Rehabilitation of the Kanuti Pit Materials Site 65-9-031-2 Located at Milepost 105 of the Dalton Highway

2007

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#### **Executive Summary**

The Alaska Plant Materials Center (PMC), in cooperation with the Alaska Department of Transportation and Public Facilities (DOT&PF), has overseen the implementation and monitoring of the revegetation of the approximately 19.5 acre Kanuti pit (material site 65-9-031-2) located at Milepost 105 of the Dalton Highway. Rehabilitation goals for this material site included soil stability, water retention to create wetland habitat, establishment of plant growth, and succession of the site to naturalize with the surrounding landscape. The reclamation effort began in 2002 with site contouring to establish several littoral wetlands and the importation of organic overburden hauled from the Bonanza Creek material site. The effort continued in June 2003 with site preparation work including spreading the organic soil, track walking, and removal of the culvert on the entrance road to eliminate access. Removing the culvert connected two existing wetland areas on the north side of the pit. Seed and fertilizer was applied on July 31, 2003. Performance monitoring site visits were conducted in September 2003, August 2004, August 2005, August 2006, and August 2007. Photo documentation and permanent transects were the monitoring methods employed. Vegetation is established on the site and natural re-invasion of native plant material is occuring. Water catchments are holding water, though some only seasonally.

## Introduction

The approximately 19.5 acre Kanuti Pit (Material Site 65-9-031-2) is located at mile post (MP) 105 on the Dalton Hwy, just south of the Kanuti River, USGS Bettles (B-2) T18N-R14W-Sec. 31&32, Fairbanks Meridian. The pit was initially developed by Alyeska Pipeline Service Company to build the Dalton Highway in the 1970's. Both Alaska Department of Transportation and Public Facilities (ADOT&PF) and Alyeska have used this material site for various projects over the years. In May 2001 naturally occurring asbestos was found in the Kanuti Pit and the material site was immediately closed. As part of the rehabilitation plan to close out this site, it was agreed that wetland habitat would be created as compensation for impacts to wetlands at the Bonanza Creek Material Site 65-9-037-2. Rehabilitation goals for this material site included soil stability, water retention to create wetland habitat, establishment of plant growth, and succession of the site to naturalize with the surrounding landscape.

## Site Preparation

Preparation of the site began in 2002 with capping the asbestos containing area with material imported from another location. Next, the site was contoured to establish littoral wetland areas taking advantage of naturally occuring springs. Importation of organic overburden from the Bonanza Creek material site also occurred in 2002. Preparation continued in June 2003 with spreading the organic soils with a dozer (Photo 1). This operation was hampered due to the piles being frozen from the previous winter. This was overcome by spreading the piles and allowing them to thaw. The work plan specified



ripping the site to a depth of six inches to encourage invasion of alder and willow species. The dozer supplied for the work did not include a ripper so the site was track walked to create micro-catchments for seed, fertilizer and moisture. Some areas were not able to be track walked due to remaining snow drifts.

Photo 1. Dozer spreading organic soil June 2003

# Seed and Fertilizer Recomendations

The recommendations for seed and fertilizer included seeding with native grasses at a rate of 20 pounds per acre and fertilizing with 20-20-10 (N-P-K) at a rate of 450 to 500 pounds per acre. The seed mix recommendation was:

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25%	Wainwright Slender Wheatgrass	Elymus trachycaulus
25%	Nortran Tufted Hairgrass	Deschampsia caespitosa
25%	Gruening Alpine Bluegrass	Poa alpina
15%	Egan American Sloughgrass	Beckmannia syzigachne
10%	Arctared Red Fescue	Festuca rubra

The varieties selected for this project are primarily bunch grasses with the exception of Arctared red fescue which is a sod forming grass. The bunch grasses comprise the majority of the mix to better allow for natural re-invasion of native species.

## Seed and Fertilizer Applications

Seed and fertilizer was applied to the site on July 31, 2003. The intent was for the applications to be directed by a PMC staff member. Problems with coordinating the contractor did not allow for this. The applications were completed using hand held or 4-wheeler mounted broadcast spreaders.

#### Monitoring

Monitoring visits to evaluate the performance of the revegetation treatments occurred September 2003, August 2004, August 2005, August 2006, and August 2007. Two permanent transects were installed on August 21, 2007 for quantitative measures of the species diversity and plant cover. Each transect is 300 feet long with observations taken at one foot intervals resulting in a total of 300 hit points per transect. Photo point pictures were taken during each of the five monitoring visits as qualitative measures of the overall revegetation performance. The photo point images are presented on pages 9-14 of this report. Figure 1 is an aerial photo overlaid with the transect and photo point locations. Table 1 presents the transect data. Other species observed within the boundaries of the project during all monitoring trips are presented in table 2. Photo 2 shows seedlings of many species becoming established.



Figure 1. Photo Point and Transect Locations

Photo 2. Seedlings of many species are becoming established.

Transect 1			Transect 2		
Observation	Number of	%Cover *	Observation	Number of	%Cover *
	Hits			Hits	
Soil	79	26.3%	Soil	84	28%
Litter	39	13%	Litter	48	16%
Water	5	1.7%	Water	11	3.7%
Moss	43	14.3%	Moss	21	7%
Deschampsia caespitosa	47	15.7%	Deschampsia caespitosa	68	22.7%
Poa alpina	41	13.7%	Poa alpina	22	7.3%
Beckmannia syzigachne	3	1%	Beckmannia syzigachne	3	1%
Elymus trachycaulus	2	0.7%	Elymus trachycaulus	4	1.3%
Hordeum jubatum	22	7.3%	Hordeum jubatum	14	4.7%
Festuca rubra	14	4.7%	Festuca rubra	18	6%
Poa sp.	5	1.7%	Salix alaxensis	2	0.7%
			Chamerion latifolium	2	0.7%
			Calamagrostis canadensis	2	0.7%
			Achillea sibiricus	1	0.3%
Total	300		Total	300	
Total Plant Cover	177/300	59%	Total Plant Cover	157/300	52.3%

Table 1. Transect Data

\* Percentages rounded to the nearest tenths

Achillea millifolium	Achillea sibiricus	Agrostis scabra	Alnus viridis
Arctagrostis	Arnica Lessingii	Artemisia Tilesii	Betula nana
latifolia			
Betula papyrifera	Bromus	Calamagrostis	Carex podocarpa
	pumpellianus	canadensis	
Carex utriculata	Chamerion	Chamerion	Deschampsia
	angustifolium	latifolium	caespitosa
Dryas octopetala	Elymus	Eriophorum	Festuca rubra
	trachycaulus	angustifolium	
Hordeum jubatum	Ledum palustre	Lepidium	Luzula sp.
		densiflorum	
Minuartia stricta	Pedicularis Kanei	Plantago major	Picea mariana
Poa alpina	Poa glauca	Poa sp.	Polemonium
			pulcherrimum
Populus balsamifera	Potentilla fruticosa	Potentilla	Potentilla virgulata
		hyoarctica	
Pyrola asarifolia	Rumex acetosa	Salix alaxensis	Senecio congestus
Taraxacum	Vaccinium	Vaccinium vitis-	Vicia cracca**
ceratophorum	uliginosum	idaea	

 Table 2. Plant Species Observed within the Boundaries of the Project 2003-2007

\*\*Note: Only one plant found in 2006 and 2007. It was pulled out both times.

#### Discussion

The revegetation of the Kanuti pit is proceeding. Establishment of all the planted species is evident. Natural re-invasion of other native plants is also occuring (photo 2). The littoral wetlands are holding water in most cases, if only seasonally (see photo point pictures). Most of the project area has a fairly high density of plant cover.



Photo 3. Sandy gravel soils with little vegetation on the south end of the project. (2006 photo)

The dozer used on the project was not equipped with a ripper as specified in the work plan. Track walking was a reasonable second best option. Ripping would have been better than track walking at reducing soil compaction and creating larger catchments for seed and fertilizer. This may have also better supported the re-invasion of native plants, especially woody species. Ripping also discourages off-road vehicle traffic which is not a problem with this project due to the remote location of the site and the presence of a gate.



Photo 4. Heavier seeding rate close to loading area (Sept. 2003)

As previously described, it was intended that the contractor applying the seed and fertilizer would be directed by a PMC staff member. This did not occur due to poor scheduling by the contractor. A few shortcomings in the execution of the seed and fertilizer applications resulted from the lack of direction. This, combined with some other factors, has resulted in one area of the project with lower plant cover than other areas. Photo 3 shows a portion of the north facing slope on the south side of the project (see figure 1). Soil in this area is sandy gravel. This is

also the area that had portions covered by snow drifts during the site preparation phase of the project. No organic soil was spread in this area (see figure 2). One reason for the lack of vegetation may be associated with the poor moisture holding capacity of the soil. This would have been improved by an organic soil application. Ripping may also have improved the ability of this area to sustain plant growth. This location is also one of the furthest points away from the pit access road. This may have resulted in a lower rate of seed and fertilizer application than in other areas. Photo 4 was taken in the fall of 2003 approximately two months after seed and fertilizer applications. The fact that seedling density appears to decrease uniformly away from this location indicates this area was probably used to load broadcast equipment. If spreading was done from this location for each load without a focus on uniformity, application rates would be greatest at this point and decrease as one moves away. Figure 3 depicts the approximate areas with relation to the reduced applications rates of seed and fertilizer.



Figure 2. Area Where Organic Soil was Spread



Figure 3. Reduced Application Rates Farther Away from the Loading Area

Figure 4. Planned vs. Actual Application Boundaries



The other shortcomings were primarily associated with the treatment area boundaries. The areas treated with seed and fertilizer appeared to only include portions that were completely void of vegetation. It was intended that the fertilizer boundary would have encompassed the entire pit area. This would have included much of the site that had not been disturbed for an extended period of time exhibiting vegetation establishment. It was intended that fertilizing these areas would have encouraged seed production on the primary invader species already present thus promoting the natural re-invasion of native plants to the site. Figure 4 compares the planned application boundary to the perceived application boundary. Since a PMC staff member was not present during the applications, all of the discussion regarding such are assumptions based on monitoring observations.

*Vicia cracca*, a species not native to the area, was observed on the site near the location of photo points 3 and 4 during the 2006 and 2007 monitoring visits. Only one plant was observed each visit and was pulled out both times. This may warrant treatment before the scope of the infestation increases.

#### Conclusions

The revegetation effort at the Kanuti pit has resulted in the establishment of vegetation over most of the project area. All the planted species have become established. Re-invasion of native species is occuring as expected. Wetland areas are holding water and, as a result, are promoting the development of niche wetland habitats. It is expected that long term success, gauged by natural succession of plant communities on the site, will be achieved. Monitoring is scheduled to continue through 2013.

Significant efforts should be made on future projects for professional oversight of all revegetation treatment activities. Also, highly organic topsoil should be placed across the entire project area to help insure uniform establishment of revegetation species and encourage natural reinvasion of native plants.

Photo Point 1.



6/5/03

9/23/03



8/31/04

8/16/05





Photo Point 2.



6/5/03

9/23/03



8/31/04

8/16/05





Photo Point 3.



6/5/03

9/23/03



8/31/04

8/16/05





Photo Point 4.



6/5/03

9/23/03



8/31/04

8/16/05



\*\*No Photo available from 2006 for this location

8/21/07

Photo Point 5.



6/5/03

9/23/03



8/31/04

8/16/05



8/21/07

Photo Point 6.



6/5/03

9/23/03



8/31/04

8/16/05



