



ALASKA SEGMENT

ALASKA NATURAL GAS TRANSPORTATION SYSTEM

Alaskan Northwest Natural Gas
Transportation Company

In Response to
The U.S. Department of Interior Stipulations
for Alaska
Part 1.6.1

PLAN NO. 17

RESTORATION

ALASKAN NORTHWEST NATURAL GAS TRANSPORTATION COMPANY

August, 1982

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1.0 SCOPE

1.1 INTRODUCTION

This Plan¹ describes the criteria and methodology of the restoration program for the Alaska segment of the Alaska Natural Gas Transportation System (ANGTS*), including the Alaska Gas Conditioning Facility (AGCF), and the Pipeline facilities. Restoration will occur during preconstruction design/data gathering, construction, operation, and termination phases of the project. Restoration is closely connected with erosion control, both thermal and hydraulic, as well as mitigation of visual impacts resulting from the project. It relies upon physical, chemical, and biological methods for insuring surface stabilization and for maximizing natural succession potential on terrestrial areas disturbed in the course of the project. Therefore, basic cleanup will be performed immediately following construction and initial restoration will then be accomplished. Section 12, Restoration of the Pipeline, Design Criteria Manual describes the criteria for the selection and design of restoration treatment to be applied for the pipeline portion of the project. The restoration section in the Pipeline Design Criteria Manual is intended to guide the designer through a series of steps by which preliminary restoration treatment can be selected during final design. Although the requirements are minimal, restoration treatment for the AGCF is covered by this plan.

1.2 OBJECTIVES

Restoration strategies and methods require flexibility in order to succeed under the diverse environmental conditions found along the Alaska Segment. They must be able to accommodate short notice design (field modifications) to alleviate unforeseen problem areas such as thermally unstable soils. These conditions necessitate the wide use of qualitative methods such as visual inspection to assess sites and to determine success.

Pipeline restoration activities will begin immediately as construction is completed. As cleanup of the Right-of-Way and other sites occurs, grading and initial restoration activities will proceed. Depending on the season and as later discussed, final restoration activities will be initiated or deferred.

Construction activities at the AGCF site differ significantly from those employed on the pipeline. AGCF construction activities

*Hereafter referred to as "the Alaska Segment."

¹For Pipeline, in conjunction with the Pipeline Design Criteria Manual.

will normally be performed on gravel pads. Occasional access to tundra will only be necessary, subject to prior approval of the State of Alaska. Restoration efforts at the AGCF will be directed at mitigation of the effects of intermittent localized damage to the tundra caused by accidental vehicular travel outside the designated work areas or off gravel roads and construction pads.

Restoration planning for terrestrial habitats, both upland and riparian includes, but is not necessarily limited to, workpad, pipeline ditch, access roads, material sites, disposal sites, storage yards, compressor stations, the AGCF, mainline valve sites, camps and unanticipated disturbances.

- o All temporary disturbances are to be restored, with priority given to restoration of material sites.
- o Restoration treatments are applied only after site surface stability is achieved.
- o Restoration treatment design may undergo site-specific modification if required by changed field conditions.
- o Restoration treatment for AGCF temporary facilities is addressed herein.
- o Restoration treatment for pipeline camp facilities is addressed in Pipeline 1.6.1 Plan 3 - Camps.
- o Permanent facilities needed for operation as well as termination of the Alaska Segment will not be addressed in this plan.

Restoration treatments will promote one or more of the following goals:

- o Encourage reestablishment of native plant communities via appropriate measures such as the optimization of the substrate for supporting plant growth.
- o Provide biological stabilization to supplement engineering stability measures in order to prevent or control thermal, hydraulic, and wind erosion of disturbed soils.
- o Mitigation of adverse visual impact.
- o Protect or rehabilitate wildlife and fishery habitat.

The importance, and hence the priority of these goals will vary according to site conditions, management concerns, and cost/benefit ratios of the restoration techniques required to meet these goals. In some instances a single goal will be pursued while in other cases restoration will seek to promote a plurality of equally important goals.

The primary goal will be to encourage reestablishment of native plant communities. However, this goal will become secondary when severe erosion potential exists, such as a site having steep slopes with fine grained substrates, or where special cases exist, such as areas of high visual impact. Revegetation and restoration alone cannot solve many stability problems. Instead, vegetation acts as a supplemental measure to aid physical techniques in long term thermal, hydraulic and wind stability by building up a litter layer, root structures and organic mat, but this will be a slow process.

2.0 SUMMARY

Restoration relies upon an array of plural treatment strategies of physical, chemical, and biological techniques in order to fulfill criteria as specified by the appropriate statutes, regulations, and stipulations. During restoration planning, disturbed terrestrial areas are first assessed in terms of stability and natural plant succession potential. One or more site specific treatment are then chosen to meet the site conditions.

The general goal will be to encourage reestablishment of native plant communities, but alternative goals include site stabilization, wildlife or fish habitat rehabilitation, and/or reduction of visual impact. These goals may supplement or even supercede native plant reestablishment as determined by site conditions. Treatments will be selected on the basis of goals and site assessments. Routine monitoring during the operations phase of the project will ensure that restored sites continue to meet the success criteria and goals.

3.0 CRITERIA

The following types of documents set forth the legal criteria for restoration on the Pipeline and AGCF, as applicable.

- o Statutes
- o Regulations
- o Stipulations

The pertinent requirements are summarized in the following sections:

3.1 STATUTES

Mineral Mines Leasing Act (Statute 437):
Section 185, rights-of-way for pipelines through Federal land (3USCS185), paragraph "h" requires applicant to submit a plan of construction, operations, and rehabilitation, including requirements for restoration, revegetation, and curtailment of erosion of the surface of the land; and protection of air and water quality standards.

3.2 REGULATIONS

- o Code of Federal Regulations, 43 CFR, Part 23, Surface Exploration, Mining and Reclamation of Lands: This regulation provides for the protection and conservation of nonmineral resources pursuant to the Mineral Leasing Act of February 25, 1920, The Mineral Leasing Act for Acquired Lands, and the Materials Act of 1947.

Upon application for a permit, the district Manager of BLM shall make an examination of the potential effects of exploration or mining on recreational, scenic, historic, and ecological values; the control of erosion, pollution of water, the reclamation by revegetation, replacement of soil, and other protective measures.

Paragraph 23.8(7) of 43 CFR, Part 23, a statement of the manner and time of performance of reclamation of areas disturbed may be required; and, for those areas in which the permit requires revegetation of the area, the mining plan is to show proposed methods of soil preparation and fertilization prior to revegetating; the types and mixtures of vegetative materials to be planted; the methods of planting and the amounts or numbers per acre, or spacing of trees and plants to be planted. (In all cases

where specifics are required, e.g., types and mixtures, such detail will be provided prior to site closeout as presented in the BLM Mineral Material Disposal Policy and Procedure from the Northwest Alaskan Pipeline, September 15, 1982.)

The mining plan shall show, where applicable, a backfilling and grading plan and proposed timing of the work. Following the cessation of operations, the operator shall submit a report indicating the details identifying the site and work completed, including dates and other information as described in the mining plan.

- o Alaska Statutes, 1962 Annotation, Title 38, Public Lands (known generally as the "Alaska Lands Act") Chapter 35, Right-of-Way Leasing Act.

Section 38.35.100, Decision on Application: The Commissioner shall consider whether or not the applicant has the technical and financial capability to take action to the extent reasonable and practical to 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 habitats; and undertake any necessary restoration or revegetation; and protect the interest of individuals living in the areas of the right-of-way who rely on fish, wildlife, and biotic resources of the areas for subsistence purposes.

- o Code of Federal Regulations, Title 18, Section 2.69, Federal Energy Regulating Commission's guidelines for natural gas pipeline right-of-way construction.

3.3 STIPULATIONS

- o The Federal Grant of Right-of-Way for the Pipeline facilities, issued December 1, 1980, details numerous stipulations related to Restoration. It is assumed that similar stipulations will be included in the State of Alaska Right-of-Way lease, but that all stipulations applying to the Pipeline may not necessarily be applicable to the AGCF.

<u>Stipulation</u>	<u>Subject</u>
1.1.18	"Revegetation"
1.3.6	Responsibilities
1.6.1	Design Criteria, Plans and Programs
1.8.2	Quality Assurance and Control

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Subject

1.10.1	Surveillance and Maintenance
2.1.1	Environmental Briefings
2.2.1	Pollution Control
2.3.1	Buffer Strips
2.4	Erosion and Sedimentation Control
2.10.1	Visual Resources
2.12	Restoration

4.0 TREATMENT SELECTION

The initial step in selecting treatments is to identify and prioritize the goals for a particular site. The goals will be based on site type, the projected long term use and upon evaluations made during assessment of site stability (vulnerability to thermal degradation, hydraulic, or wind erosion), visual impact, and importance of wildlife or fish habitat. As previously stated, in most instances the primary goal will be reestablishment of native plant communities and erosion control, but in areas, such as roadside embankments, whose use is to support and protect the traffic surface, priority will be given to alternate goals such as site stability. (For more detail see Pipeline Design Criteria Manual (DCM), Section 12.0, Restoration of the Pipeline.)

Preliminary Pipeline Restoration Plans will be assembled for Execution Contractor bid packages. These plans are necessary to:

- o Determine methods for restoration
- o Determine acreages of revegetation and type of treatment
- o Determine plant material requirements and method of seeding or planting
- o Determine unit cost

An assessment of the post construction ground surface soil properties will be made during site closeouts. As a result of these assessments, some modifications to the Preliminary Pipeline Restoration Plan may be required, i.e., seed mixture or fertilizer type.

Preliminary Pipeline restoration plans will be noted on the "Restoration Drawings" and entered into an automated retrieval system which will be used to aid in uniformity of treatment and measurement of success.

For both the Pipeline and AGCF, after completing site assessment and goal prioritization, treatments for restoration will be selected. A basic level of treatment will be applied to all sites to improve succession potential, see DCM as cited above. Additional treatments will be added to the basic treatment level to meet special goals and site conditions.

On stable sites, treatment will be limited to the basic level. The basic treatment level would consist of final grading, replacing available surface materials, and scarification to provide an optimum surface for seed collection and germination, and to improve substrate conditions for root growth.

Seed and fertilizer mixes will be based upon physiographic region and site specific goals. Although the actual species and rates will be based upon ongoing research, and the results will be

presented in Detailed Restoration Program, the use of native grass species will be maximized. The species with revegetation potential include Poa glauca, Arctagrostis latifolia, and Calamagrostis canadensis. Other adapted species such as boreal or creeping red fescue may be used south of the Yukon River. If feasible, Alsike Aurora clover or native legumes may be added to the seed mix or be seeded individually.

All areas covered by the preliminary restoration plans will require a post-construction assessment to insure that the predicted site conditions are as anticipated and that the plan will result in the proper restoration. Some of the sites may require an updated plan due to changed site conditions. These updated plans will also be entered into the automated retrieval system for measurement of success.

5.0 AGCF RESTORATION OF TEMPORARY FACILITIES SITES

Temporary facilities, in the judgement of NWA not needed for the operation of the AGCF, will be removed after AGCF construction is completed. Aboveground items and structures will be removed from the temporary facilities sites. Piling will be cut off 12 inches below grade and the cutoffs removed. Anchors and deadmen, above and below ground, will be removed.

Aboveground piping, conduits, and tanks will be removed. Buried piping and electrical conduit and cable will be left in place, except it will be cut back to 12 inches below grade. Buried piping will be drained, purged and capped and left in place when it does not interfere with restoration efforts.

Temporary dikes and raised areas will be leveled with the surplus material blended into the surrounding area. Excavations required for the removal of foundations, piling, anchors, deadmen, piping, electrical conduit and cable, and tanks will be filled to avoid ponding of water.

Impermeable liners, such as those in fuel storage containment areas and beneath shop buildings will be removed. Fuel contaminated gravel will be removed to an approved site either on the pad or elsewhere and will be spread to allow open air weathering and biological breakdown of the petroleum.

Gravel pads will be reworked, if necessary, to ensure adequate drainage to outer edges with a minimum of erosion. Edges will be reworked to avoid sharp breaks and shoulders and native grasses may be seeded at the toe of pad. Drainageways and surrounding topography will be monitored to ensure nonerosive flow. Repairs or modifications, as necessary, will be determined at the site.

Disposition of items of commercial value will be made at the time of demobilization and the discretion of NWA. Disposal of nonsalvageable material and equipment will be in accordance with applicable regulations. Gravel pads and concrete slabs will not be removed since they can function as material storage or parking areas.

6.0 SCHEDULING

Restoration activities, material, equipment and labor will be scheduled as far ahead as possible. This will avoid delays and will permit planning so that conflicts can be minimized. Preliminary plans must be written, submitted, and approved by regulatory agencies far enough in advance that procurement of materials and schedules can be modified, if necessary, and still assure adequate lead time to obtain material.

Restoration grading will be undertaken as soon as construction is completed or use of the site is no longer required.

The execution contractors must provide schedules, along with material, equipment and labor requirements, to NWA at least two months prior to the scheduled start of their contractual work. NWA will provide to the execution contractors the seed, cuttings, transplants, fertilizers, mulch and soil stabilizers, if necessary. The execution contractor will provide equipment and labor.

6.1 MATERIALS, EQUIPMENT, AND LABOR

The initial step is to identify the type and amount of materials and equipment required for the treatments selected. Since plant propagation require the longest lead time, any seed, cuttings, or transplants should be identified first so that NWA can be assured that its supply is adequate. NWA will order seed, which requires a minimum of two years lead time, since most northern species cannot be depended upon to produce seed in their initial year of growth. Longer lead times will help to overcome the possibility of periodic crop failures frequently encountered in northern climates. Seed will be specified as certified seed or place of origin will be identified. Transplants will require a minimum of 3-6 months lead time (containerized seedlings would require longer periods of time). Cuttings will need to be planted during the winter prior to a spring program. The origin of transplants and cuttings must be specified as well as the size and, in the case of transplants, the type--bare root, or containerized.

Quantities of other materials, such as fertilizer and mulch, will be identified so that NWA can ensure their availability in Alaska prior to the commencement of the restoration activities.

Equipment for spreading seed, fertilizer, soil stabilizers (if required) and mulch, landscape shaping, scarification, and transplanting should be acquired or otherwise scheduled at least six months prior to restoration. In instances where equipment is also used for civil work, it is imperative that restoration activities such as landscaping be scheduled far enough in advance so

that restoration can proceed on schedule. This is necessary so that the emerging plants can take maximum advantage of the short arctic or subarctic growing season.

Finally, both the type and amount of labor should be scheduled two months or farther in advance so that they are available when needed and so that proper planning can eliminate or at least minimize any conflicts.

6.2 SITE RESTORATION SCHEDULING

As early as possible in the project, general estimates of acreage and types of sites to be restored should be made on a yearly basis.

These estimates should be conservative on the high side. This will insure that adequate supplies, labor, and equipment will be available during each year in the event that unexpected restoration needs arise.

Restoration grading will be undertaken as soon as construction is completed or use of the site is no longer required. Seasonal restoration schedules should insure maximum use of the growing season, take maximum advantage of available moisture, and minimize winterkill. In order to do this, dormant seeding may be used. Dormant seeding can be accomplished after the first killing frost and allows the seed to take full advantage of moisture available during the following spring melt and runoff.

However, care must be taken to insure that seed will not be blown and washed away from the site or otherwise redistributed over the site prior to germination. Rooted transplants should be done after the first hard frost and prior to freeze-up. Maintenance fertilization, if required, should be undertaken as early as possible in the growing season following breakup. Conversely, cuttings are best planted as soon as the ground thaws to a workable depth or later, if scheduling requires, but in any event, prior to freeze-up.

7.0 TREATMENT APPLICATION

Treatments will be done in the following chronological order.

7.1 CIVIL WORK

Any engineering structures should be installed, if required, to stabilize the site. These may include drainage controls such as culverts, rip-rap and so forth. Sites should be contoured for stability to enhance visual resources as well as to aid in erosion/drainage control, which may entail serrated cut slopes. Available stockpiled surface materials will be distributed over disturbed areas and the site scarified to a minimum six inches. Finished grading should result in a rough surface of uncompacted soil which will allow for increased infiltration of water, normally decreases runoff and creates favorable traps for seed and fertilizer.

7.2 REVEGETATION

7.2.1 Temporary Revegetation

When the permanent seeding or transplanting schedule is delayed or outside timing windows, temporary restoration measures to control erosion will be implemented. One or more of the following may be used:

- o Vegetative or commercial mulch
- o Annual seed
- o Check dams
- o Diversion ditches
- o Chemical stabilizers
- o Other acceptable measures

7.2.2 Permanent Revegetation

7.2.2.1 Native Revegetation

The encouragement of native species on stable soil sites is the goal of the revegetation program. Following the grading, cleanup and scarifying procedures on all disturbed areas, except drive lane, fertilizer will be applied and then the surface will be lightly scarified.

Since the disturbed area is typically no more than 50 to 70 feet from the pipeline centerline to several hundred feet at material

sites, there will be a proximal continuous seed source from the adjacent undisturbed vegetation.

7.2.2.2 Seeding

Seed composition and rate of application will be based upon the physiographic region and the site specific goal. Use of native species will be maximized; however, where conditions are such that cover must be achieved quickly, annual grasses and legumes will be added to the seed mixture.

Application of seed will be by broadcasting (aerially or ground application), drill planting, or hydroseeding.

- o Aerial broadcasting of seed will be by a dry dispersion bucket with an electric centerfugal fan type dispersal system or other similar method which assure uniform broadcast. The altitude, windspeed and width of broadcast area will be specified.
- o Ground broadcast application will be by cyclone seeder or similar equipment, either machine operated or hand held.
- o Drill plant will be accomplished with standard or grassland drills. The depth of planting will be based upon site conditions.
- o Hydroseeding may be used to apply appropriate mixture at prescribed rates. Fertilizer and mulch may be included.

7.2.2.3 Fertilizing

Fertilizer rates and types will be specified later, but normally all disturbed sites will be fertilized at a rate of 300 to 600 pounds of NPK fertilizer per acre. On subsurface materials, high nitrogen fertilizers at the higher rates will be used.

When seeding occurs, fertilizers will normally be applied separately and during the same season. However, to promote reestablishment of native plants on sites without seeding, fertilization may be more effective if applied during the second or third. Again, such determinations will be made later.

Application will be aerially (with windspeed restrictions) or by ground application.

7.2.2.4 Mulch

Mulch, either vegetative or manufactured, will be used only where it is required for site specific use or where it can be beneficial

to growth of grass seeds, cuttings or transplants. The application of mulch will normally be applied separately from seed and fertilizer.

7.2.2.5 Scarification

Light scarification of surface will occur following the broadcast application of seed and fertilizer.

7.2.2.6 Cuttings and Transplants

The use of cuttings and transplants for revegetation will be performed as required for erosion control, visual resource or wildlife habitat restoration. Cuttings and transplants can be used in conjunction with or in absence of seeding. Specific methods of planting seedlings, spacing, watering and fertilizing will be determined.

7.2.2.7 Chemical Stabilizer

Approved chemical stabilizers may be used on a limited basis, if required.

8.0 QUALITY ASSURANCE/INSPECTION

All restoration activities in the field as well as procurement, handling and storage of living plant materials will be monitored by Quality Assurance/Inspection. Seed will be verified as to origin, purity, percent germination, and other requirements as stated in the procurement specifications. A certified testing laboratory will do the testing. Similarly, transplants and cuttings, if not collected under direct project supervision, will be verified as to origin and other project specifications.

On site checks by field environmental quality control inspection will be done to verify the timely and accurate execution of restoration plans. This includes correct contouring, adequate depth of ripping, appropriate distribution of organic soil, uniform dispersal of seed, fertilizer, and mulch proper post seeding light scarification, successful germination, and adequate performance of all other activities as described in the restoration plan including restoration success.

9.0 RESTORATION SUCCESS

Restoration success reflect the general project goals to be used on a site specific basis.

On stable soils, the following criteria should be achieved:

- o Growth potential of all stable soils will be site maximized - available surface materials respread over site; a minimum six inches of soil scarified to hold seed, trap moisture, and to increase seedling survival.
- o All sites not requiring active revegetation must show evidence of reinvasion of native species.

On visual impact sites, the following criteria should be met:

- o Greater than 50 percent survival of transplants after three years.
- o Greater than 15 percent cover of seeded native species after three years.

On sites requiring wildlife or fish habitat rehabilitation, growth potential must be maximized, and the following criteria should be met:

- o Greater than 50 percent survival of transplant or cuttings after three years.

On unstable soils (cut slopes with high content of fine materials or sand), the following criteria should apply:

- o On sites requiring active revegetation, there should be at least 15 percent cover of seeded native grasses after three years.
- o Greater than 50 percent vegetative cover (including seed and plantings) on low stability sites after three years or appropriate engineering measures must be judged adequate in controlling stability problems. For example, vertical cut slopes will not easily revegetate but drainage control above them and maintenance of open ditches below should provide stability for these areas.

10.0 MAINTENANCE

Erosion control structures should be properly maintained. Stability controls will be assessed to evaluate effectiveness, especially if visual evidence of thermokarst, mass wasting, (e.g.. slumps and slides, gullies) off site stream siltation, or soil deposits at the base of slopes due to sheet erosion are present at any sites. If thermal degradation, hydraulic, or wind erosion becomes an unexpected problem, remedial restoration measures shall be taken. These will include relandscaping, refertilization, seeding and/or planting, and re-application of mulches as described in the restoration plan until the site is stabilized.

If seeded areas have extremely low germination, corrective measures would be applied. Soil pH should be tested to determine if it is below 4.2 or above 8. Low pH soils should be amended with lime while irrigation or other measures such as sulfur coated fertilizers should be used on high pH sites. If pH is not a problem, the area should be reseeded and/or refertilized.

11.0 REFERENCES

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