

June 8, 2014

Joan Armstrong, Director
Pueblo County Department of Planning and Development
229 W. 12th Street
Pueblo, CO 81003-2810

Dear Joan,

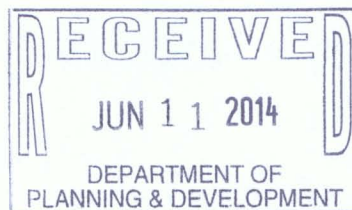
Per contract requirements, I am sending three paper copies of our initial 2014 report regarding revegetation along the S3 Section of the SDS Pipeline route in Pueblo County. I have already emailed Word and Adobe Acrobat versions of the report to you.

Best regards,

Warren

Warren R. Keammerer, Ph.D.
Senior Plant Ecologist

Encls.



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EVALUATION OF VEGETATION ESTABLISHMENT ALONG THE S3 SECTION
OF THE SDS PIPELINE ROUTE IN PUEBLO COUNTY, COLORADO:
2014 INITIAL REPORT

June 8, 2014

Prepared for:

Pueblo County Department of Planning and Development
Pueblo, Colorado

Prepared by:

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INTRODUCTION

This report presents the results of the initial 2014 evaluation of the S3 section of the SDS Pipeline Route located in Pueblo County. Field observations were made on April 29 and 30, 2014. Field work consisted of walking the S3 section of the SDS Pipeline Route in Pueblo County. The primary purpose of the field trip was to check on the status of the vegetation at the beginning of the second growing season for reclaimed areas.

During the first growing season (2013), vegetation development showed varying degrees of success along the S3 section of the SDS pipeline route. The best vegetation development was on the portion of the route located north of Antelope Road and on the northern section of the Walker Ranch property between Steel Hollow and Antelope Road. The southern sections where the pipeline crosses areas with Limon and Heldt; Razor; and Midway Shale and Shingle soils were the least successful. Reclamation success was also influenced by several intense rainfall events which resulted in the creation of numerous rills and gullies along and crossing the pipeline route. Because of these erosional events, a considerable amount of repair and re-seeding work was recommended. The repair and re-seeding work had been completed by SDS contractors prior to the April field trip.

GENERAL OBSERVATIONS

At the time of the April field trip, the vegetation was just initiating growth. Some broadleaved plants were in flower, but mostly the plants were in vegetative condition. In 2013, the soils were very dry, but this year the soil moisture conditions were much better resulting from natural precipitation as well as irrigation during the 2013 growing season. Continued irrigation is planned for 2014, but it had not started as of late April.

For the purposes of discussion, the S3 section of the SDS pipeline has been divided into three sections: 1) southern section starting at the south end of the S3 portion and continuing to Steel Hollow; 2) northern section extending from Steel Hollow to Antelope Road; and 3) far northern section extending from Antelope Road to the Pueblo County Line. All of Section 1 and most of Section 2 are located on the Walker Ranch property.

Southern Section of the S3 Pipeline Route. This section covers approximately 3.5 miles of the route. Limon and Heldt soils occur along the first two miles at the south end of section (Photo 1). These soils tend to have a high clay content and are somewhat saline. The soils on the remaining 1.5 miles are a mix of the Midway Shale and Shingle complex and Razor Soils. In 2013, seedlings were noted throughout this section, but the seedling establishment was not as good as on the more northerly sections of the S3 route. Also, some of the most severe water erosion was noted in this section. For these reasons, a considerable amount of repair and re-seeding work was conducted in this section. Photo 2 shows a re-worked section of a drainage that crosses the route near the south end of the section. In general, re-worked sites like this were graded, re-contoured and then drill seeded. After seeding, erosion control netting was installed and the sites were hydromulched. Several small drainages were repaired using this approach. One drainage was repaired using rock rip-rap to stabilize the area (Photo 3). In addition to the re-seeding work on the drainage sites, it appeared that much of the southern part of the southern section was either disked and re-seeded or was drill interseeded. Approximately the southern 2.75 miles of the section were re-worked using these approaches. Since it was early in the growing season, few new seedlings were noted. General conditions at the northern end of this section can be seen in Photos 4 and 5. One portion of the route that crosses the Midway Shale and Shingle complex soil type just south of Steel Hollow has very limited vegetation development (Photo 6). This area had few seedlings in 2013.

Since much of this section was re-worked, it is difficult to predict how successful the vegetation development will be by the end of the 2014 growing season. It is possible that under irrigation the performance standards may be met. Growth of the grasses that became established in 2013 along with the development of new seedlings may provide enough vegetation cover. If not, then the standards may not be met until 2015. Numerous seedlings of halogeton were noted in this section. Some weed control will be needed to control this species.

Section between Steel Hollow and Antelope Road. This section extends from Steel Hollow north to Antelope Road and is approximately 2 miles long. The soils are mostly Razor and Cascajo/Stoneham soil types which seem to provide a better growth medium than the Limon and Heldt soils. Most of this section is located on the Walker Ranch except for the most northerly quarter mile. The Antelope Road staging area is also in this section. In general, the vegetation development along this section was quite good in 2013 (Photo 9). There was some erosion but not as much as in the more southerly part of the route. Some drainage repair work was done in this section (Photo 10). Vegetation establishment on the

Steel Hollow side slopes was good in 2013 (Photo 7), however some repair work was conducted because of erosion problems (Photo 8). Since the vegetation development was good in 2013, it is likely that the vegetation development will be better in 2014. Vegetation cover in the staging area along Antelope Road was sparse in 2013 (Photo 11), but under irrigation in 2014 it will probably be adequate.

Section North of Antelope Road. The section north of Antelope Road is approximately 2 miles in length. Soils are mostly a mixture of Cascajo/Stoneham, Razor and Penrose/Manvel/ and Minnequa types. This section tends to have more varied topography with some relatively steep slopes (Photo 12 and 13). Overall vegetation development in this section tends to be better than in the other parts of the route. There are, however, some scattered patches with sparse vegetation (Photos 12-14). Also, some small rills were noted on the side slopes. Overall vegetation cover was less in parts of the section that were grazed by livestock in 2013. The vegetation cover in this section is high enough so that the performance standards should be met in 2014. There is a short section at the far north end that had not been completed in 2013. This area is now done and has been seeded (Photo 15). The 2014 growing season will be the first year for this area.

WEEDS

Several Colorado List B and List C noxious weed species occur along the S3 Section. Not all of the species were observed during the April field trip, but it can be anticipated that most of the species noted in 2013 are still present. In general, the noxious weeds are widely distributed and are not abundant. The only exception to this is halogeton (*Halogeton glomeratus*) which was commonly seen in the southern part of the route. While some control work was done in 2013, many seedlings of this species were noted in April. The noxious weed species are shown in bold in Table 1.

At this early time in the field season, species identification can be somewhat difficult. In spite of the early date, 45 species were noted (Table 1). Some of the species that were observed were species that were included in the seed mix. Other species had re-grown from existing root systems, especially along the eastern site of the route. Overall pre-construction species richness included approximately 100 species in various life form groups.

COMMENTS REGARDING PERFORMANCE STANDARDS

For the purposes of discussion, the vegetation conditions along the route were described based on three sections that were not separated by soil types. The reason for this was primarily related to the repair and re-seeding work that has been done. It was also possible to identify some of the problem areas that may not necessarily correlate with soil type, but may be related to land use or erosion issues. Later in the growing season when the pipeline route is evaluated relative to meeting performance standards, it will need to be done based on soil types. It is important to recognize that even though some sections of certain soil types may have conditions that may not meet the standards, the decision regarding success will be made on mean cover values for each of the soil types.

As part of the spring evaluation, the cover summary report prepared in late 2013 by the SDS vegetation consultants was preliminarily reviewed. At the project meeting in January the results were presented and the preliminary conclusion was that the standards are mostly being met. During the review, it was noticed that some of the allocations of species into life form groups was not correct. The effect of this is that some cover values that were attributed to native species were actually being

contributed by introduced species, which can only partially be used to attain the performance standard. I suggest that the SDS consultants review their summary tables relative to introduced vs. native species. It would be worthwhile to have this concern addressed now rather than when the Colorado Springs Utilities prepares its report on revegetation success later this year.

COMMENTS REGARDING REVEGETATION REPAIR WORK

Overall Implementation. Based on field observations, it appears that the repaired areas were revegetated according to appropriate revegetation approaches. Evidence of drill seeding could be seen in most of the re-seeded areas.

Mulch. The more intensively repaired areas were hydromulched after seeding. Native hay mulch was used as part of the original design but problems were noted when the mulch was unevenly distributed by high winds. This was not a problem with the hydromulch. Sites that were drill interseeded were mostly not mulched.

Erosion Control Blankets. Various types of erosion control blankets and straw logs were installed along the repaired drainages that cross the pipeline route. Where small drainages crossed the route, the blankets were installed to protect the surface from occasional flows (Photos 2 and 10). The blankets were well-secured with wooden stakes. Erosion control blankets were also installed on some of the steeper slopes, especially those that occur at the Steel Hollow crossing (Photos 7 and 8). One of the sites where erosion was more severe was repaired by installing a rock lined rip-rap channel (Photo 3). All of these installations should help alleviate erosion problems.

Irrigation. Irrigation for the 2014 growing season had not yet been started in late April. Broken irrigation feed lines were noted in several places along the route. The SDS irrigation contractors were working on the lines at the time of the field evaluations.

Access Road. In 2013, the access roads had been ripped and seeded. However, as a result of the needed repair work, most of the access roads were again being used by vehicles and revegetation equipment. If the intent is for these roads to be vegetated, they will need to be ripped, disked and re-seeded when access is no longer needed.

SUMMARY

- Field observations suggest that vegetation establishment along portions of the pipeline route north of Steel Hollow has been good enough to expect that the cover performance standards will be met.
- Most of the pipeline route south of Steel Hollow was reworked. Erosion control blankets were installed along the small drainages and some sections were disked, re-seeded and hydromulched. Other sections were drill interseeded. The 2014 growing season will be the first year for many of these sites. The vegetation in the interseeded areas will include established plants from the 2013 seeding as well as new seedlings. Depending on how well the vegetation develops, these areas may or may not meet the performance standards in 2014.

- The SDS vegetation consultants should review the tabular cover summaries that were prepared based on the 2013 transect sampling with regard to native versus introduced species. Treating introduced species as native species affects conclusions regarding attainment of performance standards.
- Several species of Colorado List B and List C noxious weeds occur along the route. Mostly these are widely distributed and infrequently encountered. The major species of concern is halogeton. Numerous seedlings of this species were noted in the southern part of the route, especially on the Limon and Heldt soils.

Table 1. List of Species Observed along the S3 Section of the SDS Pipeline in Pueblo County. “(?)” indicates uncertain identification.

Scientific Name	Common Name	Observation Dates				
		04/30/13	7/24/2013 7/25/2013	09/12/13	04/29/14 04/30/14	
COOL SEASON PERENNIAL GRASSES						
<i>Agropyron trachycaulum</i>	Slender Wheatgrass		x	x	x	
<i>Aristida purpurea</i>	Three-awn			x		
<i>Pascopyrum smithii</i>	Western Wheatgrass	x	x	x	x	
<i>Puccinellia airoides</i>	Alkali Grass			x		
<i>Sitanion longifolium</i>	Squirreltail Grass		x		x	
WARM SEASON PERENNIAL GRASSES						
<i>Bouteloua curtipendula</i>	Side-oats Grama	x	x	x		
<i>Buchloe dactyloides</i>	Buffalo Grass			x		
<i>Chondrosium gracile</i>	Blue Grama	x	x	x	x	
<i>Hilaria (Pleuraphis) jamesii</i>	Galleta Grass		x	x	x	
<i>Muhlenbergia asperifolia</i>	Alkali Muhly			x		
<i>Sporobolus airoides</i>	Alkali Sacaton		x	x	x	
<i>Sporobolus cryptandrus</i>	Sand Dropseed		x	x	x	
ANNUAL GRASSES						
<i>Bromus japonicus</i>	Japanese Brome		x			
<i>Bromus tectorum</i>**	Cheatgrass		x	x	x	
<i>Chloris verticillata</i>	Windmill Grass			x		
<i>Digitaria sanguinalis</i>	Crab Grass		x	x		
<i>Echinochloa crus-galli</i>	Barnyard Grass		x	x		
<i>Eragrostis cilianensis</i>	Lovegrass			x		
<i>Munroa squarrosa</i>	False Buffalo Grass		x	x		
<i>Panicum capillare</i>	Witchgrass		x	x		
<i>Setaria sp.</i>	Foxtail			x		
<i>Setaria viridis</i>	Green Foxtail		x	x		
NATIVE PERENNIAL FORBS						
<i>Argemone polyanthemus</i>	Prickly Poppy		x			
<i>Asclepias subverticillata</i>	Milkweed		x	x		
<i>Astragalus bisulcatus</i>	Two-grooved Milkvetch	x	x		x	
<i>Astragalus sp.</i>	Milkvetch	x	x	x	x	
<i>Cirsium undulatum</i>	Thistle	x	x			

**Colorado Noxious Weeds List C Species

Table 1. (Continued) List of Species Observed along the S3 Section of the SDS Pipeline in Pueblo County. “(?)” indicates uncertain identification.

Scientific Name	Common Name	Observation Dates				
		04/30/13	7/24/2013 7/25/2013	09/12/13	04/29/14 04/30/14	
<i>Erigeron strigosus</i> (?)	Daisy Fleabane		x		x	
<i>Eriogonum</i> sp.	Buckwheat		x			
<i>Erysimum asperum</i> (?)	Wallflower				x	
<i>Euphorbia marginata</i> (?)	Snow-on-the-Mountain		x			
<i>Evolvulus nuttallianus</i>	Evolvulus		x			
<i>Gaillardia aristata</i>	Blanket Flower		x			
<i>Glandularia bipinnatifida</i>	Showy Vervain	x	x	x	x	
<i>Grindelia squarrosa</i>	Curlycup Gumweed		x	x		
<i>Heterotheca villosa</i>	Golden Aster		x			
<i>Ipomopsis</i> sp.	Gilia				x	
<i>Lesquerella</i> sp.	Bladderpod	x			x	
<i>Linum lewisii</i>	Blue Flax		x		x	
<i>Lomatium orientale</i> (?)	Biscuitroot	x			x	
<i>Oenothera caespitosa</i>	Evening Primrose				x	
<i>Physalis hederifolia</i>	Ground Cherry			x		
<i>Physaria</i> sp.	Double Bladderpod			x		
<i>Picradeniopsis oppositifolia</i>	Bahia		x			
<i>Polanisia dodecandra</i>	Clammy Weed		x			
<i>Psoralea lanceolata</i>	Scurfpea		x	x		
<i>Senecio</i> sp.	Ragwort				x	
<i>Sphaeralcea angustifolia</i>	Globe Mallow			x	x	
<i>Sphaeralcea coccinea</i>	Scarlet Globemallow	x	x	x	x	
<i>Stephanomeria pauciflora</i>	Wire Lettuce		x			
<i>Zinnia grandiflora</i>	Zinnia		x	x		
INTRODUCED PERENNIAL FORBS						
<i>Convolvulus arvensis</i>**	Field Bindweed		x		x	
<i>Cirsium (Breea) arvense</i>*	Canada Thistle		x	x	x	
<i>Malva neglecta</i>	Cheeseweed		x	x	x	
<i>Rumex crispus</i>	Curly Dock			x	x	
<i>Taraxacum officinale</i>	Common Dandelion				x	
<i>Trifolium pratense</i>	Red Clover		x	x	x	

*Colorado Noxious Weeds List B Species

**Colorado Noxious Weeds List C Species

Table 1. (Continued) List of Species Observed along the S3 Section of the SDS Pipeline in Pueblo County. “(?)” indicates uncertain identification.

Scientific Name	Common Name	Observation Dates				
		04/30/13	7/24/2013 7/25/2013	09/12/13	04/29/14 04/30/14	
NATIVE ANNUAL/BIENNIAL FORBS						
<i>Amaranthus arenicola</i>	Pigweed			x		
<i>Artemisia dracunculus</i>	False Tarragon		x		x	
<i>Chamaesyce glyptosperma</i>	Spurge		x	x		
<i>Chamaesyce stictospora</i>	Spurge		x			
<i>Chenopodium leptophyllum</i>	Narrowleaved Goosefoot	x	x			
<i>Cryptantha sp.</i>	Cryptantha		x			
<i>Descurainia pinnata</i>	Tansy Mustard		x	x	x	
<i>Dyssodia aurea</i>	Fetid Marigold	x	x	x		
<i>Dyssodia papposa</i>	Fetid Marigold			x		
<i>Lappula redowskii</i>	Stickseed		x		x	
<i>Lepidium densiflorum</i>	Peppergrass		x	x		
<i>Machaeranthera sp.</i>	Machaeranthera			x		
<i>Nuttallia decapetala</i>	White Evening Star		x	x	x	
<i>Plantago patagonica</i>	Woolly Plantain		x		x	
<i>Suaeda sp.</i>	Sea-Blite			x		
<i>Tripterocalyx micranthus</i>	Sand Verbena		x			
INTRODUCED ANNUAL/BIENNIAL FORBS						
<i>Amaranthus albus</i>	White Pigweed		x	x		
<i>Amaranthus graecizans</i>	Pigweed		x			
<i>Amaranthus retroflexus</i>	Pigweed		x	x		
<i>Artemisia biennis</i>	Biennial Wormwood		x			
<i>Carduus nutans</i>*	Musk Thistle			x	x	
<i>Chamaesyce serpyllifolia</i>	Spurge			x		
<i>Chenopodium sp.</i>	Goosefoot	x	x	x	x	
<i>Conyza canadensis</i>	Horseweed			x		
<i>Descurainia sp.</i>	Tansy Mustard	x				
<i>Erodium cicutarium</i>	Filaree			x		
<i>Erysimum repandum</i>	Wallflower		x			
<i>Halogeton glomeratus</i>**	Halogeton		x	x		
<i>Helianthus annuus</i>	Annual Sunflower			x		
<i>Hibiscus trionum</i>*	Flower-of-the-Hour			x		

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Scientific Name	Common Name	Observation Dates				
		04/30/13	7/24/2013 7/25/2013	09/12/13	04/29/14 04/30/14	
<i>Kochia scoparia</i> (<i>Bassia sieversiana</i>)	Kochia		x	x	x	
<i>Lactuca serriola</i>	Prickly Lettuce			x		
<i>Melilotus alba</i>	White Sweetclover		x			
<i>Melilotus officinalis</i>	Yellow Sweetclover		x	x	x	
<i>Portulaca oleracea</i>	Purslane		x	x		
<i>Quincula lobata</i>	Chinese Lantern		x	x		
<i>Salsola australis</i>	Russian Thistle		x	x	x	
<i>Salsola collina</i>	Russian Thistle		x	x	x	
<i>Solanum physalifolium</i>	Nightshade			x		
<i>Solanum rostratum</i>	Buffalo Bur		x	x		
<i>Solanum triflorum</i>	Nightshade		x	x		
<i>Tribulus terrestris</i>**	Caltrop			x		
<i>Verbascum thapsus</i>**	Common Mullein				x	
<i>Verbena bracteata</i>	Creeping Charlie		x	x		
<i>Ximenesia encelioides</i>	Cowpen Daisy		x	x		
<i>Xanthium strumarium</i>	Cocklebur			x		
NATIVE SEMI-SHRUBS						
<i>Gutierrezia sarothrae</i>	Broom Snakeweed				x	
SHRUBS/TREES						
<i>Atriplex canescens</i>	Four-wing Saltbush	x	x	x	x	
<i>Atriplex confertifolia</i>	Shadscale			x		
<i>Chrysothamnus nauseosus</i>	Rubber Rabbitbrush				x	
<i>Populus sargentii</i>	Plains Cottonwood			x		
CACTI AND SUCCULENTS						
<i>Cylindropuntia imbricata</i>	Cholla		x	x	x	
<i>Opuntia polyacantha</i>	Plains Prickly-pear Cactus	x	x	x	x	
<i>Yucca glauca</i>	Spanish Bayonet	x	x	x	x	
		17	73	73	45	

*Colorado Noxious Weeds List B Species

**Colorado Noxious Weeds List C Species

SITE PHOTOGRAPHS



Photo 1. South end of S3 Section of the SDS Pipeline Route. Photo taken at N38° 24' 38.6"; W104° 41' 23.9", looking north. April 30, 2014.



Photo 2. Erosion Control Blanket Installation near the South end of S3 Section of the SDS Pipeline Route. Photo taken at N38° 25' 13.5"; W104° 41' 25.1", looking southeast. April 30, 2014.



Photo 3. Installed rock rip-rap channel - S3 Section of the SDS Pipeline Route. Photo taken at N38° 26' 15.3"; W104° 41' 24.3", looking north. April 30, 2014.



Photo 4. Northern part of the Southern Section of S3 portion of the SDS Pipeline Route. Photo taken at southern high point at N38° 26' 54.8"; W104° 41' 24.6", looking south. April 30, 2014.



Photo 5. Northern part of the Southern Section of S3 portion of the SDS Pipeline Route. Photo taken at southern high point at N38° 26' 54.8"; W104° 41' 24.6", looking north. April 30, 2014.



Photo 6. Midway Shale and Shingle complex soil type just south of Steel Hollow. Photo taken at N38° 27' 38.2"; W104° 41' 24.5", looking south. April 29, 2014.



Photo 7. Steel Hollow Crossing along S3 Section of the SDS Pipeline Route. Photo taken at N38° 28' 11.2"; W104° 41' 24.9", looking southeast. April 29, 2014.



Photo 8. Repair work at Steel Hollow Crossing along S3 Section of the SDS Pipeline Route. Photo taken at N38° 28' 11.2"; W104° 41' 24.9", looking northwest. April 29, 2014.



Photo 9. Northern portion of S3 Section of the SDS Pipeline Route located south of Antelope Road. Photo taken at N38° 29' 04.2"; W104° 41' 24.5", looking south. April 29, 2014.



Photo 10. Drainage repair north of Steel Hollow S3 Section of the SDS Pipeline Route. Photo taken at N38° 28' 40.1"; W104° 41' 25.9", looking southeast. April 29, 2014.



Photo 11. Staging area along Antelope Road. S3 Section of the SDS Pipeline Route. Photo taken at N38° 29' 25.3"; W104° 41' 25.8", looking southeast. April 29, 2014.



Photo 12. Portion of S3 Section of the SDS Pipeline Route located north of Antelope Road. Photo taken at N38° 29' 51.2"; W104° 41' 19.6", looking south. April 29, 2014.



Photo 13. Portion of S3 Section of the SDS Pipeline Route located north of Antelope Road. Photo taken at N38° 29' 51.2"; W104° 41' 19.6", looking north. April 29, 2014.



Photo 14. Portion of S3 Section of the SDS Pipeline Route located north of Antelope Road at the north end of the route. Photo taken at N38° 31' 00.9"; W104° 41' 20.7", looking south. April 29, 2014.



Photo 15. Newly completed portion of S3 Section of the SDS Pipeline Route located north of Antelope Road at the north end of the route. Photo taken at N38° 31' 09.4"; W104° 41' 17.7", looking north. April 29, 2014.