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Fiscal Year 2010 Revegetation Assessment

November 2010

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Idaho National Laboratory
Idaho Falls, Idaho 83415

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ABSTRACT

This report summarizes the Fiscal Year 2010 Revegetation Assessment by Battelle Energy Alliance, LLC. This assessment was conducted to supplement documentation related to the Storm Water Pollution Prevention Plan for Construction Activities and to ensure that disturbed vegetation and soil at various locations are being restored. This report provides the following information for each site being monitored by the Idaho National Laboratory Environmental Support and Services:

- Summary of each site
- Assessment of vegetation status and site stabilization at each location
- Actions and Resolutions for each site.

CONTENTS

ABSTRACT iii

ACRONYMS ix

1. Introduction 1
   - 1.1 Purpose 2
   - 1.2 Organization 2

2. Background 2

3. Site Revegetation Assessment Summary 4

4. Geomorphic Investigations for Flood Bounds 5
   - 4.1 Site Background Conditions 5
   - 4.2 Site Assessment 6
     - 4.2.1 Big Loop Trenches 6
     - 4.2.2 Saddle Trenches 6
     - 4.2.3 BLR-8 Trenches 7
   - 4.3 Actions and Resolutions 7

5. Materials and Fuels Complex Equipment Enclosure and Search Station 8
   - 5.1 Site Background Conditions 8
   - 5.2 Site Assessment 8
     - 5.2.1 Power Cable Corridor 8
     - 5.2.2 Equipment Enclosure, Search Station, and Security Guardhouse 10
     - 5.2.3 Septic Tank Drain Field 10
   - 5.3 Actions and Resolutions 10

6. Materials and Fuels Complex Vehicle Barrier Project 12
   - 6.1 Site Background Conditions 13
   - 6.2 Site Assessment 13
   - 6.3 Actions and Resolutions 14

7. National Security Test Range Project 14
   - 7.1 Site Background Conditions 15
   - 7.2 Site Assessment 15
     - 7.2.1 North of power pole 170 15
     - 7.2.2 Power pole 176 16
     - 7.2.3 North of power pole 181 17
   - 7.3 Actions and Resolutions 18

8. Vadose Zone Research Park 19
   - 8.1 Site Background Conditions 19
     - 8.1.1 Site Assessment 21
   - 8.2 Actions and Resolutions 22

9. References 25

Appendix A 27

Appendix B 32

Appendix C 49

FIGURES

Figure 1. Map of the Geomorphic Investigations Project 5

Figure 2. Locations of photo plots along the Power Cable Corridor. 9

Figure 3. Transect locations for the MFC Equipment Enclosure. 11

Figure 4. Transect locations for the MFC Septic Tank Drain Field. 12

Figure 5. Disturbed area resulting from the removal of the soil pile previously located south of the MFC facility. 13

Figure 6. Location of transects at Power Pole 170. 16

Figure 7. Transect locations for Power Pole 176. 17

Figure 8. Transect locations at Power Pole 181. 18

Figure 9. Map of the Vadose Zone Research Park. 20

Figure 10. Transect Locations at Wells 164A and 164B. 23

Figure 11. Transect locations at Wells, 199, 200, and 205. 24

Figure B-1. Southwest Big Loop Trench at the GI. 33

Figure B-2. Middle Big Loop Trench at the GI. 33

Figure B-3. Northeast Big Loop Trench at the GI. 34

Figure B-4. Long Saddle Trench at the GI. 34

Figure B-5. West Saddle Trench at the GI. 35

Figure B-6. East Saddle Trench at the GI. 35

Figure B-7. East BLR-8 Trench at the GI. 36

Figure B-8. West BLR-8 Trench at the GI. 36

Figure B-9. Background vegetation plot at the MFC Equipment Enclosure, Security Guardhouse and Search Station Power Cable Corridor, and Septic Tank Drank Field. 37

Figure B-10. Disturbed Vegetation Plot for the Power Cable Corridor. 37

Figure B-11. Disturbed area vegetation plot at the MFC Equipment Enclosure, Security Guardhouse and Search Station. 38

Figure B-12 Disturbed area vegetation plot for the Septic Tank Drain Field. 38

Figure B-13. Overview of the MFC Vehicle Barrier Project. 39

Figure B-14. Background plot for the NSTR Project. 39

Figure B-15. Disturbed vegetation near power pole 179. 40

Figure B-16. Disturbed area at the east end of the NSTR access road. 40
Figure B-17. Disturbed vegetation plot at Power Pole 170. 41
Figure B-18. Burned area near Power Pole 170. 41
Figure B-19. Disturbed vegetation plot at Power Pole 176. 42
Figure B-20. Burned area near Power Pole 176. 42
Figure B-21. Disturbed vegetation plot at Power Pole 181. 43
Figure B-22. VZRP Well 165. 43
Figure B-23. VZRP Well 166. 44
Figure B-24. VZRP Well 215. 44
Figure B-25. VZRP Well 201A. 45
Figure B-26. VZRP Well 209. 45
Figure B-27. Background vegetation plot at the VZRP. 46
Figure B-28. Disturbed vegetation plot at Wells 164A and 164B. 46
Figure B-29. Disturbed vegetation plot at Wells 199, 200, and 205. 47

TABLES

Table 1. Sites included in the 2010 revegetation assessment. 2
Table 2. Equipment Enclosure and Search Station project seed mixture. 8
Table 3. Equipment Vehicle Barrier project seed mixture. 12
Table 4. Table showing T-25 Road sites where seeding was recommended. 14
Table 5. Recommended seed mixture for T-25 Road disturbed sites. 14
Table A-1. Comparison of Power Cable Corridor revegetation to background vegetation. 28
Table A-2. Comparison of the east side of MFC-736 location of the Equipment Enclosure, Search Station, and Security Guardhouse revegetation to background vegetation. 28
Table A-3. Comparison of revegetation of the Septic Tank Drain Field to background vegetation. 29
Table A-4. Comparison of revegetation of Power Pole 170 to background vegetation. 29
Table A-5. Comparison of revegetation of Power Pole 176 to background vegetation. 30
Table A-6. Comparison of revegetation of Power Pole 181 to background vegetation. 30
Table A-7. Comparison of revegetation of wells 164A and 164B to background vegetation. 31
Table A-8. Comparison of revegetation of wells 199, 200, 205. 31
Table C-1. GPS Coordinates for the MFC Power Cable Corridor 50
Table C-2. GPS Coordinates for the MFC Equipment Enclosure, Search Station, and Guardhouse 51
Table C-3. GPS Coordinates for the MFC Septic Tank Drain Field 53
Table C-4. Coordinates for NSTR Power Pole 170 54
Table C-5. Coordinates for the NSTR Power Pole 176 55

Table C-6. Coordinates for the NSTR Power Pole 181 56
Table C-7. Coordinates for VZRP Wells 164A and 164B 57
Table C-8. Coordinates for VZRP Wells 199, 200, and 205 58

ACRONYMS

ACOE	Army Corp of Engineers
BEA	Battelle Energy Alliance, LLC
CGP	General Permit for Storm Water Discharge from Construction Activities
DOE-ID	U.S. Department of Energy Idaho Operations Office
EPA	Environmental Protection Agency
ES&S	Environmental Support and Services
ESRP	Eastern Snake River Plain
ft	feet
FY	Fiscal Year
GI	Geomorphic Investigations
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MFC	Materials and Fuels Complex
NPDES	National Pollution Discharge Elimination System
NSTR	National Security Test Range
SPC	Construction Specification
STD	Standard Deviation
SWPPP-CA	Storm Water Pollution Prevention Plan for Construction Activities
UAV	Unmanned Aerial Vehicle
VAM	vesicular-arbuscular mycorrhizae
VSP	Visual Sample Plan 6.0
VZRP	Vadose Zone Research Park

Fiscal Year 2010 Revegetation Assessment

1. Introduction

Battelle Energy Alliance, LLC (BEA) complies with the National Pollutant Discharge Elimination System (NPDES) (40 CFR 122) General Permit for Storm Water Discharges from Construction Activities (CGP) issued by the U.S. Environmental Protection Agency on July 1, 2003 (as modified, effective January 1, 2005). New projects will require coverage under the 2008 CGP, effective date of June 30, 2008. The Idaho National Laboratory (INL) Site currently uses the INL Site Storm Water Corridor to determine when a construction activity has the potential to impact "waters of the United States" under the CGP requirements. The INL Storm Water Corridor is defined "as an area that has a reasonable potential to discharge storm water to the Big Lost River."

A letter (Stenzel 2008) was submitted to the U. S. Army Corps of Engineers (ACOE) on May 7, 2008. The letter requested the ACOE to perform a Jurisdictional Determination concerning the applicability of Section 404 of the Clean Water Act and Sections 9 and 10 of the Rivers and Harbors Act of 1899 for the Big Lost River, Little Lost River, and Birch Creek. The ACOE responded with a letter dated May 26, 2009 (Brochu 2009) that stated "Due to the workload and priorities we are unable to complete your request. If you propose a specific project which may affect wetlands, playas, streams, creeks, or other waters such as the Big Lost River, Little Lost River or Birch Creek we shall reinitiate your request." Therefore, until a specific project is initiated and ACOE performs the Jurisdictional Determination or BEA submits another request, BEA will continue to comply with the CGP requirements.

For the 2010 Revegetation Assessment, two sites were determined to be within the INL Storm Water Corridor. These sites are the Geomorphic Investigations for Flood Bounds (GI) and the Vadose Zone Research Park VZRP). Three additional sites not in the INL Storm Water Corridor were also evaluated. These included the Materials and Fuels Complex (MFC) Equipment Enclosure and Search Station, MFC Vehicle Barrier Project, and the National Security Test Range (NSTR) Project.

The 2009 Revegetation Assessment included the Unmanned Aerial Vehicle (UAV) Airfield as a site located within the INL Storm Water Corridor. However, based on the 2009 Revegetation Assessment, it was determined that the UAV Airfield met the revegetation requirement goal of 70% of background. A Notice of Termination for coverage under the CGP was submitted to the Environmental Protection Agency (EPA). Coverage for the UAV Airfield under the CGP was terminated on 2/16/2010 (EPA 2010). Therefore, revegetation assessments of the UAV Airfield will no longer be performed.

A digital camera sampling and analysis method was used to assess specific well sites at the VZRP located within the INL Storm Water Corridor. It was also used to assess the MFC Equipment Enclosure and Search Station and the NSTR Project. This method was used to quantitatively determine when revegetation of a disturbed area is complete. Visual observations will continue to be used on newly disturbed sites or until the sites appear to be reaching the final stabilization requirement.

Anderson and Shumar (1989) recommended using cover of perennial species as the best quantitative measure for evaluating the success of reclamation plantings, although visual observation of the area may suffice for many projects. They recommended using the point interception frame described by Floyd and Anderson (1987). Digital photography has been shown to be as accurate as traditional point-frame sampling if the information is abstracted from the images using techniques comparable to those used in point sampling. Manually specifying either plant cover of species at a few points on the images is equivalent conceptually to the fixed point-frame sampling recommended by Floyd and Anderson (1987) (Booth et. al., 2006 as cited in Schafer 2009).

1.1 Purpose

The purpose of this report is to comply with Contract Data Requirements List item number F.24 by providing this revegetation assessment to the Department of Energy, Idaho Operations Office (DOE-ID).

1.2 Organization

This report is organized by individual site and provides the following information:

- A historical background summary of each site
- An assessment of background vegetation
- An assessment of the revegetation effort and site stabilization status
- Actions and Resolutions for the site.

2. Background

Revegetation efforts for replanting and rebuilding the soil on disturbed land are an ongoing practice at the INL Site, and an annual report of these activities is submitted in accordance with BEA's contract with the DOE-ID. Revegetation sites being assessed for final stabilization in fiscal year (FY) 2010 are listed in Table 1 below.

Table 1. Sites included in the 2010 revegetation assessment.

Site Name
Geomorphic Investigations for Flood Bounds (located within INL Storm Water Corridor)
Materials and Fuels Complex Enclosure and Search Station
Materials and Fuels Complex Vehicle Barrier Project
National Security Test Range Project
Vadose Zone Research Park (located within INL Storm Water Corridor)

Currently, the INL uses the definition of final stabilization provided by the CGP to make the determination that "final stabilization" has been achieved at the two revegetation sites within the INL Storm Water Corridor. The CGP defines final stabilization as follows:

1. All soil disturbing activities at the site have been completed and either of the two following criteria are met:
   A. A uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or
   B. Equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

2. When background native vegetation will cover less than 100% of the ground (e.g., arid areas, beaches), the 70% coverage criteria is adjusted as follows: if the native vegetation covers 50% of the ground, 70% of 50% percent (0.70 x 0.50 = 0.35) would require 35% total cover for final stabilization.

3. In arid and semi-arid areas only, all soil disturbing activities at the site have been completed and both of the following criteria have been met:

A. Temporary erosion control measures (e.g., degradable rolled erosion control product) are selected, designed, and installed along with an appropriate seed base to provide erosion control for at least three years without active maintenance,
B. The temporary erosion control measures are selected, designed, and installed to achieve 70% vegetative coverage within three years.

The location of the INL in the Eastern Snake River Plain (ESRP), including altitude, latitude, and intermountain setting, affects the climate of the Site. Air masses crossing the ESRP have first crossed a mountain barrier and precipitated a large percentage of inherent moisture. Therefore, annual rainfall at the INL is light, and the region is classified as arid to semi-arid (Clawson et. al. 1989).

Vegetation at the INL typically consists of a shrub overstory with a perennial grass and forb understory. Wyoming big sagebrush (*Artemisia tridentata* subspecies *wyomingensis*) is the most common shrub. Basin big sagebrush (*Artemisia tridentata* subspecies *tridentata*) is dominant or co-dominant with Wyoming big sagebrush on sites having deep soils or accumulations of sand on the surface. Communities dominated by big sagebrush occupy most of the central portions of the INL and most areas included in this assessment. Green rabbitbrush (*Chrysothamnus viscidiflorus*) is the next most abundant shrub in many of these communities. Other common shrubs include gray rabbitbrush (*Chrysothamnus nauseosus*), winterfat (*Krascheninnikovia lanata*), spiny hopsage (*Grayia spinosa*), prickly phlox (*Leptodactylon pungens*), broom snakeweed (*Gutierrezia sarothrae*), and horse-brush (*Tetradymia canescens*).

The most common native grasses found within sagebrush communities across the INL and in the assessment areas include thickspiked wheatgrass (*Elymus lanceolatus*), bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (Achnatherum *hymenoides*), needle-and-thread grass (*Stipa comata*), and Sandberg bluegrass (*Poa secunda*). Patches of creeping wildrye (*Leymus triticoides*) and western wheatgrass (*Pascopyrum smithii*) can also be found in localized patches. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is rare at the lowest elevations but is common at slightly higher elevations to the southwest and along the eastern side of the INL; it is often the dominant grass on alluvial fans and slopes of the buttes and foothills (Anderson, et. al. 1996).

Cheat grass (*Bromus tectorum*), an invasive annual species, is also widespread and well established across the INL. Goodrich and Gale (1999) noted that in similar situations, cheatgrass should be recognized as a component of the potential plant community.

In addition, nearly monotypic stands of crested wheatgrass (*Agropyron cristatum*) can be found in localized areas across the INL, including several of the sites near MFC included in this assessment. Crested wheatgrass remains productive for more than 30 years, and stand mortality is virtually unknown, except in cases of extreme drought during critical phenological stages (Hardy BBT Limited 1989). Anderson and Marlette (1986) point out that crested wheatgrass may inhibit or preclude the re-establishment of native species on disturbed sites and may become the dominant species.

Big sagebrush is the climax species on most of its range (Eddleman and Doescher 1978, Jensen at. al. 1988). While seedling establishment may begin immediately following a disturbance, it usually takes a decade or more before big sagebrush dominates a site (Welch and Criddle 2003), though some researchers argue that 25-45 years is typical (Watts and Wambolt 1996, Wambolt et. al. 2001). Because roots of big sagebrush species, particularly Wyoming big sagebrush, are infected with the vesicular-arbuscular mycorrhizae (VAM) *Glomus microcarpus* and *Gigaspora* spp. (Bethlenfalvay and Dakessian 1984; Doerr, et. al. 1971; Hurley and Wicklow-Howard 1986) and VAM associated with Wyoming big sagebrush are killed by heating or chemical alteration of the soil, VAM, and thus sagebrush, take several years to recolonize after soil-altering disturbance (Wicklow-Howard 1989).

Absence of VAM probably inhibits Wyoming big sagebrush establishment on disturbed soils. For example, 2.5 years after restoration work, VAM had not yet colonized a coal-mined site in south-central Wyoming even though stockpiled topsoil was replaced. When VAM-infected and noninfected Wyoming big sagebrush seedlings were transplanted on the site, there was no significant difference in growth between the 2 groups: both showed poor establishment. However, in the greenhouse, biomass gain of the

infected group was significantly greater (about 1.5 times more, p=0.05) compared to the uninfected group. This suggests that on the disturbed site, VAM were unable to survive anywhere but inside Wyoming big sagebrush roots, and establishment of VAM and host Wyoming big sagebrush probably will not occur until the chemistry of lower soil horizons changes with succession (Stahl et. al. 1988).

None of the subspecies of big sagebrush resprout after fire or other disturbance, and prior to re-establishment, big sagebrush communities are mostly populated with associated grasses (Sheehy and Winward 1981). As expected, shrub cover on disturbed sites across the INL is much lower than that found on undisturbed sites, and grasses associated with big sagebrush communities account for most of the perennial vegetation found on disturbed sites included in this assessment.

National Oceanic and Atmospheric Administration Idaho National Laboratory Mesonet data at CFA indicate that precipitation during the fall of 2009 and spring of 2010 was near average. Plant growth was not as vigorous as in 2009.

3. Site Revegetation Assessment Summary

The State of Idaho Department of Environmental Quality's "Catalog of Stormwater Best Management Practices for Idaho Cities and Counties" notes that construction activities should maintain and preserve the vegetative canopy. In addition, Minnesota Pollution Control Agency and EPA Region V developed stormwater guidance for small construction operators to use canopy cover when determining compliance with the 70% final stabilization requirement. Based on this information, canopy cover is used to determine final stabilization of revegetation sites at the INL.

Canopy cover is the area of the ground surface spanned by the canopy of the plant, and is used because it determines the underlying plant community. A high percentage of plant cover generally increases the soil infiltration rate, thereby reducing runoff and soil erosion. Plant cover also reduces wind erosion.

For specific well sites at the VZRP located within the Stormwater Corridor, the MFC Equipment Enclosure and Search Station, and the National Security Test Range Project, Environmental Support and Services (ES&S) personnel performed digital camera sampling and analysis as described in "Establishing Revegetation Performance Measures at INL" (Schafer 2009) to determine cover on disturbed sites of the assessment area. Invasive and annual species were not included when determining percent cover. Where digital camera sampling was performed, resulting transect quadrate photos were interpreted using the program SamplePoint (discussed in Schafer, 2009), and were categorized as being grass, forb, shrub, cactus, litter, soil, rock, unknown, or annual. Because the CGP requires the establishment of perennial vegetation, annual species such as cheat grass, desert alyssum (*Alyssum desertorum*), and mustard species were classified in the same category as invasive species and not used to calculate total cover.

For each location, results are summarized as percent by category and percent by category within the background data for each site. In addition to the categories previously listed, the tables include a category for "% Cover" computed as the total cover percent as the sum of the means for the percentages for grass, forb, shrub, and cactus. Invasive and annual species, rock, soil, litter, and unknown species were not considered in the percent cover calculations. These summary tables are included in Appendix A. Appendix C contains GPS coordinates for transect photos. For sites where digital camera sampling was not conducted, this report relies on visual observations. Visual observations and photos were used to evaluate these sites.

Statistical analysis was performed using SigmaStat 3.0. A Mann-Whitney U- test was used on sample locations that showed a non-parametric distribution. SigmaStat is able to determine whether or not the data is normally distributed, and in cases where the distribution was normal, a paired t-test was performed. The t-test is a type of parametric test. This means that the test itself is based upon certain assumptions about the data. In particular, the values are assumed to approximate a normal distribution, and the standard deviations of both sets of numbers are assumed to be equal.

For many types of data, non-parametric tests are also available. These do not rely upon the data conforming to any particular distribution; that is, they are "robust". The Mann-Whitney U-test is appropriate for comparing two sets of numbers to see whether or not they are different.

4. Geomorphic Investigations for Flood Bounds

During the Geomorphic Investigations (GI) Project, eight trenches near the Big Lost River on the INL Site were excavated for the purpose of collecting soil and geomorphic and stratigraphic data of the Holocene and Pleistocene deposits for evaluating historical river and flood information (Figure 1). The project began in May 2002 and continued through October 2002. The trenches ranged from 60 to 900 feet in length.

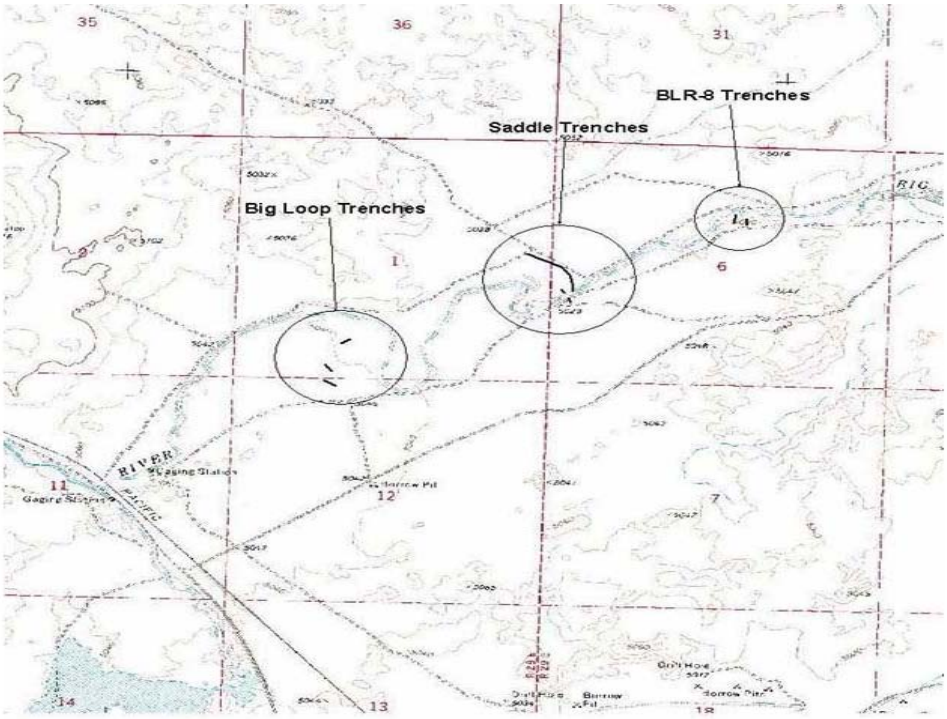

Figure 1. Map of the Geomorphic Investigations Project

The S. M. Stoller Corporation backfilled, contoured, seeded, and installed new silt fencing in September 2007. The seed mix included Wyoming big sagebrush, thickspiked wheatgrass, Indian ricegrass, needle and thread grass, and bottlebrush squirreltail. Approximately 1,000 Wyoming big sagebrush seedlings were also planted. Electric fences were placed around the trenches located on the west side of the Big Lost River, however, these fences were removed in 2009.

In 2009, the erosion fences (silt fences) installed at the ends of the BLR-8 and Saddle Trenches were removed and replaced with straw wattles. The straw wattles appear to be more durable than the silt fences while serving the same purpose. In addition, it was determined that silt fences were no longer required for the Big Loop Trenches because of the distance from the Big lost River and the level topography where the trenches are located.

4.1 Site Background Conditions

The GI Project is located within a sagebrush steppe community. Wyoming big sagebrush is dominant on undisturbed sites in this area, although other species of big sagebrush are co-dominant. Bottlebrush squirreltail is the dominant grass. Other plant species observed throughout the background include: sego lilly (*Calochortus nuttallii*), tapertip hawksbeard (*Crepis acuminata*), cushion buckwheat (*Eriogonum*

ovalifolium), shaggy fleabane (*Erigeron pumilus)*, bluebunch wheatgrass, green rabbitbrush, and Hood's phlox (*Phlox hoodii*).

Only the Big Loop Trenches are located within the undisturbed sagebrush steppe community. Both the BLR-8 and Saddle Trenches are located within the Tin Cup Fire scar (Forman 2010).

4.2 Site Assessment

The S.M. Stoller Corporation is continuing to monitor the GI Project revegetation progress (Forman 2010). Therefore, only the visual observation method was used in 2010. Visual observations were conducted at all 8 trenches on June 23, 2010.

4.2.1 Big Loop Trenches

The southwest Big Loop Trench vegetation is composed primarily of cheatgrass, Jim Hill tumblemustard (*Sysimbrium altissimum*), and western tansymustard (*Descurainia pinnata*) (Figure B-1). Density of Jim Hill tumblemustard and western tansymustard appear to be lower this year than it was in 2009. Perennial grasses observed included: bottlebrush squirreltail, needle and thread grass, Sandberg bluegrass (*Poa secunda*), and thickspiked wheatgrass. Sandberg bluegrass appeared to be the most common perennial grass observed. Wyoming big sagebrush plants were located within the disturbed area of the trenches. These sagebrush plants appeared healthy based on the vigorous annual growth.

Figure B-2 shows Jim Hill tumblemustard and cheatgrass as the most common vegetation on the middle Big Loop Trench. Perennial grasses included the following: bottlebrush squirreltail, needle and thread grass, and Sandberg bluegrass. Of the Big Loop Trenches, the middle trench appears to have the most Wyoming big sagebrush plants.

Similar to the other two Big Loop Trenches, the northeast Big Loop Trench (Figure B-3) is dominated by cheatgrass. Jim Hill tumblemustard and western tansy mustard don't appear to be as numerous at this trench as they are at the other two trenches. Other forbs observed included: silvery lupine and shaggy fleabane. Perennial grasses included bottlebrush squirreltail, Sandberg bluegrass, and thickspiked wheatgrass. Fewer Wyoming big sagebrush plants were found on this site, but those that were observed showed vigorous annual growth.

4.2.2 Saddle Trenches

There are some areas in the Long Trench comprised almost solely of cheatgrass and Jim Hill tumblemustard (Figure B-4). In other areas, the native perennial grasses appear to be doing well. Perennial grasses observed included needle and thread grass, Indian ricegrass, and western wheatgrass. Russian thistle production was significantly lower than in 2009. Wyoming big sagebrush and green rabbitbrush plants were showing vigorous growth.

Cheatgrass is the dominant species in the West Trench (Figure B-5). A few needle and thread grass, bottlebrush squirreltail, and Indian ricegrass plants were observed. Other species identified were Wyoming big sagebrush, orange globemallow (*Sphaeralcea munroana*), and western tansymustard.

Similar to the other two Saddle Trenches, cheatgrass was the dominant grass species in the East Trench. Perennial grasses included western wheatgrass, needle and thread grass, bottlebrush squirreltail, and Indian ricegrass (Figure B-6). The perennial grasses appeared vigorous as did the few Wyoming big sagebrush plants. Orange globemallow and silvery lupine (*Lupinus argenteus*) were also observed.

In these three trenches, cheatgrass appears to be the most abundant grass species. There appear to be significantly fewer forbs such as western tansymustard, Jim Hill tumblemustard, and Russian thistle (*Salsola kali*) than were present in 2009.

4.2.3 BLR-8 Trenches

Perennial needle and thread grass and Indian rice grass are dominant grass species at the East and West Trenches (Figures B-7 and B-8). Growth appears to be vigorous. Other perennial grasses observed were bottlebrush squirreltail and Sandberg bluegrass. Cheatgrass is present but not nearly as abundant as it is at the Big Loop Trenches or the Saddle Trenches. Wyoming big sagebrush and green rabbitbrush are showing vigorous growth.

Russian thistle that was prevalent during the 2009 evaluation appeared to be nearly non-existent at these two trenches in 2010.

4.3 Actions and Resolutions

The disturbed areas within the GI Trenches exhibit characteristics typical of normal succession for early sagebrush steppe communities. The occurrence of Jim Hill tumblemustard and western tansymustard in early sagebrush steppe succession is well documented. Researchers describe a seral continuum where Russian thistle pioneers on disturbed sagebrush steppe. Tumble mustard establishes next, followed by tansymustard (*Descurainia* spp.) and cheatgrass.

For example, a 20-year study in southern Idaho showed succession on former big sagebrush steppe was initially dominated by Russian-thistle, tumble mustard, and tansymustard. An increase in cheatgrass and bottlebrush squirreltail followed; after that, there was a temporary increase in mustards and a decrease in Russian-thistle. The community eventually stabilized as a cheatgrass-bottlebrush squirreltail cover type (Hironaka and Tisdale 1963). Brandt and Rickard (1994) reported similar results, where tumble mustard codominated recently disturbed sites along with Russian-thistle, prickly-lettuce (*Lactuca serriola*), and bur ragweed (*Ambrosia acanthicarpa*). Cheatgrass dominated slightly older seres.

Some of these communities dominated by annuals may be stable (Hironaka and Tisdale 1963). Cline and Rickard (1973) state that on the Atomic Energy Commission's Hanford Reservation in Washington, some areas have supported cheatgrass-tumble mustard-tansymustard communities for 30 or more years.

Tumble mustard, western tansymustard, and most other early successional species found in sagebrush steppe communities are nonmycorrhizal (Bethlenfalvay and Dakessian 1984; Fontenla et. al. 1999), unlike sagebrush, and therefore can colonize sterile sites or sites undergoing primary succession. However, western tansymustard does not usually persist in late-seral communities and may not require special control measures. Canopy closure, litter accumulation and/or growth interference from later-successional species tend to exclude tansymustard over time. Jim Hill tumblemustard and western tansymustard are not highly invasive in undisturbed sagebrush communities, mainly because they need an open canopy to establish.

In 2010, it appeared that western tansymustard, Jim Hill tumblemustard, and Russian thistle plant production at the GI Project was significantly less than in 2009. This was evidenced by the amount of litter left by these plants from the previous year’s growing season when compared with new growth during the 2010 evaluation. Cheatgrass was present at all the trenches. Wyoming big sagebrush and green rabbit brush, where it occurred, showed good growth in 2010. Perennial grasses also appeared vigorous and showed good growth.

As described in the above sections, the disturbed areas within the GI Project are recovering as expected for this type of ecosystem, and shrubs are beginning to establish within the disturbed area. Due to the lack of perennial cover, however, these sites have still not achieved final stabilization. Most of the trenches show good establishment of shrub seedlings, so allowing succession to progress may be the best course of action. The GI project will continue to be visually observed to monitor progress toward meeting final stabilization.

5. Materials and Fuels Complex Equipment Enclosure and Search Station

The Equipment Enclosure and Search Station project at MFC included construction of a check point and guard booth (MFC-734), security gatehouse (MFC-735), and equipment enclosure and search station (MFC-736). In addition, a septic tank system for MFC-735 was installed, and power cables run underground from the southern end of MFC to the new buildings.

A total of approximately 9 acres were reseeded by the project, including approximately 3 acres around the equipment enclosure, search station, and security guardhouse (including the septic tank drainfield location) and another 6 acres for the power cable installation portion of the project (a corridor approximately one mile long and 40 feet wide). The disturbed areas were reseeded on November 18, 2008 in accordance with Construction Specification SPC-979, Section 32 9219. Table 2 shows the recommended seed mixture that was specified in SPC-979.

Table 2. Equipment Enclosure and Search Station project seed mixture.

Species	Rate of Application (pounds per acre pure live seed)
Indian Rice Grass "Rimrock"	2
Thickspiked wheatgrass "Bannock"	2
Bottlebrush Squirreltail	2
Green Rabbitbrush	1
Silverleaf Lupine	1

5.1 Site Background Conditions

The MFC Equipment Enclosure and Search Station are located within an area consisting almost entirely of crested wheatgrass, with thickspiked wheatgrass present in very small amounts. Crested wheatgrass is persistent and allows little establishment of native species, especially in arid areas (Allen and Jackson 1992). It is expected that the disturbed areas of the MFC Equipment Enclosure and Search Station will eventually revert back to a crested wheatgrass monoculture. Halogeton (*Halogeton glomeratus*) and clasping peppergrass (*Lepidium perfoliatum*) were the most common annual species encountered within the background transects. Figure B-9 shows a background plot that is characteristic of the background vegetation for the three disturbed sites in this vicinity.

It should be noted that due to seed dispersal from adjacent vegetation, the edges of the disturbed areas at this location were difficult to distinguish from background vegetation. Therefore, as the following figures in this section show, five background plots near MFC-736 and 2 background plots for the septic tank drain field were located in areas that satellite photos indicate were disturbed. Due to the number of other plots and sample locations, this did not significantly alter the results.

In addition, satellite imagery shows a rectangular disturbed area just north of MFC-735 (Figures, 2, 3, and 4). This area was disturbed prior to 2000 and was not included in this assessment.

5.2 Site Assessment

Canopy cover at these locations was assessed using the digital camera sampling and analysis method.

5.2.1 Power Cable Corridor

The Power Cable Corridor is approximately 40 feet wide and one mile long. Due to the large size of the disturbed area, Visual Sample Plan (VSP) 6.0 software was used to create a sample plan for the corridor. The VSP software randomly generated 27 GPS coordinates within the corridor. However, it was determined by ES&S personnel that the part of the corridor lying within the boundaries of the Vehicle

Barrier Project did not meet criteria for final stabilization, so the five plots located within that boundary were removed. The remaining 22 locations (Table C-1, Figure 2) were sampled using the digital camera sampling and analysis method.

Figure 2. Locations of photo plots along the Power Cable Corridor.

Random sampling provides more information on the spacial structure of the vegetation than systematic sampling does, but there is also the possibility that areas of the site were not represented with the same frequency as if grid sampling were performed. ES&S Monitoring personnel located the VSP generated coordinates using a Garmin eTrex handheld GPS.

Background vegetation for this site was taken by combining all background transects from the Equipment Enclosure and Search Station and the Septic Tank Drain Field since they are located in the same vicinity and within the same vegetation type.

Perennial cover on the disturbed site is 62.4% of background (Table A-1). Mean perennial cover percentages are not statistically different for background plots versus disturbed plots ($p = 0.046$). However, mean percent grass cover is significantly higher for background vegetation ($p = < 0.001$), and the mean percentage of annual species is significantly higher in the disturbed area ($p = 0.009$). Grass along the power cable corridor is predominantly crested wheatgrass. Other grasses observed include thickspiked wheatgrass, bottlebrush squirreltail, and cheatgrass.

Predominant forbs include tansymustard, Jim Hill tumble mustard, desert alyssum, and Kochia (*Kochia scoparia*). All are commonly found in disturbed areas of the INL. Halogeton and globemallow

are also present, although in much smaller numbers. Figure B-10 shows a typical vegetation plot along the disturbed area of the Power Cable Corridor.

5.2.2 Equipment Enclosure, Search Station, and Security Guardhouse

Cover in the fenced area between MFC-735 and MFC-736 was visually observed and determined not to meet the 70% revegetation criteria, and therefore, digital camera sampling and analysis method was not used in this area. Kochia, halogeton, and tansy mustard are prevalent in this area, though perennial grasses appear to be increasing.

Digital camera sampling was conducted in the fenced area on the east side of the MFC-736. Three disturbed area transects, running roughly east to west were placed in the fenced area, and two background transects, running north to south, were placed east of the fenced area (Figure 3). Table C-2 lists GPS coordinates.

Perennial cover, mostly crested wheatgrass, has reached 79.5% of background (Table A-2, Figure B-11). There is not a significant difference between mean perennial cover percentages in background versus disturbed areas ($p = 0.039$), but mean percent grass cover is significantly higher in the background ($p = 0.045$). Kochia, tansymustard, and halogeton are the dominant forbs, though the mean percentage of annual species is not significantly different between the two areas ($p = 0.974$). Grasses, predominately crested wheatgrass, are revegetating well. Cheatgrass is also present. No shrubs were observed within the disturbed area.

In the fenced exclusion area on the east side of MFC-736, heavy gravel extends out from the east side of the building approximately 45 feet, running about ¾ the length of the site. Forbs are dominant with halogeton and kochia being the most prevalent on graveled and bare areas. The gravel is prohibiting growth in this area.

5.2.3 Septic Tank Drain Field

The septic tank drain field is approximately 58 ft x 105 ft. Perennial vegetation has reached 79.2% of background (Table A-3, Figure B-12) and consists almost entirely of crested wheatgrass. There is not a statistical difference between mean cover percentages for background and disturbed area transects ($p = 0.093$). The mean percentage of grass in the background is significantly higher than that of the disturbed area ($p = 0.044$). Annuals including kochia, pinnate tansymustard, halogeton, cheatgrass, and clasping peppergrass were also observed, but mean cover percentage of annual species is not significantly different between the background and disturbed areas ($p = 0.305$). There is still a small strip of bare ground running down the middle of the disturbed area. Transects were located as shown in Figure 4.

5.3 Actions and Resolutions

Because the area surrounding the project is dominated by crested wheatgrass, it is expected that crested wheatgrass will eventually become the dominant species on the disturbed sites. The Septic Tank Drain Field and fenced area east of MFC-736 have achieved final stabilization and will not be evaluated in future assessments. The Power Cable Corridor and fenced area between MFC-735 and MFC-736 will be evaluated again in 2011 to determine whether or not final stabilization has been achieved.

Figure 3. Transect locations for the MFC Equipment Enclosure.

Figure 4. Transect locations for the MFC Septic Tank Drain Field.

6. Materials and Fuels Complex Vehicle Barrier Project

The MFC Vehicle Barrier project included installation of vehicle gate barriers, Delta vehicle crash barriers, and precast concrete vehicle barriers. The precast concrete vehicle barriers were placed around the south and approximately half way up the east side of the MFC facility. An area approximately 10 ft wide was disturbed. The barriers were placed in the middle of the disturbed areas.

Seeding was performed in accordance with Construction Specification SPC-1000, Section 32 9219. Table 3 shows the seed mixture that was specified in SPC-1000; the same seed mixture recommended for MFC Equipment Enclosure and Search Station project. A seed drill was used to plant the seeds, and wood chips were added once the seeding was completed. The work was performed during the week of October 12, 2008.

Table 3. Equipment Vehicle Barrier project seed mixture.

Species	Rate of Application (pounds per acre pure live seed)
Indian Rice Grass “Rimrock”	2
Thickspiked wheatgrass “Bannock”	2
Bottlebrush Squirreltail	2
Green Rabbitbrush	1
Silverleaf Lupine	1

6.1 Site Background Conditions

The MFC Vehicle Barrier Project is also located within an area consisting almost entirely of crested wheatgrass, with thickspiked wheatgrass present in very small amounts. It is expected that the disturbed areas of the MFC Vehicle Barrier Project will eventually revert back to a crested wheatgrass monoculture.

6.2 Site Assessment

The vegetation assessment was performed on June 21, 2010 by visual observation. Based on the initial visual observation overview, a determination was made not to use the digital camera sampling and analysis method in 2010.

Crested wheatgrass is the most prevalent grass in both the background and the disturbed areas. Cheat grass is present in most areas and abundant is some. Bottlebrush squirreltail was more common along the barrier on the east side of MFC. It was abundant in some locations and sparse in others.

Abundance of kochia and Jim Hill tumble mustard appeared to be significantly lower this year than in 2009. The kochia observed were in the early growth stage. A few green rabbit brush plants were observed.

The relatively cool, moist spring appeared to favor the grasses. Overall, the disturbed sites appear to be recovering well. However, there were a couple of locations (Figure B-13) with very little new growth in 2010. In 2009, these areas had a dense cover of forbs and grasses.

There is a musk thistle (*Carduus nutans*) infestation located south of the gravel road that runs along the south side of the southern barriers.

A soil pile was located on the south side of the road that runs east and west along the southern barriers. The soil pile had not been seeded. In late October 2010, the soil pile was removed to grade (Figure 5).

Figure 5. Disturbed area resulting from the removal of the soil pile previously located south of the MFC facility.

6.3 Actions and Resolutions

Because the area surrounding the project is dominated by crested wheatgrass, it is expected that crested wheatgrass will eventually become the dominant species on the disturbed sites. A preliminary visual evaluation should be performed in 2011 to determine whether the digital camera sampling and analysis should be performed.

Crested wheatgrass will be used to determine final stabilization.

Musk thistle is a noxious weed and should be eradicated. The location coordinates were provided to BEA Sitewide Management Services personnel. **NOTE:** On August 5, 2010, the musk thistle was showing the appearance (dead and dying musk thistle plants) that it had been sprayed. Sitewide Management Services verified they had sprayed the thistle. The area will be observed in 2011 during the annual revegetation survey to determine how effective the control was.

The disturbed area (Figure 5) where the soil pile was previously located should be stabilized. Revegetation using an appropriate seed mix is the preferred method for final stabilization. This issue will be submitted into the INL Corrective Action Management System for resolution. In addition, the area should be monitored for noxious weeds and weed control performed as necessary. Sitewide Management Services will be requested to add the location to their list of potential sites requiring weed control.

7. National Security Test Range Project

On September 9, 2008, a survey of the T-25 Road sites disturbed by the National Security Test Range (NSTR) project was performed by NSTR personnel and the S. M. Stoller Corporation (Saupe 2009). The survey identified seven locations that required seeding (Table 4).

Table 4. Table showing T-25 Road sites where seeding was recommended.

Location	Comments
Wide spot north of power pole 138	A large mud rick has been bladed at an angle and should be revegetated.
Across from power pole 146	There is an area that appears to have been backed into during construction. This area needs to be seeded.
North of power pole 170	Disturbed during construction, reseed.
Power pole 176	Truck turn around area. Revegetate on the west side of the pole.
Power pole 179	Disturbed during construction, reseed.
North of power pole 181	Disturbed during construction, reseed.
Turn-off on east end of range access road	Reseed south half.

Table 5 shows the seed mix recommended by the S. M. Stoller Corporation for reseeding the seven disturbed sites near the T-25 Road. Disturbed sites were seeded late fall 2008.

Table 5. Recommended seed mixture for T-25 Road disturbed sites.

Species	Rate of Application (pounds per acre pure live seed)
Indian Rice Grass “Rimrock”	2
Thickspiked wheatgrass “Bannock”	2
Bottlebrush Squirreltail	2
Green Rabbitbrush	1

7.1 Site Background Conditions

The NSTR Project is located within a sagebrush steppe community. Wyoming big sagebrush is dominant on undisturbed sites in this area, although other species of big sagebrush are co-dominant. Needle and Thread grass and Indian ricegrass are the dominant grasses. Other plant species observed throughout the background include: tapertip hawksbeard, cushion buckwheat, shaggy fleabane, green rabbitbrush, and Hood's phlox. Figure B-14 shows a plot with vegetation characteristic of the background vegetation at the locations associated with the NSTR project.

7.2 Site Assessment

The disturbed areas near power poles 138 and 146 could not be located in 2008, and therefore, were not included in the 2008 or 2009 revegetation report. These areas were removed from further consideration. Additionally, it was determined by visual observation that the area near power pole 179 and the turn-off on the east end of the access road had not reached final stabilization.

Tumble mustard and Russian thistle are prevalent on the disturbed area near power pole 179 (Figure B-15) and heavy gravel at the southern end of the disturbed area is impeding regrowth of the vegetation. Native grasses in the disturbed area include needle and thread grass, Indian rice grass, and thickspiked wheat grass. Green rabbitbrush is also re-establishing.

Wood chips in some locations at the turn-off on the east end of the range access road are very heavy in some cases 2-3" thick (Figure B-16). Lanceleaf scurfpea (*Psoralidium lanceolatum*), globemallow, silvery lupine, and textile onion (*Allium textile*) are forbs that are reestablishing the disturbed area. Bottlebrush squirreltail and needle and thread grass are also present. Cheatgrass was also noted.

The following discussion details conditions at the other sites listed in Table 4:

7.2.1 North of power pole 170

This site is located on a slope approximately 100 ft north of power pole 170 on the west side of the T-25 Road. The disturbed area is approximately 30 ft x 40 ft. Soils are fine textured with scattered small rocks and some gravel. Some of the wood chips that were applied after the area was seeded have piled up, yet this does not appear to have impacted plant growth. The disturbed transect was located along the long axis of the disturbed area. The background transect was located outside of the disturbed area as shown in Figure 6.

The site assessment was conducted on June 10, 2010 and globemallow was the most abundant forb. Cheat grass, Indian ricegrass, bottlebrush squirreltail, thickspiked wheatgrass, and needle and thread grass were found within the disturbed area. There was a good mixture of desirable perennial grasses with thickspiked wheatgrass being the most common (Figure B-17). Several young green rabbitbrush plants had also established within the disturbed site. Perennial cover was 116.2% of background (Table A-4), and there was not a significant difference between mean perennial cover in the background and disturbed area ($p = 0.544$).

This location was burned during the Jefferson Fire in mid July (Figure B-18).

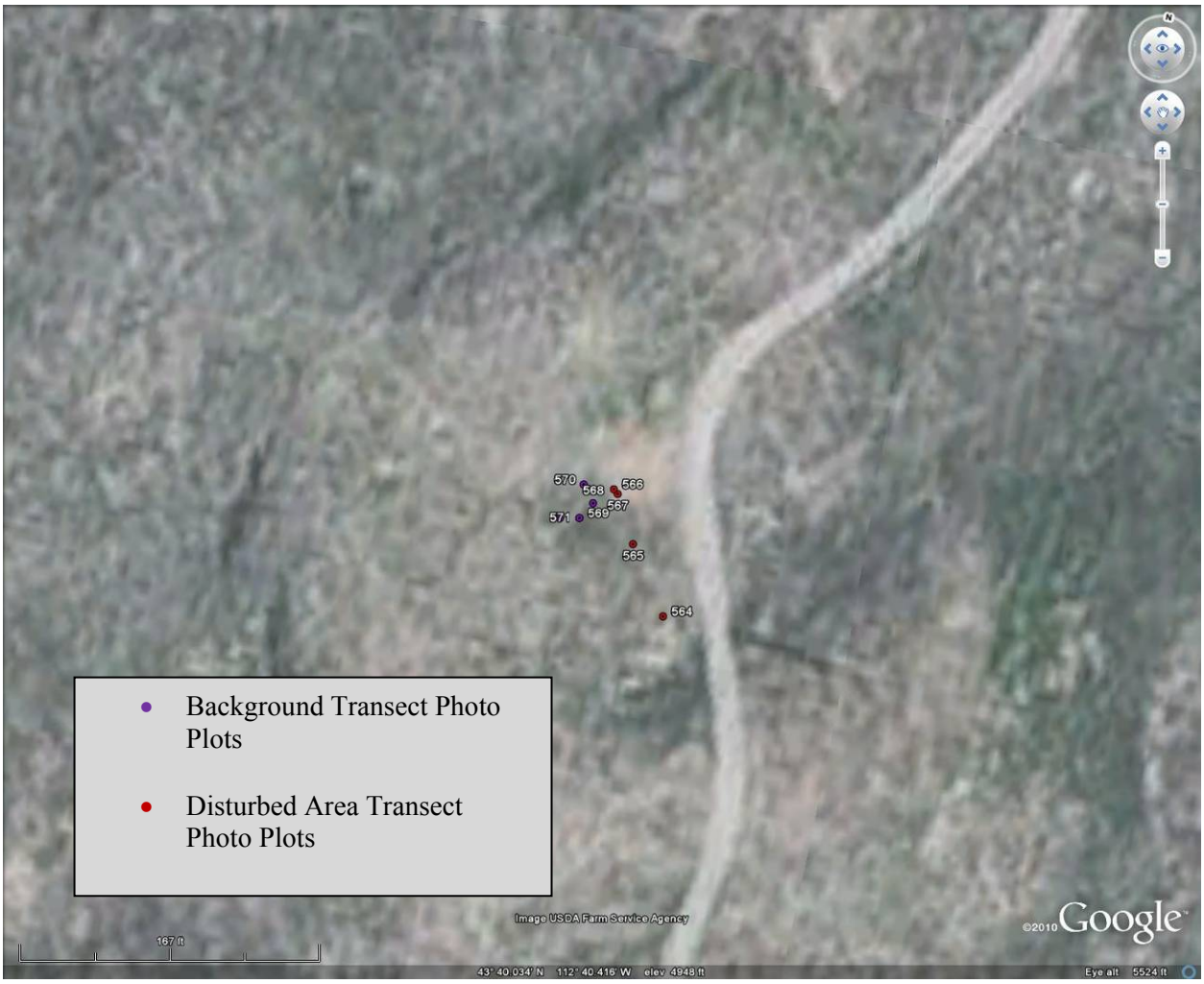

Figure 6. Location of transects at Power Pole 170.

7.2.2 Power pole 176

This site was used as a turnaround for large trucks. Entry was from the T-25 Road on both the north and south sides of power pole 176. The turnaround curves around the west side of power pole 176. The project did not disturb the area located between the power poles; therefore that area was not included in the assessment. Soils are fine to sandy textured with scattered small rocks and some gravel. Wood chips were applied after the area was seeded. Transects were located as shown in Figure 7.

As of June 10th, 2010 perennial cover at this location had reached 98.8% of background (Table A-5) and was composed mostly of grasses including Indian ricegrass, bottlebrush squirreltail, thickspiked wheatgrass, and needle and thread grass (Figure B-19). Green rabbitbrush seedlings were reestablishing within the disturbed site. There was not a significant difference between the mean percentage of cover between the background and disturbed areas ($p = 0.948$). Additionally, the mean percentages for rock and soil cover were significantly higher in the background area than in the disturbed area ($p = < 0.001$ for both). Part of the disturbed area and the background area was burned by the Jefferson Fire in mid July (Figure B-20).

Figure 7. Transect locations for Power Pole 176.

7.2.3 North of power pole 181

This site is located approximately 150 ft north of power pole 181 on the west side of the T-25 road. The disturbed area runs parallel with the T-25 road and is approximately 12 ft x 65 ft. Soils are sandy with scattered small rocks. Wood chips were applied after the area was seeded. Transects at this location are shown in figure 8.

Forbs observed include largeflower skeletonweed (*Lygodesmia grandiflora*) and silverleaf phacelia (*Phacelia hastate*). Indian rice grass is the dominant grass at this location, but scattered cheatgrass and needle and thread grass have also established in the disturbed area (Figure B-21). Green rabbitbrush was absent within the disturbed area even though it is present in nearby undisturbed areas. This site has achieved final stabilization with cover at 87.6% of background (Table A-6). There is not a significant difference between mean annual cover percentage between the background and disturbed areas ($p = 0.525$).

Figure 8. Transect locations at Power Pole 181.

7.3 Actions and Resolutions

On July 13, 2010 a wildland fire started near the Critical Infrastructure Test Range Complex and burned approximately 109,000 acres on the INL and adjacent lands, including the areas (near power poles 170 and 176) along the T-25 road discussed in earlier sections of this report. Where the fire occurred, vegetation composition in both disturbed and background areas is now at the same seral stage. Typical succession after the fire should begin with a grass/forb dominance, and eventually lead to sagebrush recovery in 30 or more years (Brown and Smith 2000). These burned sites will not be included in future versions of this revegetation assessment report.

Areas near power poles 170, 176, and 181 were determined to have met the 70% of background criteria and will not be evaluated in future Revegetation Assessment Reports.

Areas that did not burn and that have not reached the requirements for final stabilization, i.e. the area near Power Pole 179 and the disturbed area on the east end of the range access road will continue to be monitored for their progress towards reaching 70% of background cover.

It was recommended in the 2009 Revegetation Assessment that the wood chips in areas of heavy accumulation at the power pole 176 site and the turn-off at the east end of the range access road should be redistributed because of the potential to inhibit plant growth. On June 10, 2010, the digital camera sampling and analysis method was performed at the power pole 176 site. It was determined from this evaluation that the power pole 176 site had reached 98.8% of background, even though no wood chips had been redistributed at either site. Therefore, the digital camera sampling and analysis method will be

performed at the turn-off site in 2011. Based on the results of this analysis, redistributing the wood chips at the turn-off site will be re-evaluated.

8. Vadose Zone Research Park

The Vadose Zone Research Park (VZRP) is a field-scale research facility designed to investigate the behavior of water and solute movement through the vadose zone. The site is located northwest of Central Facilities Area along the Big Lost River and adjacent to the new INTEC Percolation Ponds. An important feature of this research facility is that it established a natural baseline for subsurface conditions prior to the inception of the new INTEC Percolation Ponds. The site consists of several two-track roads, numerous well locations, and a vehicle crossing across the Big Lost River (Figure 9).

8.1 Site Background Conditions

The VZRP is located within a large area previously burned by wildfire. Background vegetation was assumed to be represented by the reestablished burn area. Background vegetation is represented by Figure B-27.

Perennial vegetation observed within the background transects included sagebrush, rabbitbrush, shaggy fleabane, lupine, Indian rice grass, needle and thread grass, bottlebrush squirreltail, crested wheatgrass, and thickspiked wheatgrass. Western tansymustard, and Jim Hill tumblemustard were annual species present. Cheat grass is prevalent throughout the background. Hoary aster (*Dieteria canescens*) is prevalent along roadsides, disturbed areas, and limited in background areas.

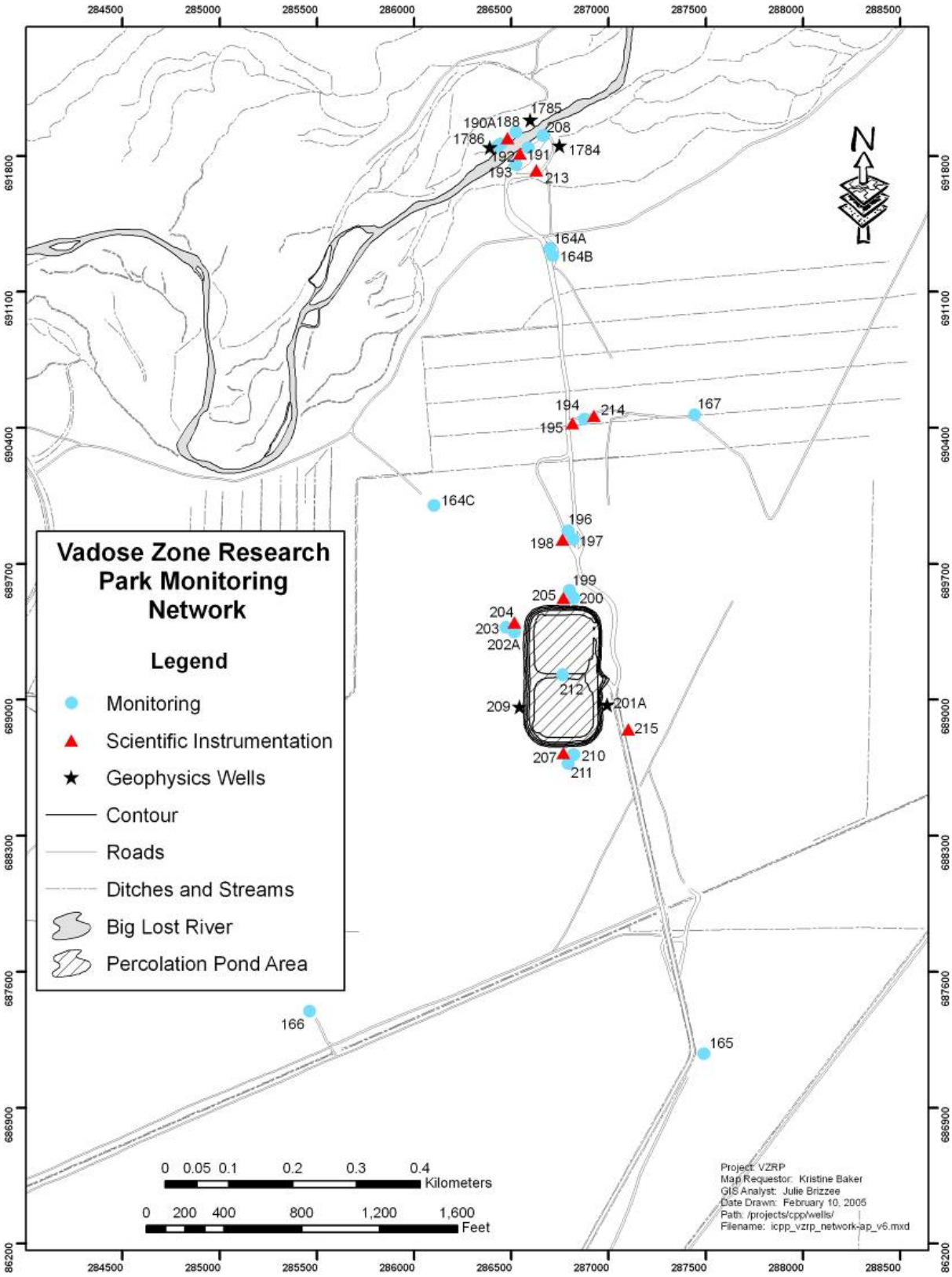

Figure 9. Map of the Vadose Zone Research Park.

8.1.1 Site Assessment

In 2009, digital camera sampling was performed, and it was determined that the following well locations had achieved the 70% cover criteria for final stabilization and, therefore, they are not included in this assessment:

- Wells 1785, 1786, 188, and 190A
- Wells 191, 192, 193, and 208
- Wells 1784 and 213
- Wells 194, 195, and 214
- Wells 196, 197, 198
- Wells 207, 210, and 211.

Furthermore, Wells 202A, 203, and 204 had not reached final stabilization in 2009 due to large amounts of annual species such as western tansymustard, tumblemustard, and cheatgrass within the disturbed area. Well 167 was visually observed in 2009 and was determined not to have met the 70% cover requirement due to large amounts of bare ground and annual species. These locations were visually observed again on June 22, 2010, and it was determined that the locations still have not achieved 70% canopy cover.

Wells 165, 166, 215, 201A, and 209 were also visually observed on August 5, 2010. Cheatgrass and tumble mustard can be found at all locations. Rabbitbrush appears to be establishing well. Indian ricegrass, bottlebrush squirreltail, needle and thread grass, and thickspiked wheatgrass are the most abundant native grasses. Native forbs include phlox, globemallow, and shaggy fleabane.

Well 165 has a patch of tumble mustard on the southern edge of the disturbed area (Figure B-22). Cheatgrass appears to be heavier on the south side than on the north side of the well head.

Off-road vehicle use is evident at Well 166 and an area of bare ground is located on the north east side (Figure B-23). However, there is a good mixture of native perennial grasses including Sandberg bluegrass, Indian rice grass, and needle and thread grass.

The disturbed area at Well 215 is indistinguishable from background (Figure B-24). Wells 201A (Figure B-25) and 209 (Figure B-26) are located just off the berm of the INTEC percolation ponds. The disturbed areas contain very high concentrations of cheatgrass and tumble mustard. Native grasses, where present, are doing well, and shrubs, especially green rabbitbrush, are also reestablishing.

In 2010, digital camera sampling and analysis was used to assess the recovery of Wells 164A and 164B and Wells 199, 200, and 205. Disturbed and background transects were located as shown in Figure 10, and GPS coordinates are located in Appendix C. The following discussion details results for the locations at the VZRP that were sampled on June 22, 2010:

8.1.1.1 Wells 164A and 164B

Two transects were placed parallel to each other through the disturbed area (Figure 10). Perennial cover has reached 68.1% of background (Table A-7, Figure B-28), and there is not a significant difference between mean percent perennial cover for the background and disturbed areas ($p = 0.152$). However, the mean percentage of grass within the disturbed area is significantly higher than in the background ($p = 0.029$), while the mean percentages for forbs and shrubs were significantly lower ($p = 0.035$ and $p = < 0.001$). The disturbed area at this location has not yet achieved final stabilization. Bottlebrush squirreltail, shaggy fleabane, and thickspiked wheatgrass are the most common native species in the disturbed area. Green rabbitbrush is also establishing well.

8.1.1.2 Wells 199, 200, 205

Figure 11 shows transects at Wells 199, 200, and 205. The disturbed area at this location has achieved final stabilization. Cover in the disturbed area is 97.8% of background (Table A-8), and there is not a significant difference between mean percent perennial cover in the background and disturbed areas (p = 0..882) Mean percent forb cover is significantly higher in the background than in the disturbed area (p = 0.006). Thickspiked wheatgrass, green rabbitbrush, sagebrush, and fleabane have colonized the site. Western tansymustard and cheatgrass are also present. Figure B-29 shows vegetation typical of the location.

8.2 Actions and Resolutions

The disturbed area surrounding wells 199, 200, and 205 has achieved final stabilization.

Wells 202A, 203, 204, and Well 167 still exhibits a high concentration of annual species such as tansymustard and cheatgrass. The digital camera sampling and analysis method will be performed in 2011 and the results compared with the 2009 evaluation to see if there has been any change.

For wells 191, 192, 193, 208, 213, and 1784, it was recommended in the 2009 report that additional signs be added to prevent vehicle excursion off-road. In 2009, it was determined these wells had met the 70% revegetation requirement. Based on the minimal vehicle disturbance observed in 2010, additional signs are not required.

Wells 164C, 165, 166, and 215 will be assessed using the digital camera sampling and analysis method in 2011 to determine if they meet the requirements for final stabilization.

The disturbed areas at well locations 201A and 209 will be visually evaluated in 2011.

The recommendations in the 2009 report for wells 164A and 164B included signs prohibiting the use of the area as a vehicle turn-around, accompanied by better vehicle barriers, e.g. fencing, are needed. Russian thistle should be controlled adjacent to the road. Additionally, the 2009 report stated wood chips in some locations in the disturbed area appear to be thick and impeding re-establishment of vegetation. Chips should be re-scattered and thinned if this can be completed without disturbing the re-establishing perennial vegetation.

During the 2010 review of wells 164A and 164B, it was noted that there is a sign designating the area as a revegetation site near the well heads. In addition, there was little indication of vehicle disturbance around most of the wells this year. Similar to other revegetation sites, Russian thistle abundance is significantly lower along the entire VZRP road than it was in 2009. Only one small Russian thistle plant was actually observed. Thick accumulations of wood chips could not be located. As discussed in Section 8.1.1.1, the disturbed area was 68.1% of background. Therefore, the digital camera sampling and analysis method will be performed on these well sites in 2011.

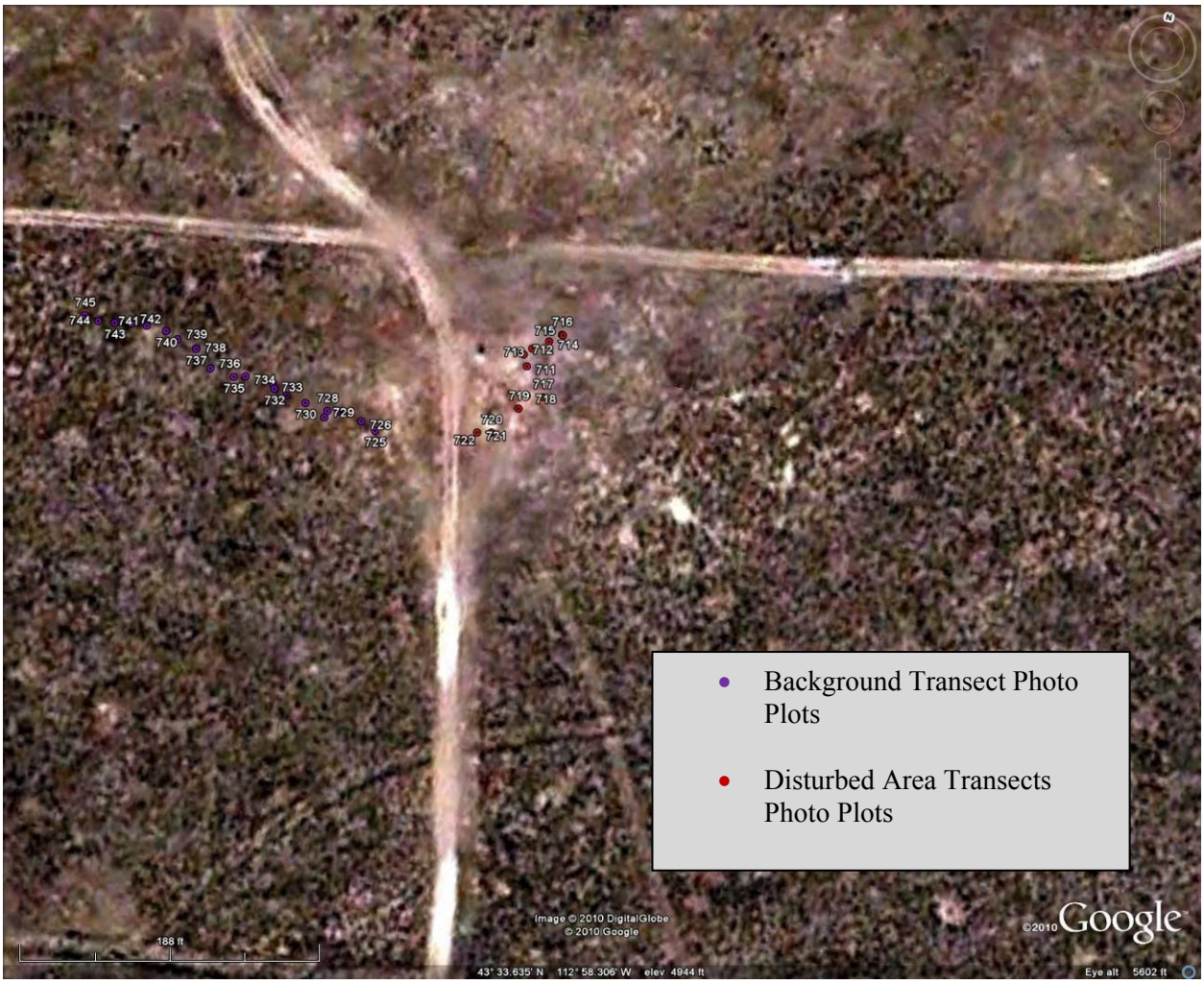

Figure 10. Transect Locations at Wells 164A and 164B.

Figure 11. Transect locations at Wells, 199, 200, and 205.

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Appendix A
Assessment Summary Tables

Table A-1. Comparison of Power Cable Corridor revegetation to background vegetation.

Category	% in Background	% in Disturbed Area	Disturbed Percentage of Background
Cover% (STD)	35.8 (8.74)	22.4 (19.86)	62.6
Grass% (STD)	35.6 (8.73)	19.0 (16.56)	53.4
Forb% (STD)	0.25 (.0.590)	3.41 (15.99)	1364
Shrub% (STD)	0.00 (0.00)	0.00 (0.00)	N/A
Cactus%(STD)	0.00 (0.00)	0.00 (0.00)	N/A
Litter% (STD)	35.1 (12.87)	28.6 (13.86)	81.5
Soil% (STD)	25.0 (15.29)	22.9 (20.02)	91.6
Rock% (STD)	0.9 (1.37)	6.3 (16.48)	700
Unknown% (STD)	0.7 (1.25)	1.0 (0.92)	142.9
Annual% (STD)	2.6 (4.06)	18.9 (23.8)	726.9
# of Quadrates Used for Background: 32 # of Total Sample Points Used for Background: 2048 # of Quadrates Used for Disturbed Area: 22 # of Total Sample Points Used for Disturbed Area: 1408			

Table A-2. Comparison of the east side of MFC-736 location of the Equipment Enclosure, Search Station, and Security Guardhouse revegetation to background vegetation.

Category	% in Background	% in Disturbed Area	Disturbed Percentage of Background
Cover% (STD)	34.1 (10.04)	27.3 (16.29)	79.5
Grass% (STD)	33.7 (9.96)	24.8 (15.70)	73.6
Forb% (STD)	0.4 (0.69)	0.8 (2.79)	233.2
Shrub% (STD)	0 (0.00)	1.48 (3.01)	N/A
Cactus%(STD)	0 (0.00)	0 (0.00)	N/A
Litter% (STD)	33.5 (14.49)	24.6 (18.62)	73.4
Soil% (STD)	26.9 (17.5)	23.0 (13.68)	85.5
Rock% (STD)	0.9(1.50)	18.7 (27.14)	2077.8
Unknown% (STD)	0.9(1.42)	0.8(1.34)	88.9
Annual% (STD)	3.8 (4.44)	5.9 (9.27)	155.3
# of Quadrates Used for Background: 22 # of Total Sample Points Used for Background: 1408 # of Quadrates Used for Disturbed Area: 35 # of Total Sample Points Used for Disturbed Area: 2240			

Table A-3. Comparison of revegetation of the Septic Tank Drain Field to background vegetation.

Category	% in Background	% in Disturbed Area	Disturbed Percentage of Background
Cover% (STD)	39.5 (2.34)	31.3 (13.76)	79.2
Grass% (STD)	39.5 (2.34)	30.2 (13.92)	76.5
Forb% (STD)	0.00 (0.00)	0.9 (1.56)	N/A
Shrub% (STD)	0.00 (0.00)	0.1 (0.46)	N/A
Cactus%(STD)	0.00 (0.00)	0.00 (0.00)	N/A
Litter% (STD)	38.6 (7.77)	24.8 (8.06)	64.2
Soil% (STD)	20.8 (7.84)	31.5 (10.04)	151.4
Rock% (STD)	1.0 (1.10)	2.4 (3.80)	240.0
Unknown% (STD)	0.2 (0.51)	0.3 (0.62)	150.0
Annual% (STD)	0.00 (0.00)	9.90 (11.45)	N/A
# of Quadrates Used for Background: 10 # of Total Sample Points Used for Background: 640 # of Quadrates Used for Disturbed Area: 12 # of Total Sample Points Used for Disturbed Area: 768			

Table A-4. Comparison of revegetation of Power Pole 170 to background vegetation.

Category	% in Background	% in Disturbed Area	Disturbed Percentage of Background
Cover% (STD)	25.3 (11.36)	29.4 (8.60)	116.2
Grass% (STD)	18.8 (8.41)	26.2 (9.73)	139
Forb% (STD)	2.5 (2.63)	0.00 (0.00)	0
Shrub% (STD)	3.7 (6.76)	3.1 (3.31)	83.8
Cactus%(STD)	0.3 (0.72)	0.00 (0.00)	0
Litter% (STD)	34.1 (18.66)	52.2 (19.21)	153
Soil% (STD)	27.8 (14.00)	12.5 (20.17)	45
Rock% (STD)	9.1 (10.10)	1.3 (1.30)	14.9
Unknown% (STD)	3.8 (3.24)	2.8 (1.29)	73.7
Annual% (STD)	0.00 (0.00)	1.9 (1.70)	N/A
# of Quadrates Used for Background: 5 # of Total Sample Points Used for Background: 320 # of Quadrates Used for Disturbed Area: 5 # of Total Sample Points Used for Disturbed Area: 320			

Table A-5. Comparison of revegetation of Power Pole 176 to background vegetation.

Category	% in Background	% in Disturbed Area	Disturbed Percentage of Background
Cover% (STD)	26.0 (13.33)	25.7 (10.18)	98.8
Grass% (STD)	16.7 (12.9)	23.0 (9.86)	138
Forb% (STD)	2.3 (3.80)	0.2 (0.52)	8.7
Shrub% (STD)	7.0 (10.26)	2.5 (4.58)	35.7
Cactus%(STD)	0.00 (0.00)	0.00 (0.00)	N/A
Litter% (STD)	14.8 (7.75)	64.4 (12.64)	435
Soil% (STD)	39.6 (15.41)	4.9 (5.65)	12.4
Rock% (STD)	13.5 (9.13)	1.1 (2.00)	8.4
Unknown% (STD)	2.2 (1.94)	1.8 (1.44)	81.8
Annual% (STD)	4.0 (4.10)	2.1 (1.69)	52.5
# of Quadrates Used for Background: 18 # of Total Sample Points Used for Background: 1152 # of Quadrates Used for Disturbed Area: 18 # of Total Sample Points Used for Disturbed Area: 1152			

Table A-6. Comparison of revegetation of Power Pole 181 to background vegetation.

Category	% in Background	% in Disturbed Area	Disturbed Percentage of Background
Cover% (STD)	25.0 (5.76)	21.9 (9.84)	87.6
Grass% (STD)	13.3 (6.48)	9.7 (4.78)	72.9
Forb% (STD)	3.9 (2.56)	11.5 (7.74)	294.9
Shrub% (STD)	7.3 (8.17)	0.8 (1.30)	11.0
Cactus%(STD)	0.5 (1.27)	0.00 (0.00)	N/A
Litter% (STD)	28.2 (5.93)	74.5 (10.91)	264.0
Soil% (STD)	44.8 (9.28)	2.1 (1.26)	4.7
Rock% (STD)	1.3 (1.17)	0.00 (0.00)	N/A
Unknown% (STD)	0.3 (0.65)	0.8 (0.88)	266.7
Annual% (STD)	0.5 (1.27)	0.8 (1.92)	160.0
# of Quadrates Used for Background: 6 # of Total Sample Points Used for Background: 384 # of Quadrates Used for Disturbed Area: 6 # of Total Sample Points Used for Disturbed Area: 384			

Table A-7. Comparison of revegetation of wells 164A and 164B to background vegetation.

Category	% in Background	% in Disturbed Area	Disturbed Percentage of Background
Cover% (STD)	36.7 (12.44)	25.0 (24.92)	68.1
Grass% (STD)	24.7 (14.46)	25.0 (24.92)	101.0
Forb% (STD)	1.8 (3.22)	0.00 (0.00)	0
Shrub% (STD)	10.1 (13.10)	0.00 (0.00)	0
Cactus%(STD)	0.1 (0.36)	0.00 (0.00)	0
Litter% (STD)	29.0 (10.84)	40.6 (15.46)	140.0
Soil% (STD)	18.4 (9.22)	12.3 (12.28)	66.8
Rock% (STD)	9.6 (10.64)	3.7 (4.88)	38.5
Unknown% (STD)	1.0 (1.05)	0.9 (0.97)	90.0
Annual% (STD)	5.4 (4.25)	17.5 (20.48)	324.1
# of Quadrates Used for Background: 20 # of Total Sample Points Used for Background: 1280 # of Quadrates Used for Disturbed Area: 18 # of Total Sample Points Used for Disturbed Area: 1152			

Table A-8. Comparison of revegetation of wells 199, 200, 205.

Category	% in Background	% in Disturbed Area	Disturbed Percentage of Background
Cover% (STD)	26.8 (11.57)	26.2 (14.38)	97.8
Grass% (STD)	18.0 (11.63)	23.3 (14.91)	129.4
Forb% (STD)	7.2 (6.41)	1.7 (2.78)	23.6
Shrub% (STD)	1.7 (3.10)	1.2 (4.64)	70.6
Cactus%(STD)	0.00 (0.00)	0.00 (0.00)	N/A
Litter% (STD)	15.4 (7.10)	19.8 (8.48)	129
Soil% (STD)	13.5 (5.20)	15.4 (9.36)	115
Rock% (STD)	20.5 (10.94)	12.6 (8.32)	61.5
Unknown% (STD)	2.1 (1.47)	1.3 (1.11)	61.9
Annual% (STD)	21.8 (14.6)	24.8 (14.6)	113.8
# of Quadrates Used for Background: 19 # of Total Sample Points Used for Background: 1216 # of Quadrates Used for Disturbed Area: 19 # of Total Sample Points Used for Disturbed Area: 1216			

Appendix B

FY 2009 Revegetation Photographs

Figure B-1. Southwest Big Loop Trench at the GI.

Figure B-2. Middle Big Loop Trench at the GI.

Figure B-3. Northeast Big Loop Trench at the GI.

Figure B-4. Long Saddle Trench at the GI.

Figure B-5. West Saddle Trench at the GI.

Figure B-6. East Saddle Trench at the GI.

Figure B-7. East BLR-8 Trench at the GI.

Figure B-8. West BLR-8 Trench at the GI.

Figure B-9. Background vegetation plot at the MFC Equipment Enclosure, Security Guardhouse and Search Station Power Cable Corridor, and Septic Tank Drank Field.

Figure B-10. Disturbed Vegetation Plot for the Power Cable Corridor.

Figure B-11. Disturbed area vegetation plot at the MFC Equipment Enclosure, Security Guardhouse and Search Station.

Figure B-12 Disturbed area vegetation plot for the Septic Tank Drain Field.

Figure B-13. Overview of the MFC Vehicle Barrier Project.

Figure B-14. Background plot for the NSTR Project.

Figure B-15. Disturbed vegetation near power pole 179.

Figure B-16. Disturbed area at the east end of the NSTR access road.

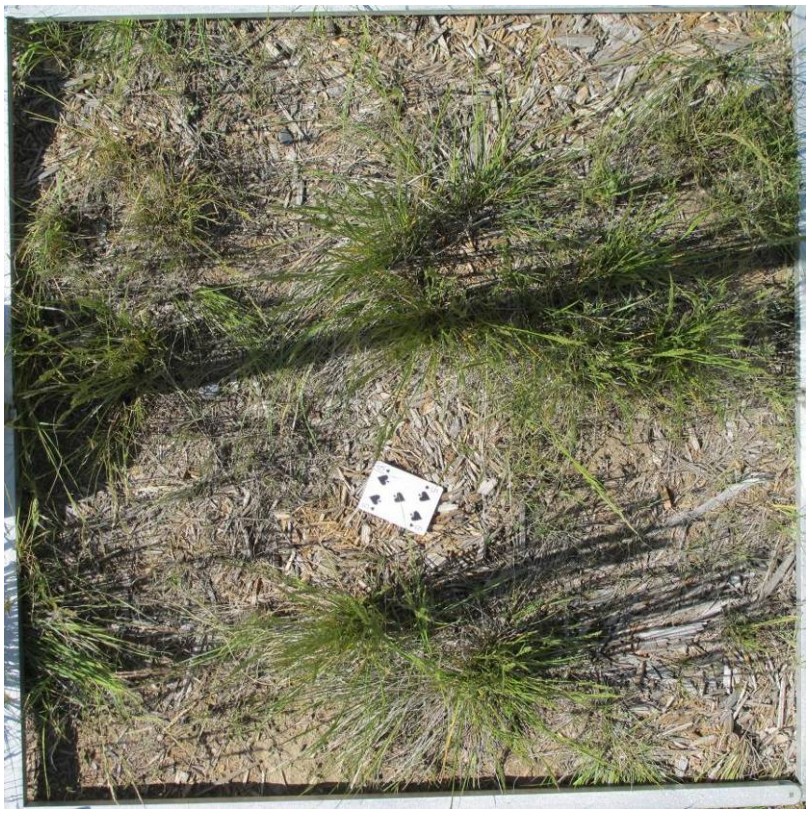

Figure B-17. Disturbed vegetation plot at Power Pole 170.

Figure B-18. Burned area near Power Pole 170.

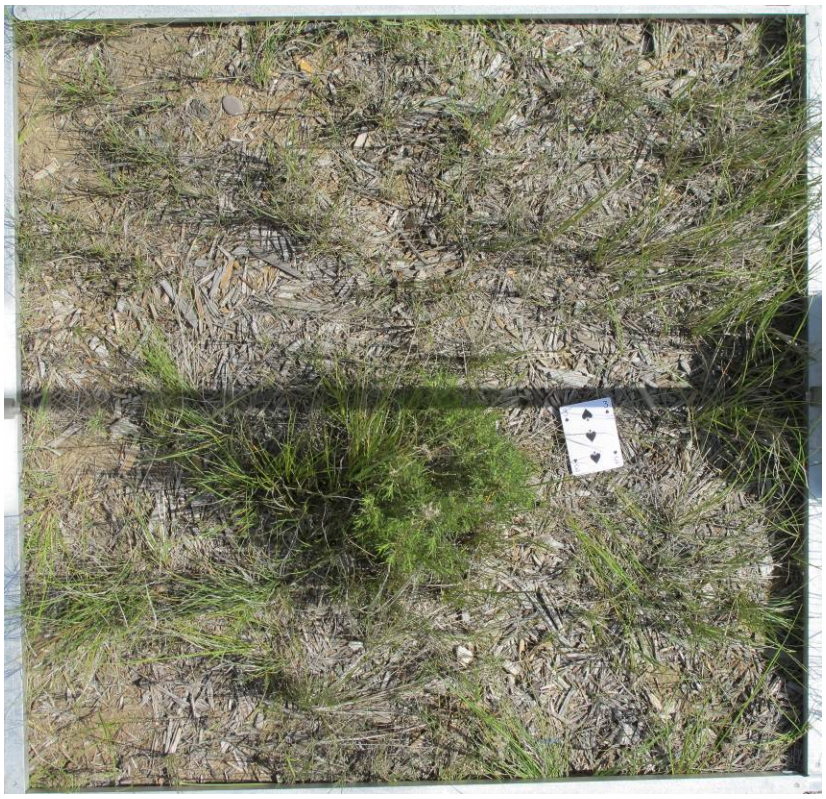

Figure B-19. Disturbed vegetation plot at Power Pole 176.

Figure B-20. Burned area near Power Pole 176.

Figure B-21. Disturbed vegetation plot at Power Pole 181.

Figure B-22. VZRP Well 165.

Figure B-23. VZRP Well 166.

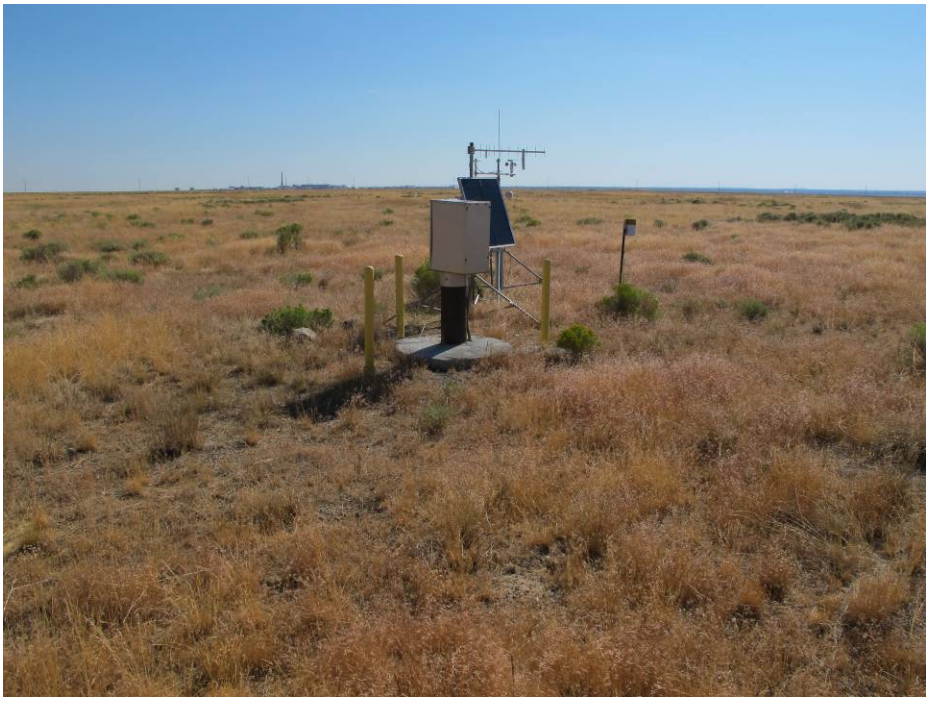

Figure B-24. VZRP Well 215.

Figure B-25. VZRP Well 201A.

Figure B-26. VZRP Well 209.

Figure B-27. Background vegetation plot at the VZRP.

Figure B-28. Disturbed vegetation plot at Wells 164A and 164B.

Figure B-29. Disturbed vegetation plot at Wells 199, 200, and 205.

Appendix C

GPS Coordinates

Table C-1. GPS Coordinates for the MFC Power Cable Corridor

DTSB	Date and Time	Coordinates	Elevation
784	30-JUN-10 8:14:46AM	N43 35.848 W112 39.725	5126 ft
785	30-JUN-10 8:15:34AM	N43 35.870 W112 39.727	5142 ft
786	30-JUN-10 9:23:34AM	N43 35.415 W112 39.528	5159 ft
787	30-JUN-10 9:28:28AM	N43 35.341 W112 39.519	5163 ft
788	30-JUN-10 9:31:58AM	N43 35.311 W112 39.527	5158 ft
789	30-JUN-10 9:35:02AM	N43 35.296 W112 39.521	5153 ft
790	30-JUN-10 9:37:23AM	N43 35.282 W112 39.521	5158 ft
791	30-JUN-10 9:41:04AM	N43 35.240 W112 39.519	5158 ft
792	30-JUN-10 9:44:08AM	N43 35.196 W112 39.528	5163 ft
793	30-JUN-10 9:47:49AM	N43 35.166 W112 39.521	5181 ft
794	30-JUN-10 9:50:11AM	N43 35.153 W112 39.527	5177 ft
795	30-JUN-10 9:52:25AM	N43 35.128 W112 39.528	5175 ft
796	30-JUN-10 9:56:13AM	N43 35.064 W112 39.519	5185 ft
797	30-JUN-10 9:59:27AM	N43 35.034 W112 39.510	5185 ft
798	30-JUN-10 10:03:56AM	N43 34.974 W112 39.506	5191 ft
799	30-JUN-10 10:07:58AM	N43 34.916 W112 39.504	5181 ft
800	30-JUN-10 10:09:45AM	N43 34.908 W112 39.505	5195 ft
801	30-JUN-10 10:13:07AM	N43 34.880 W112 39.500	5192 ft
802	30-JUN-10 10:16:11AM	N43 34.852 W112 39.498	5189 ft
803	30-JUN-10 10:17:36AM	N43 34.855 W112 39.500	5197 ft
804	30-JUN-10 10:20:15AM	N43 34.820 W112 39.498	5194 ft
805	30-JUN-10 10:23:45AM	N43 34.778 W112 39.493	5200 ft
806	30-JUN-10 10:26:59AM	N43 34.735 W112 39.489	5201 ft
807	30-JUN-10 10:30:09AM	N43 34.720 W112 39.501	5200 ft
Note: Background vegetation for the Power Cable Corridor was the same vegetation type as that around the Equipment Enclosure, Security Guardhouse, Search Station, and Septic Tank Drain Field. Background transects for those locations were combined to provide a reference background for the Power Cable Corridor. Please see Tables C-2 and C-3 for those background coordinates.			

Table C-2. GPS Coordinates for the MFC Equipment Enclosure, Search Station, and Guardhouse

DSTB	Date and Time	Coordinates	Elevation	Transect
627	21-JUN-10 12:23:42PM	N43 34.654 W112 39.432	5209 ft	T1
628	21-JUN-10 12:24:38PM	N43 34.653 W112 39.430	5204 ft	
629	21-JUN-10 12:25:24PM	N43 34.650 W112 39.425	5181 ft	
630	21-JUN-10 12:26:12PM	N43 34.653 W112 39.423	5195 ft	
631	21-JUN-10 12:27:03PM	N43 34.655 W112 39.421	5188 ft	
632	21-JUN-10 12:27:32PM	N43 34.656 W112 39.420	5199 ft	
633	21-JUN-10 12:27:56PM	N43 34.655 W112 39.418	5200 ft	
634	21-JUN-10 12:28:24PM	N43 34.657 W112 39.416	5202 ft	
635	21-JUN-10 12:29:16PM	N43 34.657 W112 39.413	5202 ft	
636	21-JUN-10 12:29:39PM	N43 34.657 W112 39.411	5206 ft	
637	21-JUN-10 12:31:29PM	N43 34.676 W112 39.410	5214 ft	T2
638	21-JUN-10 12:32:05PM	N43 34.676 W112 39.411	5209 ft	
639	21-JUN-10 12:32:39PM	N43 34.677 W112 39.413	5207 ft	
640	21-JUN-10 12:33:16PM	N43 34.675 W112 39.416	5209 ft	
641	21-JUN-10 12:33:45PM	N43 34.675 W112 39.420	5208 ft	
642	21-JUN-10 12:33:55PM	N43 34.675 W112 39.419	5203 ft	
643	21-JUN-10 12:35:02PM	N43 34.674 W112 39.421	5206 ft	
644	21-JUN-10 12:35:27PM	N43 34.674 W112 39.425	5200 ft	
645	21-JUN-10 12:36:12PM	N43 34.675 W112 39.426	5199 ft	
646	21-JUN-10 12:36:36PM	N43 34.675 W112 39.427	5218 ft	
647	21-JUN-10 12:37:09PM	N43 34.675 W112 39.430	5205 ft	
648	21-JUN-10 12:37:32PM	N43 34.674 W112 39.428	5181 ft	
649	21-JUN-10 12:38:05PM	N43 34.673 W112 39.433	5184 ft	
650	21-JUN-10 12:39:44PM	N43 34.692 W112 39.443	5207 ft	T3
651	21-JUN-10 12:40:25PM	N43 34.691 W112 39.438	5208 ft	
652	21-JUN-10 12:41:02PM	N43 34.691 W112 39.436	5213 ft	
653	21-JUN-10 12:41:37PM	N43 34.692 W112 39.434	5200 ft	
654	21-JUN-10 12:42:20PM	N43 34.689 W112 39.422	5222 ft	
655	21-JUN-10 12:43:30PM	N43 34.693 W112 39.429	5207 ft	
656	21-JUN-10 12:44:02PM	N43 34.691 W112 39.425	5228 ft	
657	21-JUN-10 12:44:21PM	N43 34.691 W112 39.425	5220 ft	
658	21-JUN-10 12:45:35PM	N43 34.690 W112 39.424	5241 ft	
659	21-JUN-10 12:45:58PM	N43 34.689 W112 39.425	5311 ft	
660	21-JUN-10 12:47:30PM	N43 34.693 W112 39.417	5239 ft	
661	21-JUN-10 12:48:02PM	N43 34.691 W112 39.412	5247 ft	
BKGD				
662	21-JUN-10 12:52:09PM	N43 34.692 W112 39.403	5205 ft	T1
663	21-JUN-10 12:53:08PM	N43 34.694 W112 39.404	5215 ft	
664	21-JUN-10 12:54:10PM	N43 34.697 W112 39.401	5226 ft	
665	21-JUN-10 12:55:17PM	N43 34.697 W112 39.403	5212 ft	
666	21-JUN-10 12:56:01PM	N43 34.697 W112 39.404	5212 ft	
667	21-JUN-10 12:56:45PM	N43 34.701 W112 39.404	5209 ft	

668	21-JUN-10 12:57:18PM	N43 34.705 W112 39.404	5212 ft	
669	21-JUN-10 12:57:57PM	N43 34.706 W112 39.404	5204 ft	
670	21-JUN-10 12:59:11PM	N43 34.709 W112 39.403	5199 ft	
671	21-JUN-10 12:59:58PM	N43 34.711 W112 39.403	5210 ft	
672	21-JUN-10 1:00:36PM	N43 34.713 W112 39.403	5212 ft	
673	21-JUN-10 1:01:58PM	N43 34.712 W112 39.396	5189 ft	T2
674	21-JUN-10 1:02:51PM	N43 34.709 W112 39.394	5200 ft	
675	21-JUN-10 1:03:23PM	N43 34.707 W112 39.395	5204 ft	
676	21-JUN-10 1:04:07PM	N43 34.705 W112 39.395	5208 ft	
677	21-JUN-10 1:04:45PM	N43 34.704 W112 39.396	5206 ft	
678	21-JUN-10 1:05:28PM	N43 34.701 W112 39.396	5211 ft	
679	21-JUN-10 1:06:07PM	N43 34.699 W112 39.394	5208 ft	
680	21-JUN-10 1:06:36PM	N43 34.697 W112 39.394	5212 ft	
681	21-JUN-10 1:07:31PM	N43 34.695 W112 39.393	5214 ft	
682	21-JUN-10 1:08:15PM	N43 34.692 W112 39.394	5215 ft	
683	21-JUN-10 1:08:49PM	N43 34.690 W112 39.394	5206 ft	

Table C-3. GPS Coordinates for the MFC Septic Tank Drain Field

DSTB	Date and Time	Coordinates	Elevation	Transect
684	21-JUN-10 1:13:40PM	N43 34.621 W112 39.465	5197 ft	T1
685	21-JUN-10 1:14:28PM	N43 34.620 W112 39.466	5197 ft	
686	21-JUN-10 1:15:24PM	N43 34.620 W112 39.470	5195 ft	
687	21-JUN-10 1:15:54PM	N43 34.618 W112 39.472	5200 ft	
688	21-JUN-10 1:16:28PM	N43 34.617 W112 39.476	5198 ft	
689	21-JUN-10 1:17:58PM	N43 34.613 W112 39.478	5203 ft	T2
690	21-JUN-10 1:18:42PM	N43 34.614 W112 39.474	5204 ft	
691	21-JUN-10 1:19:23PM	N43 34.614 W112 39.471	5196 ft	
692	21-JUN-10 1:20:02PM	N43 34.614 W112 39.467	5204 ft	
693	21-JUN-10 1:20:10PM	N43 34.614 W112 39.468	5202 ft	
694	21-JUN-10 1:21:46PM	N43 34.613 W112 39.461	5206 ft	
695	21-JUN-10 1:22:23PM	N43 34.612 W112 39.458	5208 ft	
BKGD				
696	21-JUN-10 1:24:17PM	N43 34.606 W112 39.460	5196 ft	
697	21-JUN-10 1:25:01PM	N43 34.603 W112 39.459	5202 ft	
698	21-JUN-10 1:25:38PM	N43 34.601 W112 39.458	5206 ft	
699	21-JUN-10 1:26:27PM	N43 34.599 W112 39.459	5191 ft	
700	21-JUN-10 1:27:00PM	N43 34.597 W112 39.459	5196 ft	
701	21-JUN-10 1:27:39PM	N43 34.593 W112 39.462	5195 ft	
702	21-JUN-10 1:28:49PM	N43 34.591 W112 39.461	5190 ft	
703	21-JUN-10 1:29:23PM	N43 34.589 W112 39.460	5192 ft	
704	21-JUN-10 1:30:02PM	N43 34.588 W112 39.461	5195 ft	
705	21-JUN-10 1:30:36PM	N43 34.586 W112 39.460	5203 ft	
706	21-JUN-10 1:31:22PM	N43 34.585 W112 39.460	5206 ft	

Table C-4. Coordinates for NSTR Power Pole 170

DSTB	Date and Time	Coordinates	Elevation
563	10-JUN-10 10:15:19AM	N43 40.041 W112 40.405	5003 ft
564	10-JUN-10 10:16:44AM	N43 40.024 W112 40.406	4984 ft
565	10-JUN-10 10:17:24AM	N43 40.030 W112 40.411	4981 ft
566	10-JUN-10 10:19:03AM	N43 40.034 W112 40.415	4973 ft
567	10-JUN-10 10:19:59AM	N43 40.034 W112 40.414	4963 ft
BKGD			
568	10-JUN-10 10:20:50AM	N43 40.033 W112 40.417	4963 ft
569	10-JUN-10 10:21:43AM	N43 40.031 W112 40.418	4958 ft
570	10-JUN-10 10:22:34AM	N43 40.034 W112 40.419	4932 ft
571	10-JUN-10 10:23:04AM	N43 40.031 W112 40.421	4951 ft
572	10-JUN-10 10:24:20AM	N43 40.032 W112 40.412	4960 ft

Table C-5. Coordinates for the NSTR Power Pole 176

DSTB	Date and Time	Coordinates	Elevation
573	10-JUN-10 10:41:30AM	N43 40.655 W112 40.357	4928 ft
574	10-JUN-10 10:41:59AM	N43 40.656 W112 40.356	4924 ft
575	10-JUN-10 10:42:56AM	N43 40.657 W112 40.356	4928 ft
576	10-JUN-10 10:43:47AM	N43 40.659 W112 40.354	4924 ft
577	10-JUN-10 10:44:13AM	N43 40.660 W112 40.353	4928 ft
578	10-JUN-10 10:45:06AM	N43 40.663 W112 40.354	4930 ft
579	10-JUN-10 10:45:40AM	N43 40.664 W112 40.354	4932 ft
580	10-JUN-10 10:46:32AM	N43 40.666 W112 40.354	4934 ft
581	10-JUN-10 10:47:04AM	N43 40.667 W112 40.353	4930 ft
582	10-JUN-10 10:47:43AM	N43 40.668 W112 40.353	4928 ft
583	10-JUN-10 10:47:58AM	N43 40.670 W112 40.353	4928 ft
584	10-JUN-10 10:48:46AM	N43 40.673 W112 40.353	4926 ft
585	10-JUN-10 10:49:21AM	N43 40.674 W112 40.353	4926 ft
586	10-JUN-10 10:49:53AM	N43 40.676 W112 40.353	4926 ft
587	10-JUN-10 10:50:10AM	N43 40.678 W112 40.352	4924 ft
588	10-JUN-10 10:50:57AM	N43 40.679 W112 40.352	4925 ft
589	10-JUN-10 10:51:19AM	N43 40.681 W112 40.351	4926 ft
590	10-JUN-10 10:51:41AM	N43 40.680 W112 40.351	4928 ft
591	10-JUN-10 10:51:59AM	N43 40.683 W112 40.352	4929 ft
592	10-JUN-10 10:52:51AM	N43 40.684 W112 40.351	4927 ft
BKGD			
593	10-JUN-10 10:54:20AM	N43 40.686 W112 40.361	4928 ft
594	10-JUN-10 10:55:24AM	N43 40.684 W112 40.363	4928 ft
595	10-JUN-10 10:55:51AM	N43 40.683 W112 40.364	4928 ft
596	10-JUN-10 10:56:23AM	N43 40.681 W112 40.365	4927 ft
597	10-JUN-10 10:56:57AM	N43 40.679 W112 40.364	4926 ft
598	10-JUN-10 10:57:25AM	N43 40.678 W112 40.364	4931 ft
599	10-JUN-10 10:57:53AM	N43 40.676 W112 40.365	4931 ft
600	10-JUN-10 10:58:43AM	N43 40.674 W112 40.366	4930 ft
601	10-JUN-10 10:59:11AM	N43 40.673 W112 40.366	4925 ft
602	10-JUN-10 10:59:55AM	N43 40.670 W112 40.367	4928 ft
603	10-JUN-10 11:00:30AM	N43 40.670 W112 40.366	4938 ft
604	10-JUN-10 11:00:50AM	N43 40.668 W112 40.367	4933 ft
605	10-JUN-10 11:01:27AM	N43 40.666 W112 40.369	4927 ft
606	10-JUN-10 11:01:59AM	N43 40.663 W112 40.369	4928 ft
607	10-JUN-10 11:02:29AM	N43 40.662 W112 40.368	4925 ft
608	10-JUN-10 11:02:33AM	N43 40.662 W112 40.368	4923 ft
609	10-JUN-10 11:02:50AM	N43 40.662 W112 40.368	4924 ft
610	10-JUN-10 11:03:32AM	N43 40.661 W112 40.368	4926 ft
611	10-JUN-10 11:04:06AM	N43 40.657 W112 40.369	4917 ft
612	10-JUN-10 11:04:39AM	N43 40.656 W112 40.370	4923 ft

Table C-6. Coordinates for the NSTR Power Pole 181

DSTB	Date and Time	Coordinates	Elevation
614	10-JUN-10 11:34:35AM	N43 41.279 W112 40.328	4879 ft
615	10-JUN-10 11:35:22AM	N43 41.280 W112 40.327	4868 ft
616	10-JUN-10 11:35:52AM	N43 41.282 W112 40.328	4869 ft
617	10-JUN-10 11:36:17AM	N43 41.284 W112 40.328	4869 ft
618	10-JUN-10 11:36:48AM	N43 41.285 W112 40.328	4872 ft
619	10-JUN-10 11:37:17AM	N43 41.289 W112 40.331	4868 ft
BKGD			
620	10-JUN-10 11:38:12AM	N43 41.290 W112 40.334	4846 ft
621	10-JUN-10 11:38:40AM	N43 41.287 W112 40.333	4861 ft
622	10-JUN-10 11:39:11AM	N43 41.285 W112 40.333	4870 ft
623	10-JUN-10 11:39:41AM	N43 41.283 W112 40.333	4870 ft
624	10-JUN-10 11:39:57AM	N43 41.281 W112 40.332	4869 ft
625	10-JUN-10 11:40:50AM	N43 41.280 W112 40.331	4872 ft

Table C-7. Coordinates for VZRP Wells 164A and 164B

DSTB	Date and Time	Coordinates	Elevation	Transect
707	22-JUN-10 9:30:23AM	N43 35.880 W112 39.718		T1
708	22-JUN-10 9:31:19AM	N43 35.880 W112 39.718		
709	22-JUN-10 9:31:56AM	N43 33.643 W112 58.281	5170 ft	
710	22-JUN-10 9:32:25AM	N43 33.644 W112 58.280	5167 ft	
711	22-JUN-10 9:32:46AM	N43 33.646 W112 58.320	5094 ft	
712	22-JUN-10 9:33:22AM	N43 33.648 W112 58.321	5018 ft	
713	22-JUN-10 9:33:57AM	N43 33.648 W112 58.320	4995 ft	
714	22-JUN-10 9:34:38AM	N43 33.650 W112 58.318	4979 ft	
715	22-JUN-10 9:34:58AM	N43 33.650 W112 58.316	4976 ft	
716	22-JUN-10 9:35:09AM	N43 33.650 W112 58.316	4975 ft	T2
717	22-JUN-10 9:36:24AM	N43 33.644 W112 58.317	4975 ft	
718	22-JUN-10 9:37:00AM	N43 33.643 W112 58.320	4978 ft	
719	22-JUN-10 9:37:32AM	N43 33.642 W112 58.320	4970 ft	
720	22-JUN-10 9:38:18AM	N43 33.639 W112 58.323	4969 ft	
721	22-JUN-10 9:38:46AM	N43 33.639 W112 58.325	4976 ft	
722	22-JUN-10 9:39:37AM	N43 33.638 W112 58.327	4978 ft	
723	22-JUN-10 9:40:16AM	N43 33.637 W112 58.330	4976 ft	
724	22-JUN-10 9:40:17AM	N43 33.636 W112 58.330	4976 ft	
BKGD				
725	22-JUN-10 9:43:30AM	N43 33.637 W112 58.340	4968 ft	
726	22-JUN-10 9:43:55AM	N43 33.637 W112 58.342	4970 ft	
727	22-JUN-10 9:44:37AM	N43 33.638 W112 58.345	4973 ft	
728	22-JUN-10 9:45:16AM	N43 33.638 W112 58.347	4981 ft	
729	22-JUN-10 9:45:49AM	N43 33.637 W112 58.347	4973 ft	
730	22-JUN-10 9:46:19AM	N43 33.638 W112 58.350	4975 ft	
731	22-JUN-10 9:46:47AM	N43 33.638 W112 58.353	4976 ft	
732	22-JUN-10 9:47:21AM	N43 33.639 W112 58.355	4980 ft	
733	22-JUN-10 9:47:53AM	N43 33.639 W112 58.356	4985 ft	
734	22-JUN-10 9:48:18AM	N43 33.640 W112 58.360	4983 ft	
735	22-JUN-10 9:49:05AM	N43 33.639 W112 58.361	4986 ft	
736	22-JUN-10 9:49:38AM	N43 33.640 W112 58.365	4984 ft	
737	22-JUN-10 9:50:01AM	N43 33.641 W112 58.367	4977 ft	
738	22-JUN-10 9:50:02AM	N43 33.641 W112 58.367	4977 ft	
739	22-JUN-10 9:50:47AM	N43 33.642 W112 58.370	4977 ft	
740	22-JUN-10 9:51:18AM	N43 33.642 W112 58.372	4979 ft	
741	22-JUN-10 9:51:47AM	N43 33.643 W112 58.375	4979 ft	
742	22-JUN-10 9:52:36AM	N43 33.642 W112 58.377	4976 ft	
743	22-JUN-10 9:53:16AM	N43 33.642 W112 58.379	4976 ft	
744	22-JUN-10 9:53:48AM	N43 33.642 W112 58.382	4977 ft	
745	22-JUN-10 9:54:26AM	N43 33.642 W112 58.384	4980 ft	

Table C-8. Coordinates for VZRP Wells 199, 200, and 205

DSTB	Date and Time	Coordinates	Elevation	Transect
746	22-JUN-10 10:53:11AM	N43 33.362 W112 58.299	4976 ft	T1
747	22-JUN-10 10:54:17AM	N43 33.361 W112 58.301	4969 ft	
748	22-JUN-10 10:54:45AM	N43 33.360 W112 58.301	4969 ft	
749	22-JUN-10 10:55:28AM	N43 33.358 W112 58.302	4973 ft	
750	22-JUN-10 10:55:52AM	N43 33.356 W112 58.303	4976 ft	
751	22-JUN-10 10:56:19AM	N43 33.355 W112 58.304	4976 ft	
752	22-JUN-10 10:56:47AM	N43 33.353 W112 58.305	4976 ft	
753	22-JUN-10 10:57:35AM	N43 33.349 W112 58.308	4976 ft	
754	22-JUN-10 10:57:59AM	N43 33.349 W112 58.307	4981 ft	
755	22-JUN-10 10:58:27AM	N43 33.348 W112 58.308	4974 ft	
756	22-JUN-10 10:58:59AM	N43 33.347 W112 58.309	4973 ft	
757	22-JUN-10 11:00:07AM	N43 33.346 W112 58.300	4969 ft	T2
758	22-JUN-10 11:00:36AM	N43 33.348 W112 58.302	4971 ft	
759	22-JUN-10 11:01:08AM	N43 33.349 W112 58.304	4974 ft	
760	22-JUN-10 11:01:50AM	N43 33.348 W112 58.305	4967 ft	
761	22-JUN-10 11:02:36AM	N43 33.350 W112 58.309	4976 ft	
762	22-JUN-10 11:03:03AM	N43 33.351 W112 58.311	4980 ft	
763	22-JUN-10 11:03:38AM	N43 33.353 W112 58.311	4966 ft	
764	22-JUN-10 11:04:07AM	N43 33.353 W112 58.313	4970 ft	
BKGD				
765	22-JUN-10 11:05:29AM	N43 33.357 W112 58.319	4971 ft	
766	22-JUN-10 11:05:52AM	N43 33.358 W112 58.321	4976 ft	
767	22-JUN-10 11:06:32AM	N43 33.359 W112 58.323	4975 ft	
768	22-JUN-10 11:07:01AM	N43 33.361 W112 58.324	4976 ft	
769	22-JUN-10 11:07:48AM	N43 33.362 W112 58.324	4969 ft	
770	22-JUN-10 11:08:12AM	N43 33.362 W112 58.326	4973 ft	
771	22-JUN-10 11:08:45AM	N43 33.364 W112 58.329	4976 ft	
772	22-JUN-10 11:09:29AM	N43 33.367 W112 58.332	4973 ft	
773	22-JUN-10 11:10:02AM	N43 33.368 W112 58.335	4980 ft	
774	22-JUN-10 11:10:31AM	N43 33.369 W112 58.337	4973 ft	
775	22-JUN-10 11:11:16AM	N43 33.369 W112 58.337	4971 ft	
776	22-JUN-10 11:12:04AM	N43 33.372 W112 58.342	4977 ft	
777	22-JUN-10 11:12:34AM	N43 33.373 W112 58.344	4977 ft	
778	22-JUN-10 11:13:02AM	N43 33.374 W112 58.346	4974 ft	
779	22-JUN-10 11:13:31AM	N43 33.376 W112 58.349	4973 ft	
780	22-JUN-10 11:14:03AM	N43 33.377 W112 58.351	4974 ft	
781	22-JUN-10 11:14:36AM	N43 33.379 W112 58.352	4961 ft	
782	22-JUN-10 11:15:06AM	N43 33.379 W112 58.354	4967 ft	
783	22-JUN-10 11:15:31AM	N43 33.380 W112 58.356	4970 ft	