthetics involves construction modifications of natural landscape features to a degree where public concern may be expressed. In considering aesthetics, government agencies (such as the Bureau of Land Management or the U.S. Forest Service) are concerned with maintaining visual resource values of an area by minimizing impact or undesirable modifications of the visual landscape elements.

Visual resource values are the particular physical components of an area that have been identified as having high (or in some cases, moderate) value due to their uniqueness or cultural, historical, recreational, geological or biological significance. Typically, the management or statutory objectives of the government agencies are to protect those land areas identified as high aesthetic values by diverting or modifying elements of construction, or, as a last resort, require application of mitigating measures in instances where constructed related visual impact proves unavoidable.

2.2 The Concept of Temporary and Permanent Erosion Control

Erosion and sediment control measures can be divided into two basic types: Measures applied to resolve long term or reoccurring problems and those installed to resolve short term, often single occurrence situations. The first group of control measures are permanent while the later group are temporary.

Significant differences exist between temporary and permanent erosion and sediment control measures. Although they have similar functions, there are differences in design criteria, design approaches, methods of construction installation, maintenance requirements and cost benefits.

Temporary Measures

Temporary control measures are designed to solve single occurrance problems and are as the name implies, designed to have a short life. Temporary measures, typically, are relied on to function during the length of the construction period, or, in some cases, designed to be replaced - as in the case of revegetation - by permanent measures.

Temporary measures may be only field-expedient control devices used for a matter of days as in the case of sediment control during the construction of a stream crossing. Being short lived measures, they need not be designed to last for many years nor need they be built of highly durable materials. Typically, temporary erosion or sediment control measures require minimal or no maintenance although in specialized cases, depending on design and materials, may receive routine maintenance during their period of use to remain effective as in the cases of straw bale sediment filters or flexible hose let-down structures.

Temporary control measures may have a low initial installation cost but may have high maintenance cost if use continues beyond design life. In summary, temporary erosion and sedimentation control measures are employed to:

1. Solve short lived, single occurrences.
2. Solve problems generally during construction.
3. Provide interim protection or control to be replaced either with a more permanent structure (or construction design as in the case of final grading) or replaced by natural processes such as reinvasion and establishment of native vegetation.
4. Perform a corrective function during an intermediate construction phase, to be eliminated as construction advances.

Permanent Measures

Permanent control measures are designed to solve reoccurring, perrenial erosion or sedimentation problems. The design of these measures are often an integral component of the project such as slope drain, diversion ditch or serrated slope.

Permanent measures are intended to remain in place and continue to function throughout project life (30 years, for example) with minimum maintenance requirements. Often permanent control measures must be constructed of durable materials or, say in the case of constructed embankment, planted with vegetation with a long life span in mind to maintain required slope stability.

Permanent control or design measures may have a high initial construction cost but may result in low maintenance costs. If improperly designed, inappropriately applied or improperly constructed, the long term maintenance or replacement costs can be expected to be high as in the example of improperly placed culverts or inappropriately installed low water crossings.

In summary, permanent erosion and sedimentation control measures are employed to:

1. Solve long term, reoccurring problems.
2. Solve problems considered in the planning and design phases of the project but proved unavoidable by any of the alternate project design alternatives.
3. Be the ultimate design measure and not be replaced.

2.3 The Concept of Erosion as a Process

Erosion and sediment movement and deposition are integral components of a natural cycle in which land forms are built-up, worn down and build-up again. The cycle begins when geologic features are raised by natural forces. The geologic features, that is, the rock components of these features, are broken down into smaller particles through the action of rain, wind, frost plants and animals. These particles are carried away by water runoff, wind and, to some extent, glaciers and landslides. Settling out in lower areas, the particles eventually may be reconsolidated into rock and uplifted to begin the cycle again.

Modifications of slope or increased exposure of soils through construction often results in a large or significant increase in the rate of natural erosion or sedimentation. Clearing of vegetation, stripping of topsoil, placement of embankment, grading or erection of structures very likely alter the natural erosion and sedimentation cycle in a given area - the change being an increase in the rate or speed-up of the natural cycles.

When man's construction activities increase the rate of erosion and sedimentation the effect of this change must be evaluated. Ideally the evaluation process begins at the planning or design stages of a construction project. If the changes identified have the potential of resulting in adverse impacts (both on the surrounding environment or on the project itself), measures must be established and implemented to limit construction induced erosion, ideally at the source.

The control of construction induced erosion and sedimentation is of standard concern to project management and designers of all major projects. This concern is multi-faceted and can be expressed as:

1. Concern for maintaining the design integrity of the system and its parts;
2. Concern for minimizing long-term maintenance costs;
3. Concern for minimizing "spill-over" impacts to adjacent lands or water bodies to a degree unacceptable to the responsible jurisdiction.

There exists laws and statutory guidelines that dictate what are acceptable levels of increased erosion and sedimentation tolerated on land and water bodies under the jurisdiction of the various governmental entities. There are also standard engineering practices involving the control of construction employed to minimize and/or control excessive erosion and sedimentation. The regulatory aspects of erosion control have been discussed earlier in this report. The topic of the following discussion involves engineering practices commonly applied to control erosion and sedimentation. The discussion is not intended to thoroughly review the state-of-the-art of the topic but rather give an overview as to common practices or fairly recent innovative measures.

2.4 Erosion Control Measures and Practices

Erosion and sediment control are different elements of the same problem. With erosion one is attempting to reduce the loss of soil and in some cases stabilize a slope or constructed embankment within a given portion of the project boundary. Sound planning principles (with respect to site and alignment selection) coupled with a good site grading plan will tend to minimize erosion losses.

Sediment control practices are employed in an attempt to prevent or reduce deposition damage on adjacent land or water bodies both on and off the project site. Sediment control practices attempt to trap eroded soil particles which are transported by sheet or concentrated water flows. Thoughtful site selection and good site grading will tend to minimize unacceptable levels of sedimentation.

In both cases of erosion and sedimentation control, the details of project design including delineation of site clearing, earthwork and site grading, all aspects of site preparation for facility construction, road construction material and spoil site development and all other construction activities of a project will, if planned and designed properly, minimize problems of erosion and sedimentation. The ECR & A program primarily addresses those aspects of the project that:

1. Regardless of the planning and design process, unavoidable erosion and sedimentation are predicted to occur and specialized ECR & A measures are planned to be employed.
2. During the course of construction, site conditions encountered or on-site construction decisions are made resulting in unplanned erosion and sedimentation. In these instances, specialized ECR & A measures will be employed as part of a contingency or corrective measure program.

A sound erosion and sedimentation control program can be most effective and cost efficient if the elements of that program are an integral part of the whole construction effort. As an integral part of a construction project, consideration for erosion and sedimentation must occur at:

1. The project planning stage, principally in areas of route selection or facility location where decisions of route and location consider avoidance of land forms and hydrologic features having high risk potential for erosion or sedimentation.
2. The project design stage, principally in areas of clearing limit designation, cut/fill/embankment design, facility alignment where decisions involving facility design consider design solutions that avoid altogether or reduce the opportunity for undesirable erosion or sedimentation.

3. The project construction stage, principally devising procedures and installation features to correct unforseen or unavoidable erosion and sedimentation occurrences.

Planning Practices

Standard engineering practices commonly applied in the project planning stage to avoid or minimize excessive erosion and sedimentation involve consideration of:

1. Soil classification and geologic features
2. Land form, principally topography
3. Hydrologic systems

In the planning stage of a project, decisions pertaining to route selection, material sources or facility location should integrate criteria that to the extent feasible and practical aid in filtering out and avoiding:

1. Soils or geologic features that fall on the upper scale of erosion or sedimentation potential.
2. Landforms, primarily steep topography or landform areas sloping towards water bodies, that would result in more frequent occurrences of increased erosion and sedimentation.
3. Hydrologic systems that are habitat for sensitive or critical biologic species or where water quality is a potential issue.

Design Practices

Standard engineering practices commonly applied in the project design phase to minimize excessive erosion and sedimentation include:

1. Design of mitigating measures to reduce or eliminate erosion/sedimentation. The mitigating measures are actual components of project design, for example, culverts or slope design. The measures are applied where there is an identified potential for erosion to occur and where the site or route location are fixed.
2. Design of corrective measures to reduce, eliminate or control erosion/sedimentation in instances where facility design cannot be altered to accommodate erosion control criteria. Corrective measures can be viewed as after the fact measures, applied to control known or unforseen occurrences of unacceptable levels of erosion and sedimentation.

The basic design components considered in developing erosion/sedimentation control measures include:

1. Slope
    a. Length
    b. Slope angle (percent)
    c. Surface texture
    d. Benching or other modification
    e. Stabilization

2. Cover

    a. Temporary or permaneht
    b. Timing (instantaneous or gradual)
    c. Organic or inorganic
    d. Soil compaction

3. Water flow

    a. Concentrate
    b. Divert
    c. Disperse
    d. Control flow (velocity)
    e. Sediment control

Project Construction

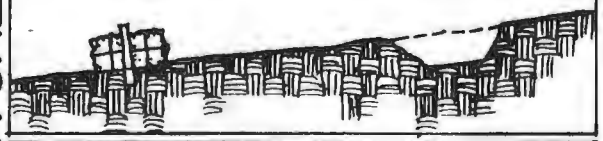
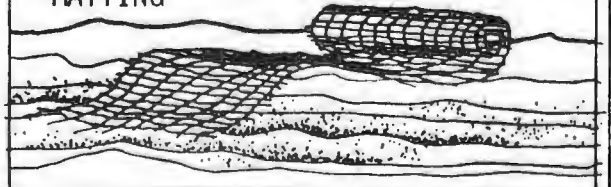
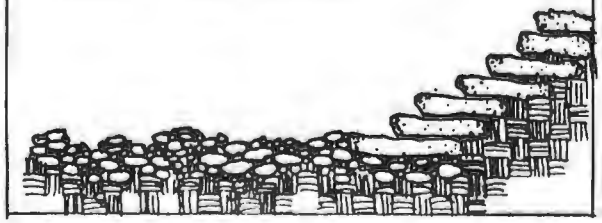
Standard engineering practices commonly executed in the project construction stage include for the most part application of measures developed in the project design phase.

In addition to the installation of planned erosion/sedimentation control measures, other measures may be devised during construction to solve unforseen erosion problems involving design of unique solutions for a specific site or modifications of standard control measures.

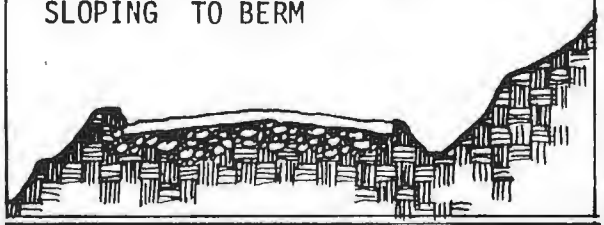
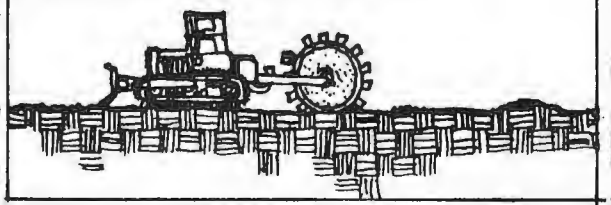
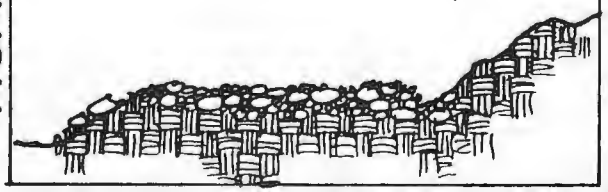
Typical Treatment Practices

The following table summarizes typical erosion/sediment control practices applicable to arctic and sub-arctic conditions. Actual erosion control measures used for any given situation would utilize one or several measures in solving a particular problem.

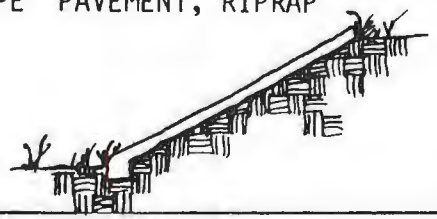
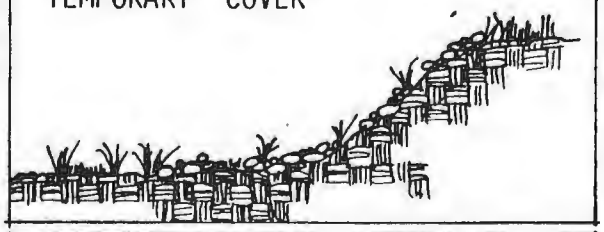
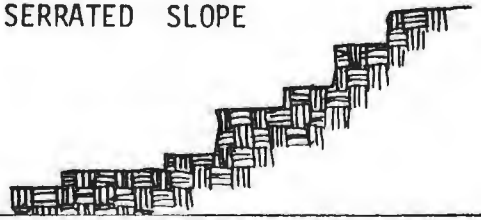
ROADWAY DITCHES

TREATMENT PRACTICE	ADVANTAGES	PROBLEMS
CHECK DAMS 	Maintain low velocities. Catch sediment. Can be constructed of logs, shot rock, lumber, masonry or concrete	Close spacing on steep grades. Require clean-out. Unless keyed at sides and bottom, erosion may occur
STRAW BALES SEDIMENT TRAPS 	Can be located as necessary to collect sediment during const. Clean-out often can be done with on-the-job equipment. Simple to construct	Little direction on spacing & size Sediment disposal may be difficult Specification must include provisions for periodic clean-out. May require seeding, sodding or pavement when removed during final cleanup
SODDING 	Easy to place with a minimum of preparation. Can be repaired during construction. Immediate protection. May be used on sides of paved ditches to provide increased capacity	Requires water during first few weeks. Sod not always available. Will not withstand high velocity or severe abrasion from sediment load
SEEDING WITH MULCH AND MATTING 	Usually least expensive. Effective for ditches with low velocity. Easily placed in small quantities with inexperienced personnel	Will not withstand medium to high velocity
RUBBLE AND RIPRAP 	Effective for higy velocities. May be part of the permanent erosion control effort	Cannot always be placed when needed because of construction traffic and final grading and dressing. Initial cost is high

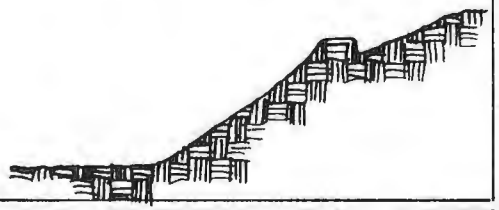
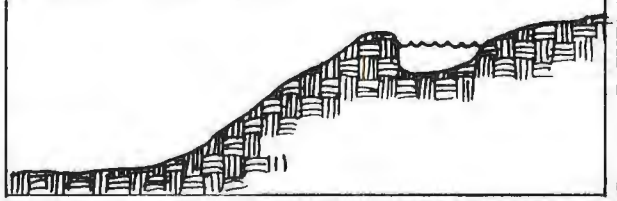
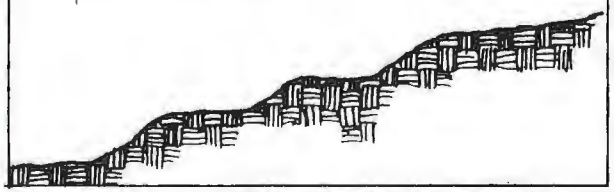
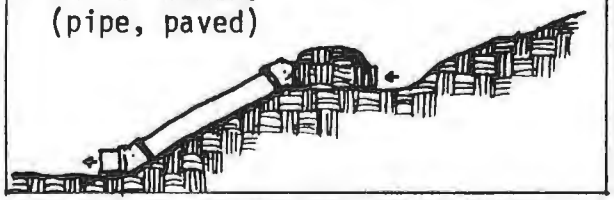
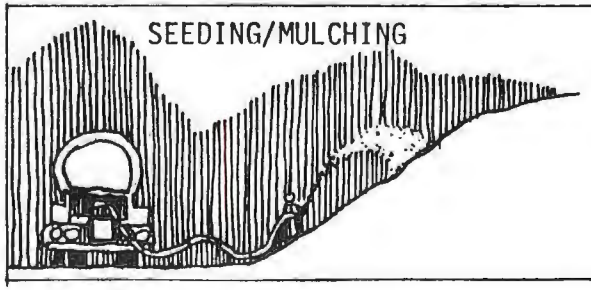
ROADWAY SURFACE

TREATMENT PRACTICE	ADVANTAGES	PROBLEMS
CROWNING TO DITCH OR SLOPING TO BERM 	Directing the surface water to a prepared or protected ditch minimizes erosion	None - should be part of good construction procedures
MECHANINCAL COMPACTION 	The final lift of each day's work should be well compacted and bladed to drain to ditch or berm section. Loose or uncompacted material is more subject to erosion	None - should be part of good construction procedures
AGGREGATE COVER 	Minimizes surface erosion. Permits construction traffic during adverse weather. May be used as part of permanent base construction	Requires reworking and compaction if exposed for long periods of time. Loss of surface aggregates can be anticipated
SEED AND MULCH 	Minimizes surface erosion	Must be removed or is lost when construction of pavement is commenced

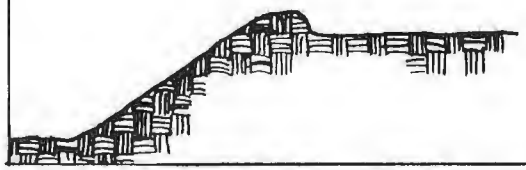
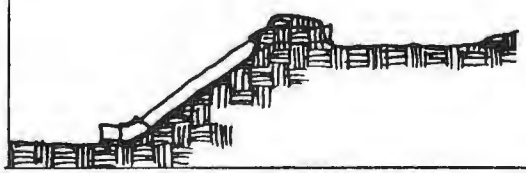
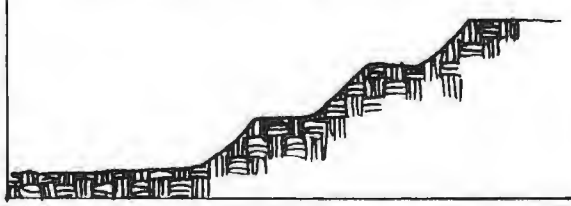
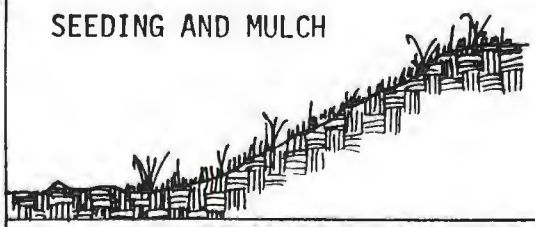
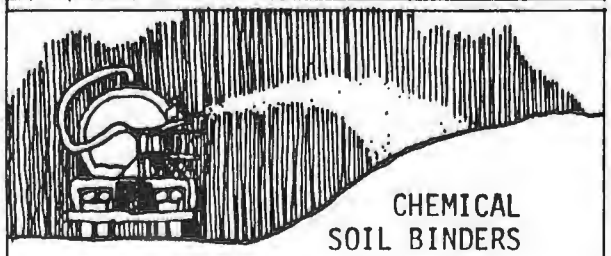
CUT SLOPES

TREATMENT PRACTICE	ADVANTAGES	PROBLEMS
SODDING 	Provides immediate protection. Can be used to protect adjacent property from sediment and turbidity	Difficult to place until cut is complete. Sod not always available. May be expensive
SLOPE PAVEMENT, RIPRAP 	Provides immediate protection for high risk areas and under structures. May be cast in place or off site	Expensive. Difficult to place on high slopes. May be difficult to maintain
TEMPORARY COVER 	Plastics are available in wide rolls and large sheets that may be used to provide temporary protection for cut or fill slopes. Easy to place and remove. Useful to protect high risk areas from temporary erosion	Provides only temporary protection Original surface usually requires additional treatment when plastic is removed. Must be anchored to prevent wind damage
SERRATED SLOPE 	Lowers velocity of surface runoff. Collects sediment. Holds moisture. Minimizes amount of sediment reaching roadside ditch	May cause minor sloughing if water infiltrates. Construction compliance
PLANT WOODY NATIVE VEGETATION 	May produce quick, effective cover having long-term qualities. May prove cost effective. Helps to meet aesthetic objectives.	May require watering maintenance to establish in "dry years". Depending on species may have a short planting window.

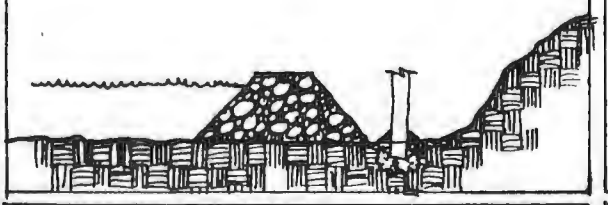
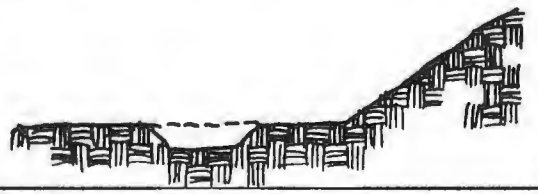
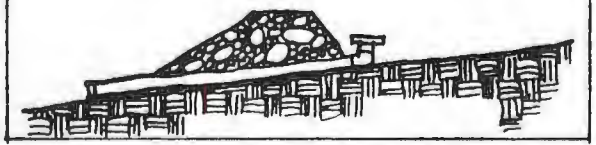
CUT SLOPES cont.

TREATMENT PRACTICE	ADVANTAGES	PROBLEMS
BERM @ TOP OF CUT 	Diverts water from cut. Collects water for slope drains/paved ditches. May be constructed before grading is started	Access to top of cut. Difficult to build on steep natural slope or rock surface. Concentrates water & may require channel protection or energy dissipation devices. Can cause water to enter ground, resulting in sloughing of the cut slope
DIVERSION DIKE 	Collects and diverts water at a location selected to reduce erosion potential. May be incorporated in the permanent project drainage	Access for construction. May be continuing maintenance problem if not paved or protected. Disturbed material or berm is easily eroded
SLOPE BENCHES 	Slows velocity of surface runoff. Collects sediment. Provides access to slope for seeding, mulching, and maintenance. Collects water for slope drains or may divert water to natural ground	May cause sloughing of slopes if water infiltrates. Requires additional ROW. Not always possible due to rotten material, etc. Requires maintenance to be effective. Increases excavation quantities.
SLOPE DRAINS (pipe, paved) 	Prevents erosion on the slope. Can be temporary or part of permanent construction. Can be constructed or extended as grading progresses	Requires supporting effort to collect water. Permanent construction is not always compatible with other project work. Usually requires some type of energy dissipation
SEEDING/MULCHING 	The end objective is to have a completely grassed slope. Early placement is a step in this dir. The mulch provides temp. erosion protection until grass is rooted. Temp. or permanent seeding may be used. Mulch should be anchored.	Diff. to schedule high prod. units for small increments. Time of year may be less desirable. May require supplemental water. Contractor may perform this operation with untrained personnel and inadequate equipment if stage seeding is required

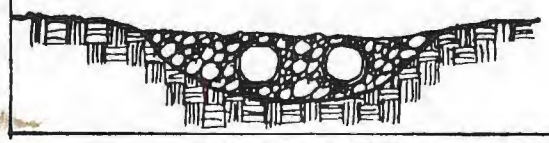
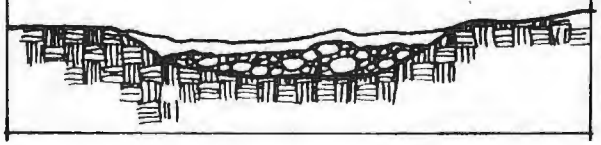
FILL SLOPES

TREATMENT PRACTICE	ADVANTAGES	PROBLEMS
BERM AT TOP OF FILL EMBANKMENT 	Prevent runoff from embankment surface from flowing over face of fil Collect runoff for slope drains or protected ditch. Can be placed as a part of the normal construction operation and incorporated into fill or shoulders	Cooperation of construction operators to place final lifts at edge for shaping into berm. Failure to compact outside lift when work is resumed. Sediment buildup and berm failure
SLOPE DRAINS 	Prevent fill slope erosion caused by embankment surface runoff. Can be constructed of full or half section pipe, bituminous, metal, concrete, plastic, or other waterproof mat. Can be extended as const. progresses. Temp. or perm.	Permanent construction as needed may not be considered desirable by contractor. Removal of temporary drains may disturb growing vegetation. Energy dissipation devices are required at the outlets
FILL BERMS OR BENCHES 	Slows velocity of slope runoff. Collects sediment. Provides access for maintenance. Collects water for slope drains. May utilize waste	Requires additional fill material if waste is not available. May cause sloughing. Additional ROW may be needed
SEEDING AND MULCH 	Timely application of mulch and seeding decreases the period a slope is subject to severe erosion. Mulch that is cut in or otherwise anchored will collect sediment. The furrows made will also hold water and sediment	Seeding season may not be favorable. Not 100% effective in preventing erosion. Watering may be necessary. Steep slopes or locations with low velocities may require supplemental treatment
 CHEMICAL SOIL BINDERS	Temporary measure to stablize soils at slope surface. Cost effective treatment.	REQUIRES SPECIALIZED EQUIPMENT and special storage and handling procedures.

PROTECTION OF STREAM

TREATMENT PRACTICE	ADVANTAGES	PROBLEMS
CONSTRUCTION DIKE 	Permits work to continue during normal stream stages. Controlled flooding can be accomplished during periods of inactivity	Usually requires pumping of work-site water into sediment pond. Subject to erosion from stream and from direct rainfall on dike
SEDIMENT TRAP 	Collect much of the sediment spill from fill slopes and storm drain ditches. Inexpensive. Can be cleaned and expanded to meet need	Do not eliminate all sediment and turbidity. Space is not always available. Must be removed (usually)
SEDIMENT PONDS 	Can be designed to handle large volumes of flow. Both sediment and turbidity are removed. May be incorporated into permanent erosion control plan	Require prior planning, additional ROW and/or flow easement. If removal is necessary, can present a major effort during final construction stage. Clean-out volumes can be large. Access for clean-out not always convenient
TEMPORARY STREAM CHANNEL DIVERSION 	Prepared channel keeps normal flows away from construction	New channel usually will require protection. Stream must be returned to old channel and temporary channel refilled
RIPRAP OR SACKED SAND 	Sacked sand with cement or stone easy to stockpile and place. Can be installed in increments as needed	Expensive.

PROTECTION OF STREAM cont.

TREATMENT PRACTICE	ADVANTAGES	PROBLEMS
TEMPORARY/PERMANENT CULVERT 	Eliminate stream turbulence and turbidity. Provide unobstructed passage for fish and other water life. Capacity for normal flow can be provided with storm water flowing over the roadway	Space not always available without conflicting with permanent structure work. May be expensive, especially for larger sizes of pipe. Subject to washout
LOW WATER CROSSING 	Minimizes stream turbidity. Inexpensive. May also serve as ditch check or sediment trap	May not be fordable during rainstorms. During periods of low flow, passage of fish may be blocked

NOTE: The above table is an adaption taken from the Highway Research Board, "National Cooperative Highway Research Program Synthesis of Highway Practice No. 18. Erosion Control on Highway Construction," Division of Engineering, National Research Council, National Academy of Sciences - National Academy of Engineering, (1973).

2.5 Restoration

2.5.1 Background

Restoration in itself may not be considered a discrete program. For purposes of this report, restoration has been defined as a set of treatment measures applied to solve non-engineering problems. This definition is different to say erosion control where measures are designed and installed to solve technical problems or even incorporated as part of an engineering solution.

Where specific geographic locations or specific resources are deemed of high or critical value for particular natural systems or man-made element - as defined by a government body - the permittee may be required to execute a site specific restoration plan in an attempt to restore (to whatever extent feasible and practical) land resources critical to the resource value in question. Examples of restoration activities that might require execution of a restoration plan include:

1. Re-establish wildlife habitat such as critical moose habitat. Restoration here would involve the planting of woody plant species indigenous to the particular location.
2. Re-establish landforms and vegetative cover of a construction disturbed site clocated in a federal or state park or management reserve.
3. Restore land and vegetative cover as part of a ROW agreement with a local government jurisdiction or private individual.
4. Re-establish landforms and vegetative cover at locations considered having high visual resource values.
5. Re-establish landforms, vegetative cover, drainage patterns or other physical features inadvertantly disturbed (physically modified) during construction to meet a non-compliance request issued by a government surveilance officer.

2.5.2 Restoration Practices

Restoration plans designed to mitigate specific resource value problems or to meet ROW agreement conditions generally utilize treatment measures established for both erosion control and aesthetic programs. Restoration plans may include measures involving:

1. Earthwork grading
2. Establish vegetative cover such as grass, herbaceous or woody plants
3. Embankment or spoil removal
4. Specialized treatment of constructed elements such as placement of rock material, altering vegetative clearing boundaries or applying selected paint colors.

The element of time must be considered a very significant component of any restoration effort. Generally it is neither feasible nor cost effective to achieve total restoration to pre-construction conditions within a short time frame. Site conditions are usually so altered that achieving instantaneous restoration is not possible particularly under the already

environmentally stressed conditions existing in the arctic.

Nature has an amazing capacity to heal - witness the re-establishment of vegetation after natural events such as fire, landslides and flooding. This ability to heal is equally evident under arctic and sub-arctic conditions. The most cost effective restoration program will, in essence, attempt to assist nature in re-establishing the disturbed vegetation by various methods that could include improving the soil seed bed or creating an environment more hospitable for native plant establishment.

2.6 Aesthetics

The subject of aesthetics is a complex subject considered by those unfamiliar with the area as somewhat subjective. There now exist procedures developed by several land management agencies, most notably the U.S. Forest Service and the Bureau of Land Management, for identifying and quantifying aesthetic values of resource areas under their management jurisdiction. As discussed in Section 1.0 of this report, there exist several references to federal regulations indicating a necessity to protect aesthetic values on government lands.

An aesthetics program typically consists of two separate components:

1. Procedures and techniques for identifying areas or locations of aesthetic or visual value.

2. Methods and procedures for mitigating unavoidable construction caused disturbances of identified areas having aesthetic value. The following is a discussion of each of these component areas.

2.6.1 Aesthetics: Visual Assessment Procedures

Ultimately an execution program must be developed to mitigate identified disturbances of highly visible areas valued for their intrinsic aesthetic qualities. In the case of the TAPS project, there were numerous locations identified by both federal and state agencies requiring extensive restoration measures including re-grading constructed slopes and planting of large native trees. Under the TAPS project, a priority rating system was never established which in the end proved very costly to the TAPS owners. Each site was treated equally, given an equal level of treatment.

In developing a creditable and cost effective program, it is recommended that a priority rating system be established and systematically applied in identifying locations of visual impact. The system should also incorporate a device for establishing priority locations with the intent of installing a high level of restoration (aesthetics) treatment for high priority areas, moderate treatment for moderate priority areas and minimal treatment for areas identified as low priority.

The system developed by BLM called The Visual Resource Management System (VRM) should be given serious consideration as the methodology to employ on the NAPLINE project. The following is a brief discussion outlining basic visual resource assessment concepts.

Numerous approaches for identifying visual impact have been developed and applied on a range of projects to date. The approaches vary considerably both in procedures followed, criteria applied, methods of evaluation and product goals. The wide variation is as much influenced by project design and construction requirements as the landscape setting as viewed by the subjective eyes of the observer (project consultant or staff).

In attempting to comprehend the essence of the many visual assessment approaches that have been used, a detailed evaluation of the various approaches reveals that they sort out into two basic schemes. The first approach emphasizes identifying areas of intrinsic beauty or environmental value and areas exhibiting high sensitivity to visual modification. This approach is generally used on projects where project location has not been set so that the approaches for visual assessment are geared toward exploring alternate project locations or routes. By exploring alternate routes, the approaches attempt to recommend locations that minimize visual impact by avoiding highly scenic areas and locations of high visual sensitivity.

The second set of visual assessment procedures follow a scheme of identifying occurrences of visual impact where project location or route have been established previously by others. The procedure of visual assessment when project location is given can be characterized as a process of establishing locational occurrences of project visibility by applying a set of criteria that establish what will be considered visible, degree of visibility and which sites will be considered for corrective treatment.

The significant difference between approaches One and Two is that the solutions of Approach One can be preventative in nature (avoid impact altogether) while in the second approach the solutions are generally corrective. Also, in the first approach the option of alternative locations to reduce visual impact is a viable solution whereas in Approach Two the option of alternative project location is not generally feasible as locational decisions have been fixed to maximize non-visual criteria.

Any visual assessment process should be designed to meet the following considerations in order to adequately respond to government requirements as well as protect the permittee:

1. An assessment procedure that would result in obtaining reliably accurate and defendable statements on what has been evaluated to be visually impact sensitive and what is not visually sensitive.

2. An assessment procedure that is standardized so as to attain consistent results given that a number of people coming from varied landscape environments, hence, individual and somewhat regionally slanted values, would participate in the assessment program.

3. An assessment process that not only points out problems (visual impact) but also is capable of indicating solutions (ameliorative action).

2.6.2 Aesthetics: Mitigation Concepts

The following concepts reflect the nature or spirit of mitigation measures available. In general, solution recommendations should be made based on the concept of attempting to achieve as close a state of site rehabilitation as possible.

1. Not Attempting to Make a Garden of the Pipeline:

   Solutions recommended for reducing visual impact should not be made with the idea of achieving well manicured, garden results. Site rehabilitation is achieved by implementing a set of prescribed actions that are designed to echo or complement patterns of vegetation and forms of topography characteristic of the site in question. More simply, solutions recommended to correct assessed visual impact will be made attempting to work with elements at a site rather than imposing foreign or ornamental features that in the end will tend to draw further attention to visually sensitive conditions.

2. Amelioration is Not Synonomous With Trying to Hide:

   The dictionary definition of amelioration is the process of making better. In an over-simplified sense, the solutions recommended to correct visible impact conditions should endeavor to improve construction modified portions of the landscape visible to the public. To make better does not mean to hide. Amelioration recommendations may, in selected areas, mean establish a program to screen out views of visible construction activity where screening is appropriate (but is not appropriate on the open, treeless north-slope landscape) and is the most direct, least costly solution.

   The majority of amelioratory activity should focus on reducing those aspects of construction that are visible and objectionable. This would be done by softening sharp contrasts and helping to blend construction; make it "fit" better, with the surrounding landscape through the easing of geometrically constructed slopes, redistributing spoil material, planting bare, cleared slopes with vegetation.

3. Basis for Amelioration Solution Selection:

The procedure developed for assessing visual impact should be designed to sort out the number of sites visible from the road into categories of low, moderate and high visual impact. These category designations imply not only severity of impact, but also relative degree of committment in terms of dollars to be spent or level of attention to be given in order to correct assessed visual impact problems.

The mitigating measures recommended would eminate out of on-site field analysis. This analysis would consist of determining what actions can be utilized to reduce or completely resolve a specific set of visual circumstances at a particular location. If planting a row of twelve trees across a clearing will block views, a row of trees should be recommended. The most effective, practical and cost effective solution should be chosen. If trees will do the job and meet cost effectiveness criteria, then a row of trees should be recommended.

Combining visual impact level with field determined, corrective measures yields an amelioration program in terms of areas to be treated, materials to be used and material quantities. The first component of the equation - field recommendations - indicates class of corrective measure (screen, ease slopes, plant cleared slopes). The second component - visual impact - indicates realitive dollar level committment. Translating the equation tells us for a given site with a low level impact designation the quantity and level of treatment to rehabilitate a cleared slope should be low. This means that instead of planting nursery grown plant materials on five foot centers, cuttings of the same plant species should be used spaced on seven or eight foot centers. The first alternate (using nursery grown plants) would provide instant rehabilitation, but because the site falls under a low priority concern, the second alternate solution (using cuttings) should be recommended. If the site were assessed as a high impact area, then the nursery stock should be recommended.

Besides cost, the difference between the high and low solutions above is time. Using the higher cost nursery stock alternative, site rehabilitation will be realized much sooner than the lower cost alternative. The hoped for, designed effect to be achieved in both cases is to bring the cleared slopes back to as close to the original condition as practical. However, in the case of the cuttings, it would take from 10 to 15 years to attain the desired effect whereas using nursery stock the effect would be realized in 5 to 7 years.

4. Use of Natives:

   Native plant species indigenous to each site location should be recommended where planting is required. The use of ornamental or non-native trees and shrubs should not be used due to the added cost of transporting them in addition to the questions of reliability and maintaining environmental integrity.

   The use of natives is based on the concept that native species are proven choices from the standpoint of survival and adaptability. Natives are specifically suited to the climatic and soil conditions at proposed planting locations thus insuring a high degree of take.

   In general, the species selected should correspond to those plants referred to as early successional species. These plants typically are found to be the first plants to pioneer naturally in areas where fire, landslides or flooding have occurred. As most areas to be planted will have been cleared, stripped of organics, possibly filled over with gravel or cut down to rock surfaces, the vegetation that occurs in undisturbed, adjacent areas will not necessarily adapt to the construction modified conditions.

   For example, at highway cuts and fills in areas where spruce is the dominant species, willow, alder or balsam poplar can be seen gradually providing a vegetative cover after a few years.

5. We Can't Always Do Something:

   On occasion there will be locations that will not lend themselves to accommodate a visual restoration solution. Conventional mitigating measures may not be appropriate due to unique site factors such as vegetative, topographic or climatic conditions.

   As case in point occurs on the north slope where exposed, highly visible gently rolling slopes covered with low growing tundra type vegetation conditions exist. Under these conditions certain conventional solutions may not be appropriate or effective. Solutions such as attempting to screen construction disturbances are not viable alternatives as they would result in bringing more attention to themselves because they would be a foreign element in the landscape.

Ultimately, VIE amelioration recommendations will be made after a detailed evaluation of field assessment data, together with information collected from other sources is completed. Field assessment will result in tentative solutions by impact category type. Final design solutions will require superimposing field data over scaled, base map and cross section drawings. Amelioration treatment will be corrective in nature, directed towards providing economically sensible and environmentally sound solutions for specific visual problems assessed.

2.6.3 Aesthetics Program: Framework

Figure 2.6.3, Aesthetics Decision Matrix provides an overview of the key decision making elements of an aesthetics program. The matrix has been set up using decisions related to material sites to demonstrate the areas project management must consider in making decisions regarding aesthetics.

The major subject headings of the matrix suggest the types of tools, program objectives and potential design criteria that would respond to governmental concerns and still meet overall NAPLINE project objectives. The headings include:

1. Planning Element:

   This heading refers to activities commonly included in the life of a project from route selection to on-line operations.

2. Management Tools:

   This heading lists the types of information and tools that would be required by project staff to provide background for decision formulation.

3. Management Objectives:

   The entries under this heading summarizes guidelines for use in the planning, design and operation of material extraction project.

4. Evaluative Criteria:

   The entries under this heading highlight criteria to be used in evaluating conditions for each phase of project activity.

PLANNING ELEMENT	MANAGEMENT TOOLS	MANAGEMENT OBJECTIVES	EVALUATIVE CRITERIA
C. Clearing Limits	a,b,c,d	a,b,c,d,e,f i. Longest boundary to be oriented perpendicular to viewer line-of-sight j. Scalloped clearing edges following non-geometric lines k. Leave islands of vegetation to break-up, large bare expanses l. Clear only as aliquot are to be worked	a. Vegetative clearning edges no greater than 300 ft. b. Avoid 90 degree angles on vegetative clearing edges
3. Operation			
A. Aliquot Schedule	a. Topography maps b. Vegetation maps c. Viewsheds from points of public access Scale: 1" = 100 ft.	a. Beginning aliquot at toe of slope, work up slope b. Beginning aliquot located behind natural buffers	
B. Spoil Disposal	a,b,c d. Terrain profiles	a,b c. Maintain low berm profile d. Avoid long berms e. Place berms to conform to terrain f. Avoid stripping overburden of areas not to be mined	a. Avoid berms greater than 300 ft. in one dimension b. Berm slopes at 3:1
C Material Processing	a,b,c	b,c,d	

F I G U R E 2.6.3

AESTHETICS DECISION MATRIX

PLANNING ELEMENT	MANAGEMENT TOOLS	MANAGEMENT OBJECTIVES	EVALUATIVE CRITERIA
1. Site Selection	a. Resource inventory maps b. Viewshed from points of public access c. Land use maps, scale: 1" = 1 mile	a. Locate in areas remote to public access and view b. Locate in areas of existing land use where disturbances already exist c. Avoid areas of high aesthetic value	a. Locate greater than 2 miles from public view b. View duration less than 15 seconds
2. Site Boundary Definition			
A. Aliquot Location	a. Topography maps b. Vegetation maps c. Air photography d. Viewsheds from points of public access Scale: 1" = 200'	a. Locate behind natural buffer features b. Conform to existing topography and vegetation patterns c. Parallel flood plain channel geometry d. Parallel vegetation, follow vegetation edges or along eco-tone of two or more vegetation types	a. Locate so view is level or inferior. Avoid birds-eye views b. Avoid transects across multi-vegetation types or topography
B. Access Road Location	a,b,c,d	a,b,c,d e. Parallel - Topographic controus f. Avoid cutting across ridges g. Road alignment should not lead eye to mining site h. Road should be seen as segments not in its entirety	a. Straight-line segments no greater than 500 ft.

PLANNING ELEMENT	MANAGEMENT TOOLS	MANAGEMENT OBJECTIVES	EVALUATIVE CRITERIA
4. Site Closeout and Restoration	a. As-built air photography b. Profiles and cross-sections, scale: 1" = 100 ft.		
A. Earthwork	a,b	a. Spread or remove stockpiled material to conform to existing topography b. Pull back cut slopes to conform to surrounding topography c. Grade rough, no smooth slopes d. Leave surfaces friable	a. Leave slopes at 3:1 or similar to surrounding, undisturbed slopes
B. Planting	a,b c. On-site soil/water/sunlight evaluation, assess horticultural conditions for use in developing planting program	e. Plant in areas to break up bare, exposed slopes f. Plant to establish buffer screens g. Plant in areas previously vegetated as practical h. Plant native vegetation representing typical early successional species in area	