APPENDIX C. PROPOSED REVEGETATION SUCCESS MONITORING PLAN FOR THE MONTANA PORTION OF THE KEYSTONE XL PIPELINE PROJECT.

1.0 INTRODUCTION

Post-construction reclamation monitoring is required on linear facilities that are regulated under the Major Facility Siting Act (MFSA). Reclamation monitoring standards are defined as follows:

> "…in rangeland, coverage of desirable perennial plant species excluding, specifically, species recognized as noxious weeds, shall be 30% or more of that on adjacent rangeland of similar slope and topography the year following revegetation, and 90% or more of the coverage of adjacent rangeland of similar slope and topography within five years following revegetation; in forested land, revegetated land exclusive of the right-of-way or permanent roads, shall be planted with trees by the end of five years so that the approximate stand density of the adjacent forest will be attained at maturity" (Administrative Rules of Montana (ARM) 17.20.1902 (10)(a)(b)).

Different reclamation standards are allowed at landowner or land management agency request provided that it can be demonstrated to the Montana Department of Environmental Quality (MDEQ) that not reclaiming to the standards described above "…would not have adverse impacts on the public and other landowners" (ARM 17.20.1902 (10)(c)(d)).

In addition to the MFSA reclamation standard, the Keystone XL Oil Pipeline Project Draft Environmental Impact Statement (DEIS) requires monitoring sagebrush establishment on the ROW to insure that sagebrush "becomes established at densities similar to what occurs within adjacent sagebrush communities" (DOS 2010).

This post-construction reclamation monitoring plan describes monitoring procedures that will be utilized on the Keystone XL Pipeline Project (Project) in Montana to demonstrate achievement of the reclamation standards described in the Administrative Rules of Montana 17.20.1902 (10)(a) and (b), and the DEIS sagebrush monitoring requirement.

2.0 METHODS

Monitoring methods for the Project are designed to address MFSA reclamation standards and mitigation measures that have been specified in the DEIS. These methods have been used on several linear facilities in the West (Westech 1997, Westech 2001, Westech 2003, Westech 2010).

Qualified reclamation specialists will conduct semi-quantitative pedestrian surveys of the right-of-way and other project components in native rangeland and CRP pastures for five years following construction. Reclamation specialists will:

- assess general plant establishment and compare canopy cover to MFSA reclamation standards;
- monitor noxious weed populations;
- identify post-construction erosion;
- monitor sagebrush reestablishment within sagebrush stands; and
- determine the need for remedial revegetation, repair, or noxious weed treatment at specific sites.

Reclamation in all native rangeland and CRP pastures will be assessed within Reclamation Evaluation Areas (REA). Each REA is a section of right-of-way with relatively consistent vegetation, soils, and topography. There may be several REA within any given mile of right-of-way depending on the variety of topography or vegetation that is

crossed, although the minimum REA length is typically 0.25 mile. Stratifying the right-of-way into separate REA allows for a continuous comparison of reclamation within the right-of-way to the MFSA standard "of adjacent rangeland of similar slope and topography", and is consistent with other semi-quantitative monitoring methods that are used to determine rangeland condition (Elzinga 1998; Pellant et al. 2005).

Vegetation data will be recorded as a range of values for each REA consistent with plotless methods that are used to evaluate vegetation development and condition (Mueller-Dombois and Ellenberg 1974). Paired monitoring plots will be used if necessary at specific locations. Soil stability will be assessed within each REA by looking for indicators of accelerated erosion such as rills, gullies, pedestaling, or other features on the right-of-way compared to adjacent areas. Particular attention will be paid to sensitive soils and other areas identified as having potential reclamation constraints.

The following specific vegetation and soil indicators will be assessed and were derived from interagency monitoring publications such as Measuring and Monitoring Plant Populations (Elzinga 1998), Interpreting Indicators of Rangeland Health (Pellant et al. 2005), and Rangeland Health (NRC 1994). These indicators provide a relatively rapid, repeatable system for assessing reclamation relative to the MFSA standard. Representative photos will also be taken.

- **Total Vegetation Cover**: Total plant canopy cover will be ocularly estimated as a range in cover on the ROW and adjacent area within each REA.

- **Vegetation Cover by Morphological Class**: Vegetation cover for each class will be ocularly estimated as a range in cover on the ROW and adjacent area within each REA. Morphological classes will include:
    - Native Perennial Grasses
    - Introduced Perennial Grasses
    - Introduced Annual Grasses
    - Native Perennial Forbs
    - Introduced Perennial Forbs
    - Native Annual/Biennial Forbs
    - Introduced Annual/Biennial Forbs
    - Subshrubs/Shrubs
    - Trees

- **Noxious Weeds**: Noxious weeds, if present, will be documented on separate noxious weed inventory forms within areas disturbed by the Project.

- **Sagebrush Density**: Keystone will implement the DEIS-required sagebrush density mitigation measure by monitoring sagebrush on the right-of-way and within adjacent sagebrush communities in areas that have been identified as a sagebrush Construction/Reclamation Unit. Silver sagebrush (Artemisia cana) and big sagebrush (Artemisia tridentata spp. wyomingensis or spp. tridentata) density will be recorded for all plants that are rooted within a 2-meter-wide belt transect. Transects will be established perpendicular to, and across the entire right-of-way, and will extend 55 feet into adjacent sagebrush stands on both side of the right-of-way. All shrubs that are rooted within the belt transect will be recorded by species and age class as follows: seedling (<1dm tall and not flowering), immature (>1 dm and not flowering), mature (flowering sagebrush plant). Transects will be located at representative locations within each sagebrush stand that is affected by the Project. A photo will be taken of each transect.

- **Accelerated Erosion:** Accelerated erosion within the right-of-way compared to adjacent areas will be monitored through the following indicators:
    - Rills
    - Water-flow patterns
    - Pedestals/terraces
    - Percent bare ground
    - Gullies
    - Wind-scoured blowouts or depressions
    - Litter movement;
    - Litter amount
    - Soil surface stability

3.0 REPORTING AND EVALUATING RECLAMATION SUCCESS

Keystone will submit an annual monitoring report to the MDEQ that details revegetation establishment and soil stability, and documents areas that meet the MFSA reclamation success standard. Monitoring will be discontinued when conditions within an REA achieve the reclamation success standard. This approach was used on the MFSA-regulated Express Pipeline between 1997 and 2001. For example, about 48 percent of native rangeland on the Express Pipeline right-of-way had achieved the reclamation success criteria within one to four years after construction (Westech 2001). Monitoring in these areas was discontinued the year after the success standard was achieved. An additional 46 percent of the Express Pipeline right-of-way had achieved the reclamation success standard five years after construction (Westech 2002). Consequently, reclamation monitoring and remediation in native rangeland were restricted to about 6 percent of the Express Pipeline right-of-way in Montana after 2001.

4.0 LITERATURE CITED

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