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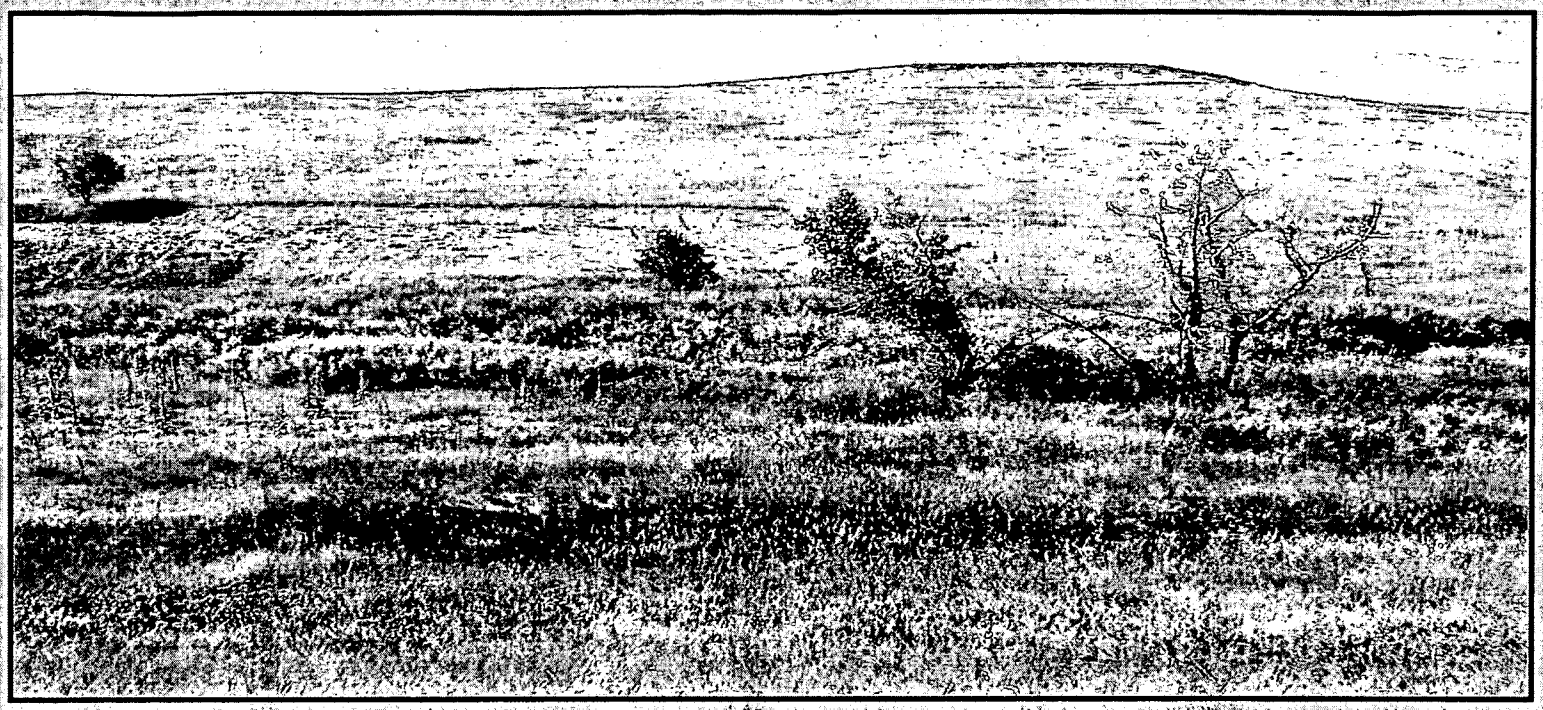
2005 USFWS Biological Opinion Annual Reports

for the Rocky Flats Environmental Technology Site



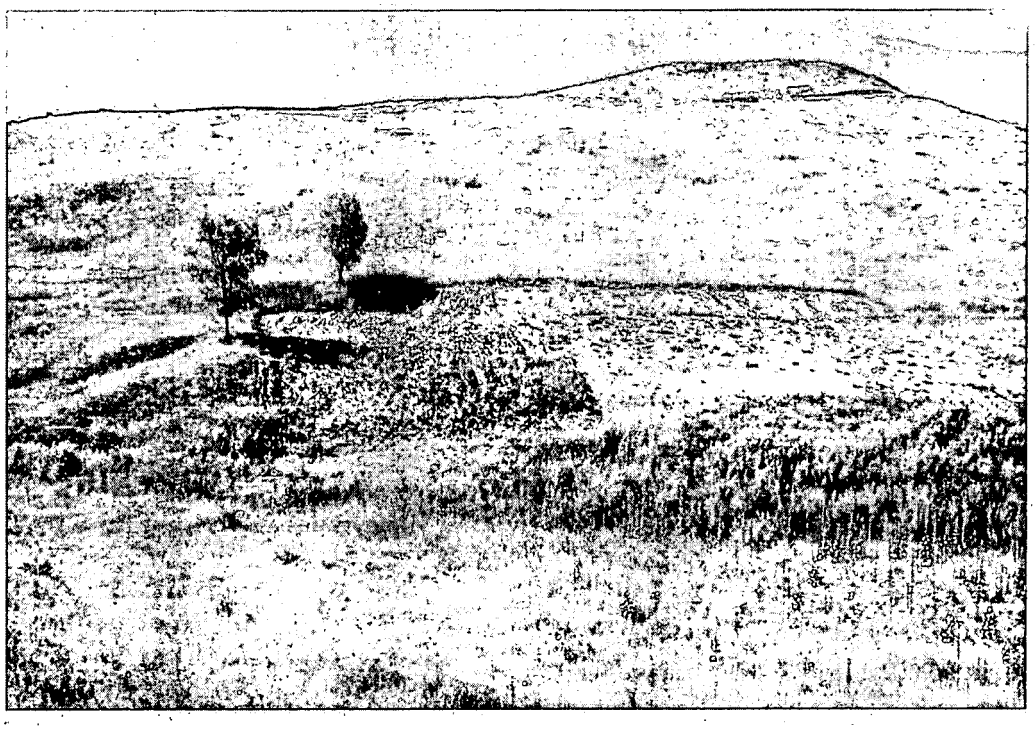
(click on the title of the report below to access the report)

- East Shooting Range Project Report
- Incinerator Project Report
- Phytoremediation Project Report
- Programmatic Biological Assessment (PBA) Part II Report
- Water Measurement Flume Replacement Project Report

SW-A-005294

2005 East Shooting Range Project Report

for the Rocky Flats Environmental Technology Site



(click below to access a particular section of the report)

- Report Text (PDF Version)
- Appendix A: Photomonitoring
- Appendix B: Qualitative Habitat Assessment Forms

Preble's Mouse Mitigation Monitoring Report for the East Shooting Range Remediation Project at the Rocky Flats Environmental Technology Site 2005 Annual Report Biological Opinion: ES/LK-6-CO-04-032 (September 17, 2004)

Introduction

This report is being submitted to the United States Fish and Wildlife Service (USFWS) in order to comply with the requirements outlined in a Biological Opinion (BO) from the USFWS on the East Shooting Range Remediation Project (hereafter referred to as the ESRR Project; USFWS BO dated September 17, 2004). The ESRR Project was conducted to remediate soils contaminated with lead at the target location of the old East Shooting Range at the Rocky Flats Environmental Technology Site (Site). The BO addresses impacts to the federally-listed Preble's meadow jumping mouse, (Preble's mouse, *Zapus hudsonius preblei*), from the ESRR Project at the Site. In the Biological Assessment written for the project it was stated that the revegetation monitoring would be conducted according to the guidance provided in Part II of the Programmatic Biological Assessment, Appendix B. This report is being submitted to satisfy the conditions of the USFWS BO for 2005 and is due by December 1 after each growing season.

Methodology

The location of the ESRR Project is shown in Figure 1. The methodology used for the monitoring was taken from Appendix B in Part II of the PBA, the Mitigation Monitoring Plan. Per the plan, qualitative monitoring was used at the ESRR Project because the total area disturbed and revegetated was less than one acre in size. Qualitative monitoring consisted of retaking photographs of the area (see Appendix A) and conducting a qualitative assessment (see Appendix B) to evaluate and document the initial revegetation efforts.

The summer of 2005 was the first growing season since the completion of the project. After project completion, the area was seeded with a mesic hillslope seed mix (Table 1) and erosion matting was installed. Along Woman Creek, after the culvert was removed from the stream that had been used for access to the south side of the stream, a total of 40 peach leaf willow (*Salix amygdaloides*) stakes and three plains cottonwood (*Populus deltoides*) poles were planted along the edge of the stream.

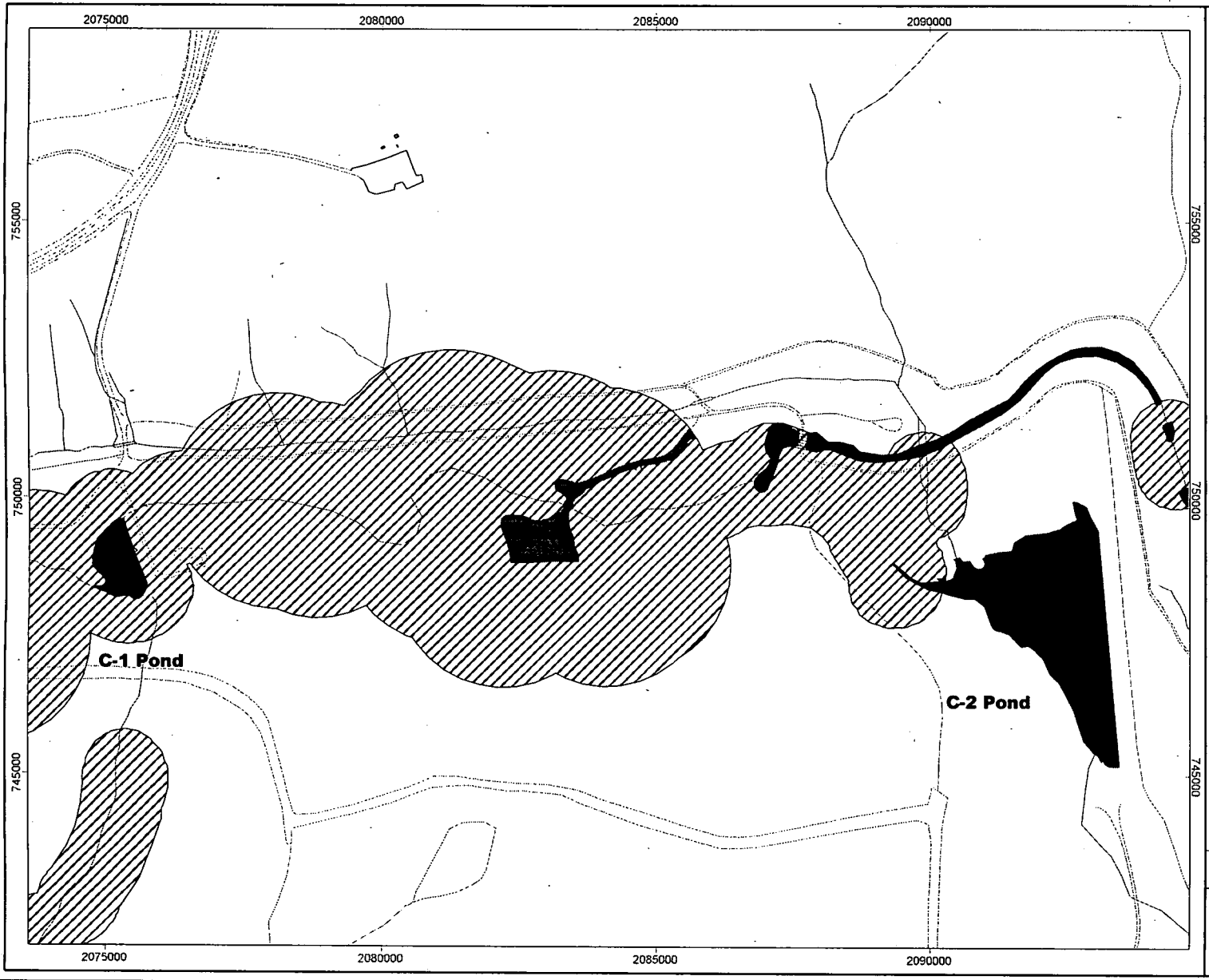
Results and Discussion

Of the seven, seeded graminoid species, four were observed growing in the revegetation area in August 2005. These included western wheatgrass (*Agropyron smithii*), slender wheatgrass (*Agropyron caninum* [=*A. trachycaulum*]), buffalo grass (*Buchloe dactlyoides*), and blue grama (*Bouteloua gracilis*). Portions of the area where germination was sparse were reseeded with the mesic seed mix on June 29, 2005. Spot control of several noxious weed species were also made on June 29 using Roundup® applied with a backpack sprayer. The species treated included Canada thistle (*Cirsium arvense*), diffuse knapweed (*Centaurea diffusa*), musk thistle (*Carduus nutans*), common mullein (*Verbascum thapsus*), and moth mullein (*Verbascum blattaria*). Some of these species were still present when the qualitative assessment was made in August although their overall abundance was much lower. Total vegetation cover was estimated to be approximately 20-25%. Erosion matting and wattles continue to protect the area from erosion. Sixty-five percent of the peach leaf willow stakes and 67% of the plains cottonwood poles were still surviving at the end of August. In general, the grasses have begun to establish and with continued weed control the area should recover within a few years. The willow and cottonwoods along the stream should continue to grow and in time will return the streamside to a wooded riparian corridor similar to that found upstream and downstream of the project area. Photo monitoring results are found in Appendix A.

Conclusions

The vegetation at the ESRR Project was monitored per the requirements of the USFWS Biological Opinion dated September 17, 2004, to evaluate the status of the revegetation establishment and determine if

management actions needed to be taken. The sampling conducted in 2005 represents one growing season for the area. To summarize, four of the seven seeded graminoid species have begun to establish in the revegetation area and total vegetation cover was approximately 20-25%. Erosion matting and wattles continue to protect the area from erosion. Noxious weeds in the area were spot treated with Roundup® and continued weed management will be necessary during the establishment of the native grass species. Woody plant survival has been good and overall, the vegetation at the ESRR Project is doing well for its first growing season. Monitoring in 2006 will continue document the re-establishment of the vegetation at the ESRR Project.



East Shooting Range Remediation Project Location

Figure 1

Project Footprint

Current Preble's Mouse Protection Area

Standard Features

- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Wetlands data surveyed, compiled, and assembled by the U.S. Army Corps of Engineers, 1994
Buildings, fences, hydrography, roads and other structures from 1994 aerial flyover data captured by EG&G R&L, Las Vegas
Digitized from the orthophotographs, 1/93.

N

200 0 200 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

RFETS GIS Dept.
303-966-7707

MAP ID: 06-0003

October 27, 2005

Q:\Projects\FY2006\06-0003\2005 USFWS BO report figs.apr\East Shooting Range Fig 1

Table 1. Mixed Grass Prairie Seed Mix

Hillside Slope Areas (Hillside Areas Or Areas With Slopes Greater Than 10%) Revegetation Seed Mix
(Based on 50 seeds/sq.ft.)

Red Map Areas

This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS
Date: 1/04

Species	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb.	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
Graminoids							
Agropyron dasystachyum	Thickspike Wheatgrass	Critana	5	108900	150000	2.5	0.73
Agropyron smithii	Western Wheatgrass	Arriba	23	500940	120000	11.5	4.17
Agropyron trachycaulum	Slender Wheatgrass	San Luis	15	326700	120000	7.5	2.72
Bouteloua curtipendula	Side-Oats Grama	Vaughn	13	283140	190000	6.5	1.49
Bouteloua gracilis	Blue Grama	Hachita	24	522720	710000	12.0	0.74
Buchloe dactyloides	Buffalo Grass	Texoka	10	217800	45000	5.0	4.84
Stipa viridula	Green Needle Grass	Lodorm	10	217800	180000	5.0	1.21
	Total		100	2178000		50.0	15.90
	Sq. ft/acre		43560				
	Seeds/sq. ft.		50				
	Seeds needed/acre		2178000				

1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast, the application rates are to be doubled.

2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.

3) The seed is to be certified weed free.

4) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

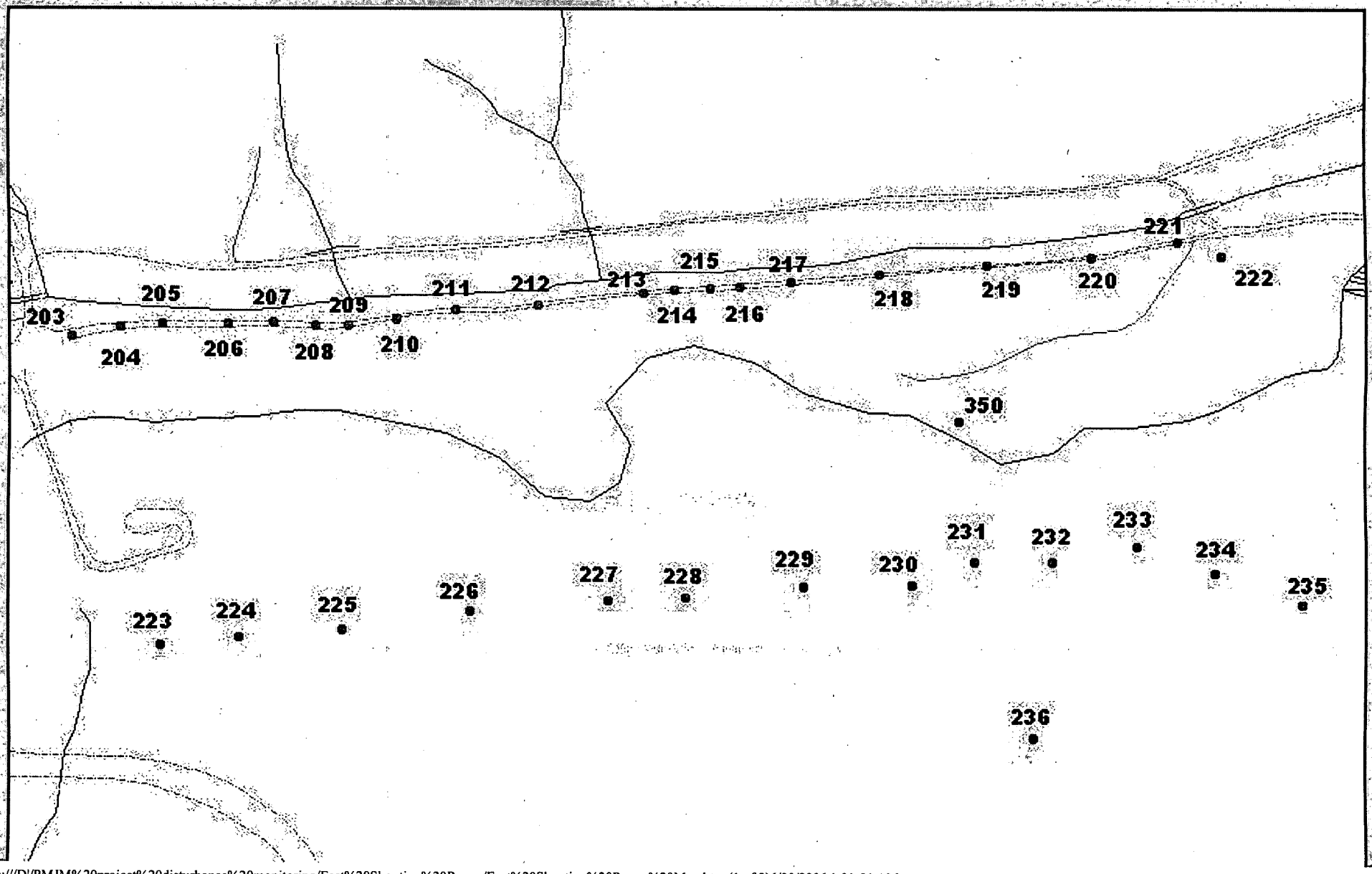
NOTE:
Slender wheatgrass and thickspike wheatgrass have been added to species mix as early successional species.

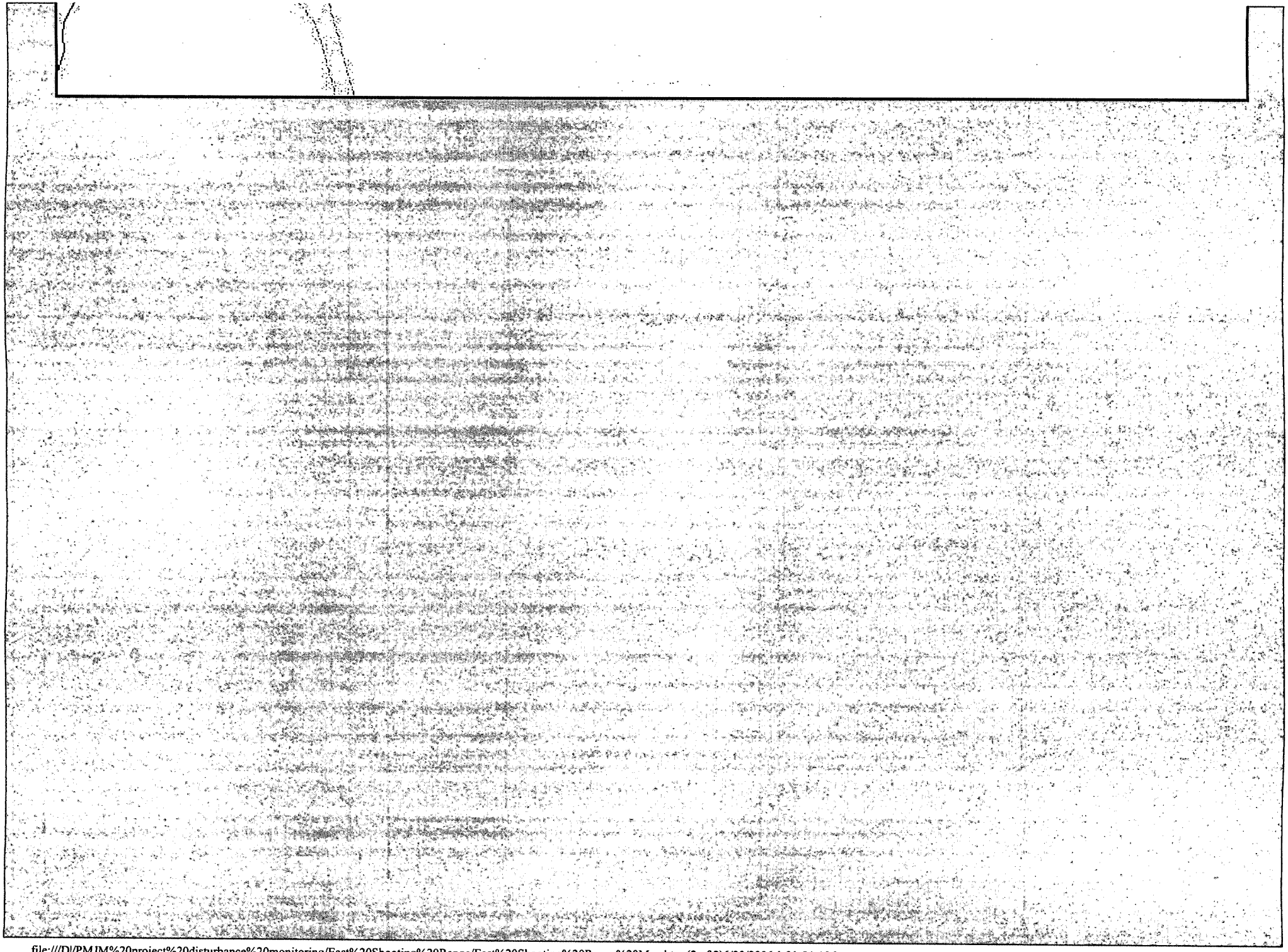
For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687.

East Shooting Range

(clicking on any photopoint on the map will take you to the corresponding monitoring photos,

then clicking on any photo will enlarge that photo)





East Shooting Range

Photopoints 203-206

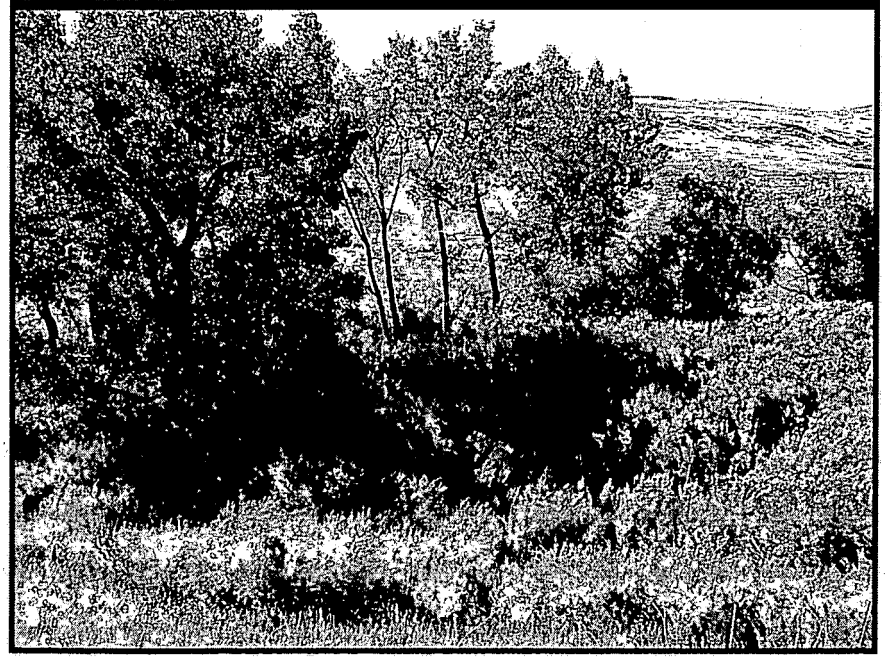
6/23/2004 **8/25/2005**

Photopoint 203

Photopoint 204

Photopoint 205

Photopoint 206



Photopoint 207

Photopoint 208

East Shooting Range south facing points

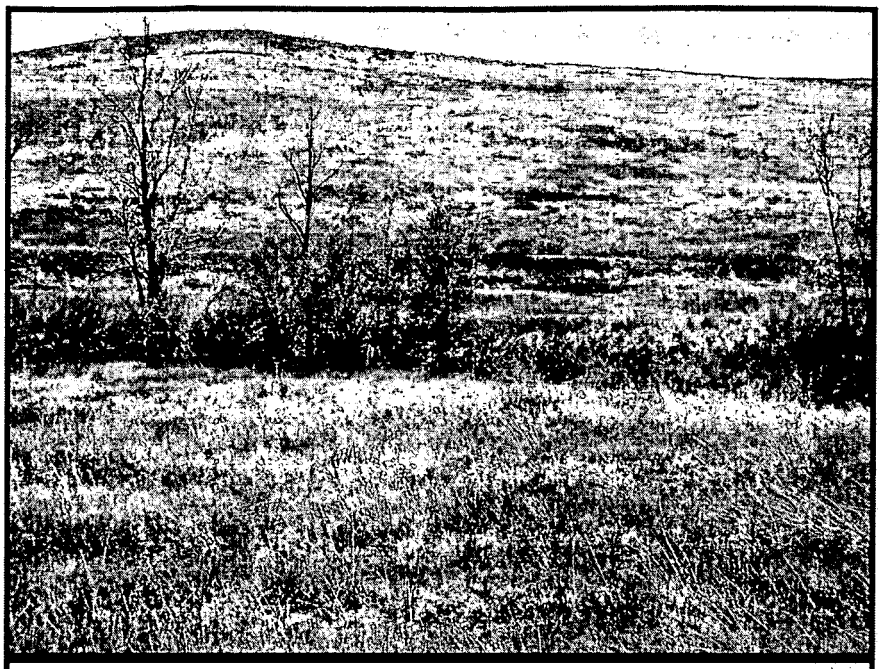
East Shooting Range

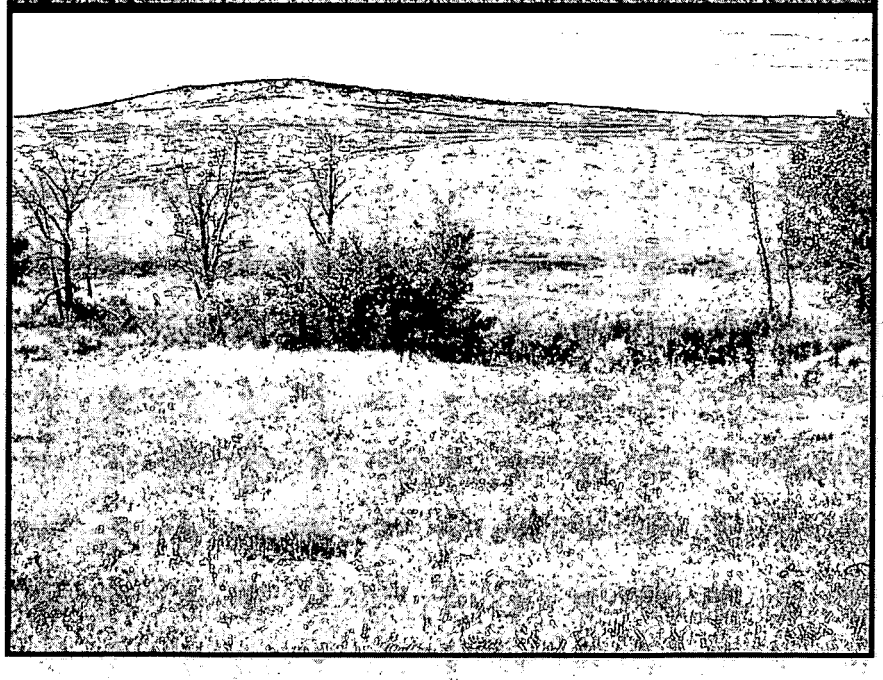
Photopoints 209-212

6/23/2004 **8/25/2005**

Photopoint 209

Photopoint 210





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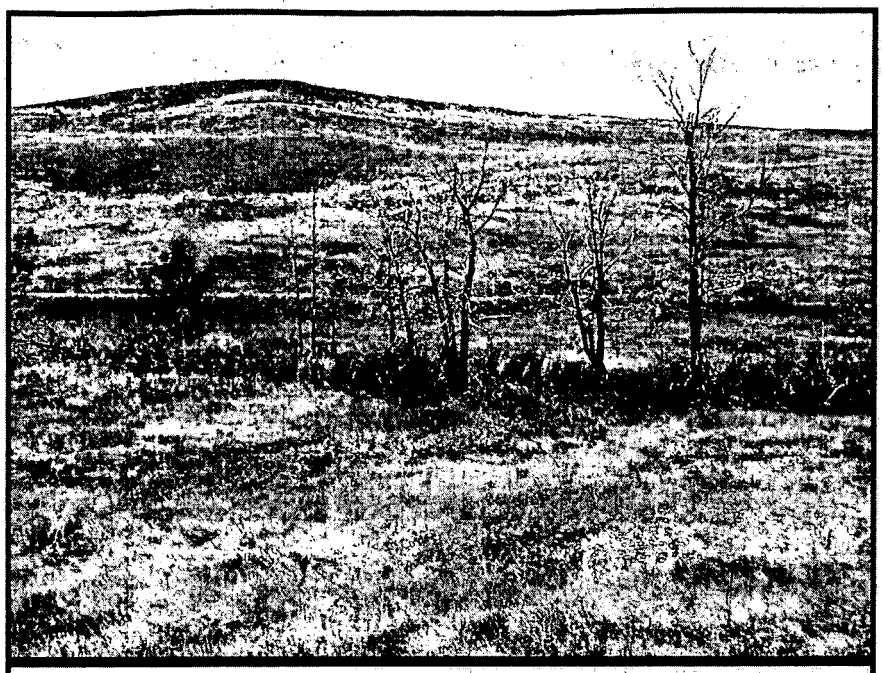

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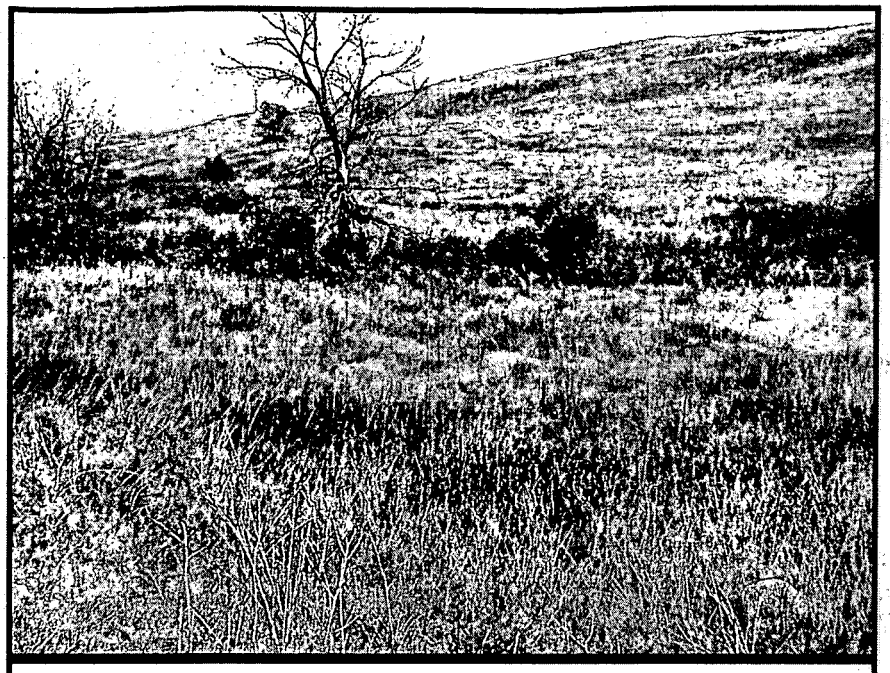
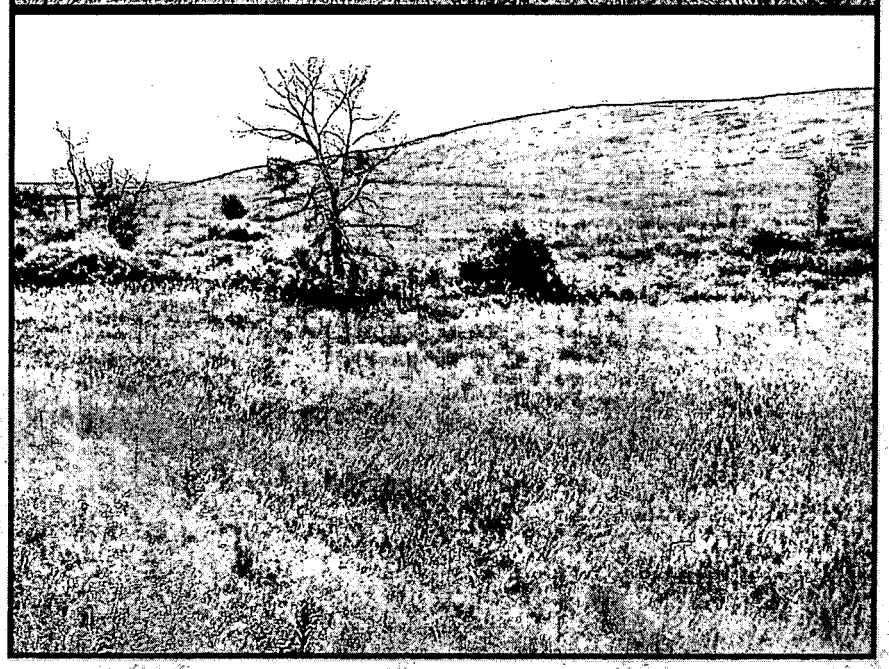
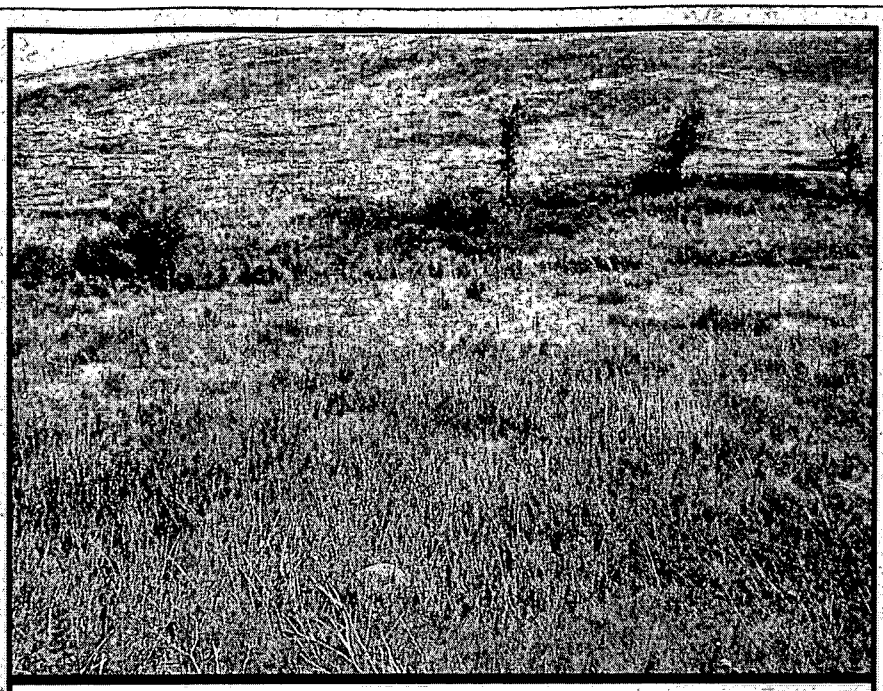
East Shooting Range south facing points







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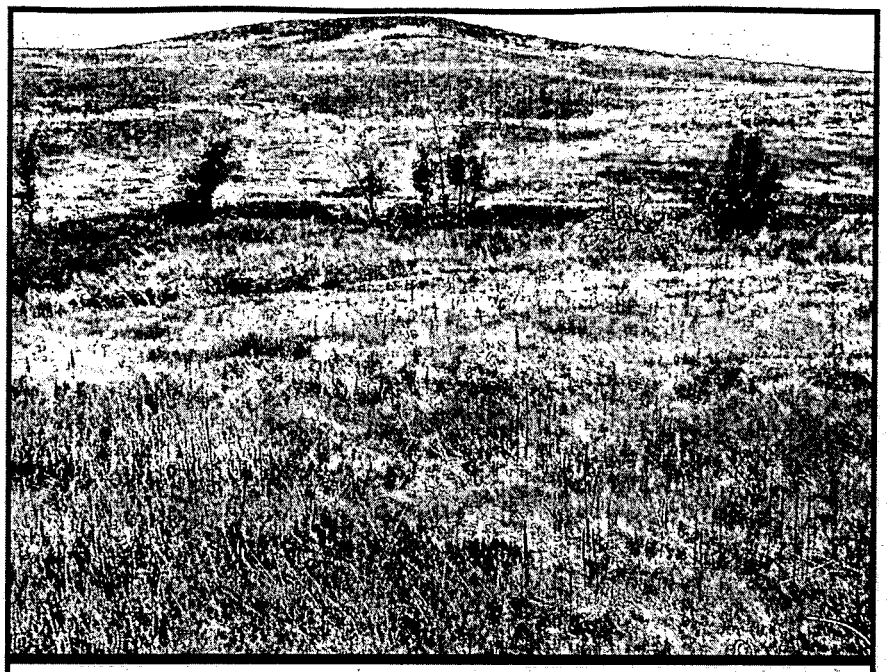

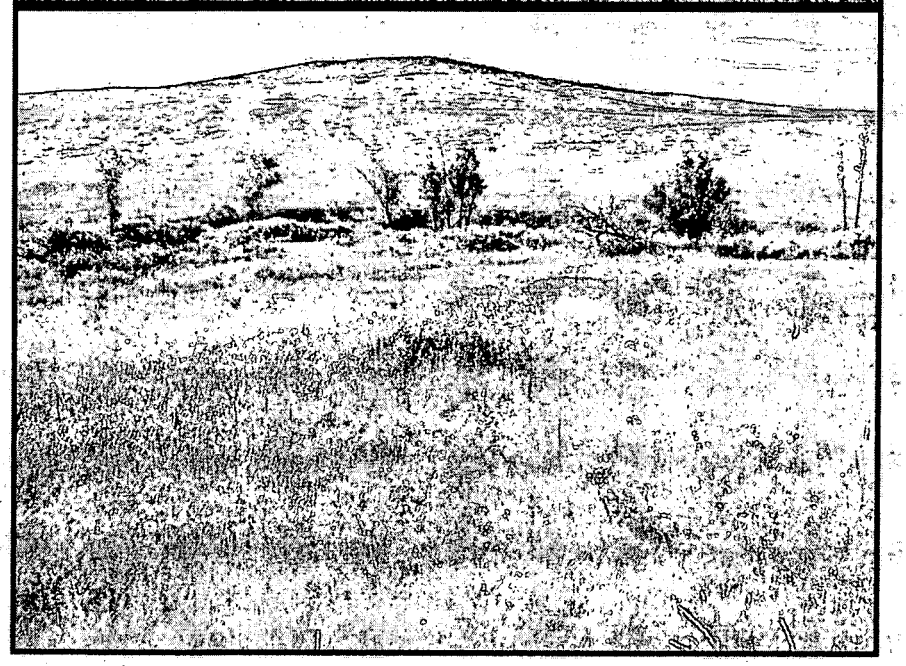

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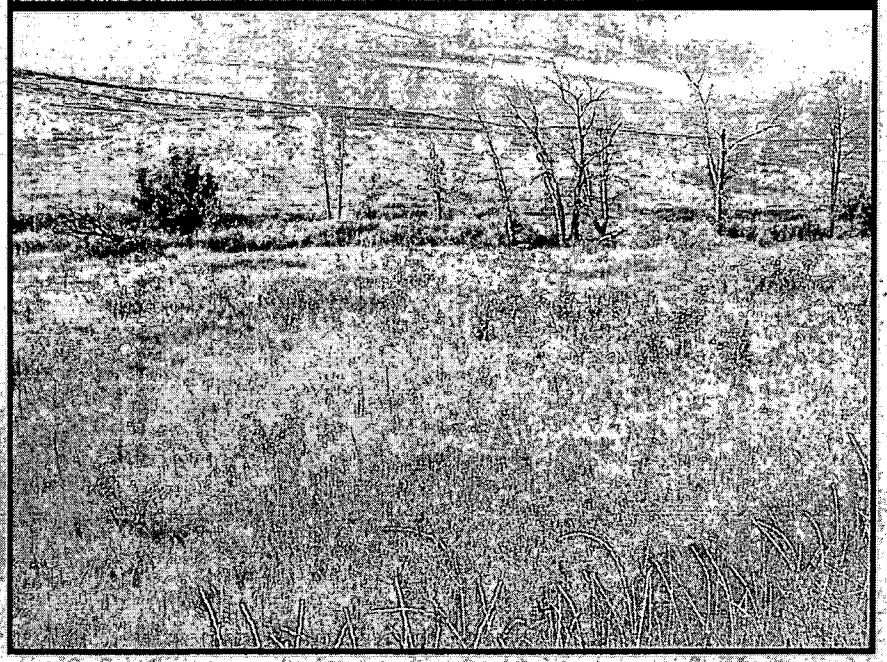

East Shooting Range

Photopoints 213-217

6/23/2004 **8/25/2005**

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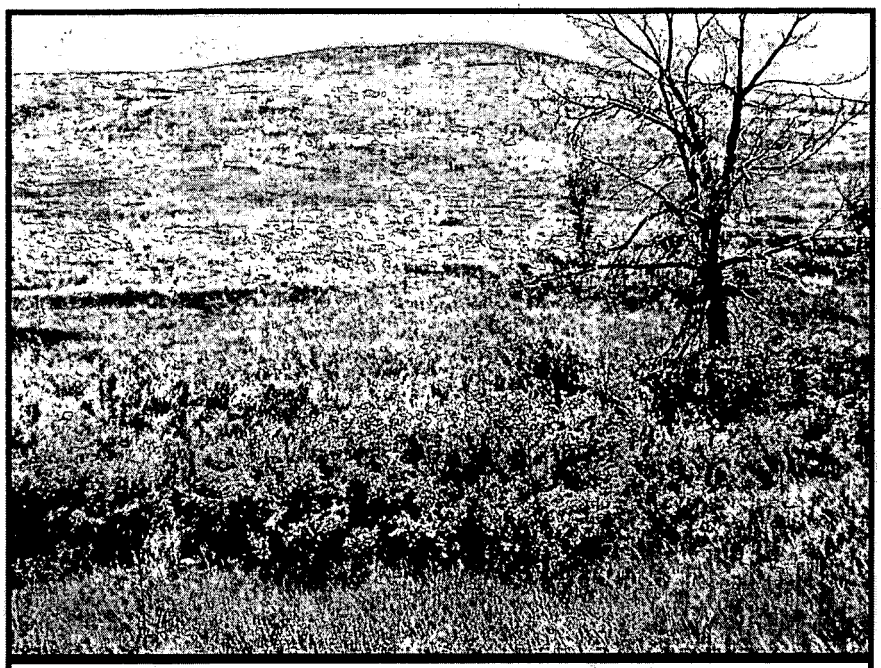

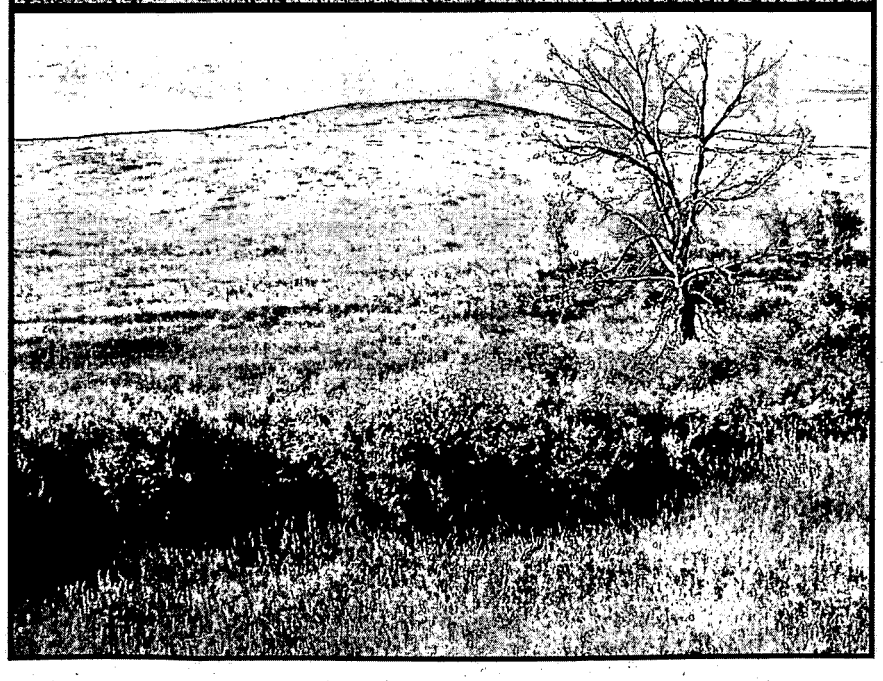

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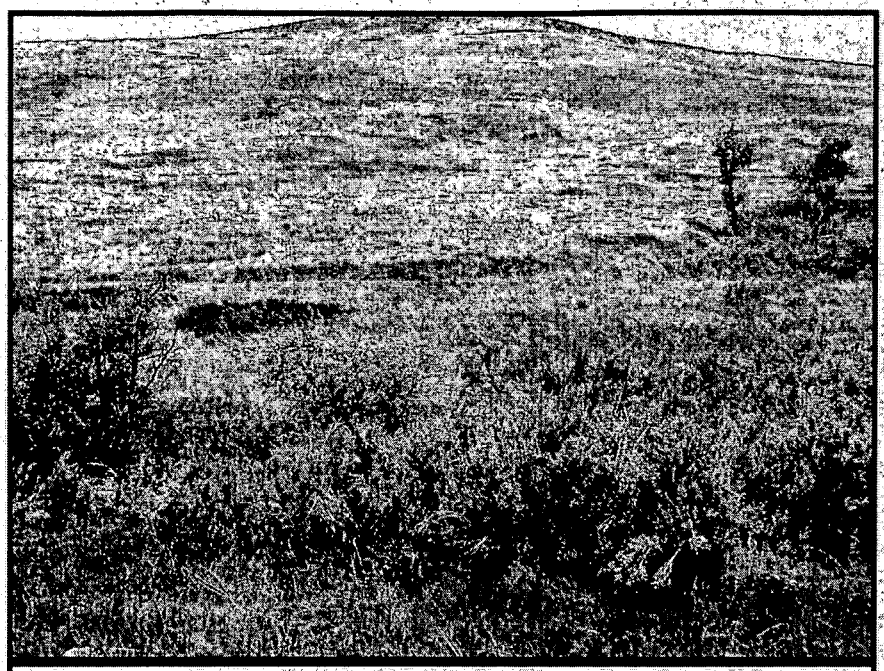

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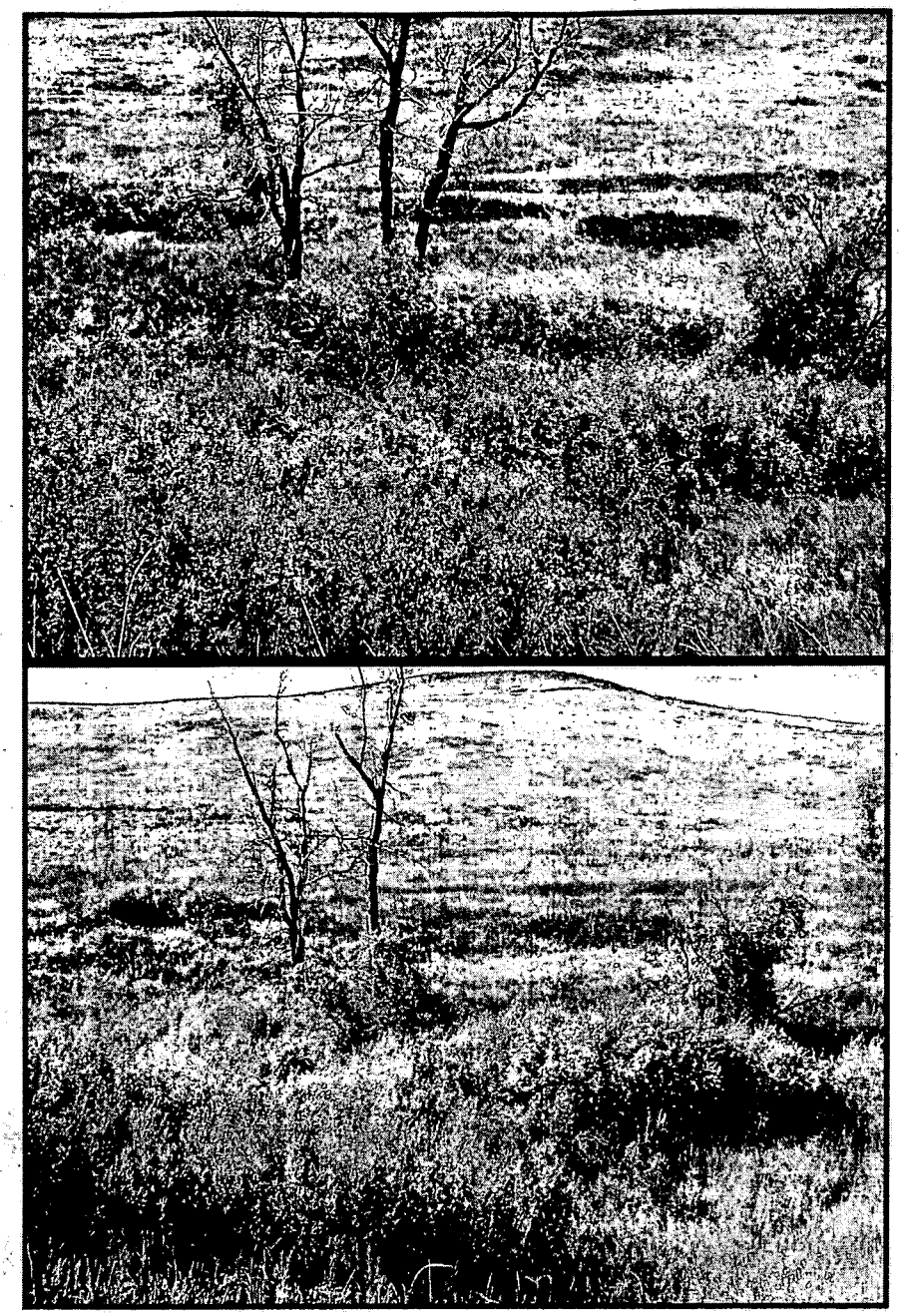

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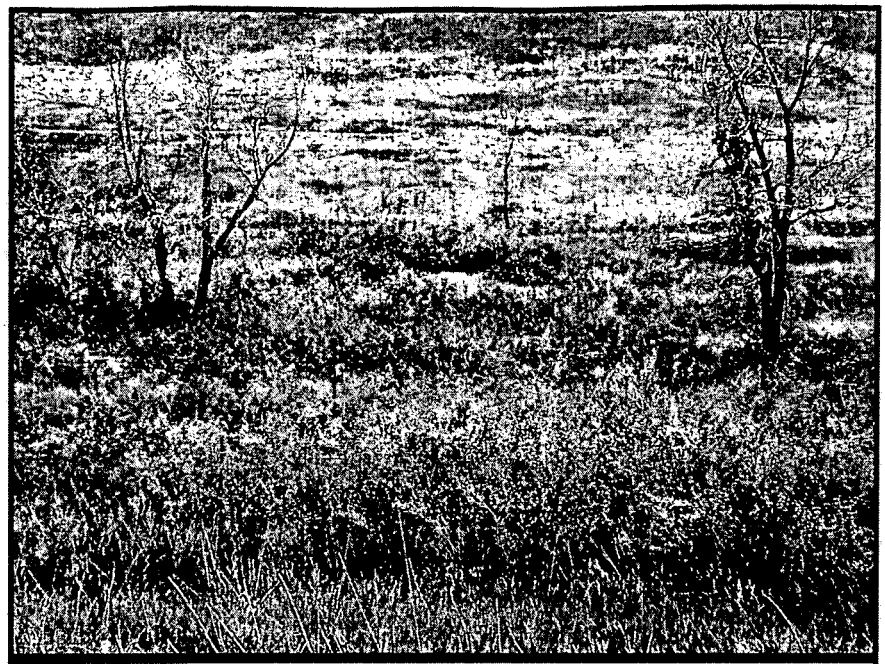

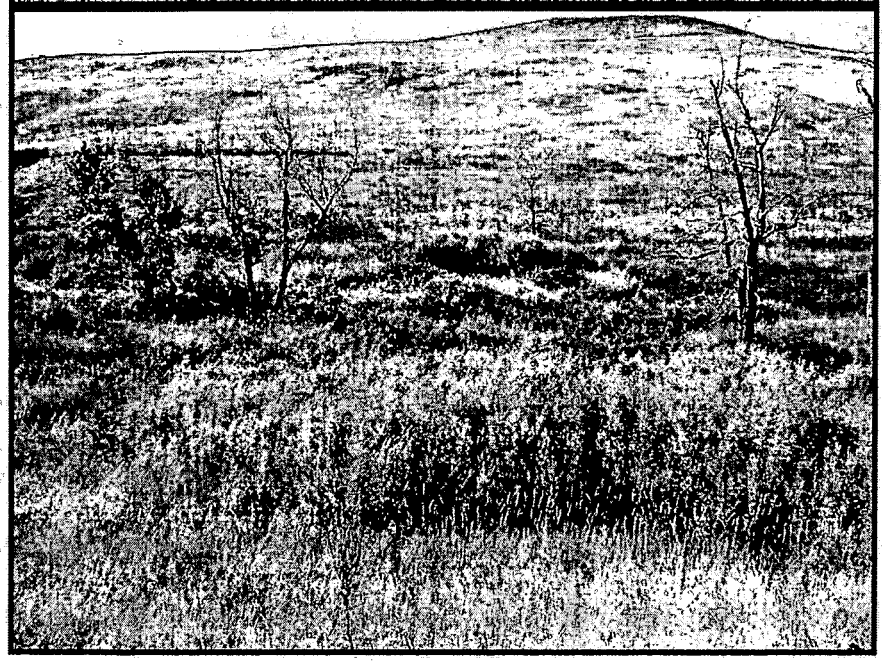

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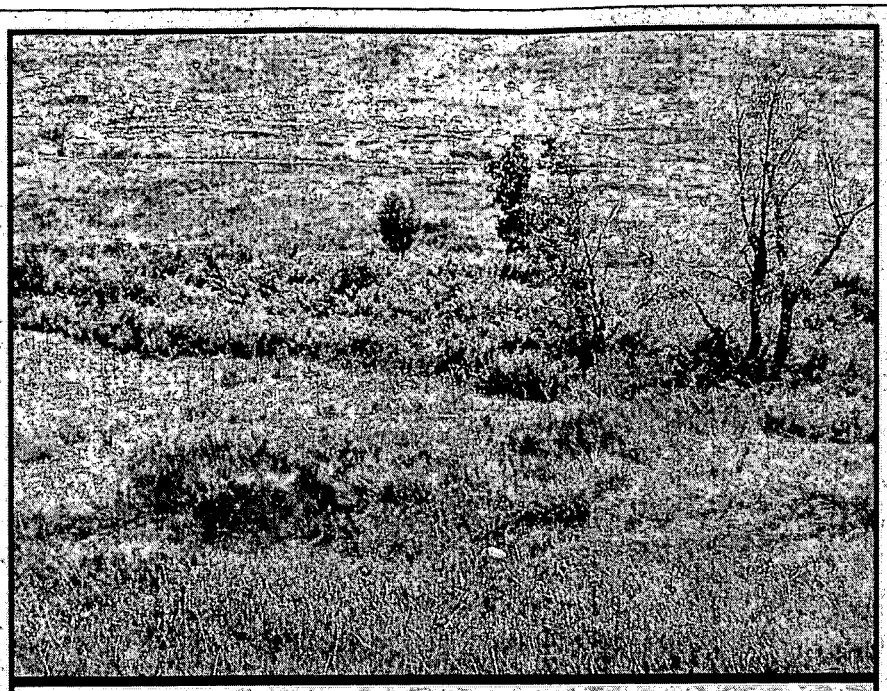
East Shooting Range south facing points

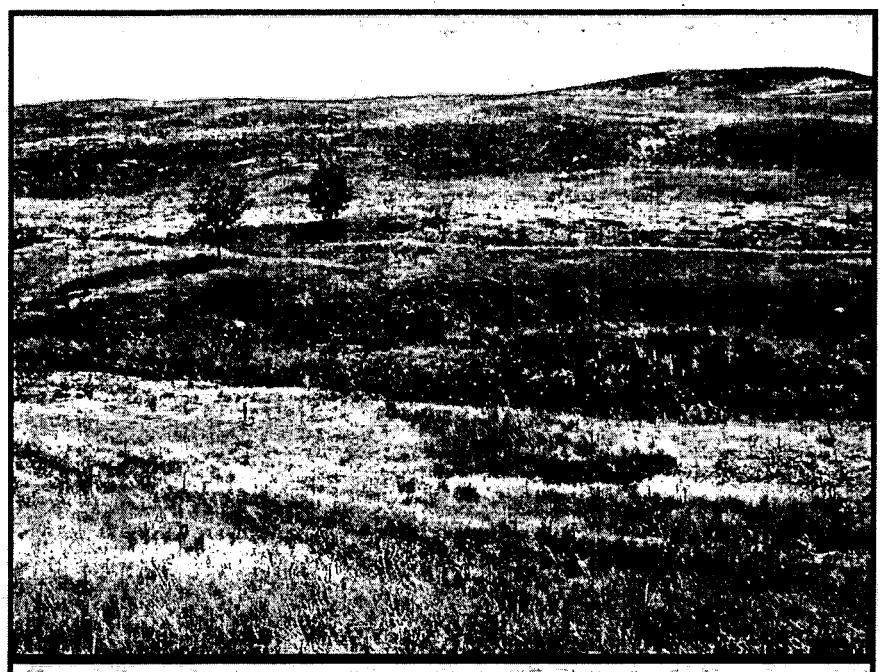


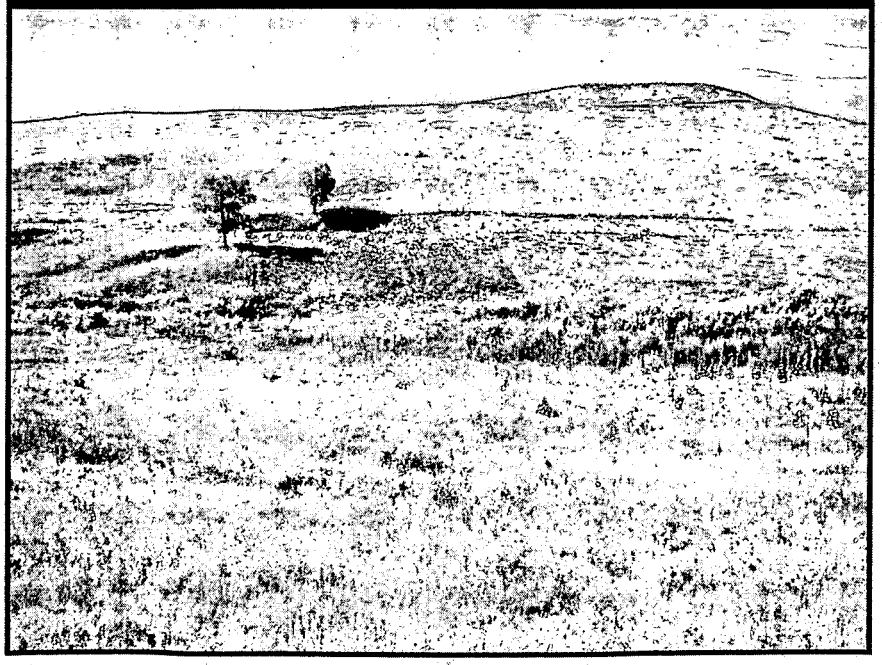
East Shooting Range

Photopoints 218-222

6/23/2004 **8/25/2005**

Photopoint 218





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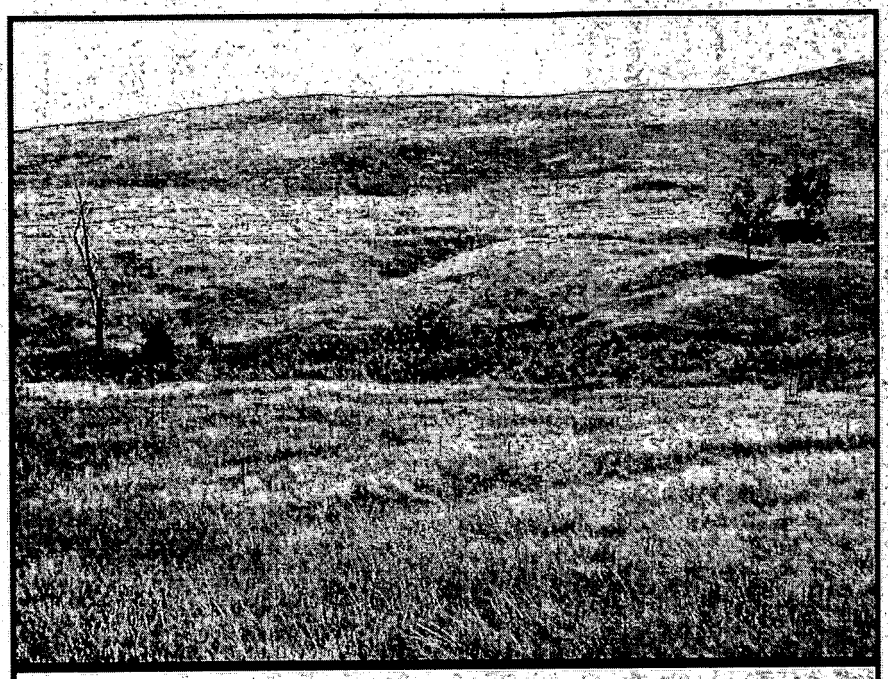

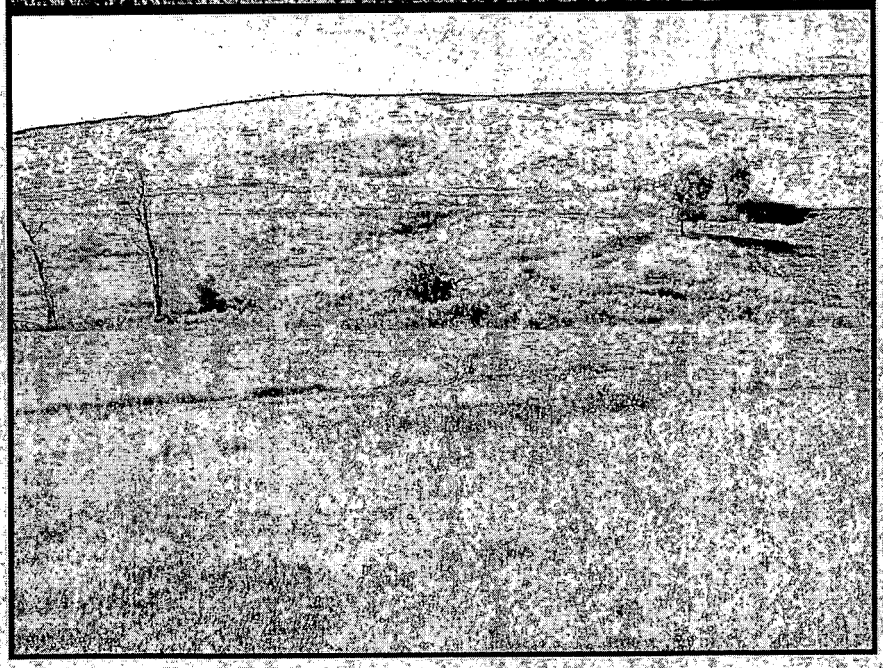

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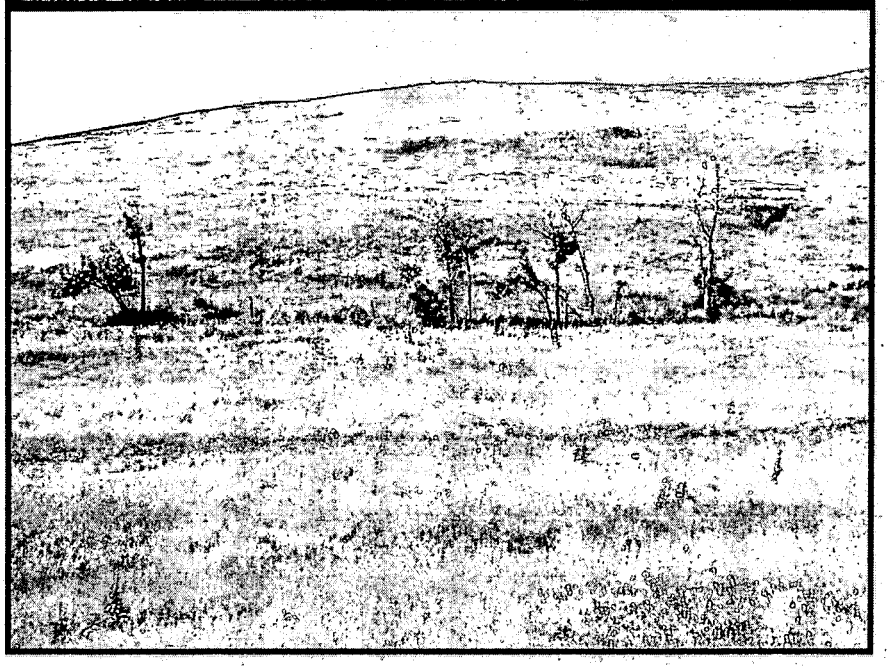

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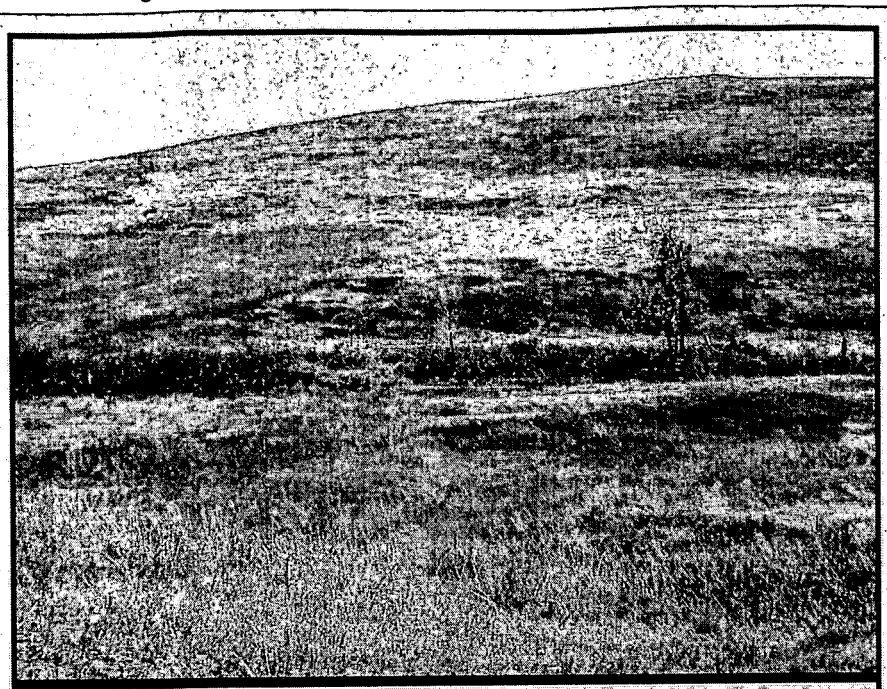
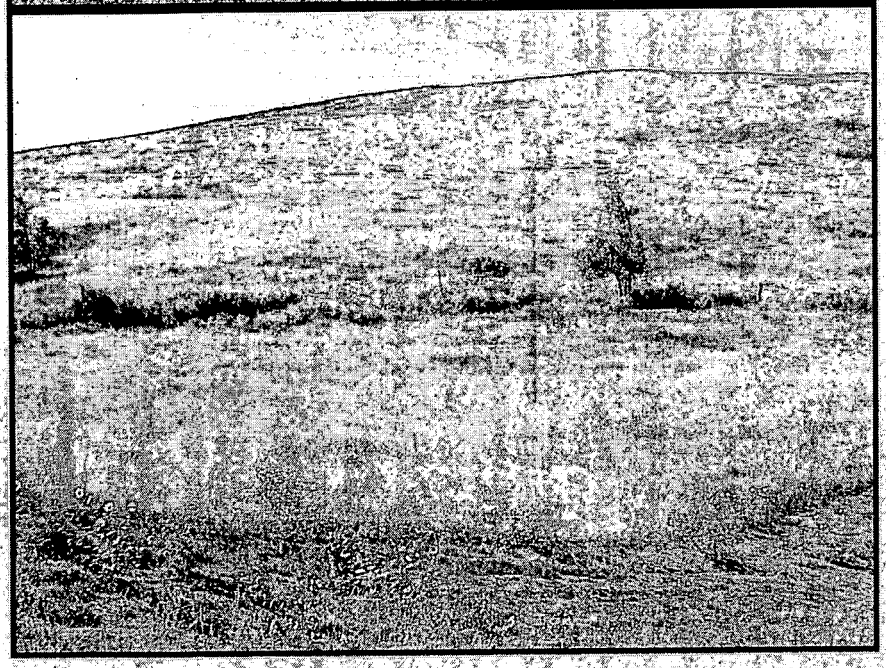
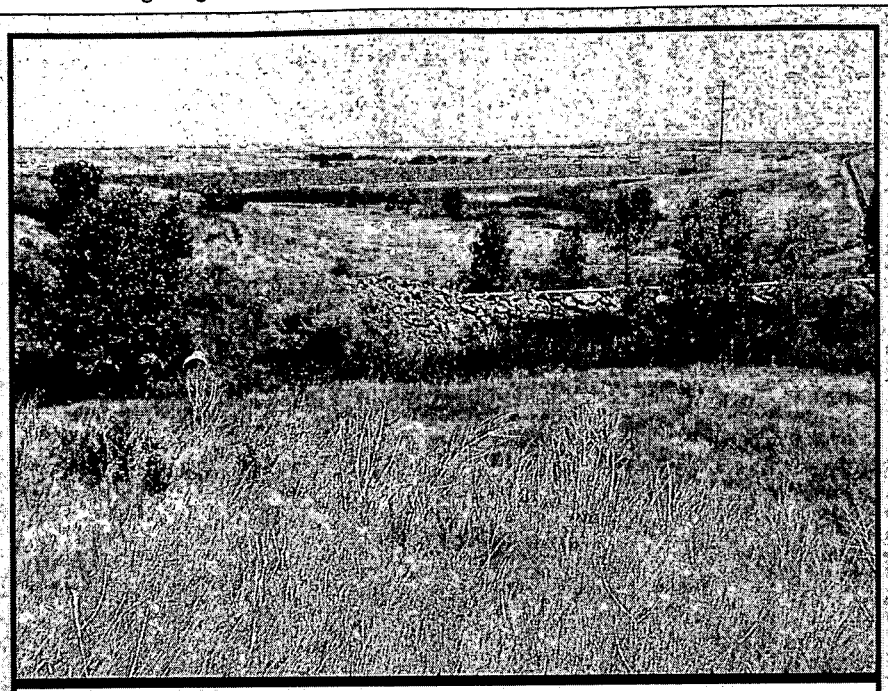


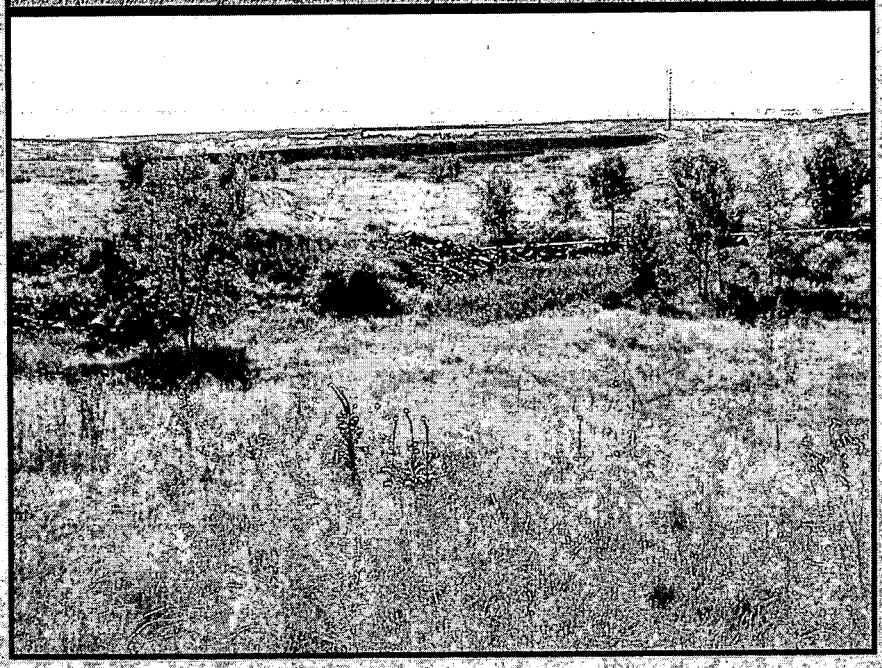


Photopoint 222

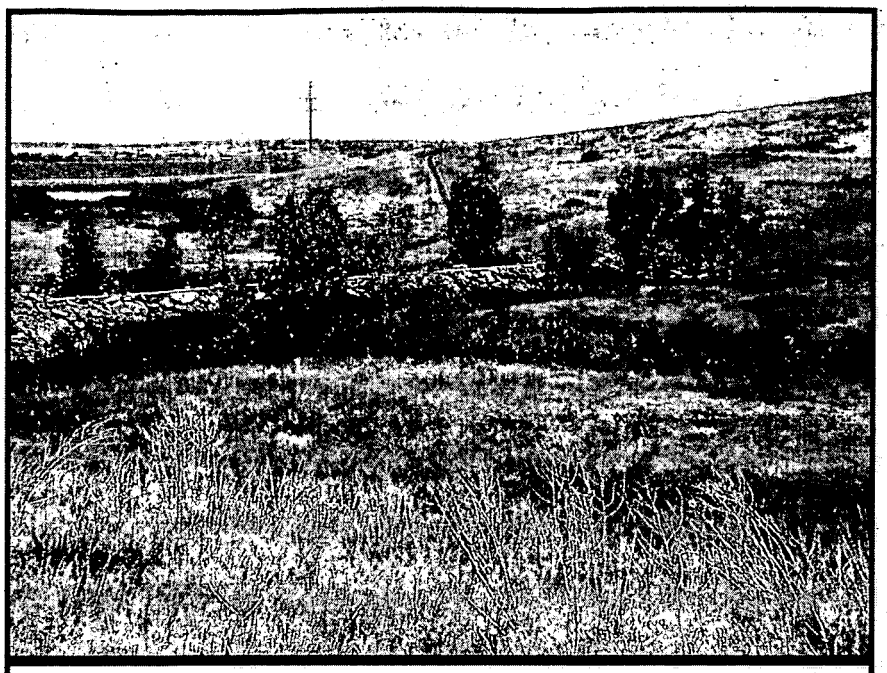
East Shooting Range south facing points

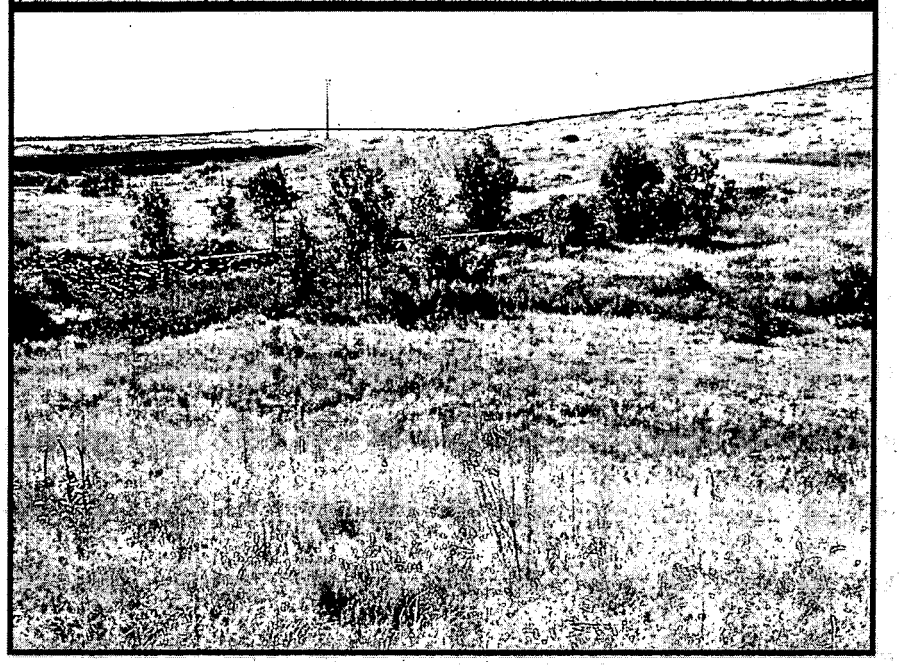
East Shooting Range south facing points



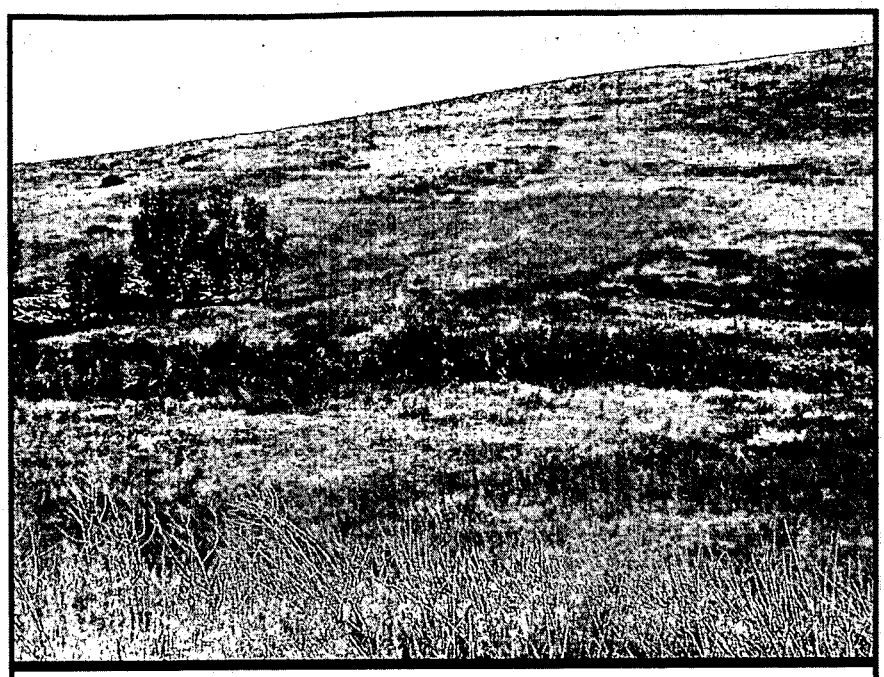


East Shooting Range south facing points

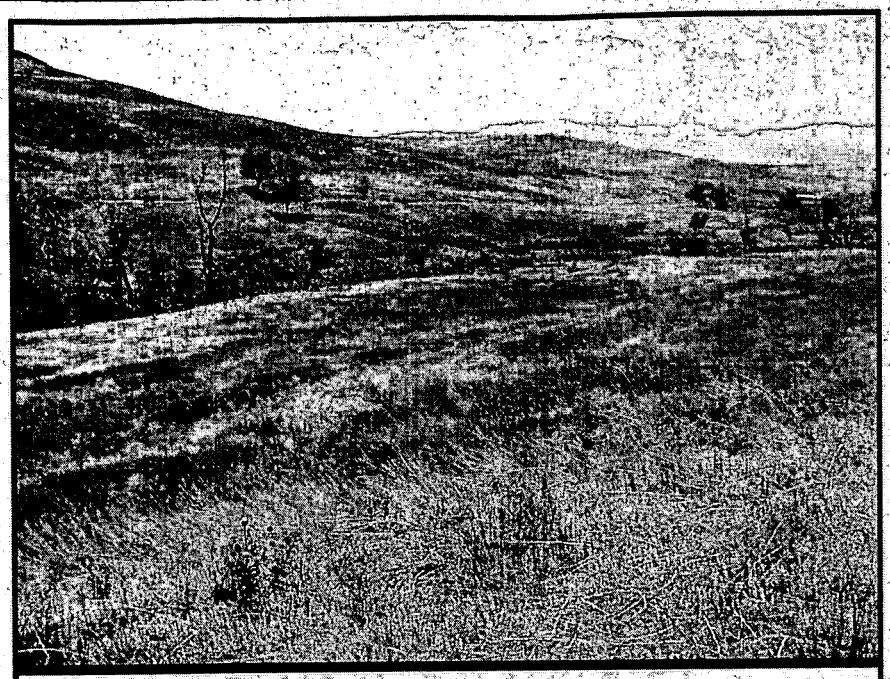




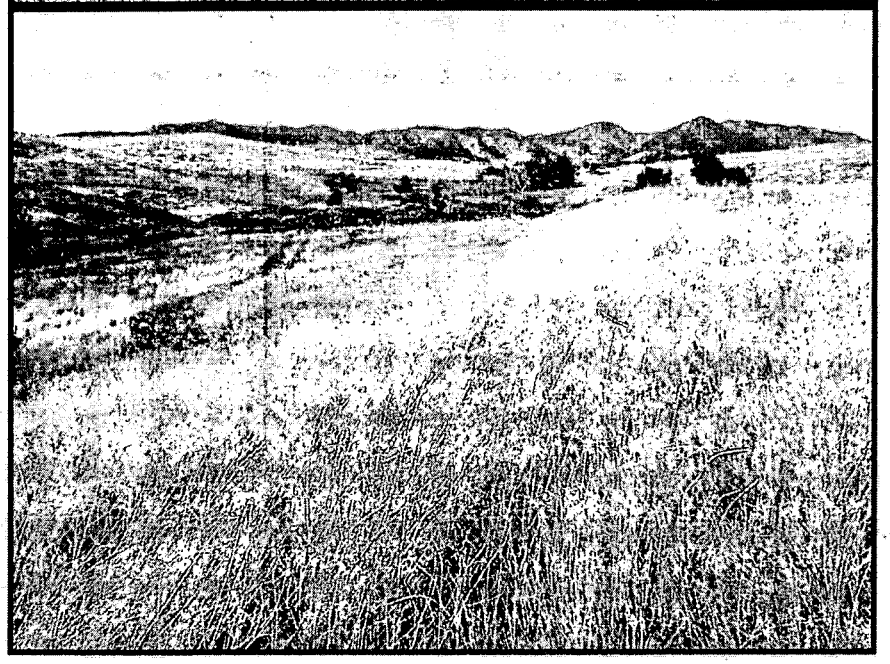
East Shooting Range south facing points



East Shooting Range south facing points



East Shooting Range south facing points



East Shooting Range

South Facing Photopoints 223-230

6/23/2004 **8/25/2005**

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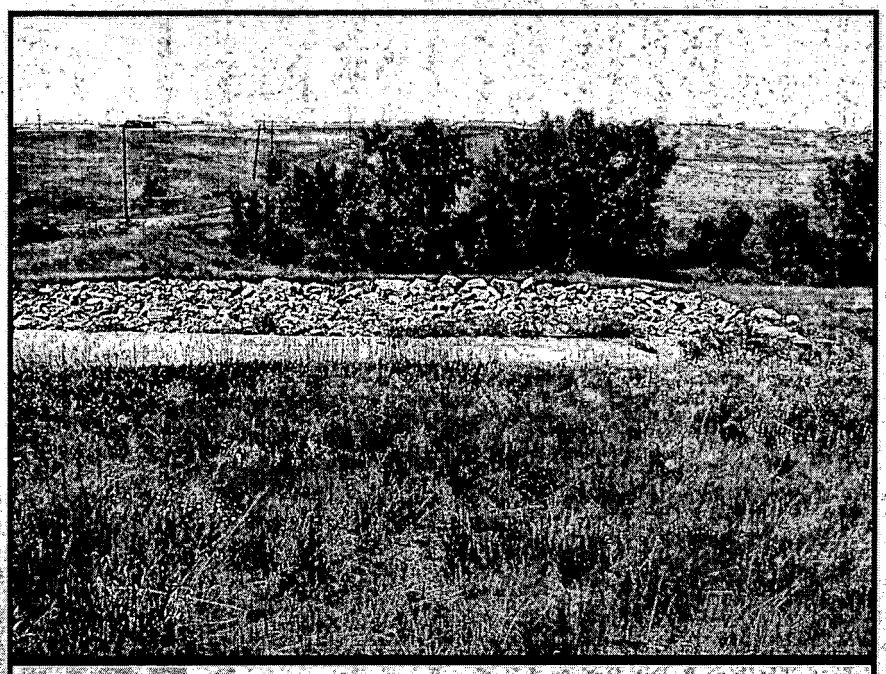
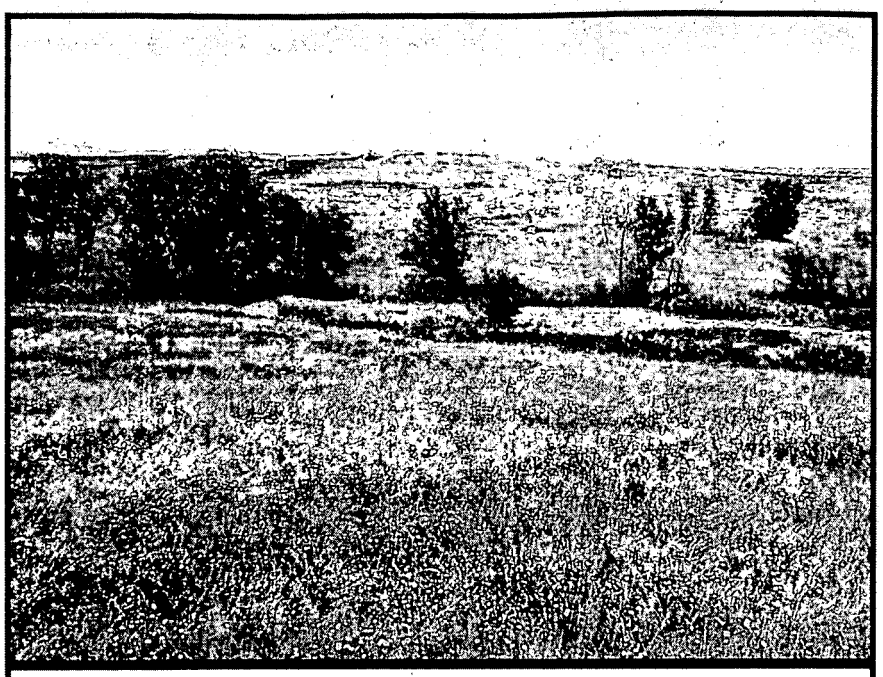


Photopoint 224

Photopoint 225



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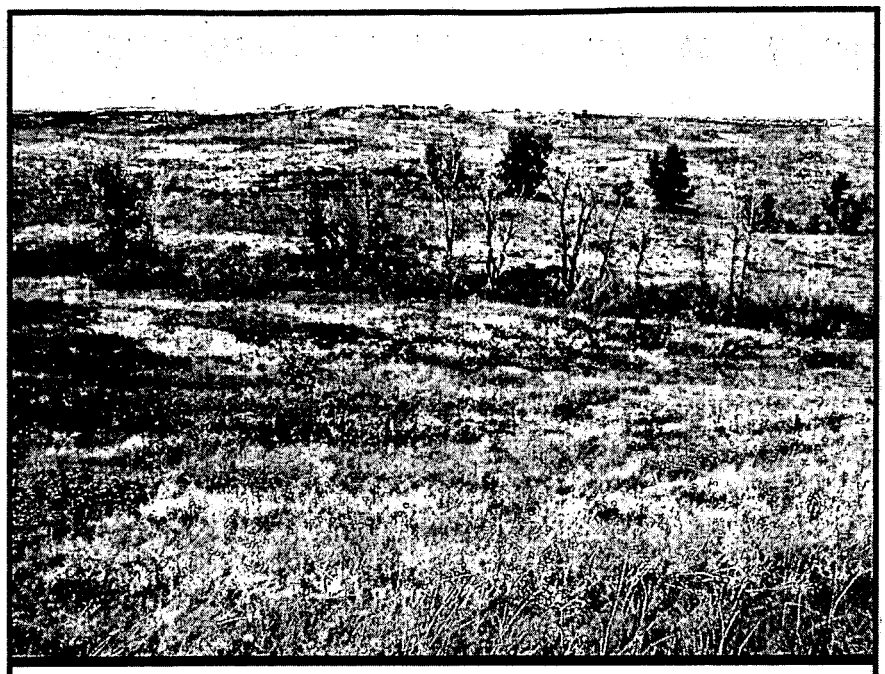

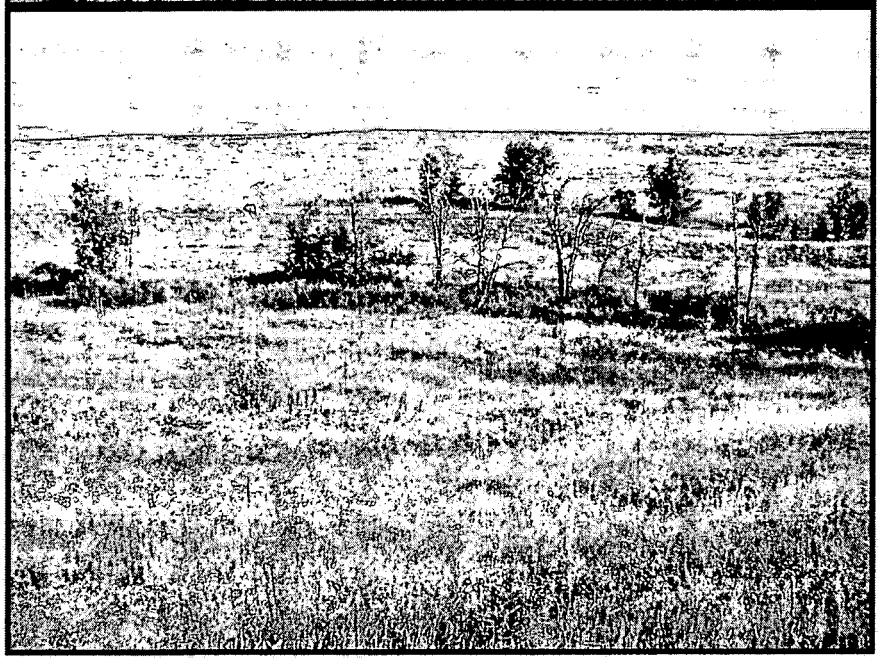

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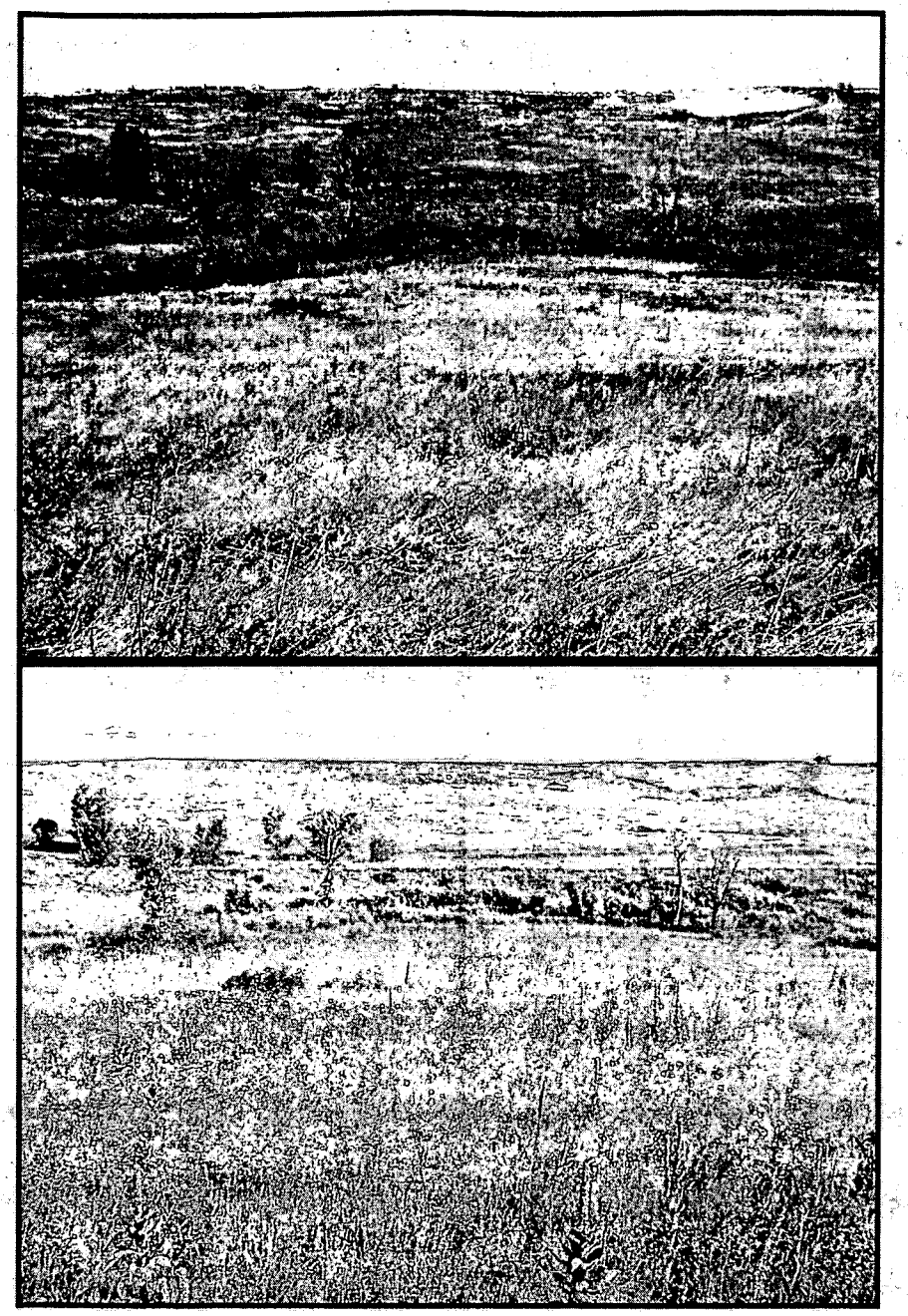
Photopoint 228



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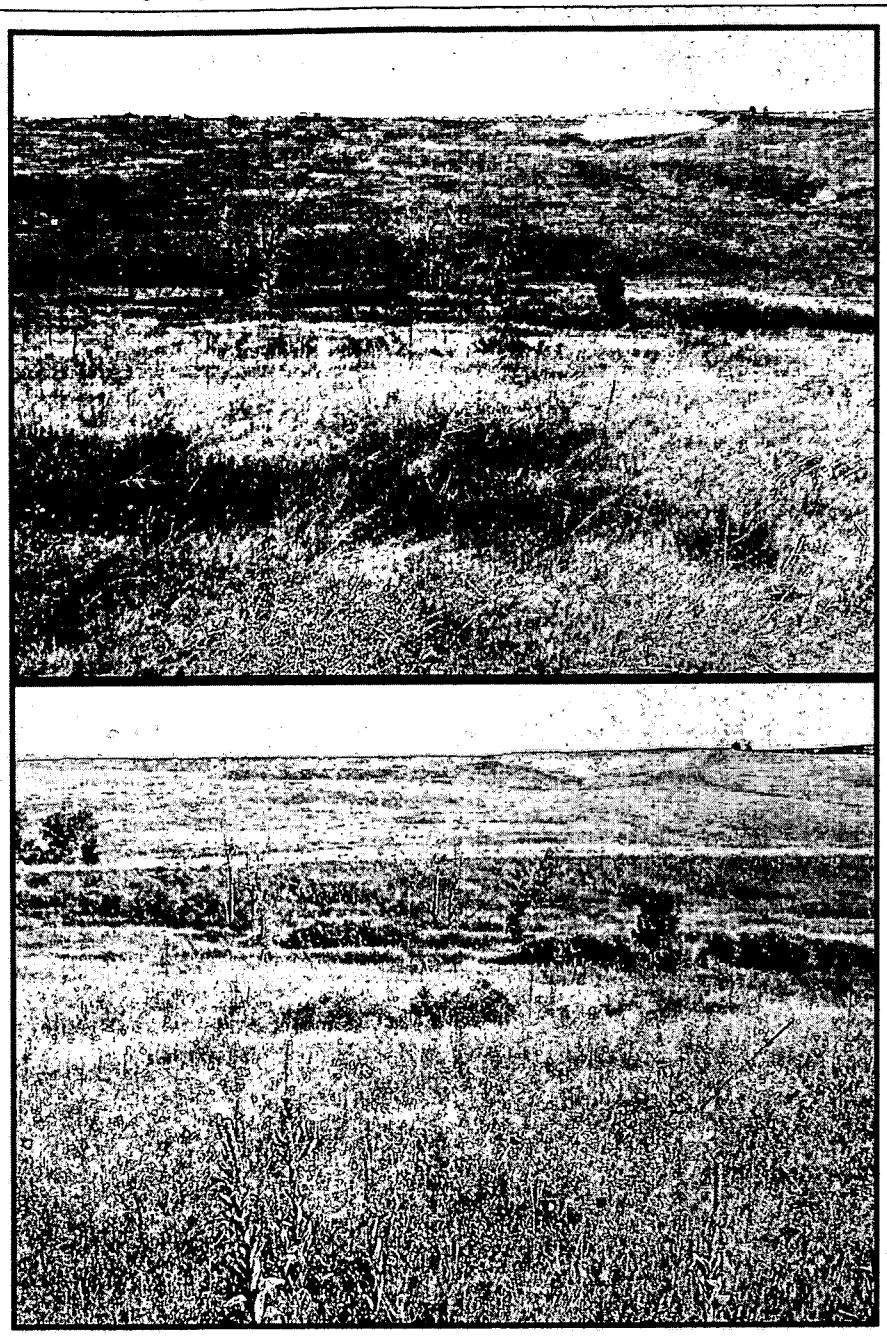
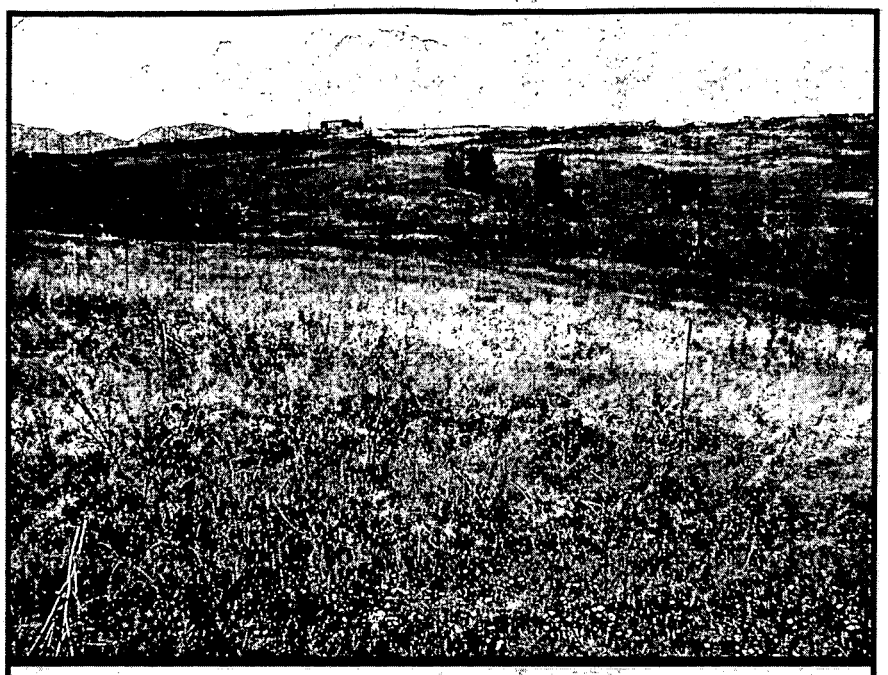
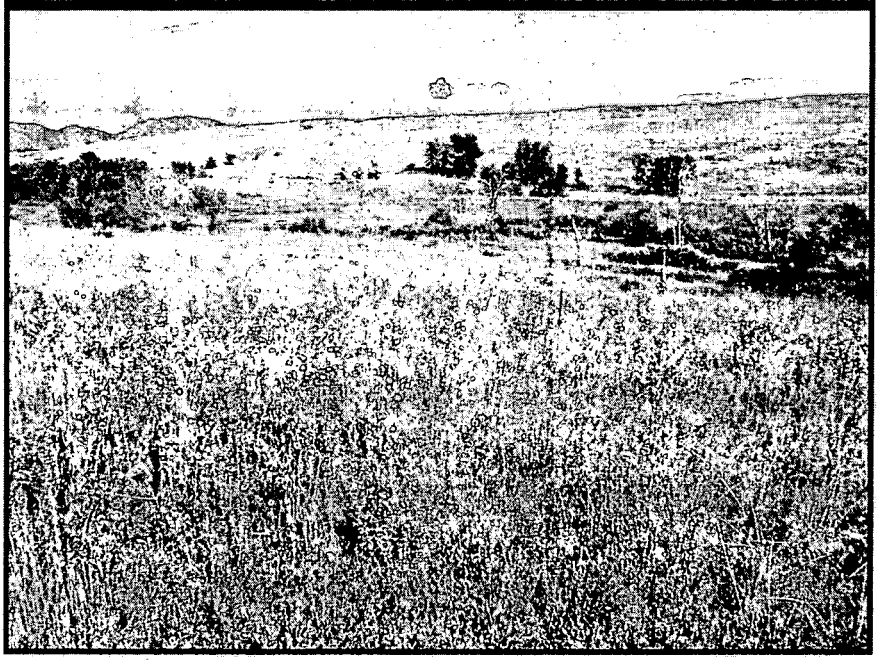


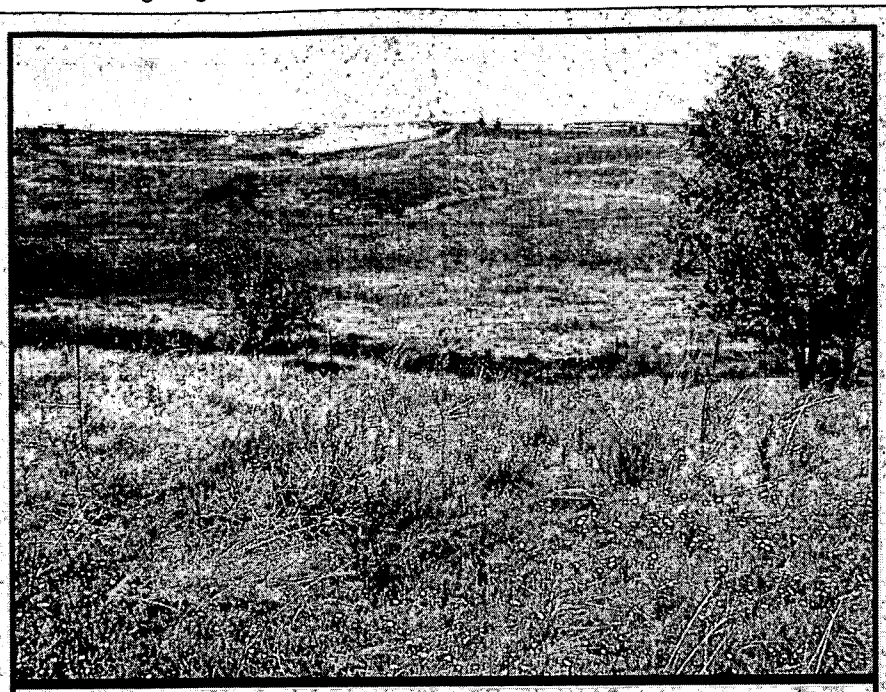
Photopoint 230

East Shooting Range north facing points





East Shooting Range north facing points

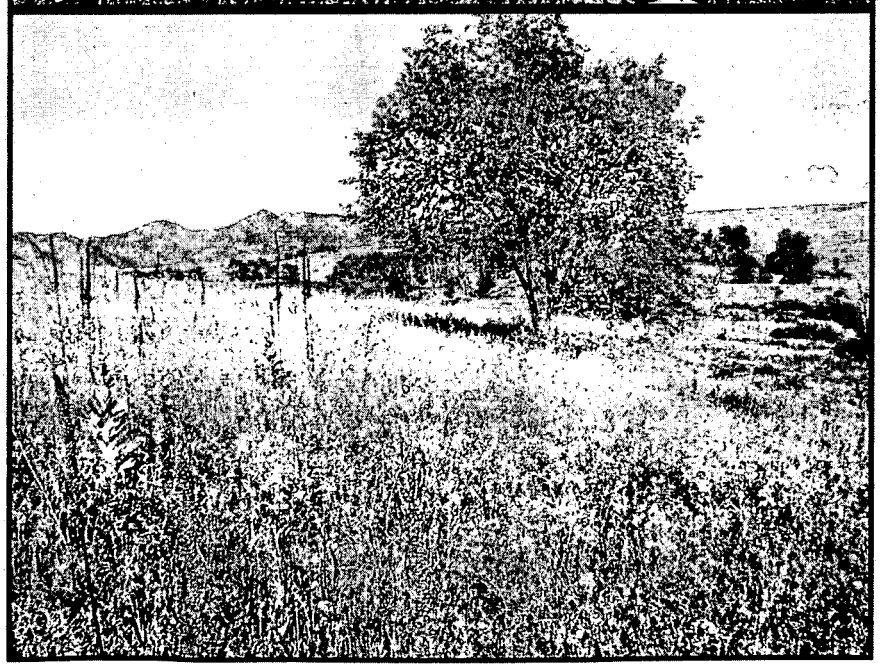


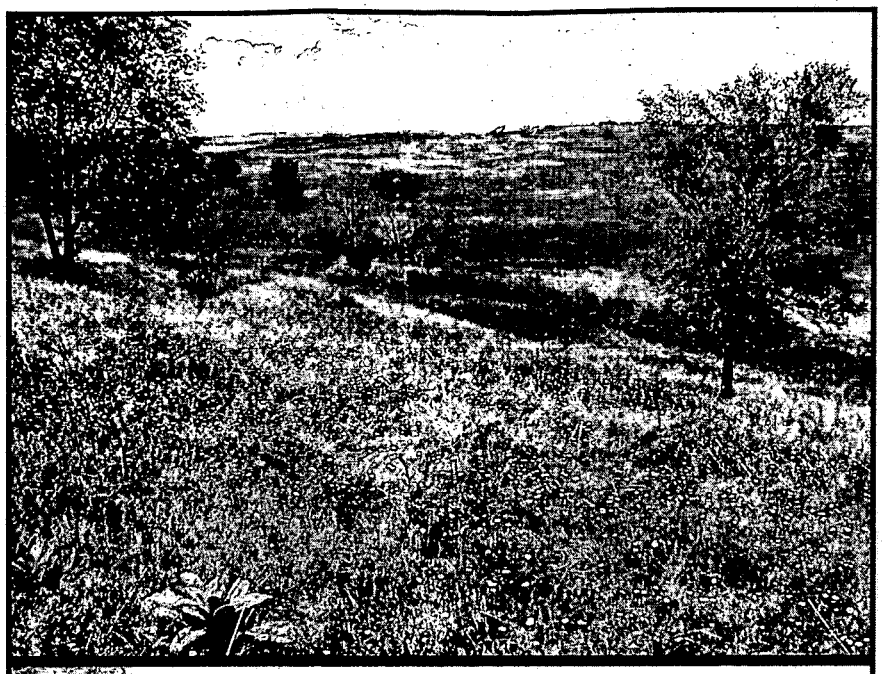
East Shooting Range

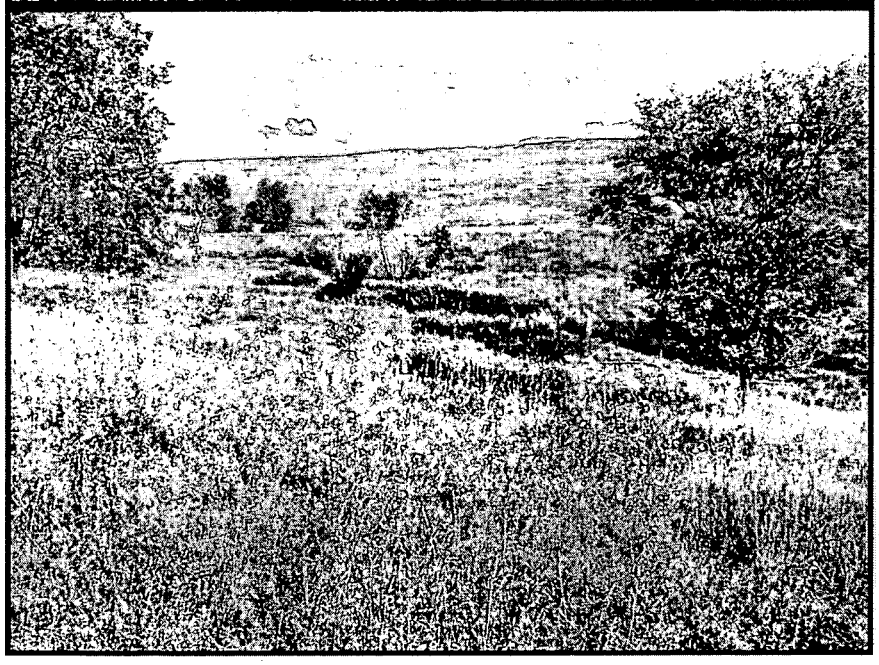
Photopoints 231-235

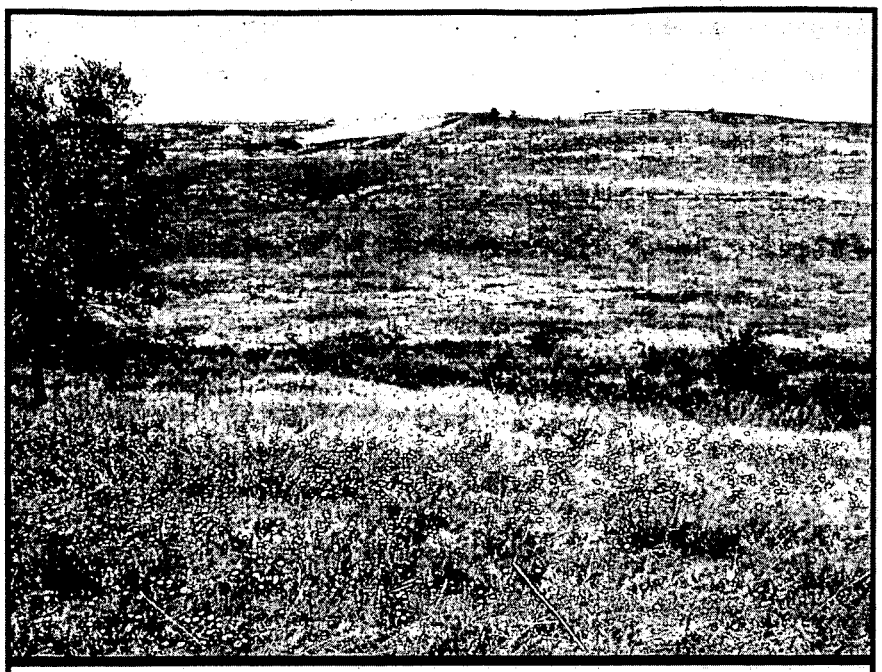
6/23/2004 **8/25/2005**

Photopoint 231









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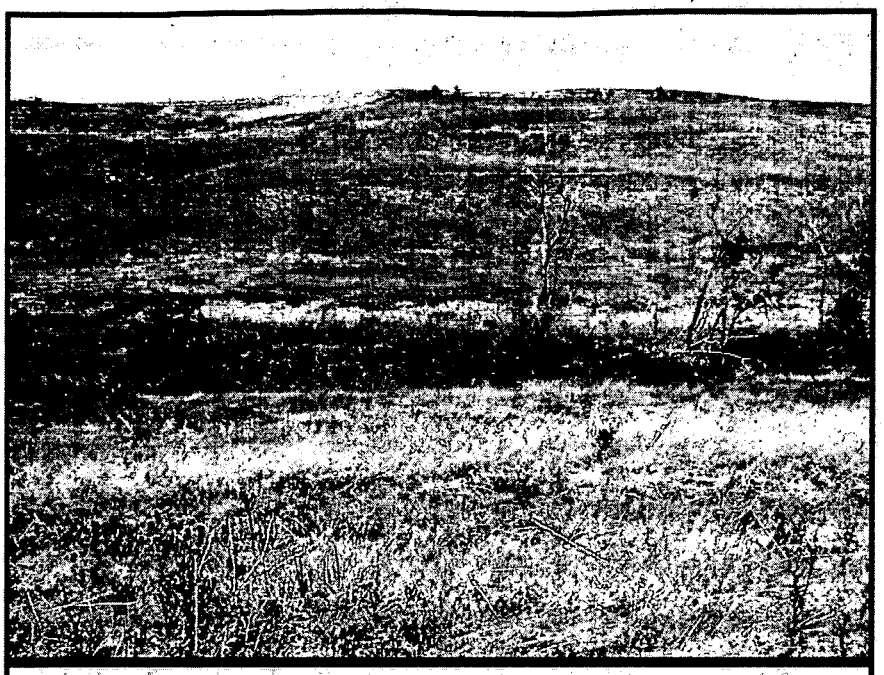

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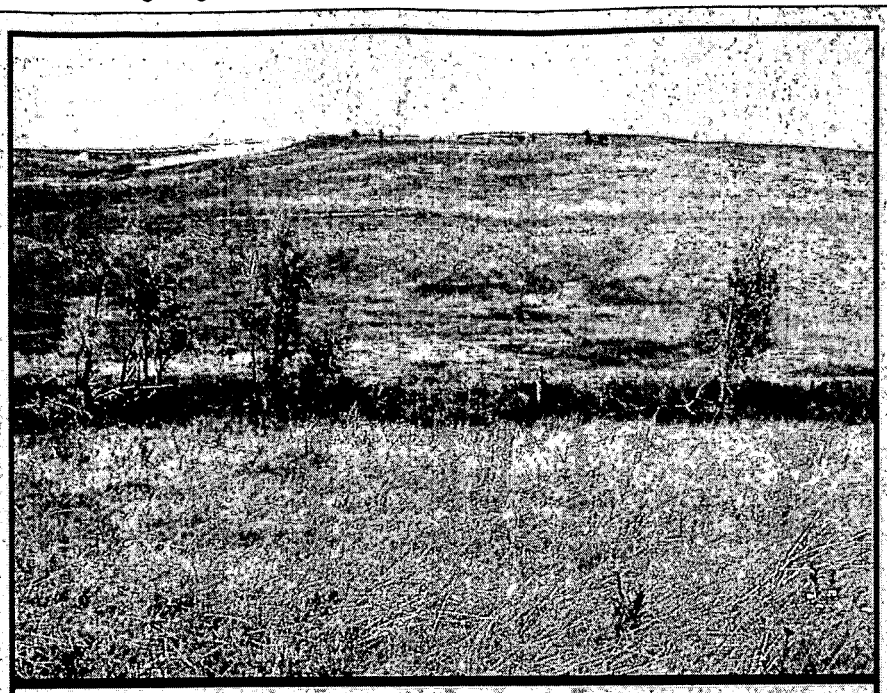

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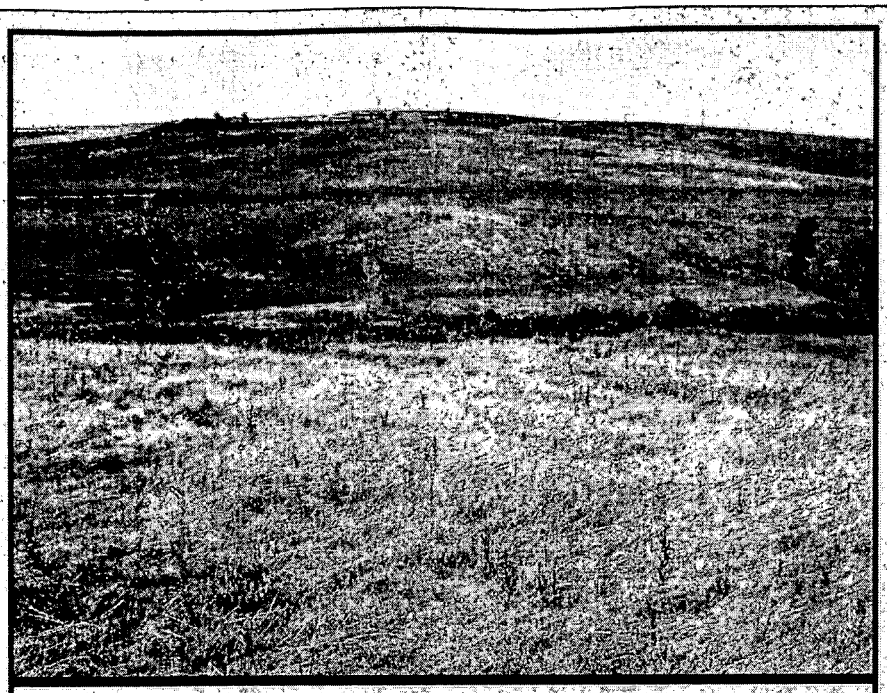
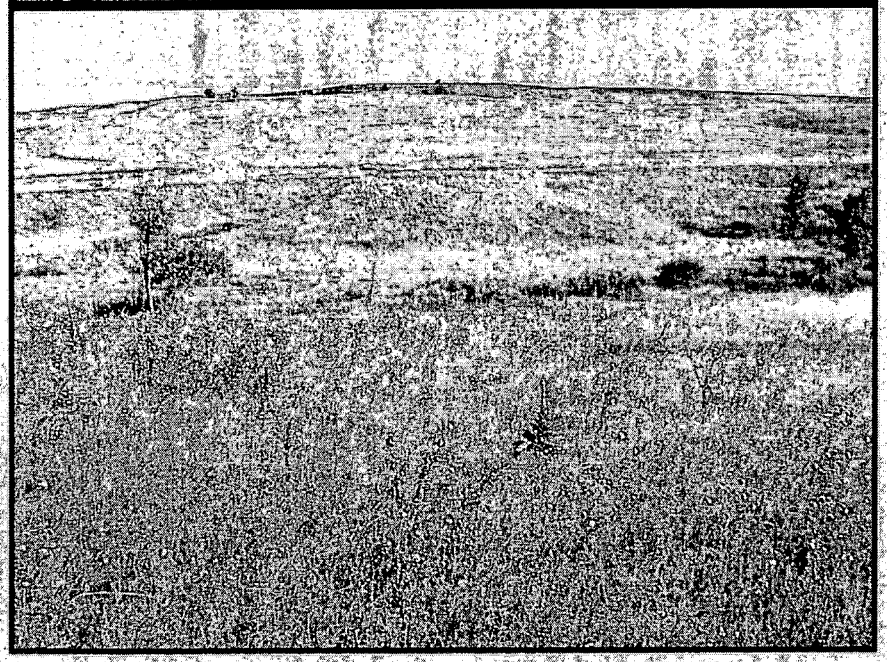
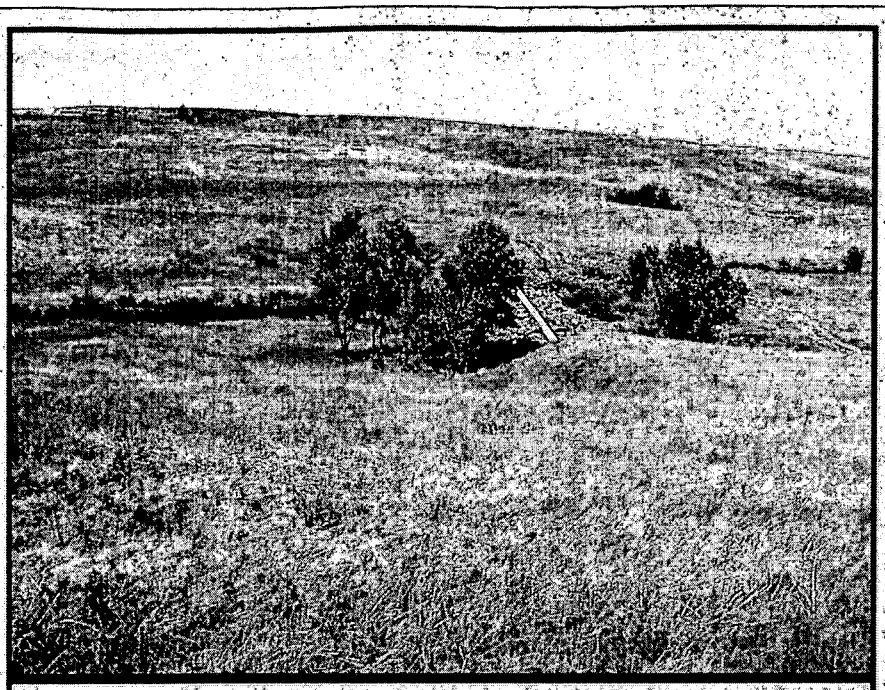


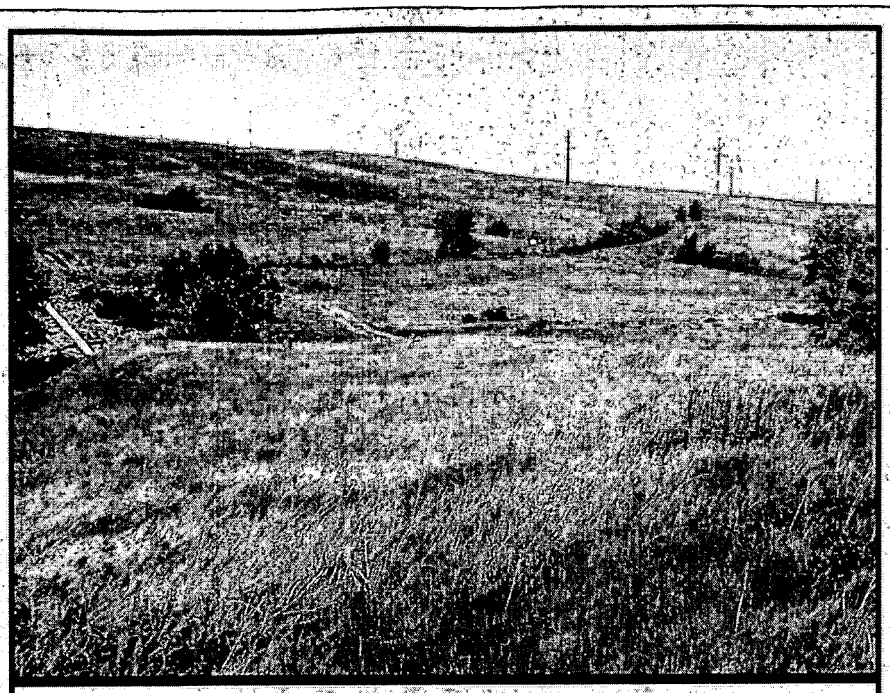


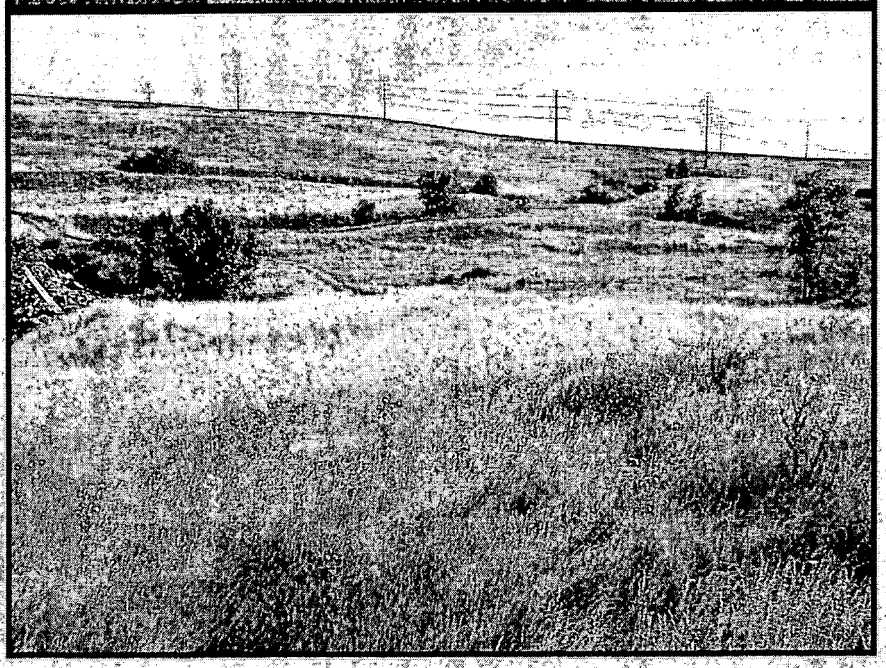
Photopoint 235

East Shooting Range north facing points

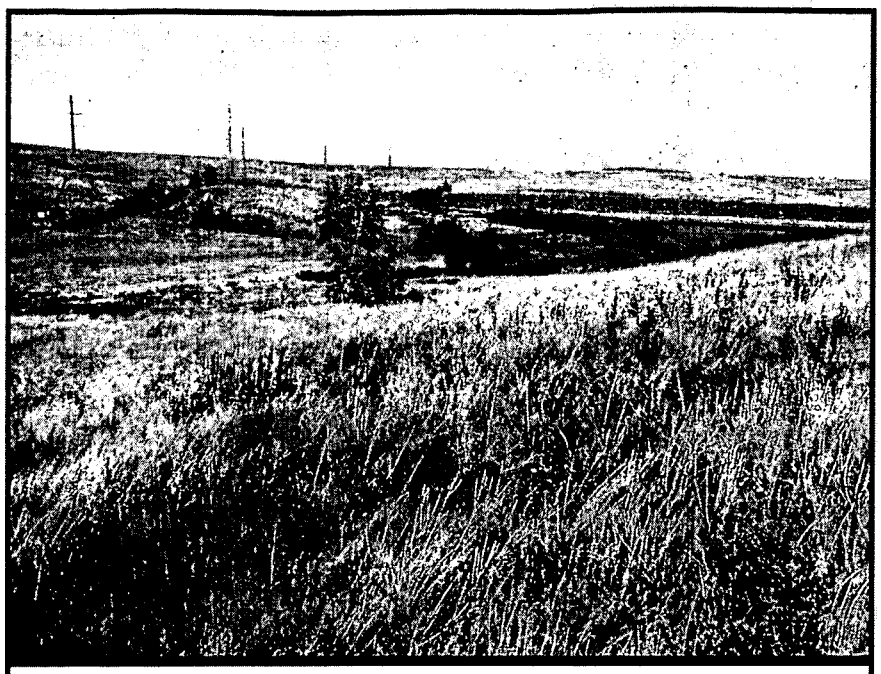


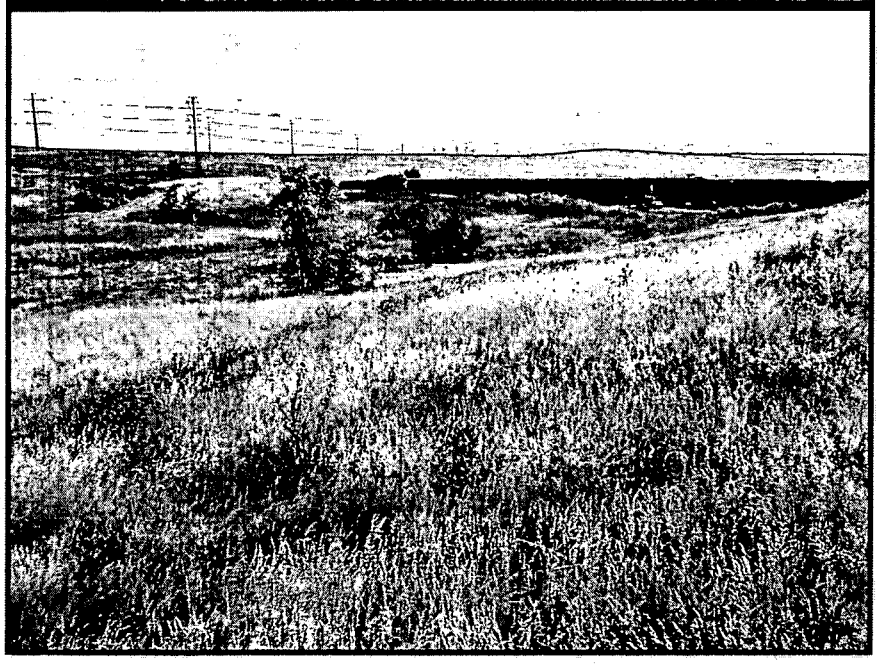
East Shooting Range north facing points





East Shooting Range north facing points



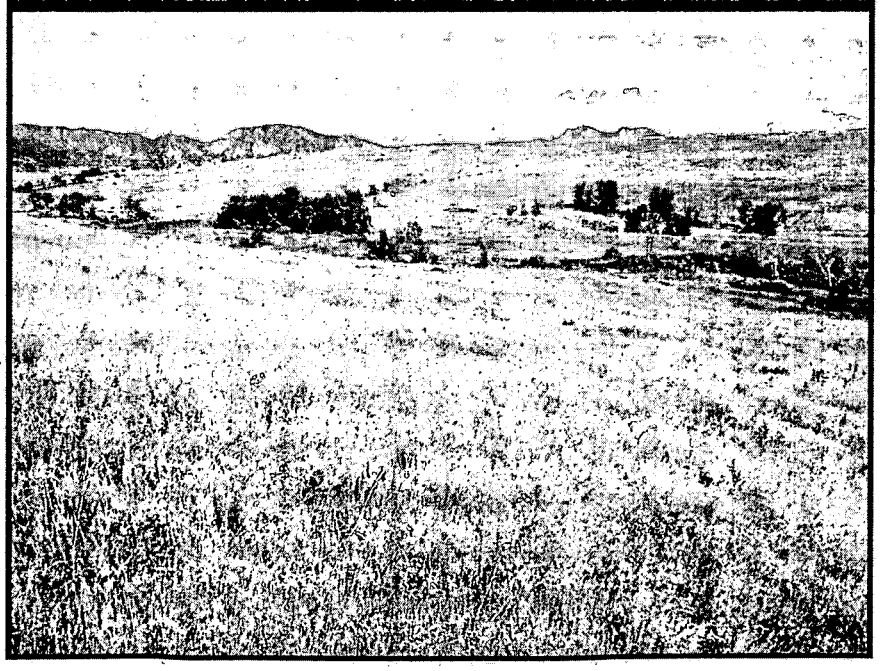


East Shooting Range

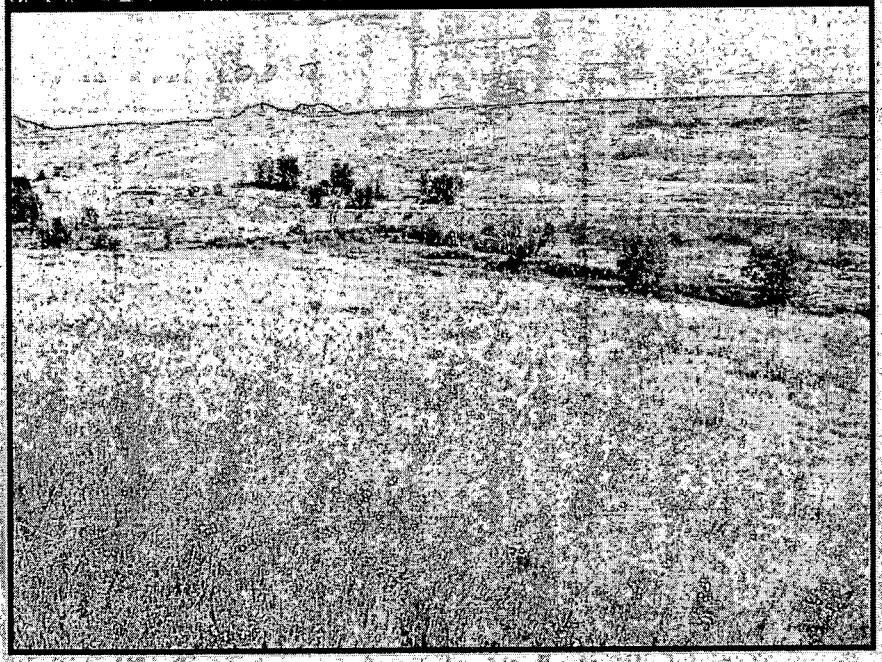
Photopoints 236 and 350

Photopoint 236

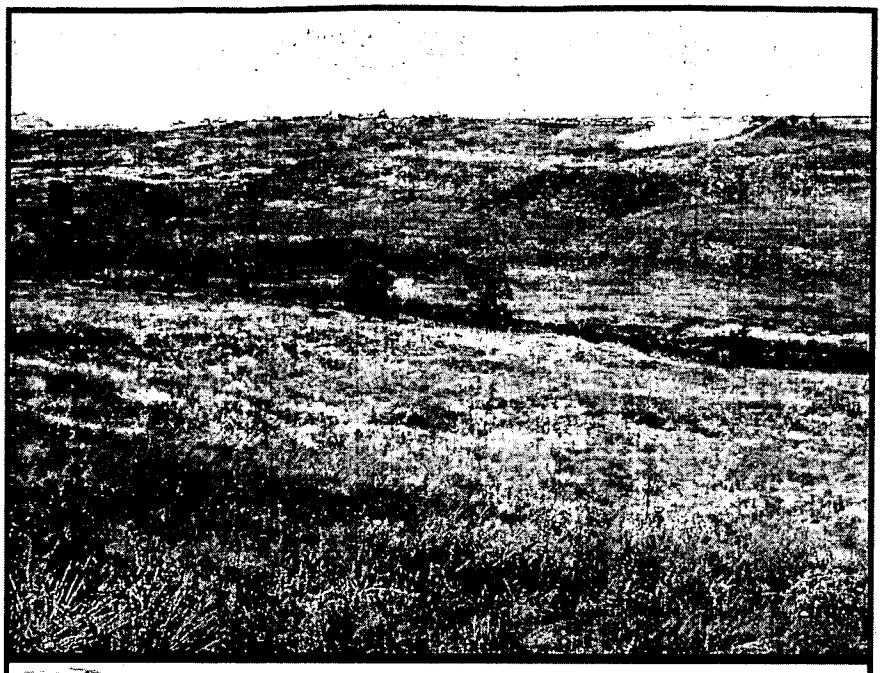
6/23/2004 8/25/2005

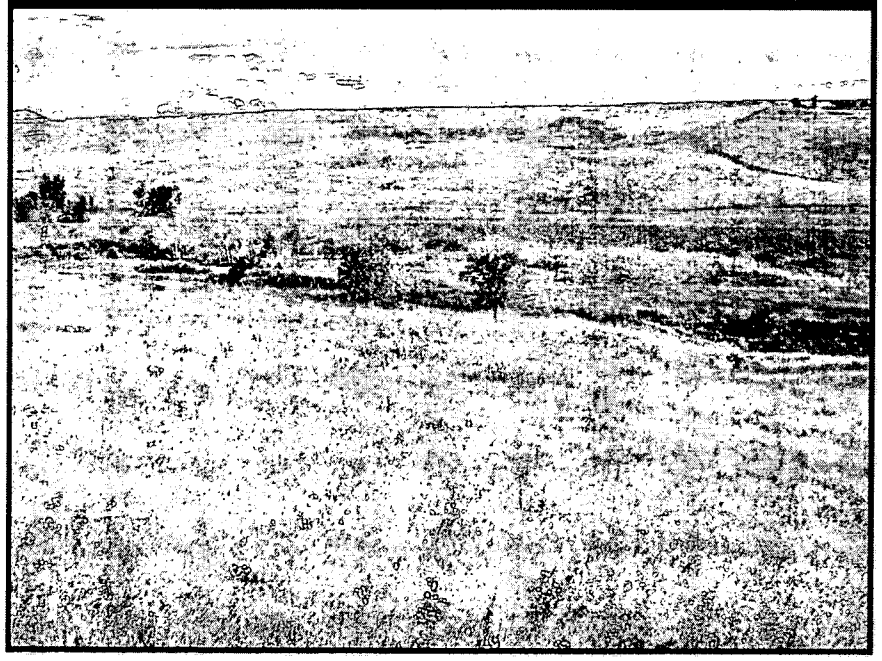


East Shooting Range north facing points

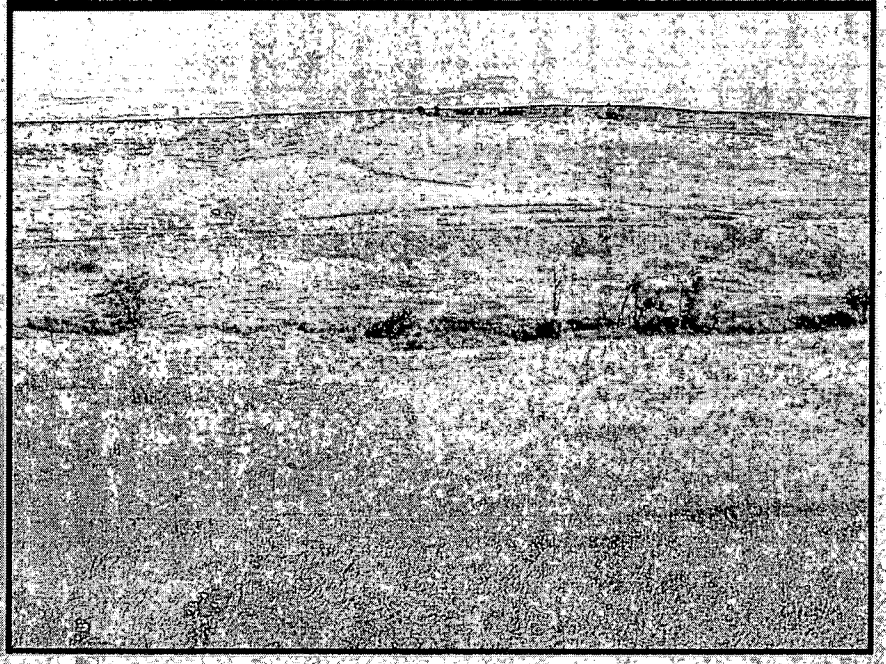


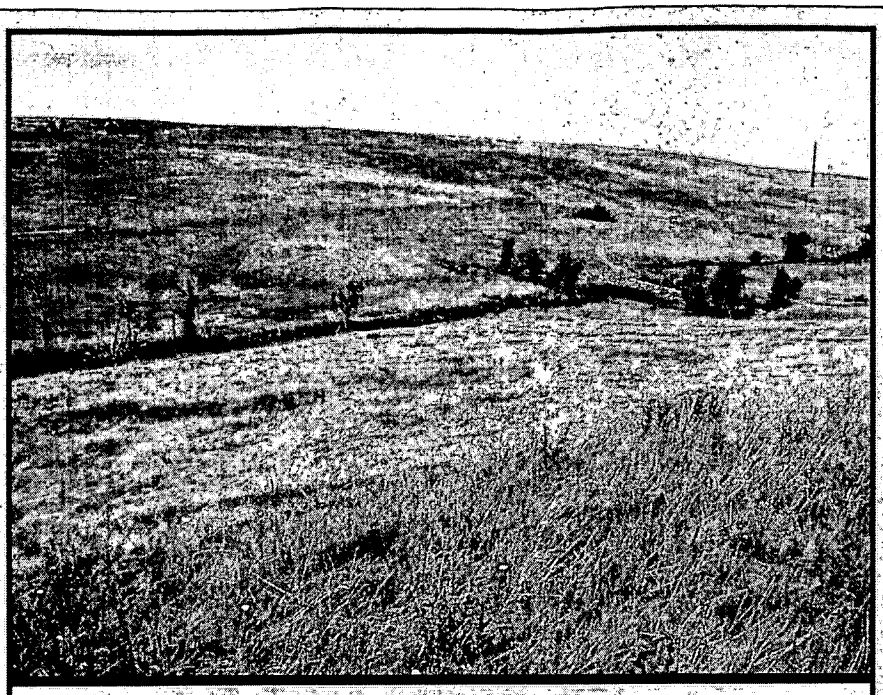
East Shooting Range north facing points

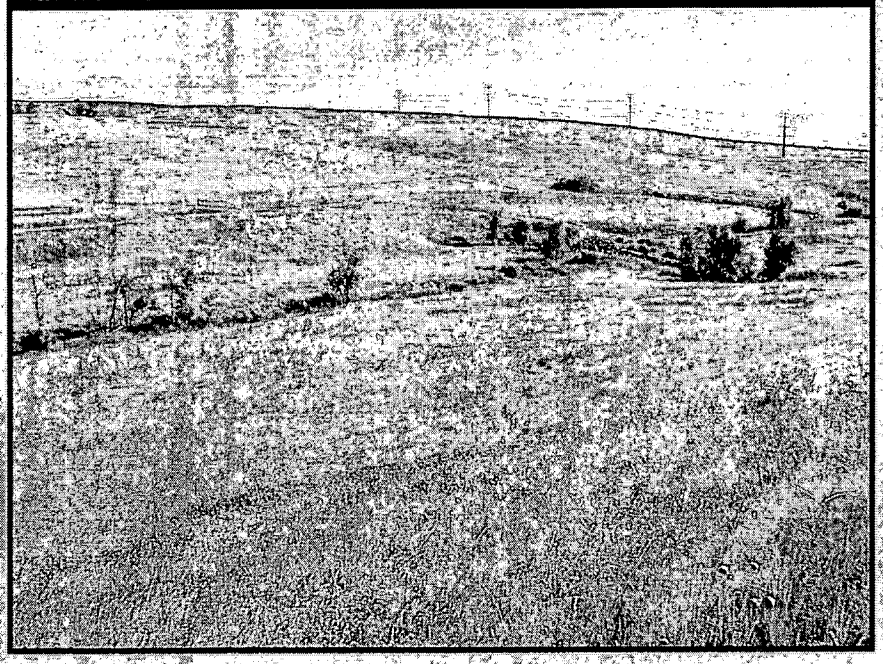




East Shooting Range north facing points





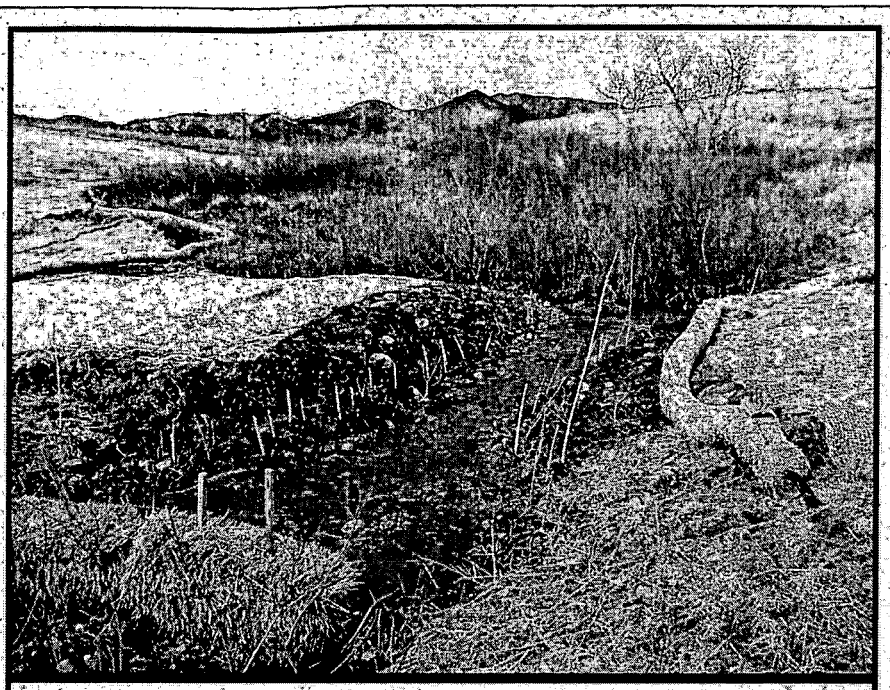


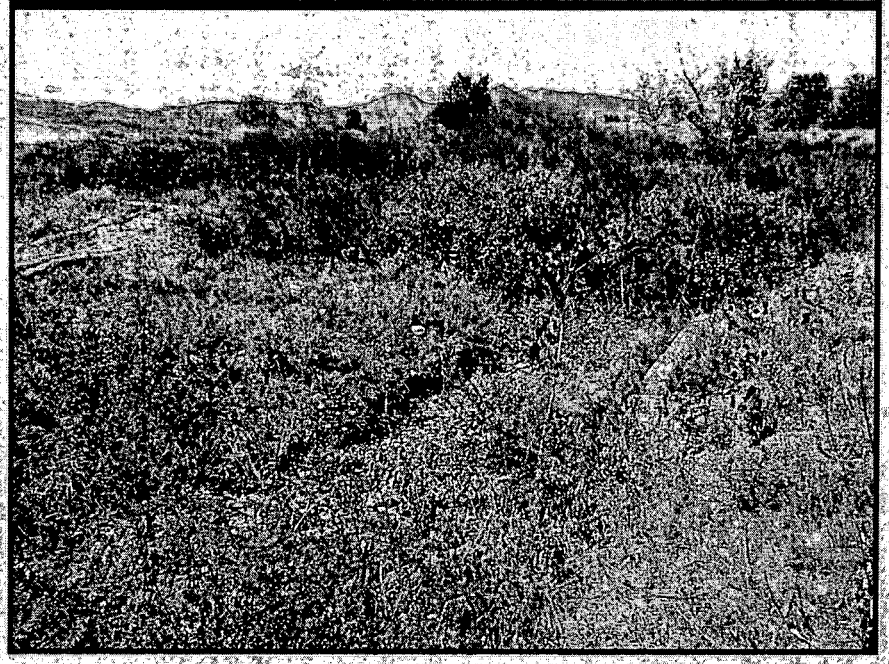
Photopoint 350

Date

Date

East Shooting Range north facing points





Qualitative Revegetation Evaluation Form Form # 00013

Date East Shooting Range
Observer(s) SKN
Location ID 8/17/05

Photographs taken today? Y (N)

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGCA1 – 2
AGSM1 – 1
BOGR1 – ~~2~~ 1 8/17/05
BUDA1 – 2

Any evidence of nutrient or water deficiencies? If so, describe. none

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CIAR1 – 2
CEDI1 – 1
CANU1 – 1
VETH1 – 1
VEBL1 – 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

BRIA1

Total Vegetation Cover (Estimate to nearest percent) 20-25%

Suggestions for management: Weed control / reseed as needed
CIARI sprayed by hand (budget) – summer 05. Needs broadcast next year.

Other comments: Area still somewhat sparsely vegetated on hillslopes. Lots coming up beneath snow mat. Cannot see far into walling area.
Road area seems doing well.
POOEI + SAEXD look well along edges.
Main gullied + sign shoved

Completed by: [illegible] (Print) [illegible] (Sign) Date 8/19/05

2005 Incinerator (Concrete Removal) Project Report for the Rocky Flats Environmental Technology Site

(click below to access a particular section of the report)

- Report Text (PDF Version)

- Appendix A: Photomonitoring
- Appendix B: Qualitative Habitat Assessment Forms

Preble's Mouse Mitigation Monitoring Report for the Incinerator Project at the Rocky Flats Environmental Technology Site
2005 Annual Report
USFWS Letter: ES/CO: BZ Concrete Flow (April 28, 2003)

Introduction

This report is being submitted to the United States Fish and Wildlife Service (USFWS) in order to comply with the requirements outlined in a letter from the USFWS on the Buffer Zone Concrete Removal Project (hereafter referred to as the Incinerator Project; USFWS Letter dated April 28, 2003). The letter addresses impacts to the federally-listed Preble's meadow jumping mouse, (Preble's mouse, *Zapus hudsonius preblei*), from the Incinerator Project at the Rocky Flats Environmental Technology Site (Site). In the Biological Evaluation written for the project it was stated that the revegetation monitoring would be conducted according to the guidance provided in Part II of the Programmatic Biological Assessment, Appendix B. This report is being submitted to satisfy the conditions of the USFWS letter for 2005 and is due by December 1 after each growing season.

Methodology

The methodology used for the monitoring was taken from Appendix B in Part II of the PBA. Both qualitative and quantitative monitoring was conducted at the Incinerator Project Revegetation Area (IPRA) during 2005. Sampling was conducted in mid-August of 2005 during the height of the growing season. Quantitative monitoring was conducted using vegetation transects. Qualitative monitoring was conducted using photographs taken from permanent photopoints and qualitative assessments. Photo monitoring results are shown in Appendix A and the qualitative habitat assessment form is in Appendix B. A total of three 50-m transects were randomly located within the revegetated area at the IPRA (called Revegetation transects = incinerator revegetation area). Three additional "reference" transects (called Reference transects = incinerator reference area) were randomly located adjacent to the revegetation area transects. All six transects were located on the hillside because the area on the pediment top that was sampled in 2004 was re-disturbed by continuing closure activities (Figure 1).

Species richness was determined in a 2-m-wide belt centered along the length of each 50-m transect. Every plant species rooted within the 100-m^2 area was recorded. Foliar cover estimates were made using a point-intercept method along each of the 50-m transects. A 2-m-long rod, with a 6-mm diameter, was dropped vertically at 50-cm increments along the transect to record a total of 100 intercept points. Foliar vegetation hits (defined as a portion of a plant touching the rod) were recorded by species in three categories as defined by height and growth form. The topmost hit of each growth form was recorded. The growth forms measured were herbaceous, woody <2 m in height, and woody >2 m in height.

Determinations of which seeded species were growing within the revegetation areas were based on the transect data. Two different seed mixes were applied at the IPRA based on whether the area was on the hillside or on the pediment top. The hillsides were seeded with a mixed grass prairie seed mix consisting of seven native graminoid species (Table 1). The pediment top was seeded with a tallgrass/mixed grass mixture of 11 native graminoid species (Table 2). The transect data in 2005 was collected on the hillsides so comparisons were made to the species list in Table 1.

Success criteria for the quantitative vegetation monitoring as outlined in Part II of the PBA, Appendix B are as follows:

1. At least 50% of the seeded species will be present within the revegetation area.
2. The combined foliar cover of grasses, forbs, and shrubs will be at least 80% of the reference area cover.
3. The relative native foliar cover will be at least 50% of the reference area.
4. Noxious weed will not exceed 5% canopy cover in the revegetation areas.

Results and Discussion

Summaries of the 2005 monitoring are shown in Tables 3 and 4. The reference area and revegetation area transects are shown side by side in the tables. The revegetation area transects monitored in 2005 were located on the hillsides where a total of seven species of native grasses were seeded in March 2004 (Table 1). In August 2005, a total of six of these species had become established on the hillside (western wheatgrass [*Agropyron smithii*], slender wheatgrass [*Agropyron caninum* [=*A. trachycaulum*]], buffalo grass [*Buchloe dactlyoides*], blue grama [*Bouteloua gracilis*], side-oats grama [*Bouteloua curtipendula*]), and green needle grass [*Stipa viridula*, Table 1]). The success criterion in the PBA for species richness states that at least 50% of the seeded species need to be present within the revegetation area. As of August 2005, 86% of the seeded species were present on the hillside areas at the IPRA. So this criterion has been met.

Foliar cover results are shown in Table 4. The revegetation area total foliar cover was 79%, 78%, and 73% of that measured in the reference areas for transects T1, T2, and T3, respectively. This is just below the success criterion of 80% of the reference area. Thus the IPRA vegetation does not yet have the abundance of total vegetation cover necessary to meet the success criterion in 2005.

The total relative native cover at the incinerator revegetation area exceeded that of the reference areas at all three transects in 2005. The success criterion in the PBA states the revegetation area will have native relative cover that is at least 50% of the reference areas. The 2005 incinerator revegetation area native cover was 238%, 153%, and 109% of that at the reference area for transects T1, T2, and T3, respectively.

Total noxious weed cover was 5.4%, 12.1%, and 18.2%, at T1, T2, and T3, in the revegetation area in 2005. The success criterion in the PBA states that no more than 5% noxious weed cover is allowed. The noxious weed cover in the revegetation area came from diffuse knapweed (*Centaurea diffusa*, Table 4). So this criterion was not met in 2005. It should also be noted, however, that two of the reference area transects also had greater than 5% cover of noxious weeds (T2 = 9.4%, T3 = 20%). Thus while weed control may reduce the noxious weed cover below that required to meet the success criterion in the revegetation area, the native plant community surrounding the incinerator does not meet this criterion. Given that the PBA restricts weed control activities within the Preble's mouse habitat at the Site (except for within revegetation areas), it is questionable whether the 5% noxious weed cover is a realistic long-term sustainable criterion.

Conclusions

The vegetation at the IPRA was sampled per the requirements of the USFWS letter dated April 28, 2003, to determine whether success criteria had been met. The sampling conducted in 2005 represents two full growing seasons for the area. To summarize, in 2005, the incinerator revegetation area exceeds the success criteria for the percent of seeded species present and total relative native cover. It has only slightly less than the amount of total foliar cover needed. Noxious weeds are still a problem in the revegetation area and with weed control can likely be brought below the 5% noxious weed cover allowed. Overall, the vegetation at the IPRA is doing very well for its second growing season, largely due to the abundant moisture received in spring 2004 and 2005.

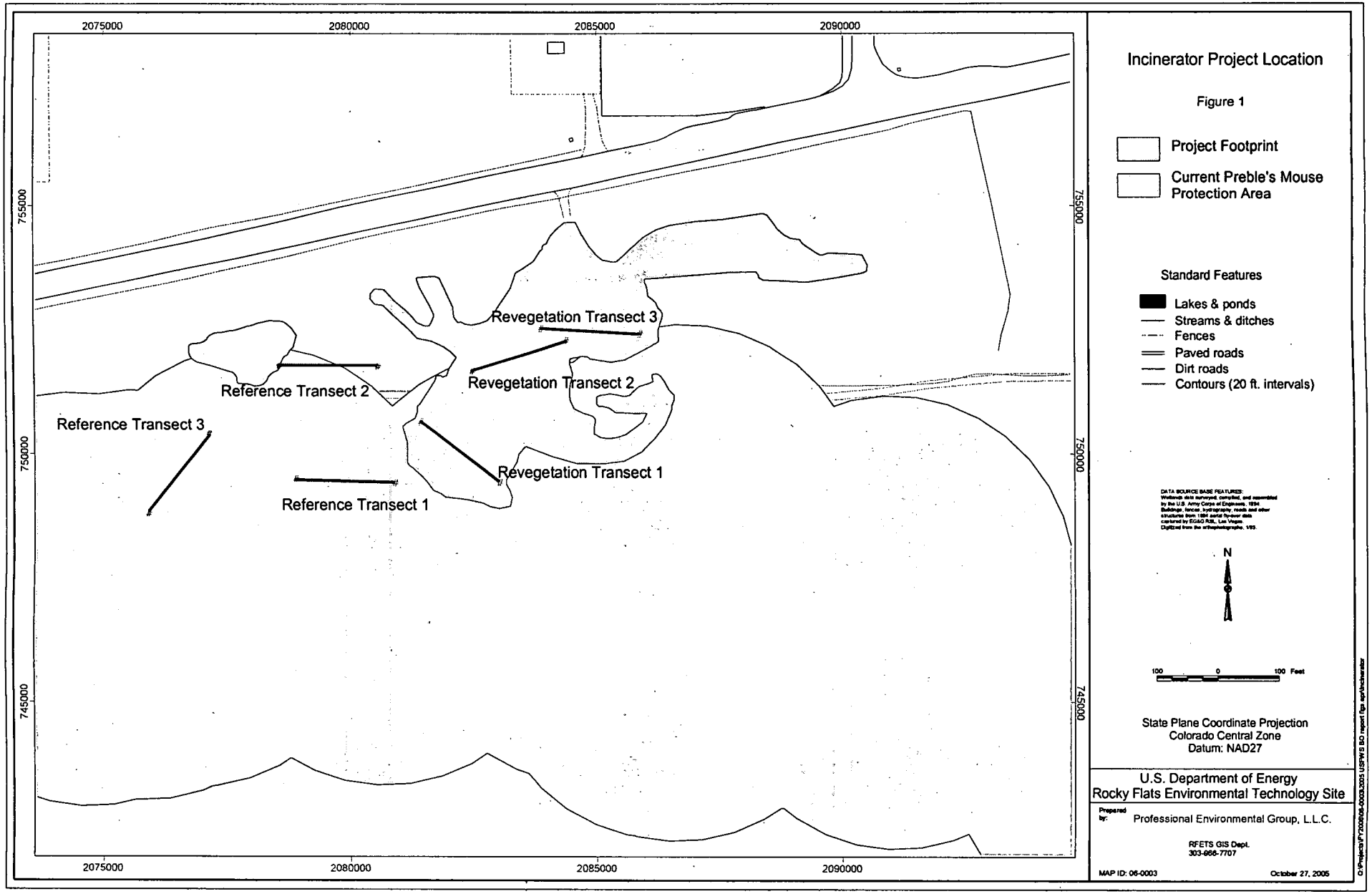

2075000
2080000
2085000
2090000
755000
750000
745000
Revegetation Transect 3
Revegetation Transect 2
Revegetation Transect 1
Reference Transect 2
Reference Transect 3
Reference Transect 1
Incinerator Project Location
Figure 1
Project Footprint
Current Preble's Mouse Protection Area
Standard Features
Lakes & ponds
Streams & ditches
Fences
Paved roads
Dirt roads
Contours (20 ft. intervals)
N
100 0 100 Feet
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27
U.S. Department of Energy
Rocky Flats Environmental Technology Site
Prepared by:
Professional Environmental Group, L.L.C.
RFETS GIS Dept.
303-966-7707
MAP ID: 06-0003
October 27, 2005

Table 1. Mixed Grass Prairie Seed Mix

Hillside Slope Areas (Hillside Areas Or Areas With Slopes Greater Than 10%) Revegetation Seed Mix
(Based on 50 seeds/sq.ft.)

Red Map Areas

This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS
Date: 1/04

Species	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb.	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
Graminoids							
Agropyron dasystachyum	Thickspike Wheatgrass	Critana	5	108900	150000	2.5	0.73
Agropyron smithii	Western Wheatgrass	Arriba	23	500940	120000	11.5	4.17
Agropyron trachycaulum	Slender Wheatgrass	San Luis	15	326700	120000	7.5	2.72
Bouteloua curtipendula	Side-Oats Grama	Vaughn	13	283140	190000	6.5	1.49
Bouteloua gracilis	Blue Grama	Hachita	24	522720	710000	12.0	0.74
Buchloe dactyloides	Buffalo Grass	Texoka	10	217800	45000	5.0	4.84
Stipa viridula	Green Needle Grass	Lodorm	10	217800	180000	5.0	1.21
	Total		100	2178000		50.0	15.90

Sq. ft/acre	43560
Seeds/sq. ft.	50
Seeds needed/acre	2178000

1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast, the application rates are to be doubled.

2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.

3) The seed is to be certified weed free.

4) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

NOTE:
Slender wheatgrass and thickspike wheatgrass have been added to species mix as early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687.

Table 2. Tallgrass/Mixed Grassland Seed Mix

Flat Areas (Areas On Pediment Tops* With Slopes Less Than 10%) Revegetation Seed Mix **Blue Map Areas**
(Based on 50 seeds/sq.ft.)

This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS
Date: 1/04

Scientific Name	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb.	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
Graminoids							
Agropyron smithii	Western Wheatgrass	Arriba	20	435600	120000	10.0	3.63
Agropyron trachycaulum	Slender Wheatgrass	San Luis	10	217800	120000	5.0	1.82
Andropogon gerardii	Big Bluestem	Bonilla	10	217800	130000	5.0	1.68
Andropogon scoparius	Little Bluestem	Aldous	8	174240	225000	4.0	0.77
Bouteloua curtipendula	Side-Oats Grama	Vaughn	15	326700	190000	7.5	1.72
Bouteloua gracilis	Blue Grama	Hachita	15	326700	710000	7.5	0.46
Buchloe dactyloides	Buffalo Grass	Texoka	5	108900	45000	2.5	2.42
Koleria pyrimidata	June Grass		3	65340	2315400	1.5	0.03
Sorghastrum nutans	Indian Grass	Cheyenne	2	43560	120000	1.0	0.36
Sporobolus cryptandra	Sand Dropseed		7	152460	5298000	3.5	0.03
Stipa viridula	Green Needlegrass	Lodorm	5	108900	115000	2.5	0.95
	Total		100	2178000		50.0	13.86

Sq. ft/acre	43560
Seeds/sq. ft.	50
Seeds needed/acre	2178000

1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast, the application rates are to be doubled.

2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.

3) The seed is to be certified weed free.

4) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

NOTE:
* The pediment tops are the upper flat surface areas throughout the IA.
Slender wheatgrass was added to species mix as an early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687.

Table 3. Incinerator Species Richness Summary 2005

Family	Scientific Name	Speccode	Native	Noxious Weed	Reference Area T1	Revegetation T1	Reference Area T2	Revegetation T2	Reference Area T3	Revegetation T3
ASCLEPIADACEAE	Asclepias speciosa Torr.	ASSP1	Y		X					
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y				X		X	
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y		X	X		X	X	X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y		X	X	X	X	X	X
ASTERACEAE	Arnica fulgens Pursh.	ARFU1	Y						X	
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y				X			
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y				X	X	X	X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y		X				X	
ASTERACEAE	Aster porteri Gray	ASPO1	Y		X	X			X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X	X	X			X	X
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X	X	X	X
ASTERACEAE	Chrysopsis fulcrata Greene	CHFU1	Y				X			
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y				X			
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N	X	X	X			X	
ASTERACEAE	Cirsium undulatum (Nutt.) Spreng.	CIUN1	Y				X			
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y		X	X				
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y		X		X		X	
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y				X		X	
ASTERACEAE	Gaillardia aristata Pursh.	GAAR1	Y			X		X		
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y		X	X	X		X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y			X				
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y							X
ASTERACEAE	Lactuca serriola L.	LASE1	N		X	X	X	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y						X	
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y		X	X		X	X	X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N			X			X	
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y		X		X		X	
ASTERACEAE	Sonchus arvensis L. ssp. arvensis L.	SOAR1	N	X				X		X
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N		X	X	X		X	X
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y						X	
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N		X	X	X	X	X	X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N							X
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y				X		X	
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y		X		X		X	
CAPRIFOLIACEAE	Symphoricarpos occidentalis Hook.	SYOC1	Y		X					
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y		X				X	
CHENOPODIACEAE	Chenopodium album L.	CHAL1	N					X		
CHENOPODIACEAE	Kochia scoparia (L.) Schrad.	KOSC1	N					X		
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	X			X			X
COMMELINACEAE	Tradescantia occidentalis (Britt.) Smyth	TROC1	Y				X			
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N	X	X				X	
CONVOLVULACEAE	Evolvulus nuttallianus R. & S.	EVNU1	Y				X			
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y				X		X	
CYPERACEAE	Carex praegracilis W. Boott.	CAPR1	Y		X					
CYPERACEAE	Eleocharis compressa Sulliv.	ELCO1	Y						X	
FABACEAE	Astragalus shortianus Nutt. ex T.&G.	ASSH1	Y						X	
FABACEAE	Dalea purpurea Vent	DAPU1	Y				X		X	
FABACEAE	Melilotus alba Medic.	MEAL1	N					X		X
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N			X	X	X		X
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y		X	X	X		X	
FABACEAE	Vicia americana Muhl. ex Willd.	VIAM1	Y			X				
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N	X				X		X
JUNCACEAE	Juncus balticus Willd.	JUBA1	Y		X					
JUNCACEAE	Juncus interior Wieg.	JUIN1	Y		X					
LAMIACEAE	Marrubium vulgare L.	MAVU1	N			X		X		X

Family	Scientific Name	Speccode	Native	Noxious Weed	Reference Area T1	Revegetation T1	Reference Area T2	Revegetation T2	Reference Area T3	Revegetation T3
LAMIACEAE	Nepeta cataria L.	NECA1	N			X				
LINACEAE	Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	Y			X		X		X
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y				X			
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y		X					
OXALIDACEAE	Oxalis dillenii Jacq.	OXDI1	N						X	
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N						X	X
PLANTAGINACE	Plantago major L.	PLMA1	N					X		
POACEAE	Aegilops cylindrica Host	AECY1	N	X			X			
POACEAE	Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	AGCA1	Y			X		X		X
POACEAE	Agropyron smithii Rydb.	AGSM1	Y		X	X		X	X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y				X		X	
POACEAE	Andropogon scoparius Michx.	ANSC1	Y				X			
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y				X			
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y			X	X	X	X	X
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y		X	X	X	X	X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y				X			
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N			X				
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N		X	X	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X		X	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y			X	X	X	X	X
POACEAE	Dactylis glomerata L.	DAGL1	N					X		X
POACEAE	Festuca pratensis Huds.	FEPR1	N							X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y		X	X			X	
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y						X	
POACEAE	Poa compressa L.	POCO1	N		X	X			X	
POACEAE	Poa pratensis L.	POPR1	N		X			X	X	
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y			X	X			X
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y				X			
POACEAE	Sporobolus heterolepis (A. Gray) A. Gray	SPHE1	Y				X			
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y				X		X	
POACEAE	Stipa viridula Trin.	STVI1	Y							X
POLYGONACEAE	Eriogonum umbellatum Torr.	ERUM1	Y				X			
ROSACEAE	Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	Y		X				X	
ROSACEAE	Rosa arkansana Porter	ROAR1	Y				X			
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X		X	X		X	
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y				X			
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	N	X	X	X			X	
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N	X	X	X	X	X	X	X
VERBENACEAE	Lippia cuneifolia (Torr.) Steud.	LICU1	Y						X	
VERBENACEAE	Verbena bracteata Lag. & Rodr.	VEBR1	Y			X		X		X
	Total Number of Species				34	36	44	28	49	34

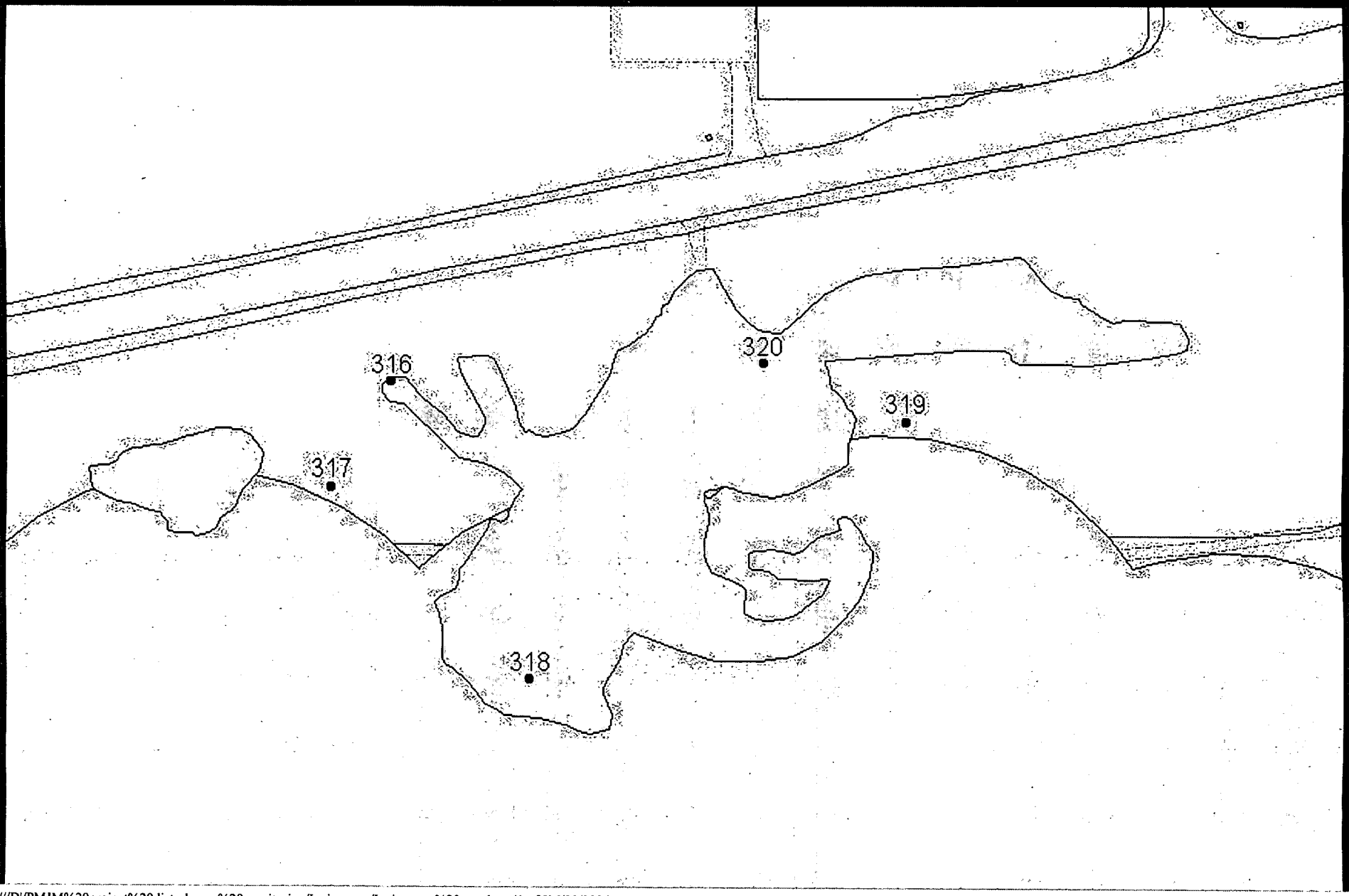
Table 4. Incinerator Foliar Cover Summary 2005

						Reference Area T1		Revegetation T1		Reference Area T2		Revegetation T2		Reference Area T3		Revegetation T3	
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	Noxious Weed	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N					1.0	1.4	6.0	7.1						
Centaurea diffusa Lam.	CEDI1	F	N		X	1.0	1.1	3.0	4.1			8.0	12.1	1.0	1.1	12.0	18.2
Cirsium arvense (L.) Scop.	CIAR1	F	N		X	1.0	1.1										
Convolvulus arvensis L.	COAR1	F	N		X									5.0	5.6		
Hypericum perforatum L.	HYPE1	F	N		X					1.0	1.2						
Linaria dalmatica (L.) Mill.	LIDA1	F	N		X					2.0	2.4						
Melilotus officinalis (L.) Pall.	MEOF1	F	N					5.0	6.8			13.0	19.7			25.0	37.9
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	F	Y											1.0	1.1	2.0	3.0
Ambrosia psilostachya DC.	AMPS1	F	Y					1.0	1.4	2.0	2.4						
Arnica fulgens Pursh.	ARFU1	F	Y											1.0	1.1		
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y							2.0	2.4						
Aster falcatus Lindl.	ASFA1	F	Y											2.0	2.2		
Aster porteri Gray	ASPO1	F	Y											2.0	2.2		
Chrysopsis fulcrata Greene	CHFU1	F	Y							1.0	1.2						
Erigeron flagellaris A. Gray	ERFL1	F	Y							6.0	7.1						
Grindelia squarrosa (Pursh.) Dun.	GRSQ1	F	Y			3.0	3.2	1.0	1.4								
Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	F	Y									1.0	1.5			1.0	1.5
Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	F	Y			3.0	3.2							1.0	1.1		
Psoralea tenuiflora Pursh.	PSTE1	F	Y							4.0	4.7			1.0	1.1		
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y									1.0	1.5	1.0	1.1	4.0	6.1
Senecio spartioides T. & G.	SESP1	F	Y			1.0	1.1										
Tradescantia occidentalis (Britt.) Smyth	TROC1	F	Y							1.0	1.2						
Verbena bracteata Lag. & Rodr.	VEBR1	F	Y													1.0	1.5
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C		6.0	6.4	4.0	5.4	34.0	40.0	1.0	1.5	8.0	8.9		
Bromus tectorum L.	BRTE1	G	N	C	X			1.0	1.4	5.0	5.9			12.0	13.3		
Festuca pratensis Huds.	FEPR1	G	N	C												1.0	1.5
Poa compressa L.	POCO1	G	N	C		31.0	33.0							21.0	23.3		
Poa pratensis L.	POPR1	G	N	C		23.0	24.5							8.0	8.9		
Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	AGCA1	G	Y	C				50.0	67.6			33.0	50.0			14.0	21.2
Agropyron smithii Rydb.	AGSM1	G	Y	C		14.0	14.9	5.0	6.8			1.0	1.5	1.0	1.1	2.0	3.0
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C						1.0	1.2						
Carex heliophila Mack.	CAHE1	G	Y	C						1.0	1.2			1.0	1.1		
Carex praegracilis W. Boott.	CAPR1	G	Y	C		9.0	9.6										
Eleocharis compressa Sulliv.	ELCO1	G	Y	C										1.0	1.1		
Juncus balticus Willd.	JUBA1	G	Y	C		1.0	1.1										
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C		1.0	1.1										
Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	G	Y	C						1.0	1.2						
Stipa comata Trin. & Rupr.	STCO1	G	Y	C						1.0	1.2						
Andropogon gerardii Vitman	ANGE1	G	Y	W						11.0	12.9			22.0	24.4		
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W						3.0	3.5	4.0	6.1			2.0	3.0
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W						2.0	2.4	1.0	1.5				
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W				3.0	4.1			3.0	4.5			2.0	3.0
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W										1.0	1.1		
Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	G	Y	W						1.0	1.2						
Total Foliar Cover						94.0	100.0	74.0	100.0	85.0	100.0	66.0	100.0	90.0	100.0	66.0	100.0
Total Forb Cover						9.0	9.6	11.0	14.9	25.0	29.4	23.0	34.8	15.0	16.7	45.0	68.2
Total Non-Native Forb Cover						2.0	2.1	9.0	12.2	9.0	10.6	21.0	31.8	6.0	6.7	37.0	56.1
Total Native Forb Cover						7.0	7.4	2.0	2.7	16.0	18.8	2.0	3.0	9.0	10.0	8.0	12.1
Total Graminoid Cover						85.0	90.4	63.0	85.1	60.0	70.6	43.0	65.2	75.0	83.3	21.0	31.8
Total Non-Native Graminoid Cover						60.0	63.8	5.0	6.8	39.0	45.9	1.0	1.5	49.0	54.4	1.0	1.5
Total Native Graminoid Cover						25.0	26.6	58.0	78.4	21.0	24.7	42.0	63.6	26.0	28.9	20.0	30.3
Total Native Cover						32.0	34.0	60.0	81.1	37.0	43.5	44.0	66.7	35.0	38.9	28.0	42.4
Total Non-Native Cover						62.0	66.0	14.0	18.9	48.0	56.5	22.0	33.3	55.0	61.1	38.0	57.6
Total Warm-Season Graminoid Cover						0.0	0.0	3.0	4.1	17.0	20.0	8.0	12.1	23.0	25.6	4.0	6.1
Total Cool-Season Graminoid Cover						85.0	90.4	60.0	81.1	43.0	50.6	35.0	53.0	52.0	57.8	17.0	25.8
Total Noxious Weed Cover						2.0	2.1	4.0	5.4	8.0	9.4	8.0	12.1	18.0	20.0	12.0	18.2

Absolute Cover = The percentage of the number of hits on a species out of the total number of hits possible.
Relative Cover = The percentage of the number of hits on a species out of the total number of vegetation hits.
Native Categories: Y = Native, N = Non-Native
Growth Form Categories: F = Forb, G = Graminoid
Cool/Warm Season Categories: C = Cool-Season Graminoid, W = Warm-Season Graminoid
Noxious Weed Category: X = Noxious Weed (listed on May 2005 Colorado State Noxious Weed List)

Incinerator (Concrete Removal) Project

(clicking on any photopoint on the map will take you to the corresponding monitoring photos, then clicking on any photo will enlarge that photo)

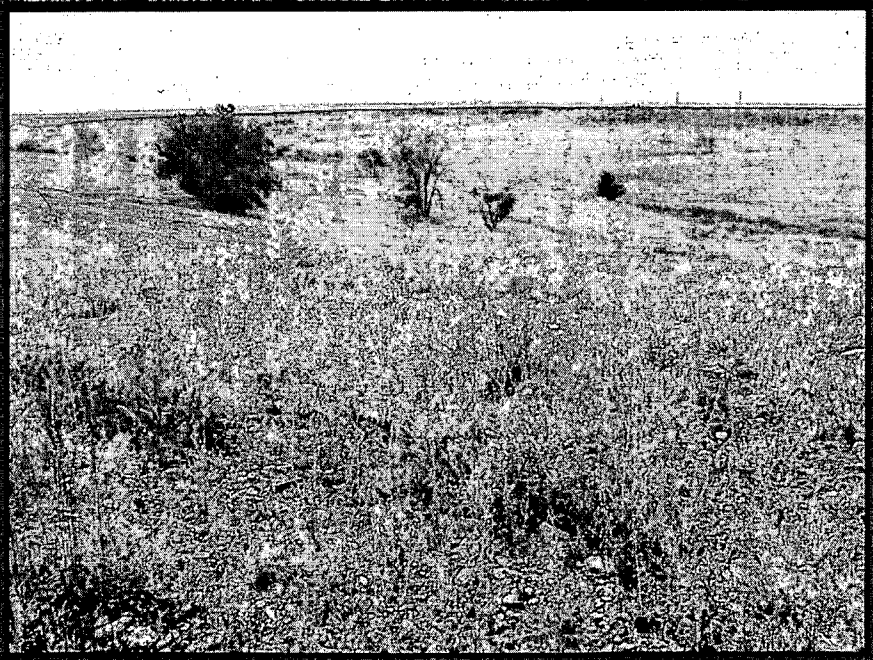


Incinerator (Concrete Removal) Project

Photopoint 316

March 2004

August 2004



August 2005

Incinerator (Concrete Removal) Project

Photopoint 317

April 2003

(during project work)

March 2004

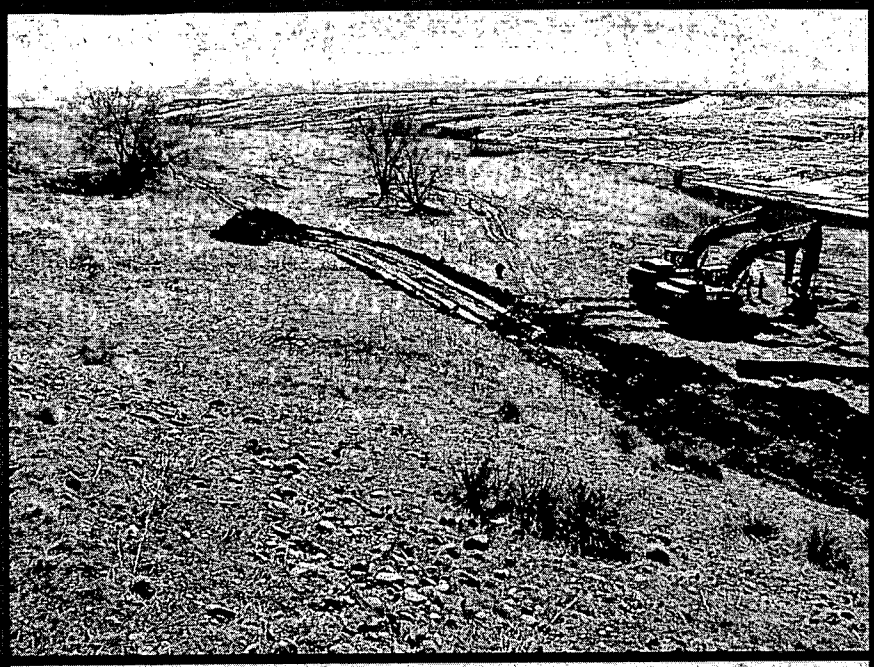
(after re-seeding)

August 2004

August 2005

April 2003

March 2004



August 2004

August 2005

Incinerator (Concrete Removal) Project

Photopoint 318

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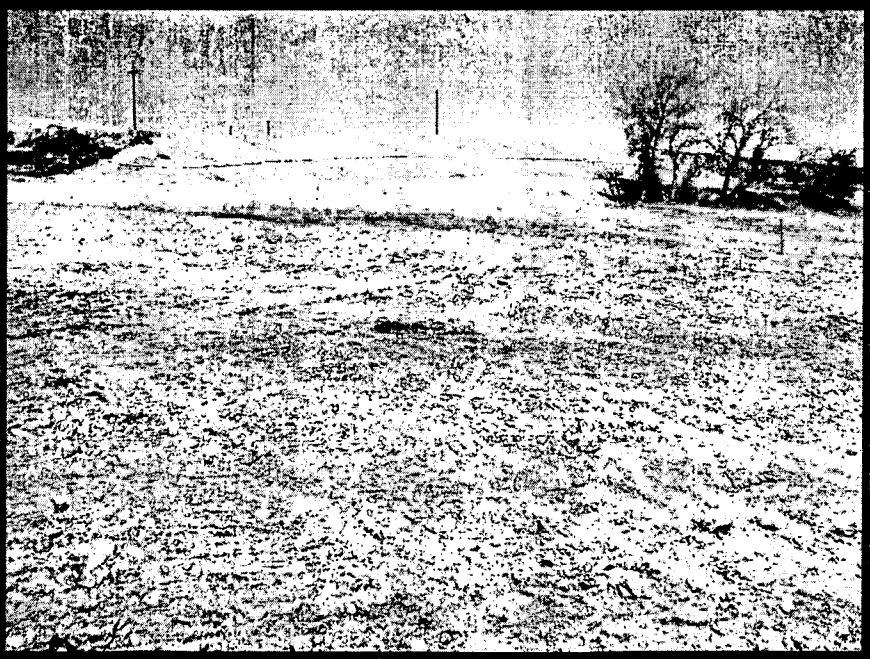

August 2004

August 2005

Incinerator (Concrete Removal) Project

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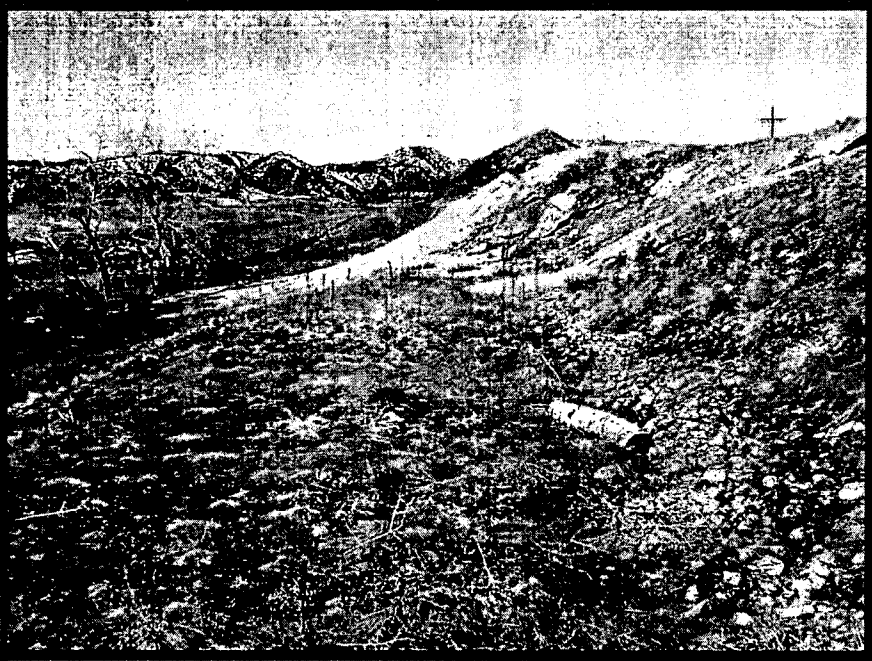

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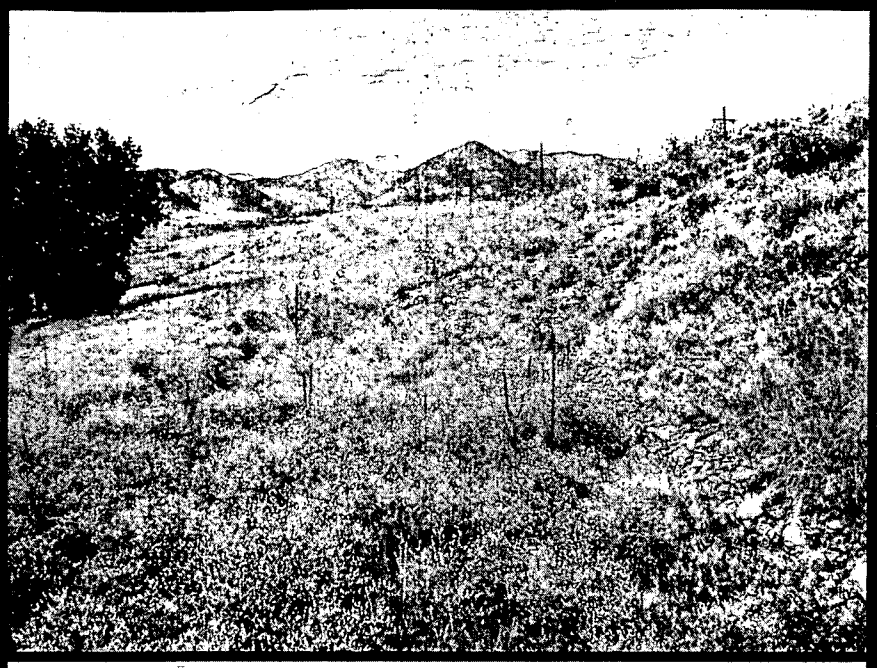
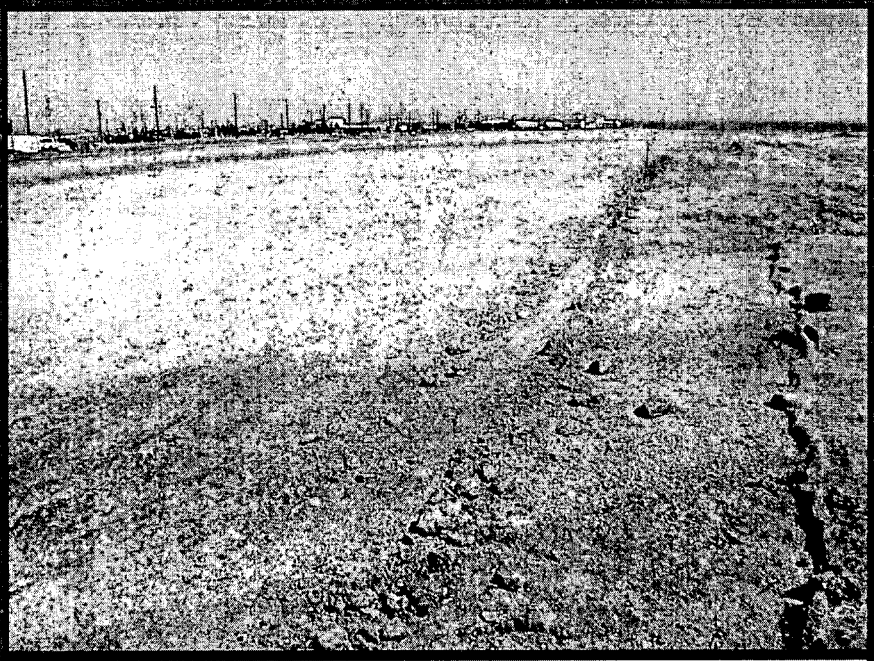


Incinerator (Concrete Removal) Project

Photopoint 320

March 2004

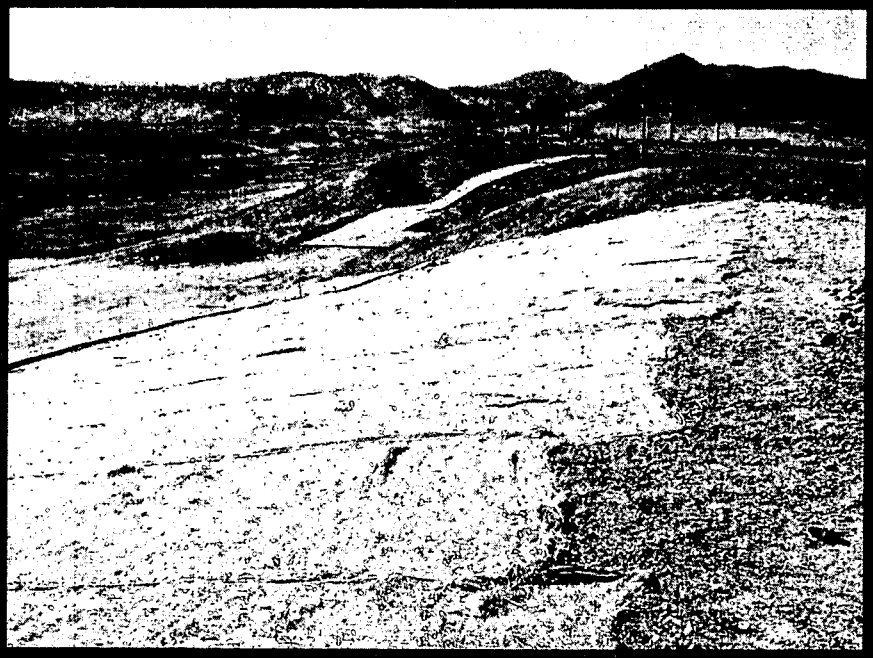


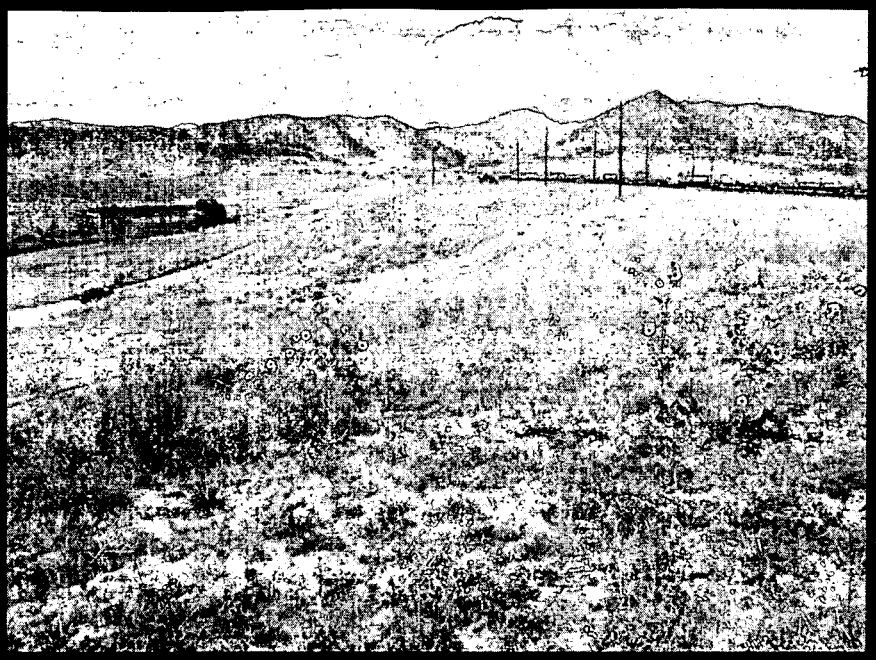
August 2004

August 2005

March 2004

August 2004





August 2005

Qualitative Revegetation Evaluation Form

Form # 00017

Date 8/22/05
Observer(s) JRN
Location ID Incinerator

Photographs taken today? (Y) N

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGCAI - 4
AGSMI - 1
BOCUI - 1
BOGRI - 1
BUDAI - 1
STUVI - 1

Any evidence of nutrient or water deficiencies? If so, describe. None

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CEDII - 2
CIARI - 1
LIDALMI - 1
VEBRI - 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

MEOFI - 2

Total Vegetation Cover (Estimate to nearest percent) ~50%

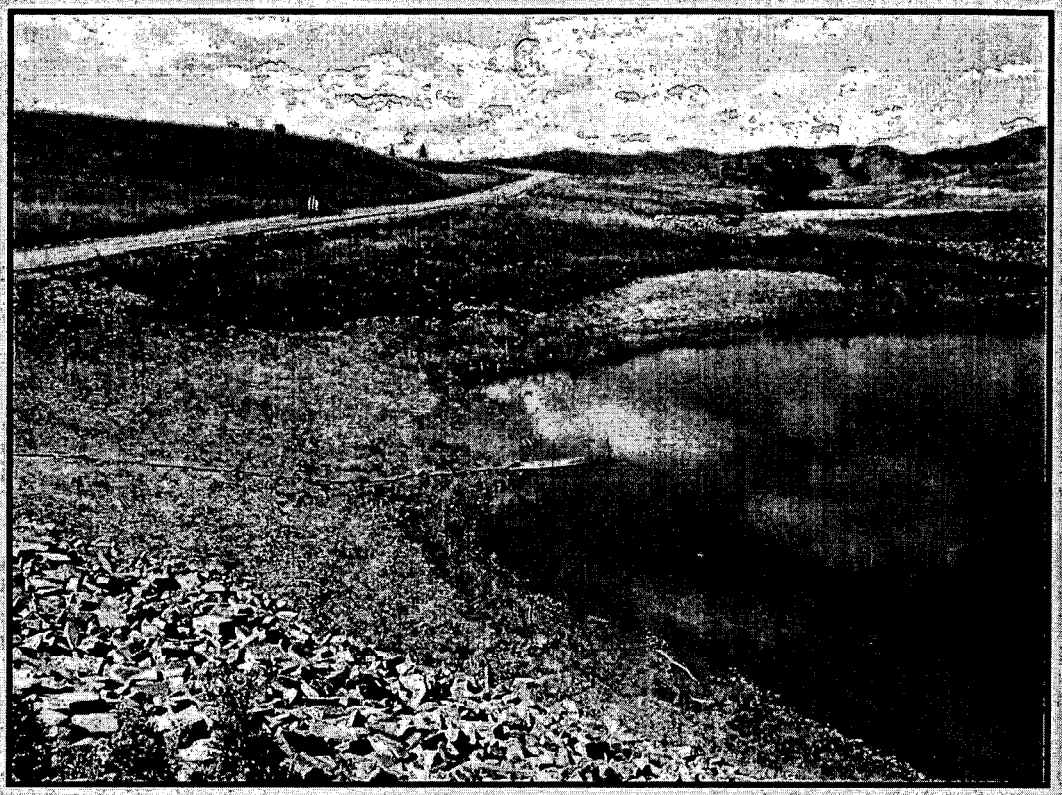
Suggestions for management: Weed control, reseeding on hillside at bare spot, also need most of hillside where lots of CEDII + MEDF1 are present (the reseeding was done on 7/14/05 by JKN)

Other comments: Much of grass looks very good. Need some weed control for next yr.

Completed by: [illegible] (Print) [illegible] (Sign) Date 8/22/05

2005 Phytoremediation Project Report

for the Rocky Flats Environmental Technology Site



(click below to access a particular section of the report)

- Report Text (PDF Version)
- Appendix A: Photomonitoring

Preble's Mouse Mitigation Monitoring Report for the Phytoremediation Project at the Rocky Flats Environmental Technology Site
2005 Annual Report
Biological Opinion: ES/LK-6-CO-05-F-014 (June 16, 2005)

Introduction

This report is being submitted to the United States Fish and Wildlife Service (USFWS) in order to comply with the requirements outlined in a Biological Opinion (BO) from the USFWS on the Phytoremediation Project (USFWS BO dated June 16, 2005). The Phytoremediation Project involved the planting of several hundred coyote willow (*Salix exigua*) and plains cottonwood (*Populus deltoides*) stakes/poles to attempt to remediate contaminated groundwater plumes at different locations in North and South Walnut Creek at the Rocky Flats Environmental Technology Site (Site). The BO addresses impacts to the federally-listed Preble's meadow jumping mouse, (Preble's mouse, *Zapus hudsonius preblei*), from the Phytoremediation Project at the Site. In the Biological Assessment written for the project it was stated that the revegetation monitoring would be conducted according to the guidance provided in Part II of the Programmatic Biological Assessment, Appendix B. This report is being submitted to satisfy the conditions of the USFWS BO for 2005 and is due by December 1 after each growing season.

Methodology

The locations of the Phytoremediation Project at the Solar Ponds Plume area and East Trenches Plume area are shown in Figures 1 and 2. Planting was conducted in early May and was completed within a week. Final application of a soil enhancement product was made in late May. Plant materials came from nearby native sources in Jefferson and Boulder Counties. At the Solar Pond Plume area in North Walnut Creek, a total of 770 plants were installed: 435 coyote willows and 335 cottonwoods. All of the cuttings were soaked in a root dip product (described below) and inserted into a 12 to 18 inch hole punched into the earth with a long, pointed steel piercing implement. The planting hole was sealed by a footstep or another plunge with the implement to ensure proper planting. At the East Trenches Plume area along Ponds B-1, B-2 and B-3 in the South Walnut Creek, a total of 760 plants were planted. At Ponds B-1 and B-2, a total of 475 plants were installed: 158 willows and 317 cottonwoods. At Pond B-3, 115 willows and 170 cottonwoods were planted for a total of 285 plants. Planting techniques at the East Trenches Plume area were the same as the Solar Pond area, however, some plantings were doubled up in their planting holes to ensure survival of at least one cutting and to gain extensive localized growth. Because the planting area along the B-ponds was steeply sloped and located in a very short transition zone from wetter soils at the pond edges to the drier adjacent upland soils, the planting strategy was to install the cuttings closer together in wet areas, and space them farther apart in dry areas.

To assist in the development of the roots and rhizosphere (soil zone), biological soil inoculants and soil conditioners were used. The products used included both a root dip product and a soil-conditioning product. A product called DIEHARD Root Dip was used as a bare root mycorrhizal inoculant treatment to inoculate the newly forming roots with live beneficial mycorrhizal fungi. All of the cuttings were soaked in the root dip prior to planting. The mycorrhizal inoculants are a combination of humic acids, biostimulants, beneficial bacteria, soluble sea kelp, and yucca plant extracts, which help promote rapid root development. The product also contains a polyacrylamide water management gel that keeps a small amount of water in the root zone to keep roots from drying out. A product called Humega (a soil conditioning product) was added to the plantings to condition the soil and help build soil structure. The Humega was added after planting as a liquid that was drenched into and around the soil at each stake/pole.

The methodology used for the monitoring is a modification of what is written in Appendix B in Part II of the PBA. It was modified based on the fact that the project involved no revegetation and essentially no disturbance of the pre-existing habitat occurred. The project did not disturb the habitat beyond walking through the area and planting willow and cottonwood stakes/poles. After the project had been installed it was

hardly possible to tell anyone had been there. Therefore monitoring in 2005 consisted of determining the percent survival of the planted materials at the end of the growing season (September 2005). In addition, photo monitoring was conducted along the reaches of stream where the plants were installed. Photo-monitoring results are shown in Appendix A.

Results and Discussion

At the Solar Ponds Plume location, monitoring results in September 2005 showed that approximately 50% of the coyote willow had survived in the vicinity of the discharge gallery where the ground was constantly wet. Plants had been installed for a distance of about 50 meters west (upstream) of the discharge gallery and about 125 meters east (downstream) of the discharge gallery. Beyond 30 meters or so from the discharge gallery, both upstream and downstream, only 10 – 20% of the coyote willow had survived. There was no evidence of survival of the plains cottonwood trees at the Solar Ponds Plume location. It was apparent for a number of the cuttings that they had leafed out earlier in the season, however, they must have been unable to establish a root system rapidly enough to stay alive. Additionally, observations suggested that the depth at which many of the stakes/poles were planted was not deep enough to reach the groundwater table, thus the plants died.

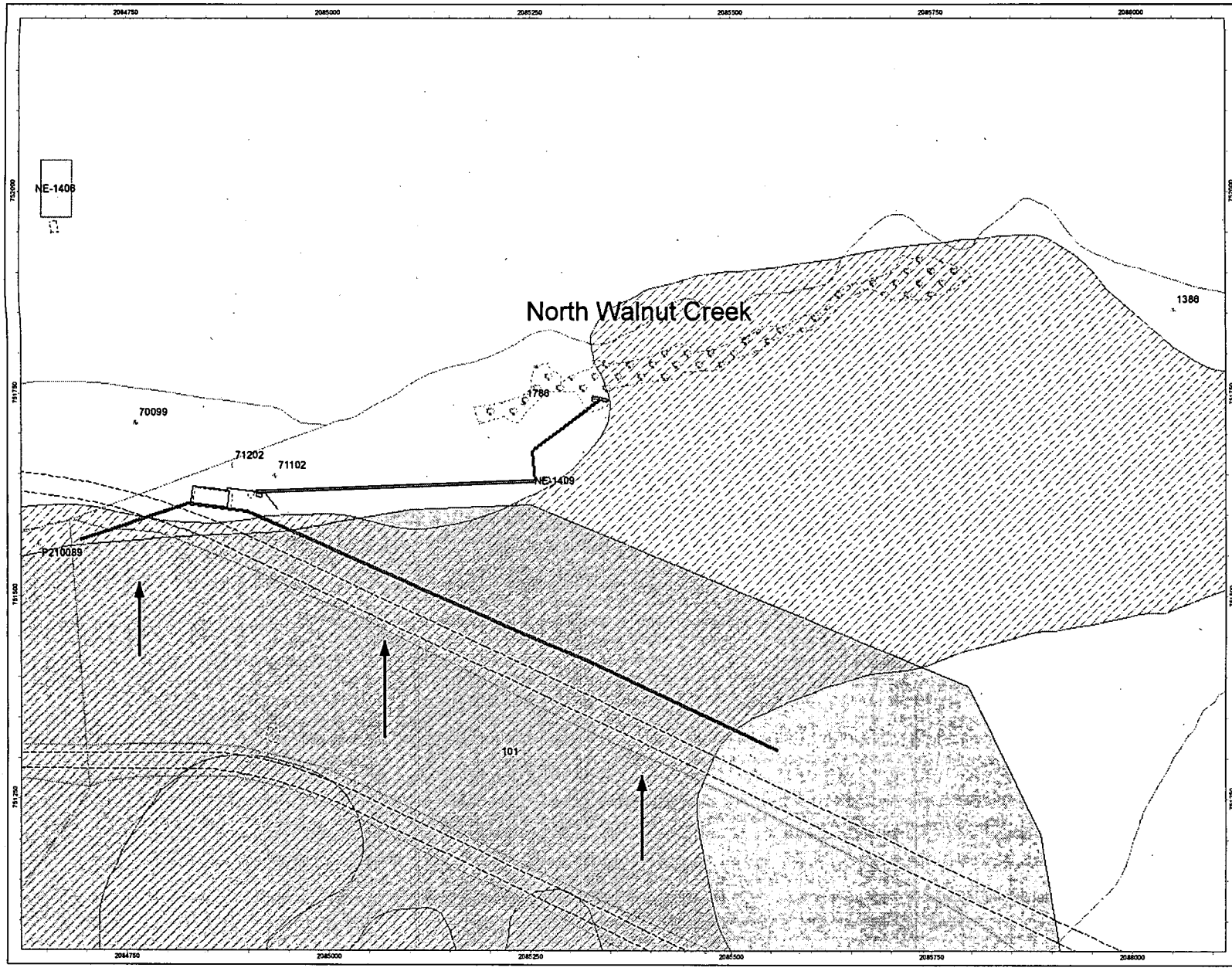
At the East Trenches Plume area, plants were installed along the southern edges of the B-1, B-2 and B-3 ponds after completion of the pond remediation activities. At the B-1 pond, the coyote willows in this location have survived well at both the east and west ends of the planted area on the south side of the pond, while the center area appears to have dried out over the summer resulting in a loss of both the coyote willow and plains cottonwoods. The success rate for survival of the coyote willow at the B-1 pond is approximately 60% at the end of the first growing season, while none of the plains cottonwoods survived at B-1. Of the dead cuttings, approximately 30% had sprouted before dying, as evidenced by the dead leaves and small branches.

At the B-2 pond, coyote willow survival was approximately 60% while only one plains cottonwood tree was still alive by September. Most of the willow stakes that died are located on the east end of the south side of the pond. Those that survived were primarily those that were planted in the seep area found in the center of the south shoreline area. At the B-3 pond, the coyote willow had a survival rate of approximately 70%, while none of the plains cottonwoods survived.

Part of the reason for the low survival rates at the B-ponds is due to the fact that the ponds had no water in them for one to two months after the plants were installed. It was not until late June/early July that the ponds had water transferred to them and so the only water available initially was from some small seeps present on the south sides of B-1 and B-2. Because the soils were dry when the stakes/poles were initially installed, the development of roots was hindered and the plants died. The coyote willow that have survived the first year should continue to grow and spread in future years around the edges of the wetlands at the ponds. Continued monitoring will be conducted in 2006.

Conclusions

The shrub and tree plantings at the Phtyoremediation Project were monitored per the requirements of the USFWS Biological Opinion dated June 16, 2005, to evaluate the survival status of the planted material. The sampling conducted in 2005 represents the survival percentages after one growing season for the areas. Coyote willow survival ranged from 50-70% at locations where surface water was present or where the plants were installed at depths that reached the water table. At drier locations, the coyote willow died. With the exception of one tree, all the plains cottonwoods poles that were planted died. Those coyote willow that survived the first year stand a good chance of continuing to grow and spreading in future years.



Rocky Flats Environmental Technology Site

Proposed Phyto-remediation Enhancement of Groundwater Quality at the Solar Ponds Plume

- GW Flow Direction
- Groundwater Wells
- Discharge Gallery
- Transmission Pipe
- Treatment Cells
- Collection Trench
- Individual Hazardous Substance Site
- Potential Area of Concern
- No Further Action PACs in 1992
- Under Building Contamination

Nitrate Plumes

- >Tier I GWAL
- >SW Standard
- Proposed Phyto-remediation

Standard Map Features

- Road
- Facility
- Pond
- Stream or Drainage Feature

1:1,389
1 inch equals 120 feet

State Plane Coordinate Projection
Colorado Central Zone (3476)
Datum: NAD27

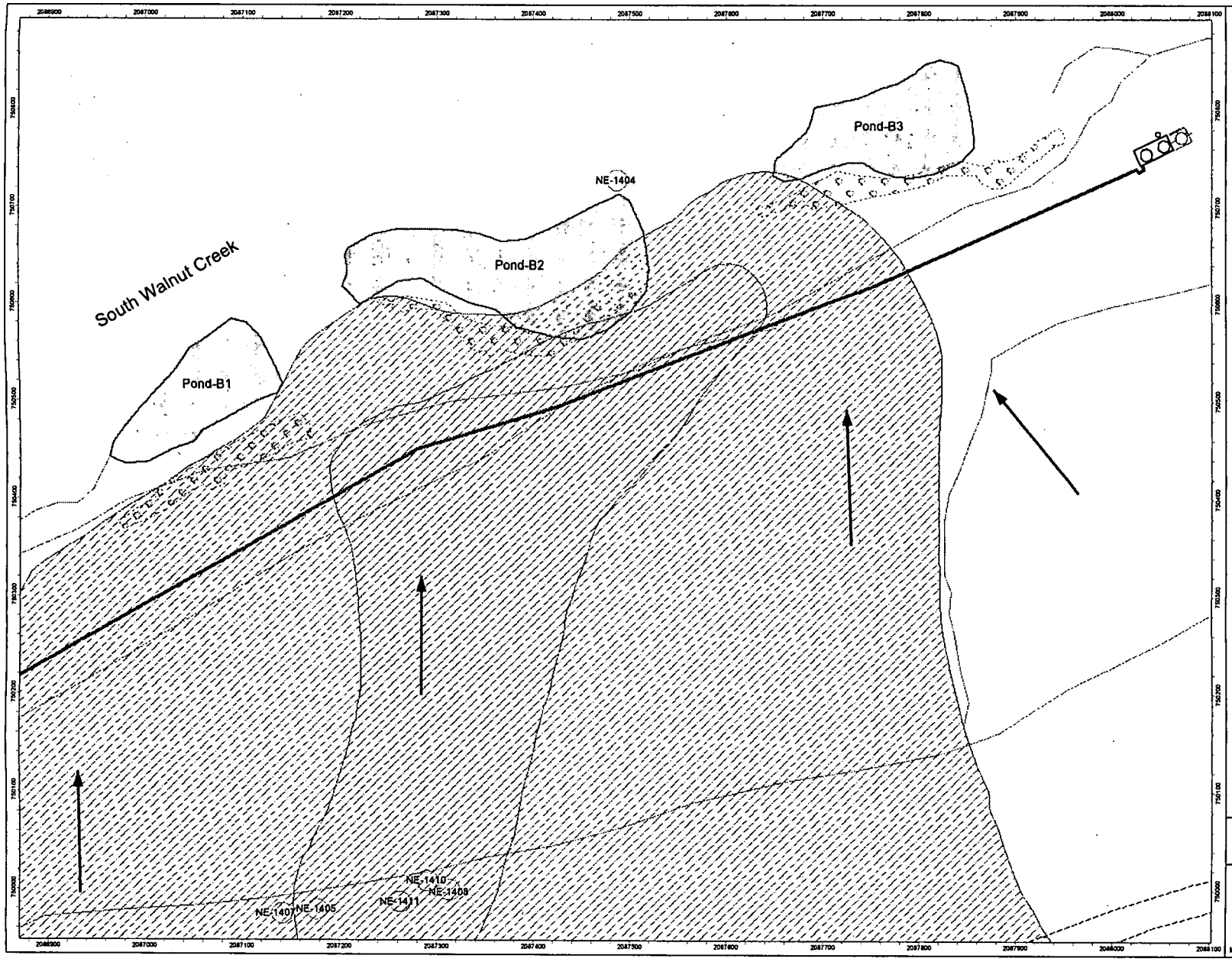
U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared By: CH2MHILL

Prepared For: KAISER-HILL COMPANY

MAP ID: GIS Dept. (303) 966-7707 June 20, 2005

PATH: W:\Projects\FY2005\05-0248\Phyto_SEP_Trenches.mxd



Rocky Flats Environmental Technology Site

Proposed Phyto-remediation Enhancement of Groundwater Quality at the East Trenches Plume

- GW Flow Direction

Treatement Infrastructure

- Possible Future Cell
- Treatement Cell
- Transmission Pipe
- Collection Trench
- Former OU2 IHSS
- Potential Area of Concern
- No Further Action PACs in 1992

TCE Plumes

- >Tier I GW AL
- >SW Standard
- Proposed Phyto-remediation

Standard Map Feature

- Facility
- Road
- Pond
- Stream or Drainage Feature

1:1,142

1 inch equals 95 feet

State Plane Coordinate Projection
Colorado Central Zone (3476)
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared By: CH2MHILL

Prepared For: KAISER+HILL COMPANY

MAP ID: GIS Dept. (303) 966-7707 June 20, 2005

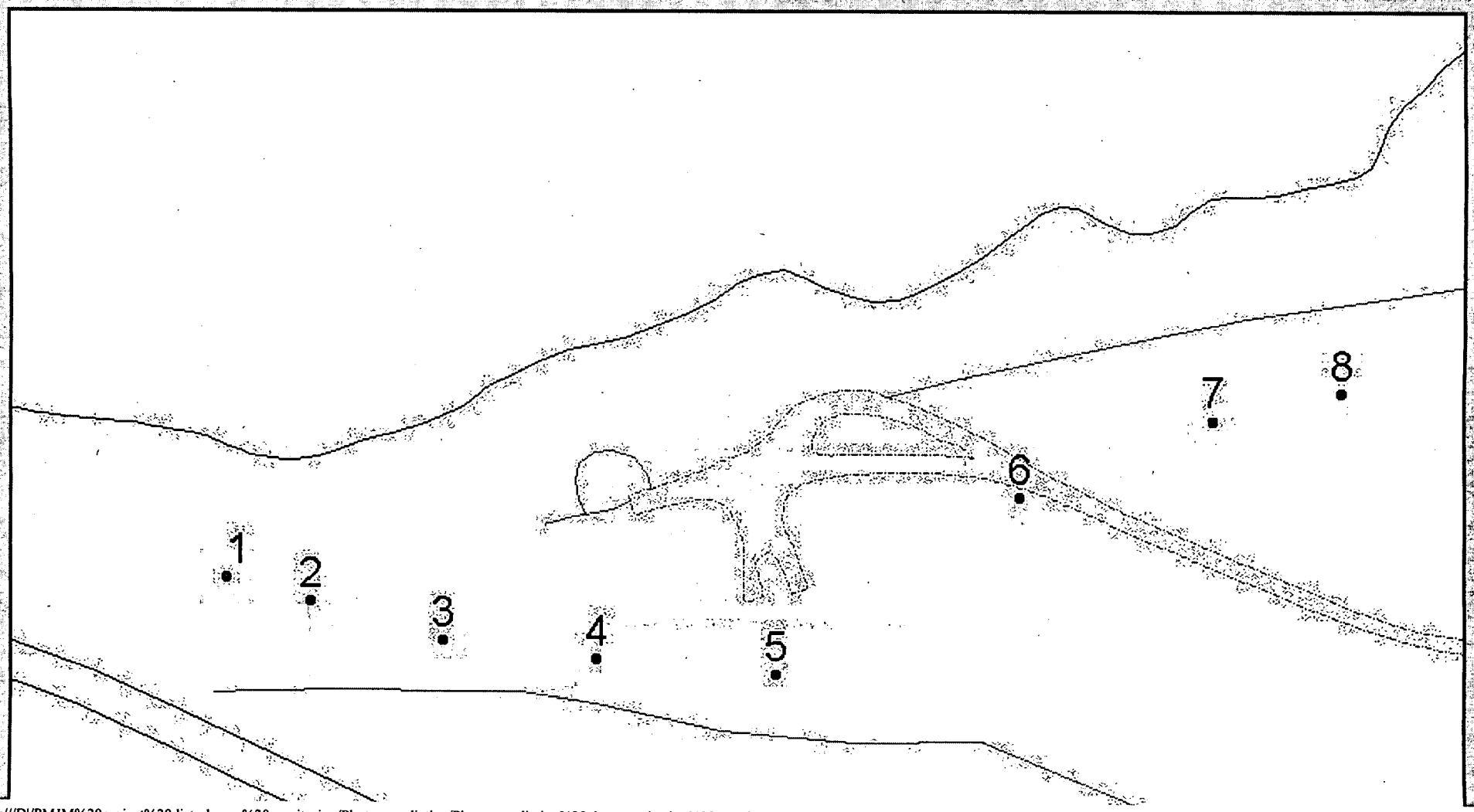
PATH: W:\Projects\FY2005\05-0249\Phyto_East_Trenches.mxd

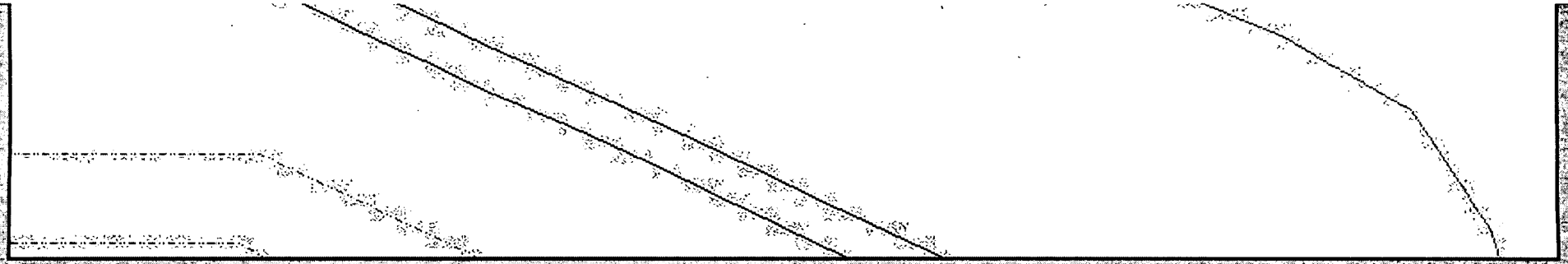
2005 Phytoremediation Project Report

Appendix A: Photomonitoring

(click on the maps below to access the set of photos you would like to view, then click on any photo to enlarge that photo)

- Solar Pond Plume Treatment Area:





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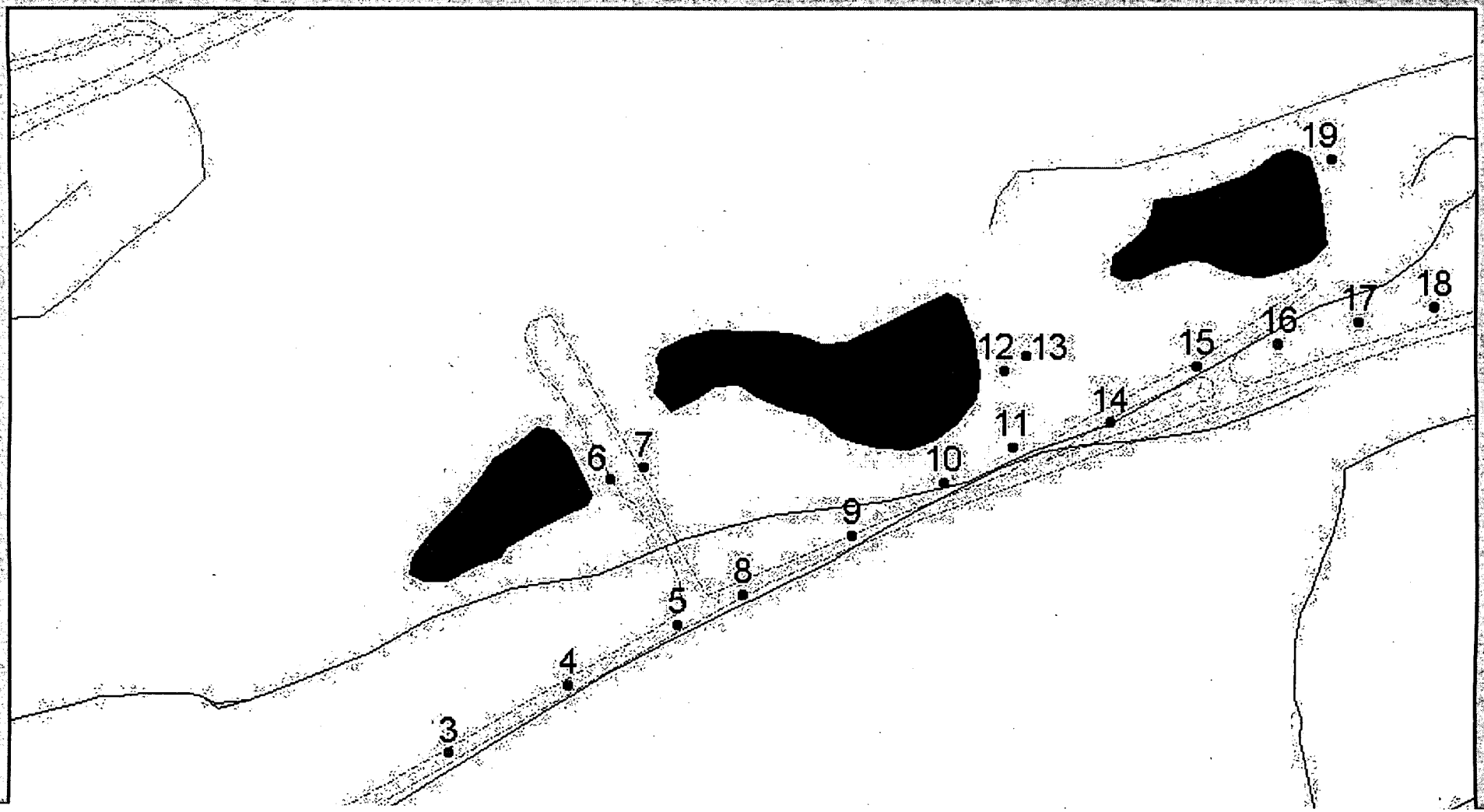
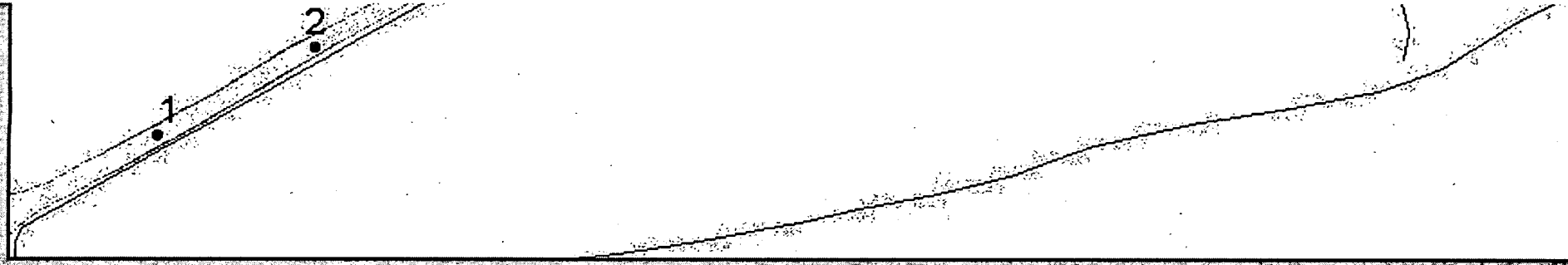


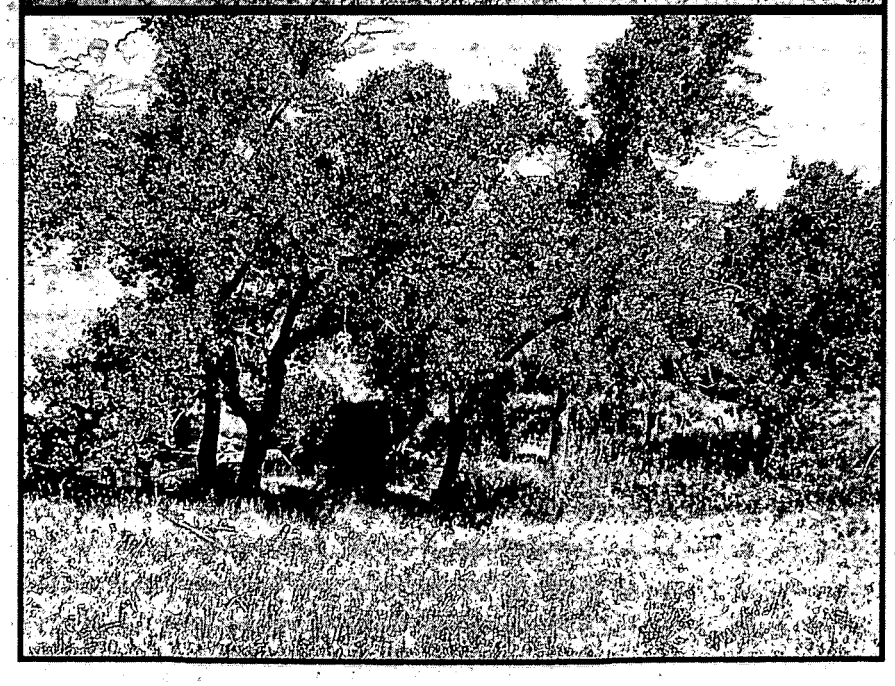

2
1

Phytoremediation

Solar Pond Plume Treatment Project

Photopoints 1-8

Photopoint 1



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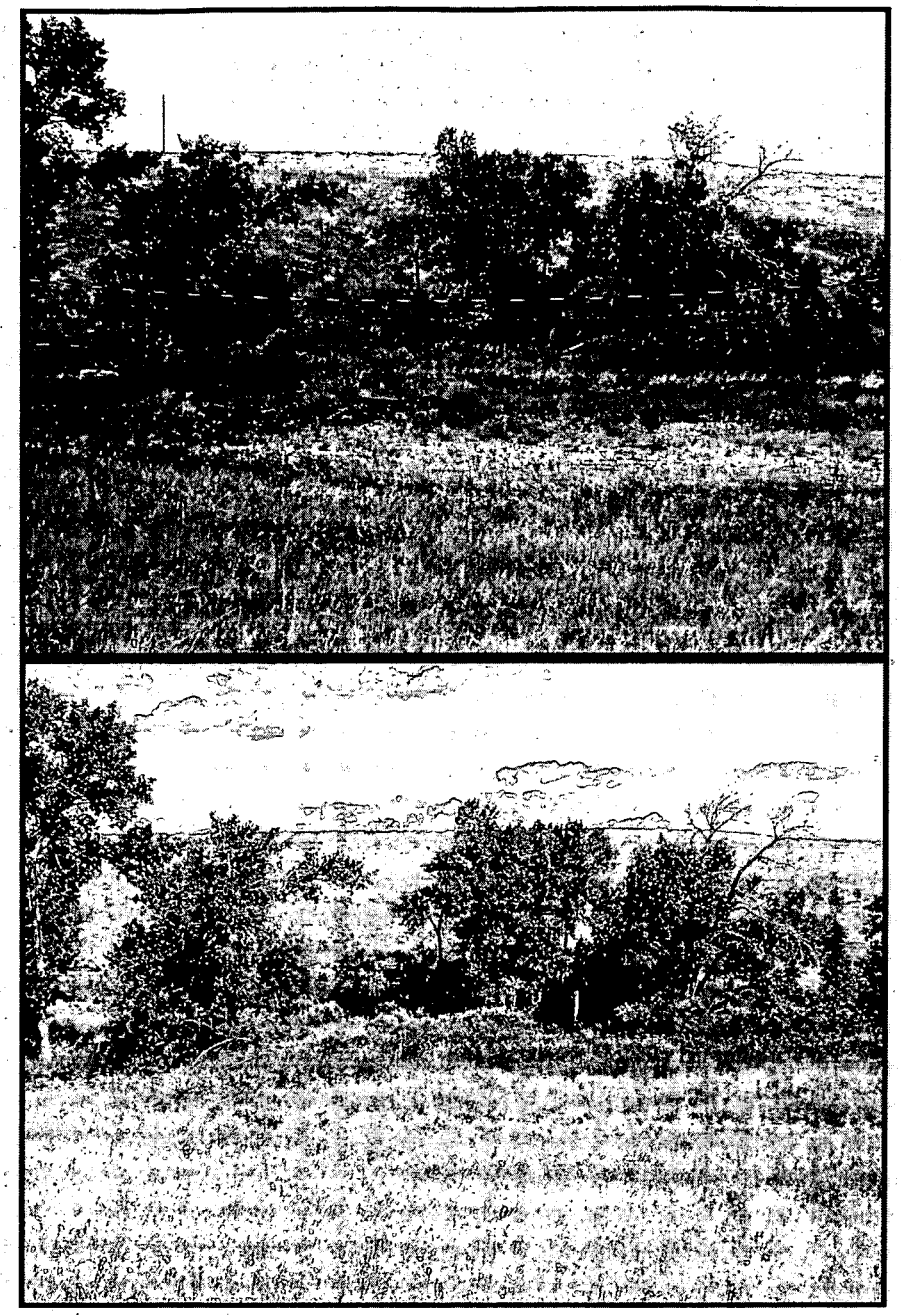

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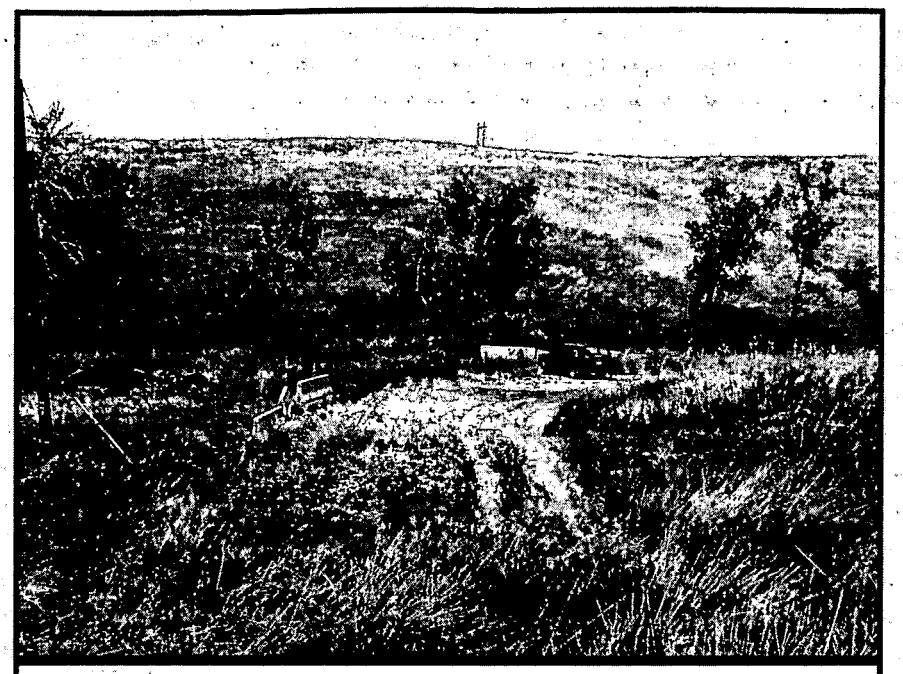

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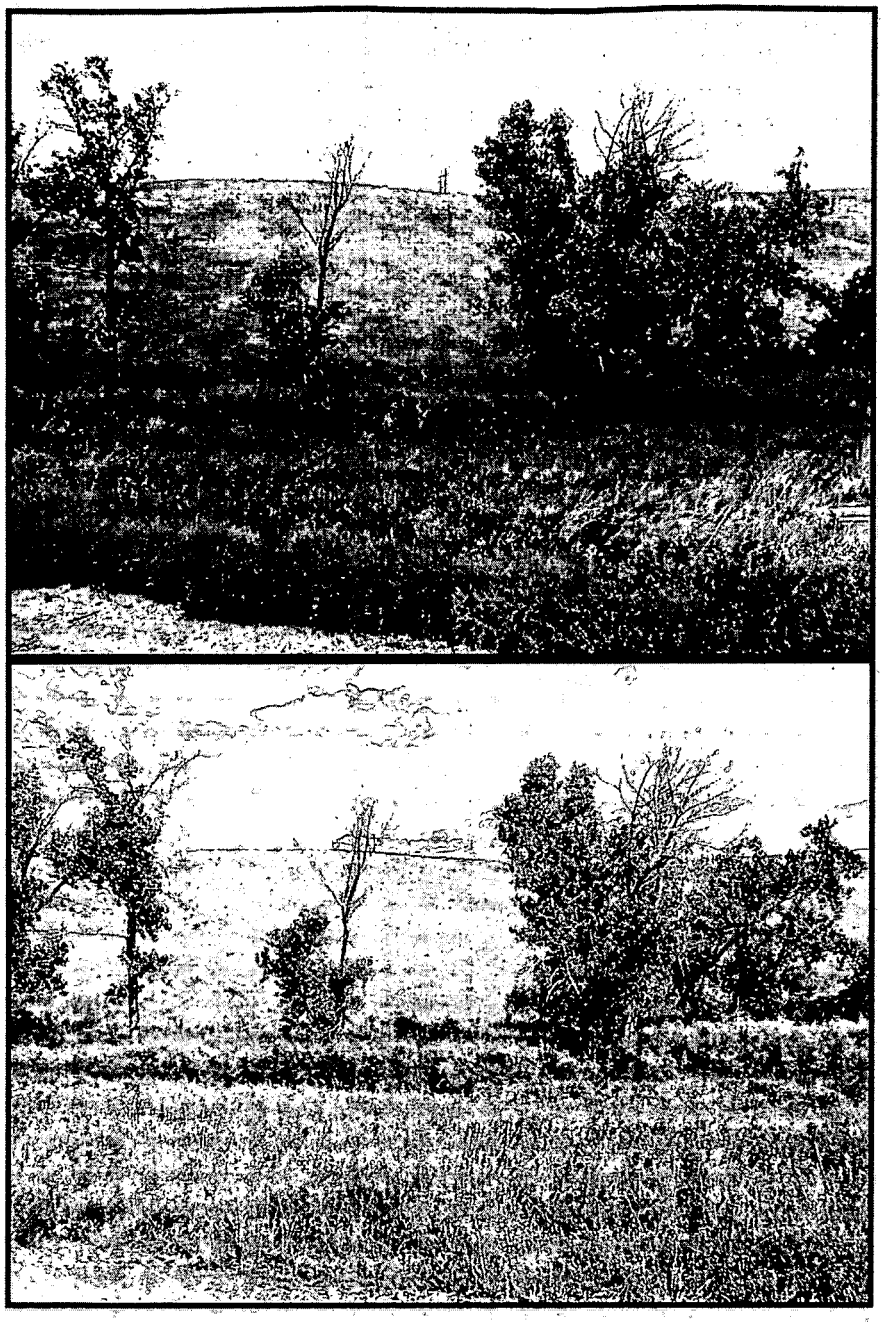

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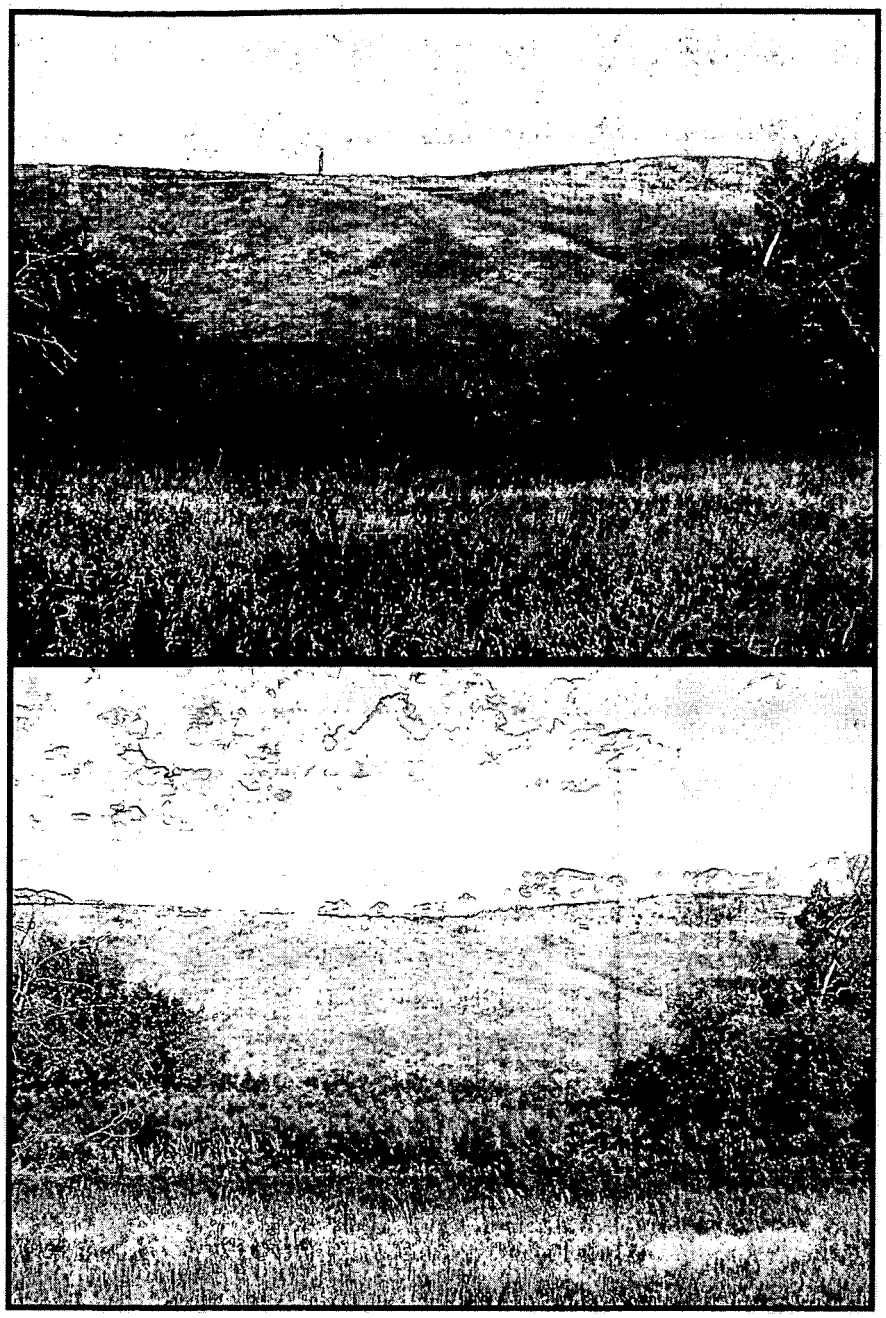


Photopoint 7

Photopoint 8

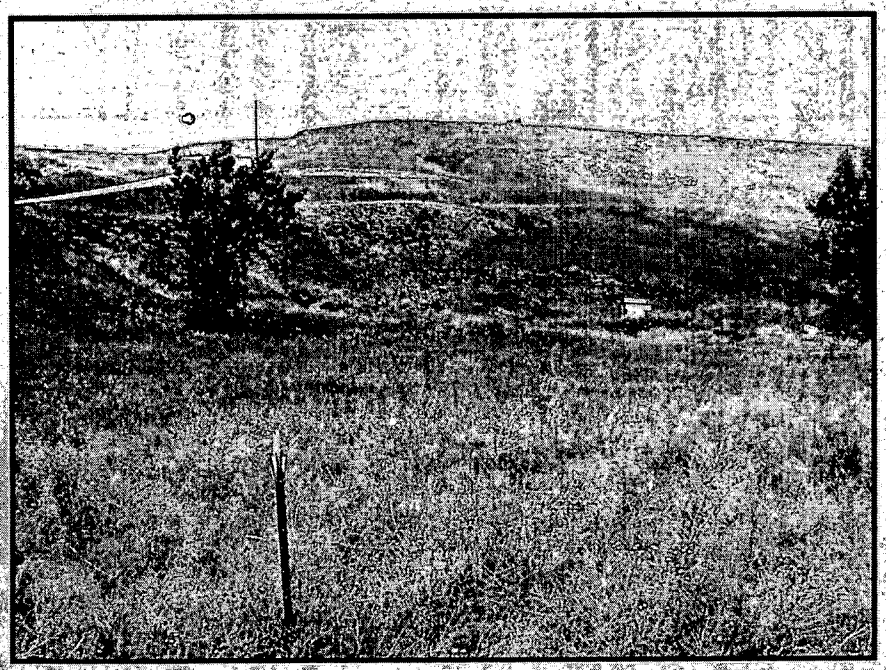
Phytoremediation Project

East Trenches Plume Treatment

Photopoints 1-10

6/28/2004 **08/26/05**

Photopoint 1



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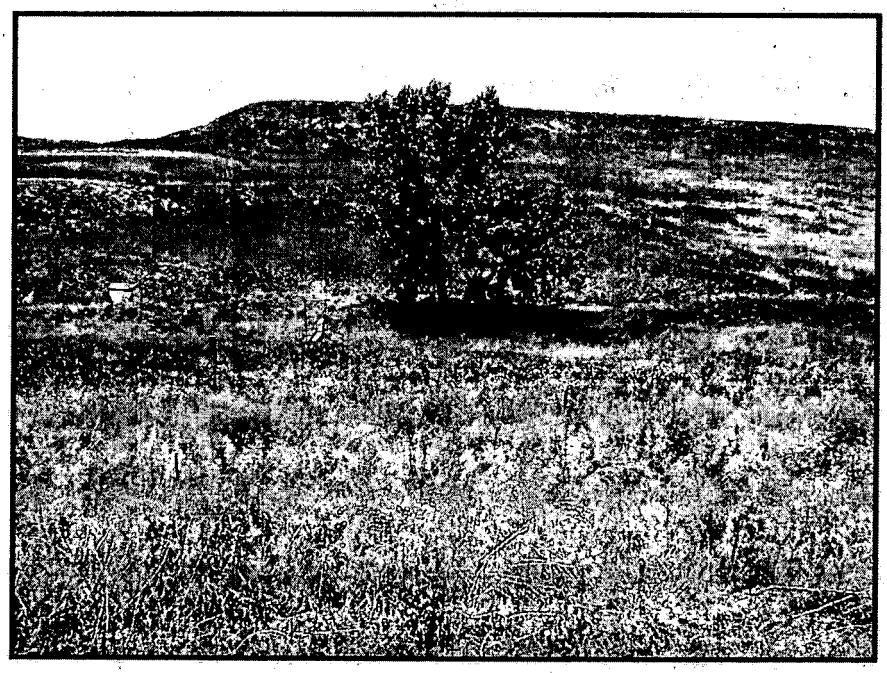

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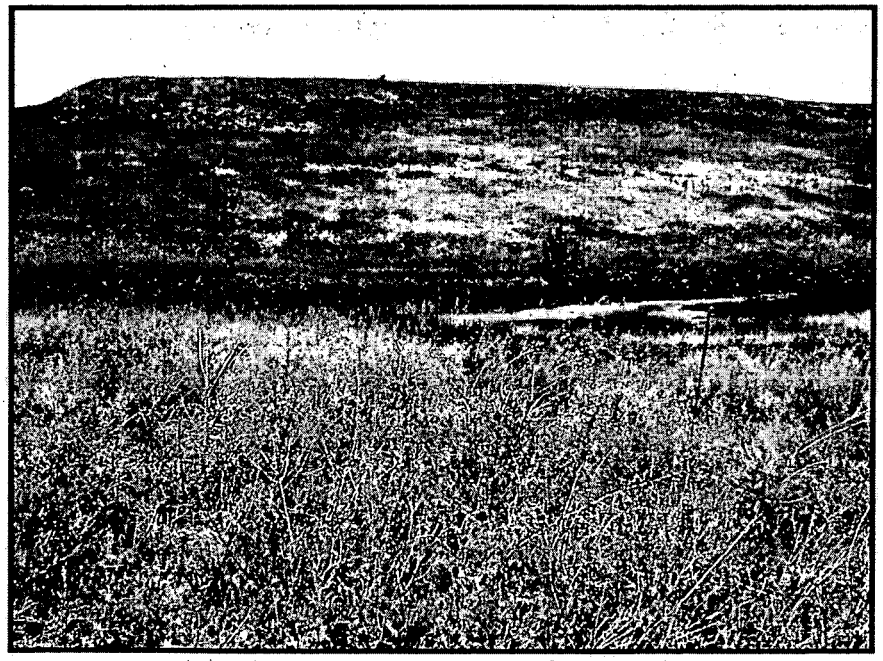

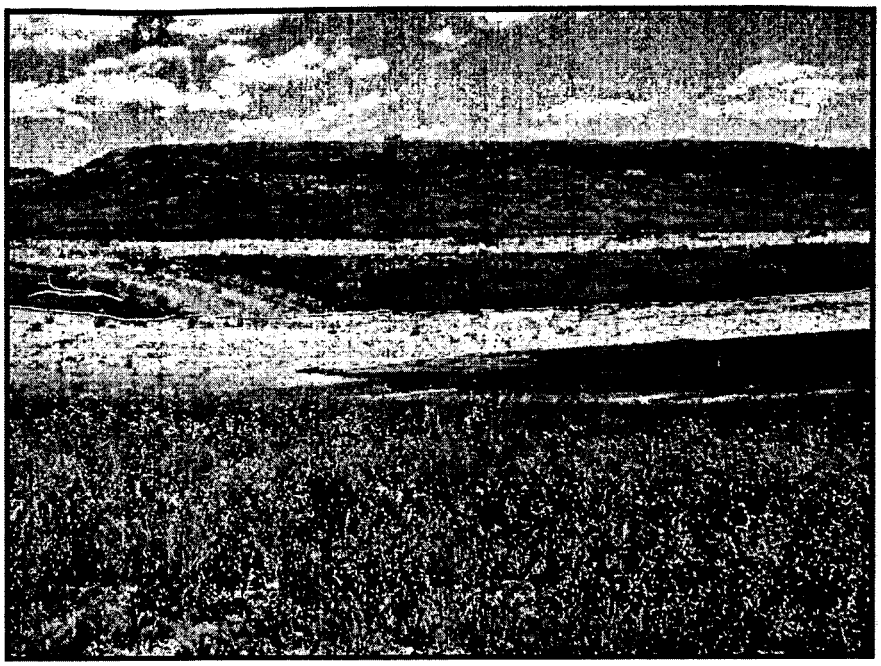

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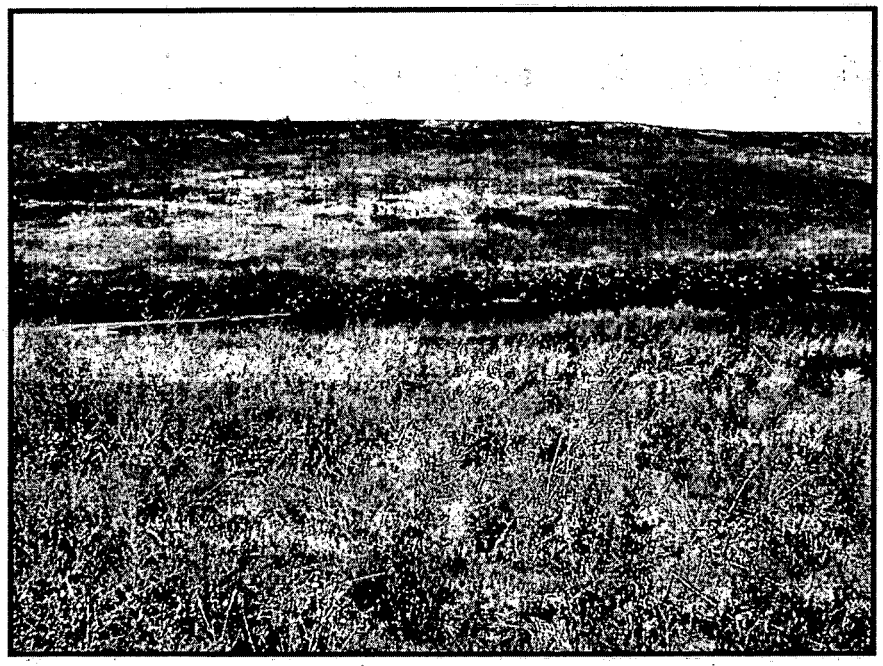

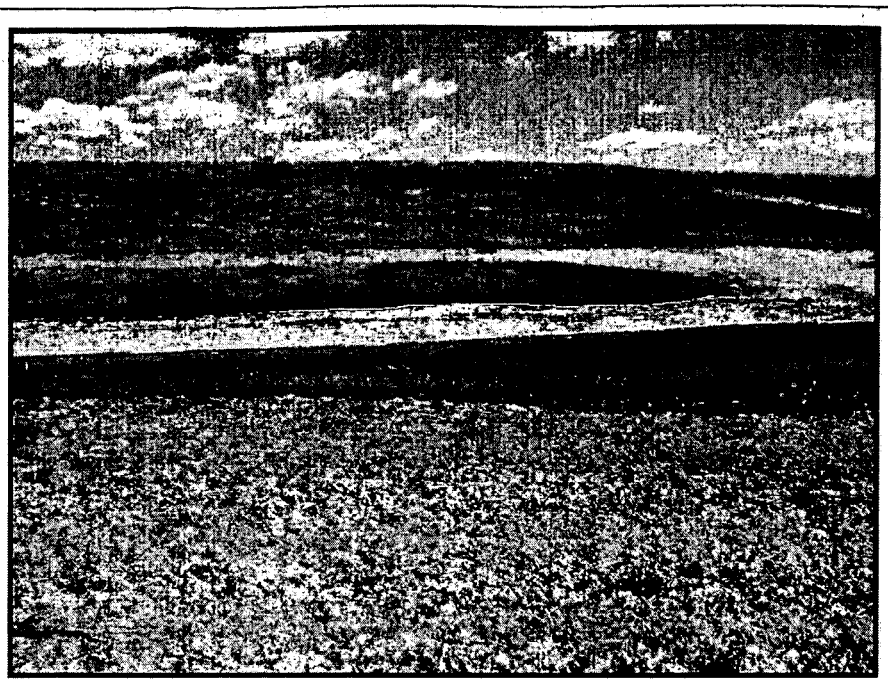

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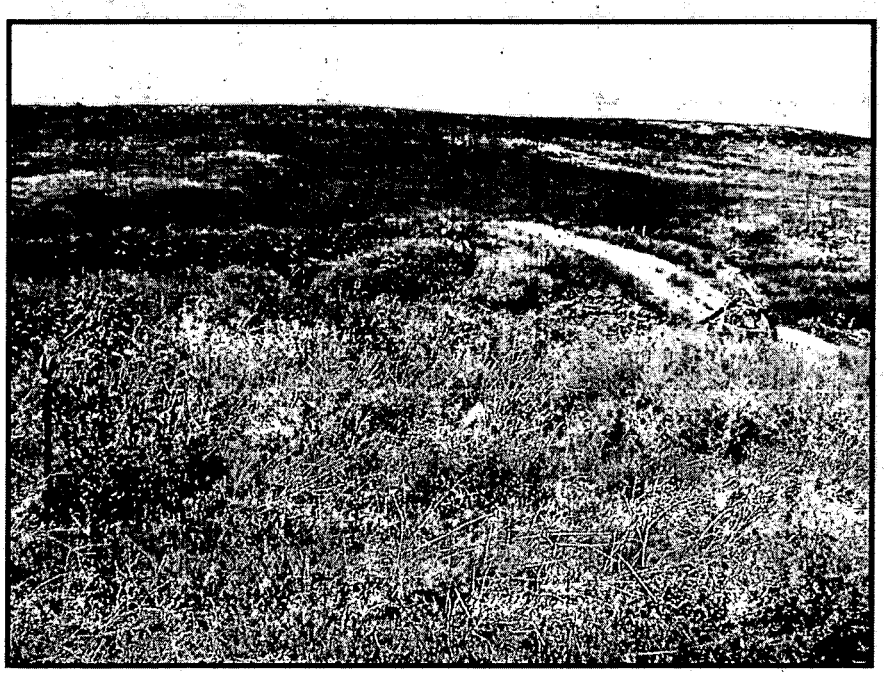

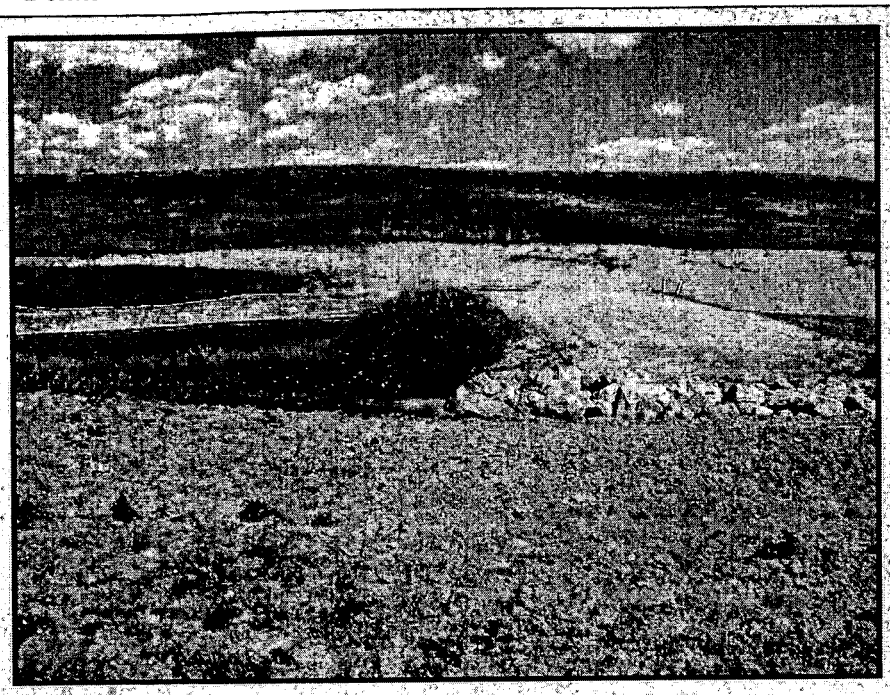

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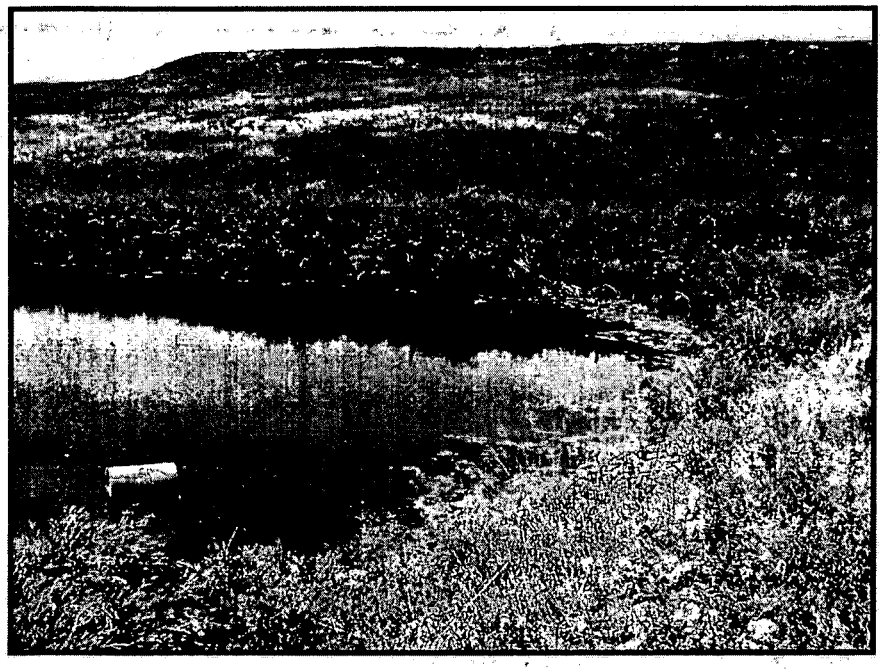

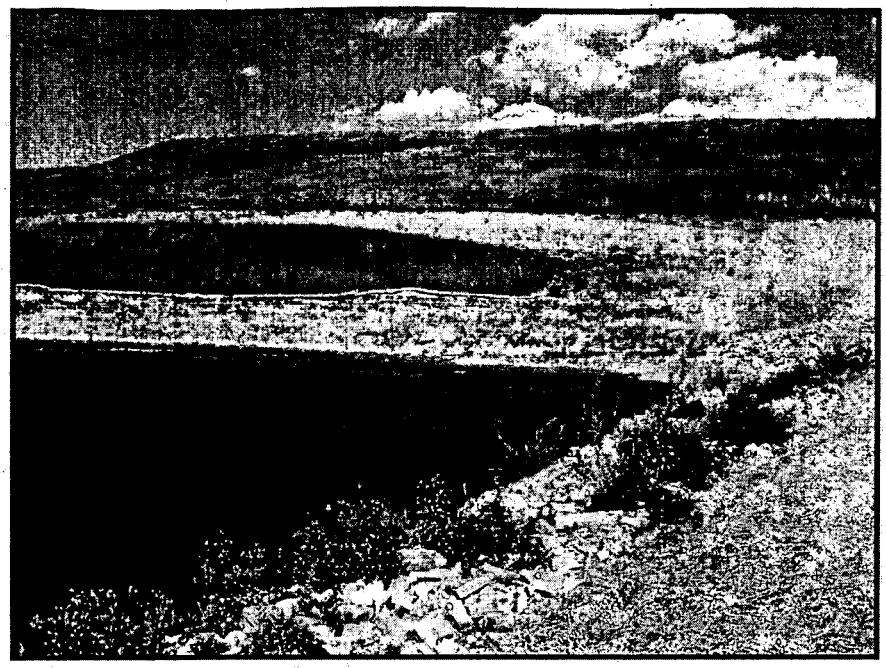

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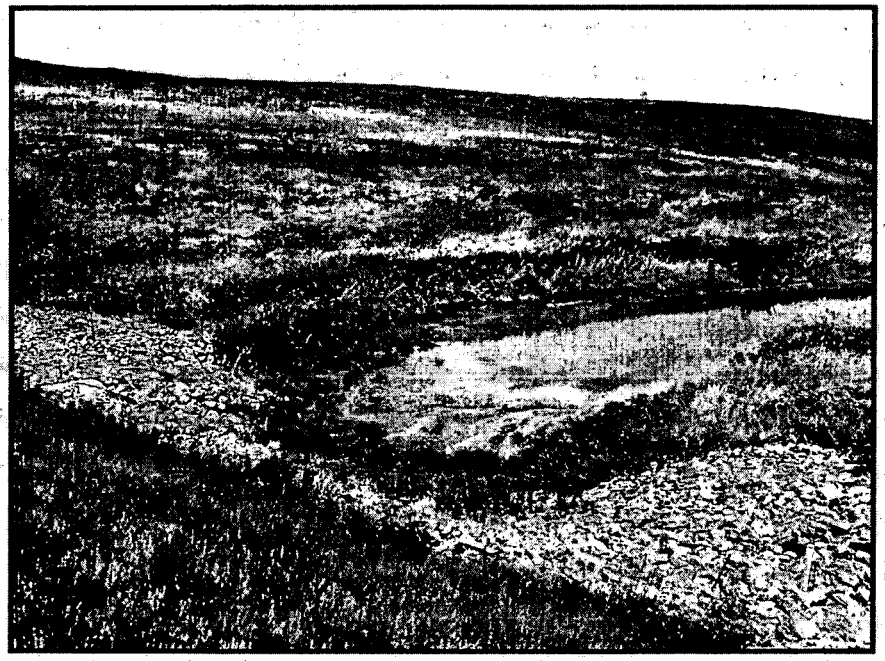

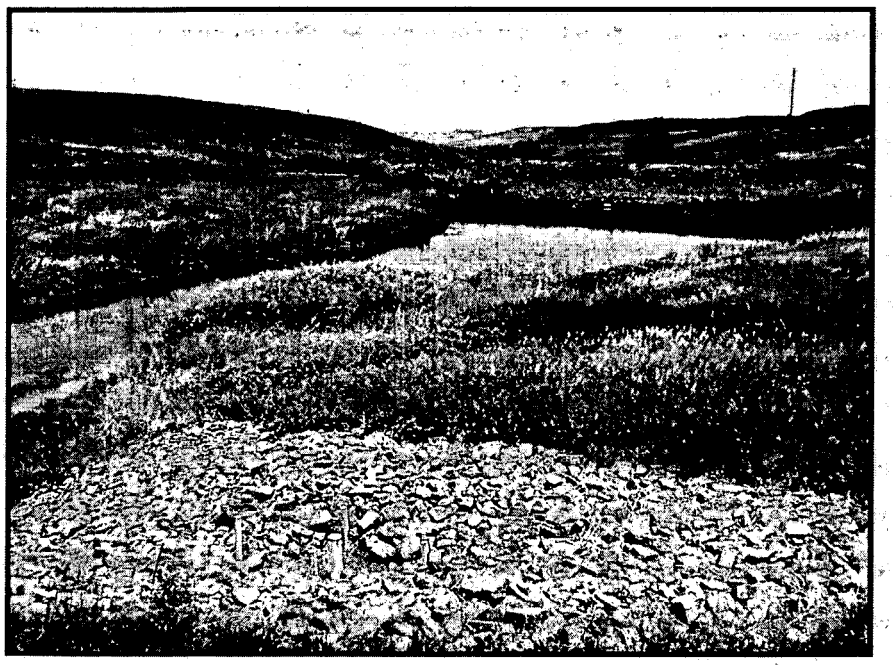

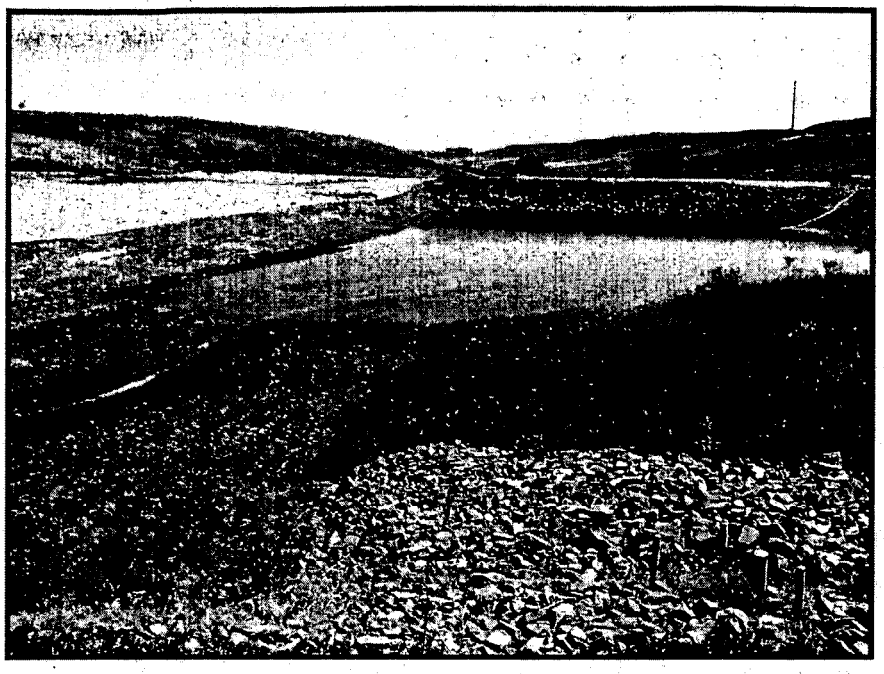

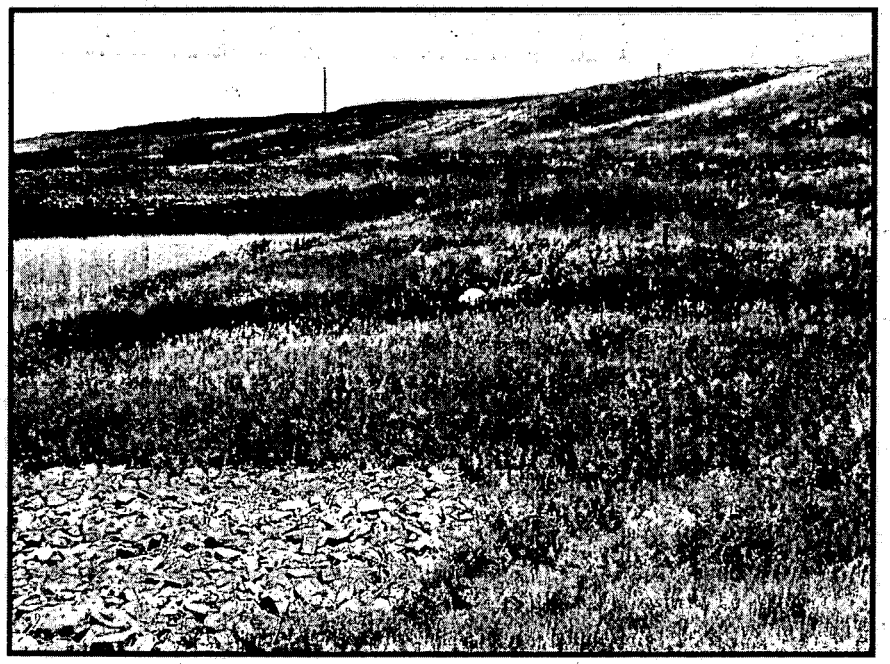

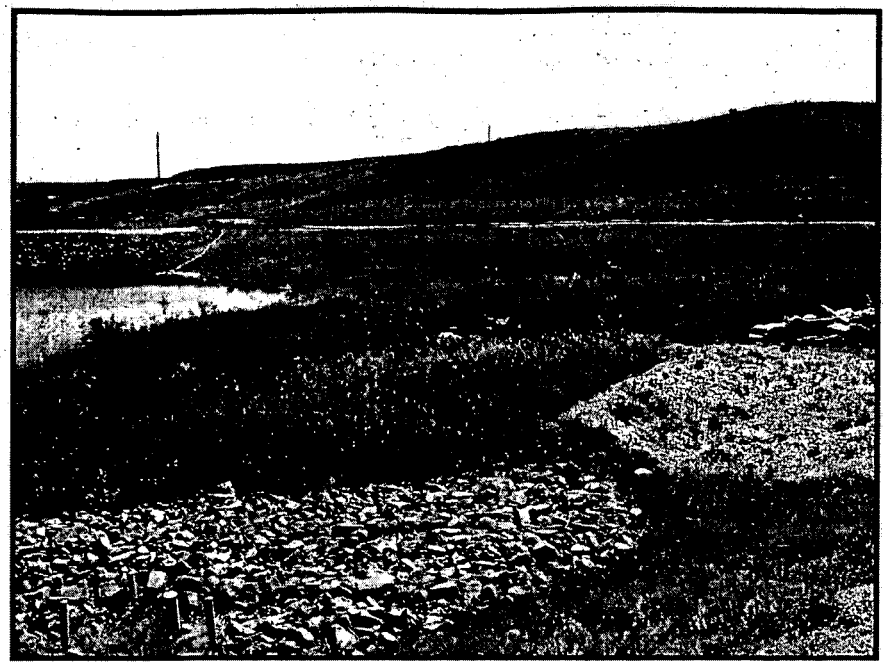

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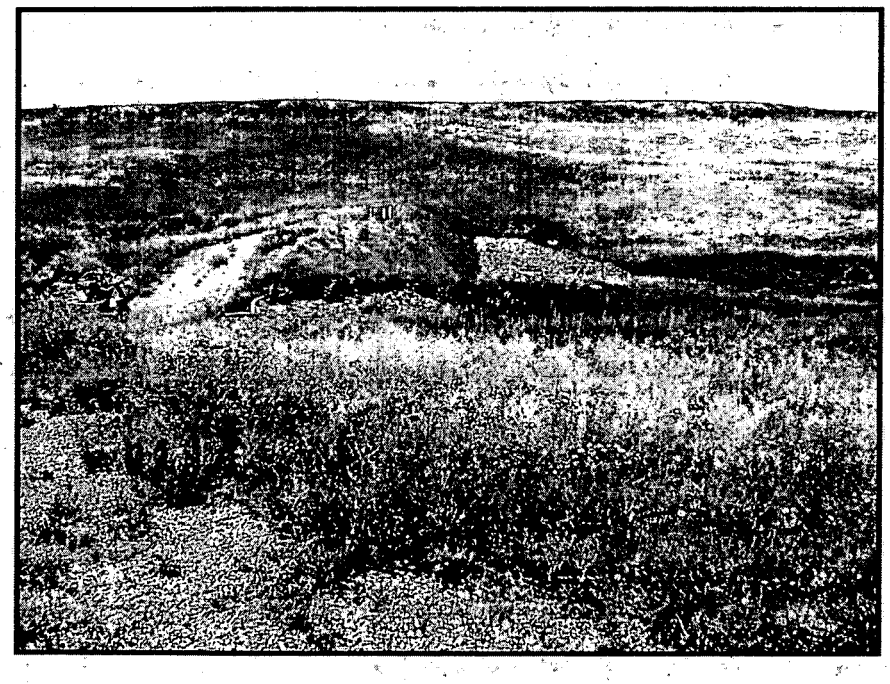

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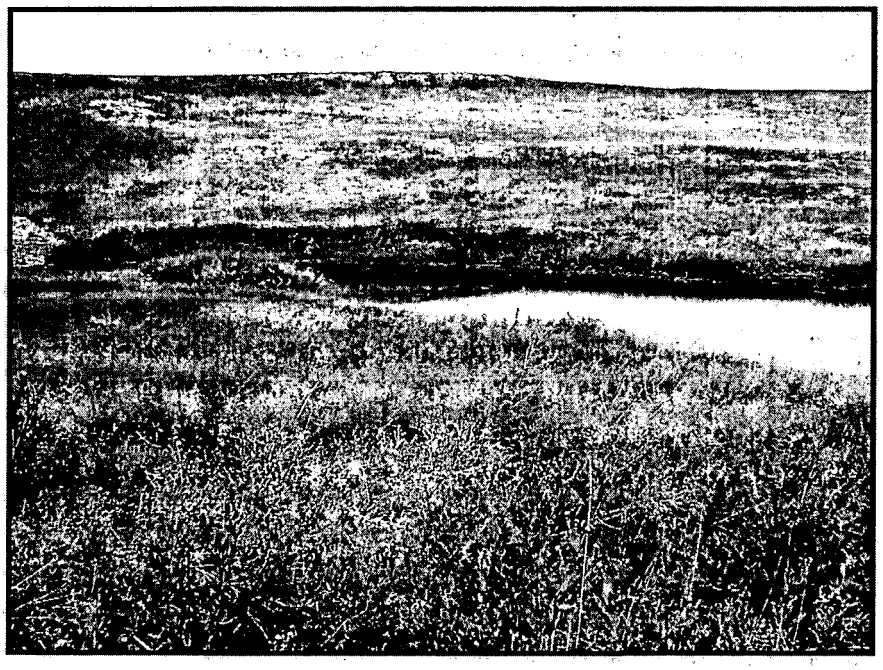

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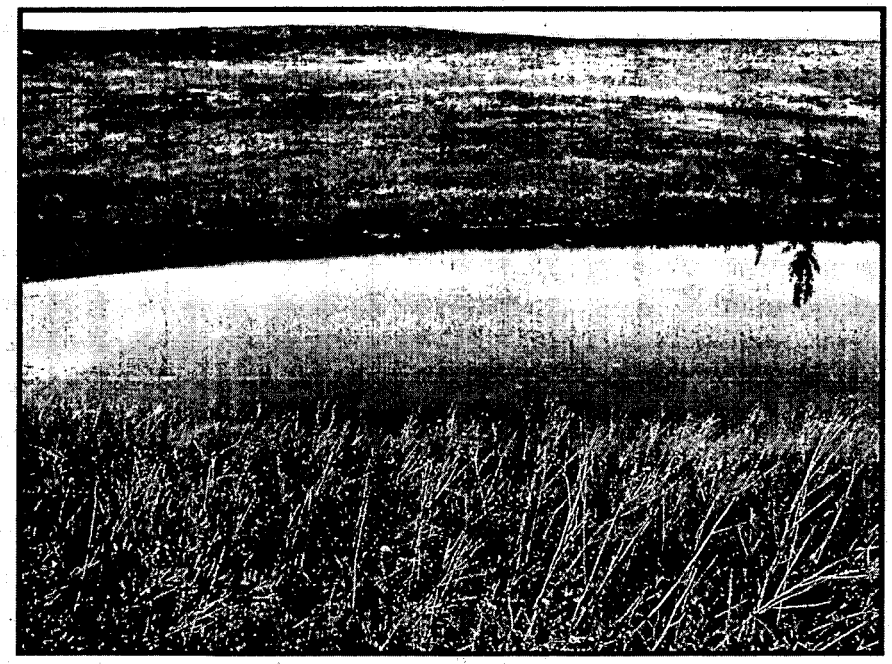


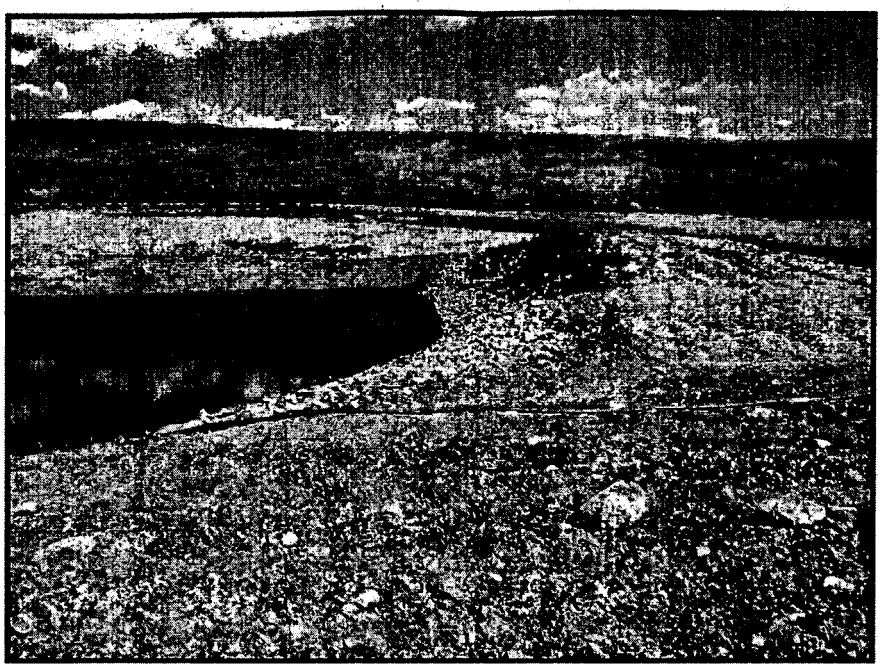
Phytoremediation Project

East Trenches Plume Treatment

Photopoints 11-19

6/28/2004 **08/26/05**

Photopoint 11



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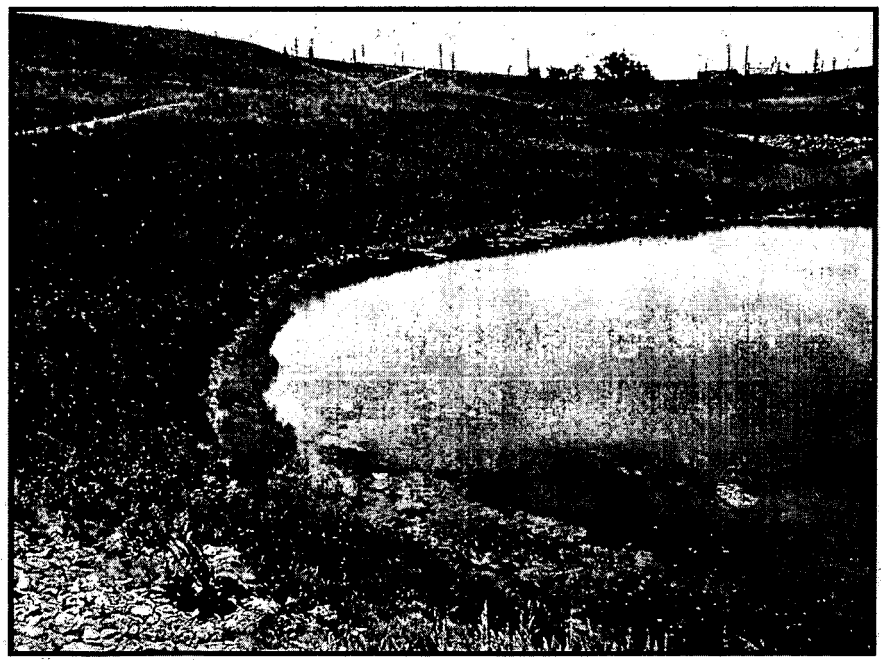

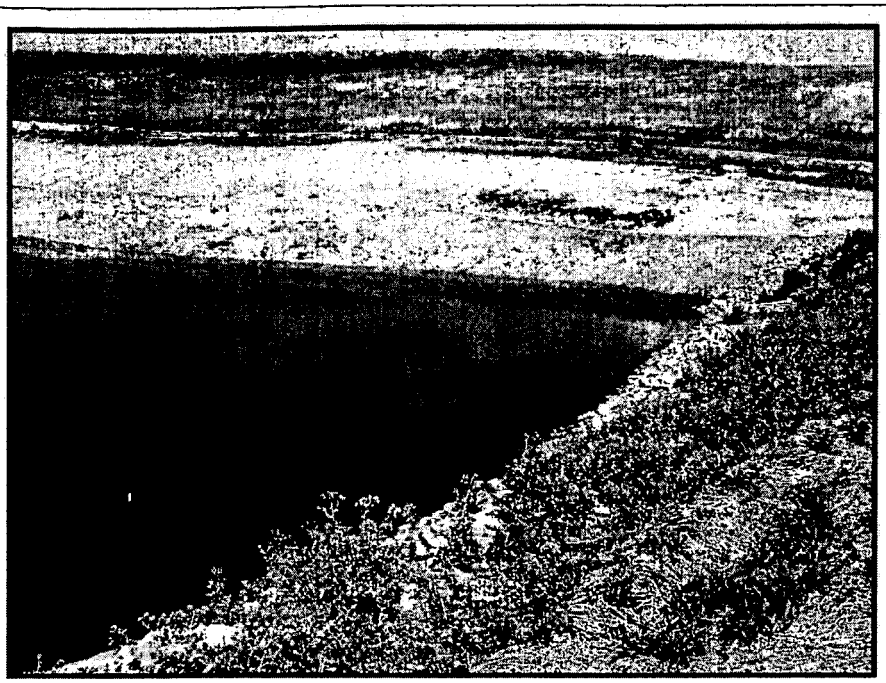

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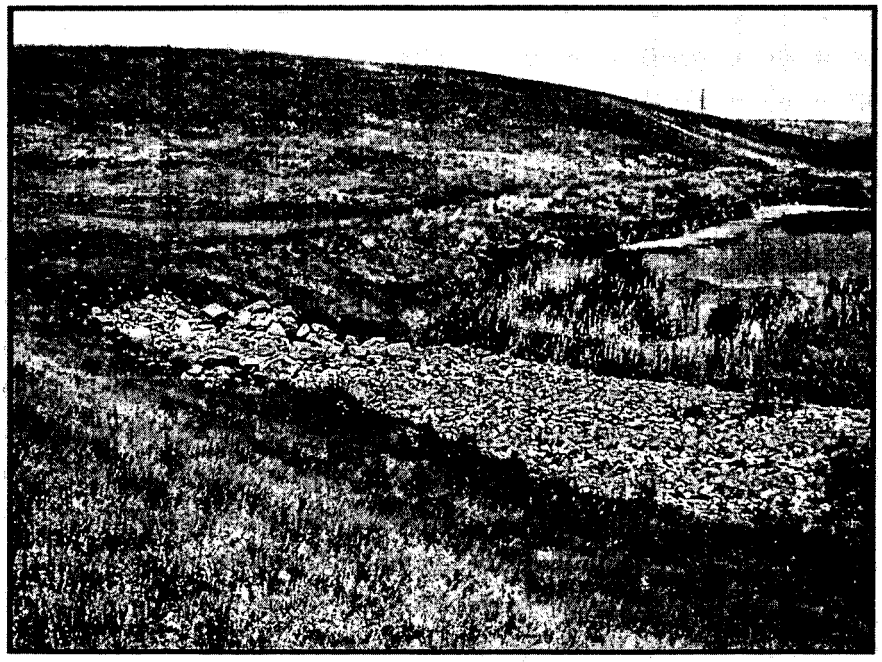

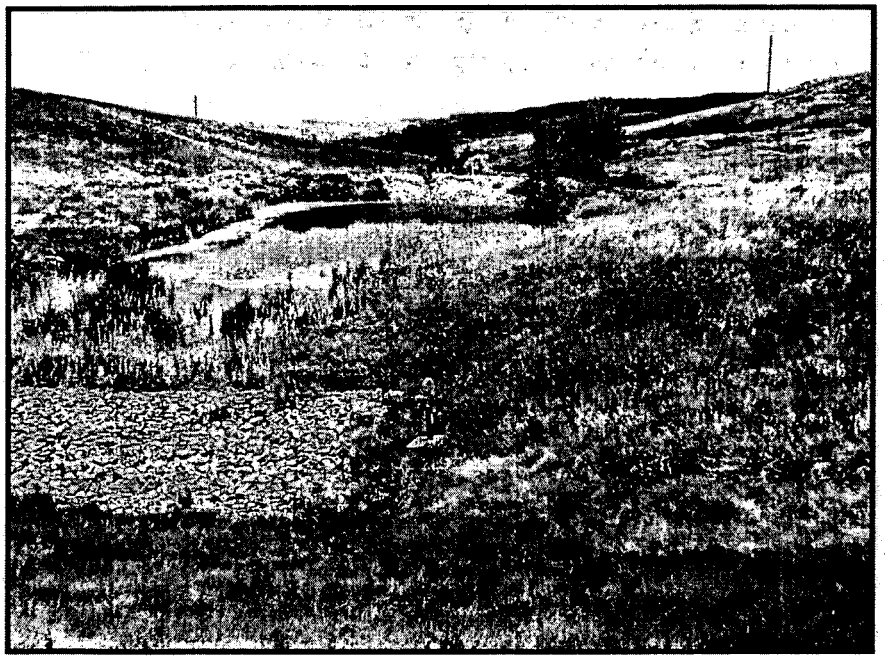

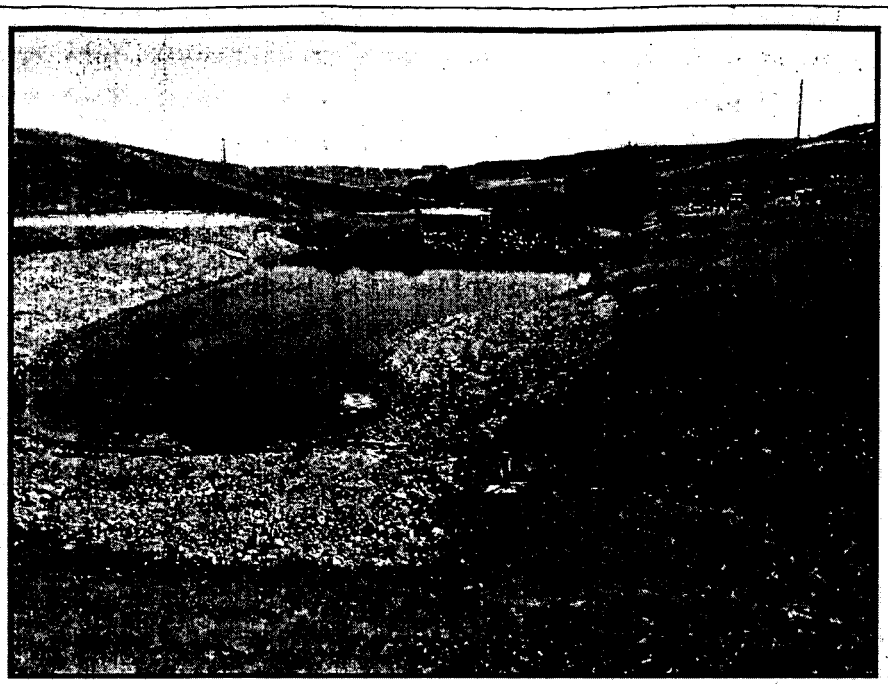

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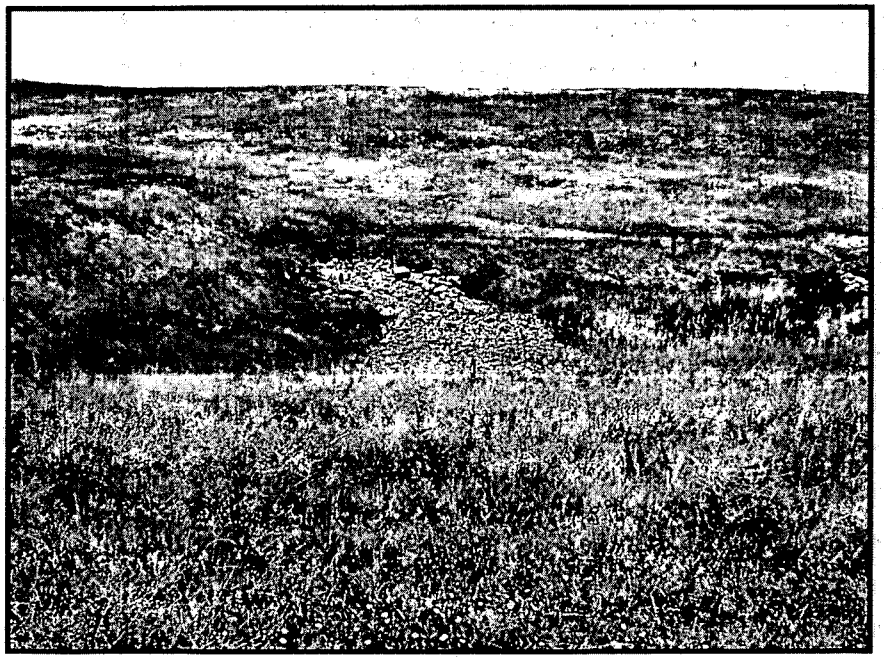

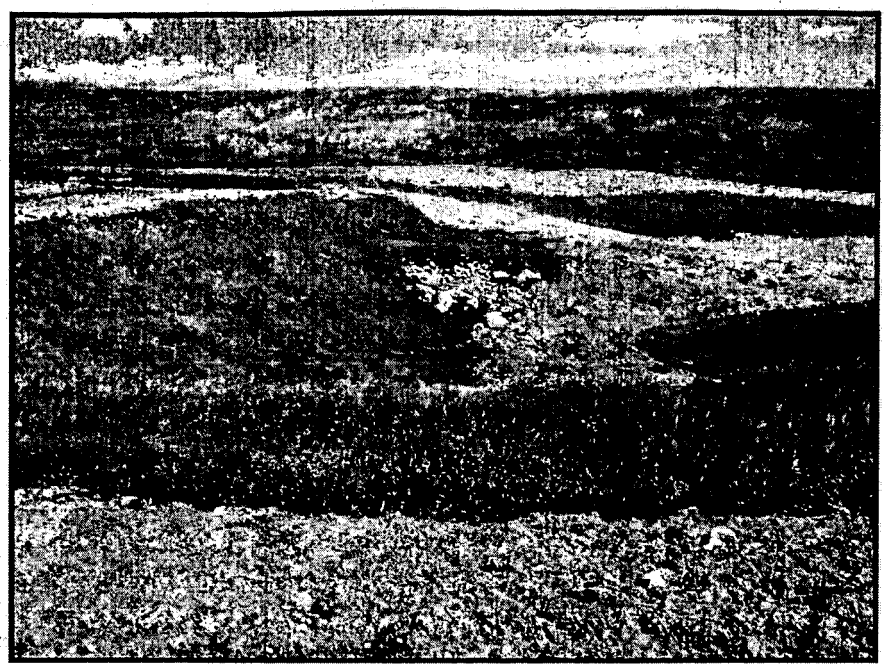

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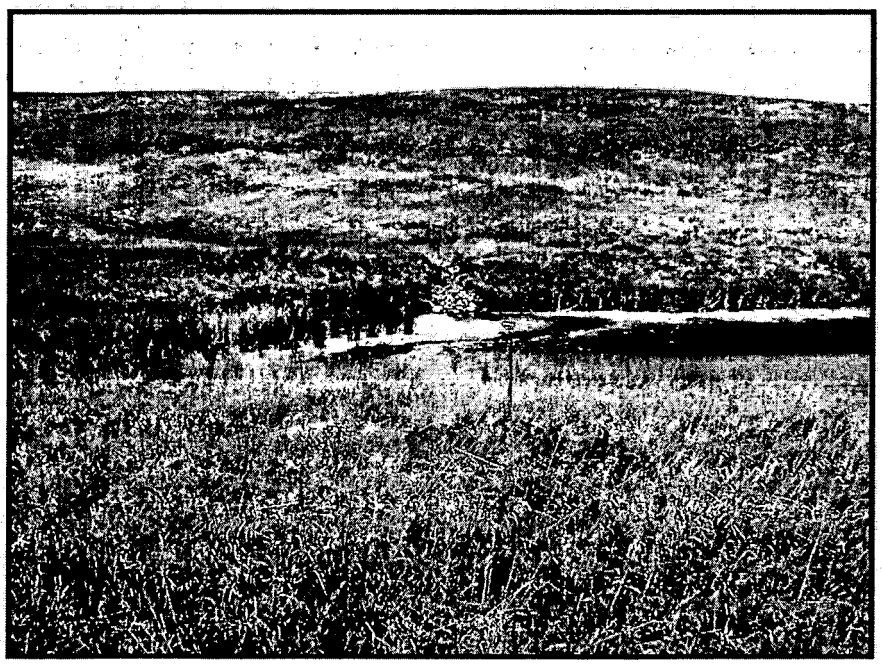

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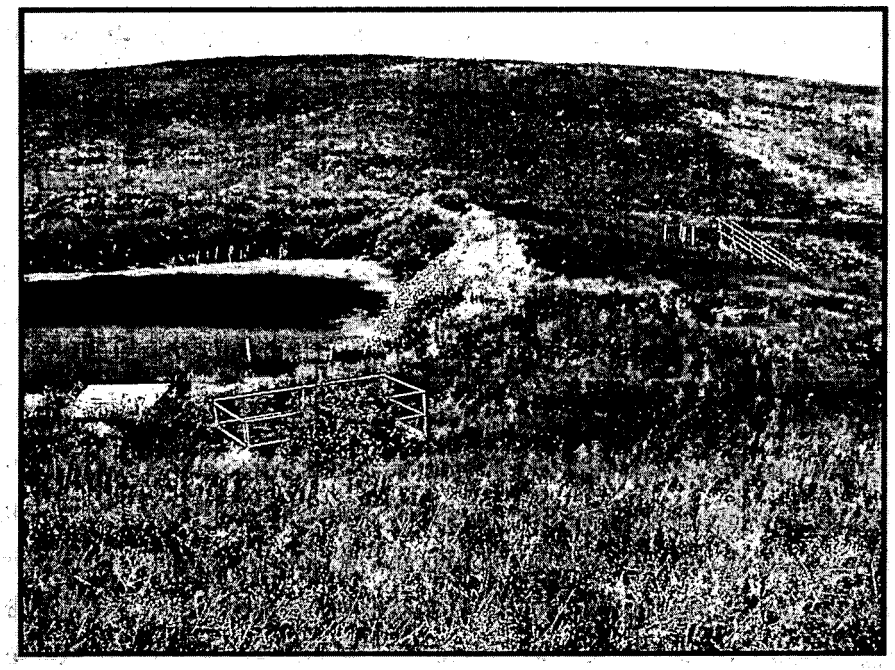
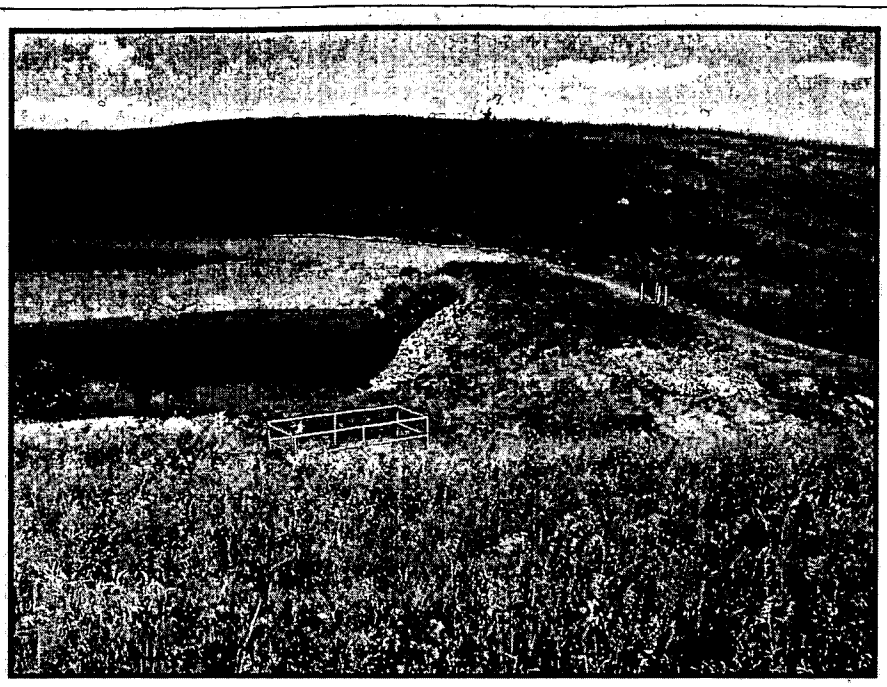
Photopoint 17





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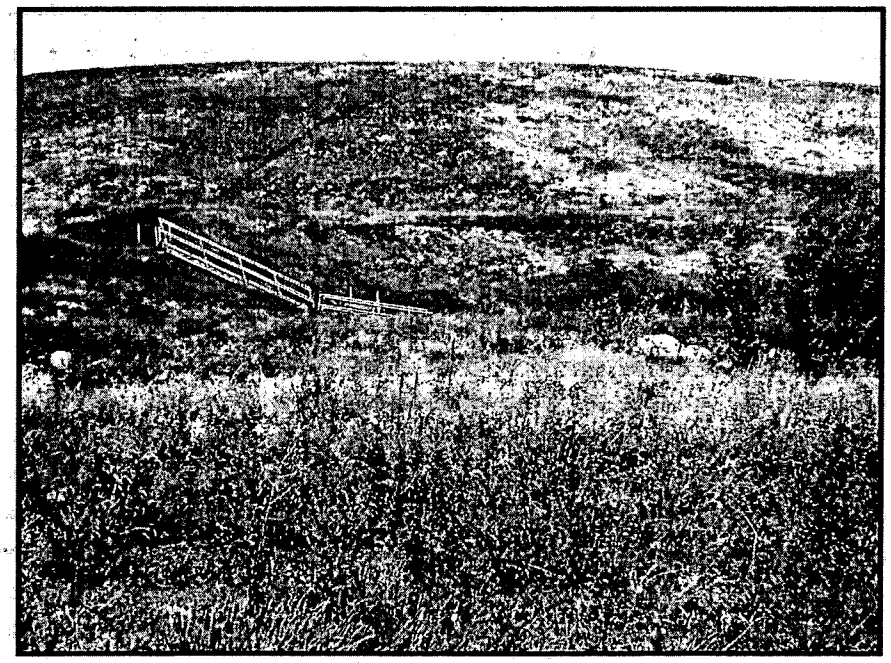

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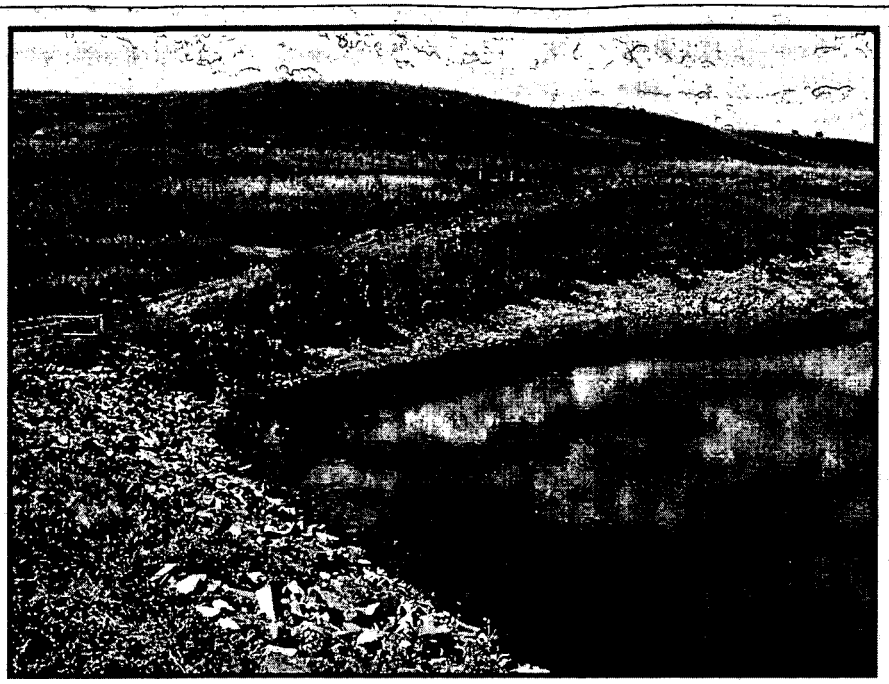
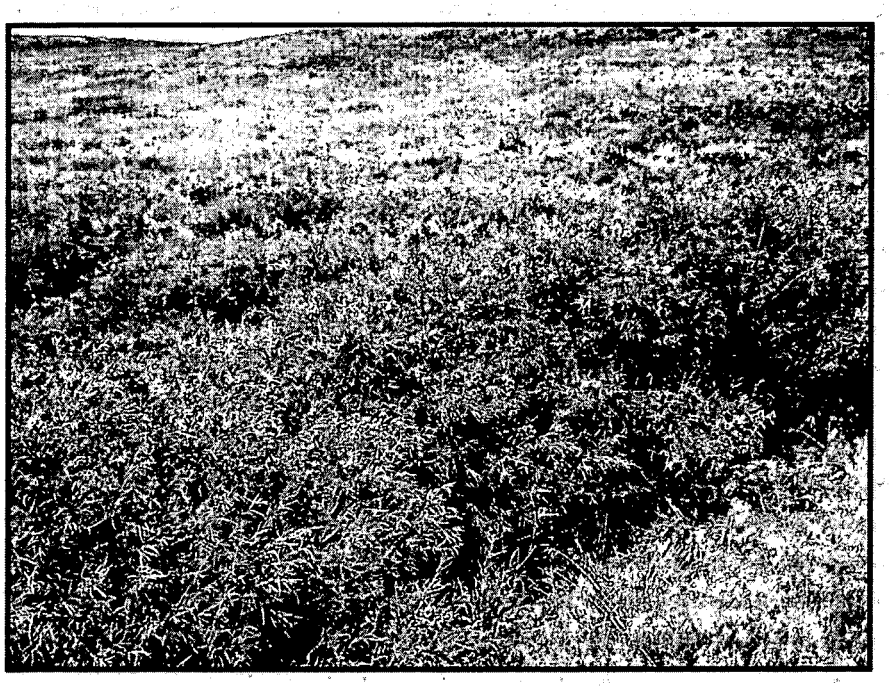
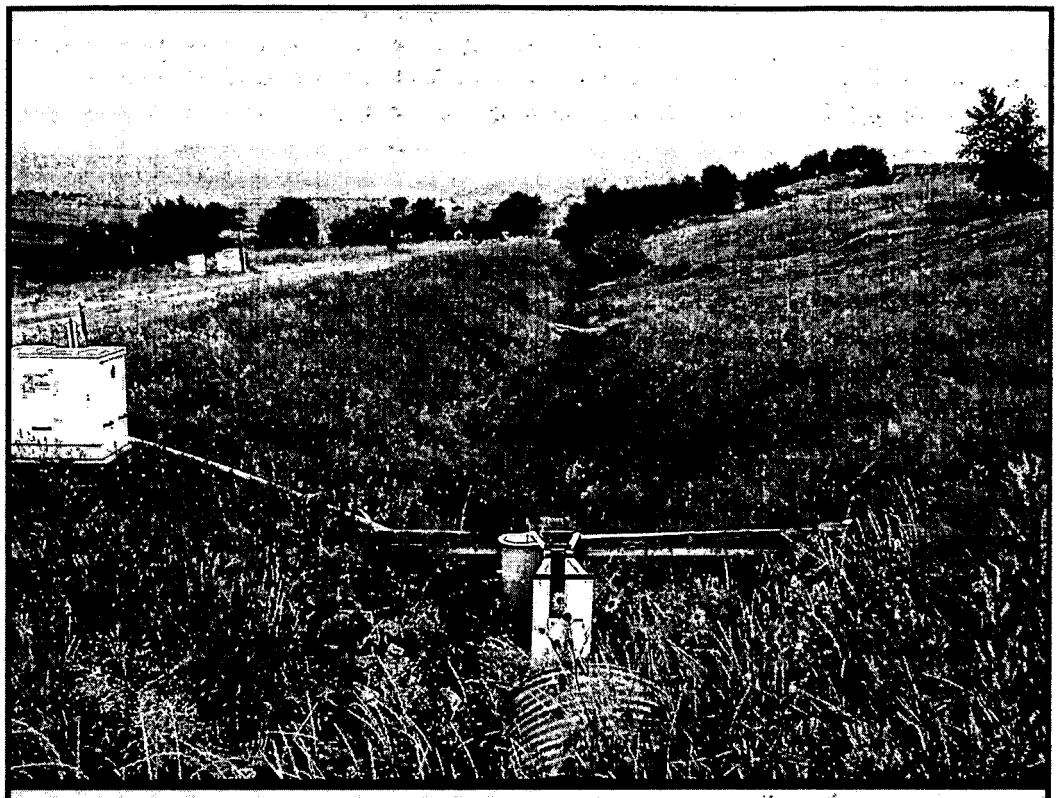




2005 Programmatic Biological Assessment (PBA) Part II Report



(click below to access a particular section of the report)

- Text of report, PDF Version
- Appendix A: Photo Monitoring Results
- Appendix B: Qualitative Habitat Assessment Forms
- Appendix C: PMJM Mitigation Tracking Spreadsheet and Maps

Preble's Mouse Mitigation Monitoring Report for the Programmatic Biological Opinion at the Rocky Flats Environmental Technology Site
2005 Annual Report
Biological Opinion: ES/LK-6-CO-04-F-012

Introduction

This report is being submitted to the United States Fish and Wildlife Service (USFWS) in accordance with the requirements outlined in the USFWS Biological Opinion (BO) for the Programmatic Biological Assessment Part II (PBA Pt. II). The BO addresses impacts to the federally-listed Preble's meadow jumping mouse, (Preble's mouse, *Zapus hudsonius preblei*), from various cleanup and closure projects at the Rocky Flats Environmental Technology Site (Site). The BO specifies under the Terms and Conditions (3a) that an annual report containing the annual monitoring information on restoration and enhancement efforts shall be submitted to the USFWS by December 1 after each growing season. This report is being submitted to satisfy this condition of the BO.

Methodology

The methodology used for the monitoring was taken from Appendix B in Part II of the PBA, the Mitigation Monitoring Plan. Per the plan, qualitative and/or quantitative monitoring will be used for monitoring revegetation efforts dependent on the size of the mitigation area. For areas larger than one acre in size, quantitative monitoring will be conducted. For areas less than one acre in size qualitative monitoring will be used. The PBA states that monitoring will be conducted for a minimum of three growing seasons after project completion. After three growing seasons, the United States Department of Energy (DOE) and the USFWS will meet to evaluate the success of the revegetation area.

During 2005, several of the projects discussed in Part II of the PBA were completed and revegetation of the project disturbances was conducted. At the time when monitoring for this report was conducted, many of the larger projects (areas larger than one acre in size) had only just been revegetated and little or no vegetation growth had begun. As a result, monitoring for all of the projects with the exception of the C-1 Pond project was conducted qualitatively during 2005. It is anticipated that in 2006, quantitative monitoring will be used at the larger areas that had little or no vegetation in 2005. Qualitative assessments and photographs were used to evaluate and document the initial revegetation efforts. Qualitative assessments consisted of completing a Qualitative Revegetation Evaluation Form (QREF) and taking a minimum of two photographs of each project area.

Quantitative monitoring was conducted only at the C-1 Pond project in 2005 because it was the only project with enough vegetation establishment by mid summer to warrant the use of quantitative methods. A total of three 50-m transects were randomly located within the revegetated area at the C-1 Pond area (called Revegetation transects; Figure 1). Three additional "reference" transects (called Reference transects) were randomly located adjacent to the revegetation area transects in undisturbed grassland areas (Figure 1).

Species richness was determined in a 2-m-wide belt centered along the length of each 50-m transect. Every plant species rooted within the 100-m^2 area was recorded. Foliar cover estimates were made using a point-intercept method along each of the 50-m transects. A 2-m-long rod, with a 6-mm diameter, was dropped vertically at 50-cm increments along the transect to record a total of 100 intercept points. Foliar vegetation hits (defined as a portion of a plant touching the rod) were recorded by species in three categories as defined by height and growth form. The topmost hit of each growth form was recorded. The growth forms measured were herbaceous, woody <2 m in height, and woody >2 m in height. Counts of surviving woody species (coyote willow [*Salix exigua*] and plains cottonwood [*Populus deltoides*]) planted were made in the late summer to determine survival rates.

Success criteria for the quantitative vegetation monitoring as outlined in Part II of the PBA, Appendix B are as follows:

1. At least 50% of the seeded species will be present within the revegetation area.
2. The combined foliar cover of grasses, forbs, and shrubs will be at least 80% of the reference area cover.
3. The relative native foliar cover will be at least 50% of the reference area.
4. Noxious weed will not exceed 5% canopy cover in the revegetation areas.

The hillslope seed mix used for the C-1 Pond area is found in Table 1.

Results and Discussion

Photo-monitoring results are found in Appendix A and electronic copies of the original QREFs are presented in Appendix B on the CD-ROM. Table 2 lists the projects included in this report from Part II of the PBA and what type of monitoring was conducted for each of them during 2005. The GIS Reference # column identifies the projects as listed on the Preble's mouse mitigation tracking spreadsheet found on the CD-ROM (Appendix C). For disturbance acreage and project specific GIS maps also see the Preble's mouse mitigation tracking spreadsheet and associated figures. Figure 2 shows the general locations of these projects.

Two ground water monitoring wells were drilled along Woman Creek during 2004 (GIS Ref. # J) to support remediation project monitoring requirements. Additionally, three geoprobe bore holes were also made to determine the best location for one of the wells at the western location. The two final monitoring wells were capped with steel casings. Little disturbance beyond trampling of the vegetation occurred at any of the locations. No reseeding was necessary at the locations because the pre-existing vegetation was coming back up in abundance even in 2004. In 2005, monitoring showed little evidence of the disturbance that occurred in 2004. The pre-existing vegetation had come back in and no difference in the vegetation was visible compared to the surrounding area. In 2005, two additional groundwater monitoring wells were installed in Preble's habitat (GIS Ref. # O, T). In both cases, some trampling of the existing grassland vegetation occurred, but by the end of the growing season much of the vegetation had returned. By next year, little difference to the pre-existing conditions should be apparent. Photo-monitoring results are found on the CD-ROM in Appendix A.

At the Original Landfill Project (OLF; GIS Ref. # G,V), geotechnical sampling and hotspot removals were conducted during 2004. Two small areas disturbed were outside of the original construction footprint assigned to the project. Erosion controls (hay bales and erosion mattes) were placed on each of the disturbances. One of the locations (T6, the easternmost location) was reseeded with a mesic hillside grassland seed mix. The other areas were not reseeded because they were going to be disturbed within the next few months when the project starts larger scale operations. By early September 2004, three seeded species (western wheatgrass [*Agropyron smithi*], slender wheatgrass [*Agropyron caninum* = *A. trachycaulum*], and blue grama [*Bouteloua gracilis*]) were already establishing at the T6 location. Some non-native species such as smooth brome (*Bromus inermis*) and Canada thistle (*Cirsium arvense*) were also beginning to come up. Some spraying of the Canada thistle with Roundup was conducted to try and keep it out of the revegetation area. Throughout much of the spring and all summer of 2005, the main OLF project activities were underway. Final completion of the project, including seeding and installation of the erosion controls was done in early September 2005. Very little vegetation had begun to come up at the OLF when the monitoring was conducted after project completion. Therefore only a qualitative assessment was conducted in 2005. Appendix A on the CD-ROM contains the pre-disturbance and post-project completion photo-monitoring.

At the B-ponds in South Walnut Creek (GIS Ref. # R, the sediments were removed from ponds B-1, B-2, and B-3, as part of the remediation activities. This created several areas of disturbance around the pond edges and on the hillsides surrounding the ponds. After project completion, the areas were seeded and erosion controls were installed. The hillsides were seeded with a mesic hillslope seed mix and the wetlands were seeded with a wetland seed mix and had coyote willow stakes installed along some of the pond edges. Little vegetation had begun to establish when monitoring was conducted and so qualitative monitoring was used in 2005. The photo-monitoring results are presented in Appendix A on the CD-ROM.

Several old culverts were removed from a location in Woman Creek south of the B130 building area during 2004 (GIS Ref. # I). The project area disturbance consisted simply of trampled vegetation and some small soil disturbance resulting from the trackhoe used to remove the culverts from the stream. The area was reseeded with a mesic hillside seed mix. No erosion controls were installed because the original vegetation was still present and little actual disturbance to the ground was done. In 2005, most of the vegetation had returned to the area and little difference was observed compared to the surrounding areas. The photo-monitoring results are presented in Appendix A on the CD-ROM.

The Old Process Waste Line (OPWL) project (GIS Ref. # A, B, C, D, E, F), an unforeseen project, disturbed an area within Preble's mouse habitat on the east and west sides of the North Access Road near the Waste Water Treatment Plant in 2004. These areas were reseeded and protected with erosion controls in 2004 to help prevent erosion until 2005 when most of the area was disturbed again to finalize the land configuration west of the B-series ponds in South Walnut Creek. Most of the OPWL area was re-disturbed during these activities in 2005. By the end of the growing season in 2005, a small amount of vegetation was just beginning establish again. The OPWL area was located in one of the larger areas discussed below that was heavily disturbed disturbed in South Walnut Creek when the North Access Road and culverts were removed and the drainage recontoured. The OPWL photo-monitoring results are presented in Appendix A on the CD-ROM.

At several other locations around the IA, culverts and roads were removed and the stream channels re-established as part of the cleanup and closure activities (GIS Ref. # Q, R, W, Z). The Waste Water Treatment Plant is included in this discussion because of its close proximity on the west side of the North Access Road and the fact that upstream of the B-ponds the entire drainage was recontoured. At many of the locations substantial earth work was conducted with heavy equipment to contour the landscape into the final configuration for closure. Where stream reaches had a very shallow slope, the stream channels were left with an earthen streambed while along the steeper stream reaches a riprap base was installed to help prevent erosion and down cutting of the streambed. The areas surrounding the stream channels were revegetated using the mesic hillside or riparian seed mixes. The earthen stream channels were also seeded with wetland species and planted with coyote willow stakes. Because of the small size of the areas that were located within the Preble's habitat, qualitative monitoring and photo-monitoring was conducted at these location. By late summer 2005, the locations that had some vegetation beginning to come up were dominated largely by slender wheatgrass and annual sunflower (*Helianthus annuus*). Photo-monitoring results for the different locations of these projects are found on the CD-ROM in Appendix A.

The C-1 Pond project (GIS Ref. # P) was conducted to notch the existing dam structure and make the pond more of a flow-through system. The project was completed in March 2005 and the seeding and erosion controls installed at completion. By early August when the quantitative monitoring was conducted, the total species richness at each of the three transects monitored ranged from 31 to 48 species within the revegetation area (Table 3). Of the seven graminoid species that were seeded, a total of three (slender wheatgrass, western wheatgrass, and buffalo grass [*Buchloe dactyloides*]) were found growing along the transects in August (43% of seeded species present). This is just below the success criterion requiring the presence of 50% of the seeded species. The total foliar vegetation cover present in the revegetation area was 20%, 27%, and 22% at each of the three transects (mean cover = 23%; Table 4). The success criterion for total foliar cover is 80% of that found in the adjacent reference area. The reference area total foliar cover values were 87%, 92%, and 95% (mean cover = 91%; Table 4). The total foliar cover in the revegetation area at the C-1 Pond in 2005 (mean = 23%) is far below the 73% needed to meet the success criterion (91% x 0.80 = 73%). Relative native cover in the revegetation area was 50%, 15%, and 50% at the three transects (mean native cover = 38%, Table 4). The success criterion for relative native cover is 50% of that in the reference area. The reference area relative native cover values were 17%, 28%, and 36% (mean native cover = 27%, Table 4). Thus the C-1 Pond revegetation area has a greater percentage of total native cover than the surrounding reference grassland areas. The total noxious weed cover at the C-1 Pond revegetation area was 5%, 15%, and 23% (mean noxious weed cover = 14%, Table 4). Most of this came from diffuse knapweed (*Centaurea diffusa*) and Canada thistle, both common noxious weeds in the Woman Creek drainage. The success criterion in the PBA is that no more than 5% cover of noxious weed cover is permitted. The C-1 Pond revegetation area does not meet the criterion for noxious weeds at this time. In the reference areas, the total noxious weed cover was 1%, 10%, and 3% (mean

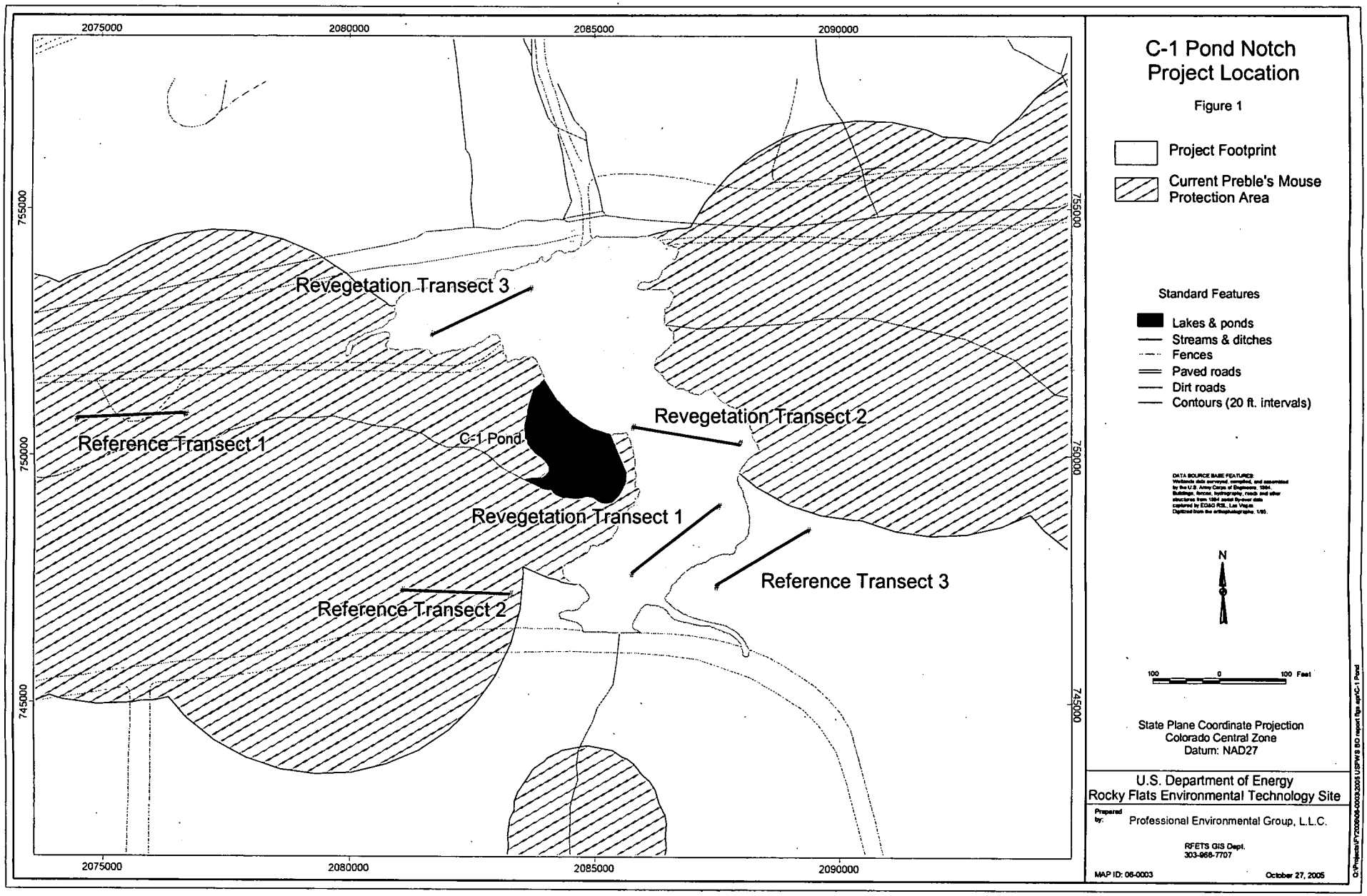
noxious weed cover = 4.7%), which is just below the success criterion. Along the north edge of the C-1 pond, 115 coyote willow stakes and three plains cottonwood poles were planted in early March 2005. An additional 28 coyote willow stakes were planted downstream of the C-1 Pond notch during the same timeframe. Survival counts made in August 2005, showed that 108 of the coyote willow (94% survival rate) and two of the three plains cottonwoods (67% survival rate) were surviving along the pond edge and 27 coyote willow (96% survival rate) were surviving below the notch. There is no survival success criterion in the PBA for these planted woody species.

Based on the success criteria and the quantitative monitoring results, the vegetation at the C-1 Pond does not meet three of the four success criteria in 2005. This is not unexpected considering it is only the first growing season. During the second growing season, more of the seeded species should establish, and total vegetation cover and total native cover should increase. With pro-active weed control, noxious weeds can be kept under control. Photo-monitoring results for the C-1 Pond are found in Appendix A on the CD-ROM.

As a general statement for all the locations that were monitored, qualitatively or quantitatively, continued germination and establishment of the seeded species is expected during 2006, as long as normal precipitation is received. Noxious weeds and other undesirable non-native species will continue to be the key management issue. Weed control and potentially reseeding of certain locations will need to be conducted to establish the desired native vegetation and restore the Preble's habitat that was disturbed.

Conclusions

Post-project completion revegetation monitoring for the projects included in Part II of the PBA was conducted in 2005. At most of the locations, project completion was late enough in the season that little of the revegetation had begun to grow during the summer of 2005. Therefore only qualitative assessments and photo-monitoring was conducted at most locations. At the C-1 Pond project, quantitative data were taken and showed that currently the vegetation is only in the very early stages of establishment. Only one of the four success criteria was met in 2005. This is not unexpected because it is the first growing season and additional vegetation establishment is expected next year. Continued monitoring in 2006 will evaluate and document the success of the vegetation establishment at these locations. Active management of these areas through reseeding as needed, and weed control will be necessary to establish the desired Preble's habitat.



C-1 Pond Notch Project Location

Figure 1

Project Footprint

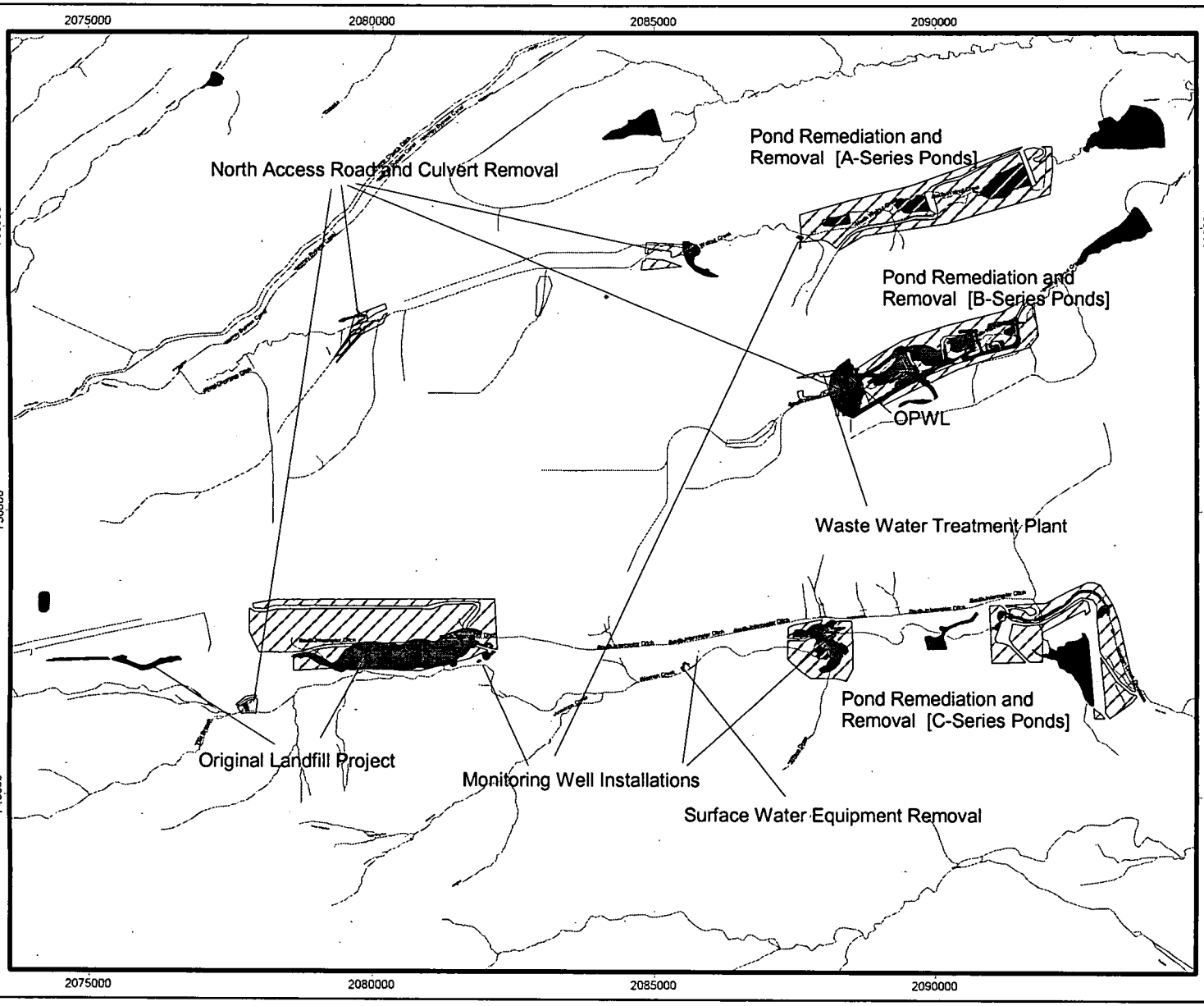
Current Preble's Mouse Protection Area

Standard Features

- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Wetlands data surveyed, compiled, and assembled by the U.S. Army Corps of Engineers, 1994.
Buildings, fences, hydrography, roads and other structures from 1994 aerial flyover data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

Q:\Projects\FY2006\06-0003\2005 USFWS BO report figs apr\C-1 Pond



Programmatic Biological Assessment Part II Monitoring Activities 2005

Figure 2

PBA Pt. II Project Footprints

PBA Pt. II Project Disturbances 2005

Standard Features

Lakes & ponds

Streams & ditches

Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas
Digitized from the orthophotographs, 1/95

N

1000 0 1000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

RFETS GIS Dept.
303-966-7707

MAP ID: 06-0003

October 27, 2005

O:\Projects\FY2004\05-0003\2005 PBA Part II Activities

Table 1. Mixed Grass Prairie Seed Mix

Hillside Slope Areas (Hillside Areas Or Areas With Slopes Greater Than 10%) Revegetation Seed Mix
(Based on 50 seeds/sq.ft.)

Red Map Areas

This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS
Date: 1/04

Species	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb.	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
Graminoids							
Agropyron dasystachyum	Thickspike Wheatgrass	Critana	5	108900	150000	2.5	0.73
Agropyron smithii	Western Wheatgrass	Arriba	23	500940	120000	11.5	4.17
Agropyron trachycaulum	Slender Wheatgrass	San Luis	15	326700	120000	7.5	2.72
Bouteloua curtipendula	Side-Oats Grama	Vaughn	13	283140	190000	6.5	1.49
Bouteloua gracilis	Blue Grama	Hachita	24	522720	710000	12.0	0.74
Buchloe dactyloides	Buffalo Grass	Texoka	10	217800	45000	5.0	4.84
Stipa viridula	Green Needle Grass	Lodorm	10	217800	180000	5.0	1.21
	Total		100	2178000		50.0	15.90

Sq. ft/acre	43560
Seeds/sq. ft.	50
Seeds needed/acre	2178000

1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast, the application rates are to be doubled.

2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.

3) The seed is to be certified weed free.

4) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

NOTE:
Slender wheatgrass and thickspike wheatgrass have been added to species mix as early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687.

Table 2. Part II PBA Project Monitored in 2005

GIS Reference #	Project Description	Qualitative Revegetation Evaluation	Photo-Monitoring	Quantitative Revegetation Monitoring
J, O, T	Monitoring Well Installations	X	X	
G, V	Original Landfill Project	X	X	
K, L, N, P, R, Y	Pond Remediation and Removal	X	X	X
X	Surface Water Monitoring Equipment Removal	X	X	
I, Q, R, W, Z	North Access Road and Culvert Removal	X	X	
R	Waste Water Treatment Plant Removal	X	X	
A - F	OPWL Project	X	X	

Table 3. C-1 Pond Species Richness Summary 2005

Family	Scientific Name	Speccode	Native	Reference Area T1	Revegetation T1	Reference Area T2	Revegetation T2	Reference Area T3	Revegetation T3
AGAVACEAE	Yucca glauca Nutt.	YUGL1	Y	X				X	
APIACEAE	Lomatium orientale Coult. & Rose	LOOR1	Y			X		X	
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y			X	X		
ASTERACEAE	Ambrosia artemisiifolia L.	AMAR1	Y		X		X		X
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y	X	X		X		X
ASTERACEAE	Artemisia dracunculus L.	ARDR1	Y	X		X		X	
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y	X	X	X		X	
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y			X	X	X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	X	X	X	X	X	
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	X	X	X	X	X	X
ASTERACEAE	Chrysanthemum leucanthemum L.	CHLE1	N				X		X
ASTERACEAE	Chrysopsis villosa Pursh.	CHVI1	Y	X				X	
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N		X	X	X	X	X
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y				X		
ASTERACEAE	Dyssodia papposa (Vent) Hitchc.	DYPA1	N		X				
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y	X		X			
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y	X		X	X		X
ASTERACEAE	Gutierrezia sarothrae (Pursh.) Britt. & Rusby	GUSA1	Y	X					
ASTERACEAE	Helianthus annuus L.	HEAN1	Y		X		X		X
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y					X	
ASTERACEAE	Lactuca serriola L.	LASE1	N	X	X	X	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y					X	
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y		X			X	
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N	X					
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y	X					
ASTERACEAE	Solidago missouriensis Nutt.	SOMI1	Y	X		X		X	
ASTERACEAE	Sonchus arvensis L. ssp. arvensis L.	SOAR1	N						X
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N			X		X	
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N	X	X	X	X	X	
ASTERACEAE	Xanthium strumarium L.	XAST1	Y				X		
BORAGINACEAE	Cynoglossum officinale L.	CYOF1	N				X		
BORAGINACEAE	Onosmodium molle Michx. var. occidentale (Mack.) Johnst.	ONMO1	Y					X	
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N	X		X	X	X	X
BRASSICACEAE	Barbarea vulgaris R. Br.	BAVU1	N				X		
BRASSICACEAE	Lepidium campestre (L.) R. Br.	LECA1	N						X
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N				X		
BRASSICACEAE	Thlaspi arvense L.	THAR1	N		X				
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y			X		X	
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y	X		X		X	
CAPRIFOLIACEAE	Symphoricarpos occidentalis Hook.	SYOC1	Y					X	
CARYOPHYLLACEAE	Vaccaria pyramidata Medic.	VAPY1	N				X		
CHENOPODIACEAE	Chenopodium album L.	CHAL1	N		X		X		X
CHENOPODIACEAE	Kochia scoparia (L.) Schrad.	KOSC1	N						X
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N	X			X		X
CONVOLVULACEAE	Evolvulus nuttallianus R. & S.	EVNU1	Y	X					
CYPERACEAE	Carex eleocharis Bailey	CAEL1	Y	X					
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y			X		X	
FABACEAE	Astragalus agrestis Dougl. ex G. Don	ASAG1	Y			X		X	
FABACEAE	Astragalus crassicarpus Nutt.	ASCR1	Y	X					
FABACEAE	Dalea purpurea Vent	DAPU1	Y			X		X	
FABACEAE	Glycyrrhiza lepidota Pursh.	GLLE1	Y	X					
FABACEAE	Melilotus alba Medic.	MEAL1	N	X					
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N	X	X		X	X	X

Table 3. C-1 Pond Species Richness Summary 2005

Family	Scientific Name	Speccode	Native	Reference Area T1	Revegetation T1	Reference Area T2	Revegetation T2	Reference Area T3	Revegetation T3
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y	X	X	X	X	X	X
FABACEAE	Vicia americana Muhl. ex Willd.	VIAM1	Y			X	X		
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N	X			X		X
HYDROPHYLLACEAE	Phacelia heterophylla Pursh.	PHHE1	Y				X		
MALVACEAE	Sphaeralcea coccinea (Pursh.) Rydb.	SPCO1	Y		X	X		X	X
NYCTAGINACEAE	Mirabilis hirsuta (Pursh.) MacM.	MIHI1	Y	X					
ONAGRACEAE	Gaura coccinea Pursh.	GACO1	Y	X		X			X
ONAGRACEAE	Oenothera villosa Thunb. ssp. strigosa (Rydb.) Dietrich & Raven	OEVI1	Y				X		
PAPPAVERACEAE	Papaver rhoeas L.	PARH1	N				X		
POACEAE	Aegilops cylindrica Host	AECY1	N		X				
POACEAE	Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	AGCA1	Y		X		X		X
POACEAE	Agropyron cristatum (L.) Gaertn.	AGCR1	N	X			X	X	X
POACEAE	Agropyron intermedium (Host) Beauv.	AGIN1	N	X				X	X
POACEAE	Agropyron smithii Rydb.	AGSM1	Y		X	X	X	X	X
POACEAE	Andropogon gerardii Vitman	ANGE1	Y	X	X	X		X	
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y			X		X	
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y	X		X			
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y	X				X	
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N	X	X	X	X	X	X
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N	X	X	X	X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	X	X				X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y			X	X		
POACEAE	Festuca pratensis Huds.	FEPR1	N	X					X
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y			X		X	
POACEAE	Phleum pratense L.	PHPR1	N				X	X	
POACEAE	Poa compressa L.	POCO1	N	X		X	X	X	X
POACEAE	Poa pratensis L.	POPR1	N		X	X		X	
POACEAE	Setaria viridis (L.) Beauv.	SEVI1	N				X		X
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y					X	
POACEAE	Sporobolus cryptandrus (Torr.) A. Gray	SPCR1	Y	X					
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y			X		X	
POACEAE	Stipa viridula Trin.	STVI1	Y			X		X	
POACEAE	Triticum aestivum L.	TRAE1	N		X		X		X
POLYGONACEAE	Polygonum arenastrum Jord. ex Bor.	POAR1	N				X		X
POLYGONACEAE	Polygonum convolvulus L.	POCO2	N		X				X
POLYGONACEAE	Polygonum persicaria L.	POPE2	N				X		
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y		X		X		X
POLYGONACEAE	Rumex acetosella L.	RUAC1	N				X		
POLYGONACEAE	Rumex crispus L.	RUCR1	N				X		
ROSACEAE	Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	Y	X	X		X	X	
ROSACEAE	Rosa arkansana Porter	ROAR1	Y		X		X	X	
SANTALACEAE	Comandra umbellata (L.) Nutt.	COUM1	Y					X	
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	X		X		X	X
SCROPHULARIACEAE	Penstemon secundiflorus Benth.	PESE1	Y					X	
SCROPHULARIACEAE	Penstemon virens Penn.	PEVI1	Y					X	
SCROPHULARIACEAE	Verbascum blattaria L.	VEBL1	N	X	X	X		X	
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N	X		X	X	X	
SOLANACEAE	Physalis virginiana P. Mill.	PHVI2	Y			X		X	X
TYPHACEAE	Typha angustifolia L.	TYAN1	Y				X		
VERBENACEAE	Verbena bracteata Lag. & Rodr.	VEBR1	Y		X		X		X
				43	31	40	48	51	37

Table 4. C-1 Pond Foliar Cover Summary 2005

						Reference Area T1		Revegetation T1		Reference Area T2		Revegetation T2		Reference Area T3		Revegetation T3	
Scientific Name	Speccode	Growth Form	Native	Cool/ Warm Season	Noxious Weed	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N			13.00	14.94							1.00	1.05		
Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	F	N		X			1.00	5.00	2.00	2.17			2.00	2.11		
Centaurea diffusa Lam.	CEDI1	F	N		X	1.00	1.15			3.00	3.26	2.00	7.41			3.00	13.64
Cirsium arvense (L.) Scop.	CIAR1	F	N		X					2.00	2.17	1.00	3.70	1.00	1.05	1.00	4.55
Erodium cicutarium (L.) L'Her.	ERCI1	F	N		X							1.00	3.70				
Kochia scoparia (L.) Schrad.	KOSC1	F	N													1.00	4.55
Linaria dalmatica (L.) Mill.	LIDA1	F	N		X					1.00	1.09						
Melilotus alba Medic.	MEAL1	F	N			4.00	4.60										
Melilotus officinalis (L.) Pall.	MEOF1	F	N			4.00	4.60	6.00	30.00			16.00	59.26			1.00	4.55
Polygonum arenastrum Jord. ex Bor.	POAR1	F	N													2.00	9.09
Tragopogon dubius Scop.	TRDU1	F	N					1.00	5.00					1.00	1.05		
Verbascum thapsus L.	VETH1	F	N		X					1.00	1.09						
Ambrosia psilostachya DC.	AMPS1	F	Y			2.00	2.30										
Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	F	Y							1.00	1.09						
Chrysopsis villosa Pursh.	CHVI1	F	Y			5.00	5.75										
Glycyrrhiza lepidota Pursh.	GLLE1	F	Y			3.00	3.45										
Helianthus annuus L.	HEAN1	F	Y									1.00	3.70			2.00	9.09
Lomatium orientale Coult. & Rose	LOOR1	F	Y											1.00	1.05		
Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	F	Y									2.00	7.41				
Psoralea tenuiflora Pursh.	PSTE1	F	Y					1.00	5.00					1.00	1.05		
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y											1.00	1.05		
Agropyron cristatum (L.) Gaertn.	AGCR1	G	N	C		7.00	8.05										
Agropyron intermedium (Host) Beauv.	AGIN1	G	N	C		17.00	19.54										
Bromus inermis Leyss. ssp. inermis	BRIN1	G	N	C		7.00	8.05	1.00	5.00	13.00	14.13	1.00	3.70				
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C		17.00	19.54	1.00	5.00	20.00	21.74	2.00	7.41	22.00	23.16	2.00	9.09
Bromus tectorum L.	BRTE1	G	N	C	X											1.00	4.55
Phleum pratense L.	PHPR1	G	N	C										1.00	1.05		
Poa compressa L.	POCO1	G	N	C		2.00	2.30			8.00	8.70			2.00	2.11		
Poa pratensis L.	POPR1	G	N	C						16.00	17.39			31.00	32.63		
Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	AGCA1	G	Y	C				8.00	40.00			1.00	3.70			7.00	31.82
Agropyron smithii Rydb.	AGSM1	G	Y	C				1.00	5.00	13.00	14.13			6.00	6.32	2.00	9.09
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C						1.00	1.09			1.00	1.05		
Carex heliophila Mack.	CAHE1	G	Y	C						5.00	5.43			6.00	6.32		
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C						3.00	3.26			7.00	7.37		
Stipa comata Trin. & Rupr.	STCO1	G	Y	C										4.00	4.21		
Stipa viridula Trin.	STVI1	G	Y	C						2.00	2.17			3.00	3.16		
Andropogon gerardii Vitman	ANGE1	G	Y	W		1.00	1.15							1.00	1.05		
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W		1.00	1.15			1.00	1.09						
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W		3.00	3.45							3.00	3.16		
Total Foliar Cover						87.0	100.0	20.0	100.0	92.0	100.0	27.0	100.0	95.0	100.0	22.0	100.0
Total Forb Cover						32.0	36.8	9.0	45.0	10.0	10.9	23.0	85.2	8.0	8.4	10.0	45.5
Total Non-Native Forb Cover						22.0	25.3	8.0	40.0	9.0	9.8	20.0	74.1	5.0	5.3	8.0	36.4
Total Native Forb Cover						10.0	11.5	1.0	5.0	1.0	1.1	3.0	11.1	3.0	3.2	2.0	9.1
Total Graminoid Cover						55.0	63.2	11.0	55.0	82.0	89.1	4.0	14.8	87.0	91.6	12.0	54.5
Total Non-Native Graminoid Cover						50.0	57.5	2.0	10.0	57.0	62.0	3.0	11.1	56.0	58.9	3.0	13.6
Total Native Graminoid Cover						5.0	5.7	9.0	45.0	25.0	27.2	1.0	3.7	31.0	32.6	9.0	40.9
Total Native Cover						15.0	17.2	10.0	50.0	26.0	28.3	4.0	14.8	34.0	35.8	11.0	50.0
Total Non-Native Cover						72.0	82.8	10.0	50.0	66.0	71.7	23.0	85.2	61.0	64.2	11.0	50.0
Total Warm-Season Graminoid Cover						5.0	5.7	0.0	0.0	1.0	1.1	0.0	0.0	4.0	4.2	0.0	0.0
Total Cool-Season Graminoid Cover						50.0	57.5	11.0	55.0	81.0	88.0	4.0	14.8	83.0	87.4	12.0	54.5
Total Noxious Weed Cover						1.0	1.1	1.0	5.0	9.0	9.8	4.0	14.8	3.0	3.2	5.0	22.7

Absolute Cover = The percentage of the number of hits on a species out of the total number of hits possible.
Relative Cover = The percentage of the number of hits on a species out of the total number of vegetation hits.
Native Categories: Y = Native, N = Non-Native
Growth Form Categories: F = Forb, G = Graminoid
Cool/Warm Season Categories: C = Cool-Season Graminoid, W = Warm-Season Graminoid
Noxious Weed Category: X = Noxious Weed (listed on May 2005 Colorado State Noxious Weed List)

Photomonitoring Projects

(clicking on the project will take you to the corresponding monitoring photos, then clicking on any photo will enlarge that photo)

C-1 Pond Project

Monitoring Well Installation

North Access Road and Culvert Removal

Original Landfill Project

Pond Remediation A-Series

Pond Remediation B-Series

Old Process Waste Line Removal Project

Surface Water Equipment Removal

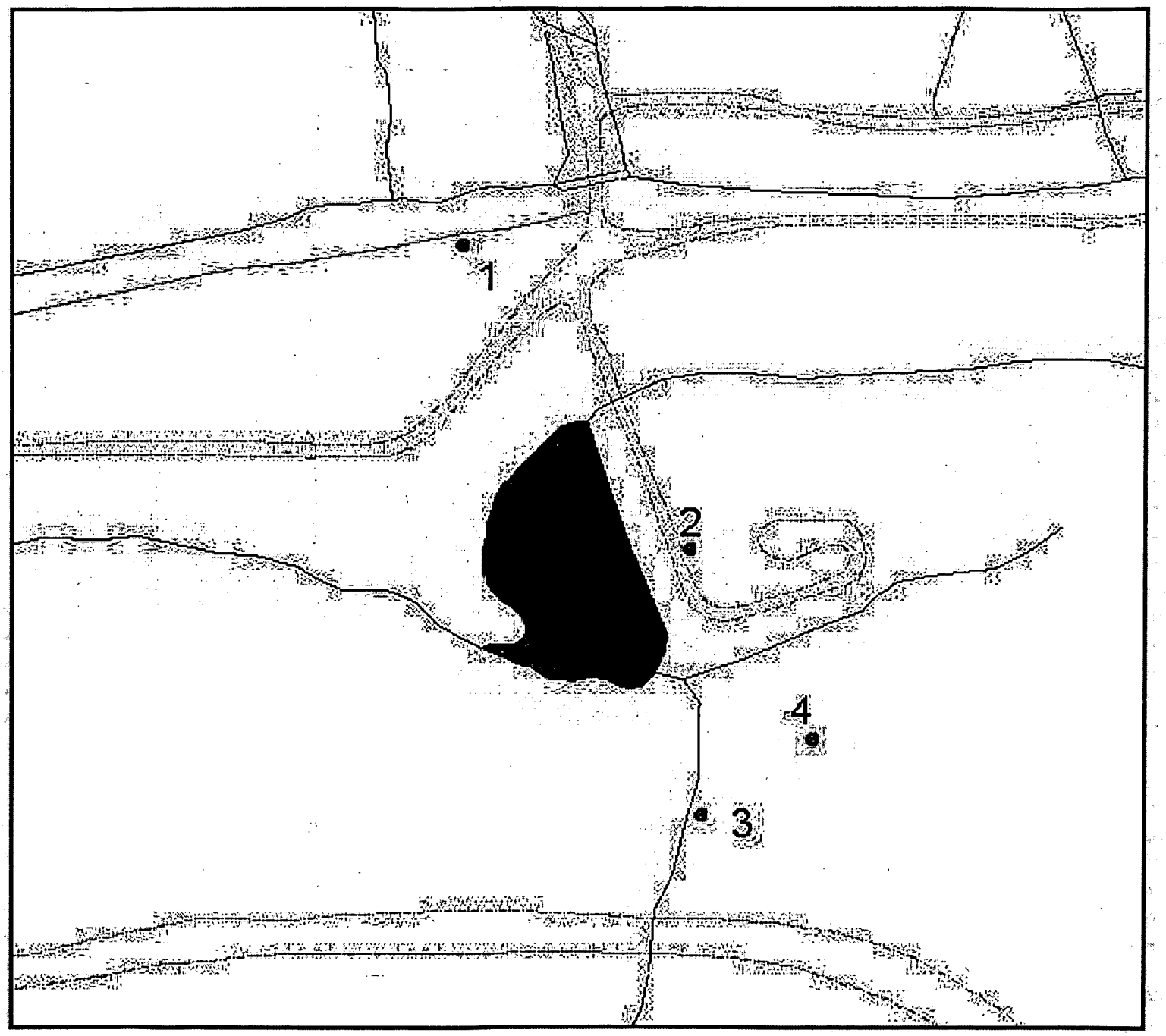
Walnut Creek Riparian Corridor Monitoring Project

Waste Water Treatment Plant

Woman Creek Bypass Rip-Rap Repair Project

C-1 Pond

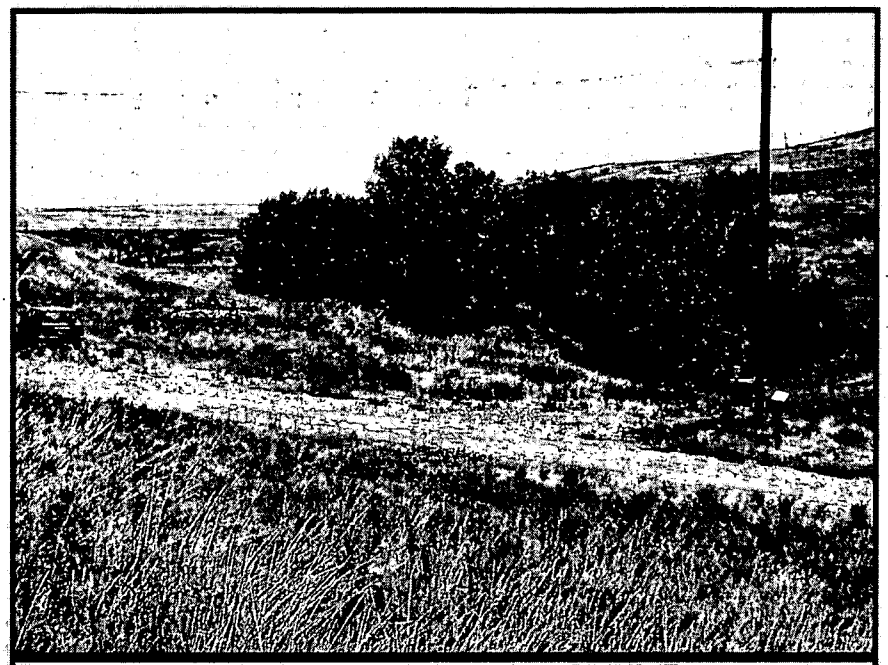
(clicking on any photopoint on the map will take you to the corresponding monitoring photos)



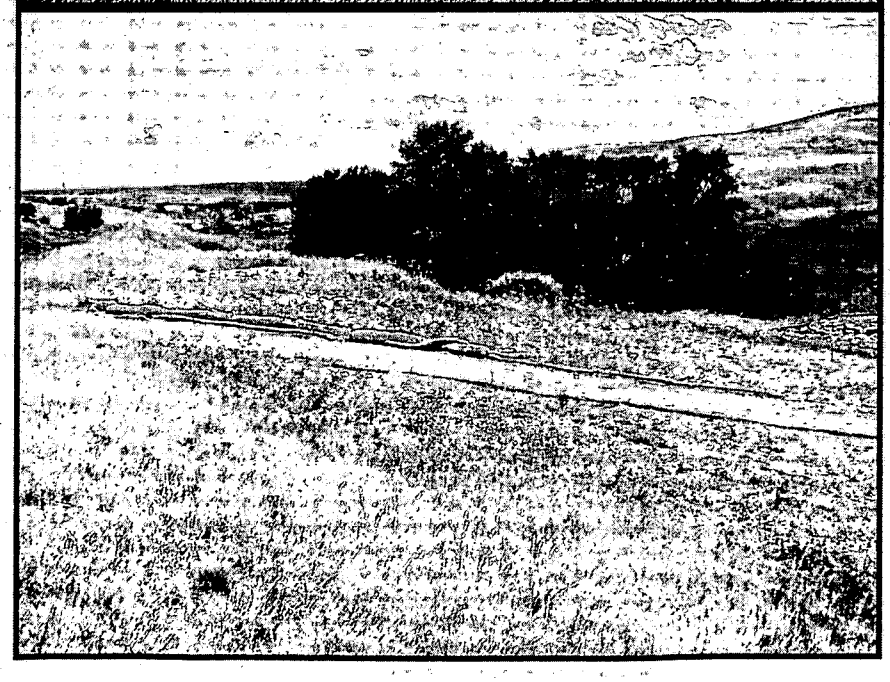
C-1 Pond

Photopoint 1

6/23/2004



8/25/2005



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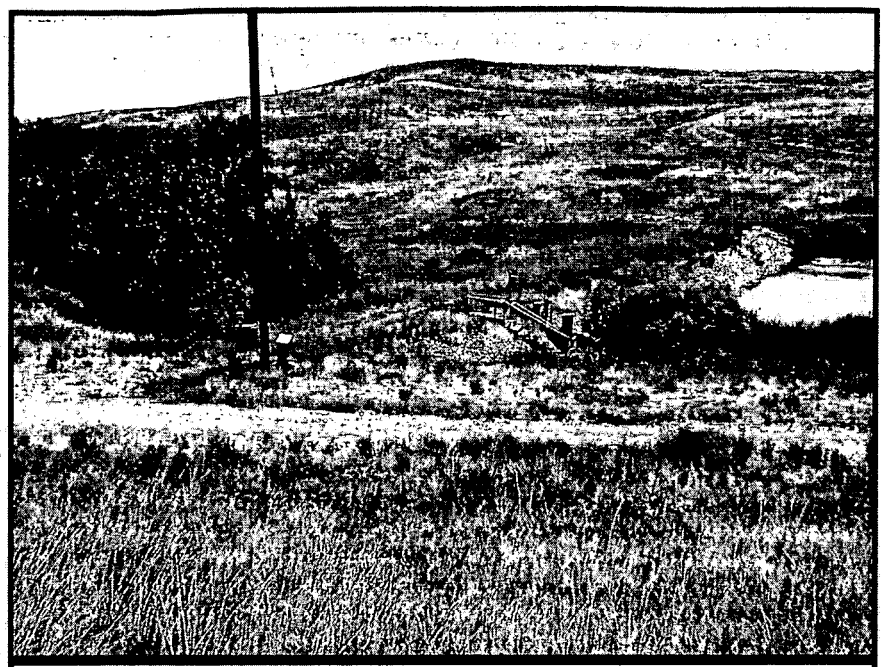

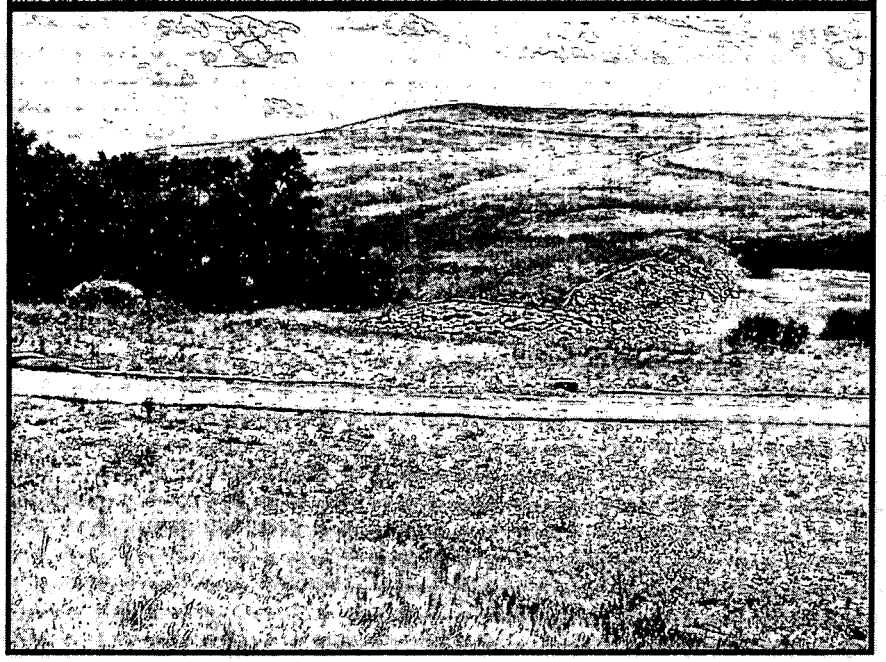

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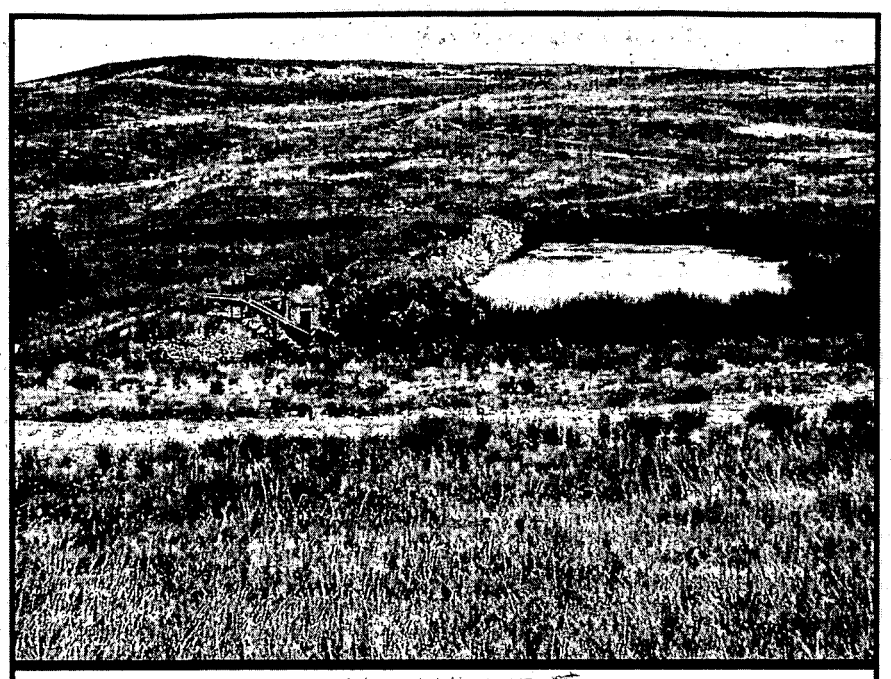

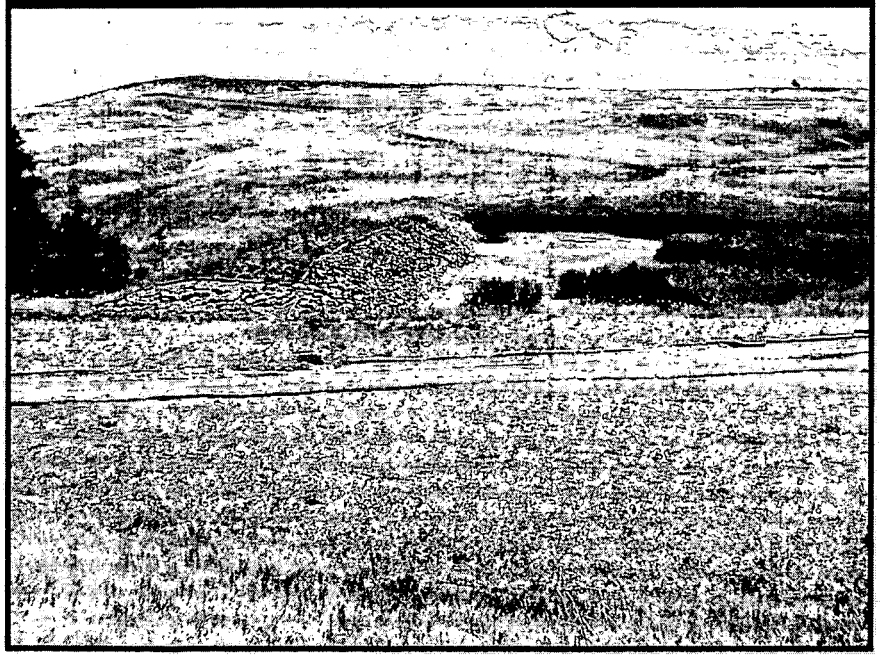

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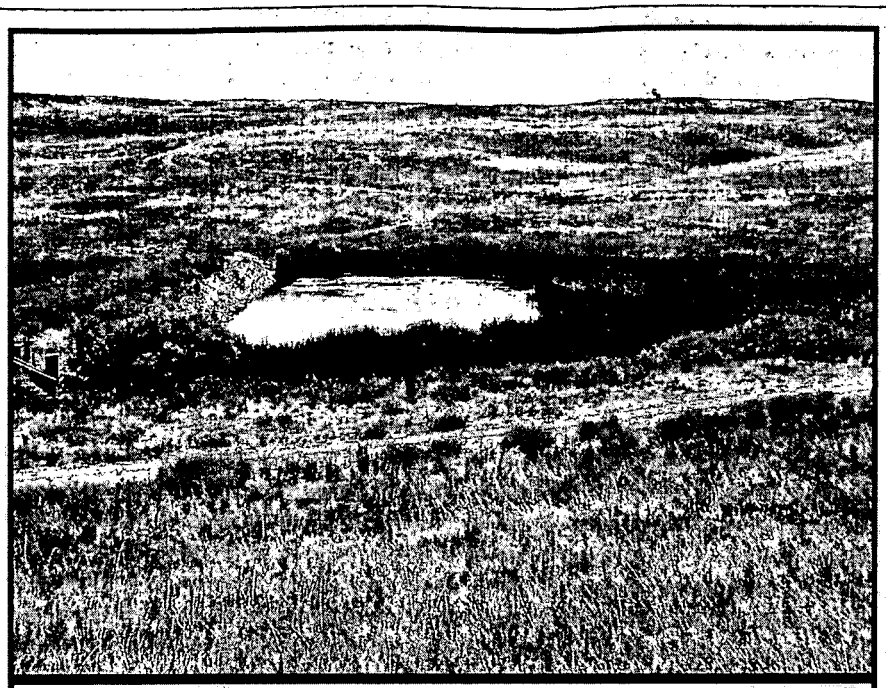

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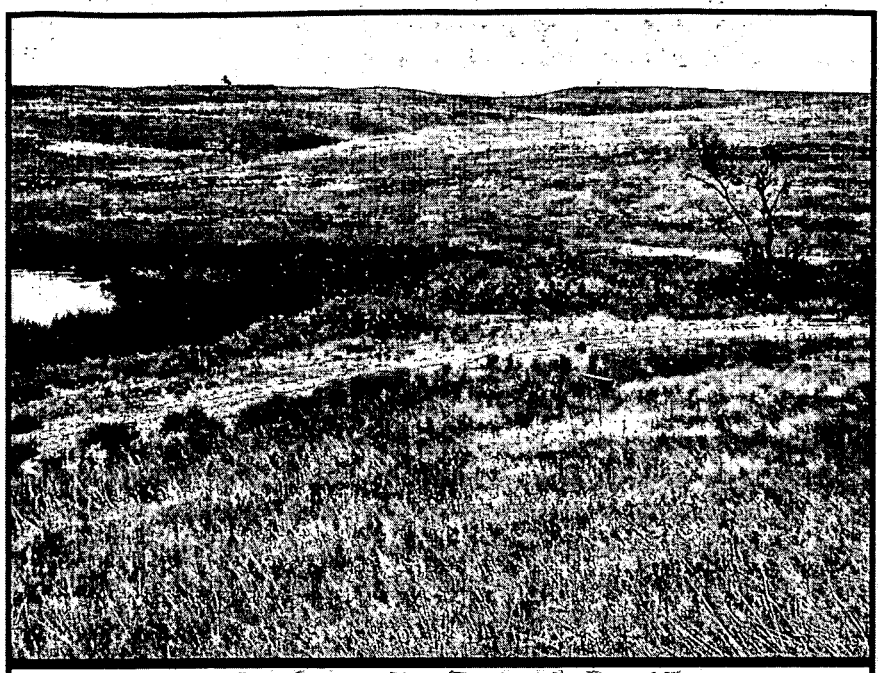

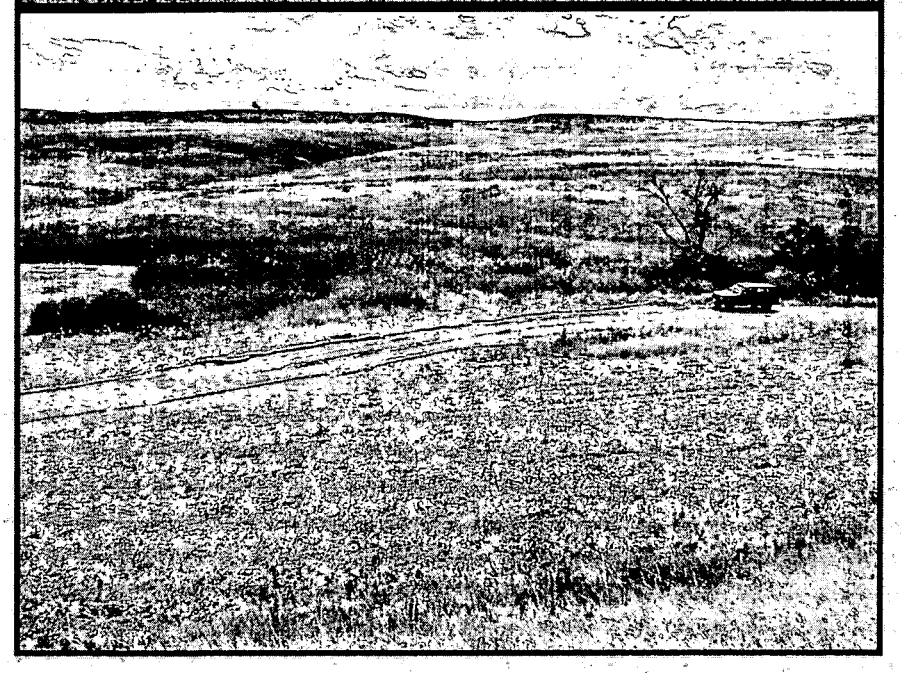

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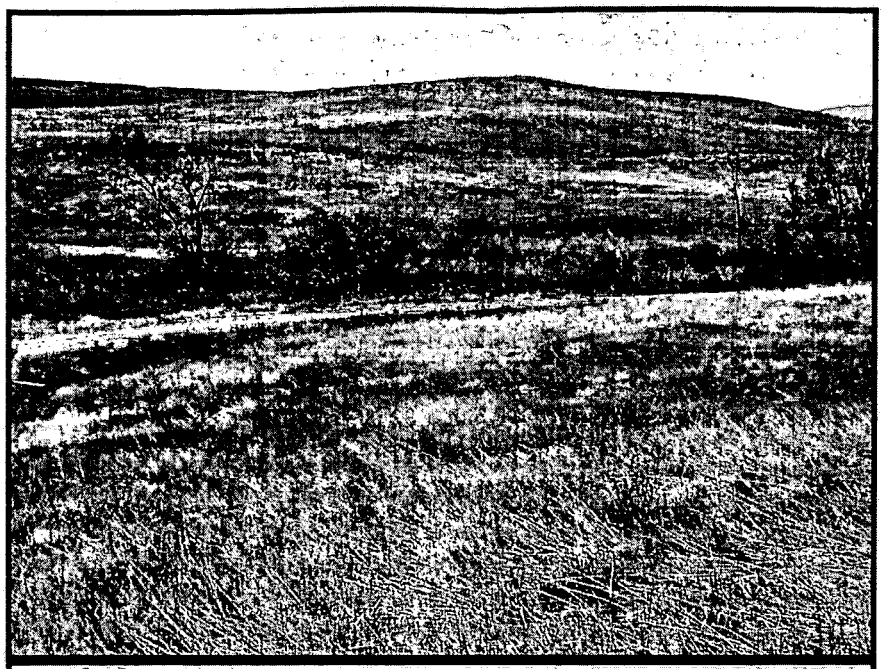
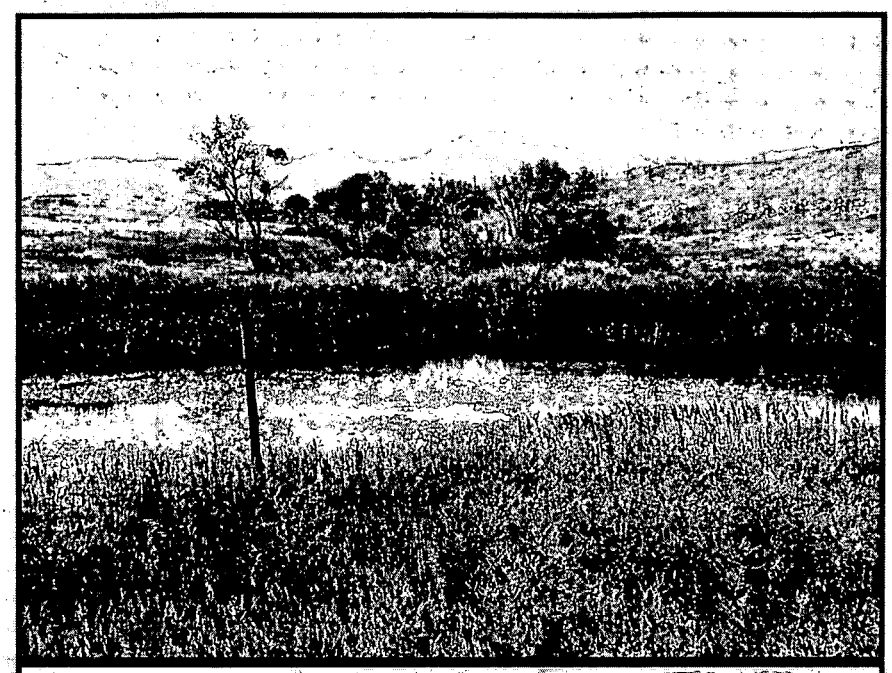
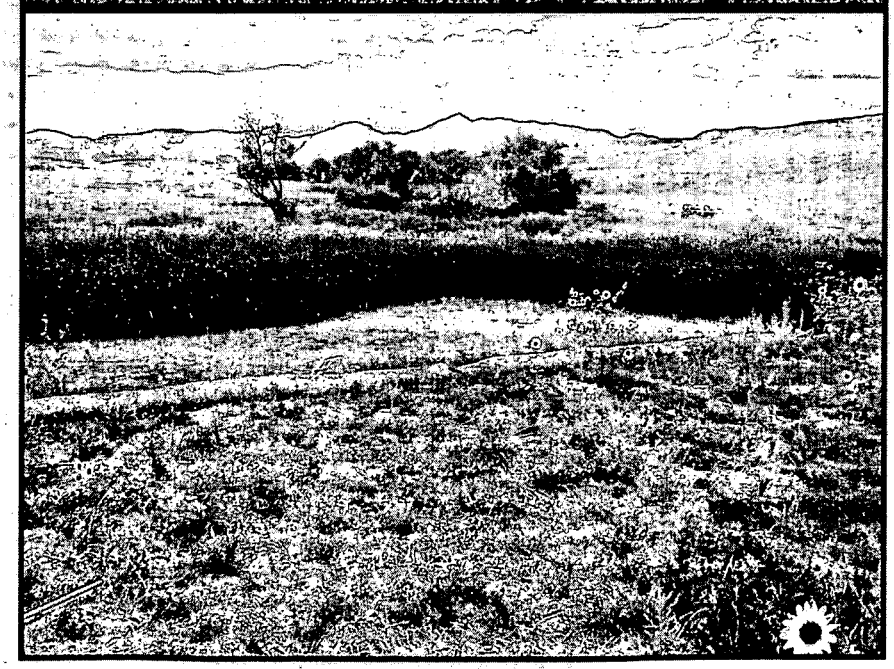


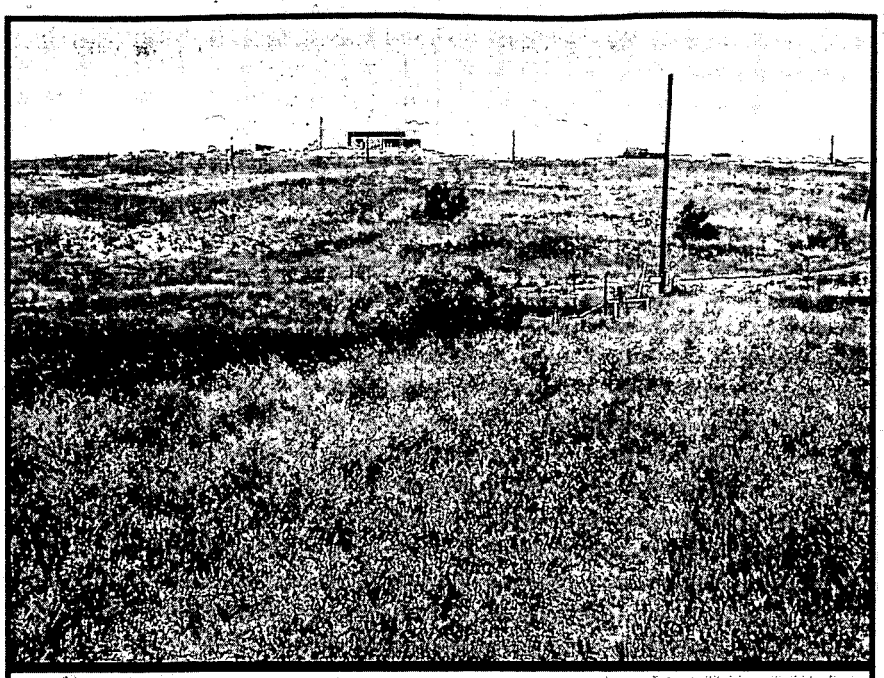
C-1 Pond

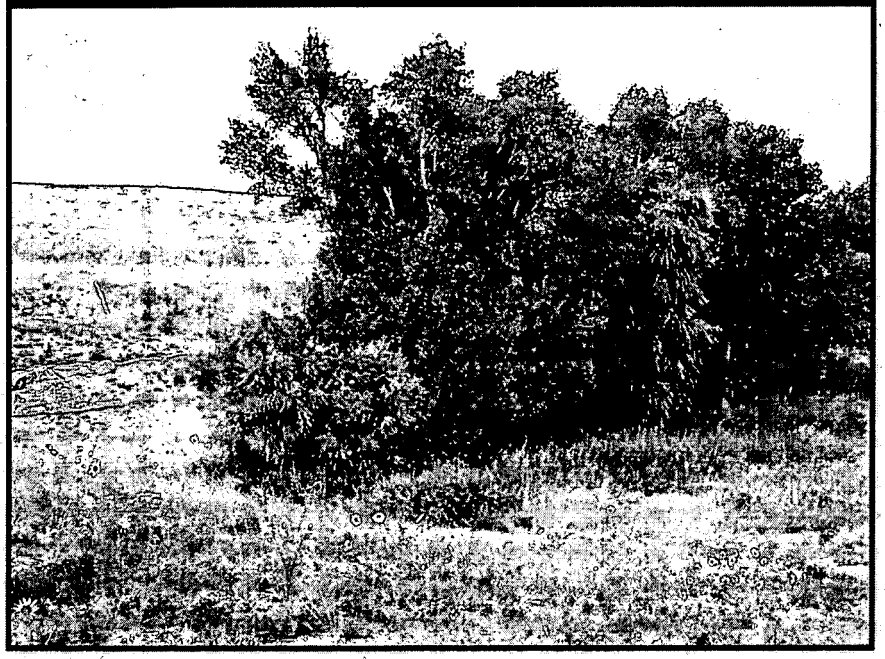
Photopoint 2

6/23/2004 **8/25/2005**







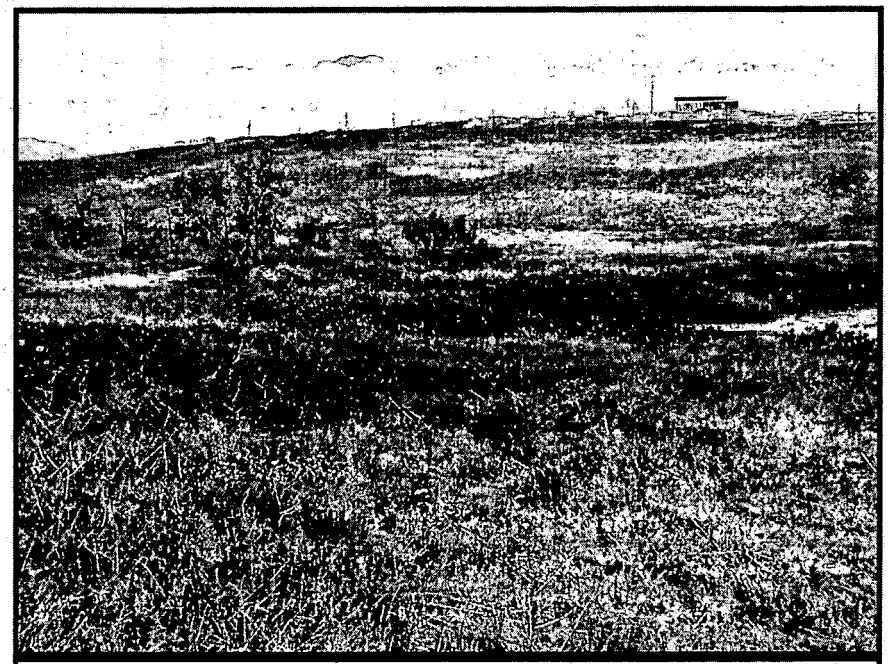


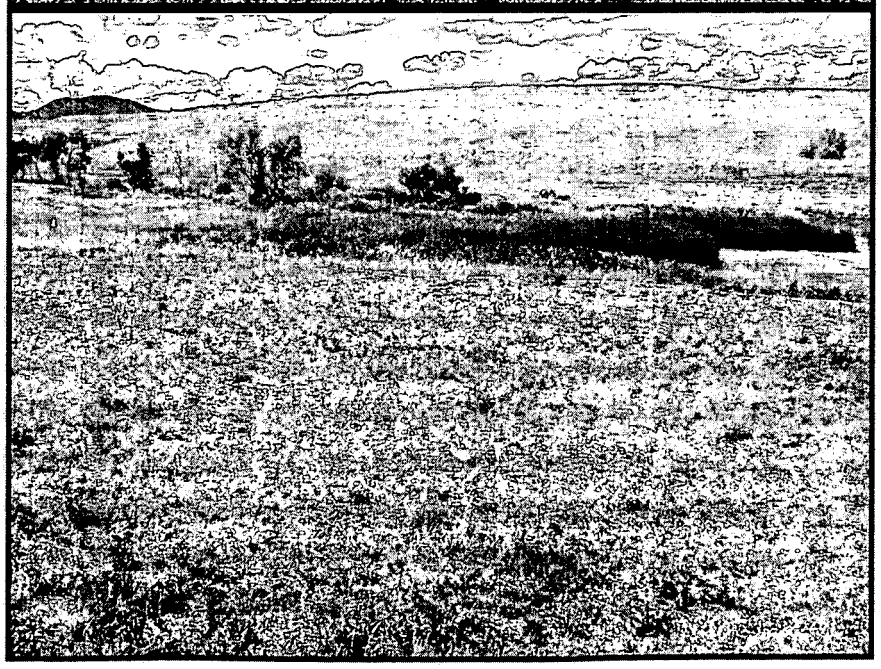
C-1 pond photopoint 2

C-1 Pond

Photopoint 3

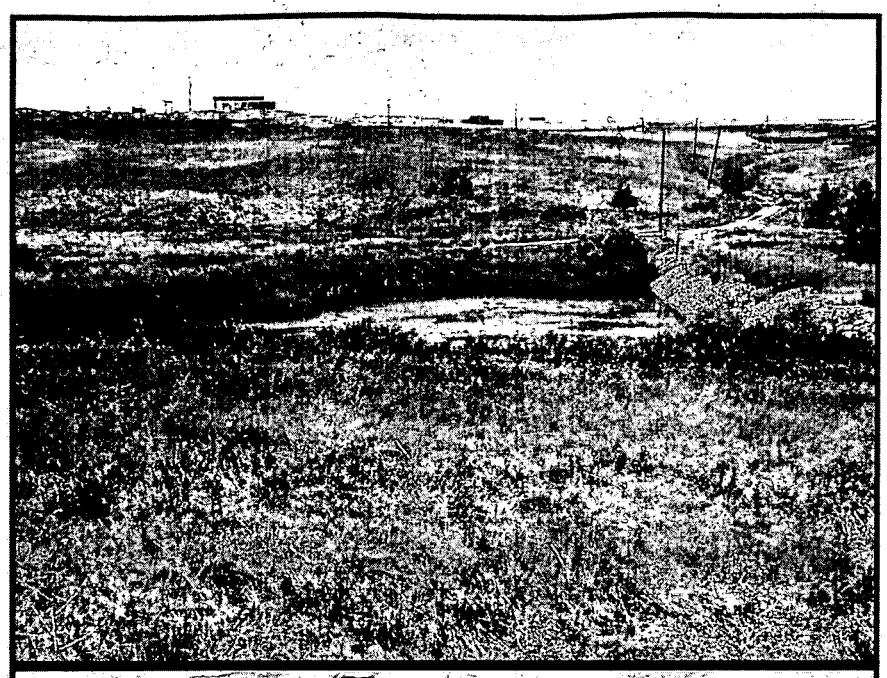
6/23/2004

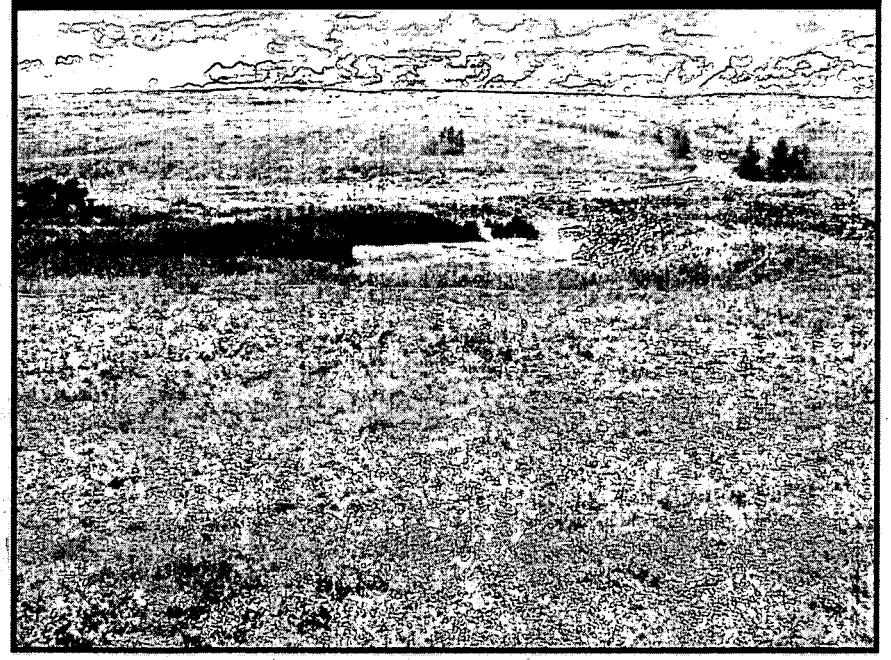




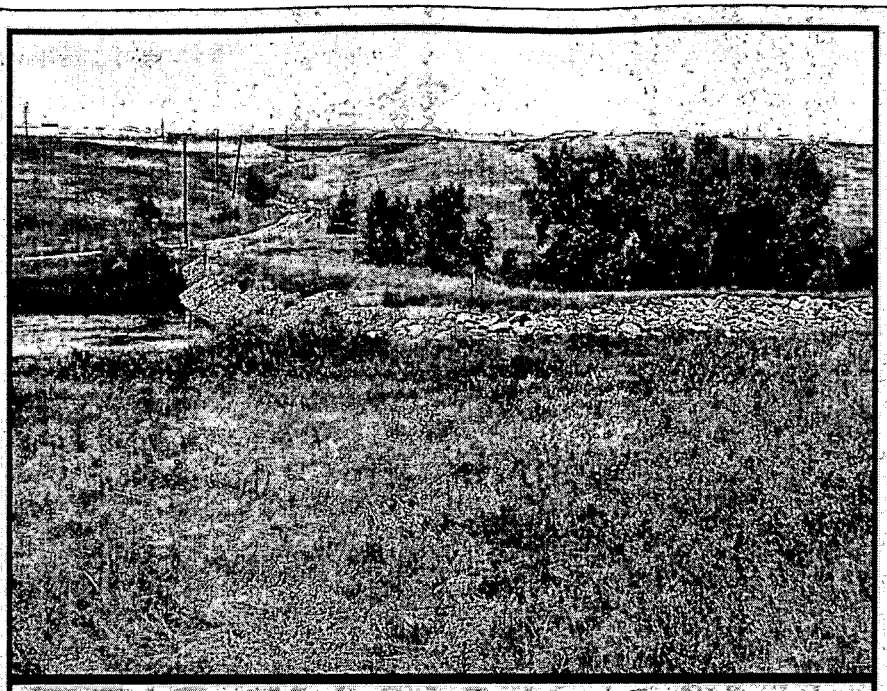
8/25/2005

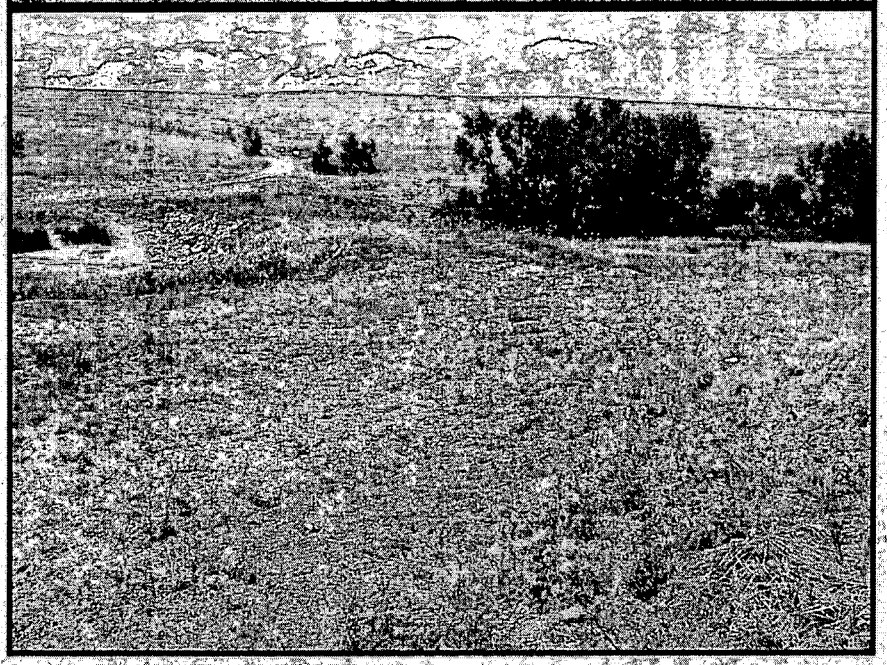
C-1 pond photopoint 3

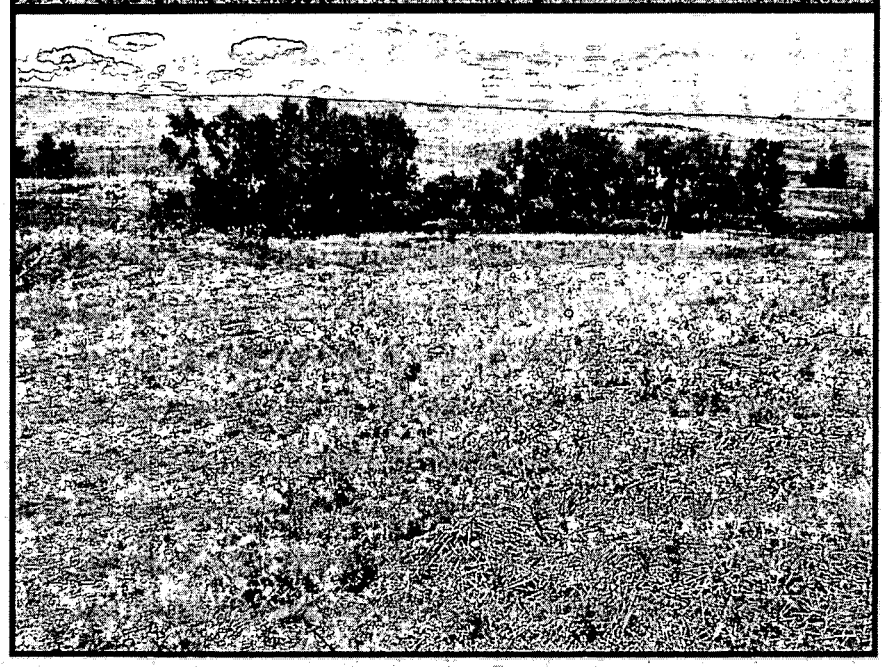




C-1 pond photopoint 3



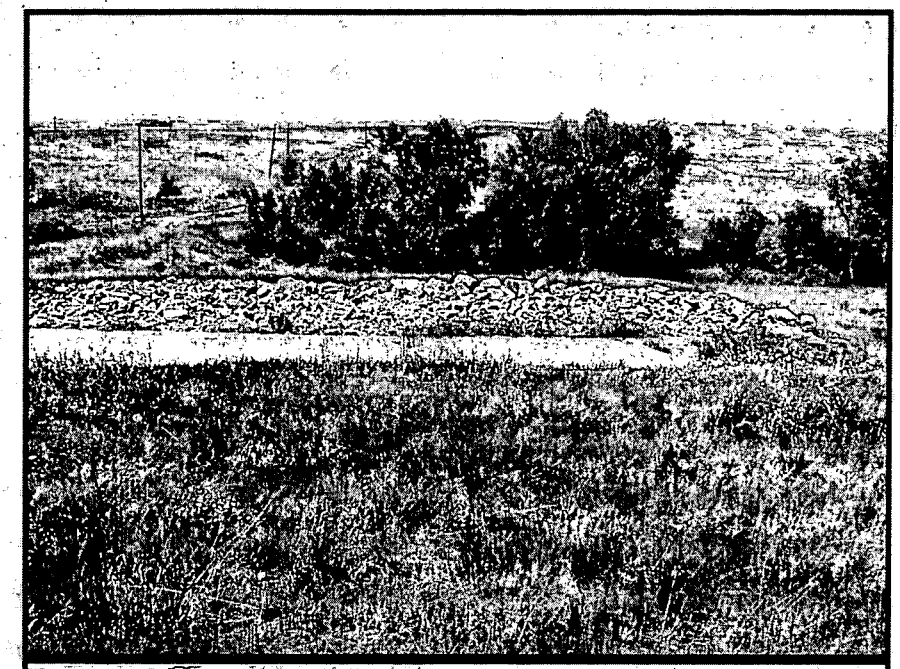




C-1 Pond

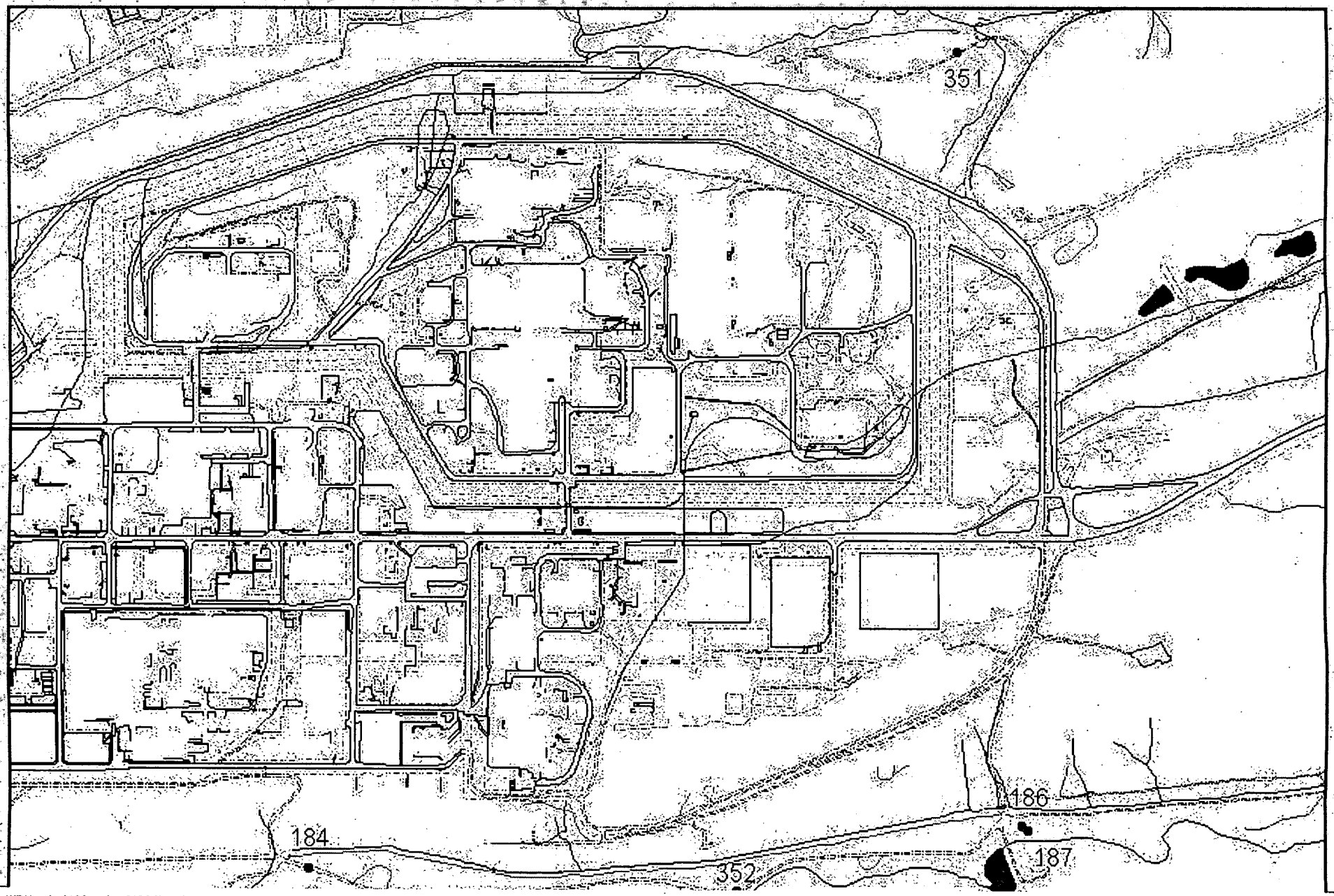
Photopoint 4

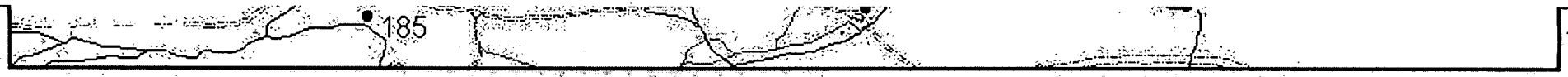
6/23/2004 **8/25/2005**



Monitoring Well Installation

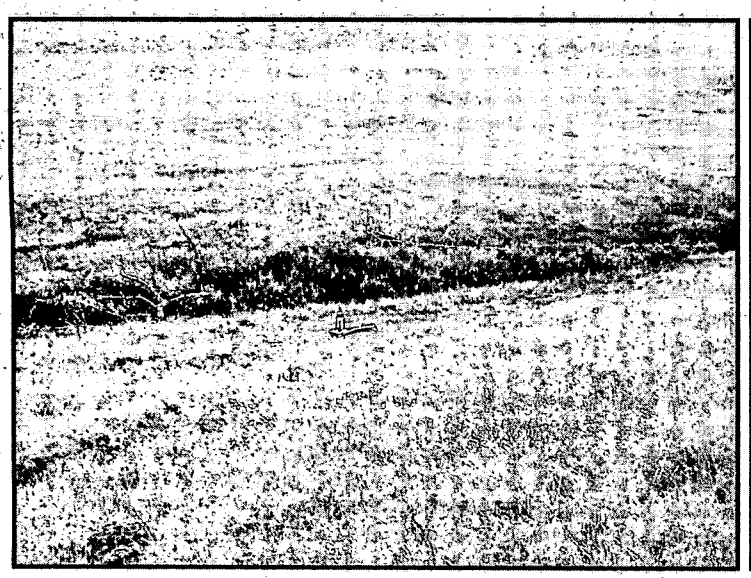
(clicking on any photopoint on the map will take you to the corresponding monitoring photos)

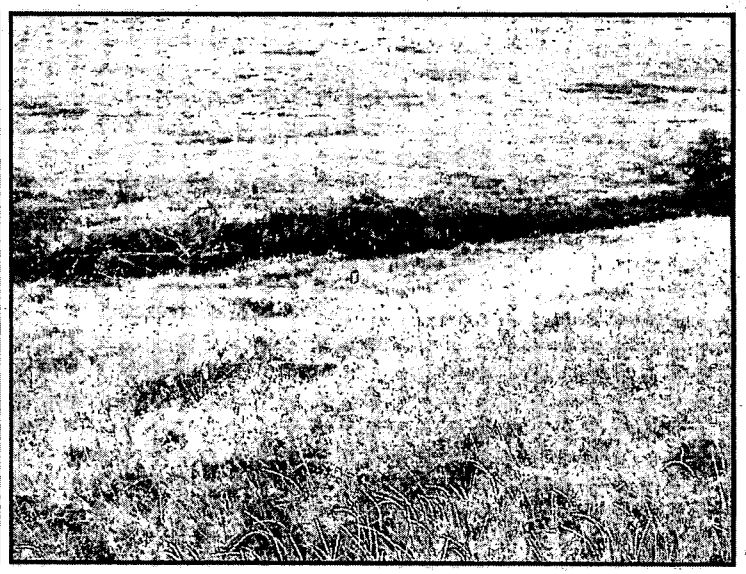




2004 2005

Photopoint 184





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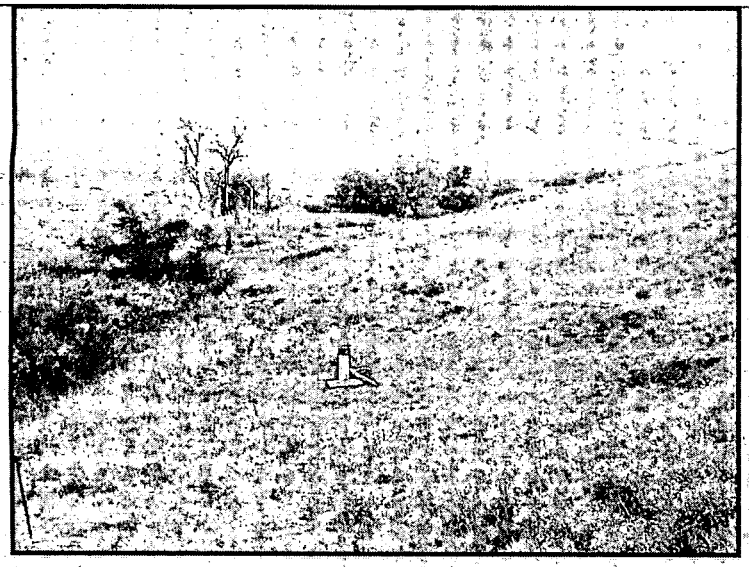
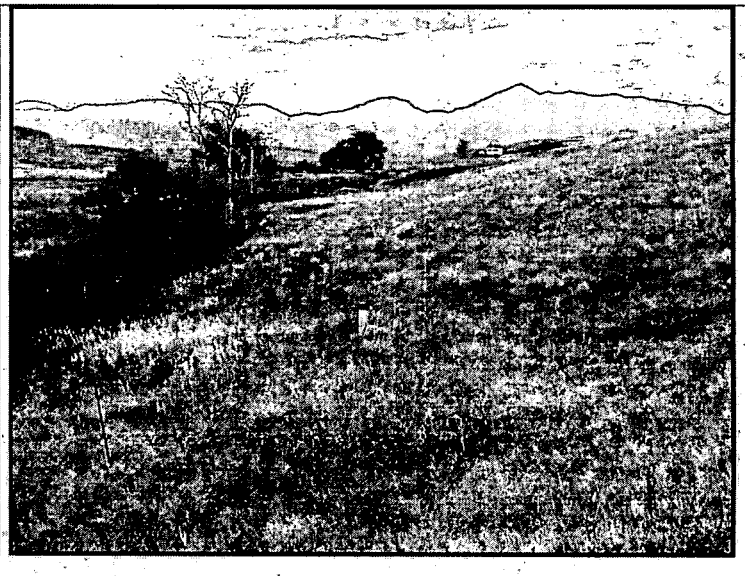
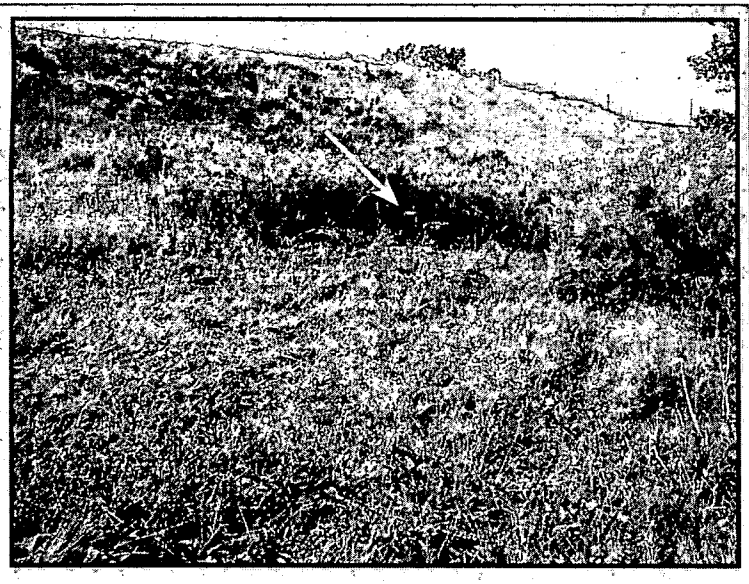




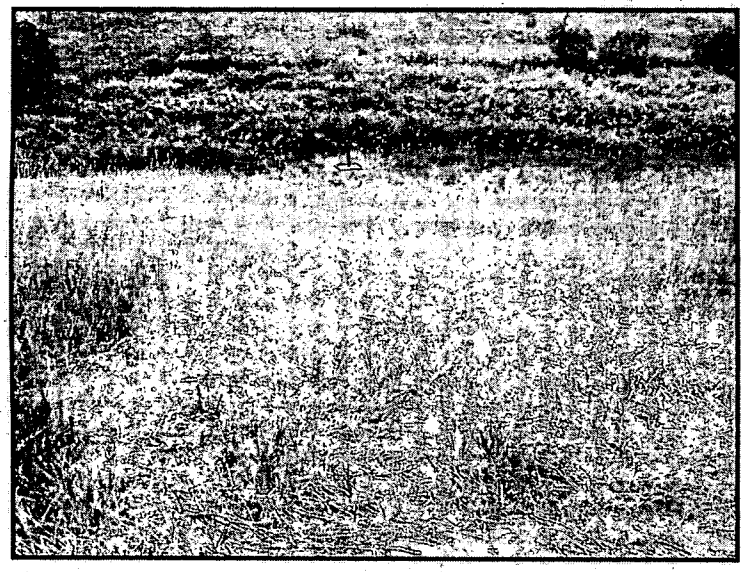
Photopoint 186

Photopoint 187



Photopoint 351

2005



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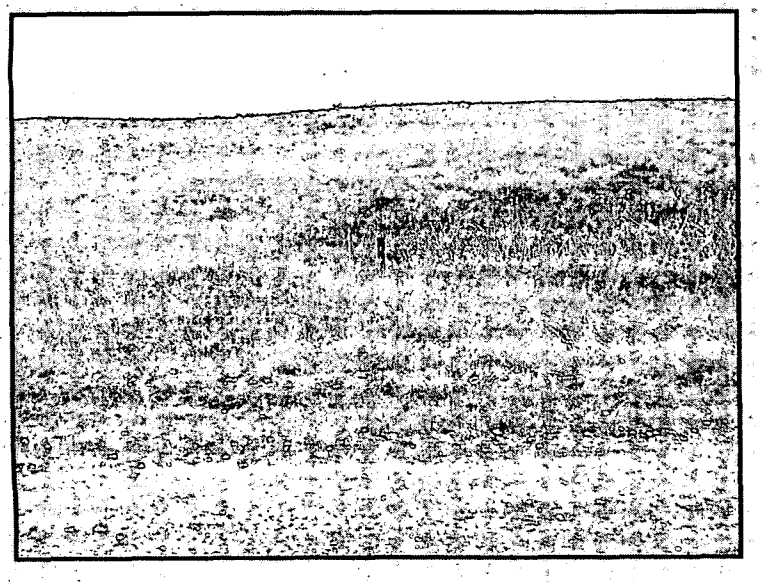
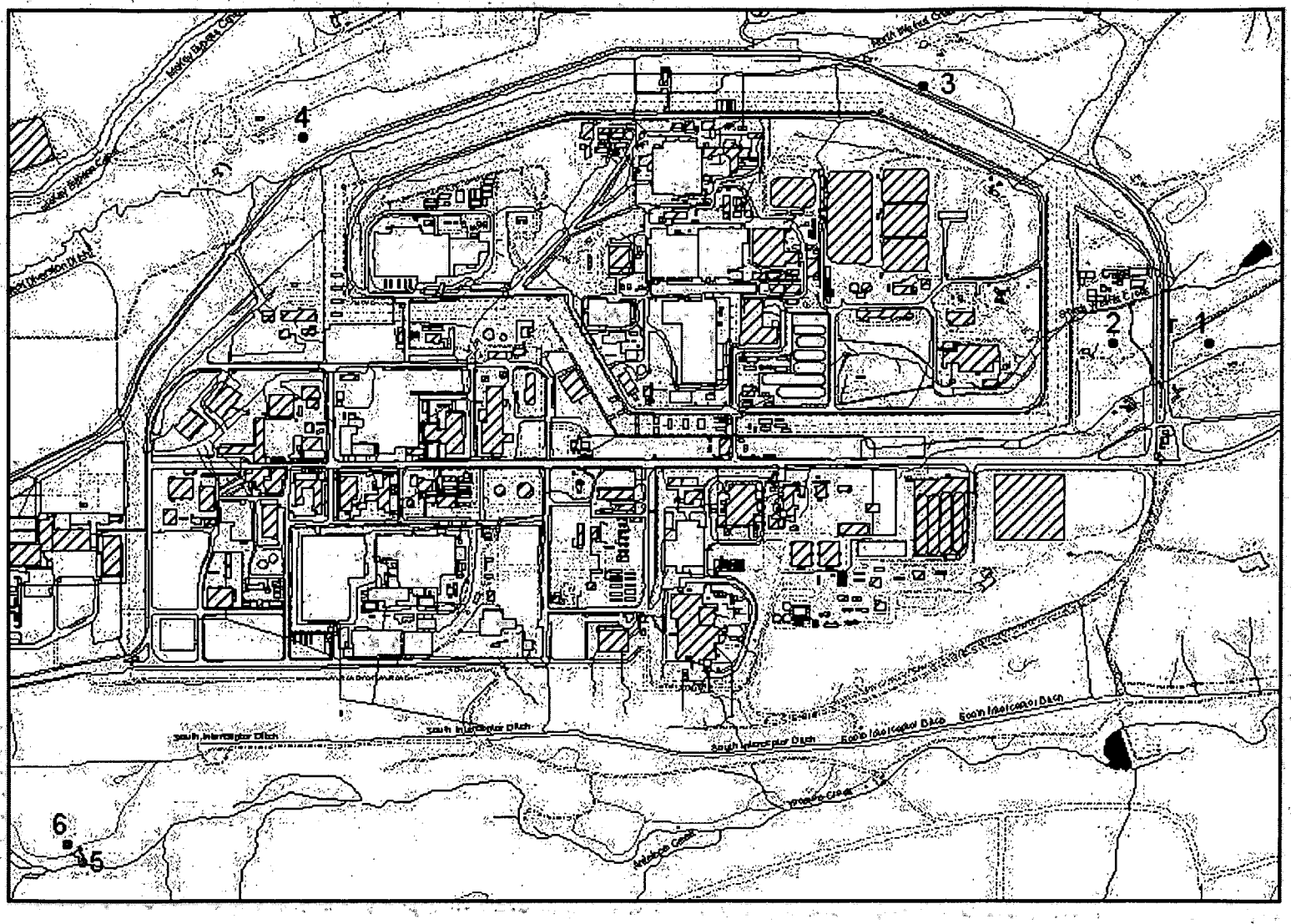


North Access Road and Culvert Removal Project

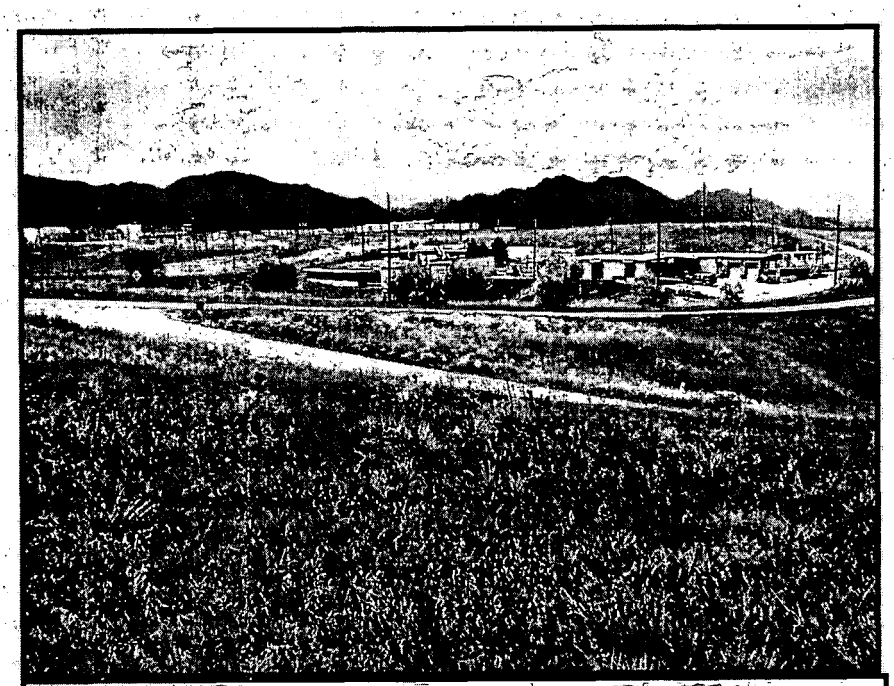
(clicking on any photopoint on the map will take you to the corresponding monitoring photos)



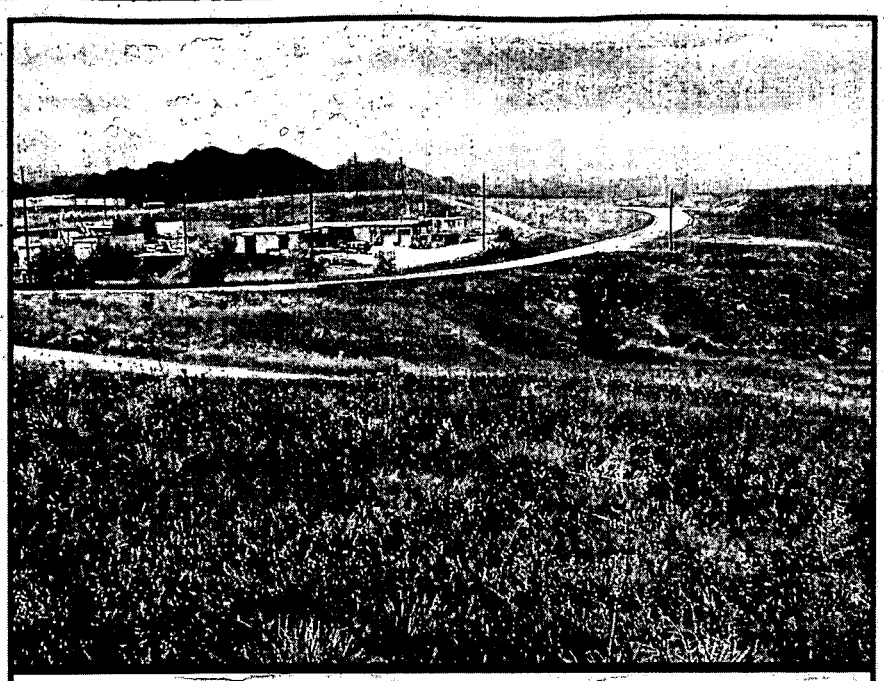
North Access Road and Culvert Removal Project

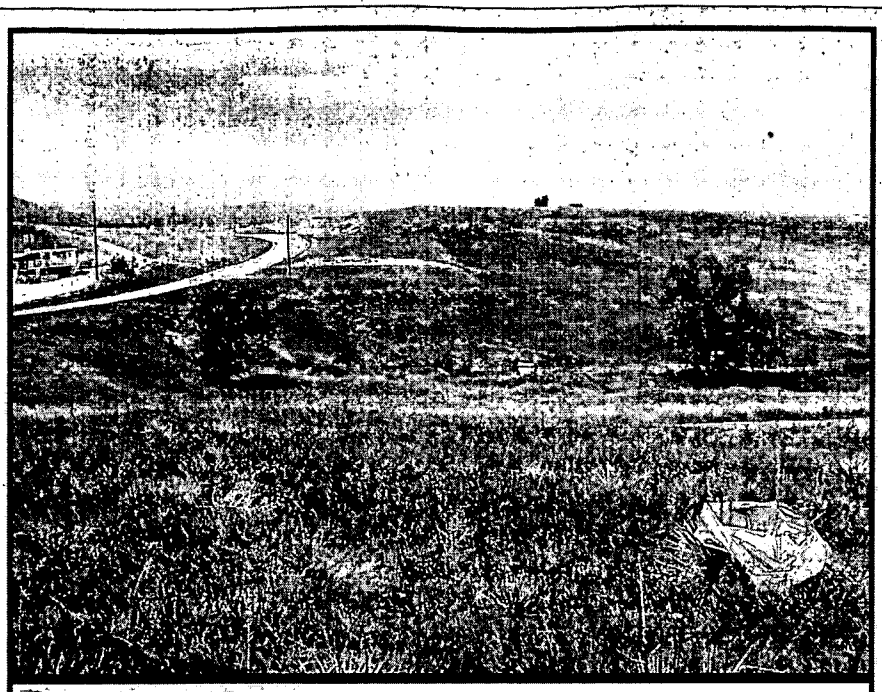
Photopoint 1

07/27/04



8/18/2005

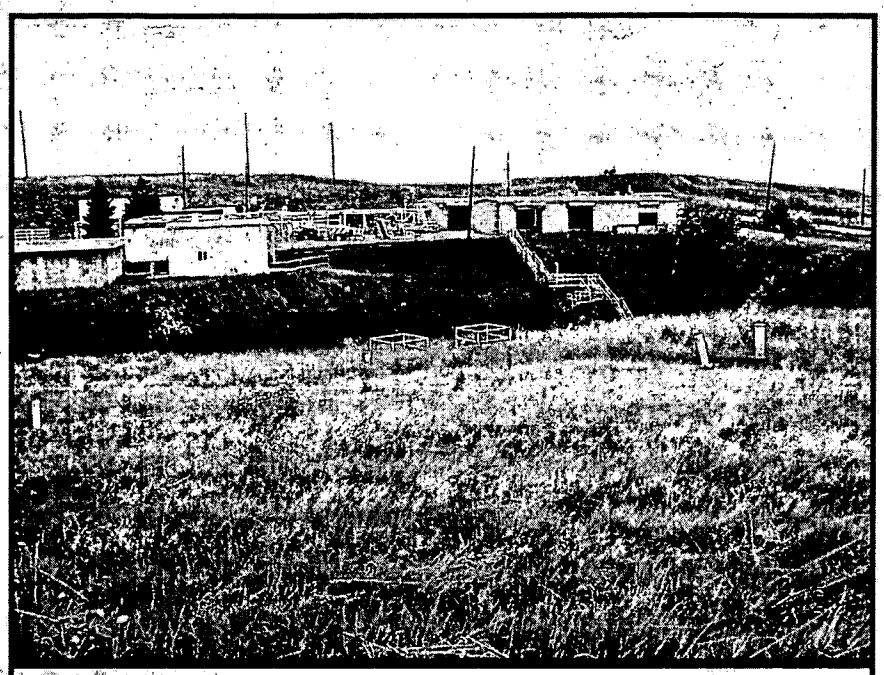




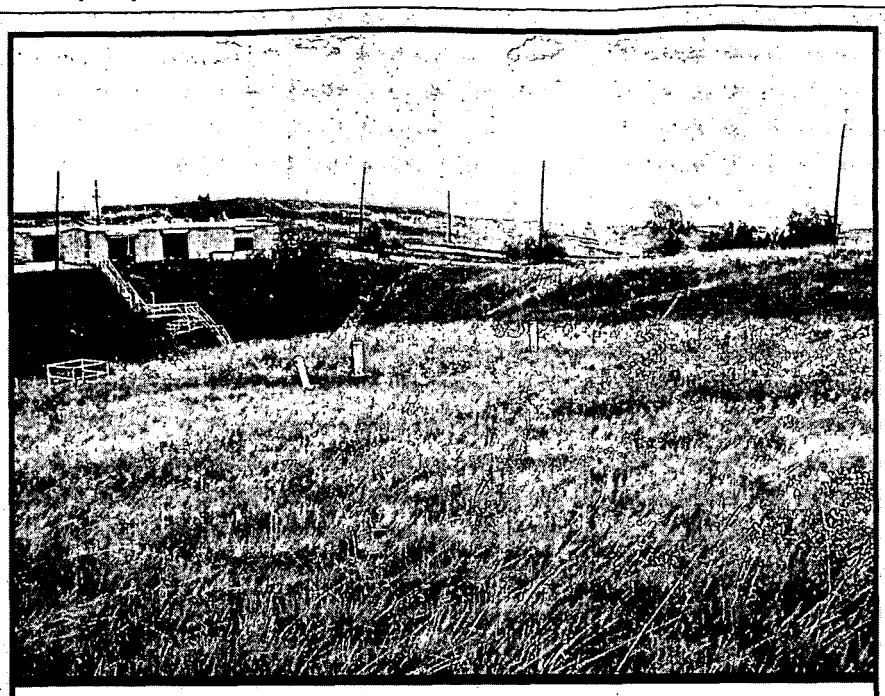
North Access Road and Culvert Removal Project

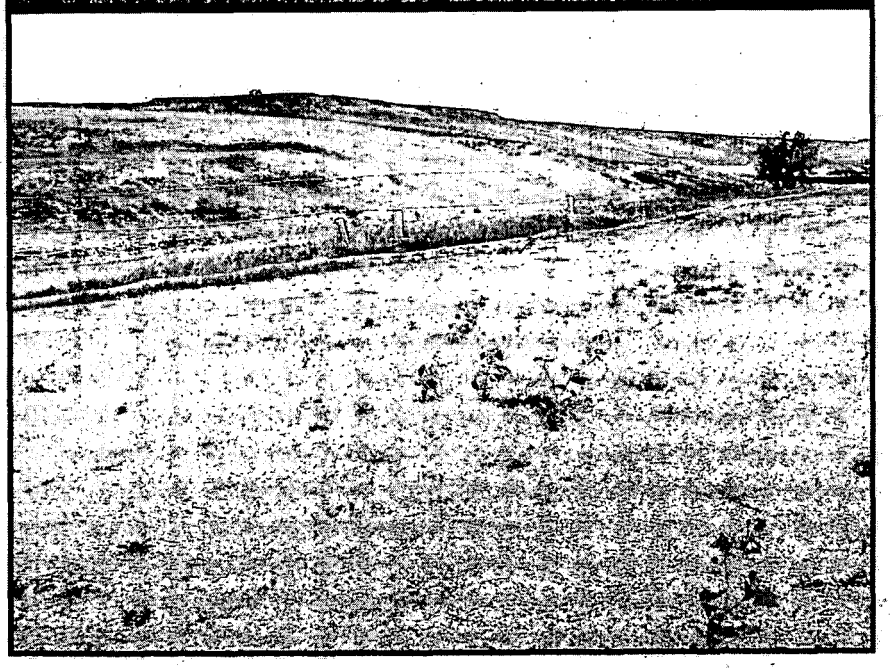
Photopoint 2

07/27/04



08/25/05

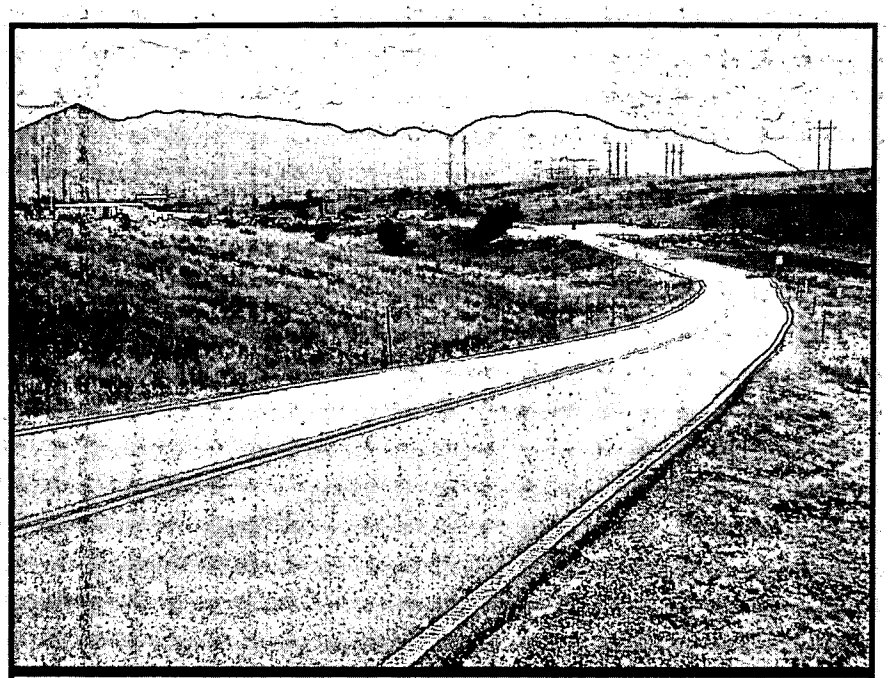




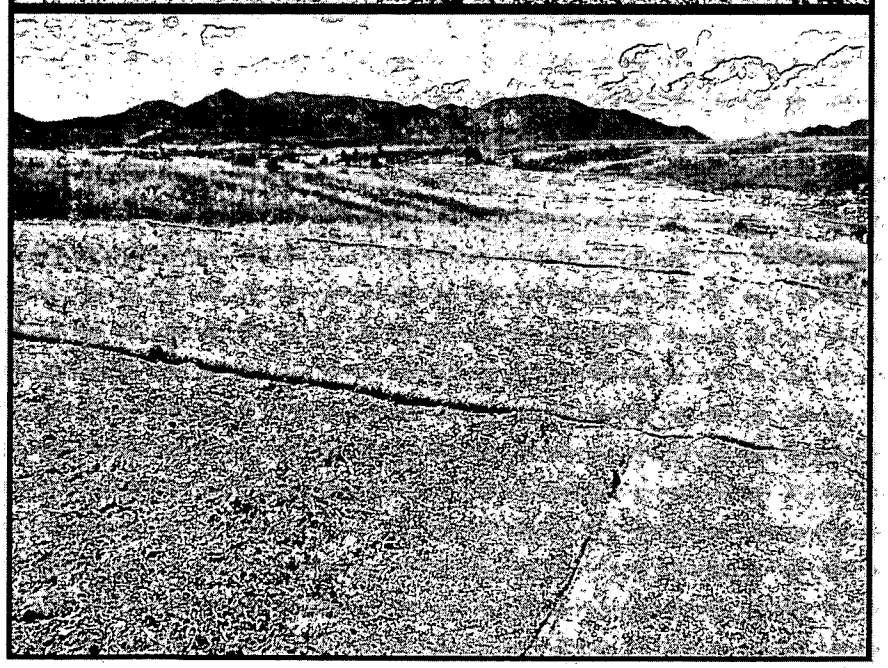
North Access Road and Culvert Removal Project

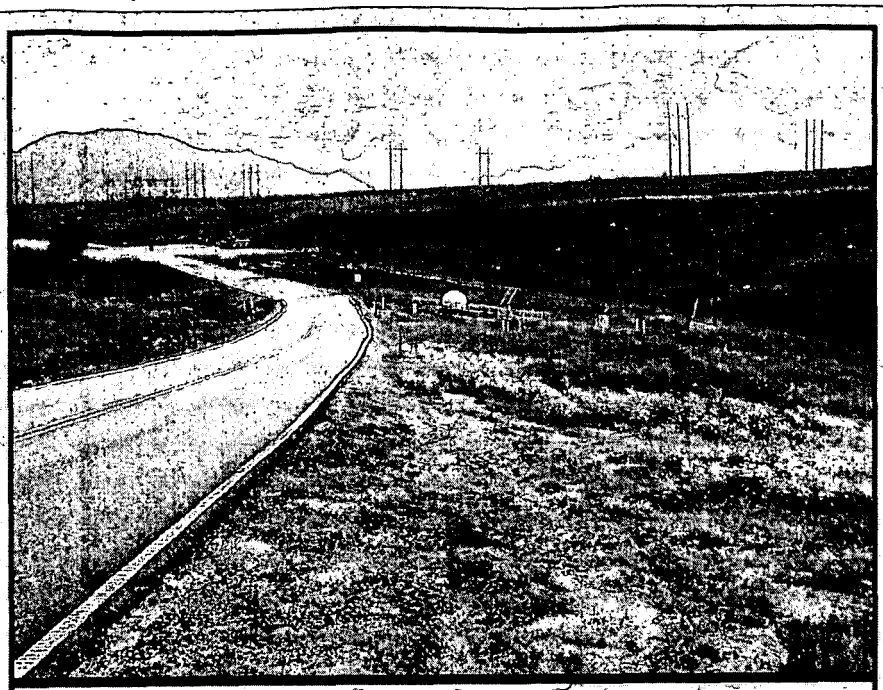
Photopoint 3

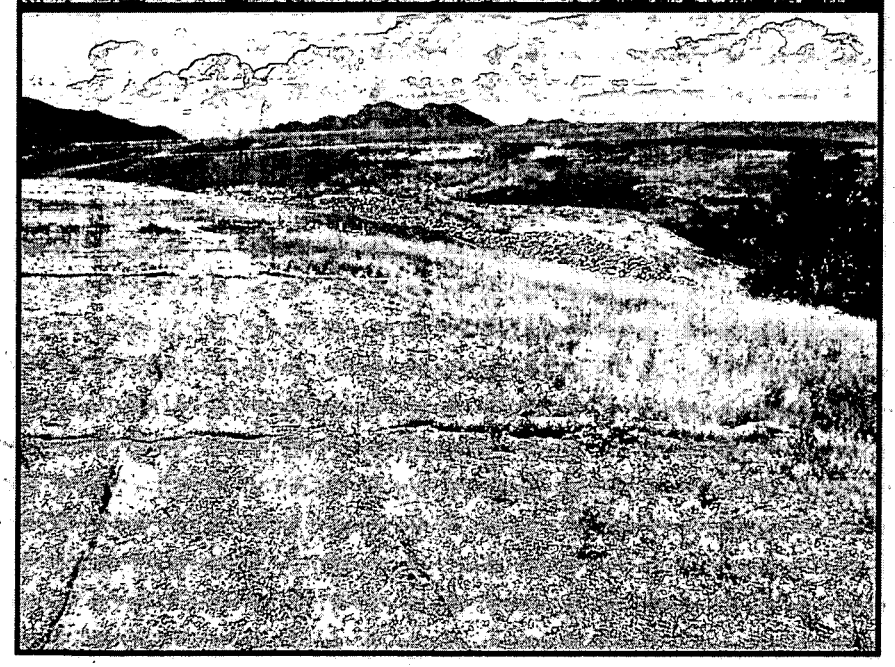
07/27/04

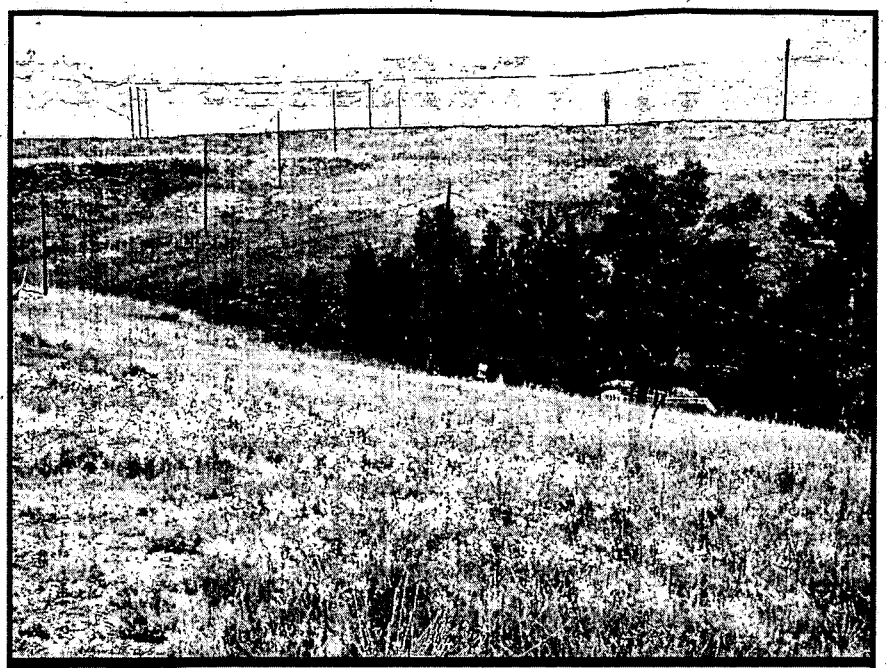


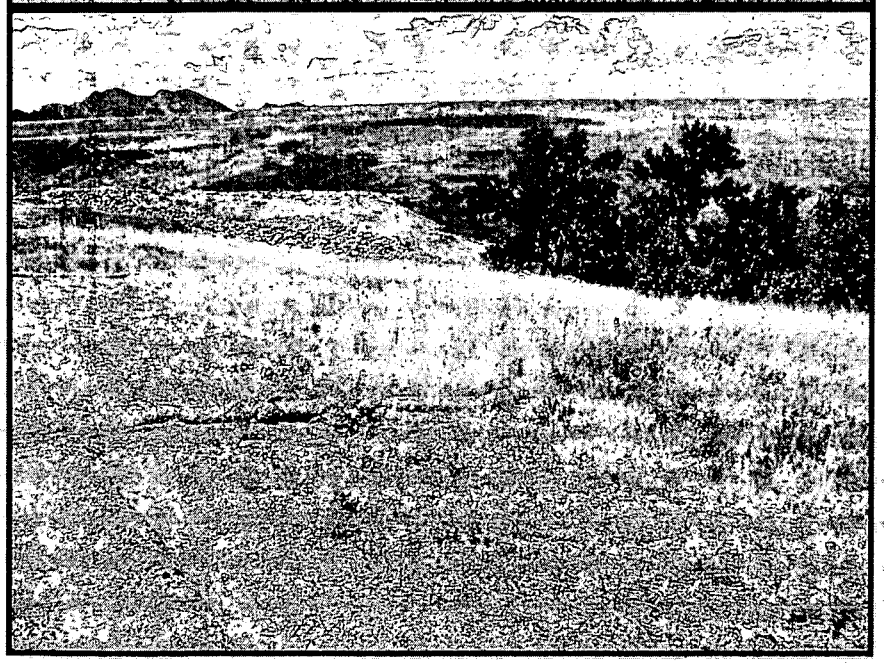
8/25/2005







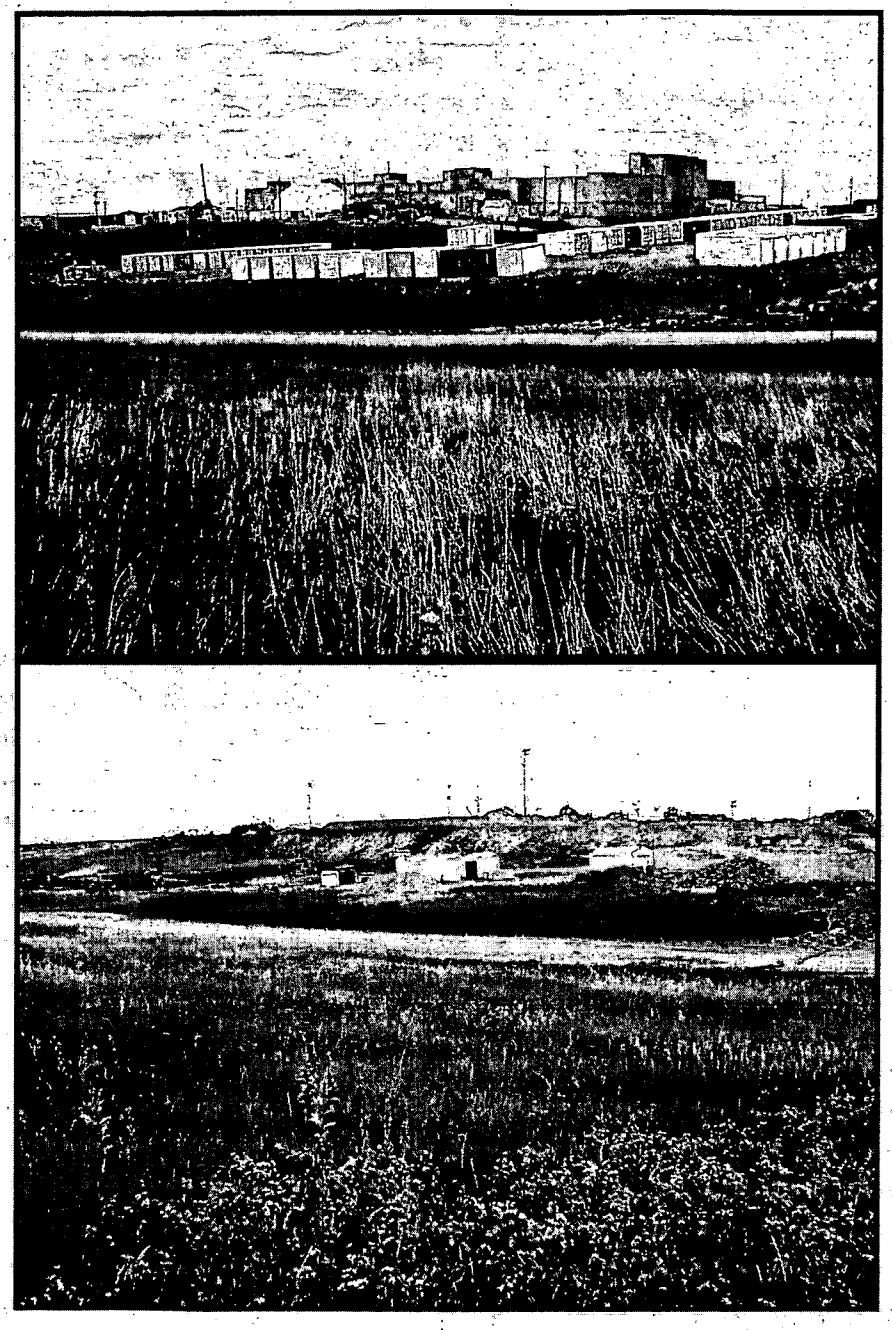




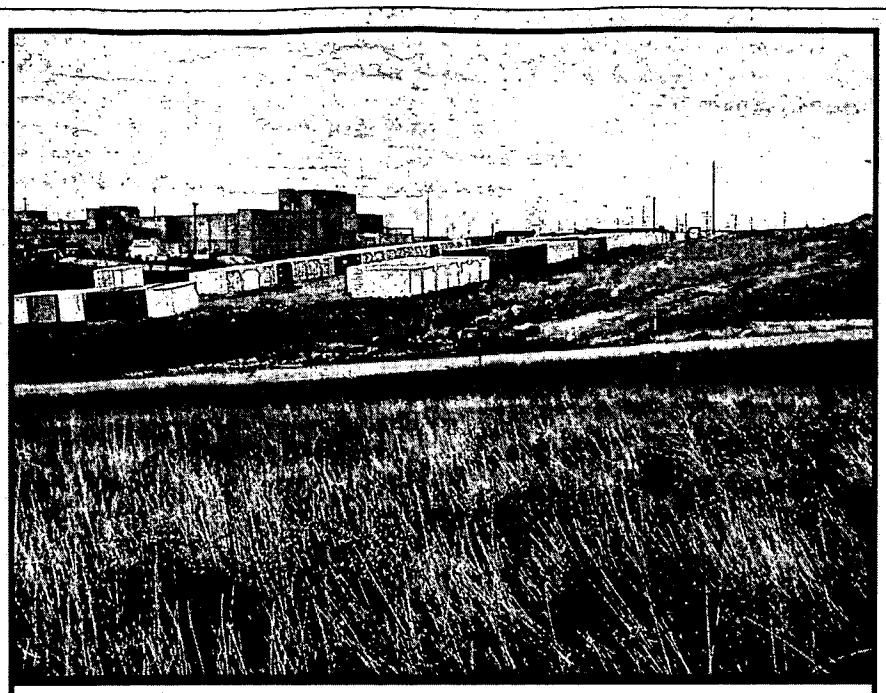
North Access Road and Culvert Removal Project

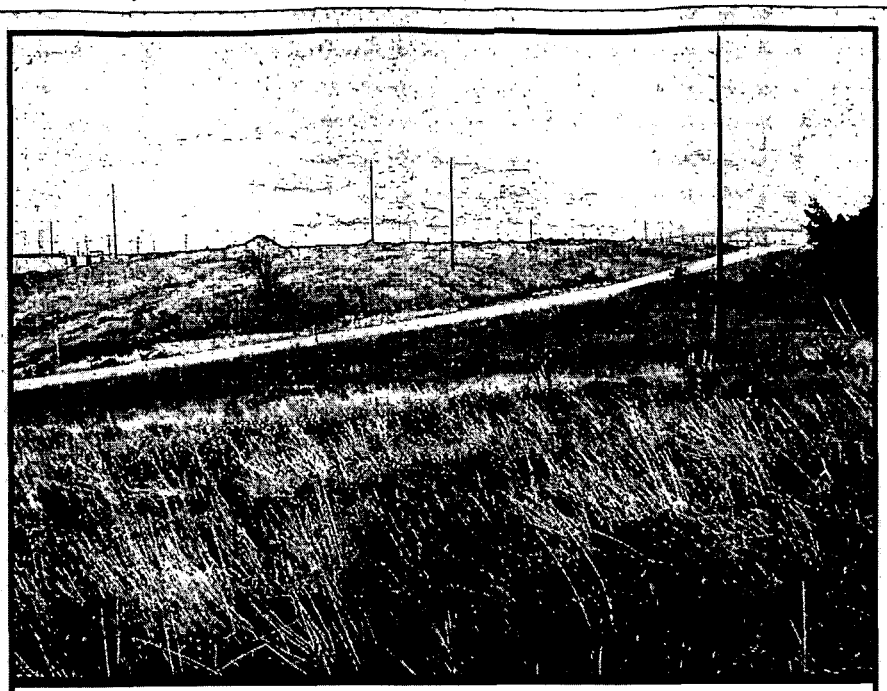
Photopoint 4

07/27/04

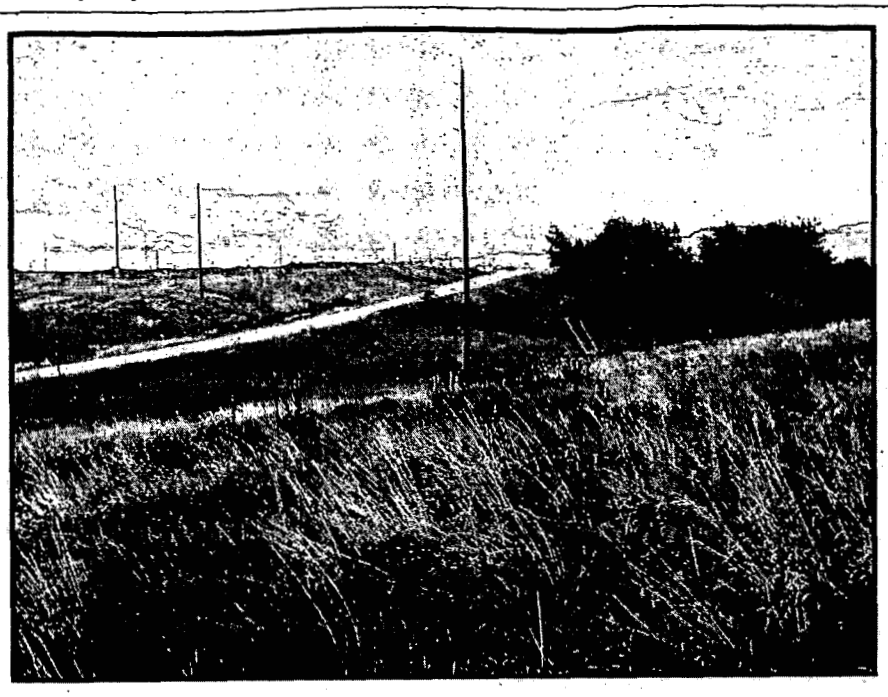


8/25/2005





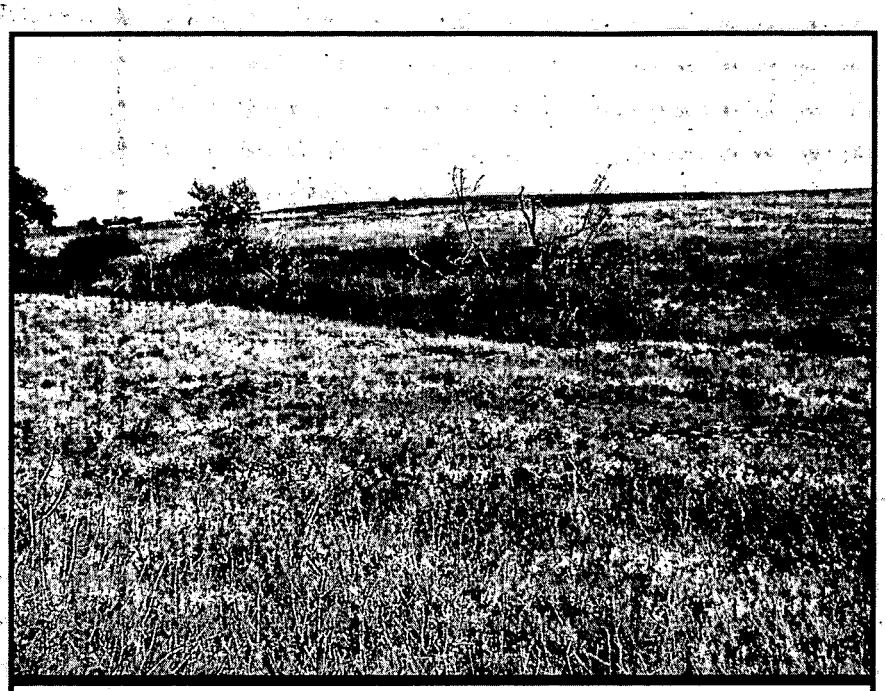
NAC photopoint 4



North Access Road and Culvert Removal Project

Photopoint 6

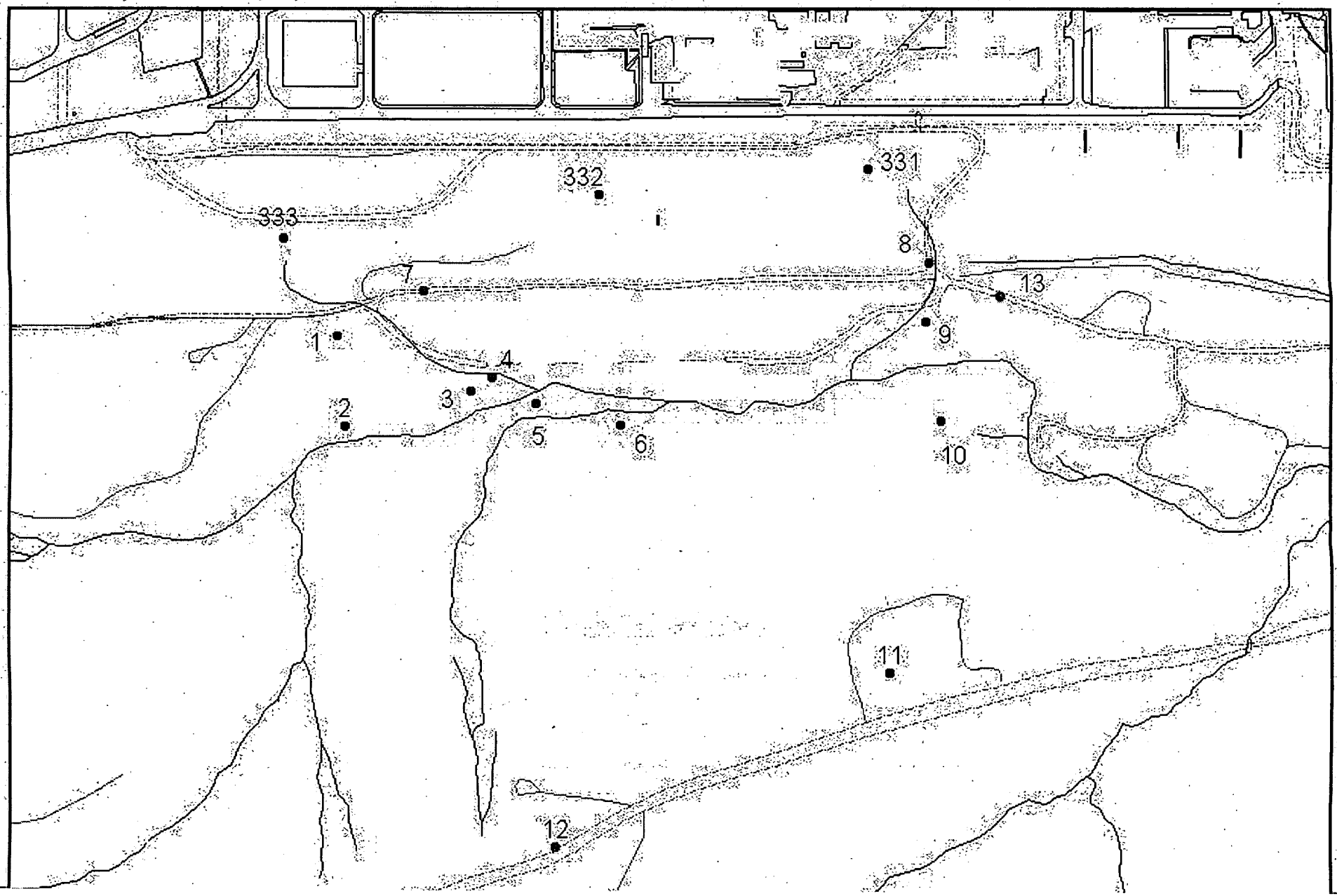
09/01/04

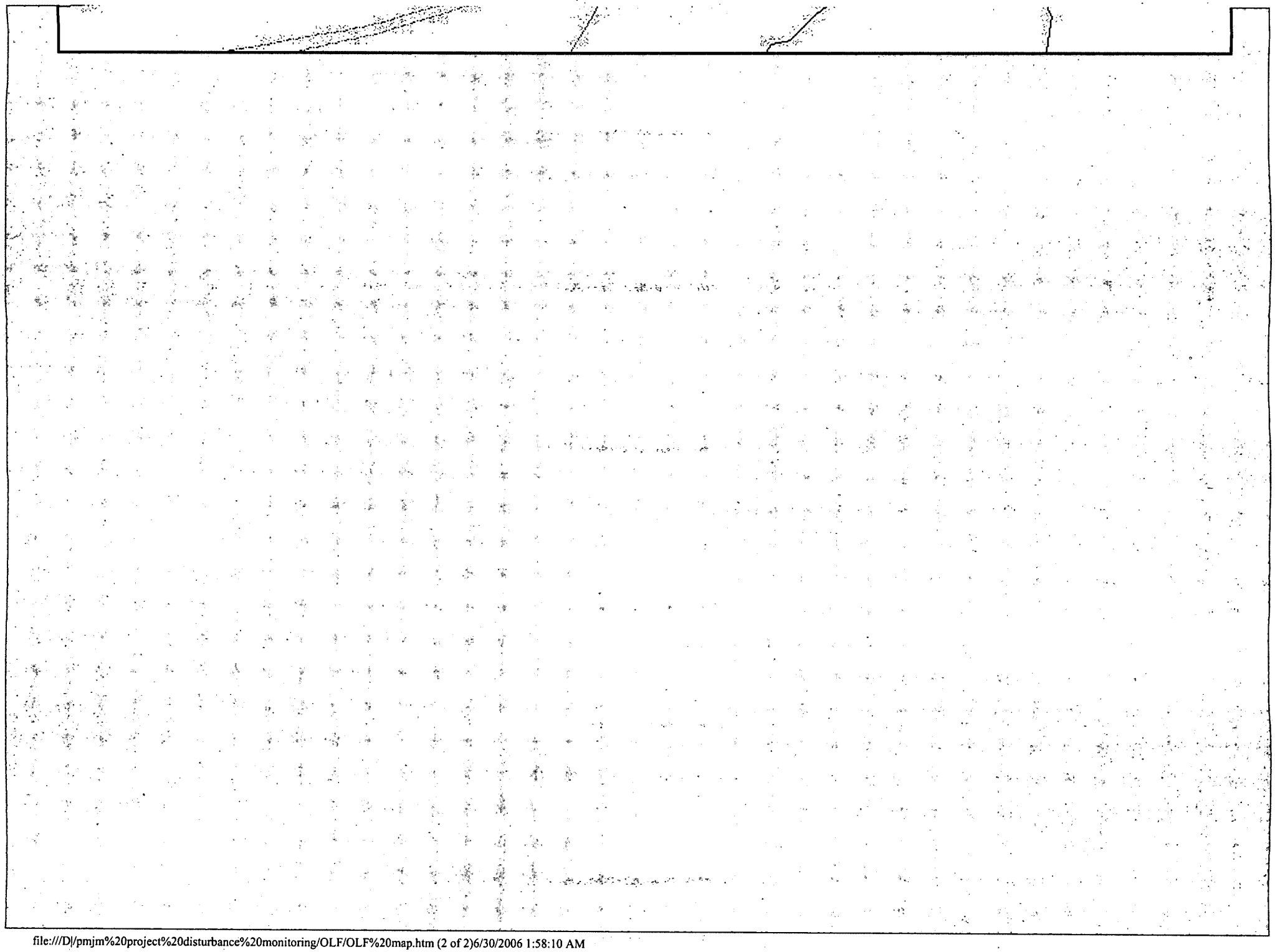


08/25/05

Original Landfill Project

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)

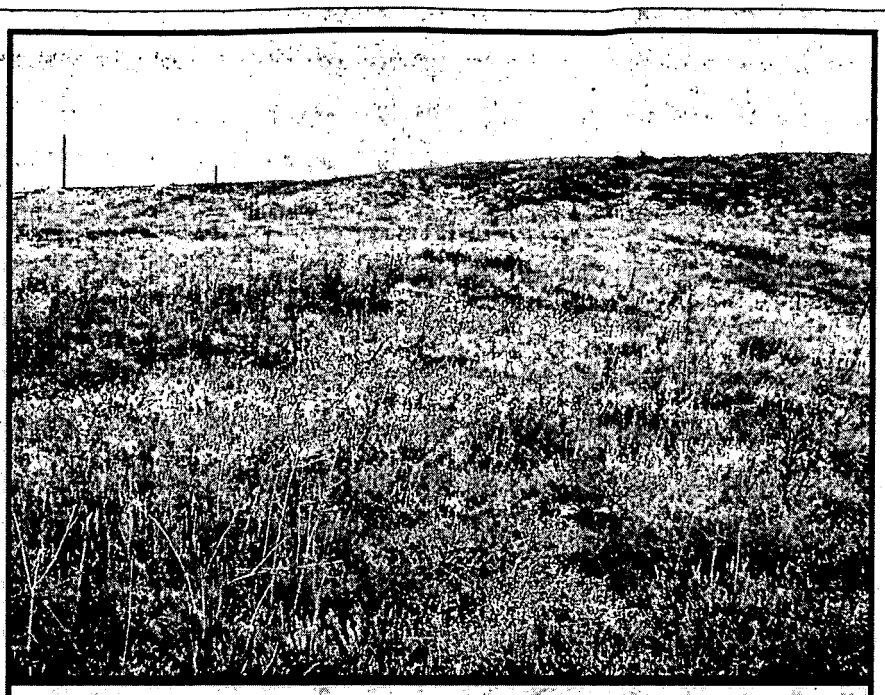


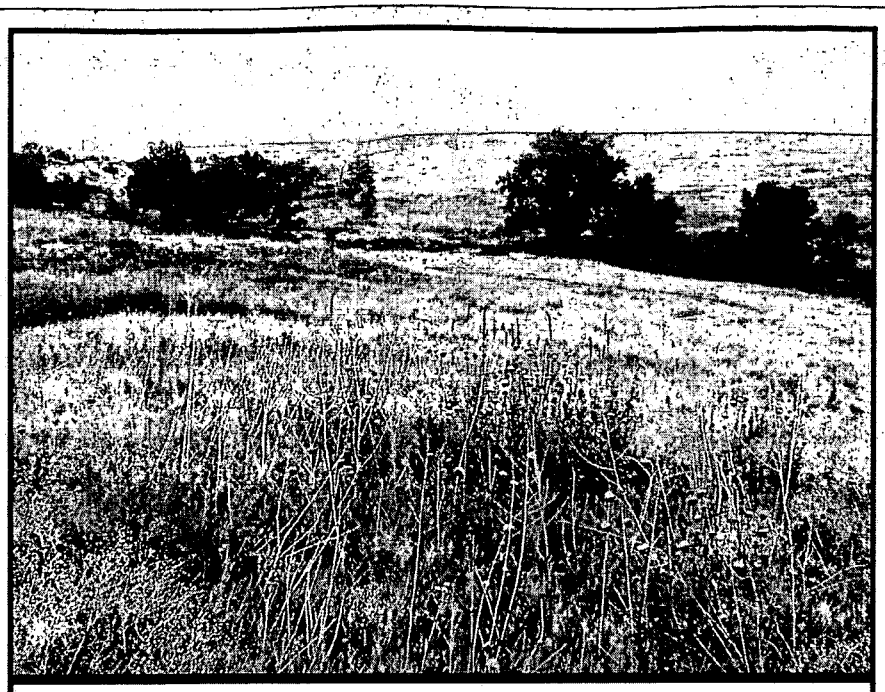


Original Landfill

Photopoint 1

2004 **2005**

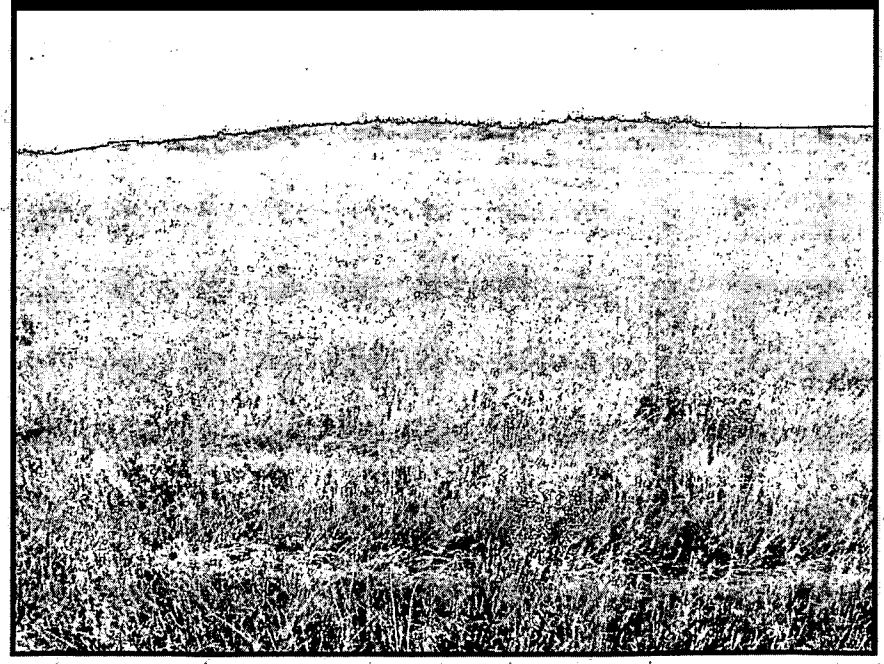




Original Landfill

Photopoint 2

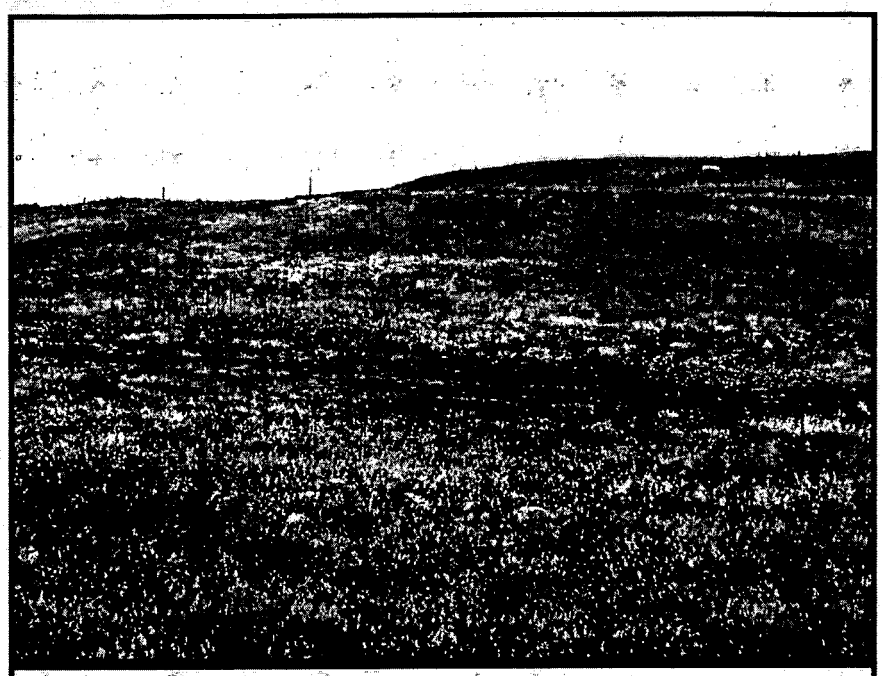
2004 **2005**

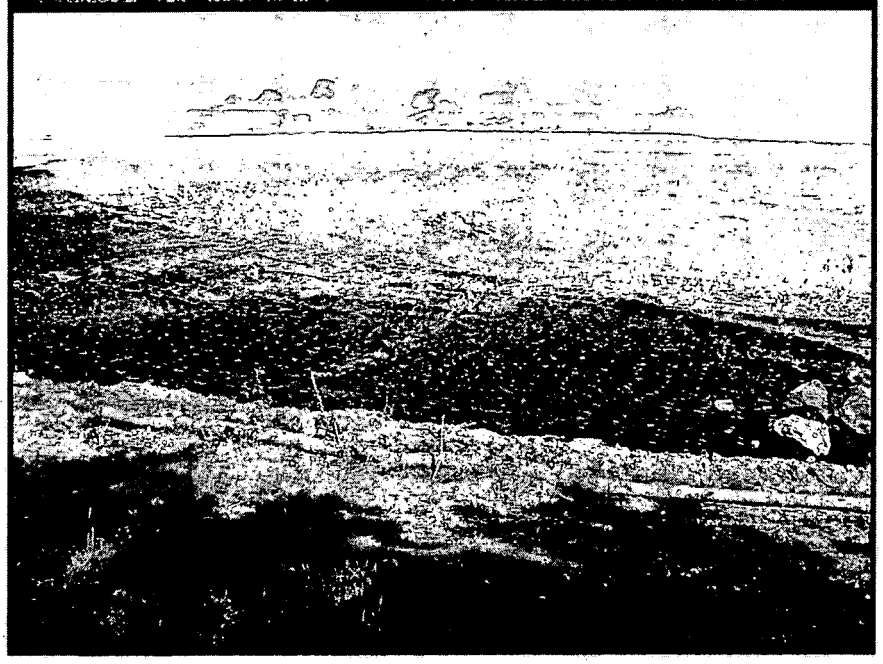


Original Landfill

Photopoint 3

2004 **2005**

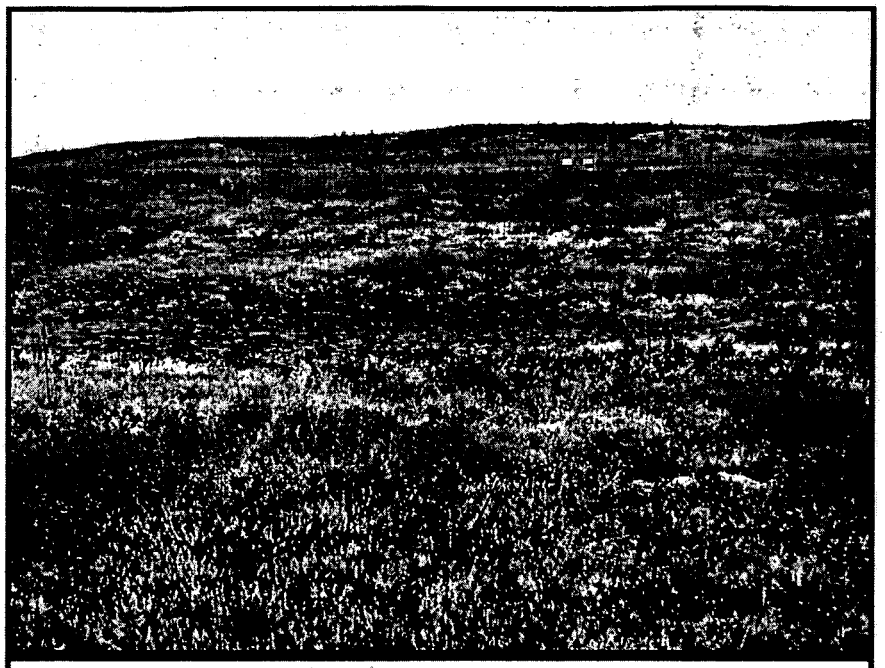


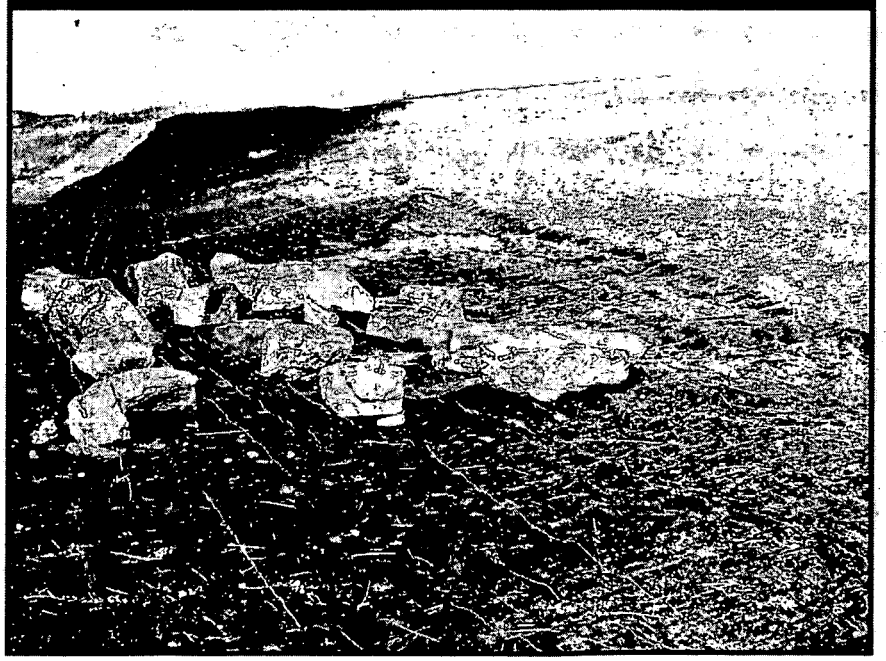


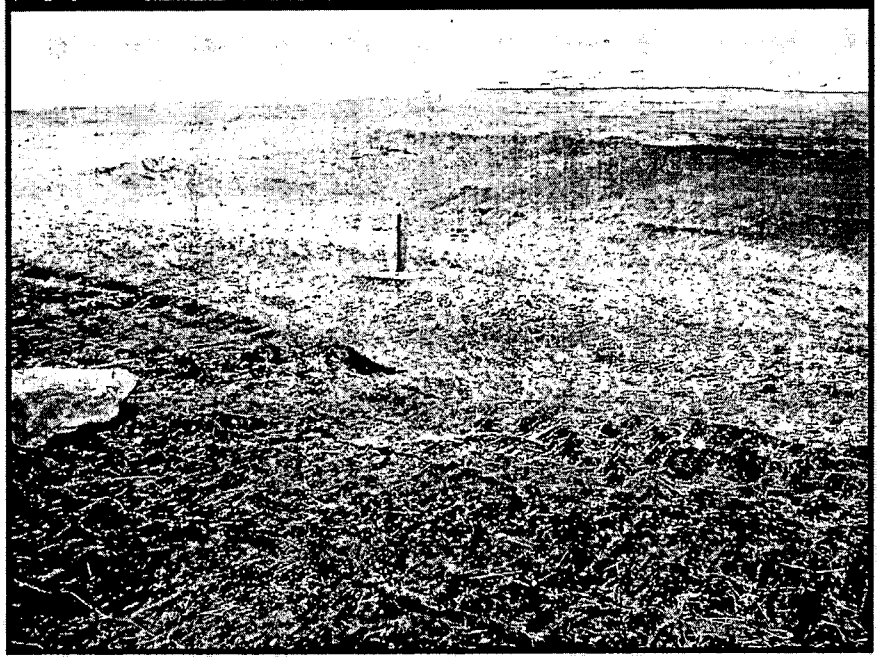
Original Landfill

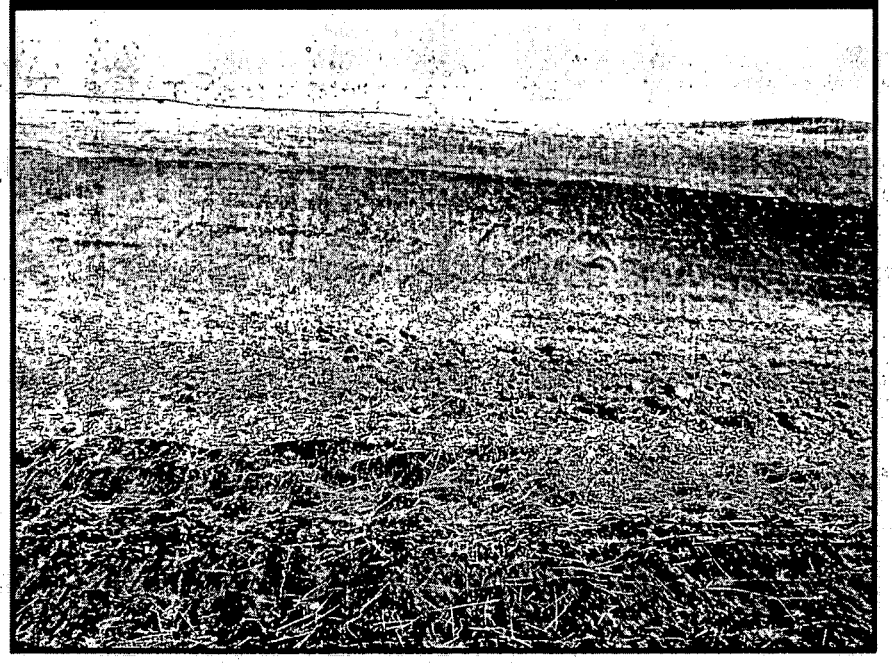
Photopoint 4

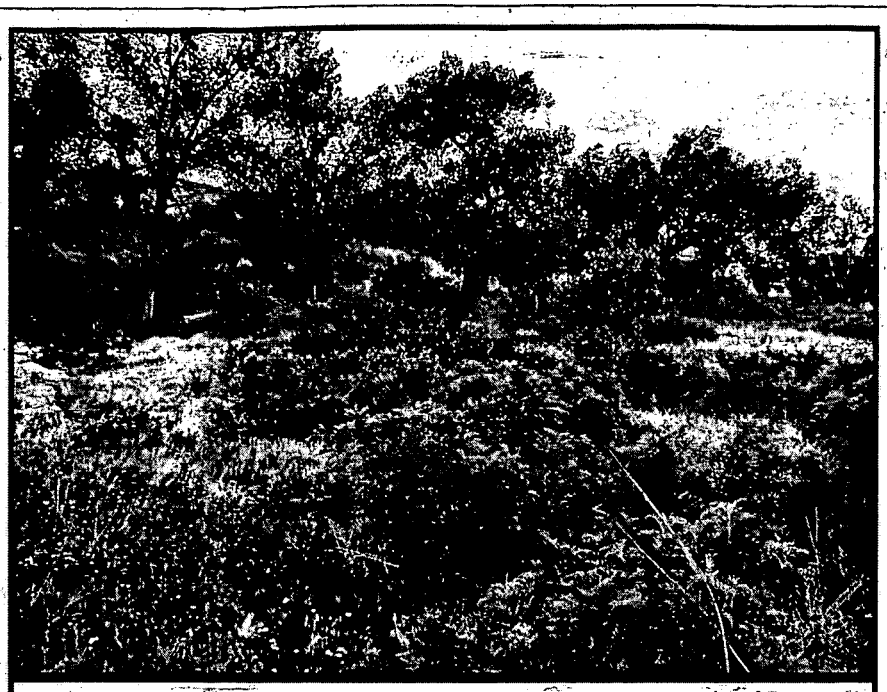
2004 **2005**







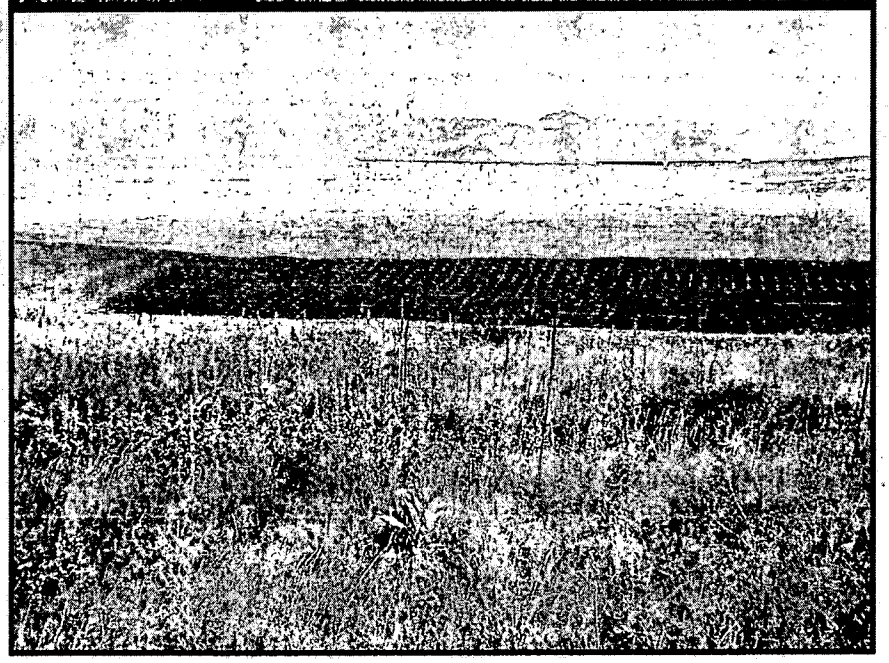




Original Landfill

Photopoint 5

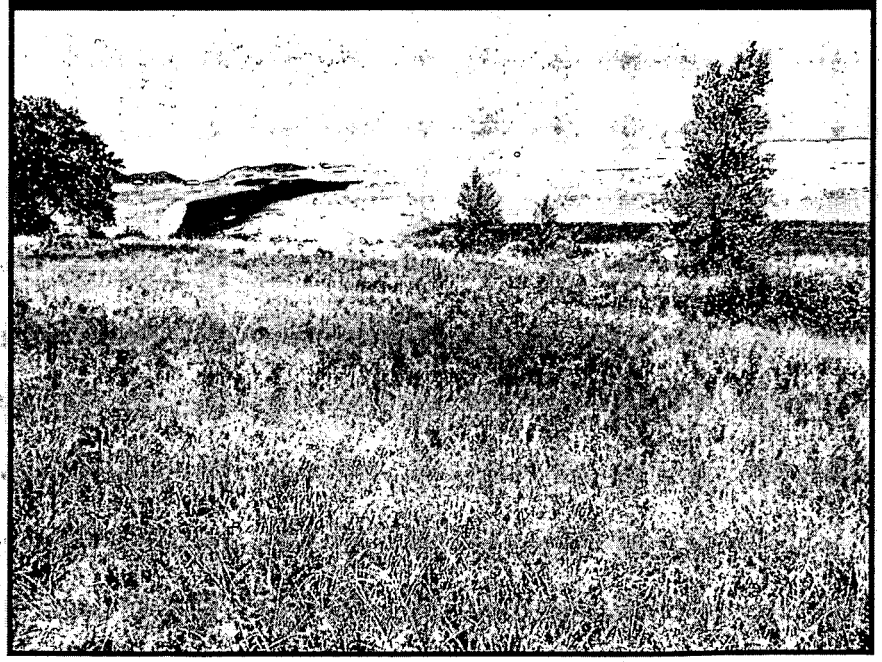
2004 **2005**

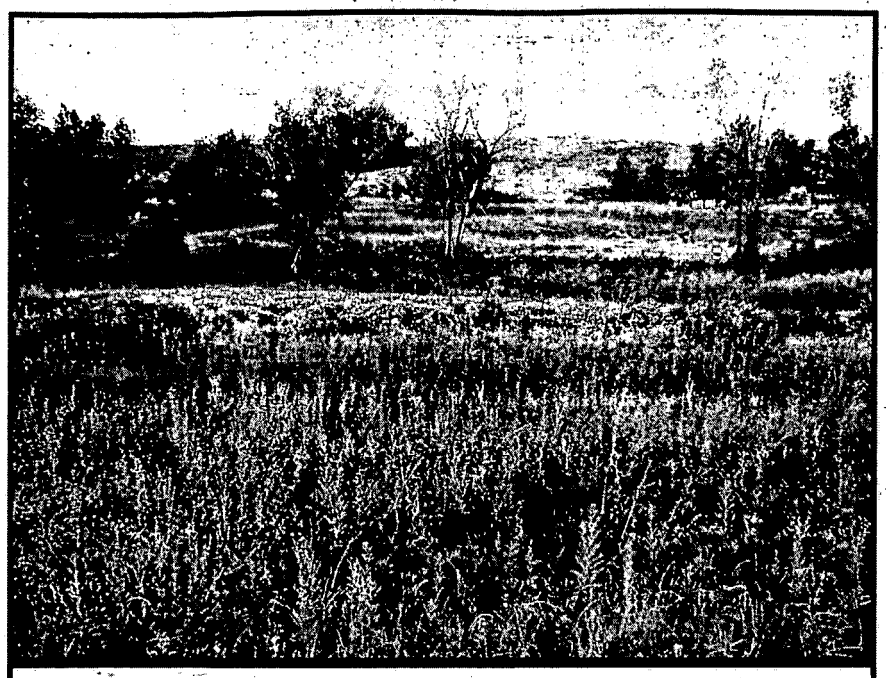


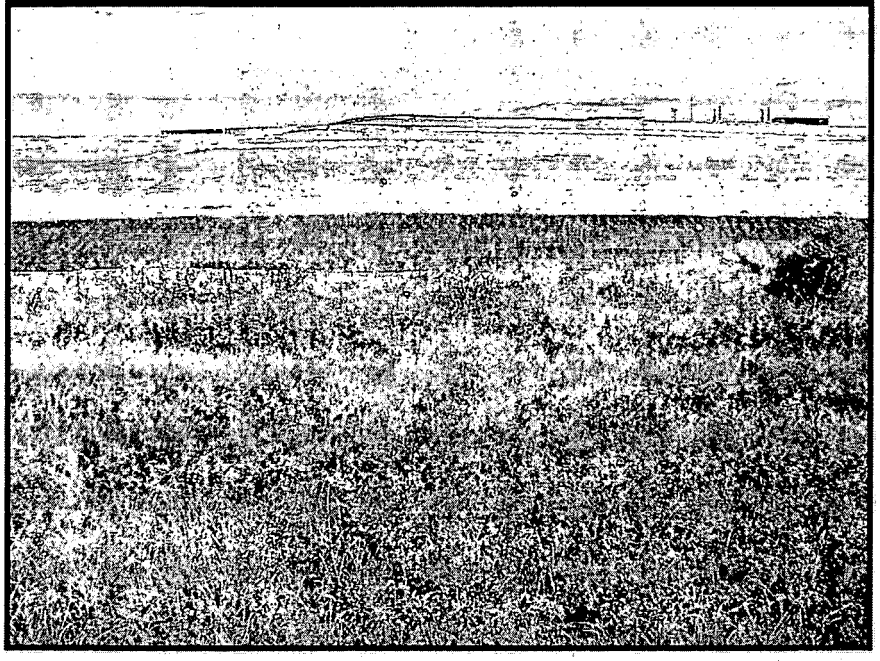
Original Landfill

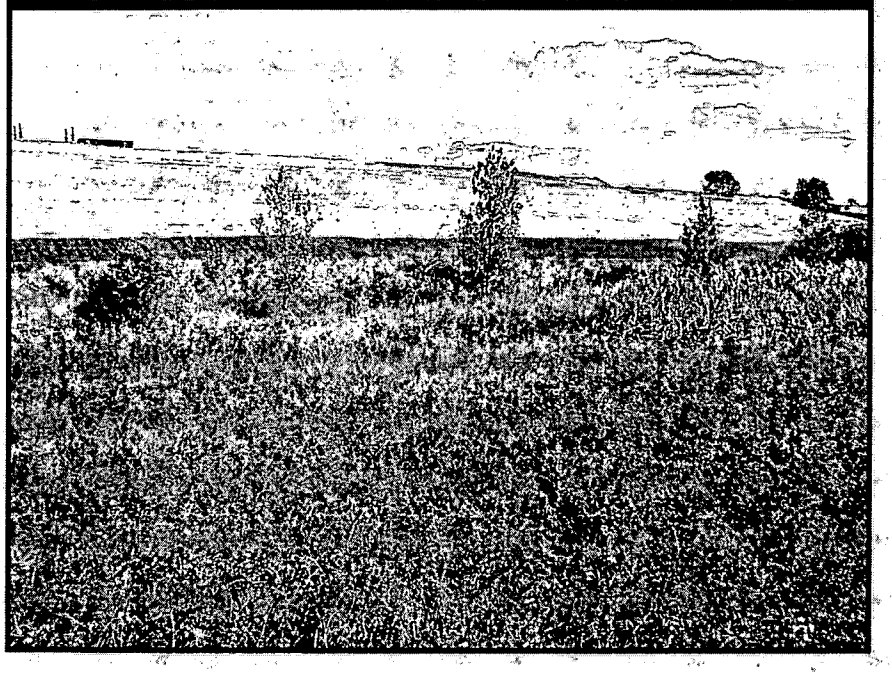
Photopoint 6

2004 **2005**





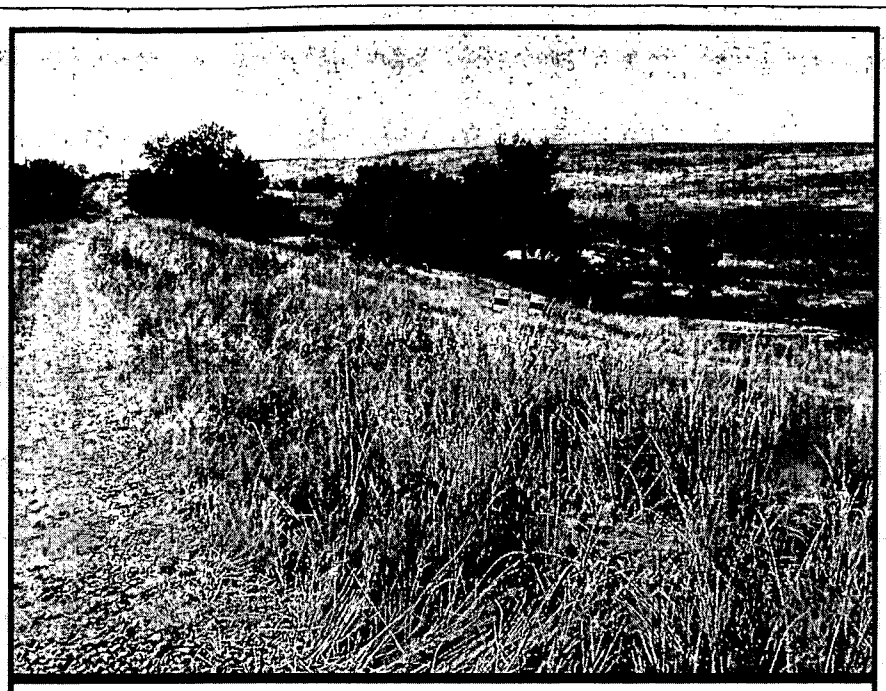


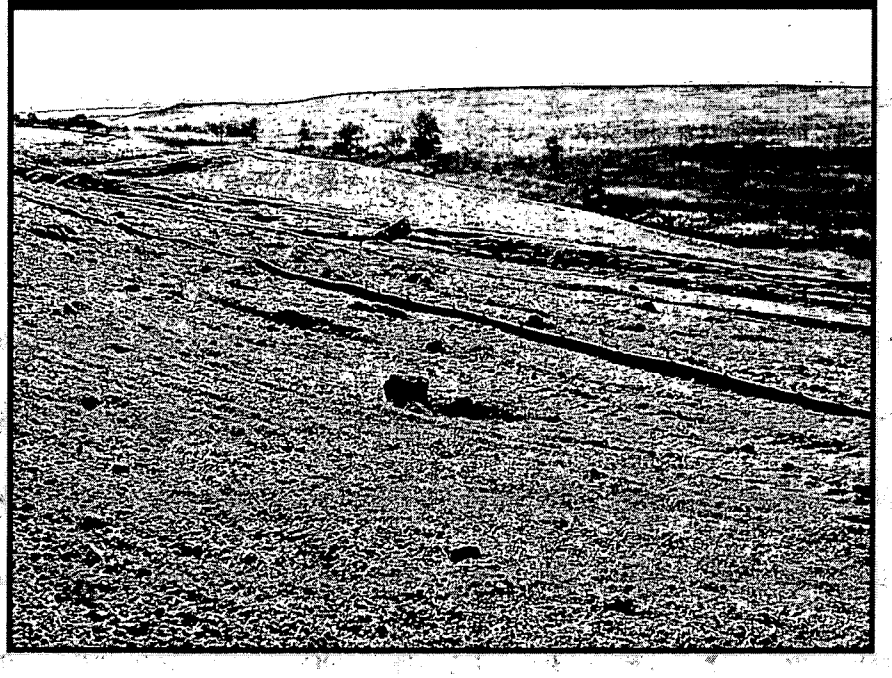


Original Landfill

Photopoint 7

2004 **2005**



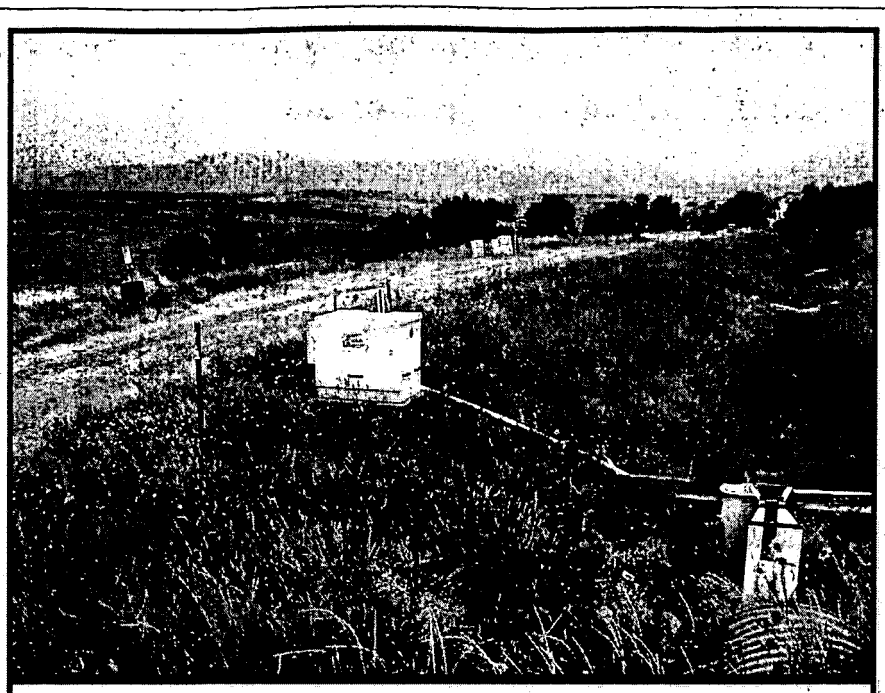


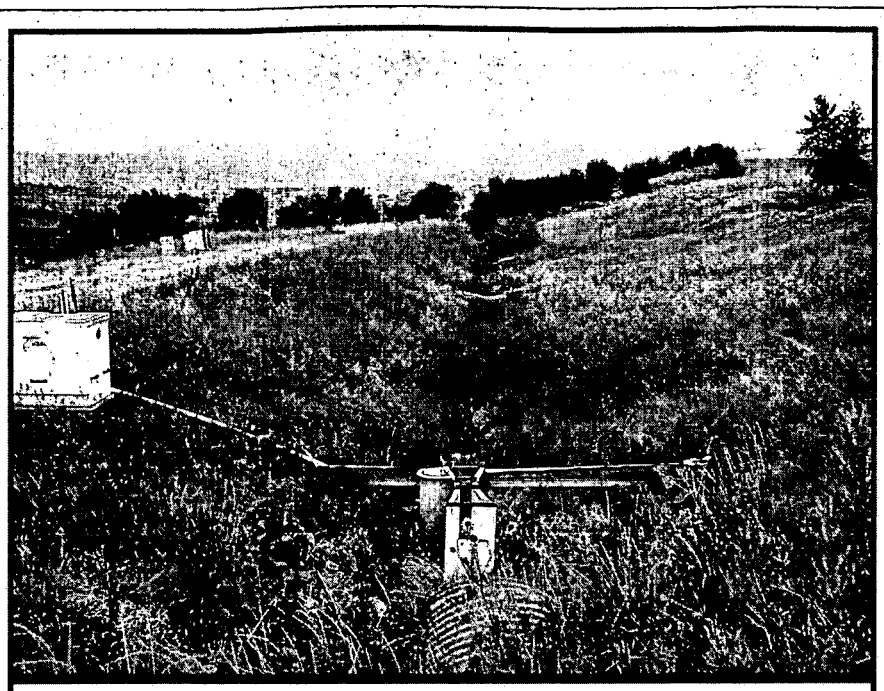
Original Landfill

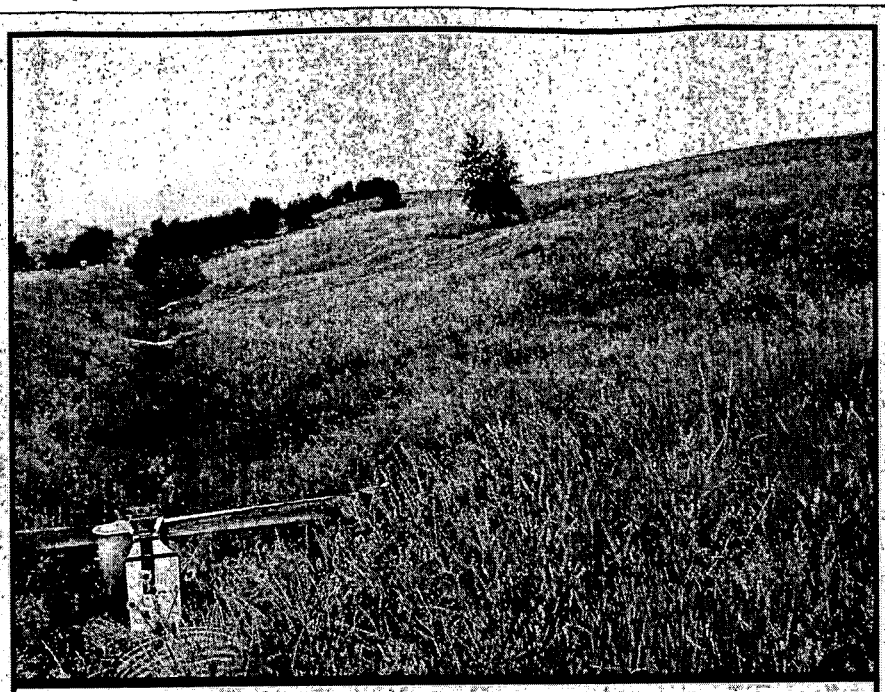
Photopoint 8

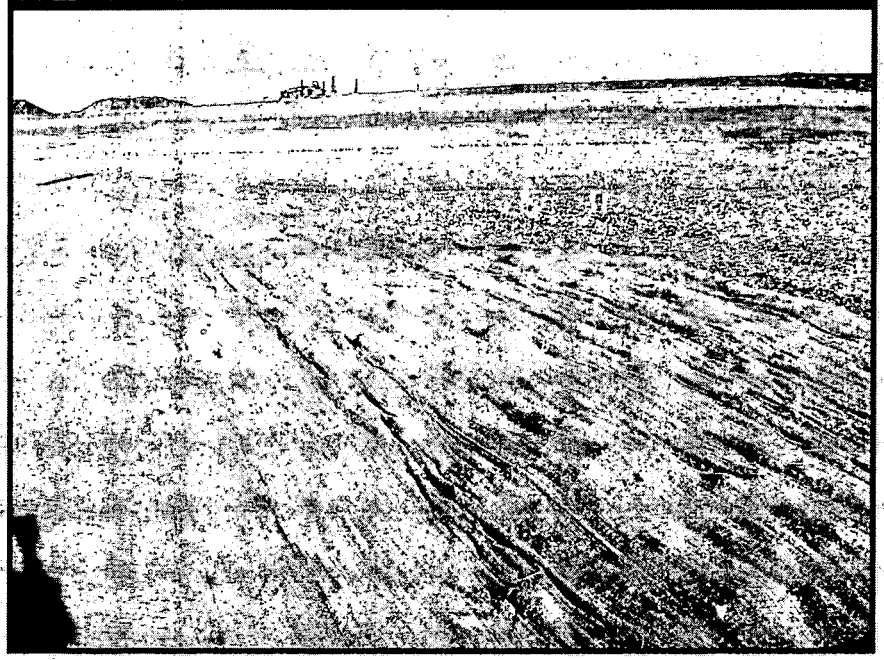
2005

2004 **2005**









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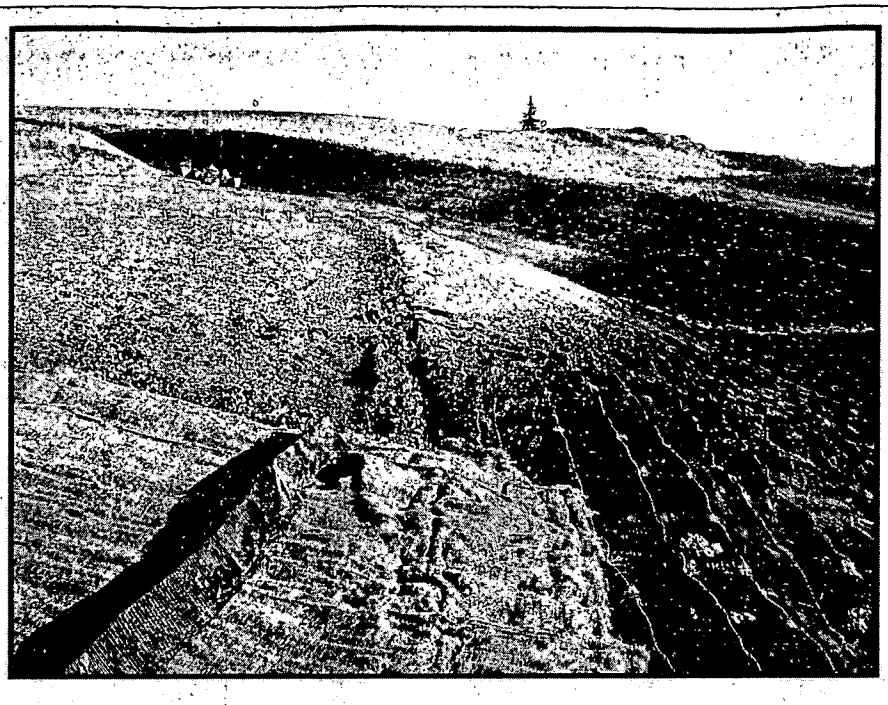
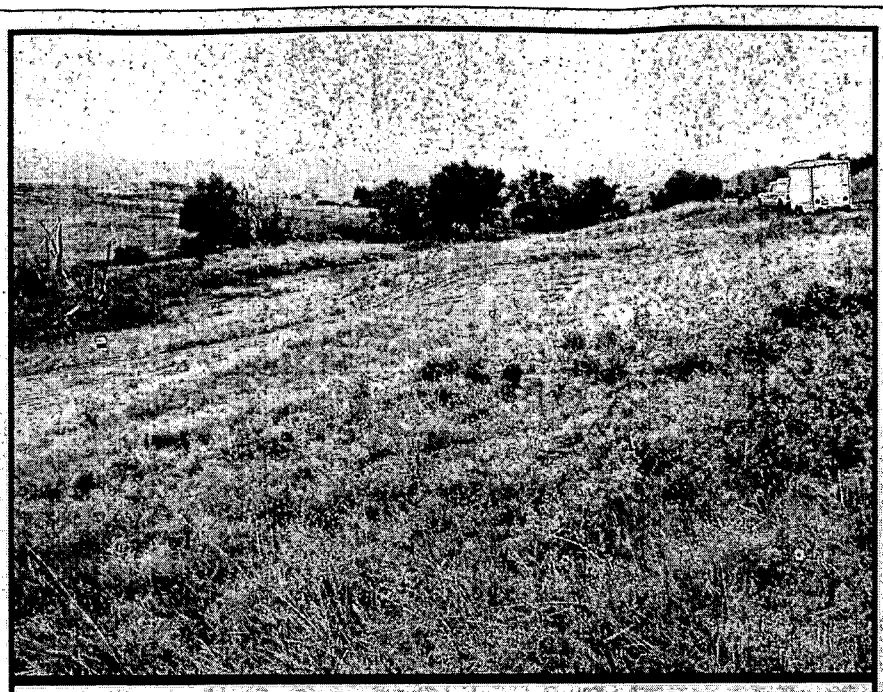
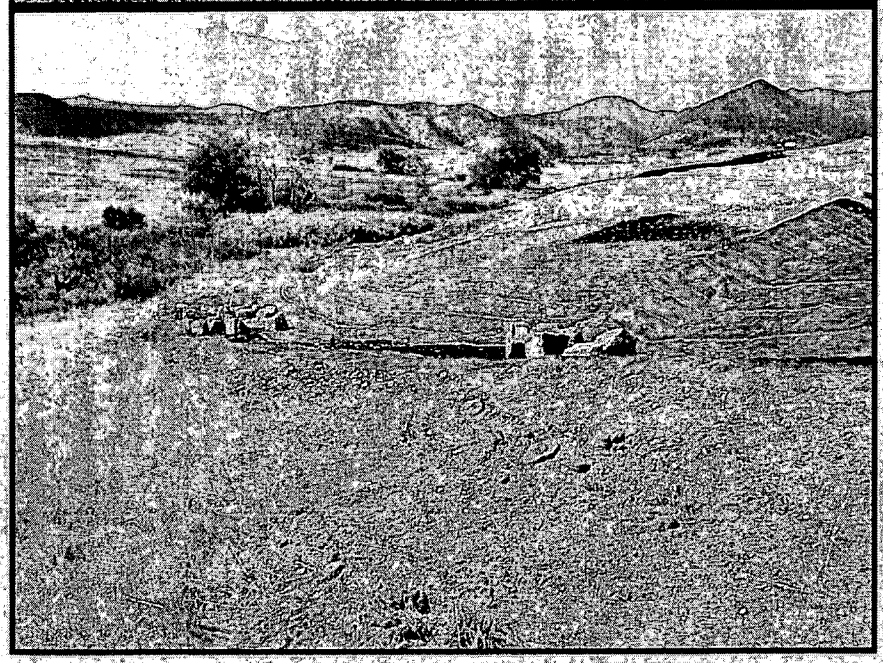


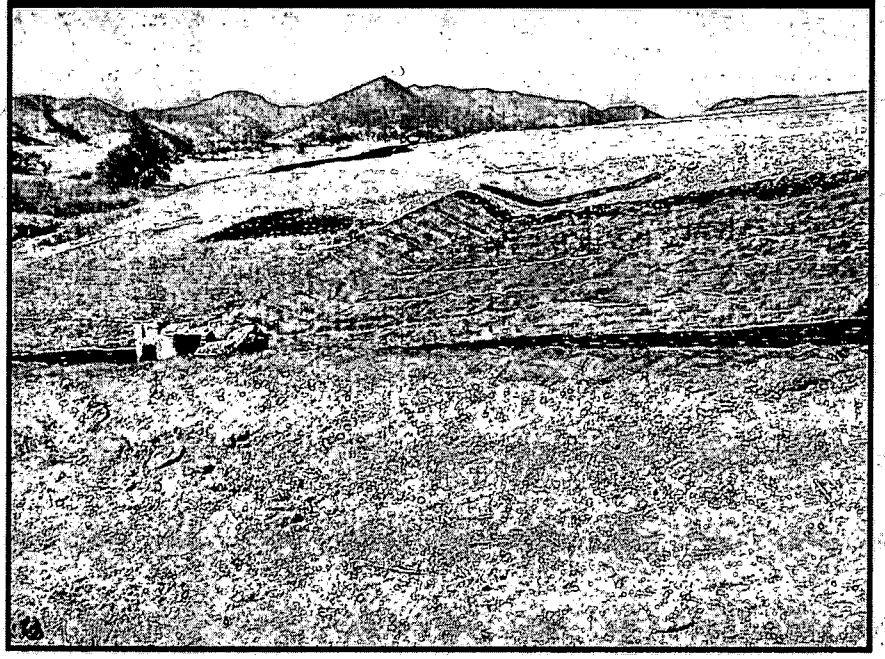
Original Landfill

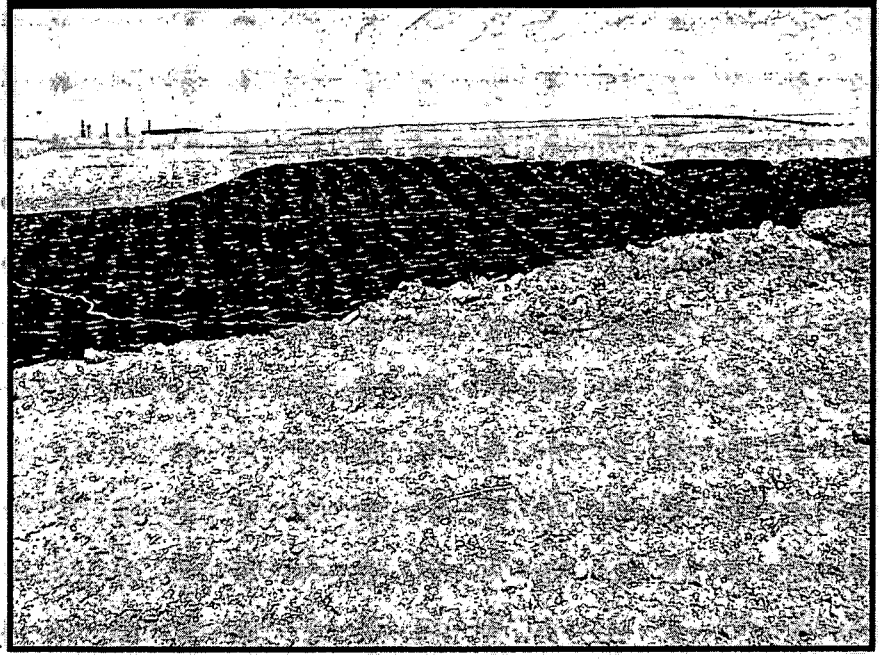
Photopoint 9

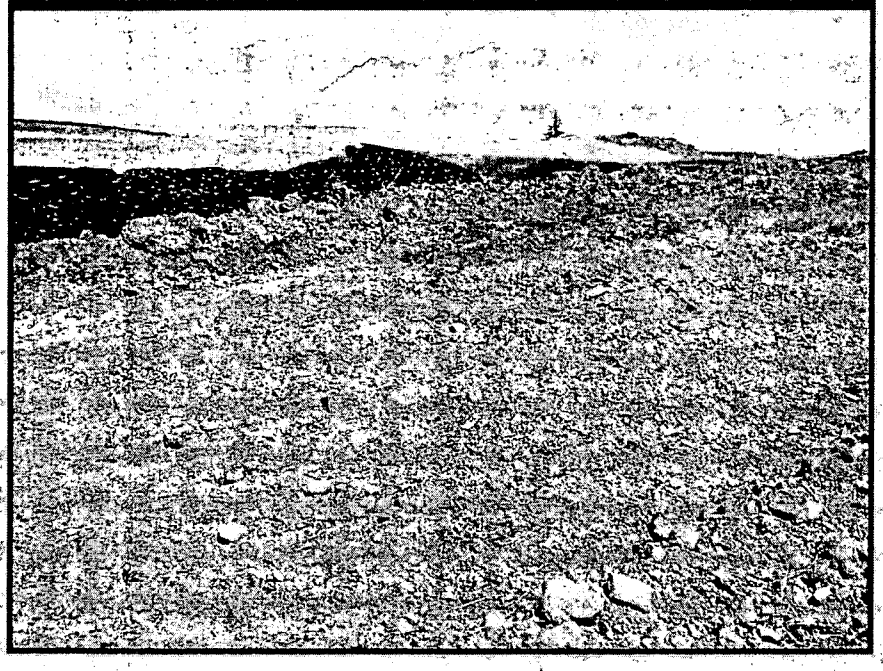
2004 **2005**







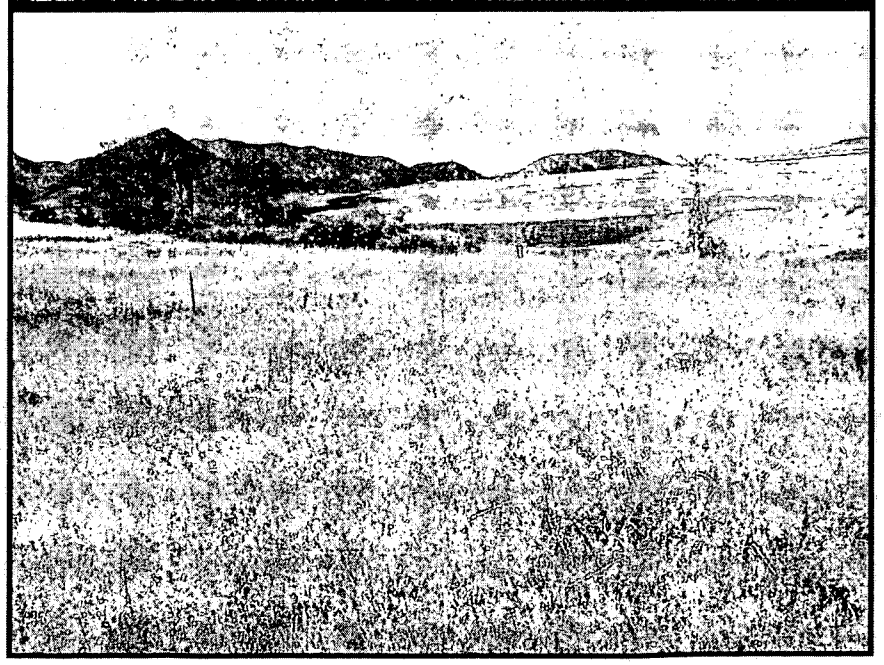


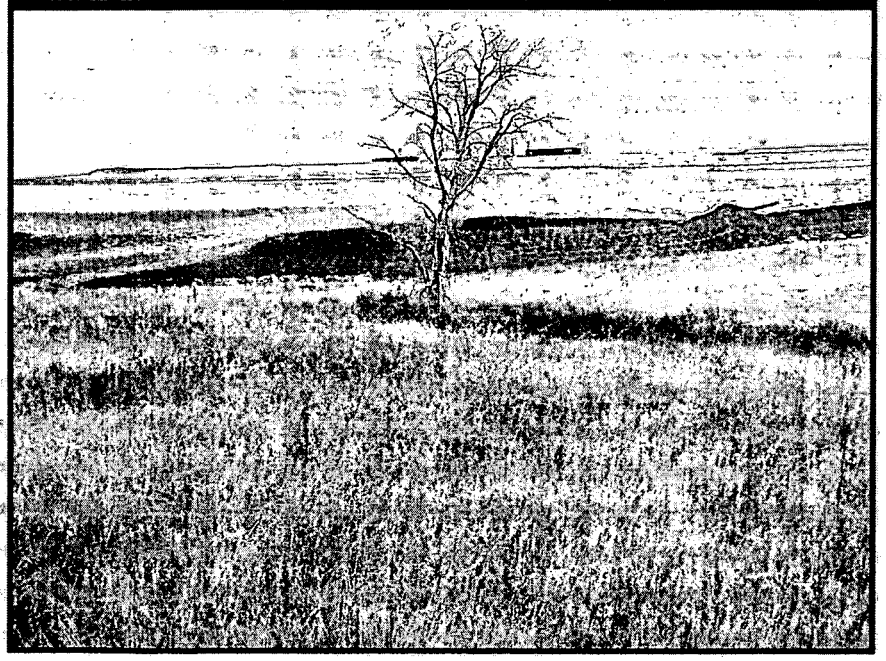


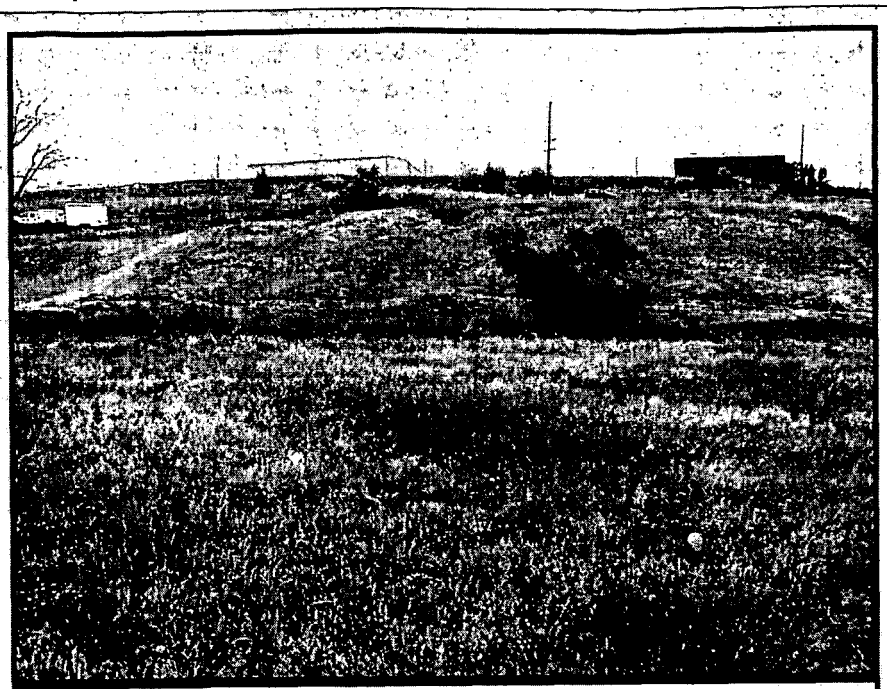
Original Landfill

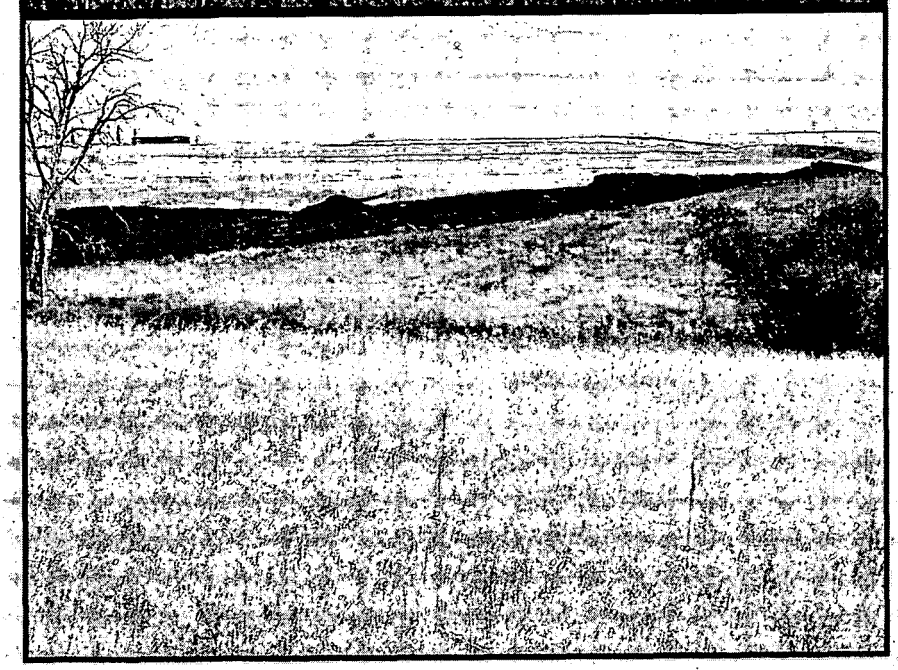
Photopoint 10

2004 **2005**





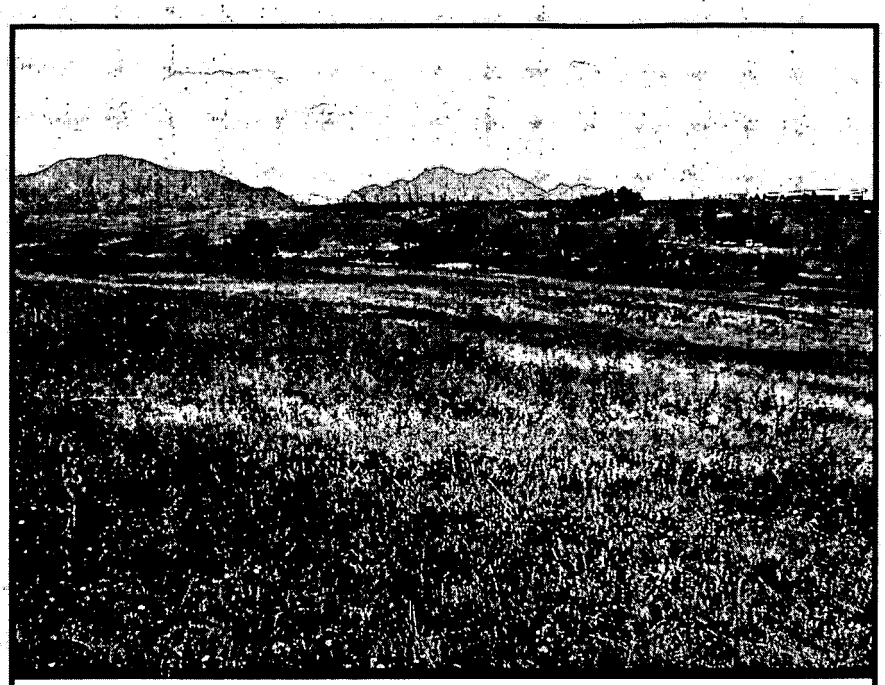




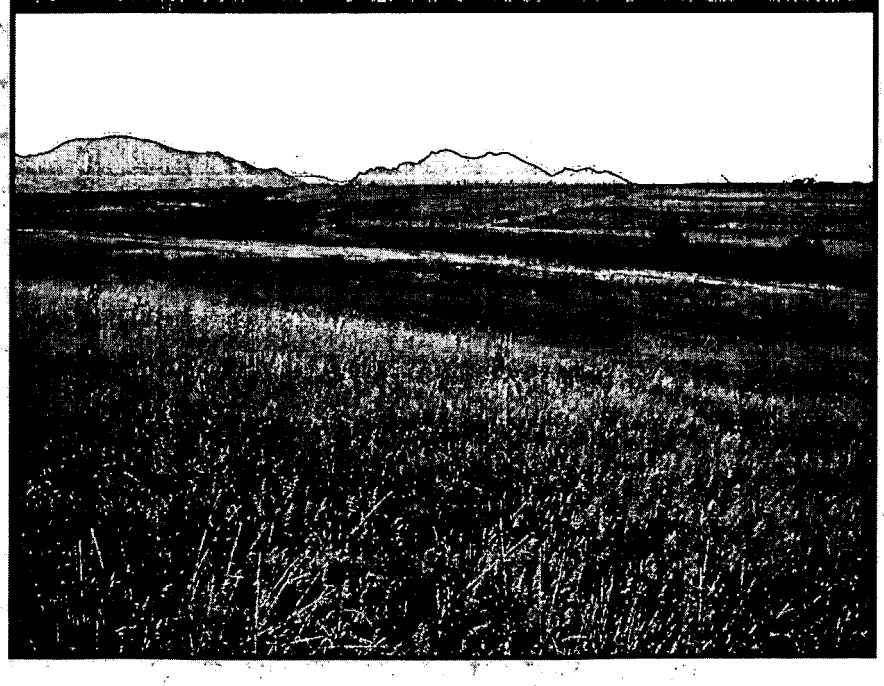
Original Landfill

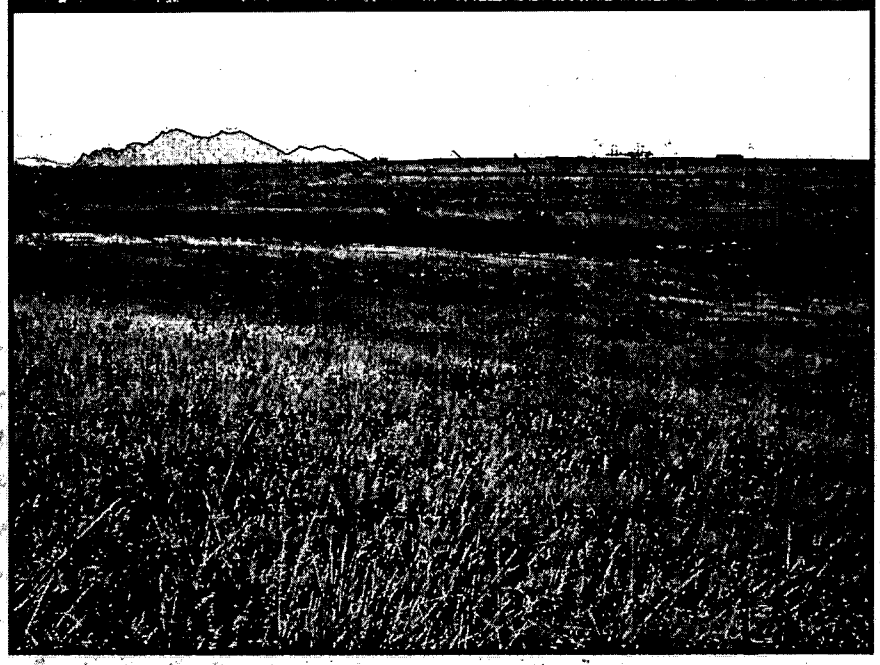
Photopoint 11

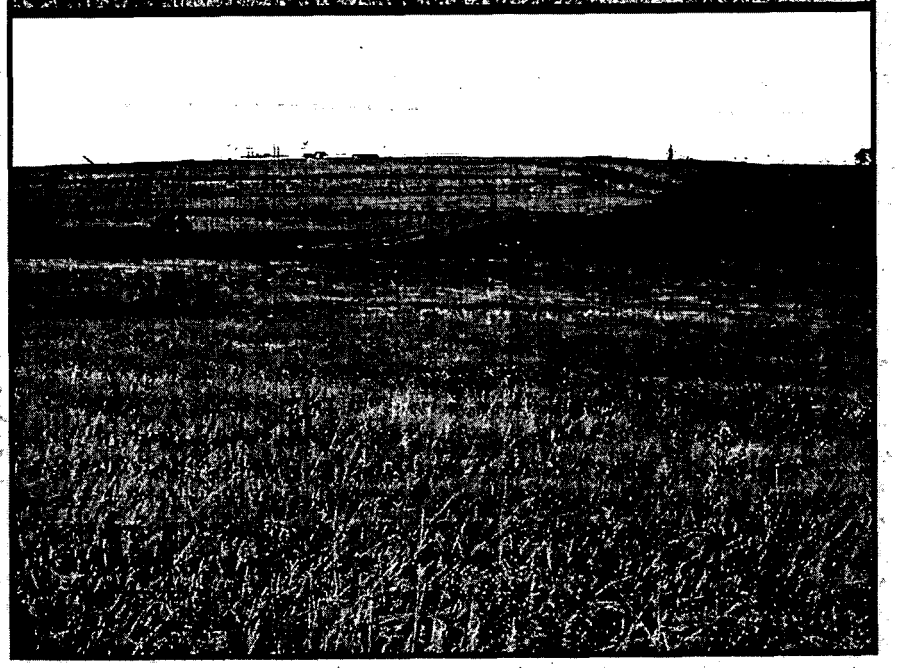
2004



2005

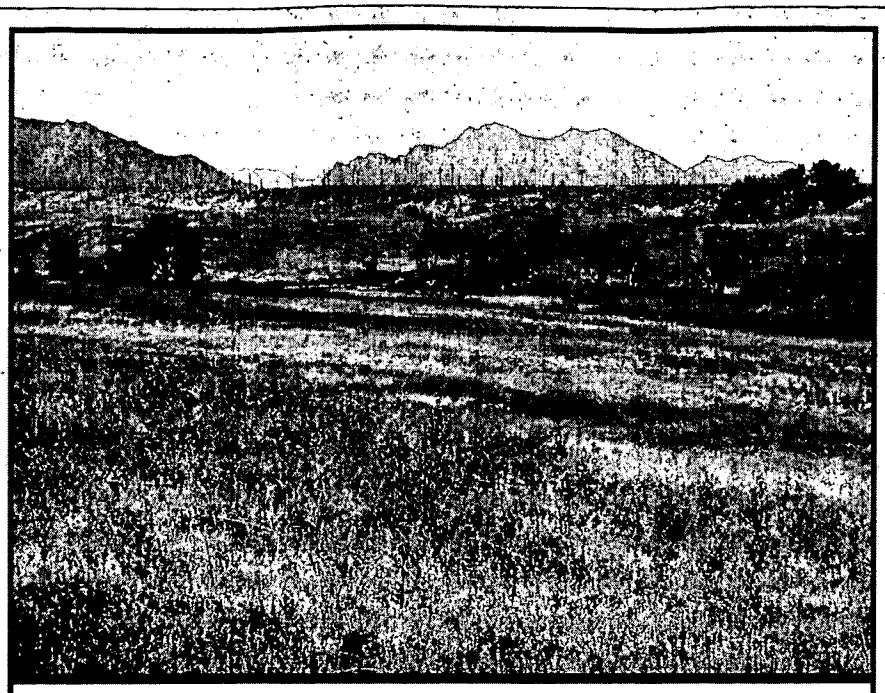


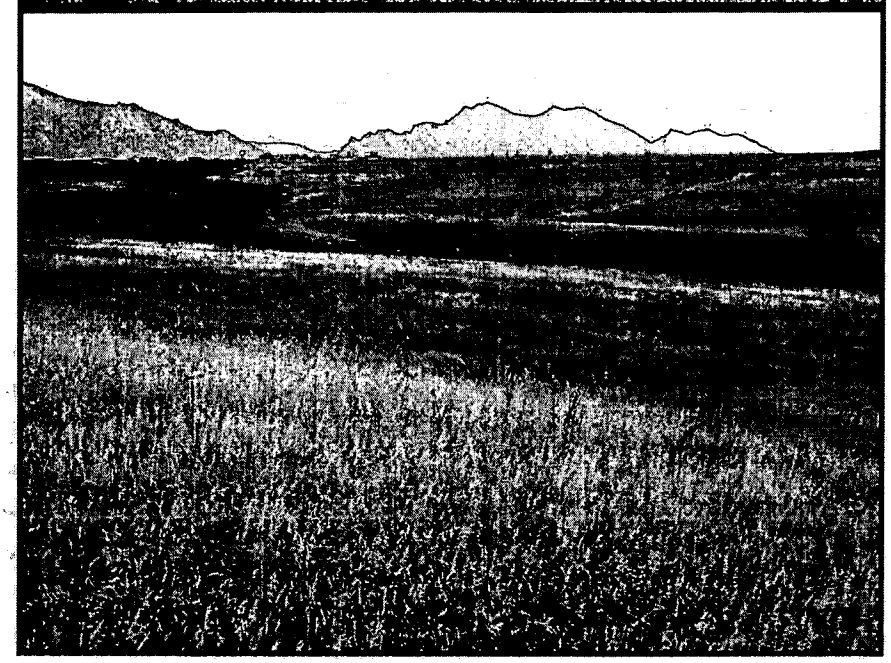


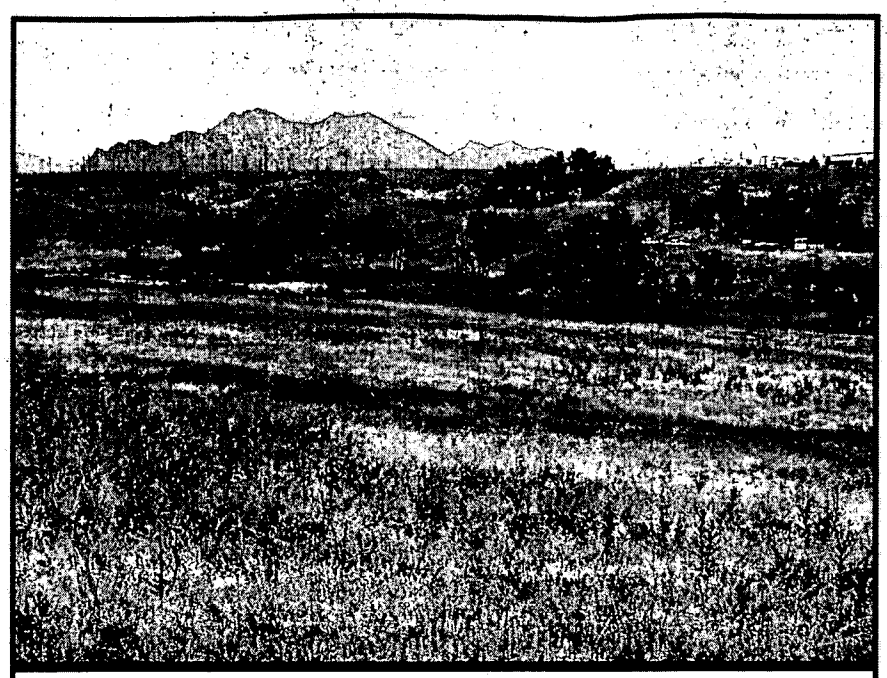


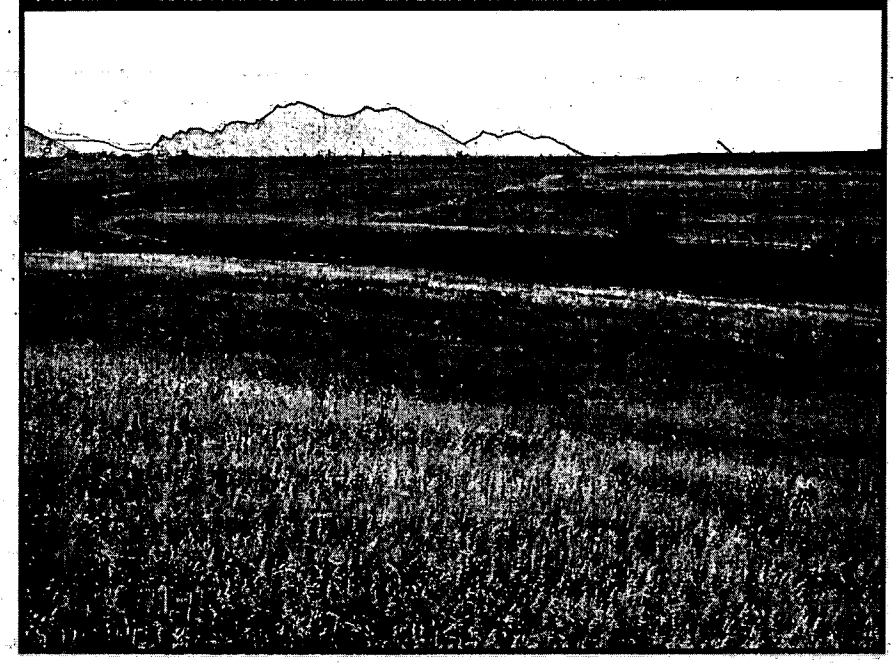
Photopoint 11 Zoom

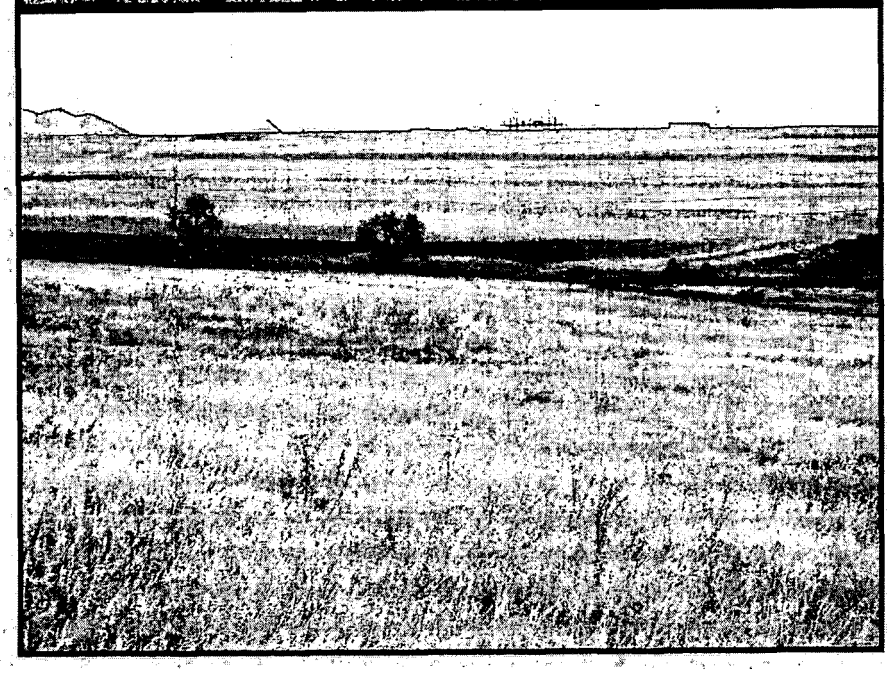
2004 **2005**

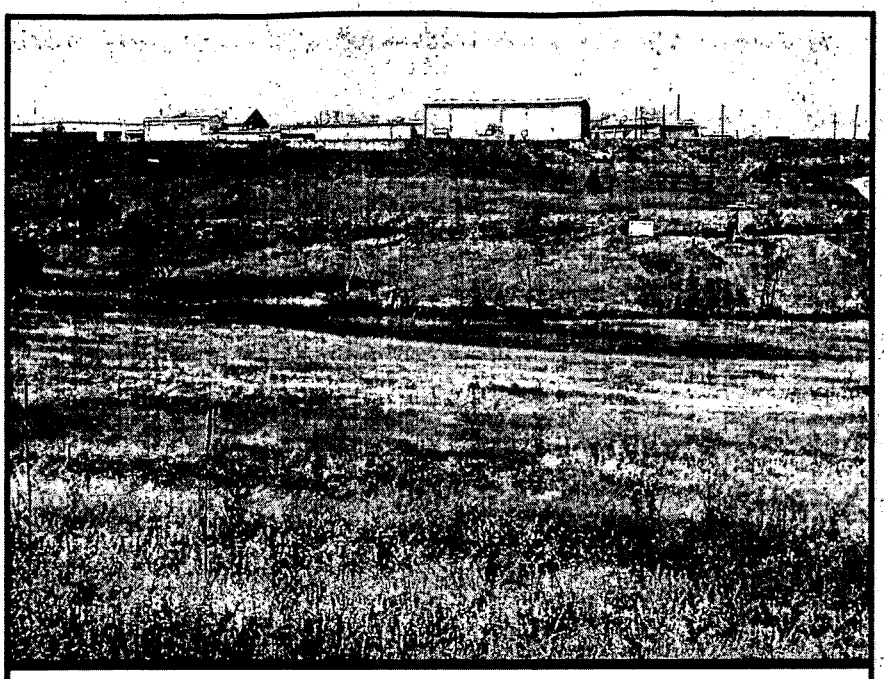


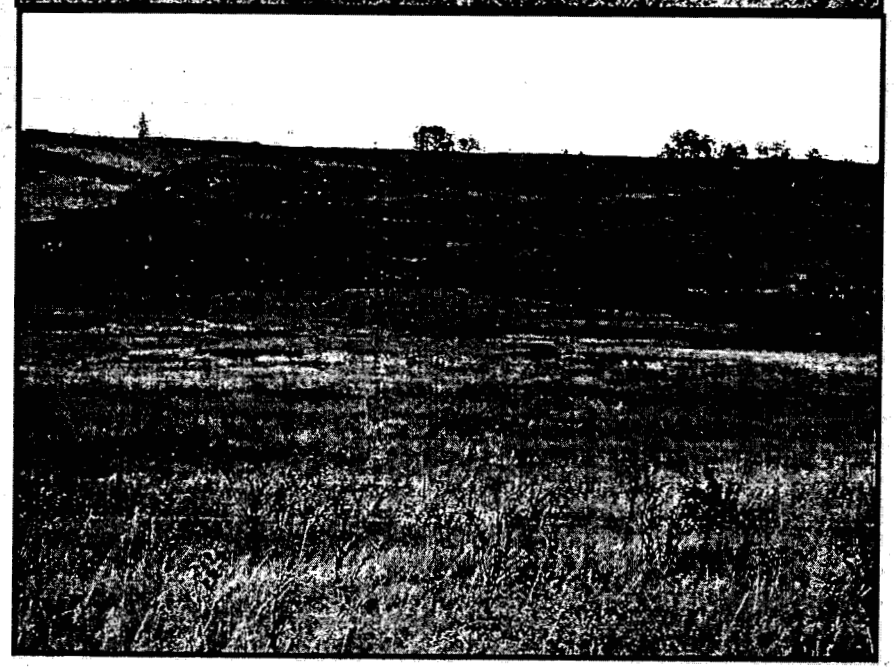


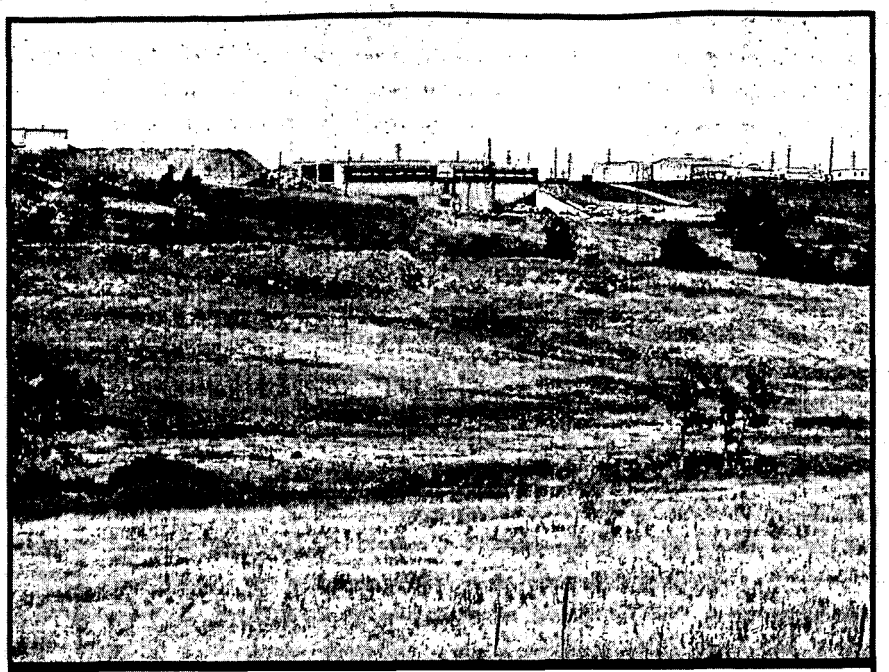










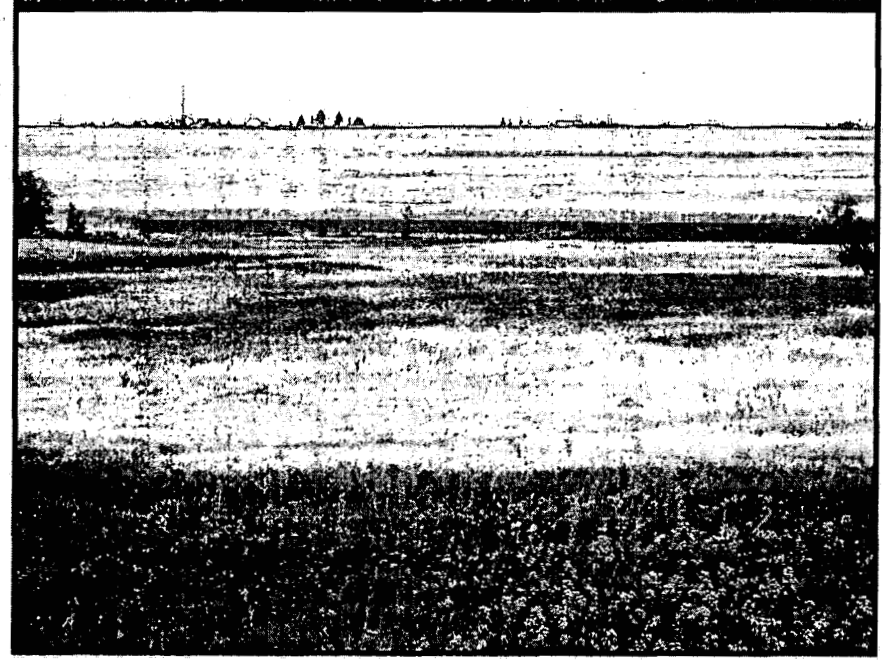


Original Landfill

Photopoint 12

2004

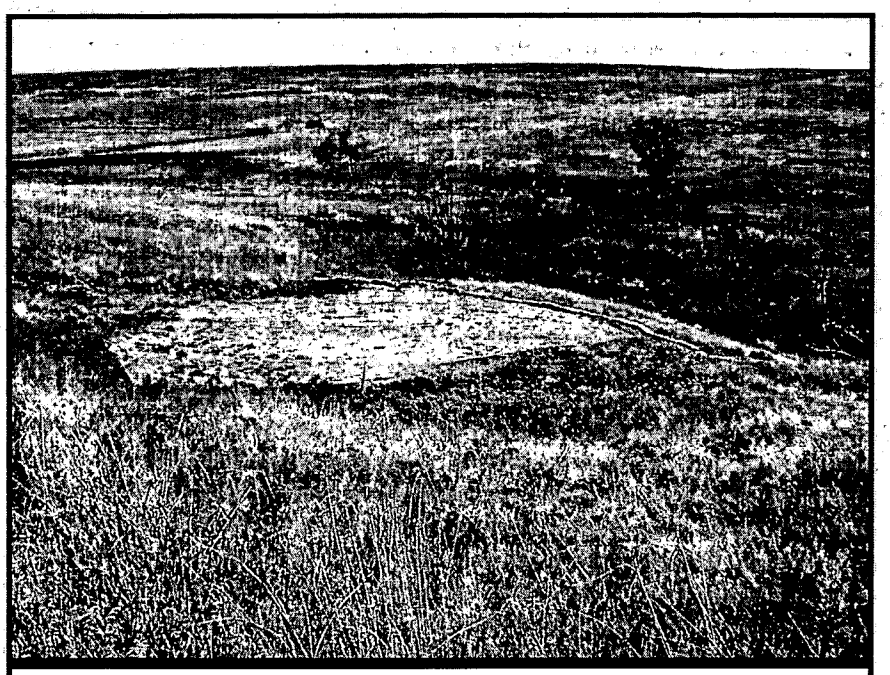
2005



Original Landfill

Photopoint 13

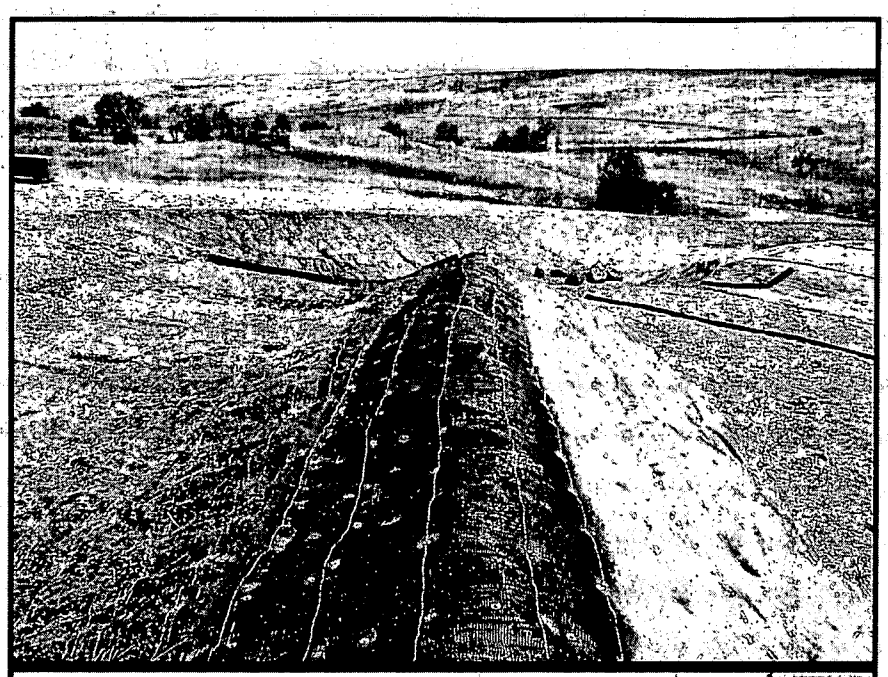
2004 **2005**

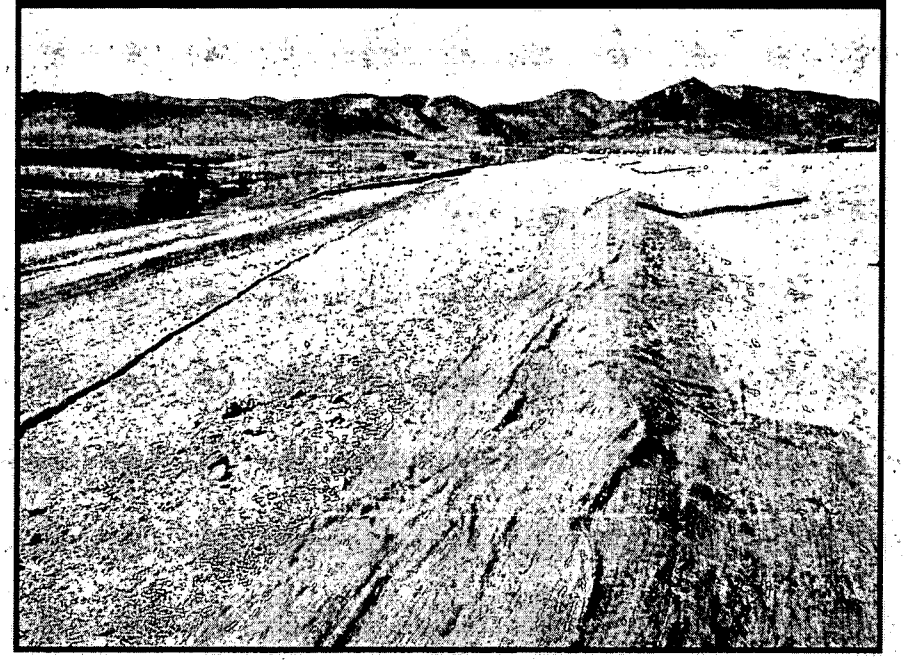


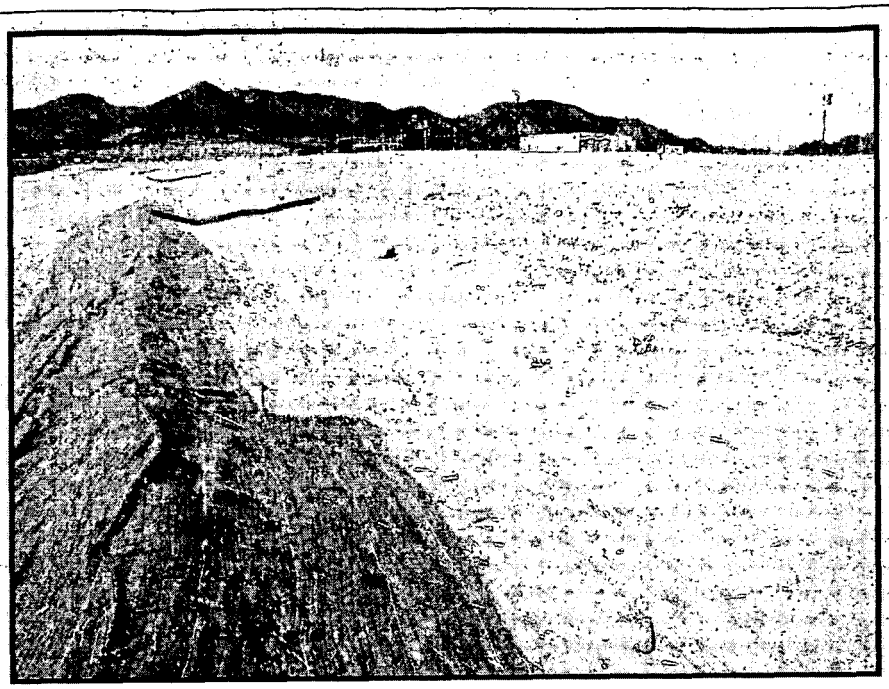
Original Landfill

Photopoint 331

2005



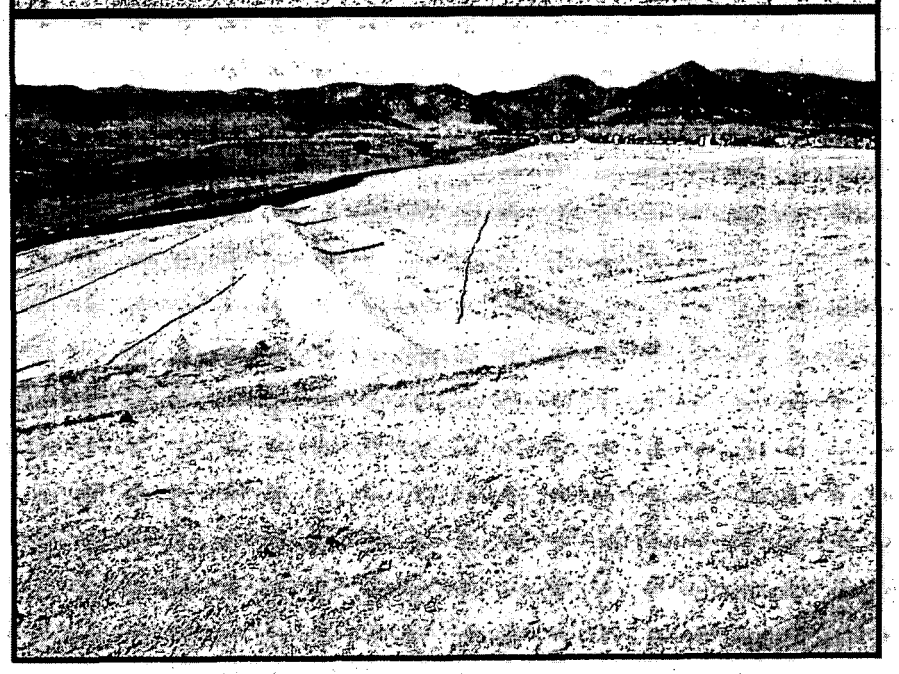


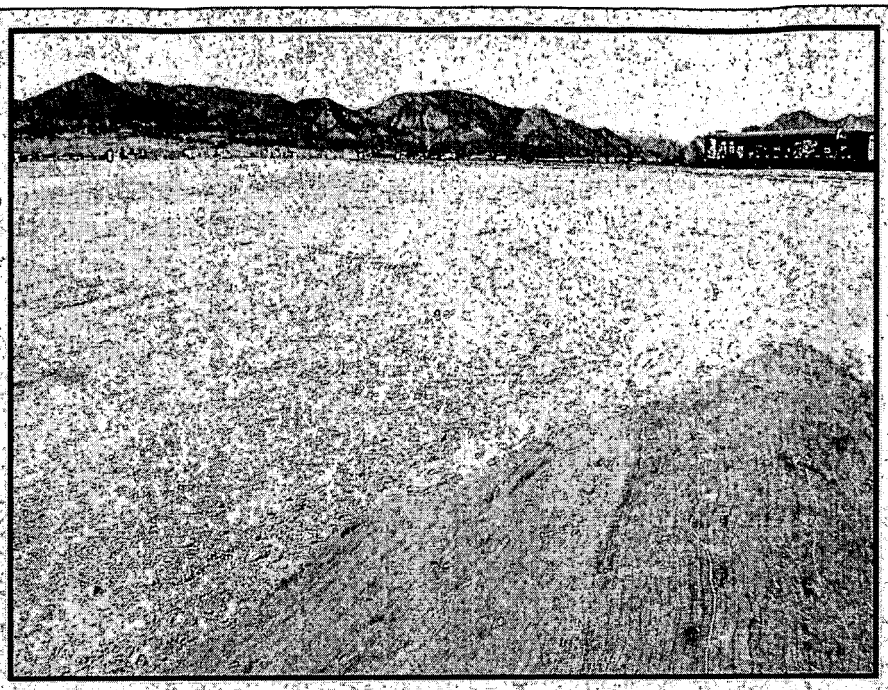


Original Landfill

Photopoint 332

2005

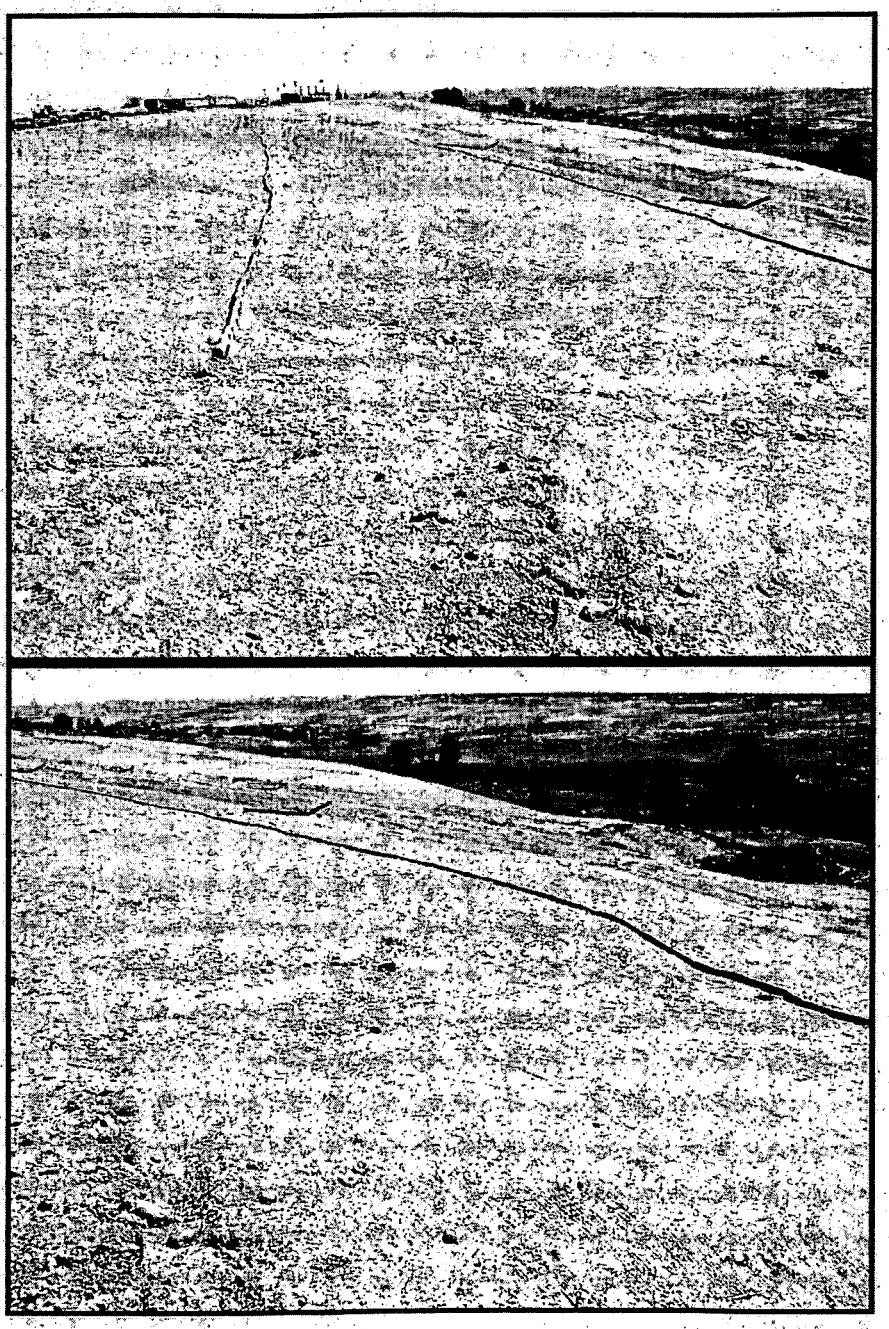




Original Landfill

Photopoint 333

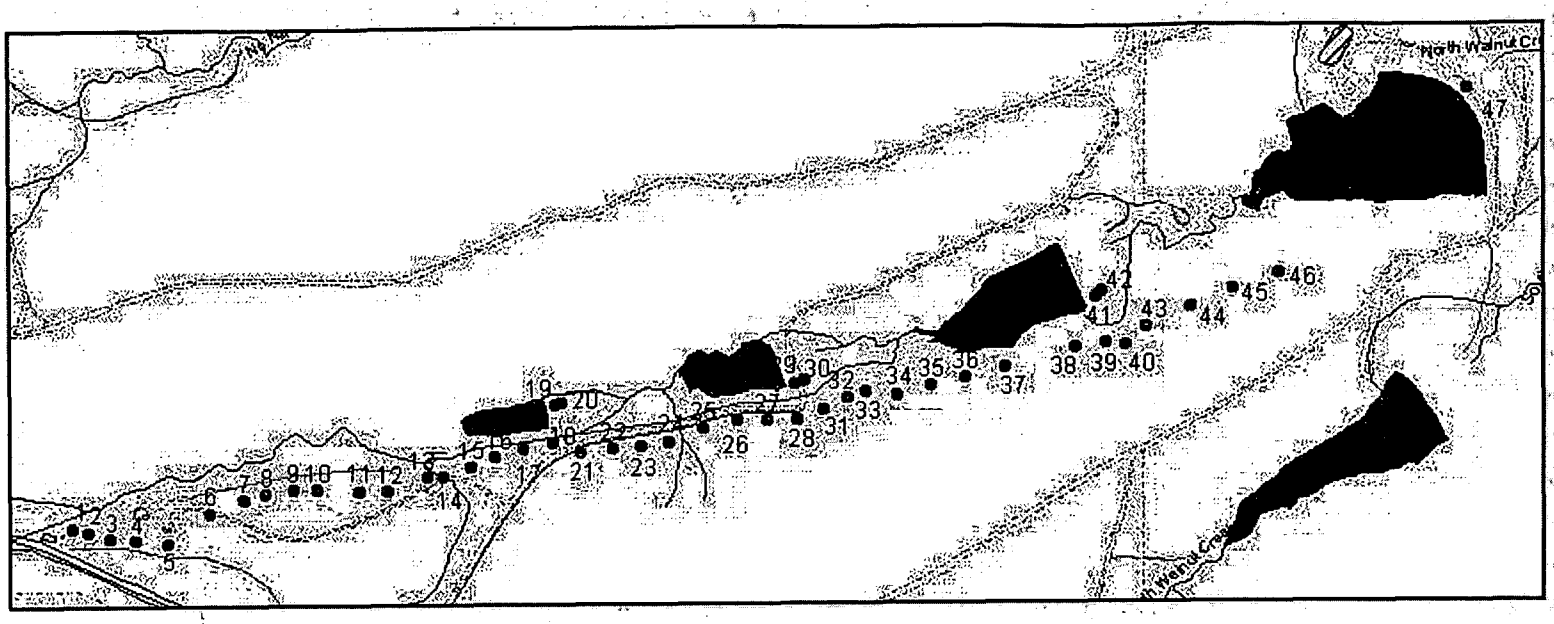
2005



Pond Remediation

A-Series

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)

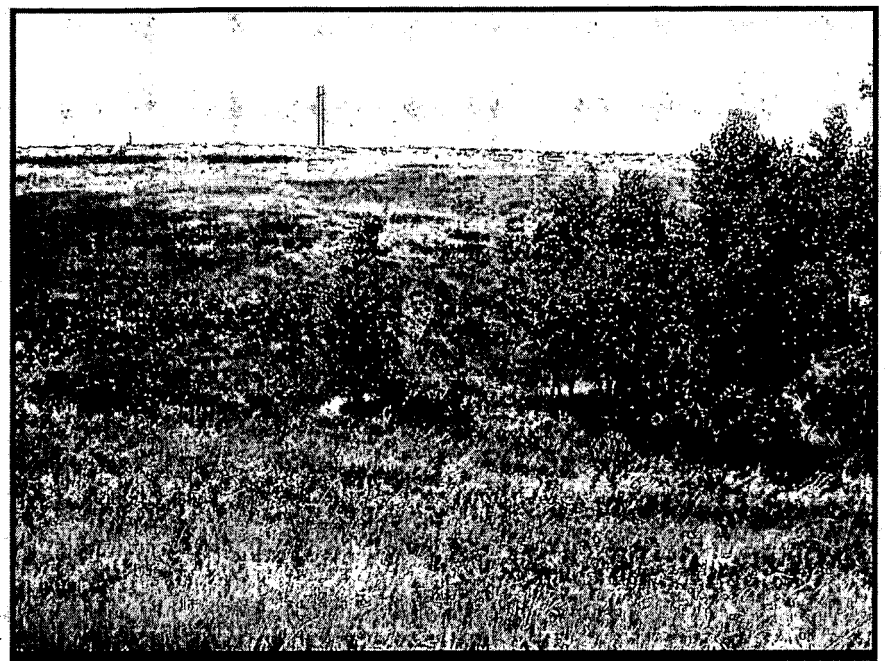


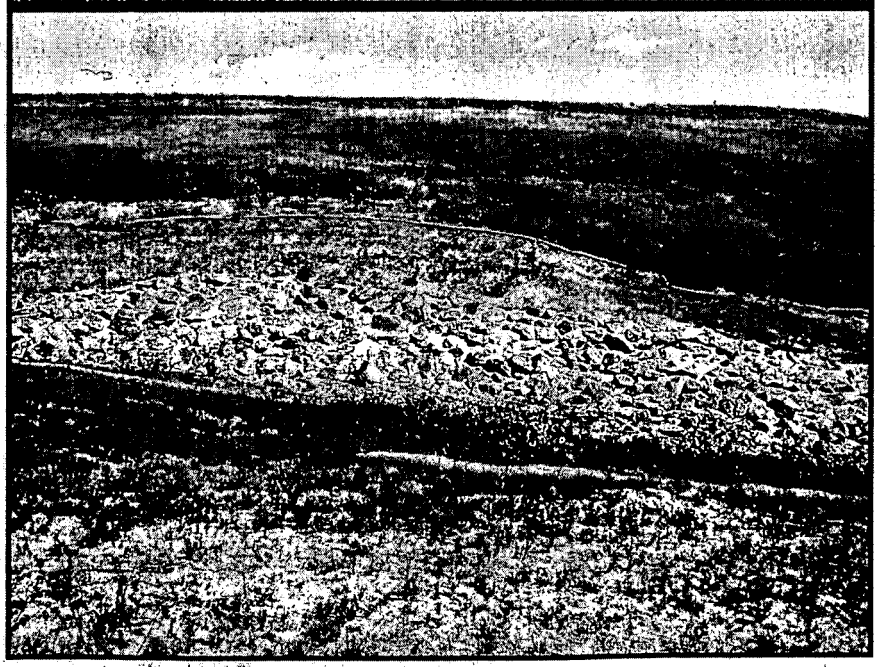
Pond Remediation

A-Series, Photopoints 1-10

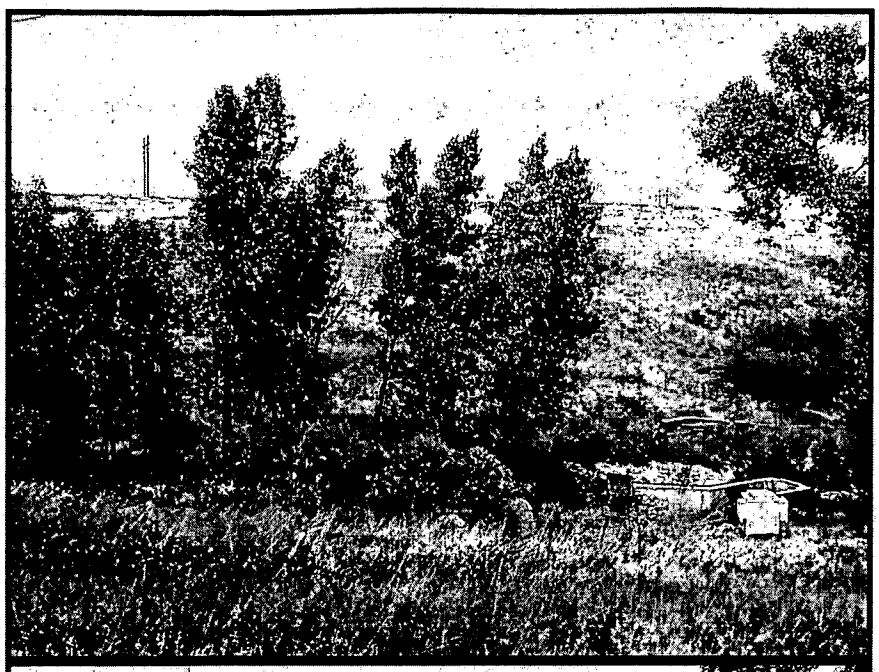
6/29/2004 **8/26/2005**

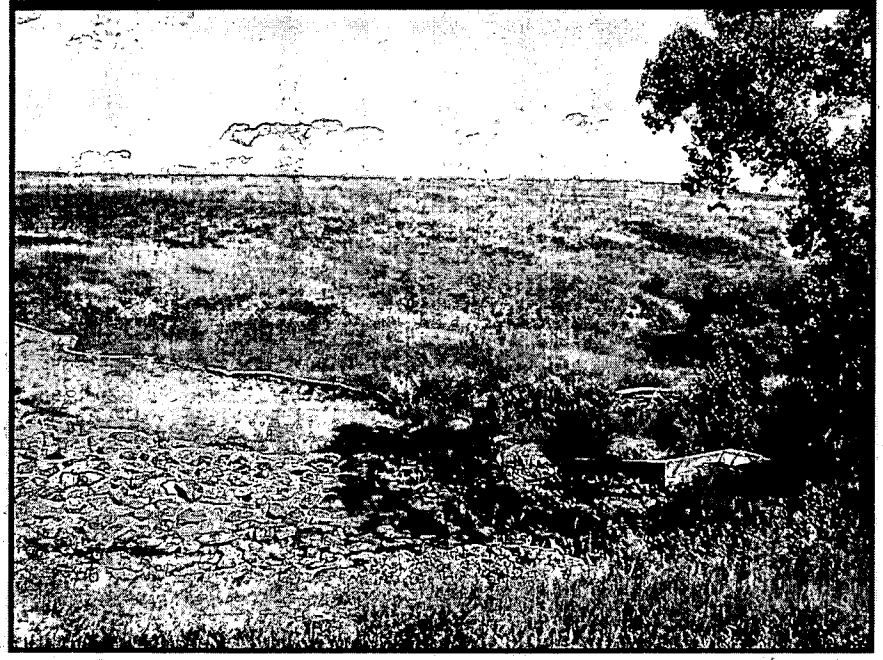
Photopoint 1





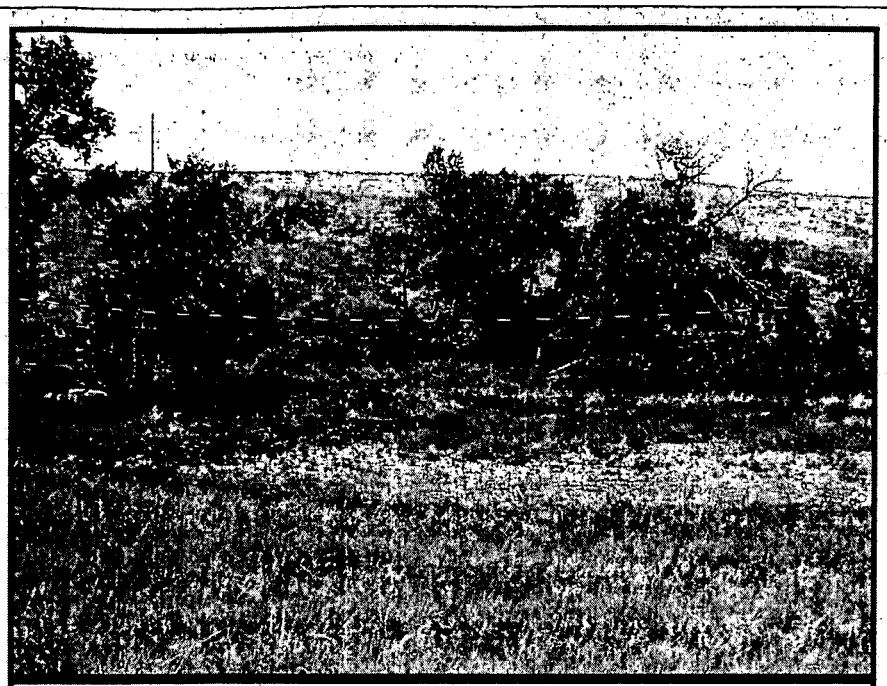
Photopoint 2

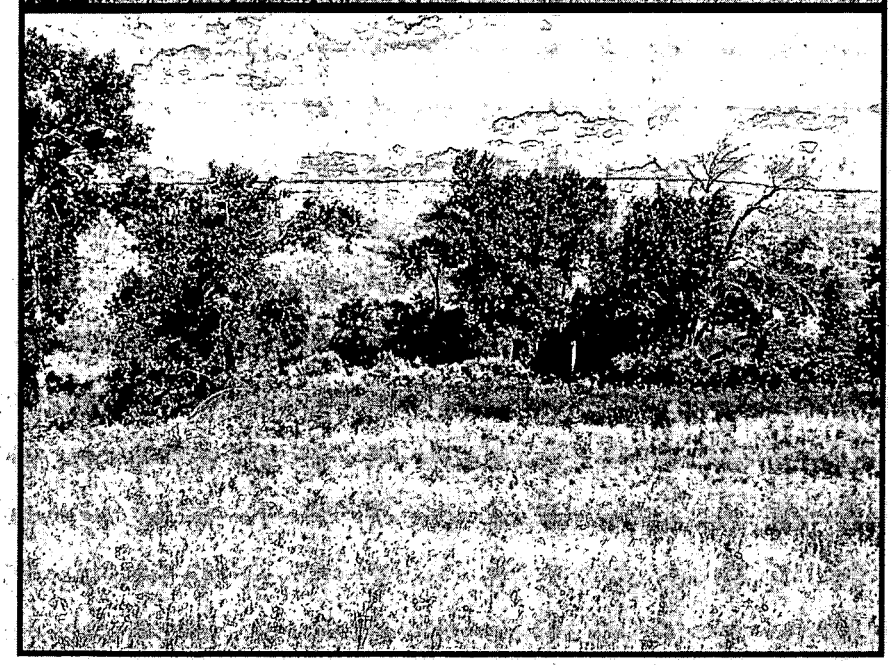




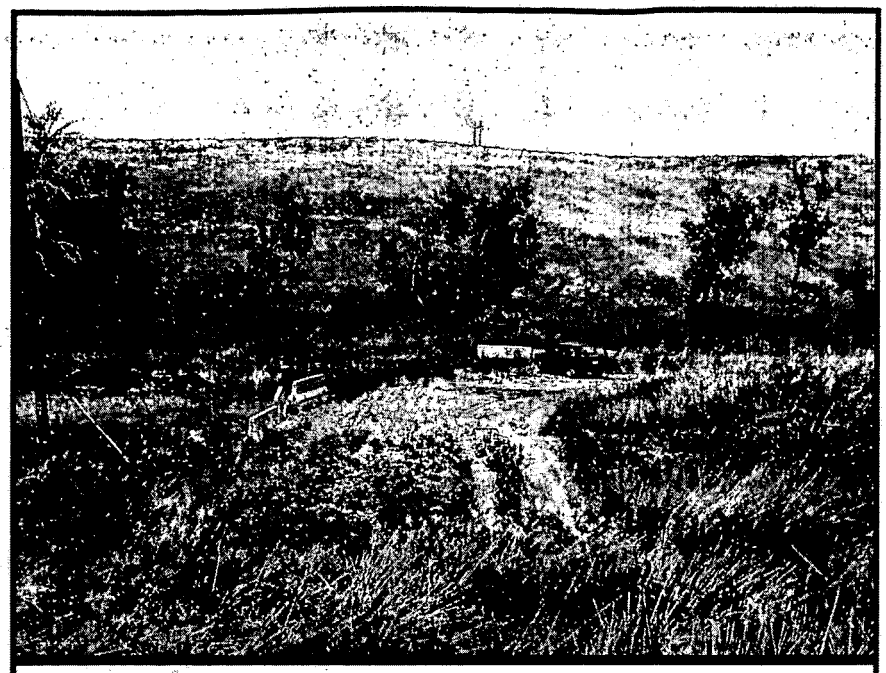
Photopoint 3

Photopoint 4

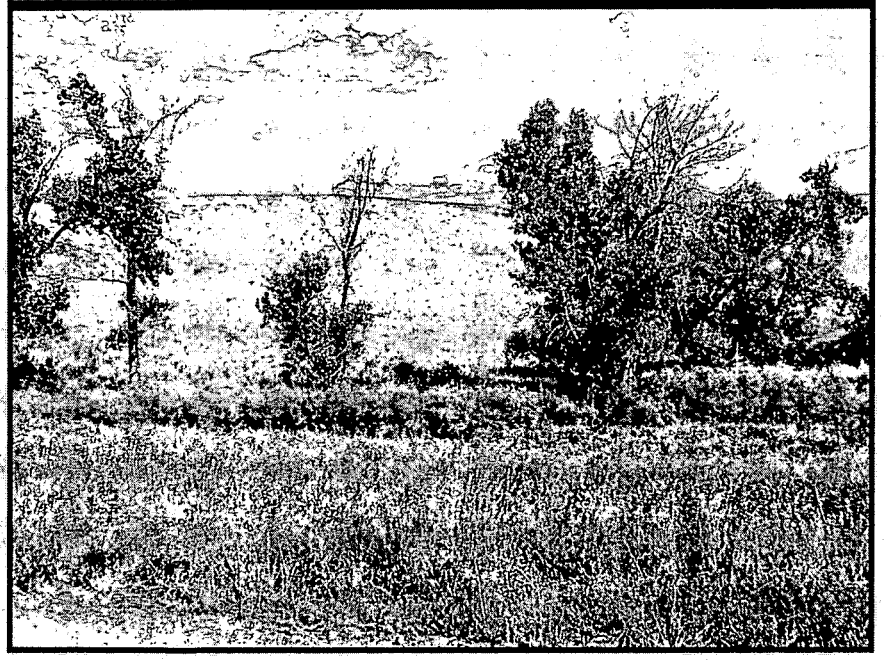




Photopoint 5

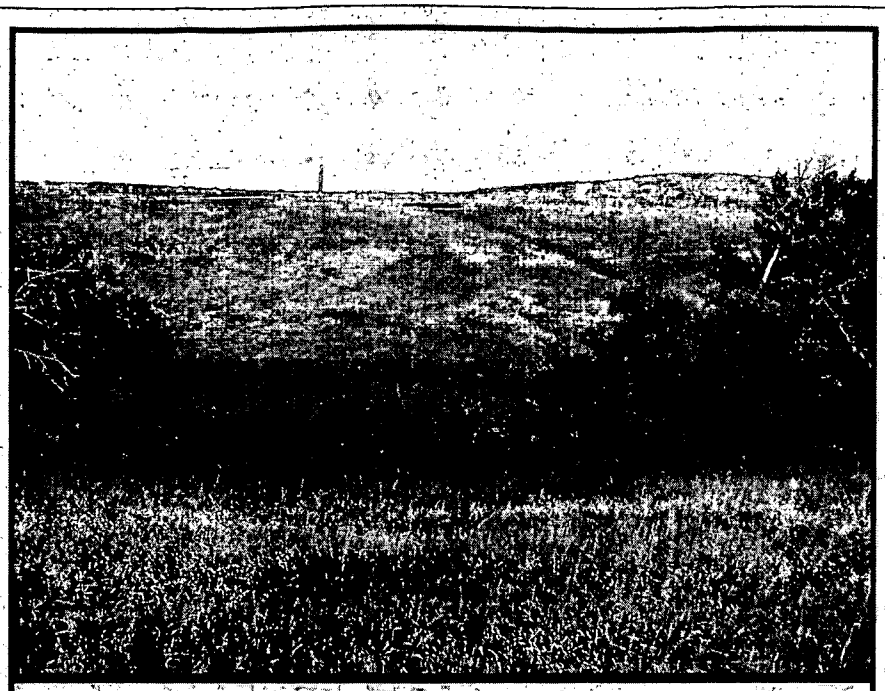


Photopoint 6



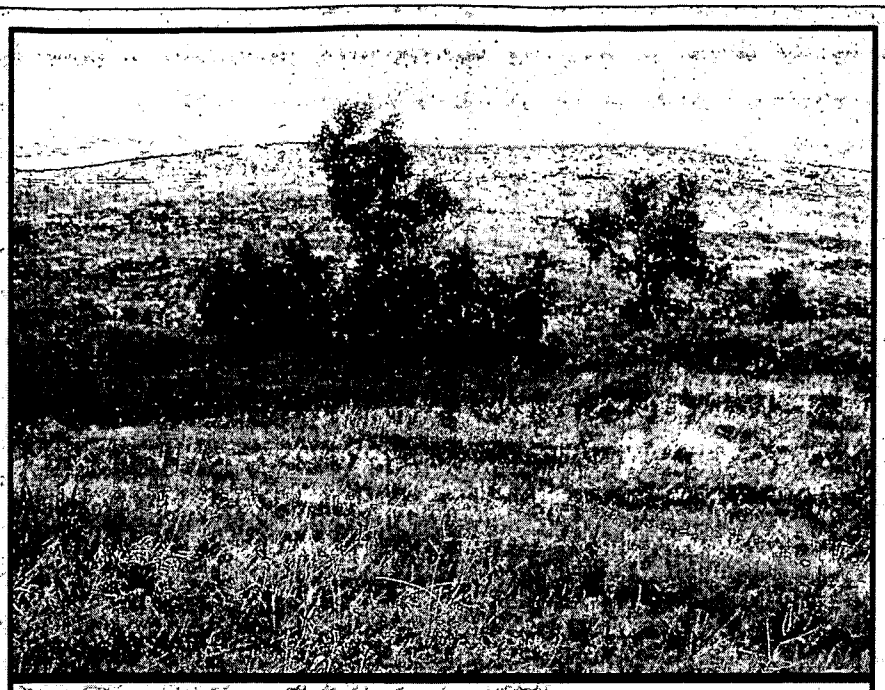
Photopoint 7

Photopoint 8



Photopoint 9

Photopoint 10

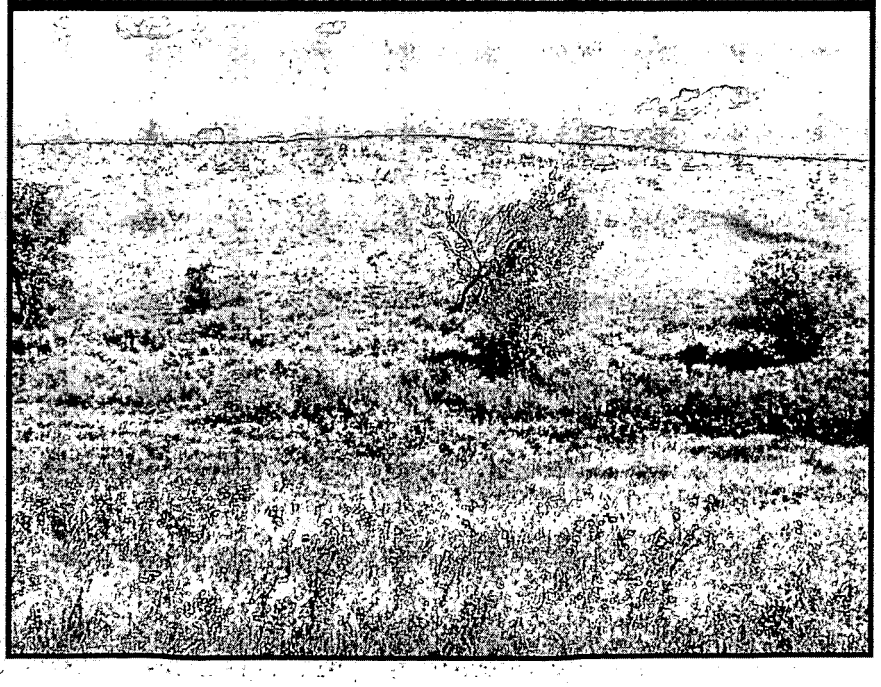


Pond Remediation

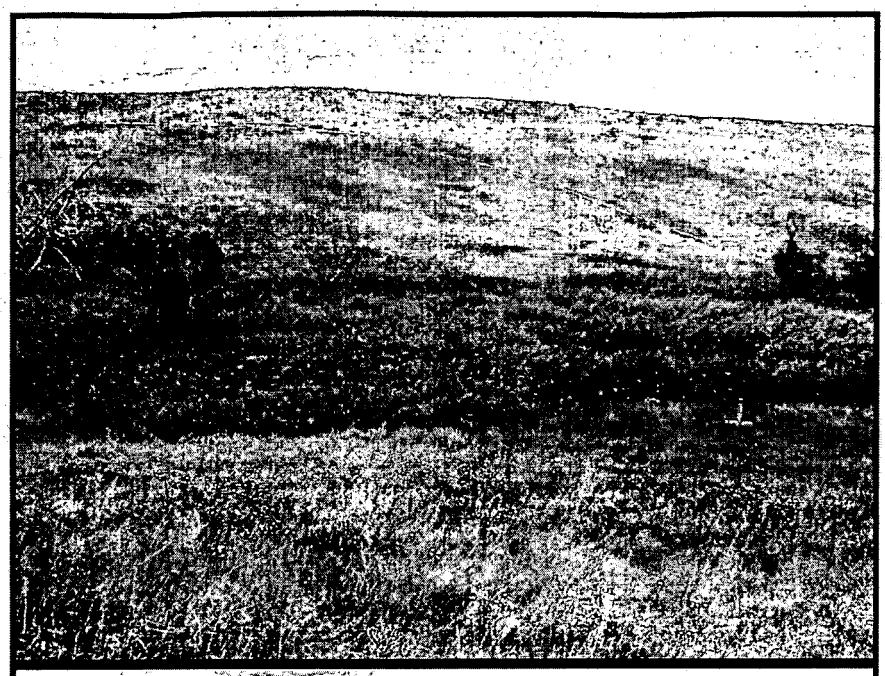
A-Series, Photopoints 11-18

6/29/2004 **8/26/2005**

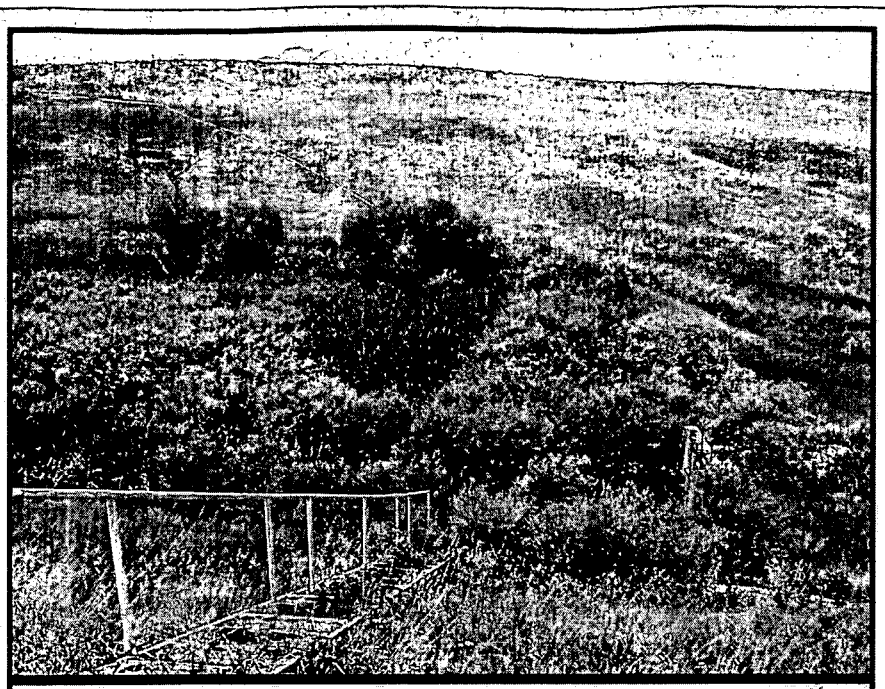
Photopoint 11



Photopoint 12

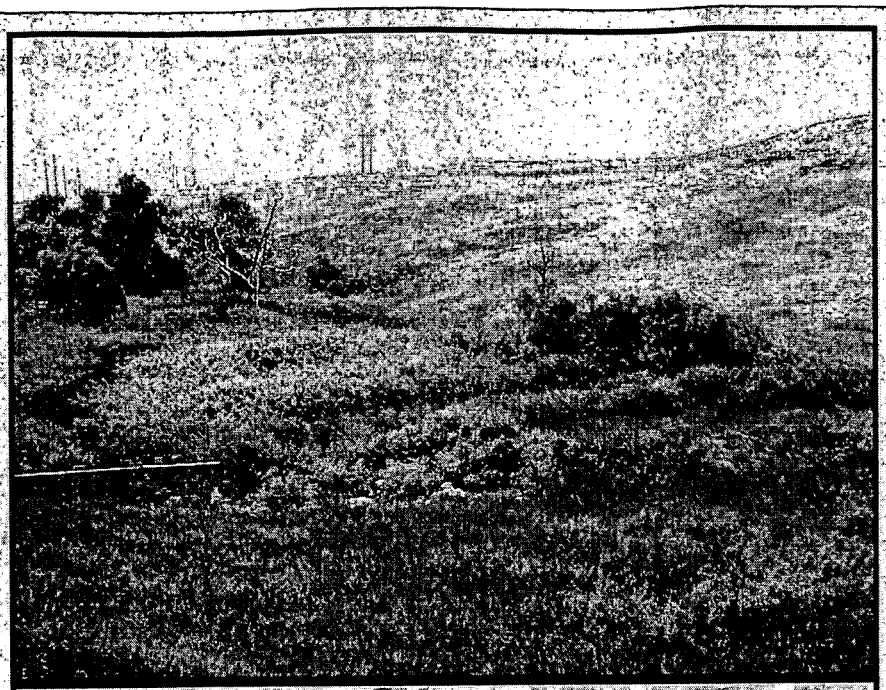


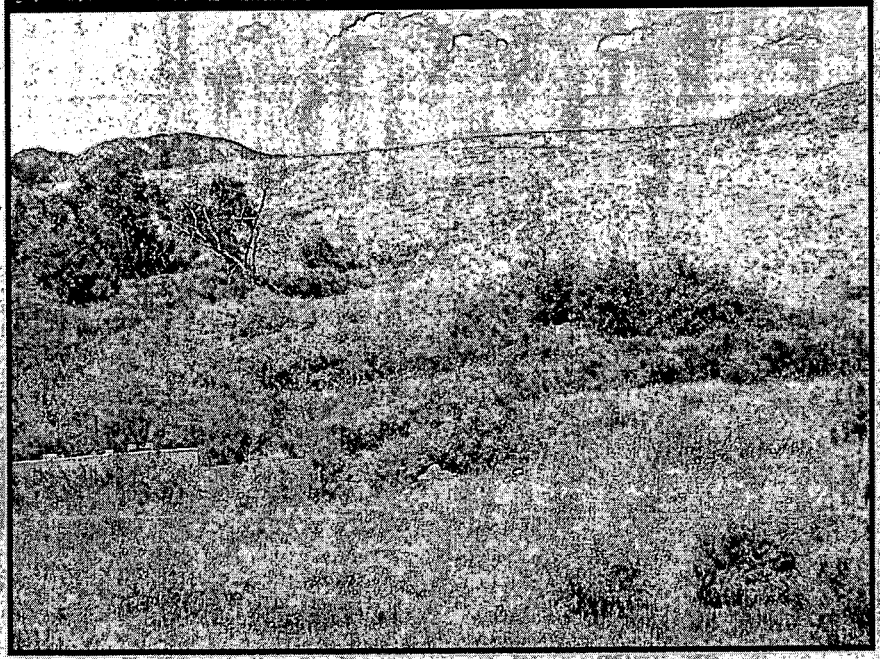
Photopoint 13

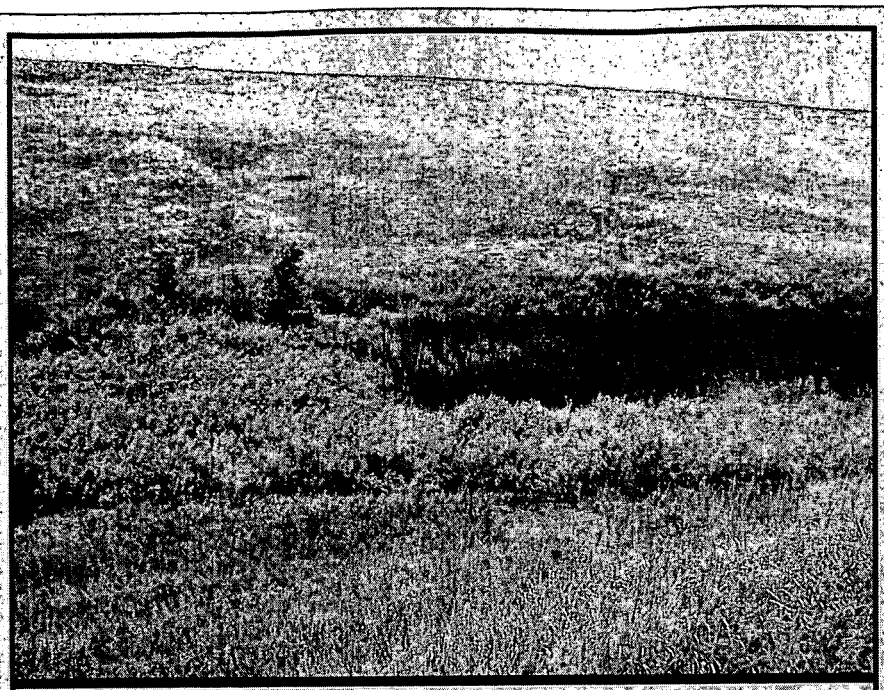


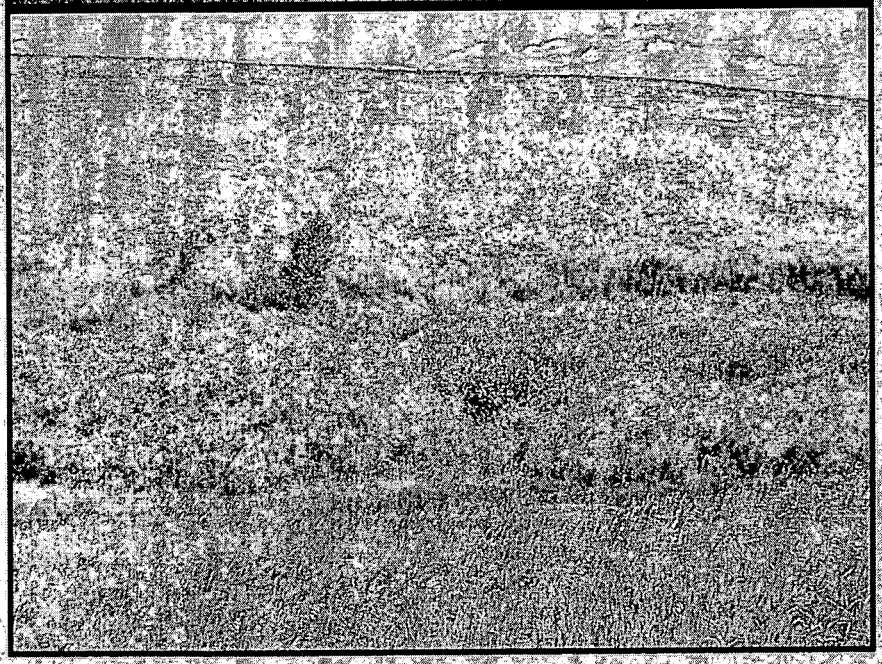
Photopoint 14

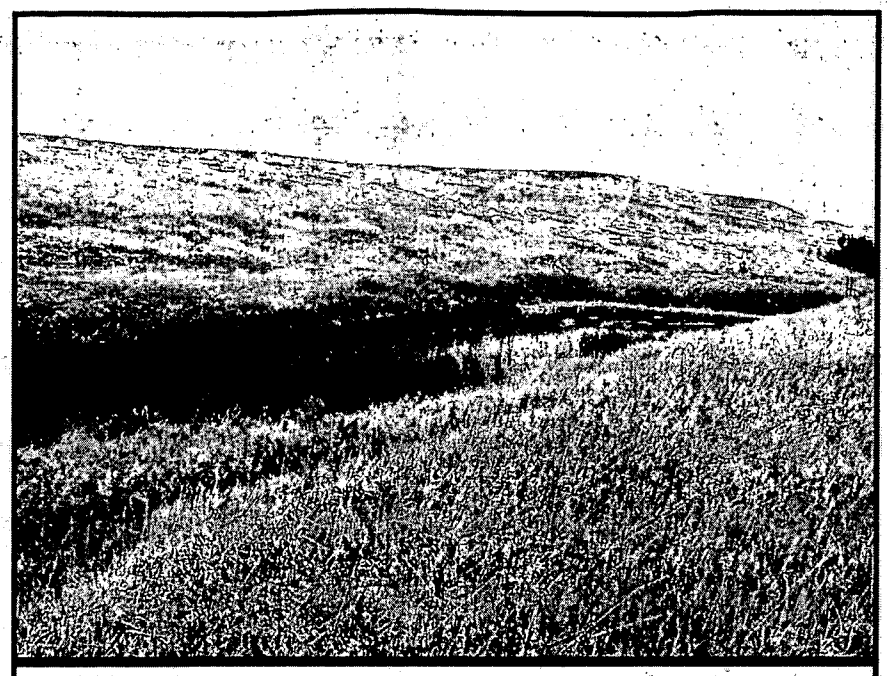
Photopoint 15



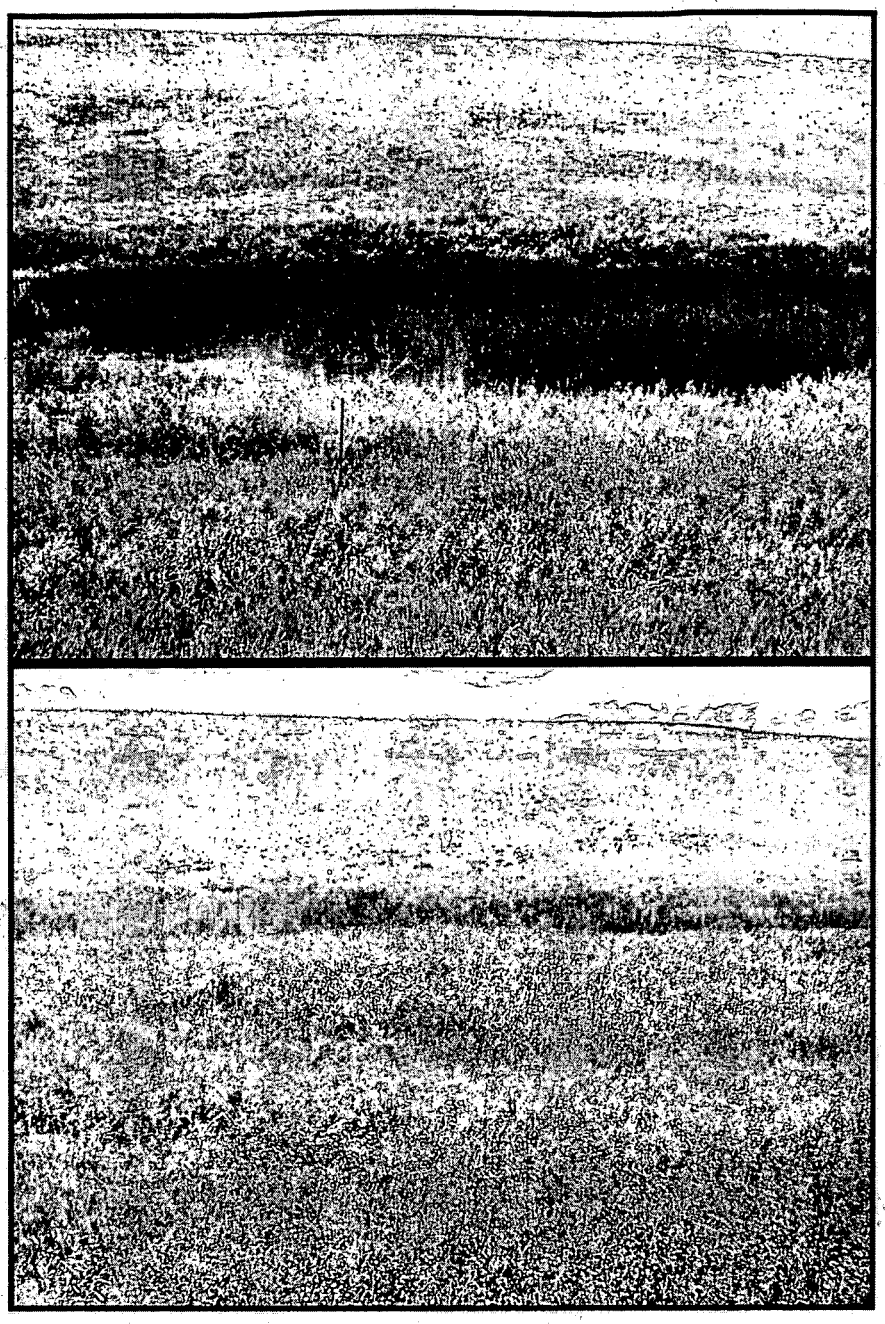




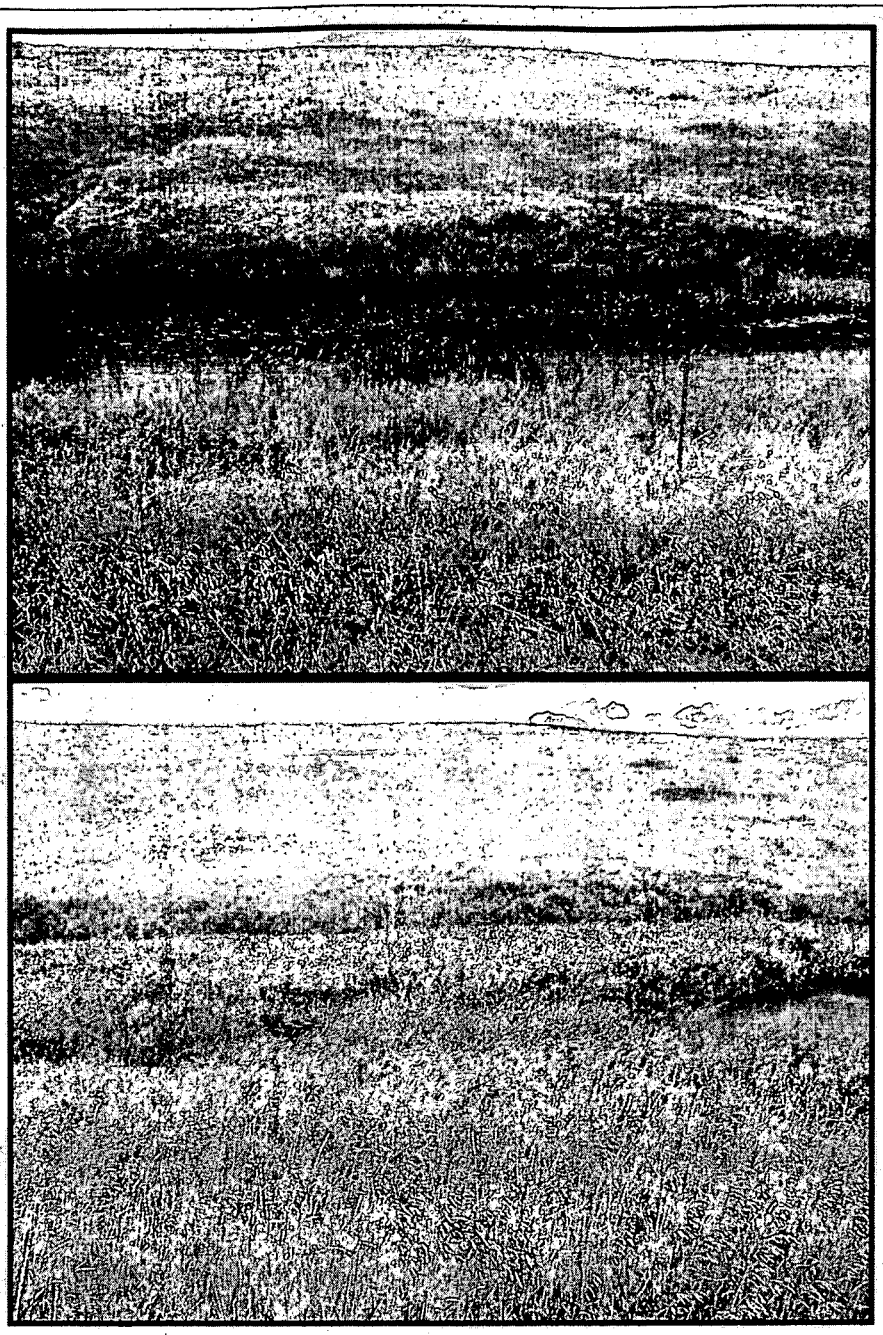




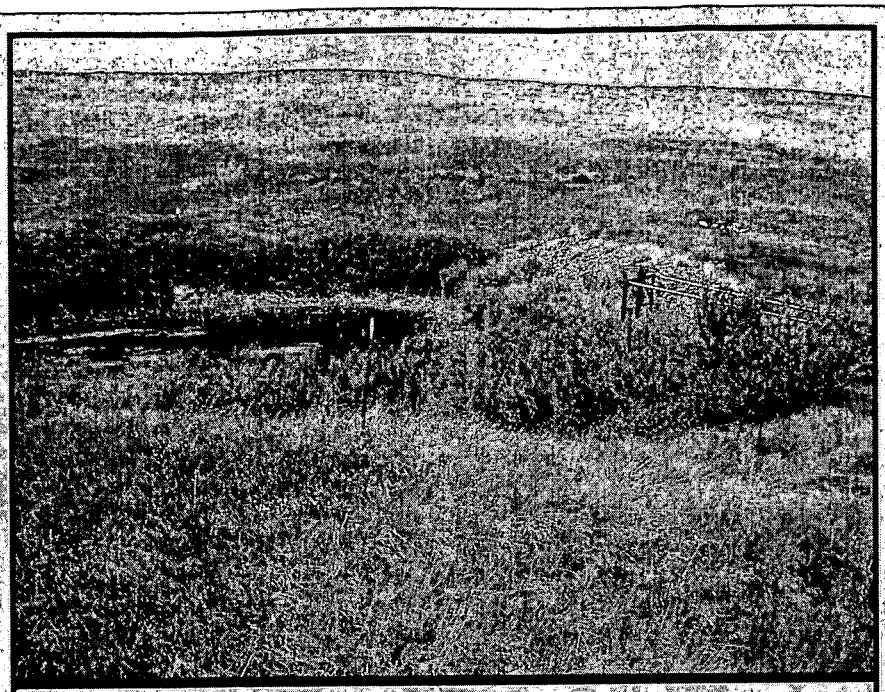
Photopoint 16

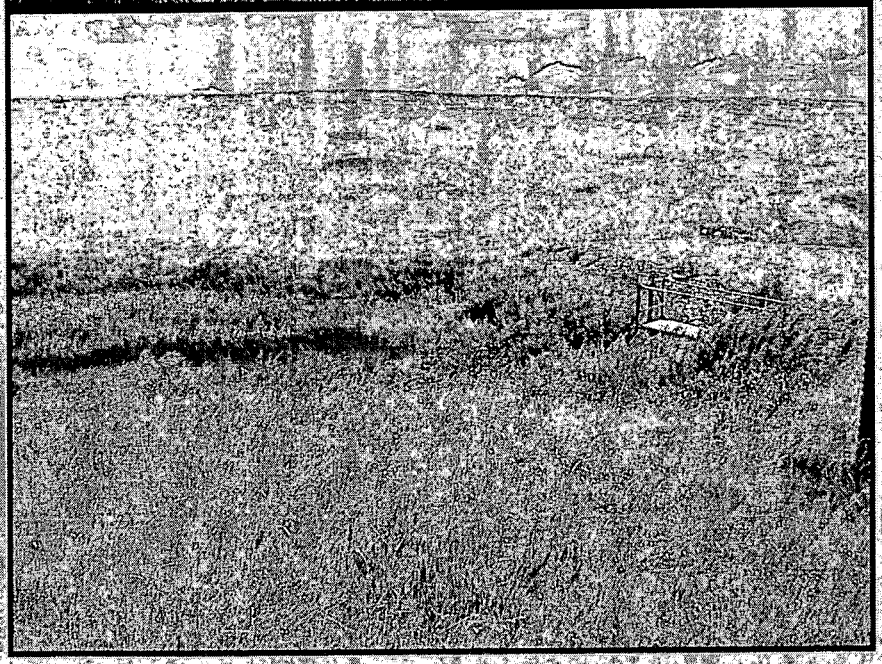


Photopoint 17



Photopoint 18



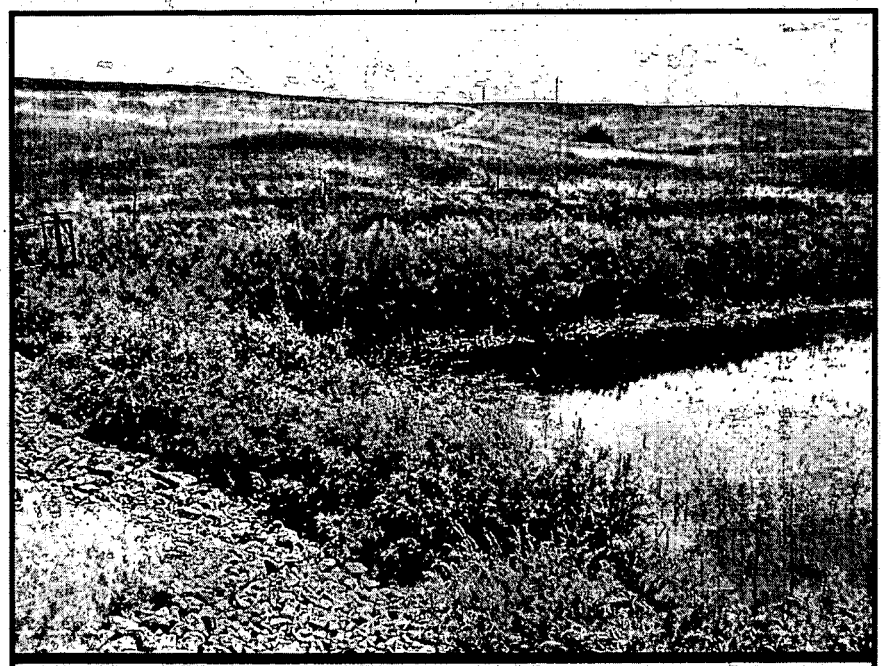


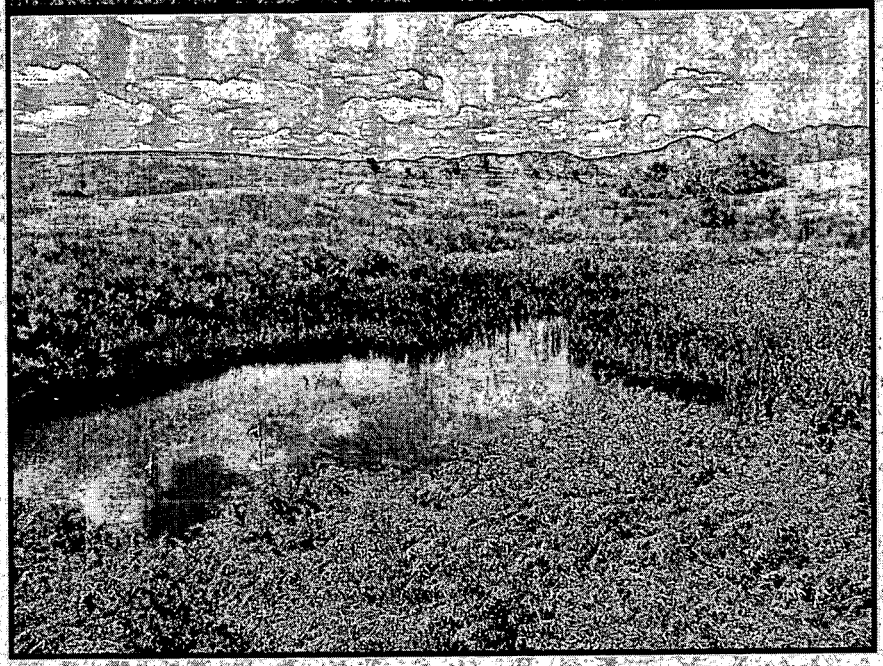
Pond Remediation

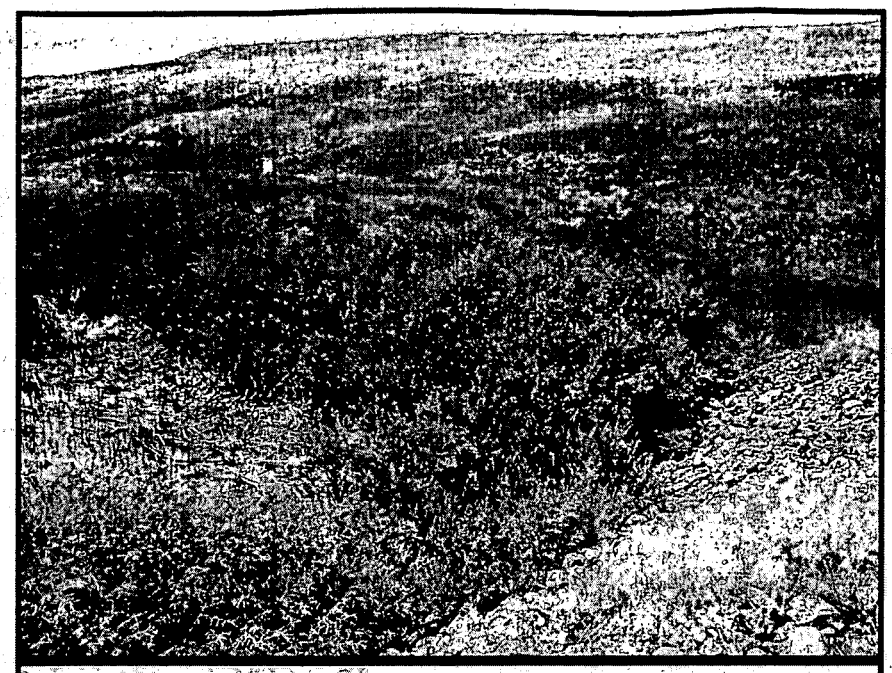
A-Series, Photopoints 19-28

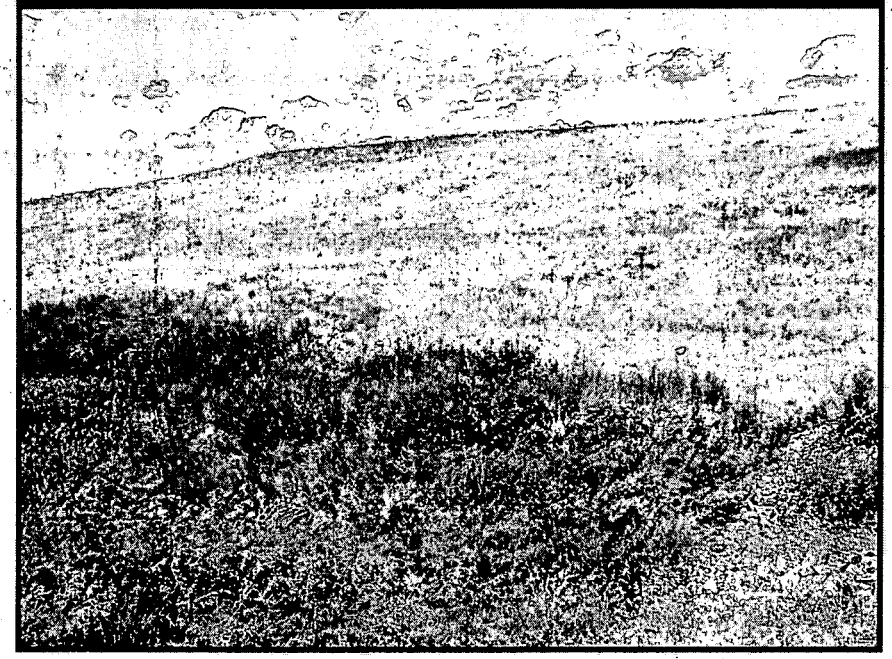
6/29/2004 **8/26/2005**

Photopoint 19 (Pond A-1)

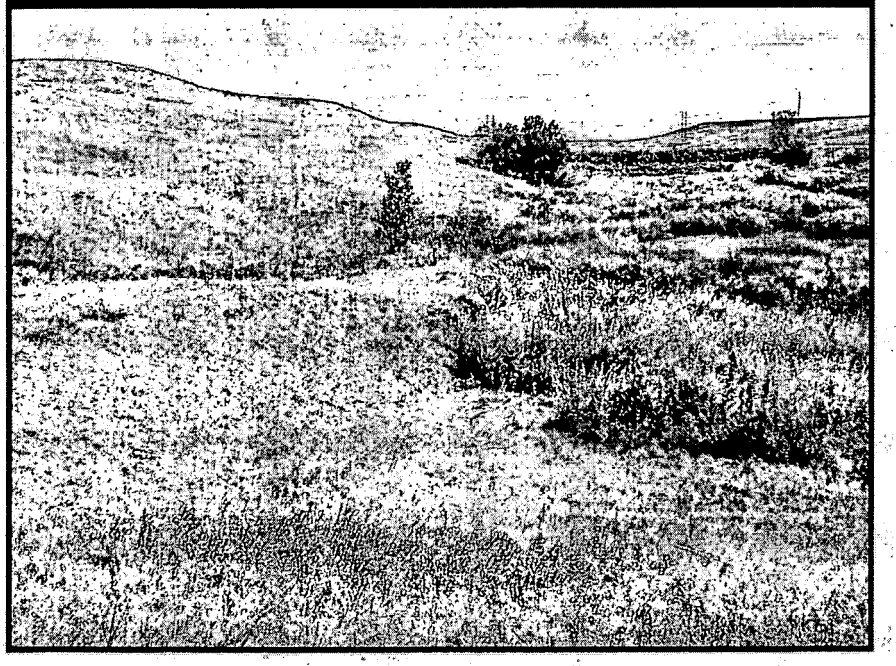


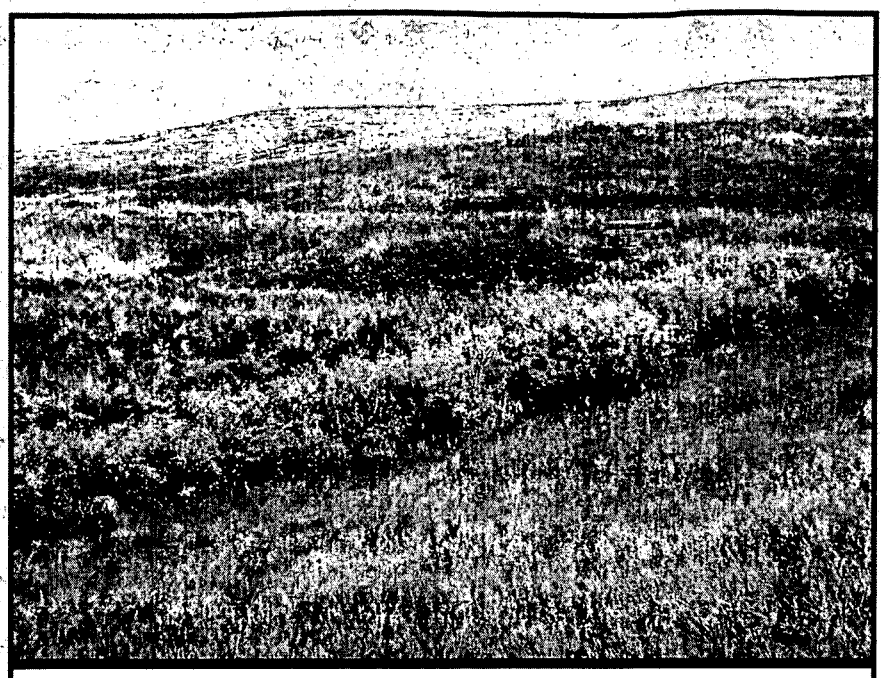




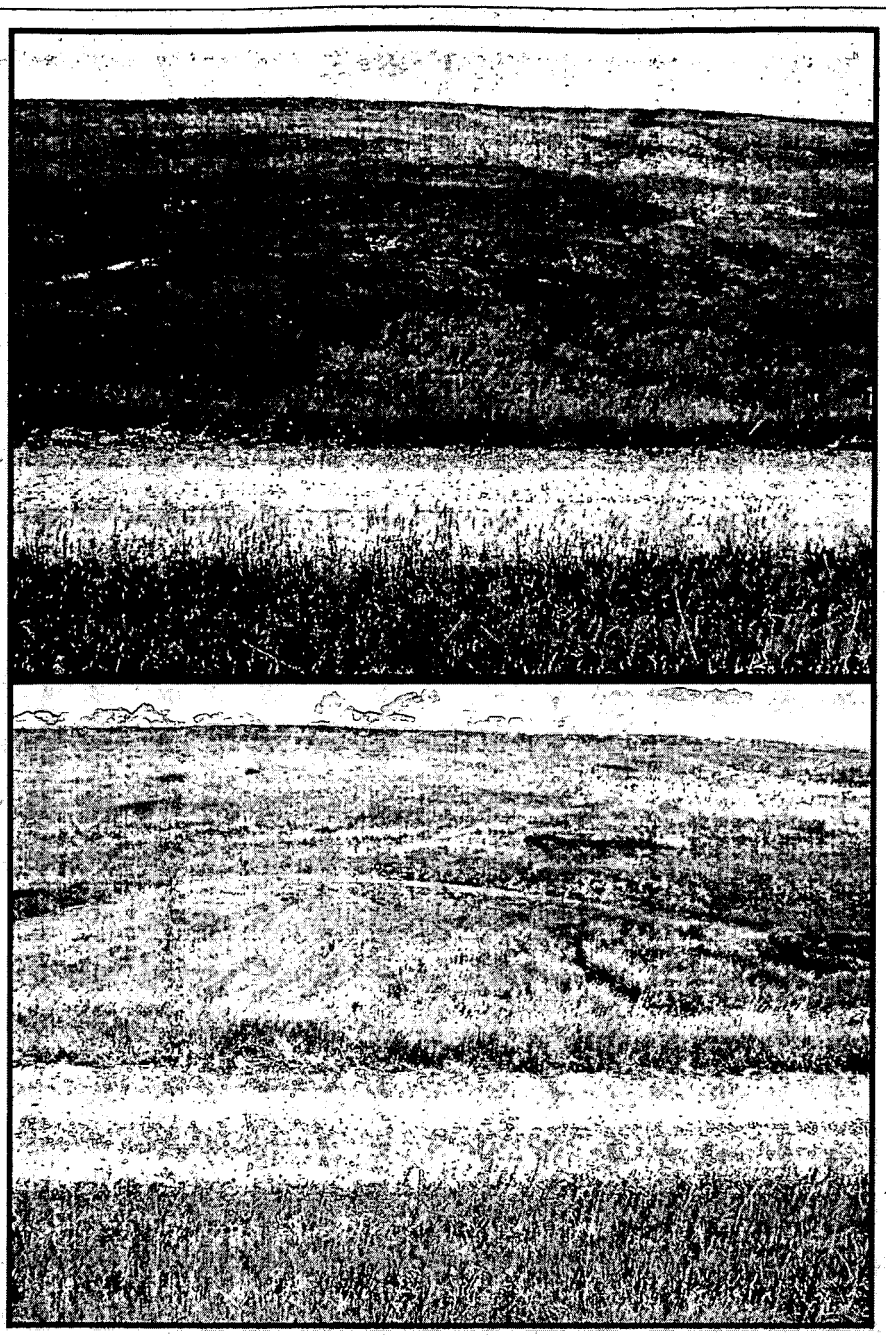


Photopoint 20 (A-2 Pond)

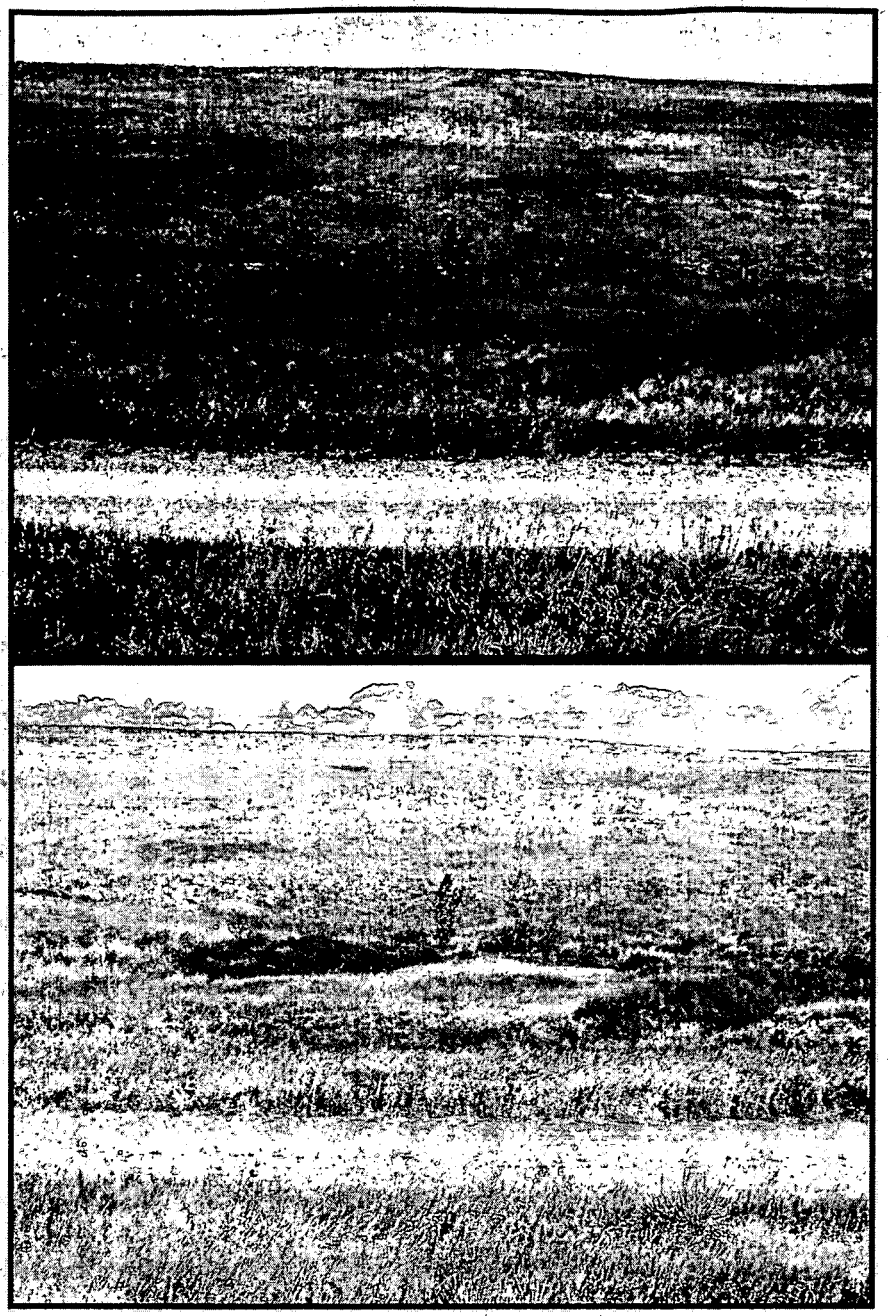




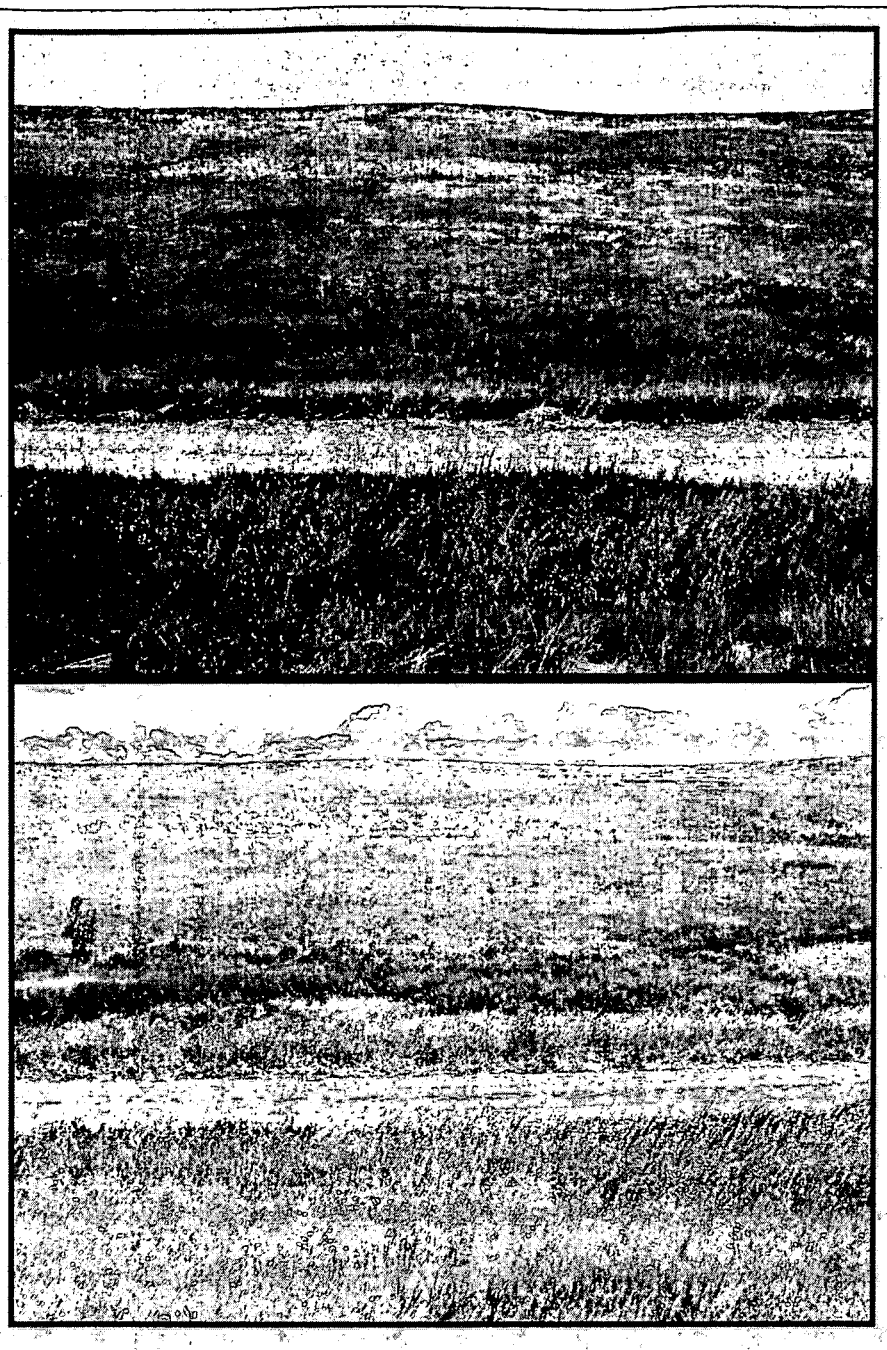
Photopoint 21



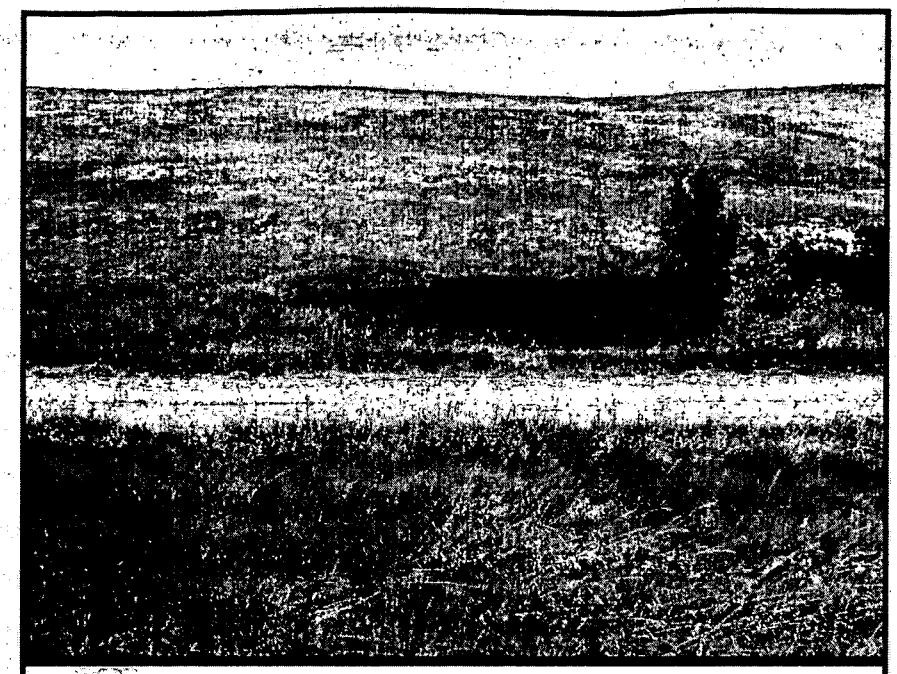
Photopoint 22



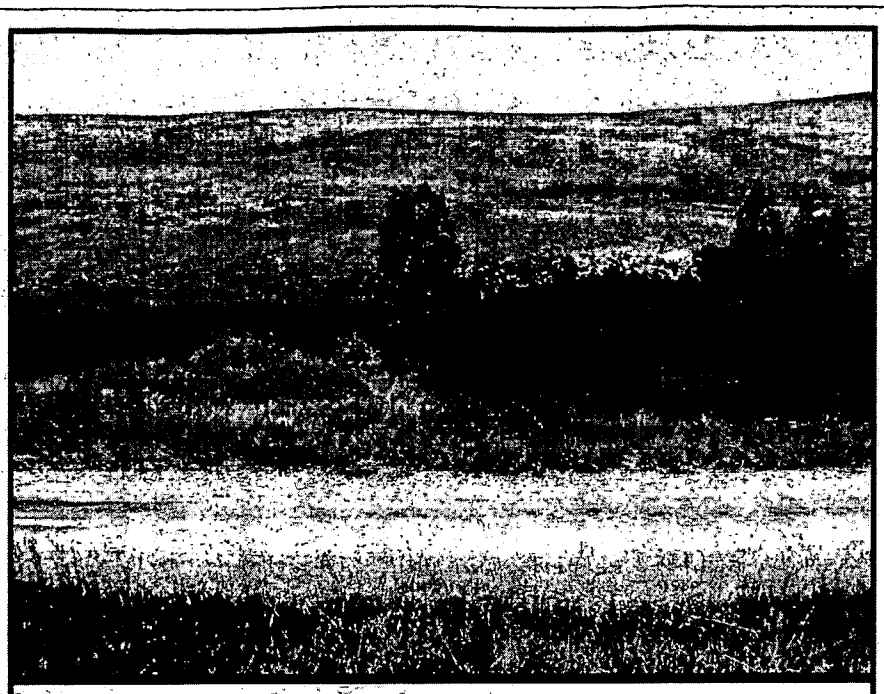
Photopoint 23



Photopoint 24

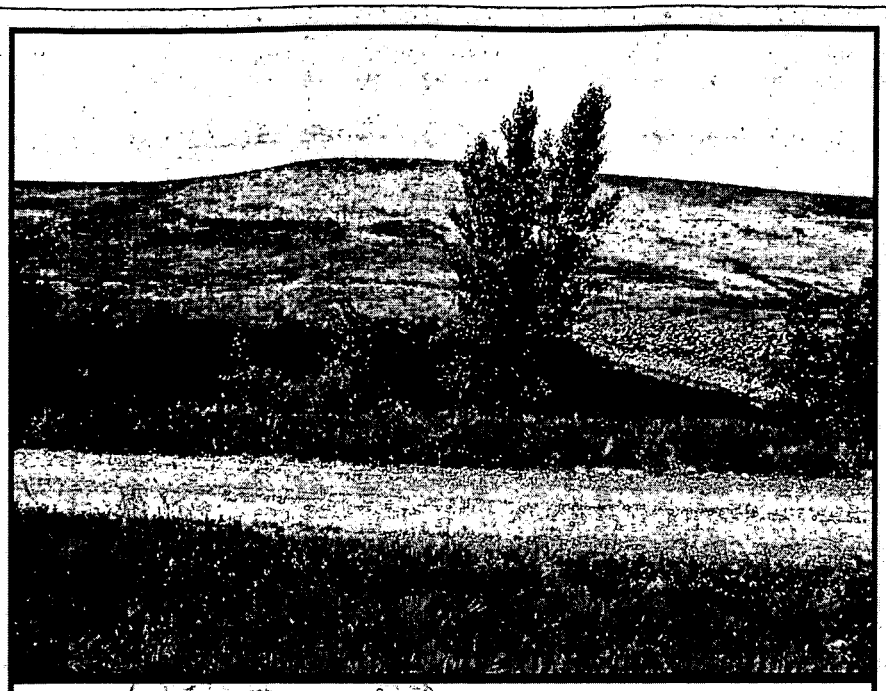


Photopoint 25

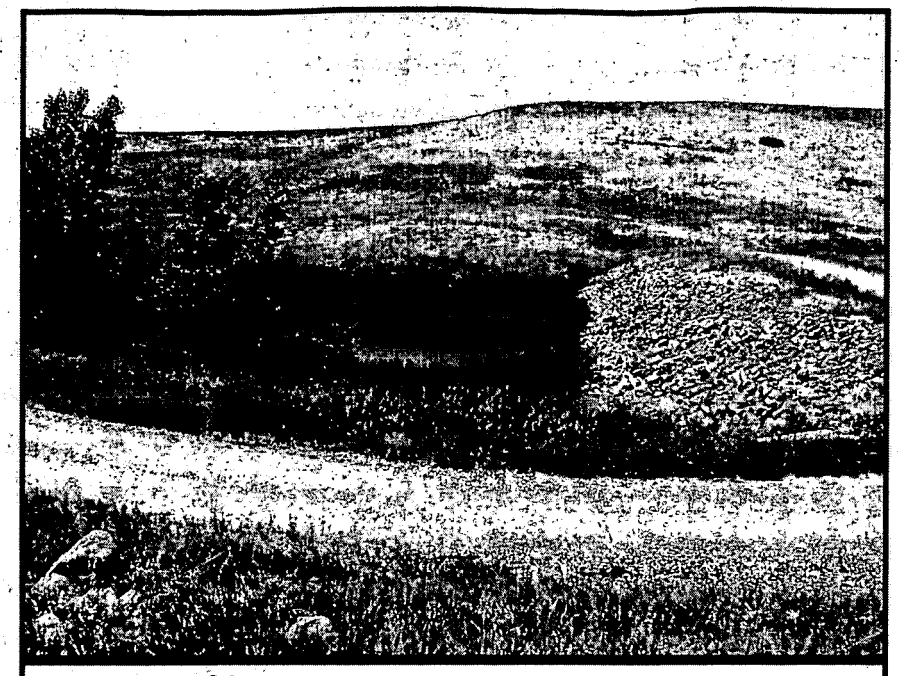


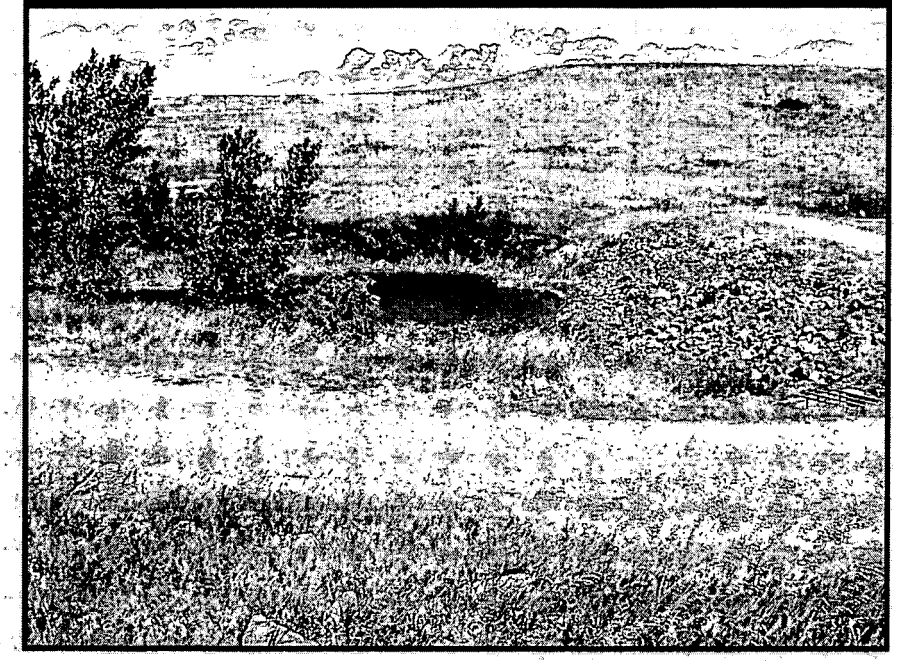
Photopoint 26

Photopoint 27



Photopoint 28



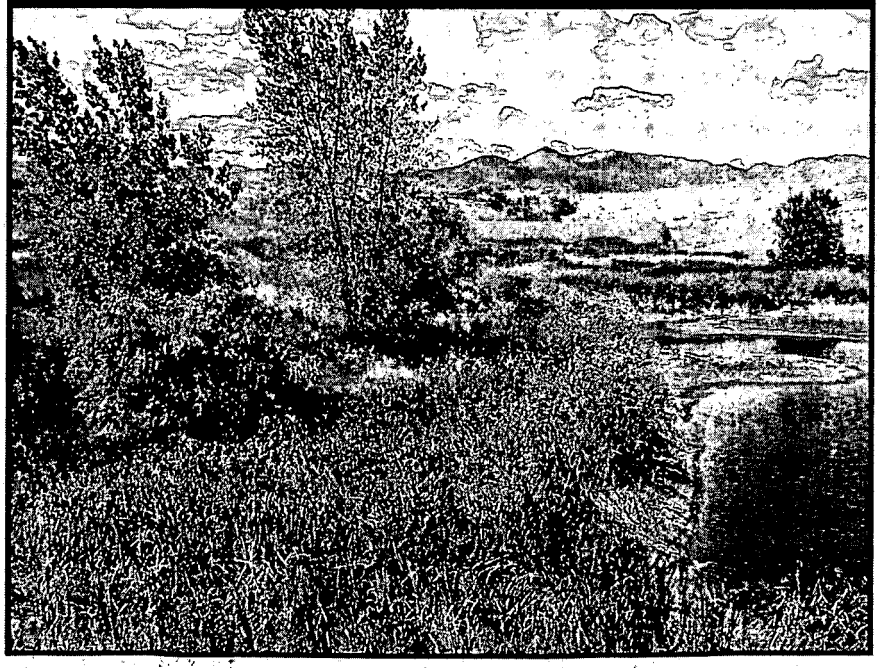


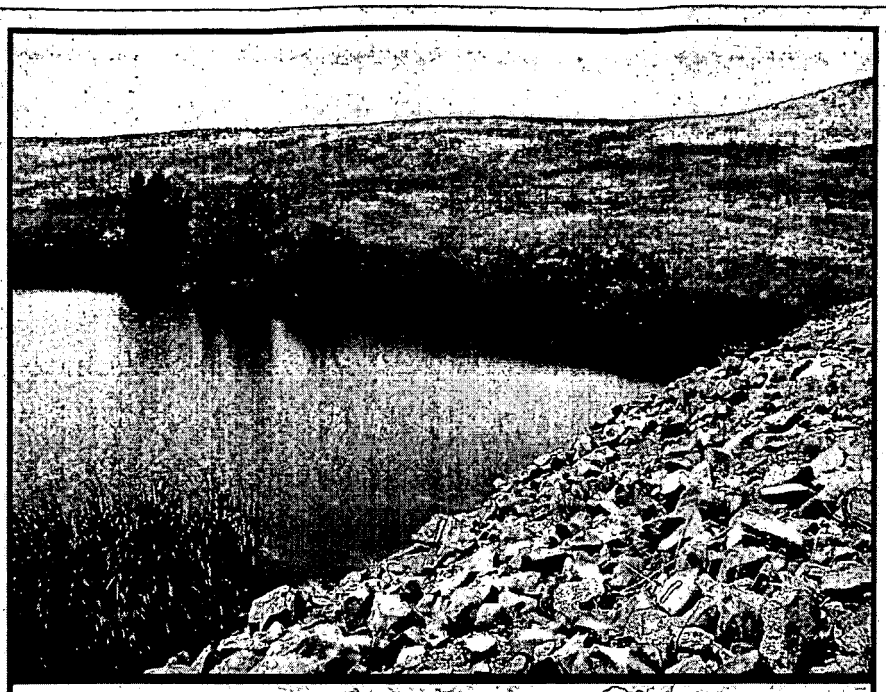
Pond Remediation

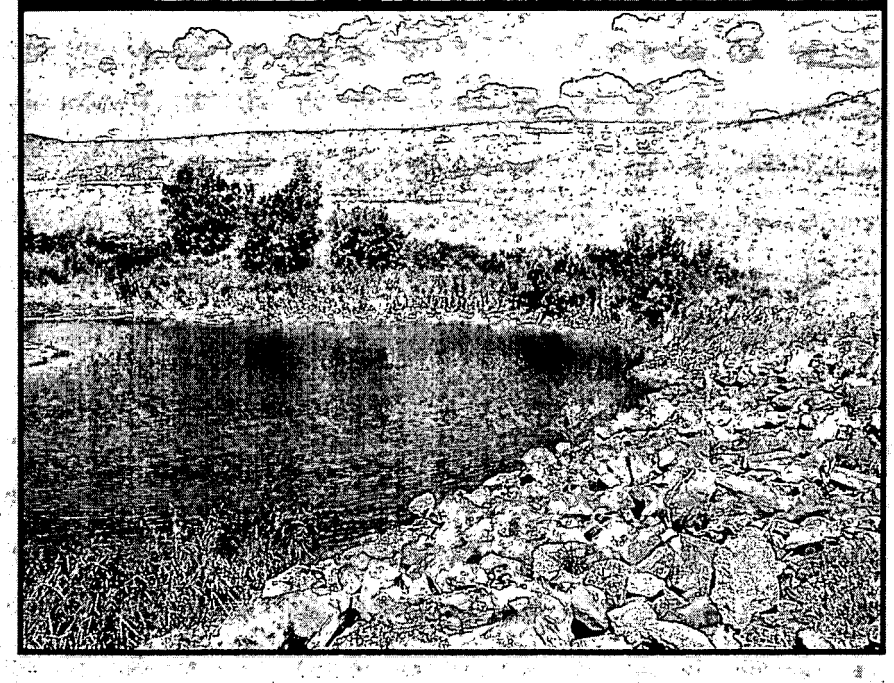
A-Series, Photopoints 29-37

6/29/2004 **8/26/2005**

Photopoint 29 (A-2 Pond)

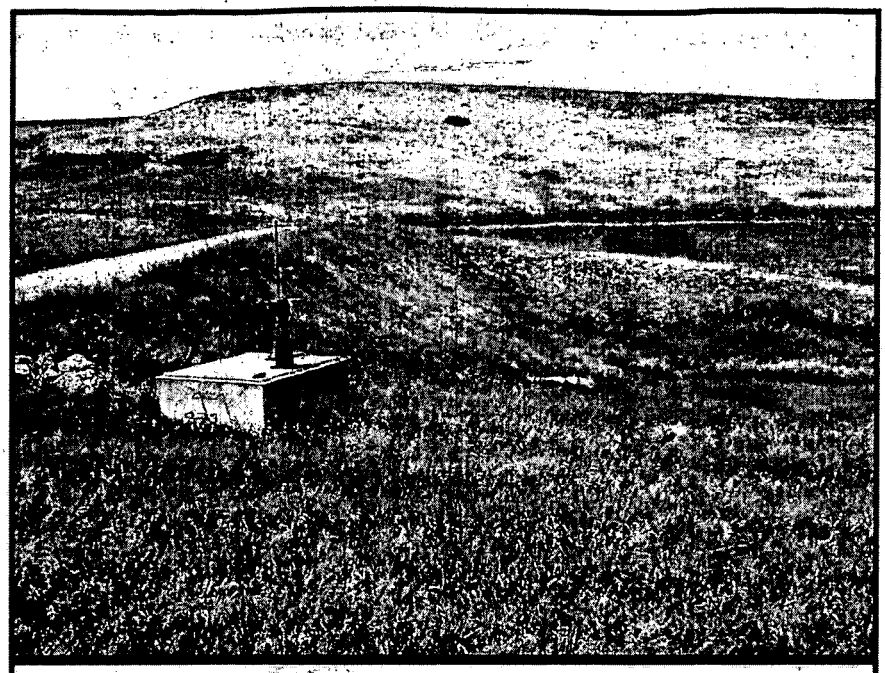


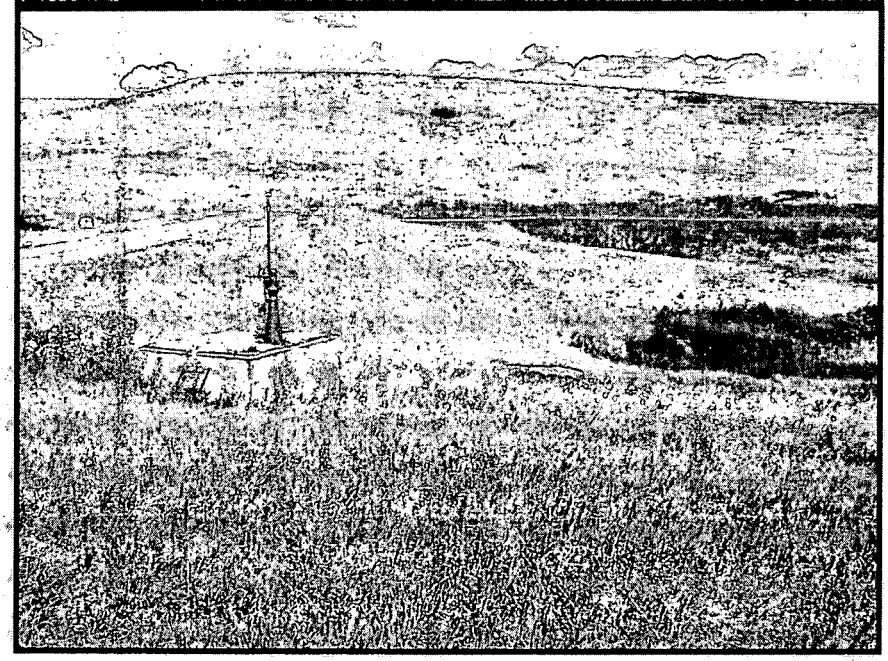




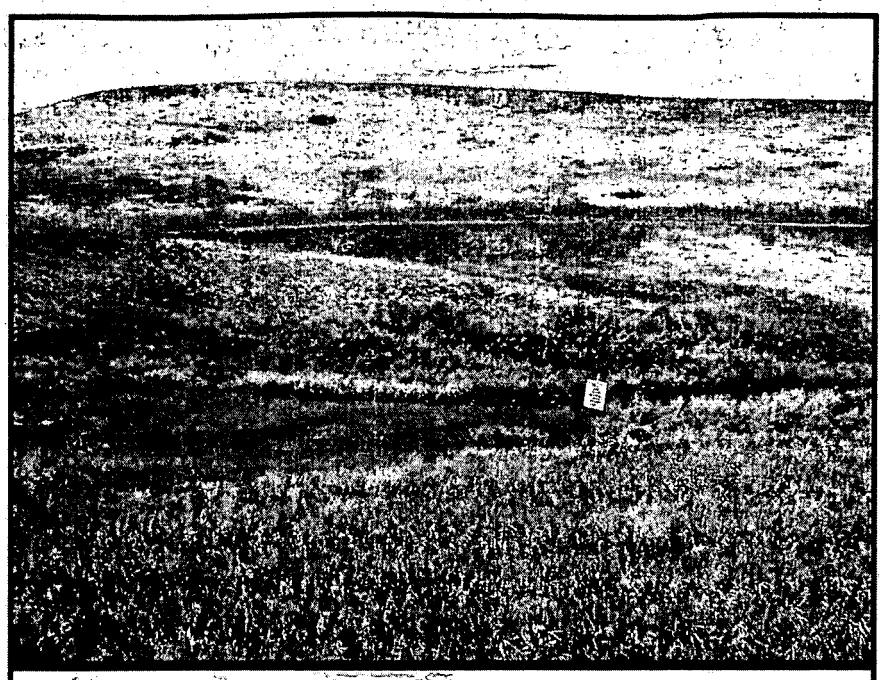
Photopoint 30 (A-3 Pond)

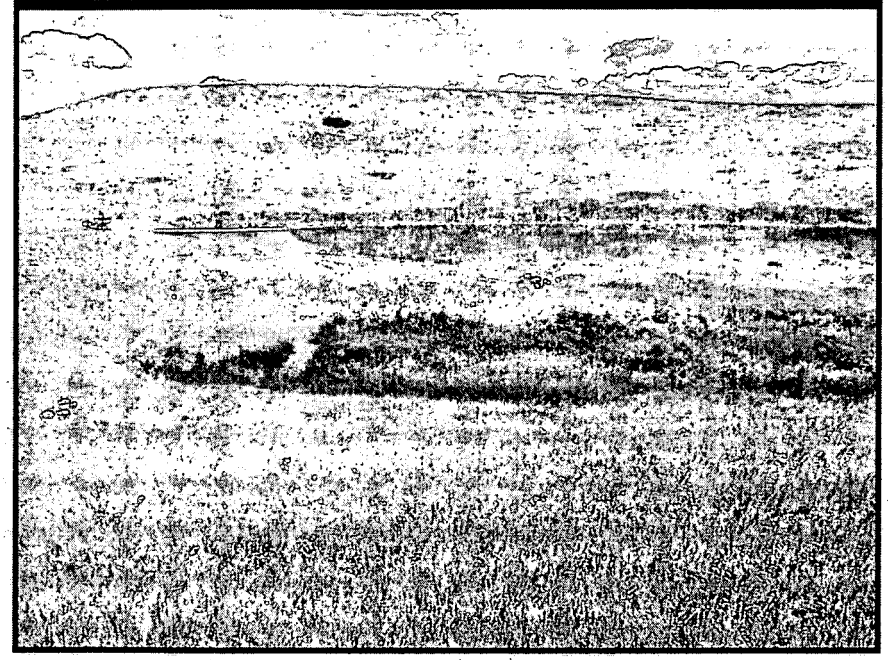
Photopoint 31



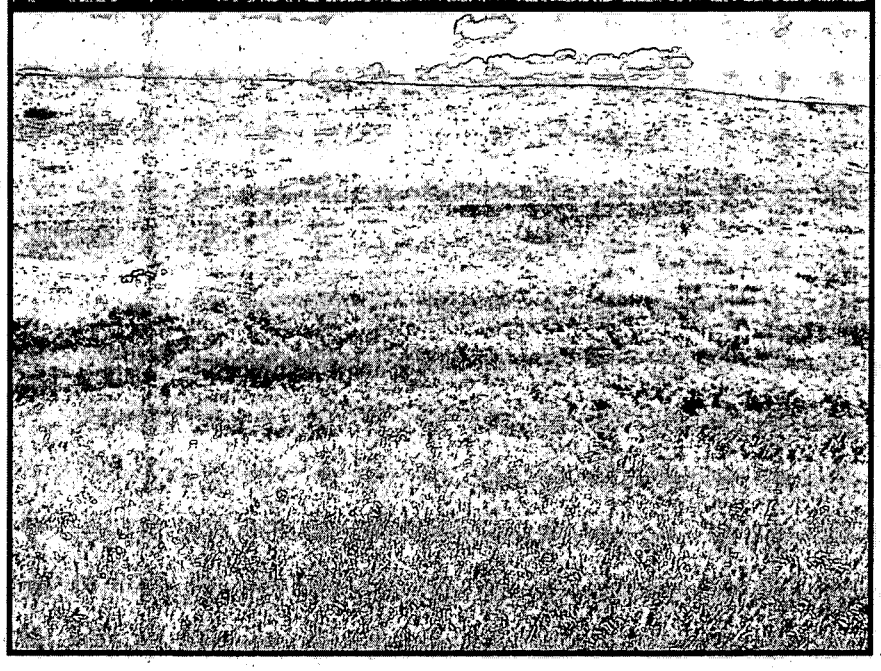


Photopoint 32

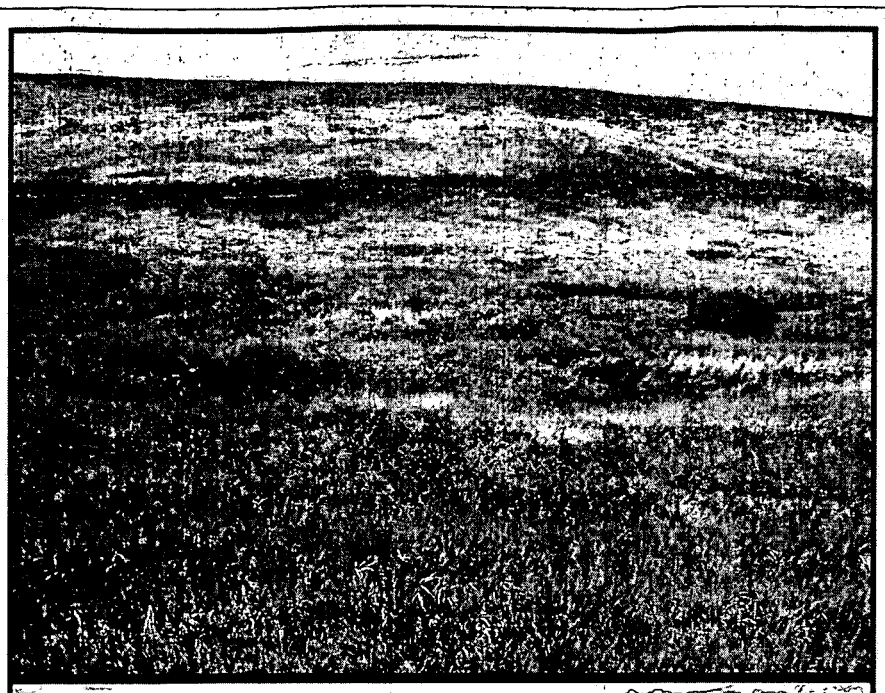




Photopoint 33

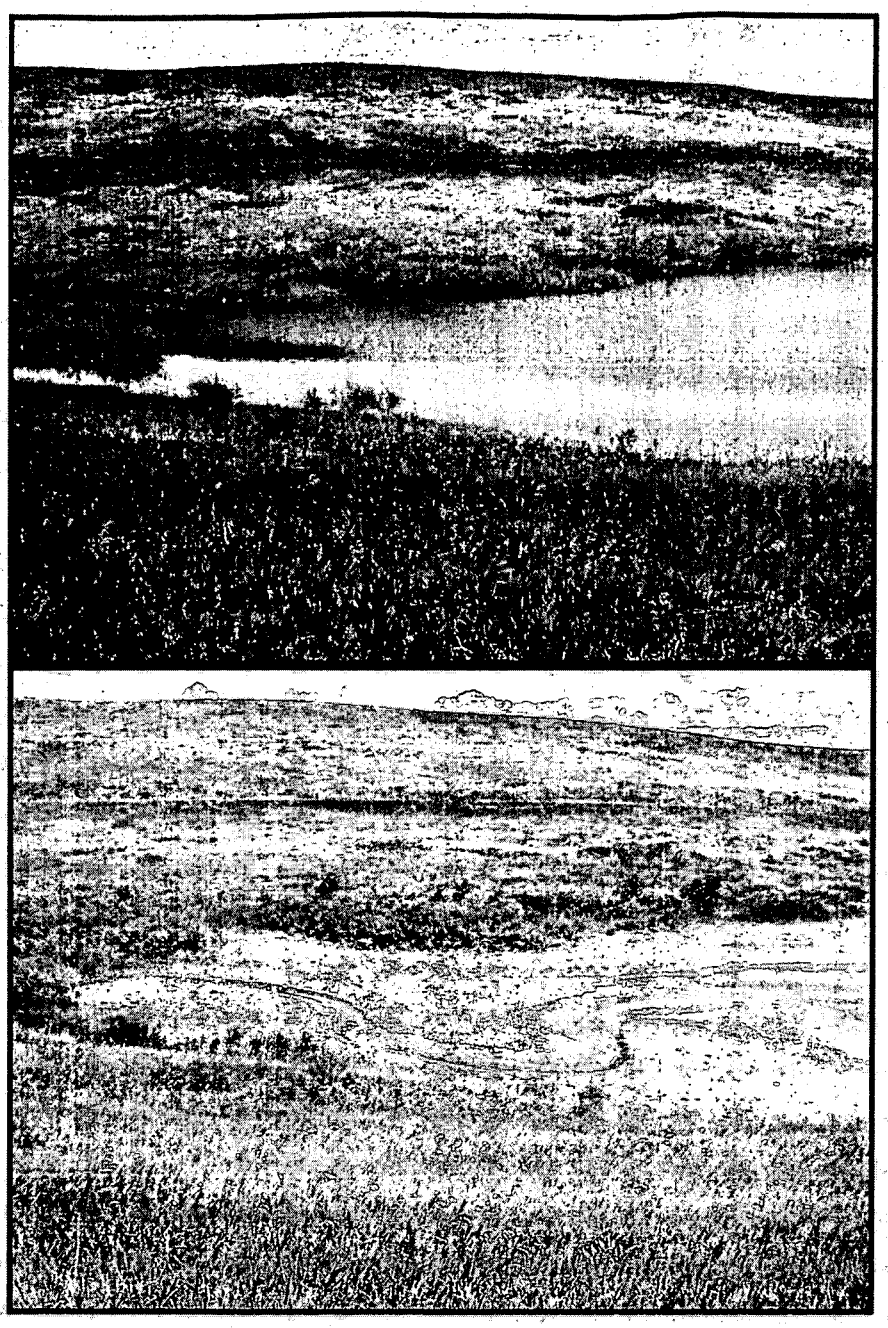


Photopoint 34

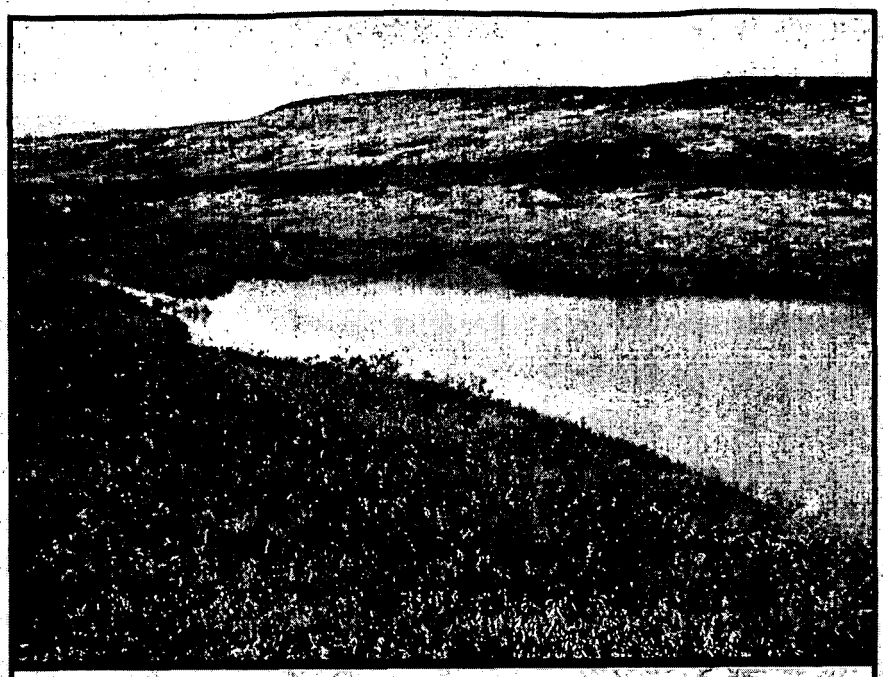


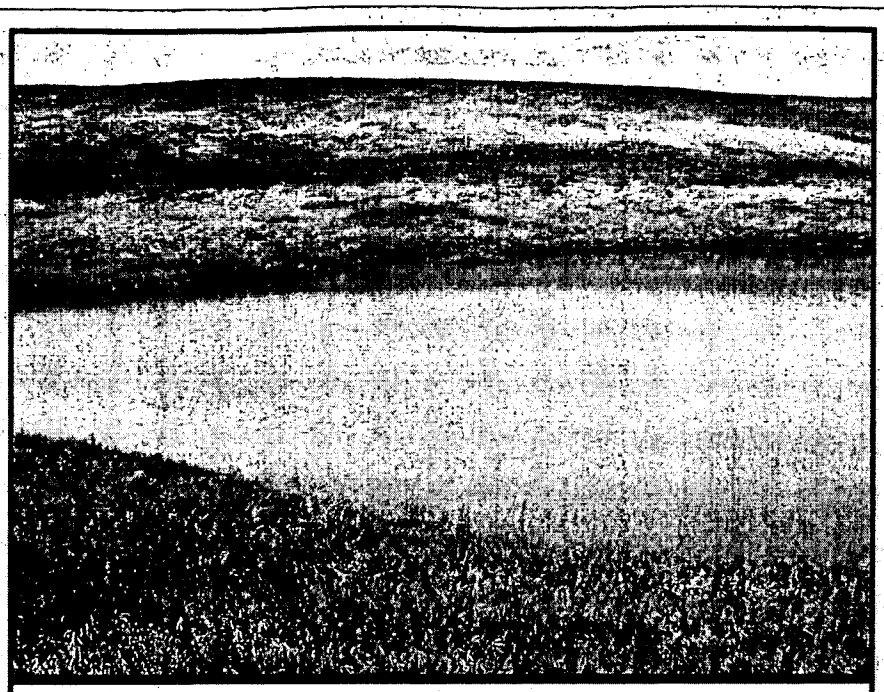
Photopoint 35

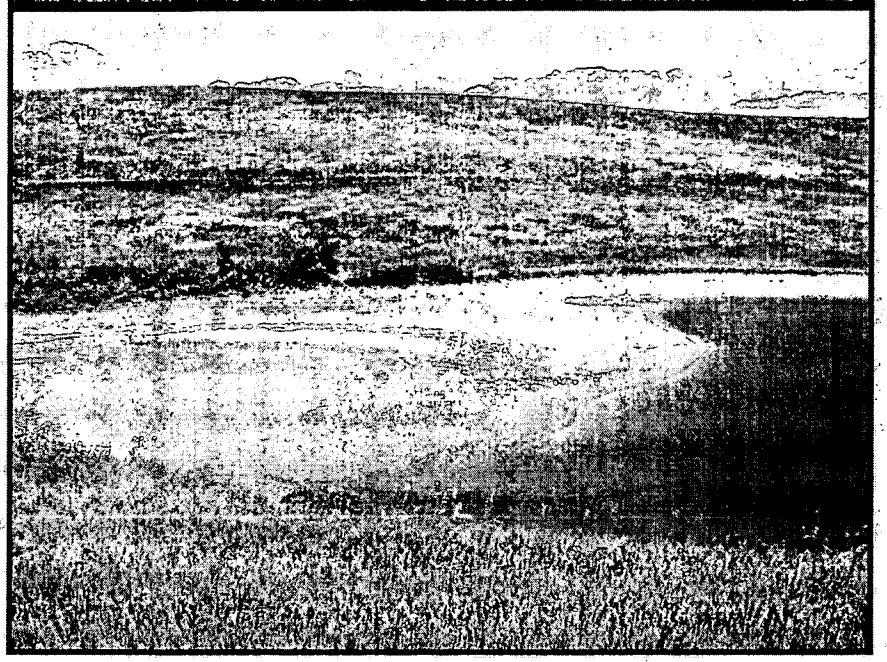
Photopoint 36

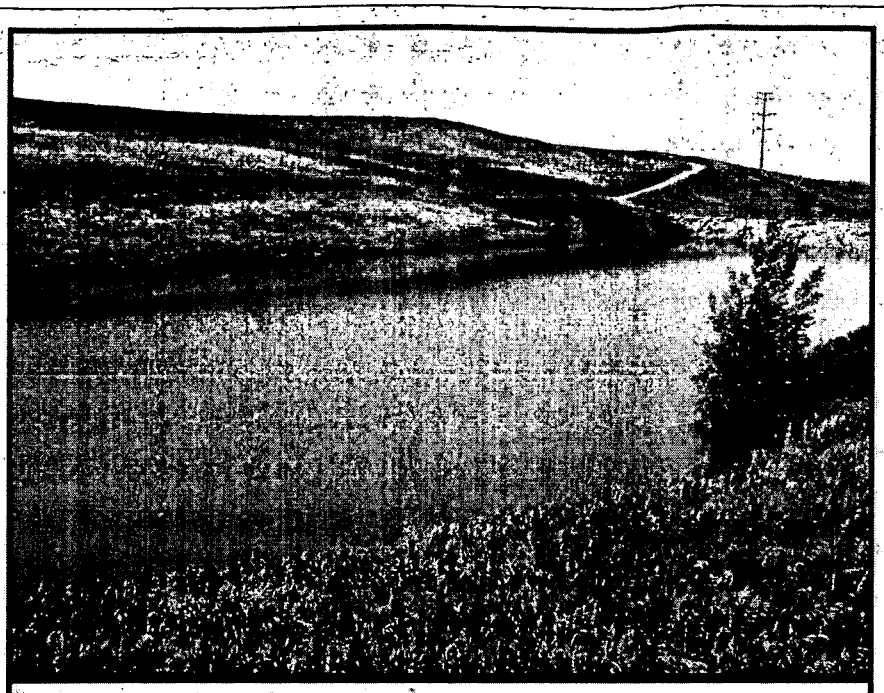


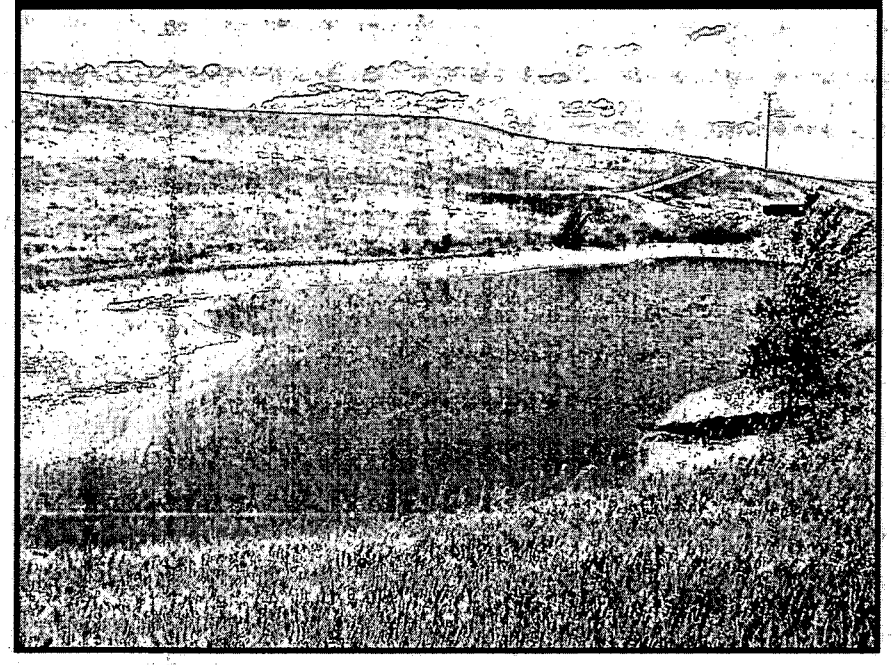
Photopoint 37 (A-3 Pond)

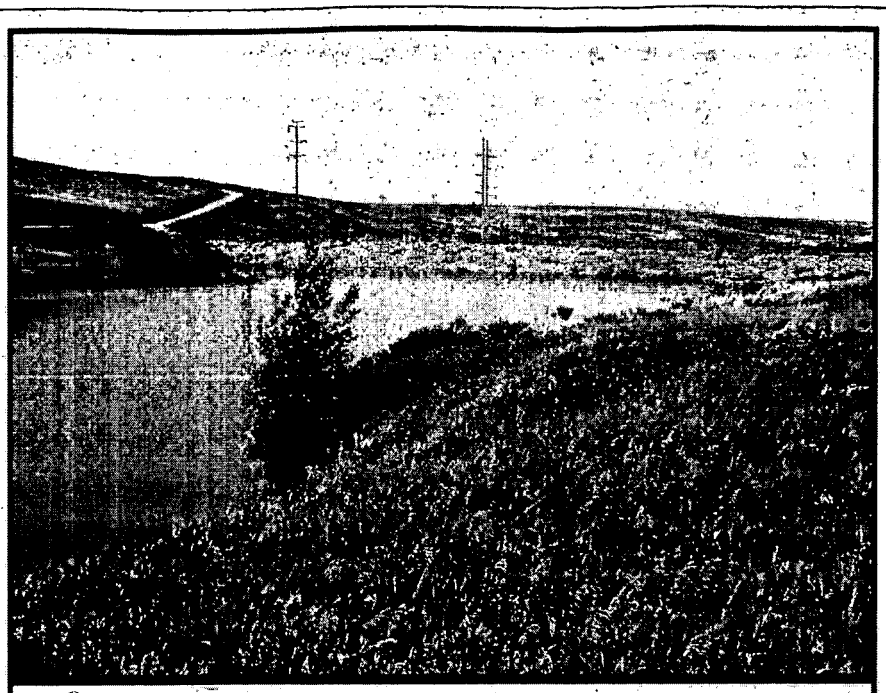


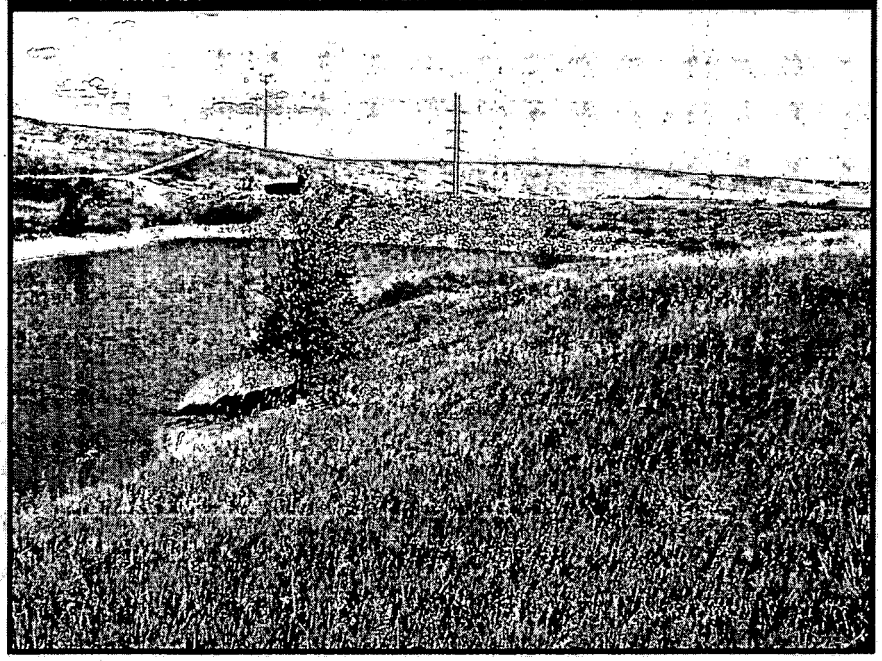










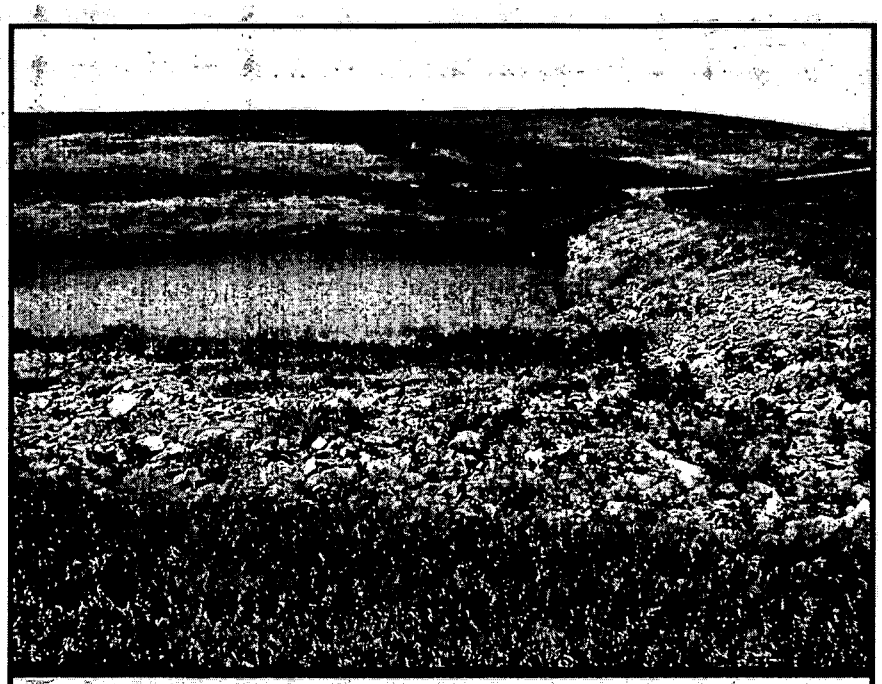


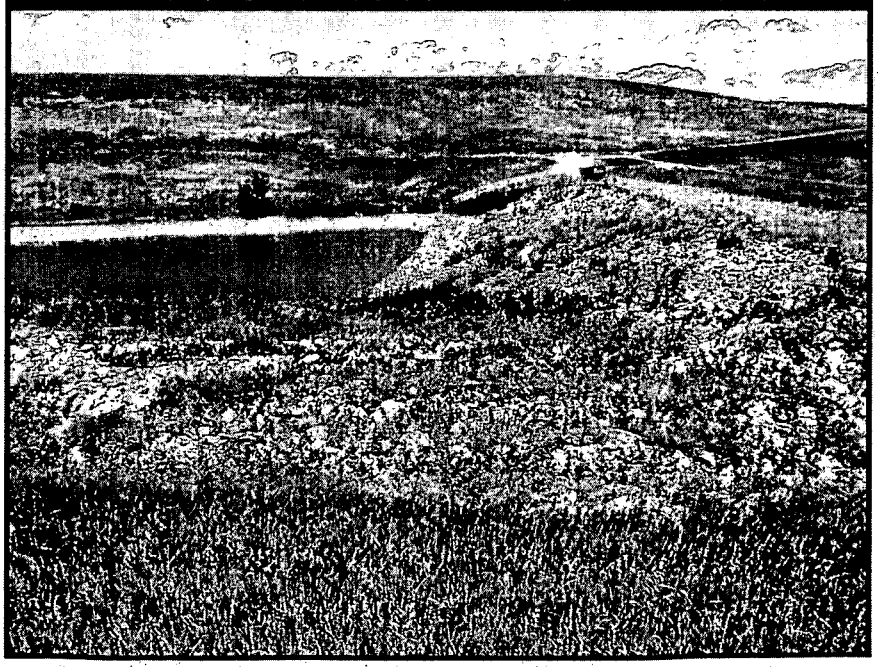
Pond Remediation

A-Series, Photopoints 38-43

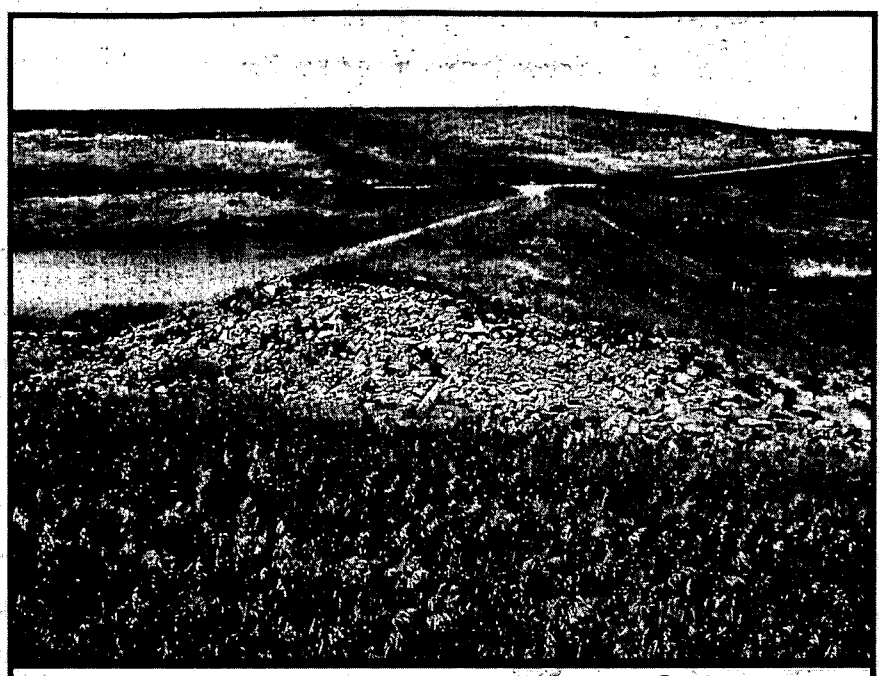
6/29/2004 **8/26/2005**

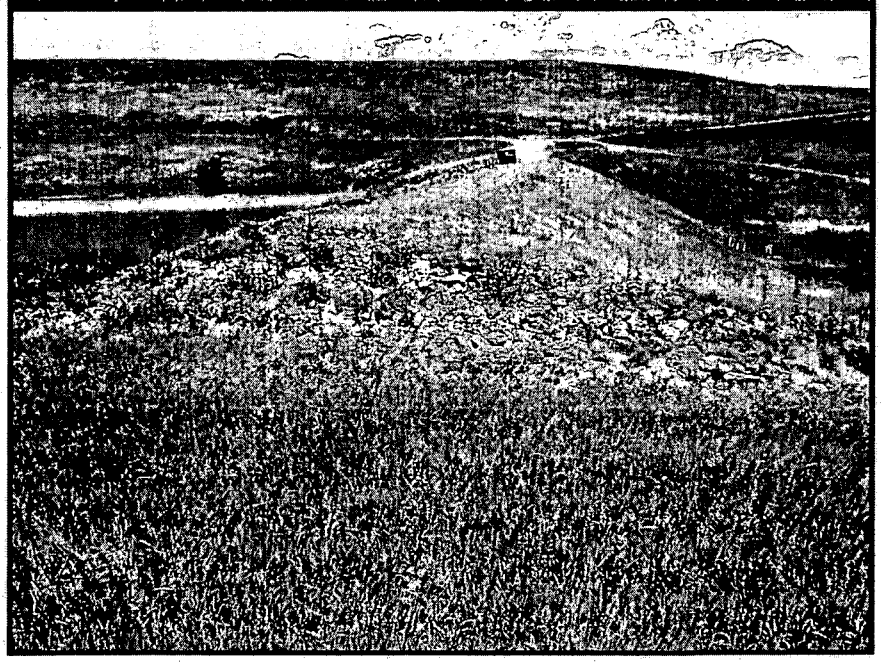
Photopoint 38



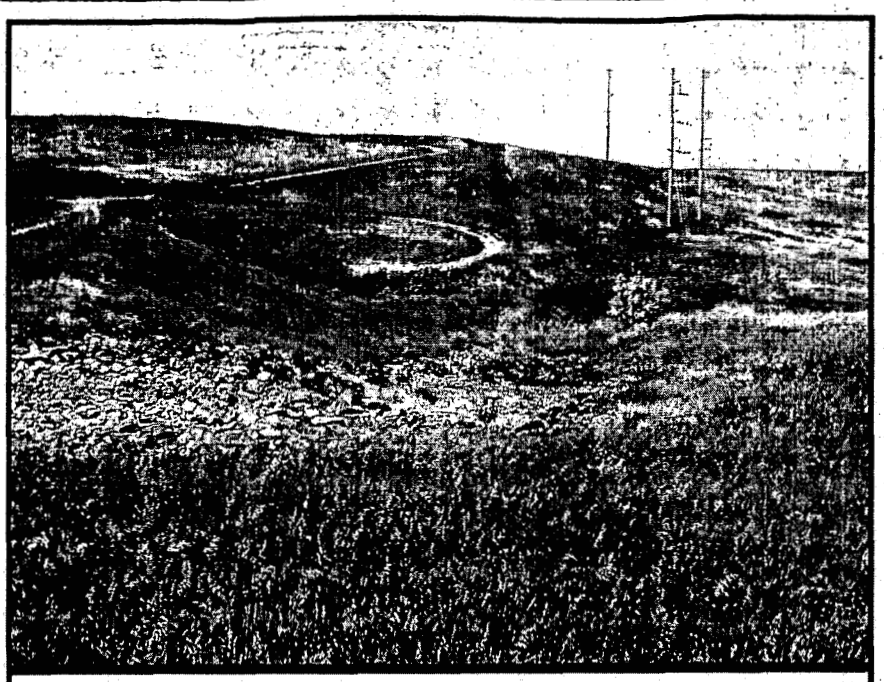


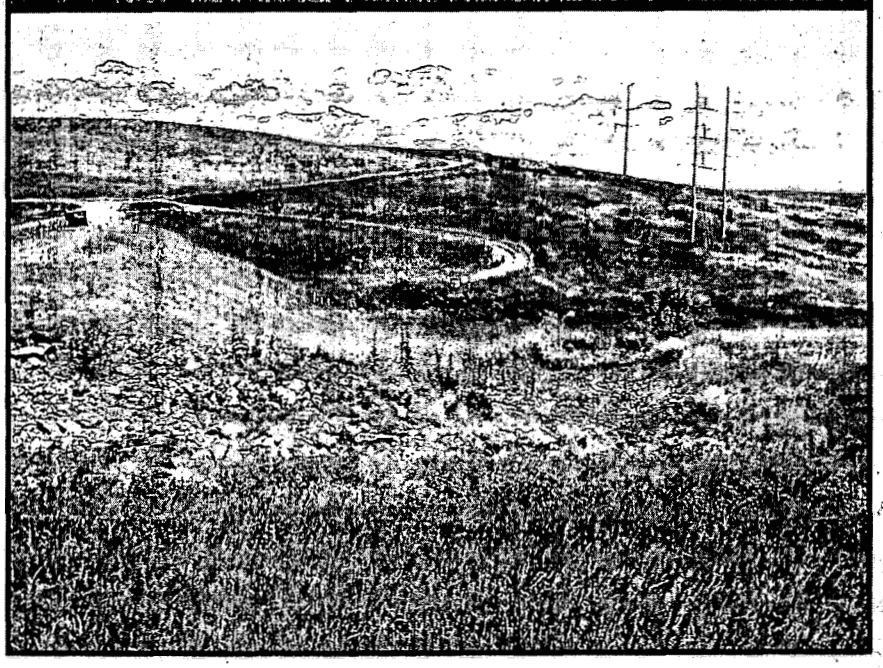
Photopoint 39



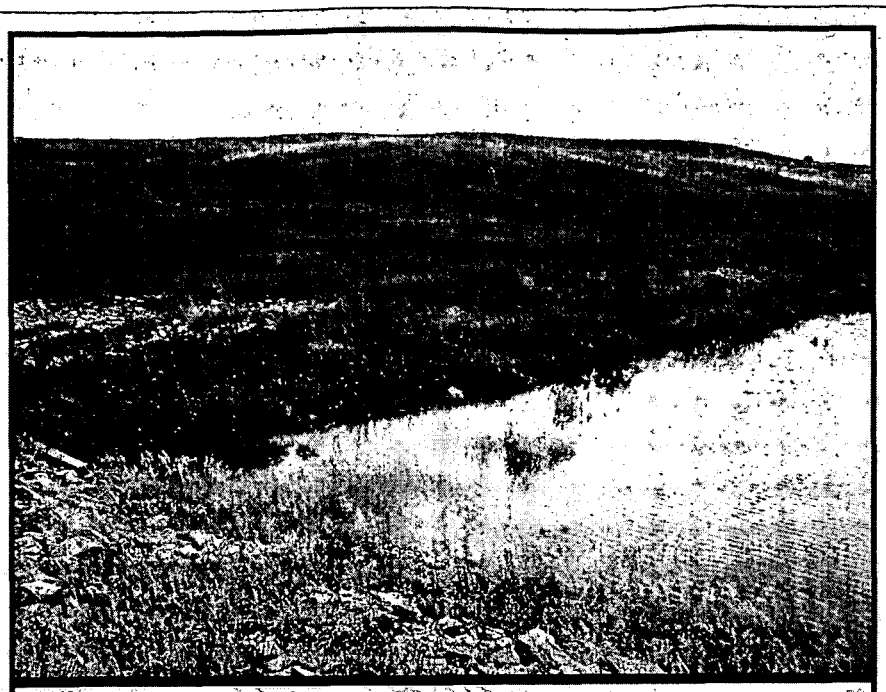


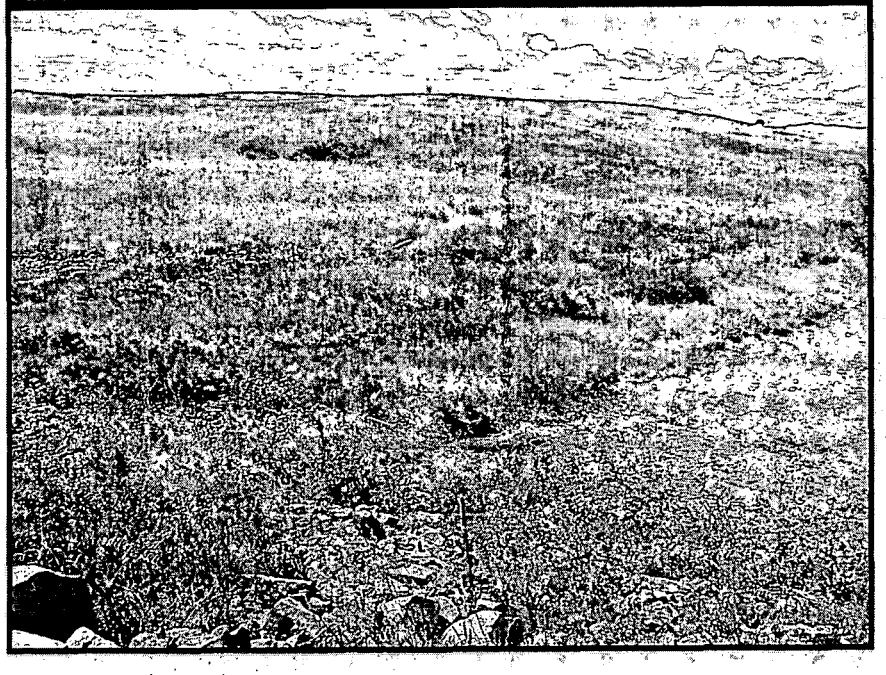
Photopoint 40

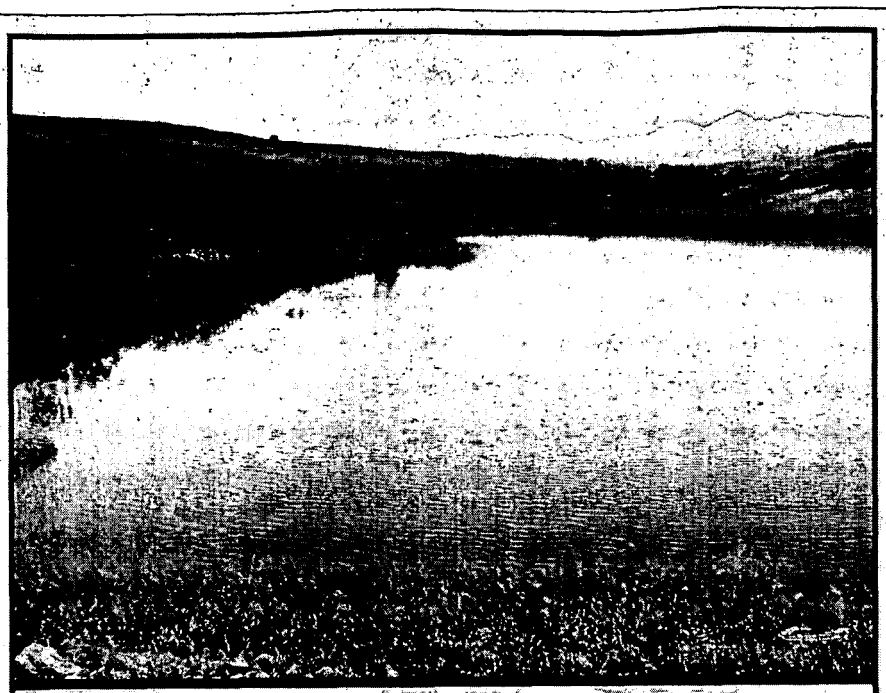


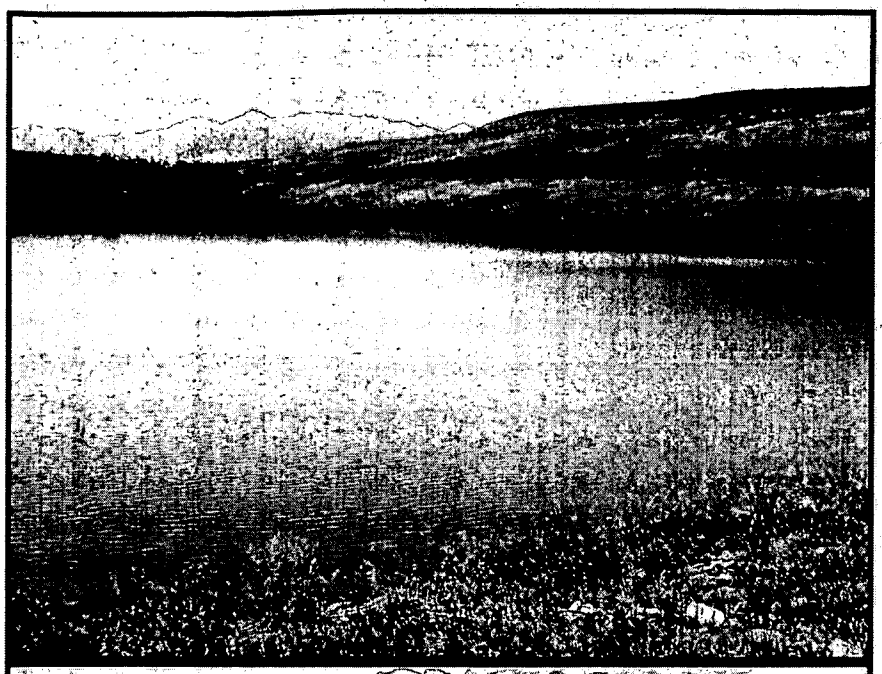


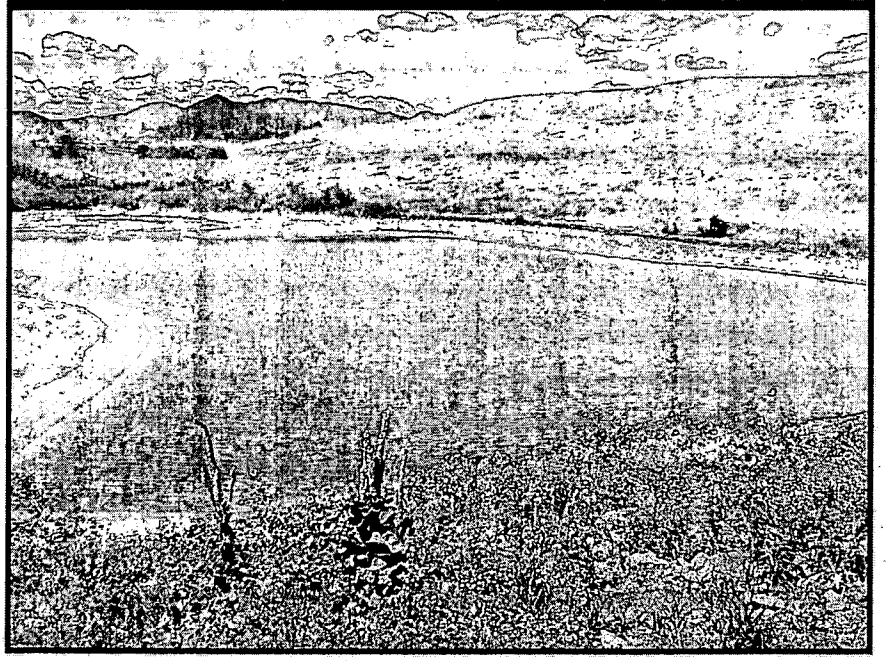
Photopoint 41 (A-3 Pond)

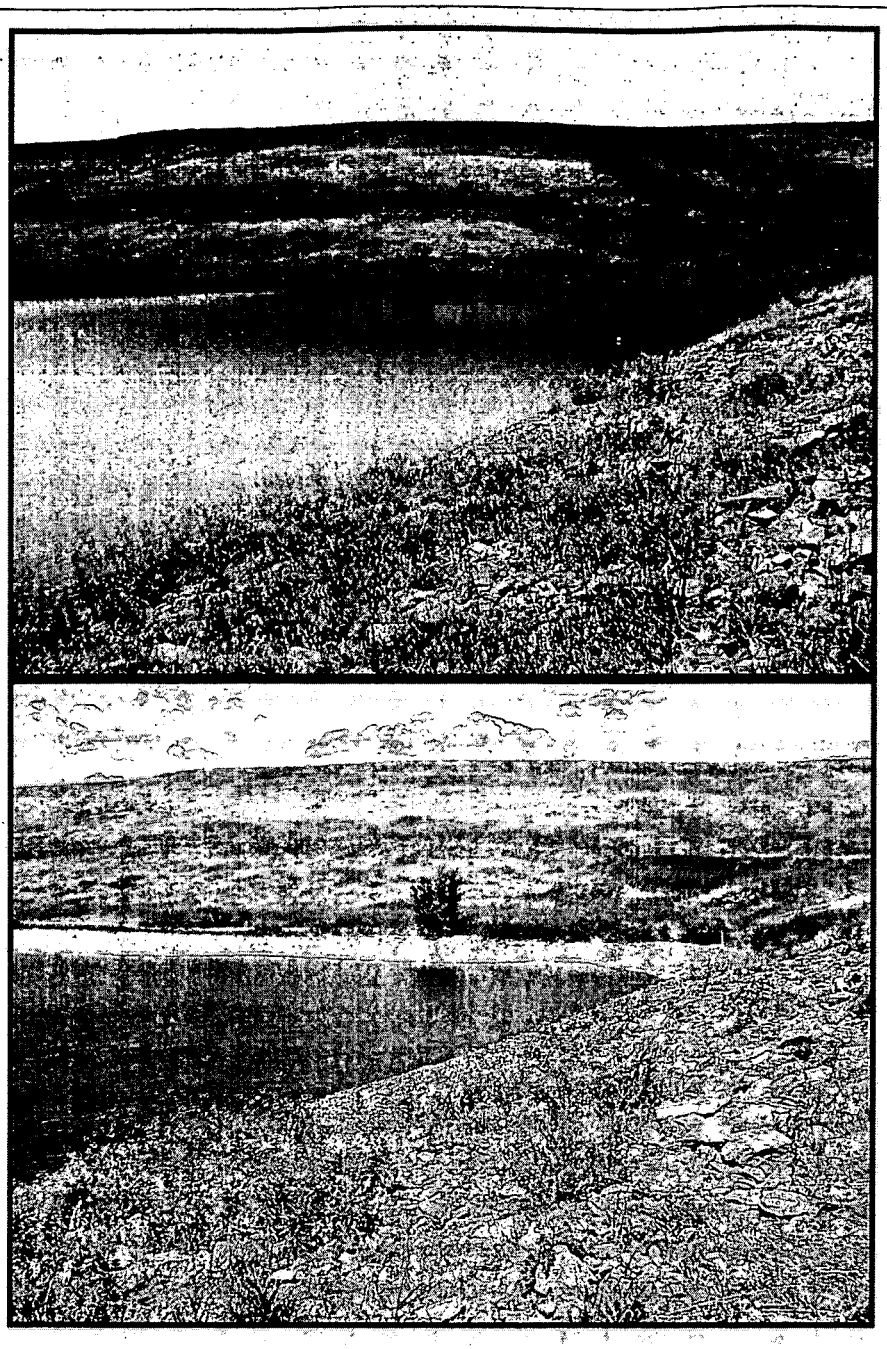




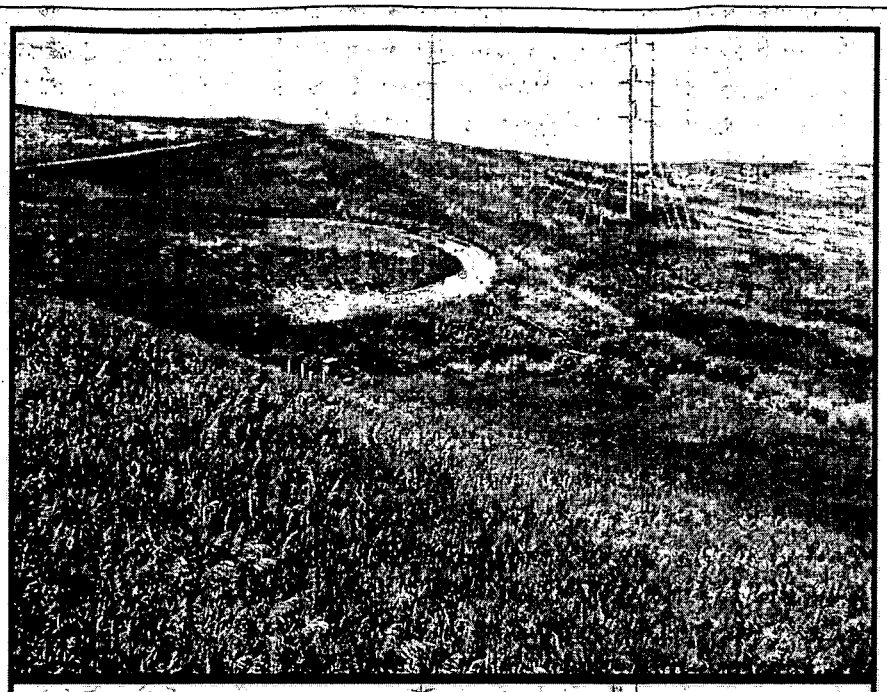


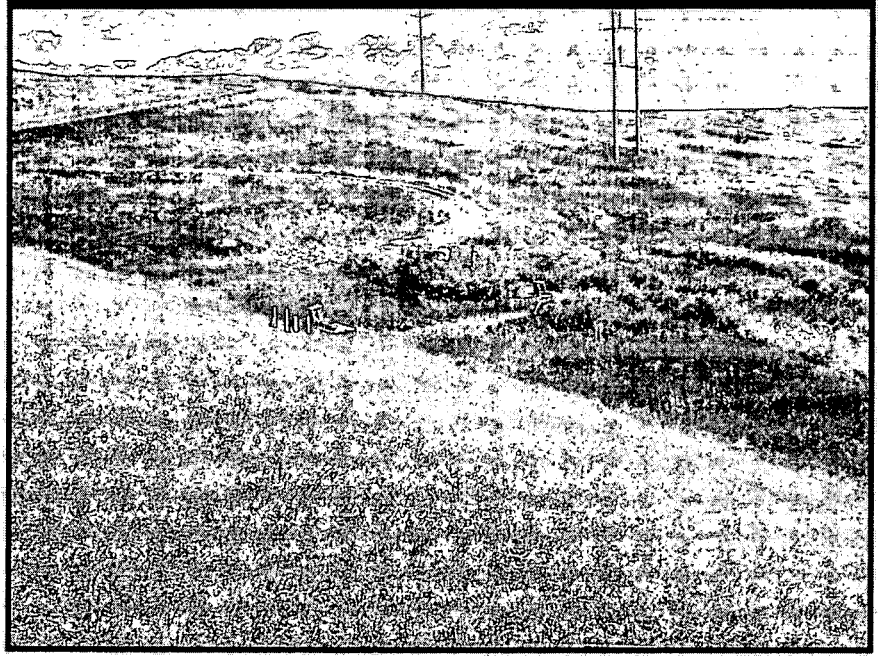


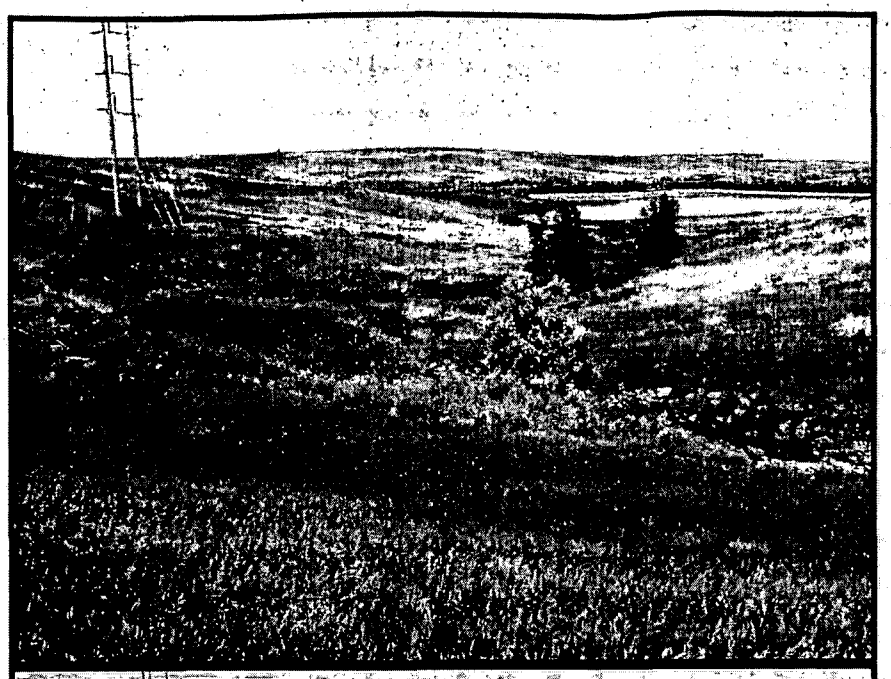


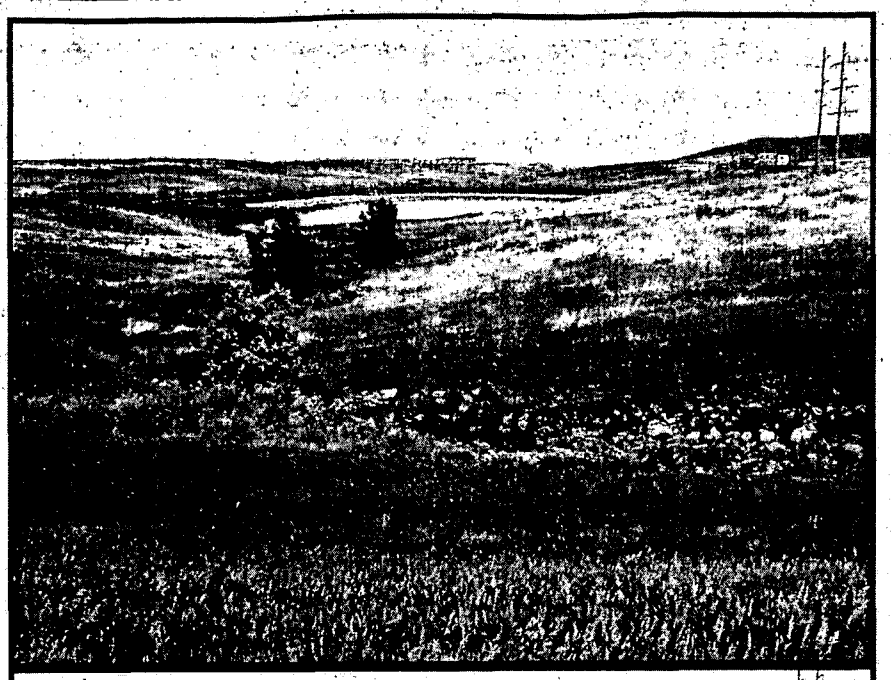


Photopoint 42 (A-4 Pond)

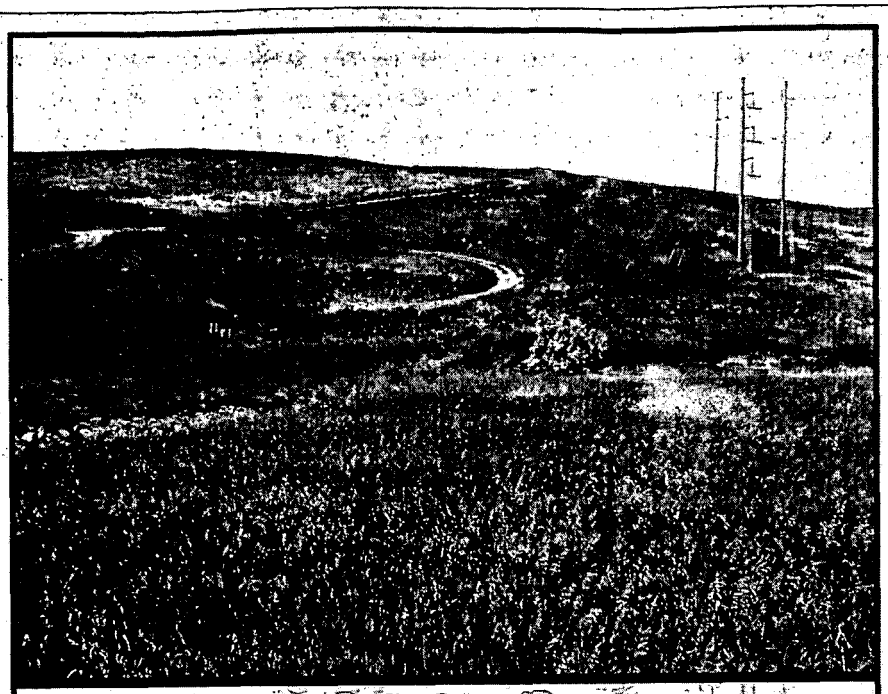








Photopoint 43

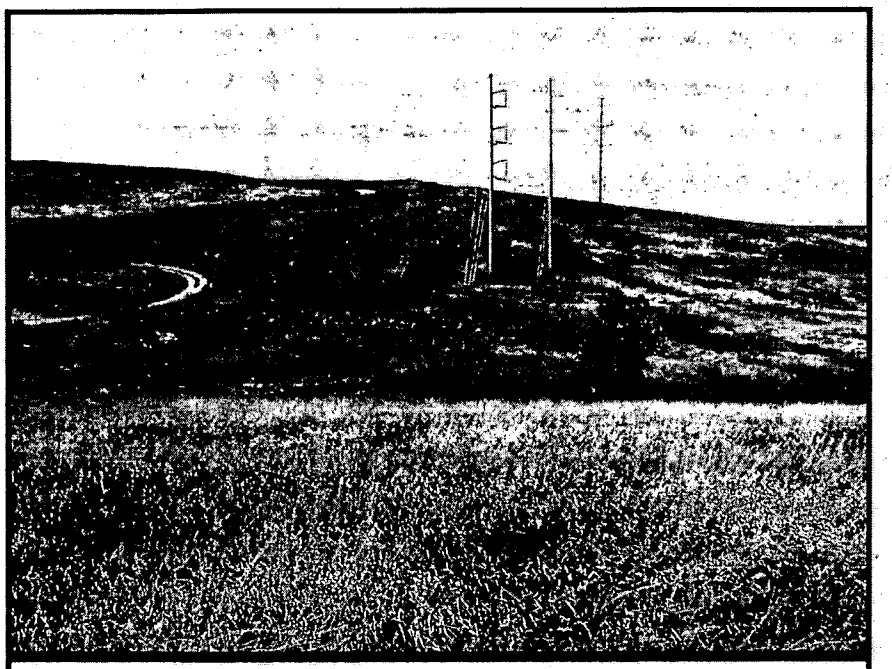


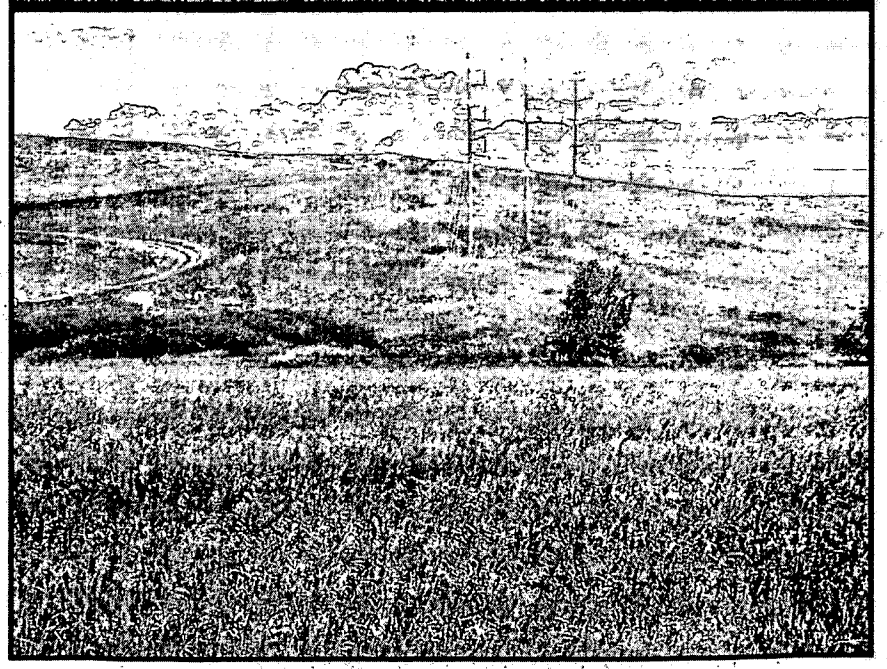
Pond Remediation

A-Series, Photopoints 44-47

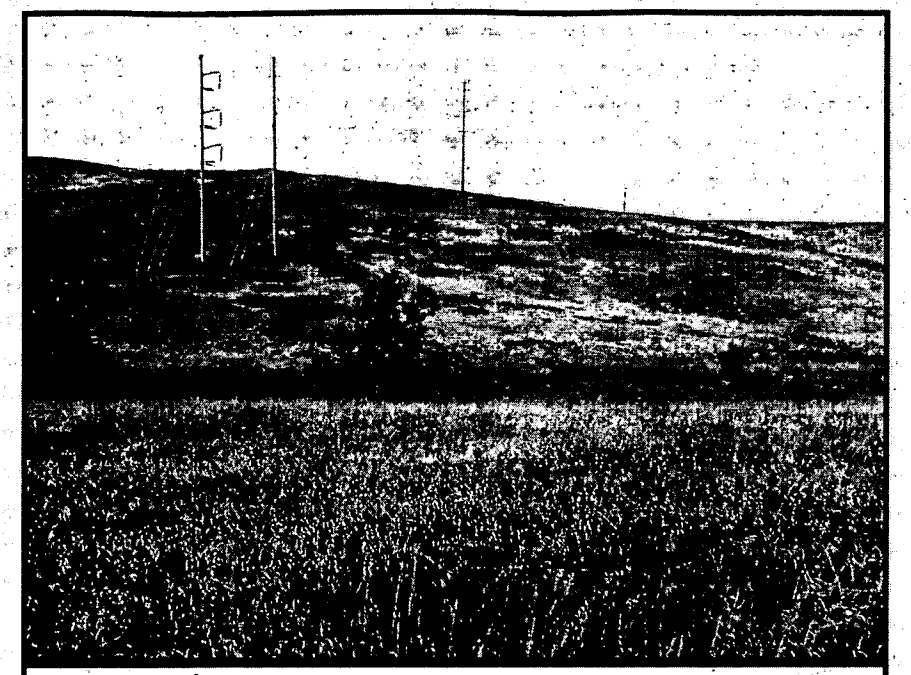
6/29/2004 **8/26/2005**

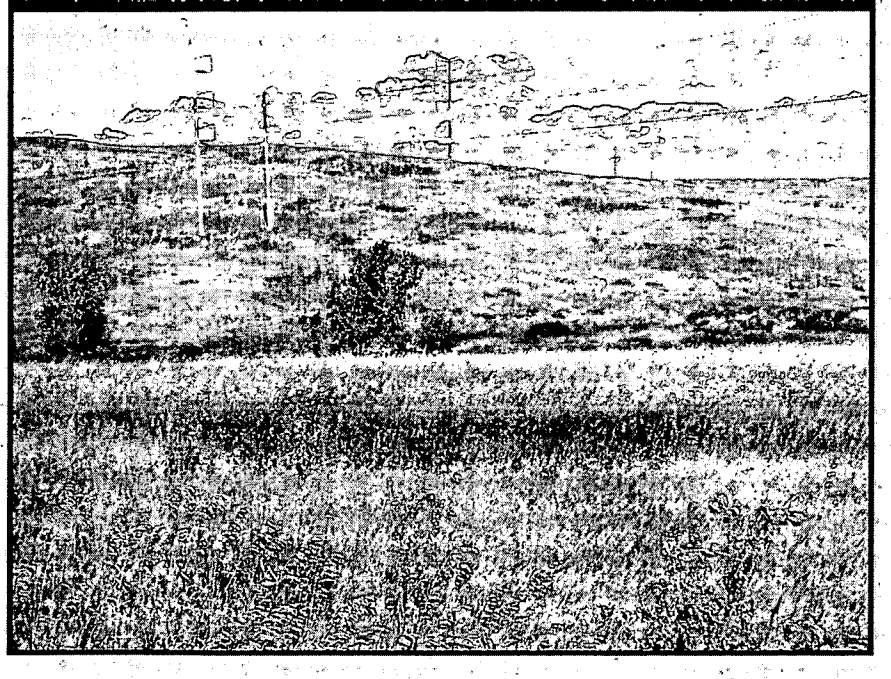
Photopoint 44



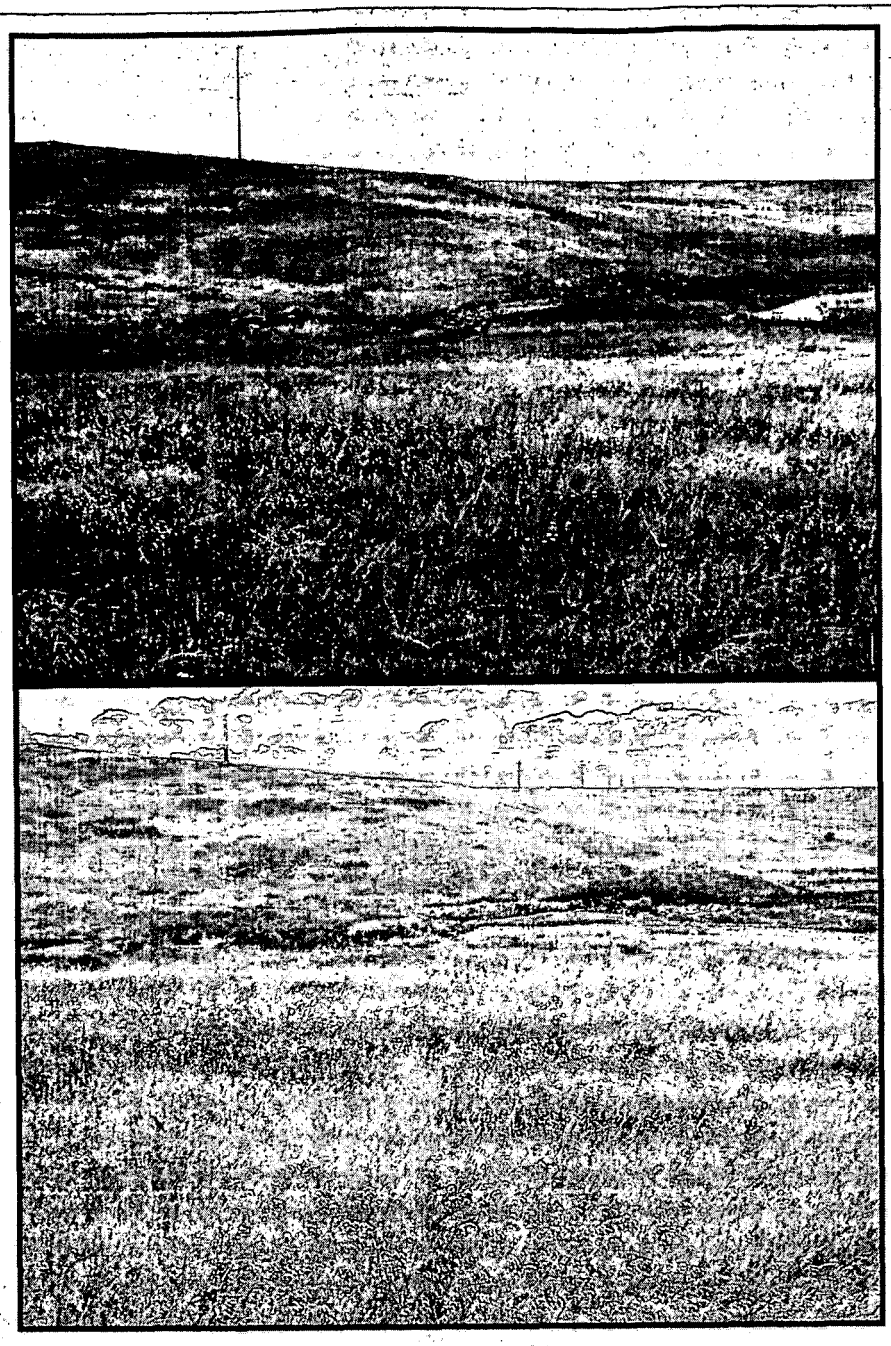


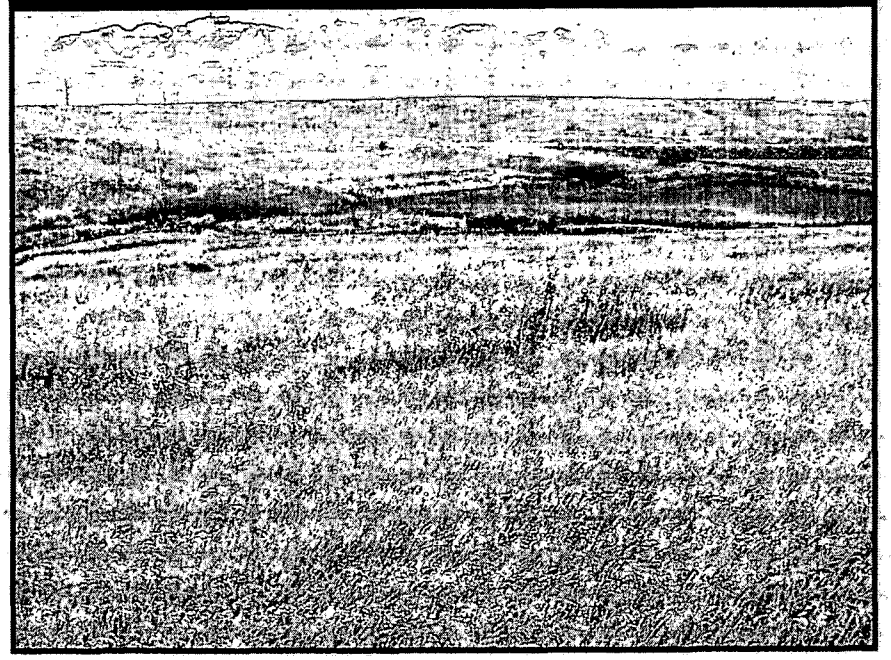
Photopoint 45

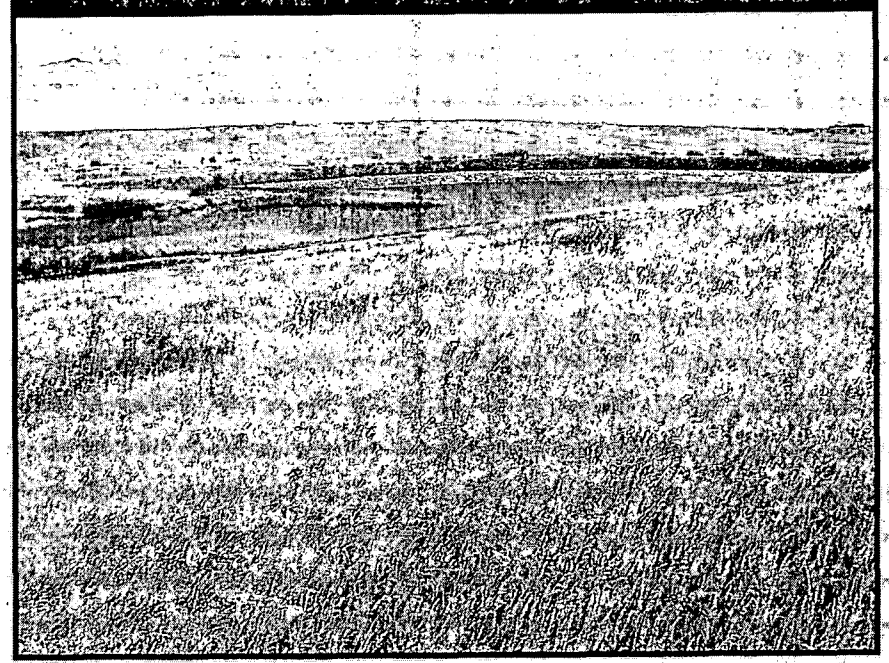




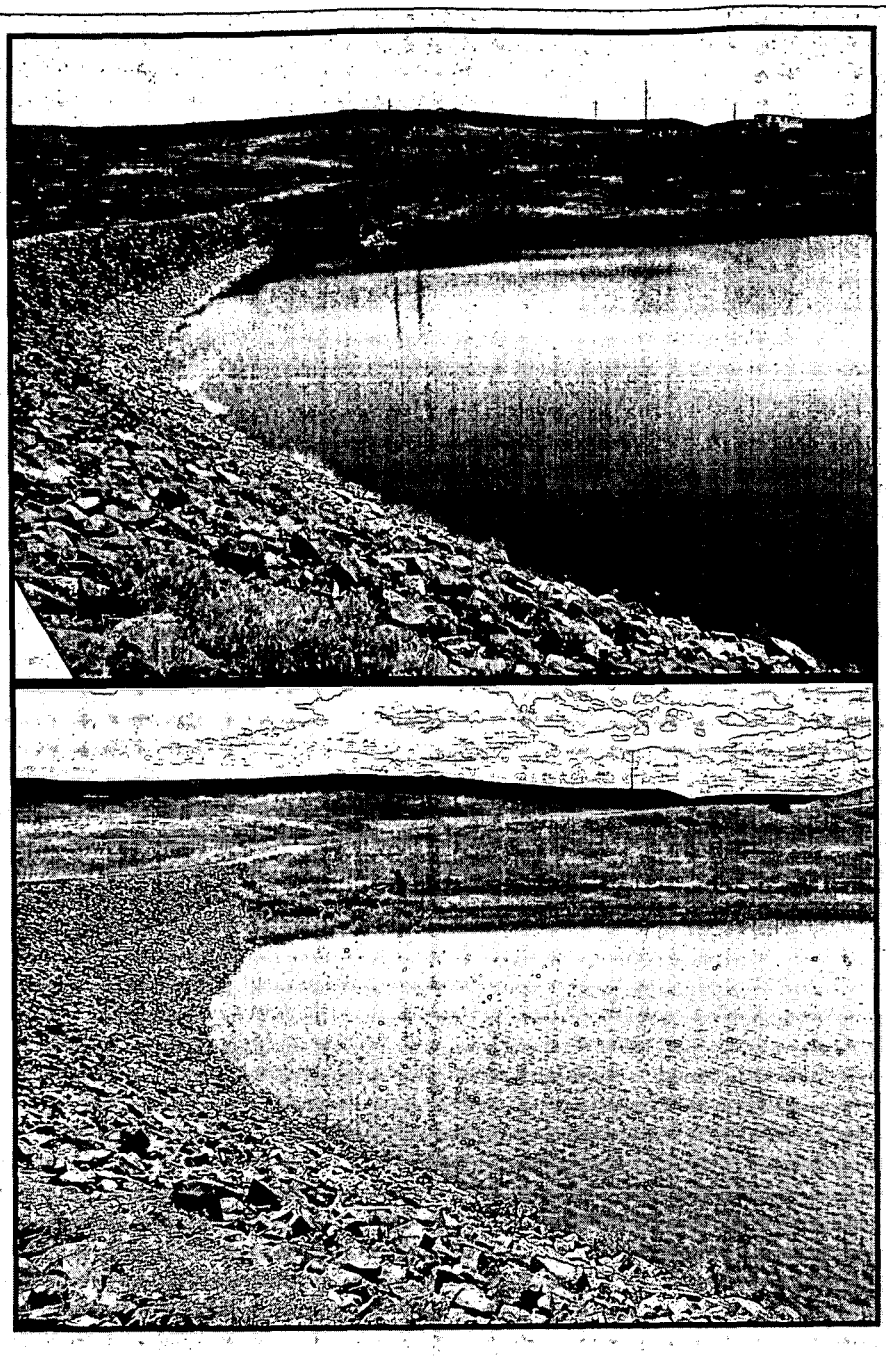
Photopoint 46 (A-4 Pond)

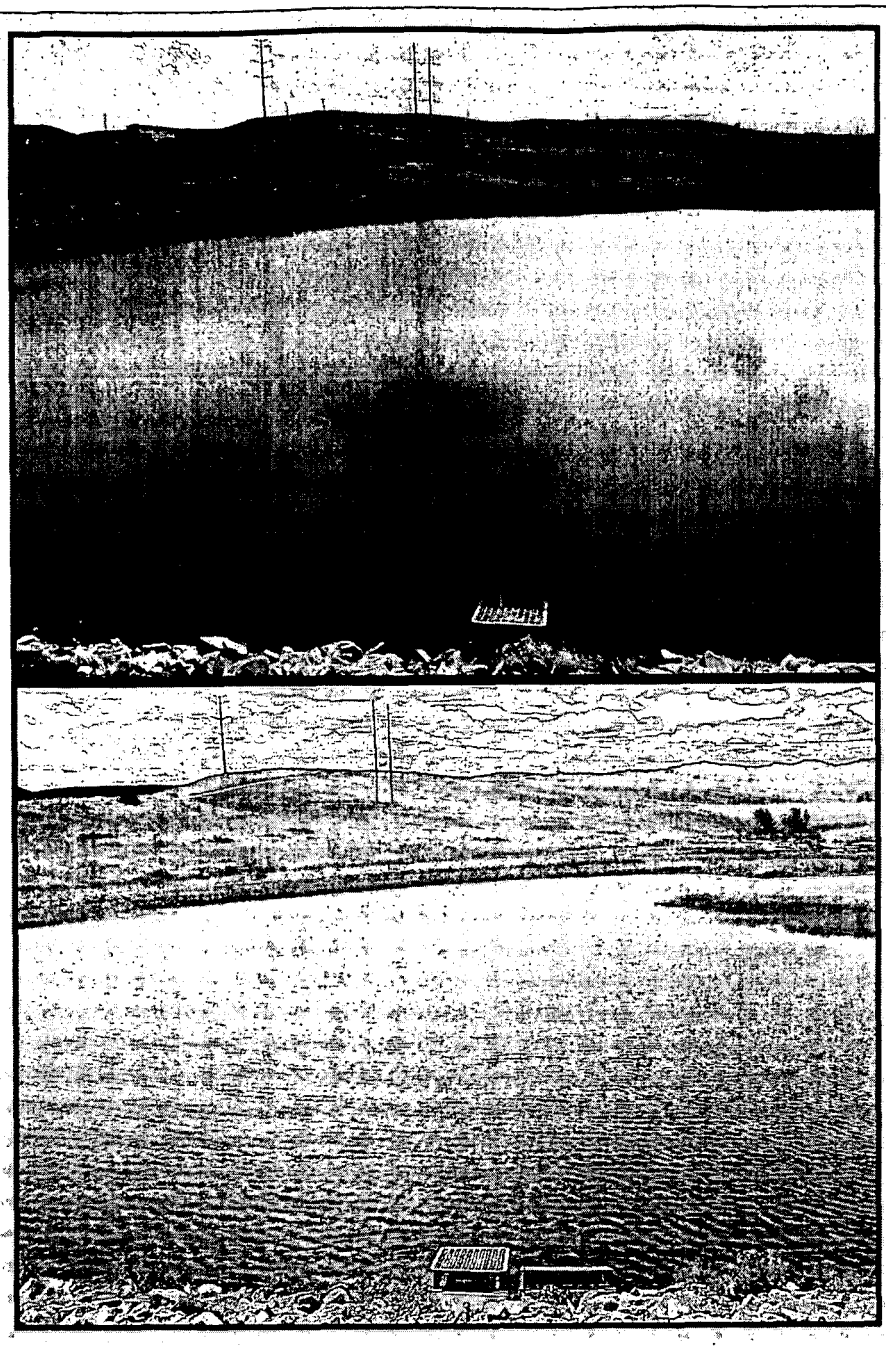


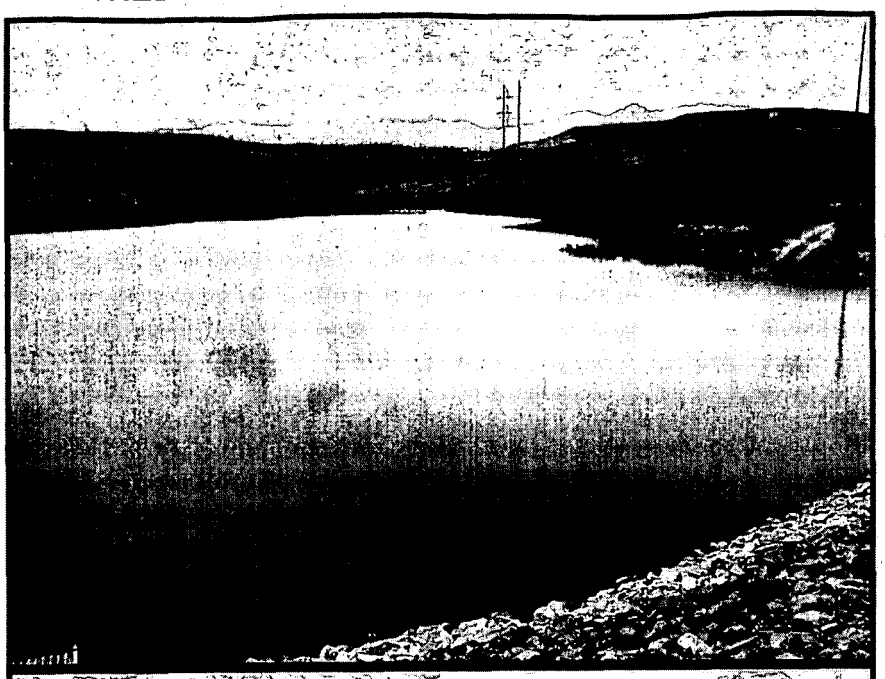


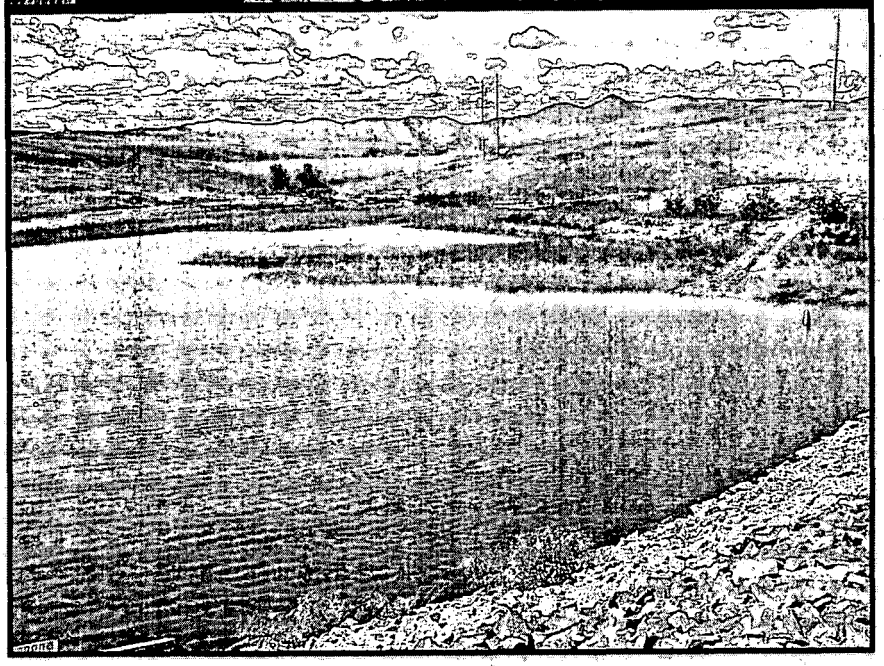


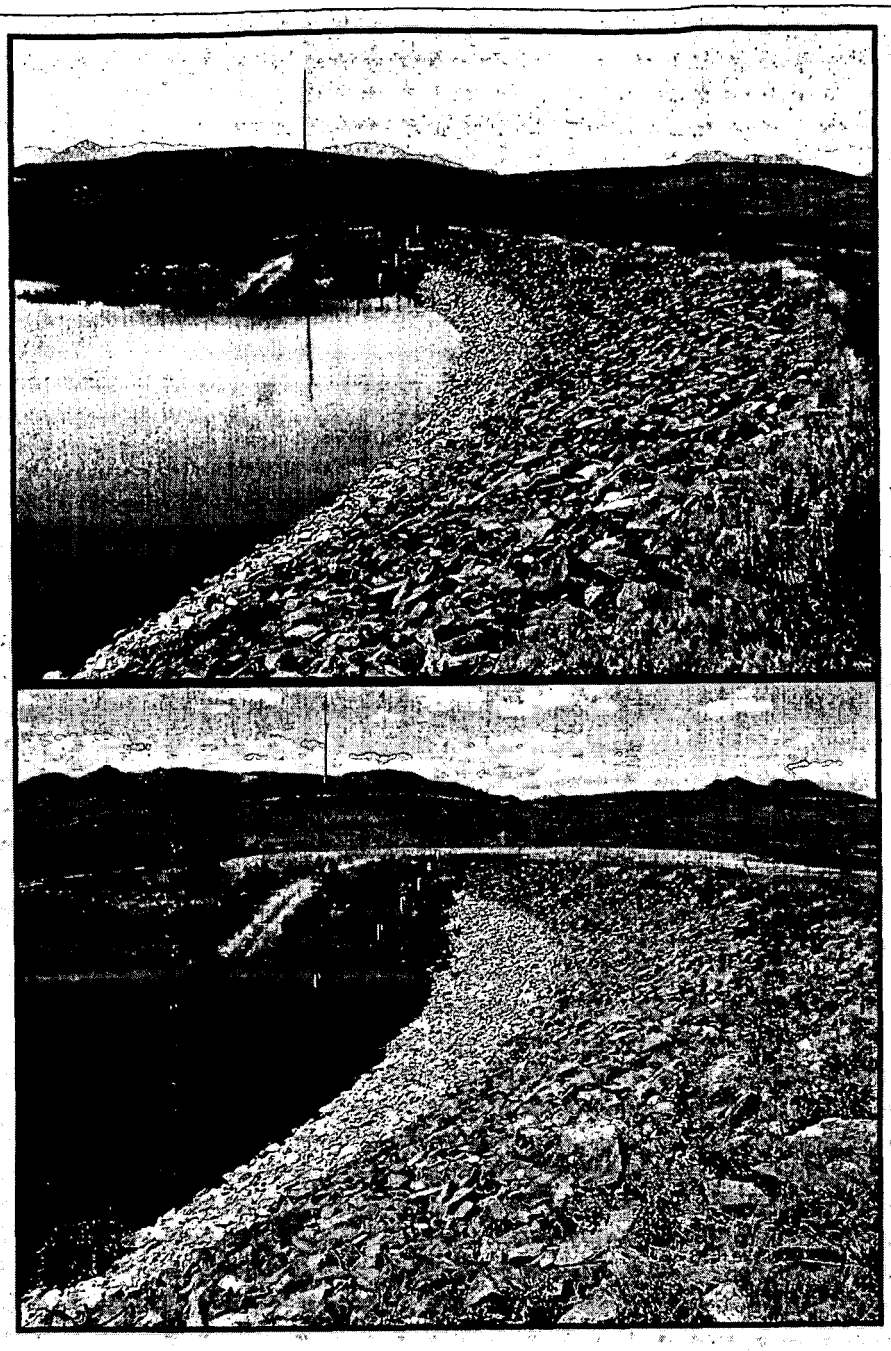
Photopoint 47 (A-4 Pond)

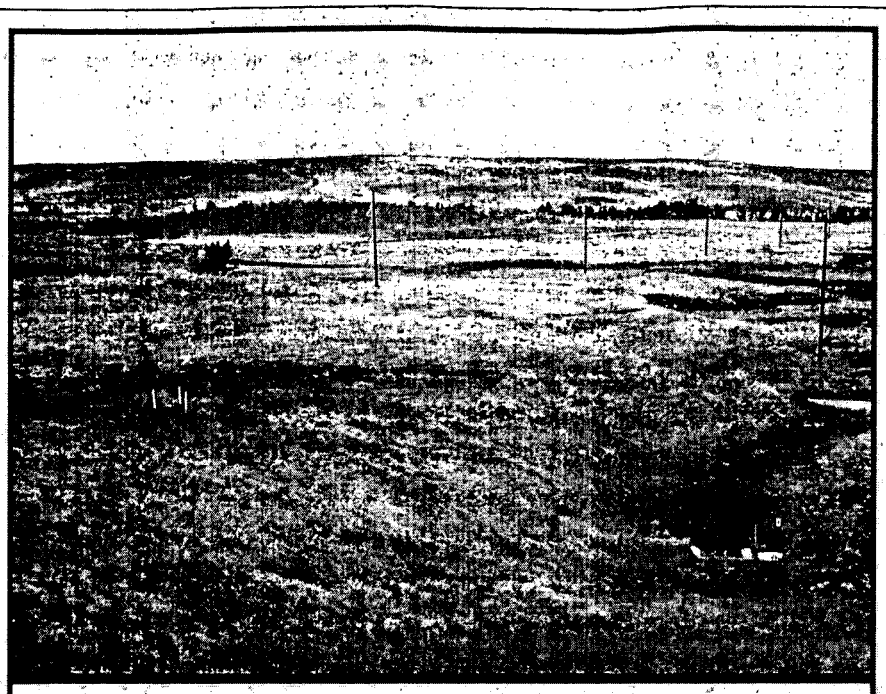


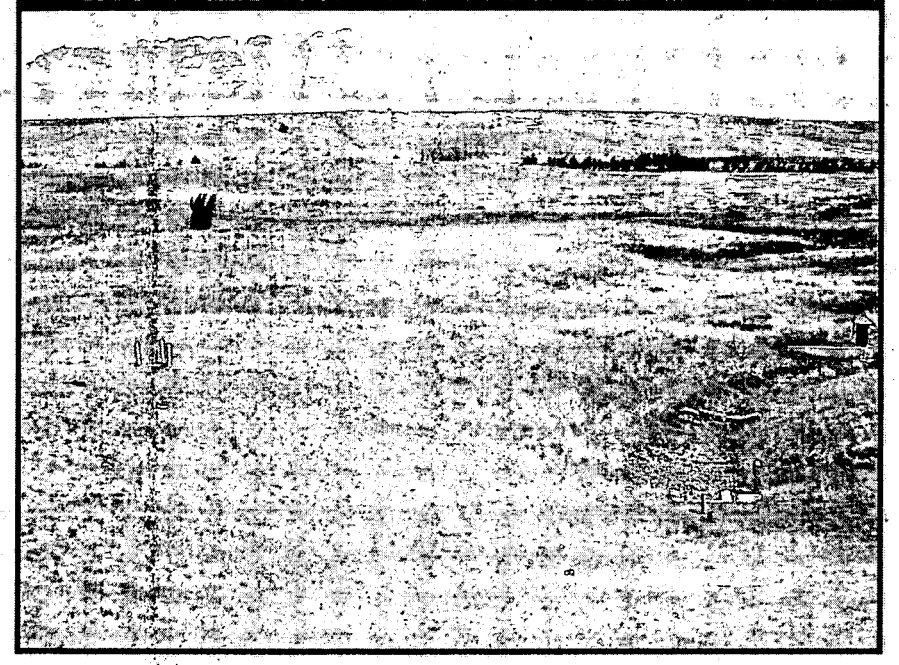


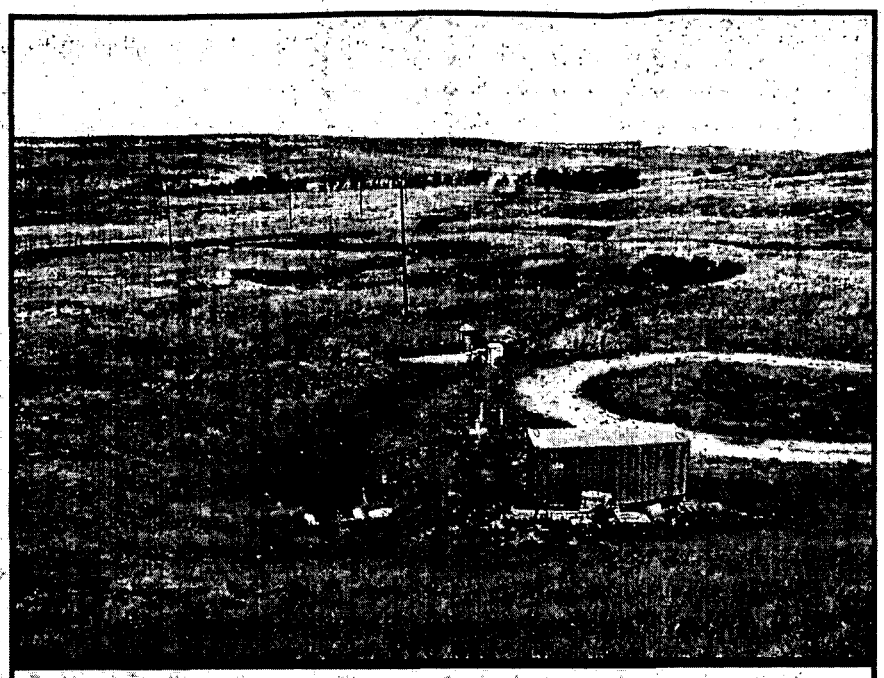


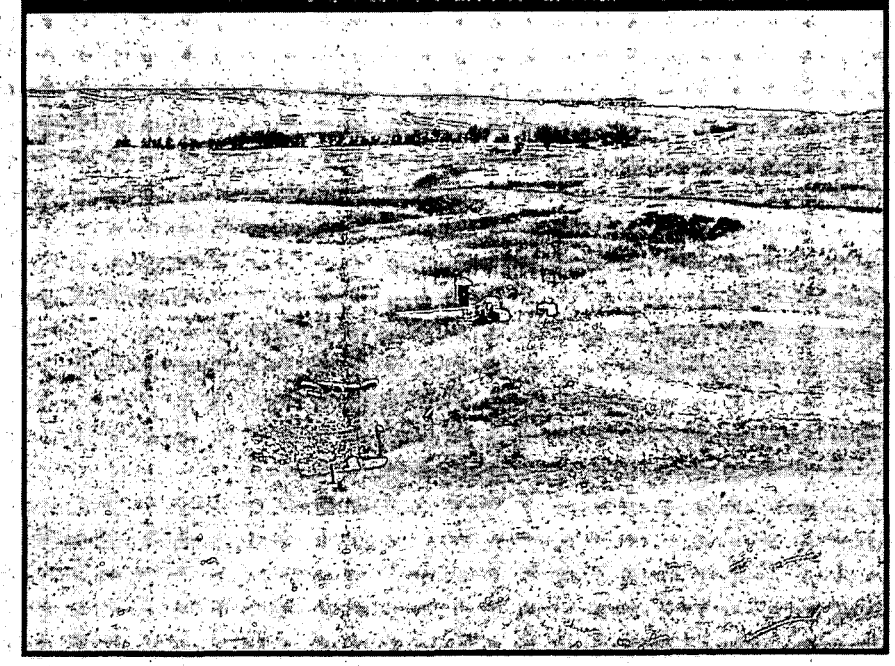


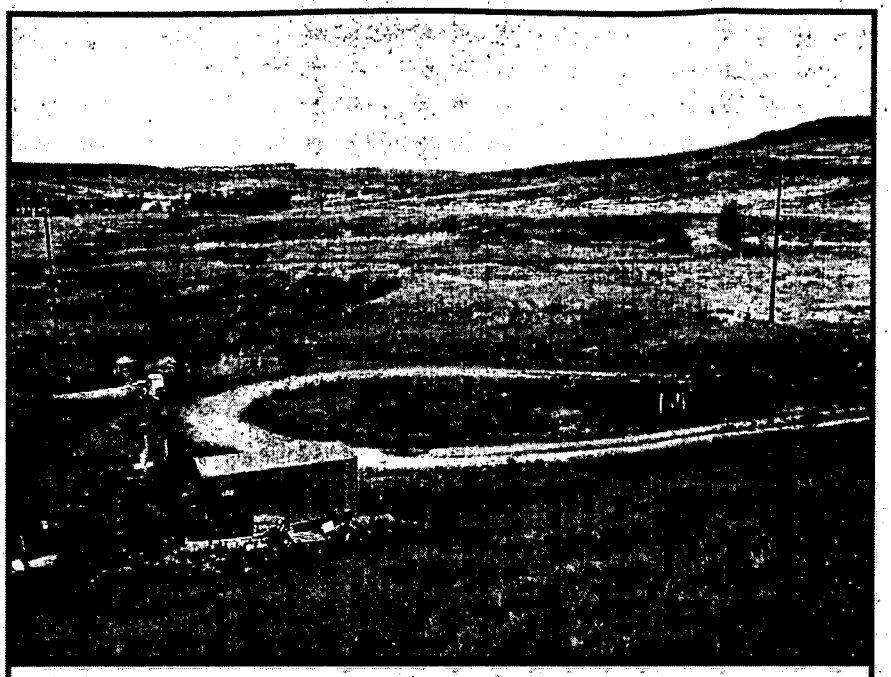


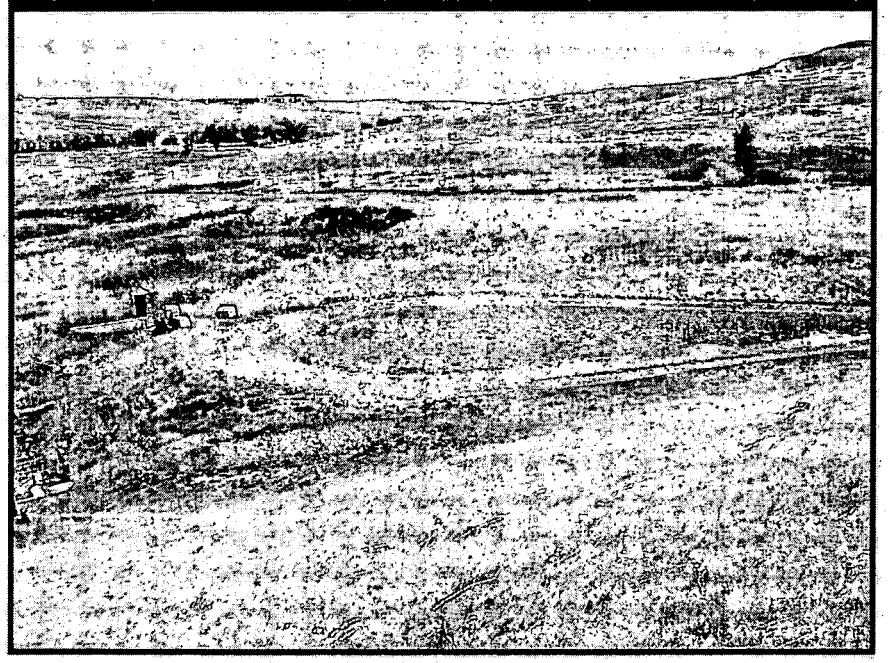












Pond Remediation

B-Series

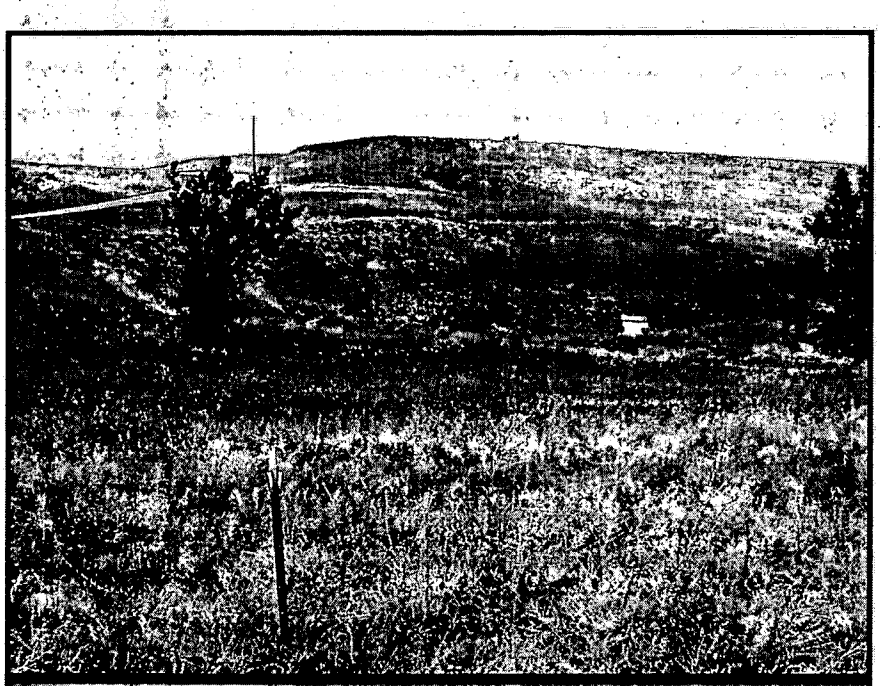
(clicking on any photopoint on the map will take you to the corresponding monitoring photos)

Pond Remediation

B-Series, Photopoints 1-10

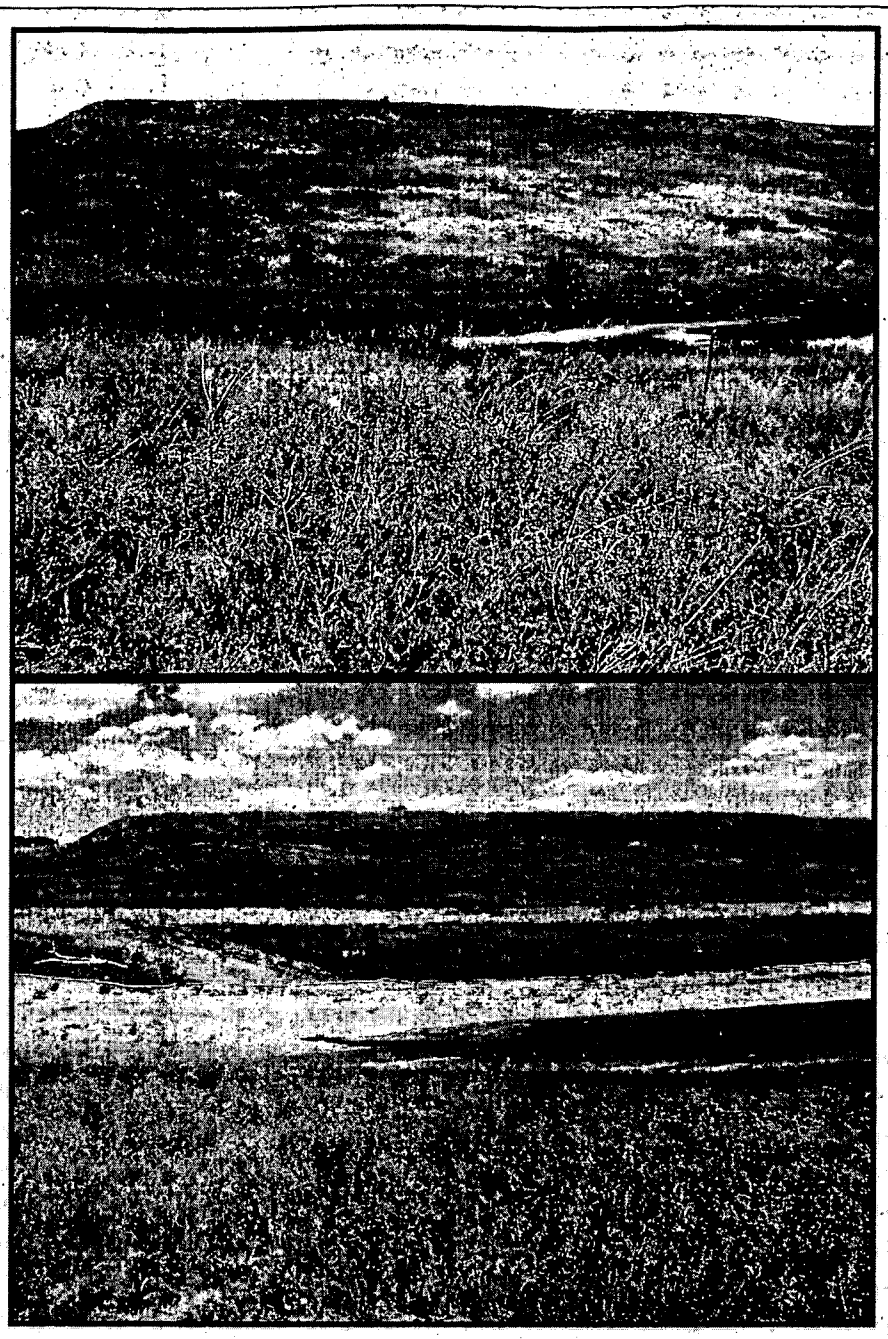
6/28/2004 **08/26/05**

Photopoint 1

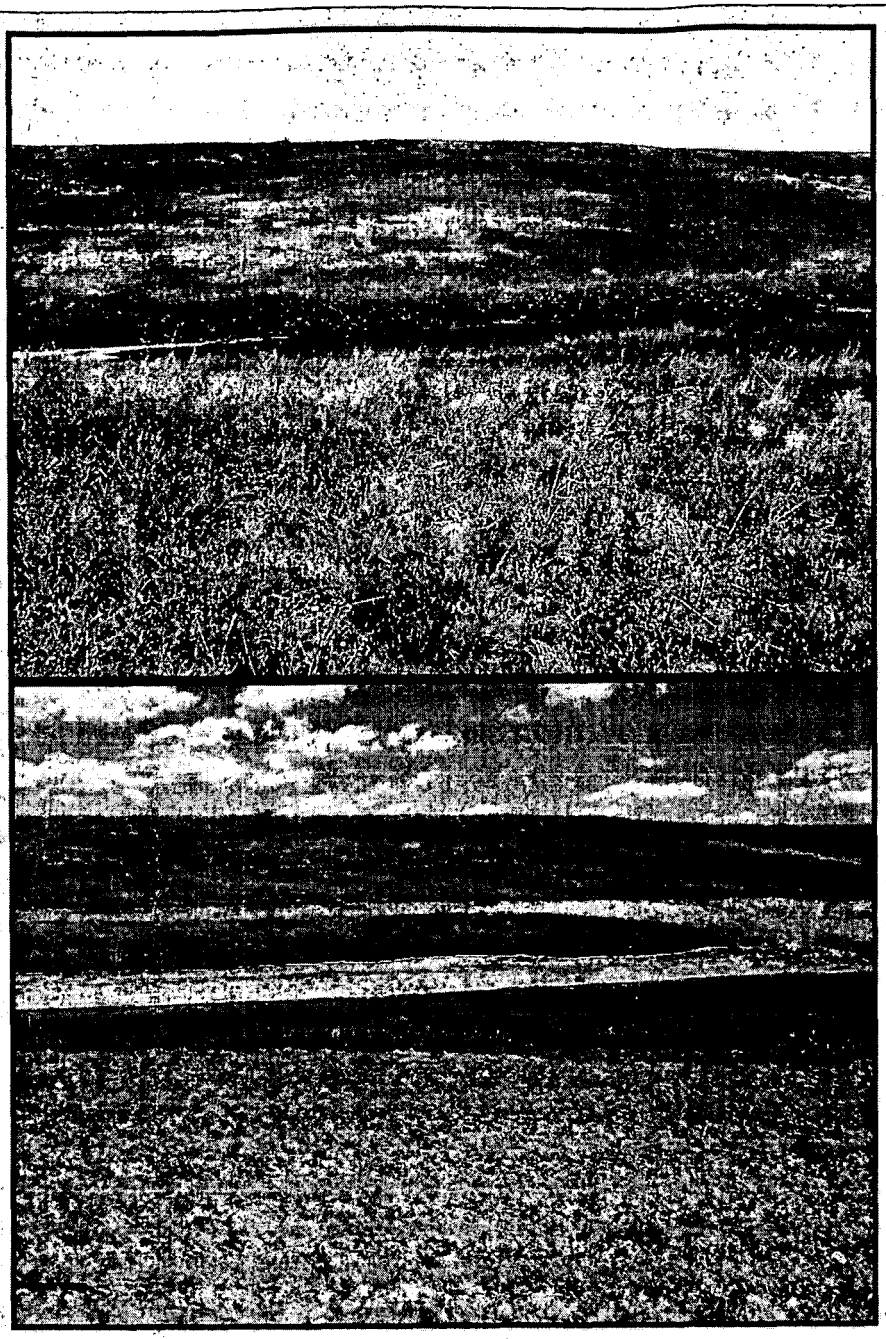


Photopoint 2

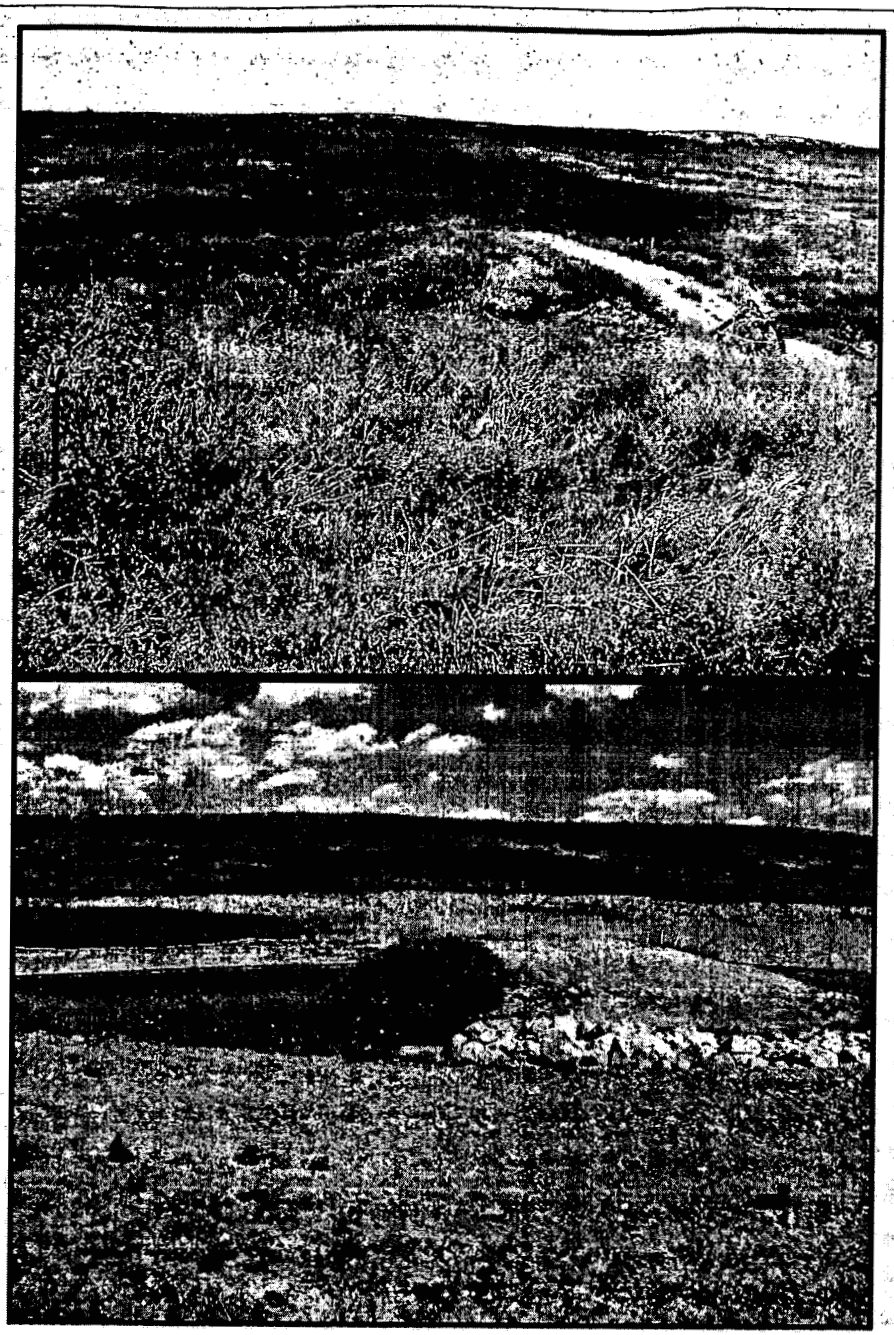
Photopoint 3



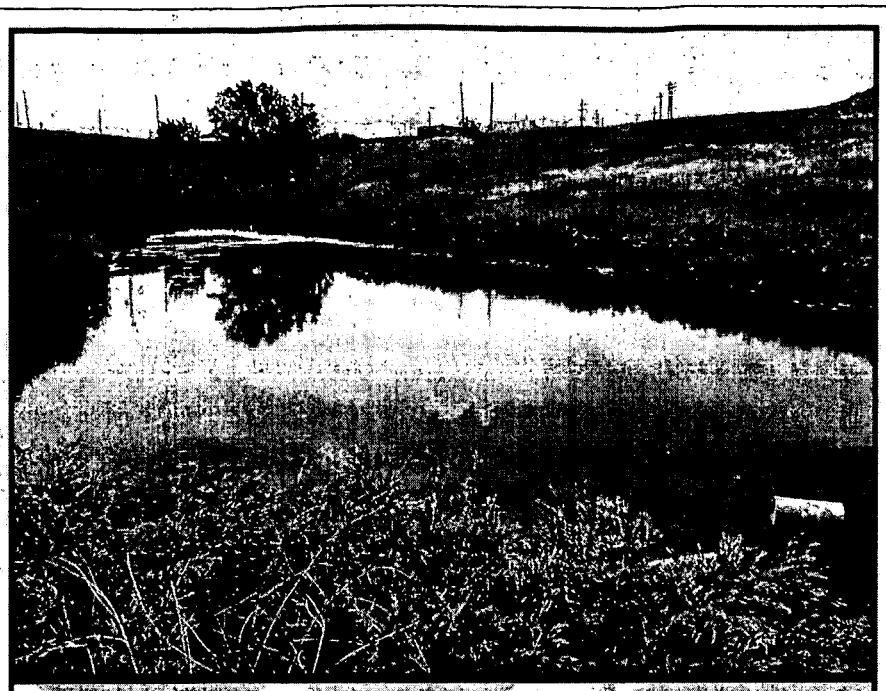
Photopoint 4

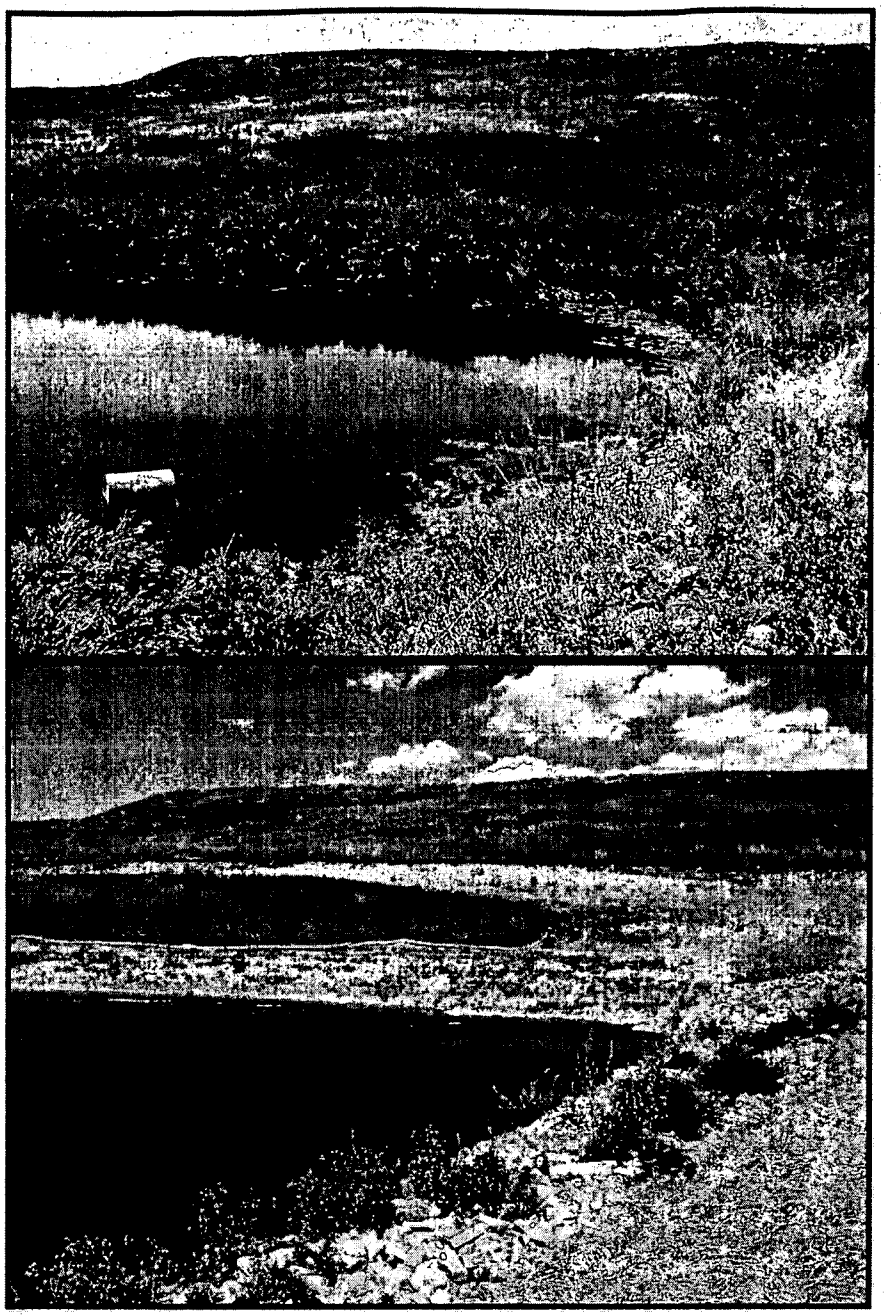


Photopoint 5

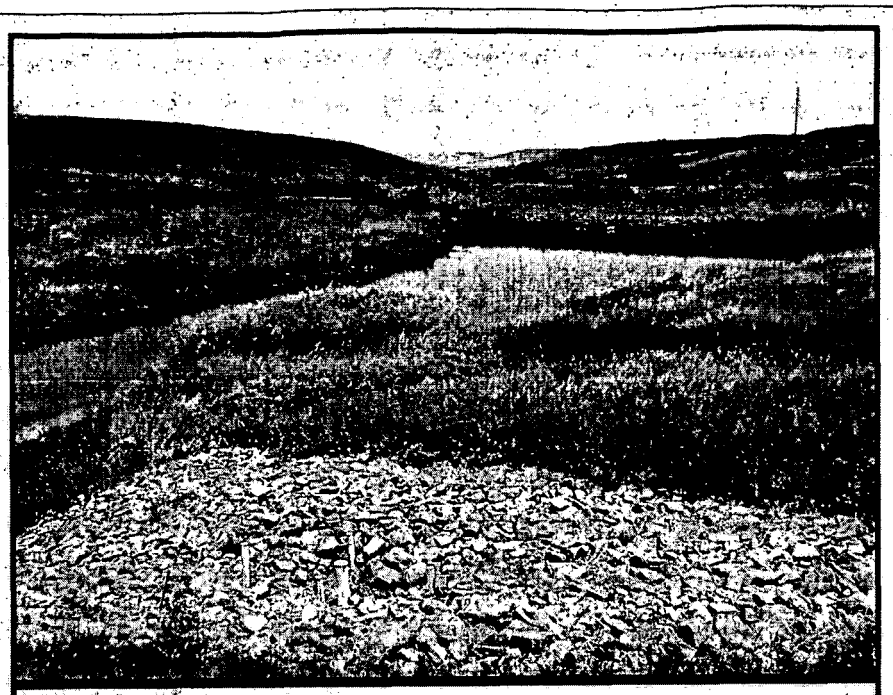


Photopoint 6 (B-1 Pond)



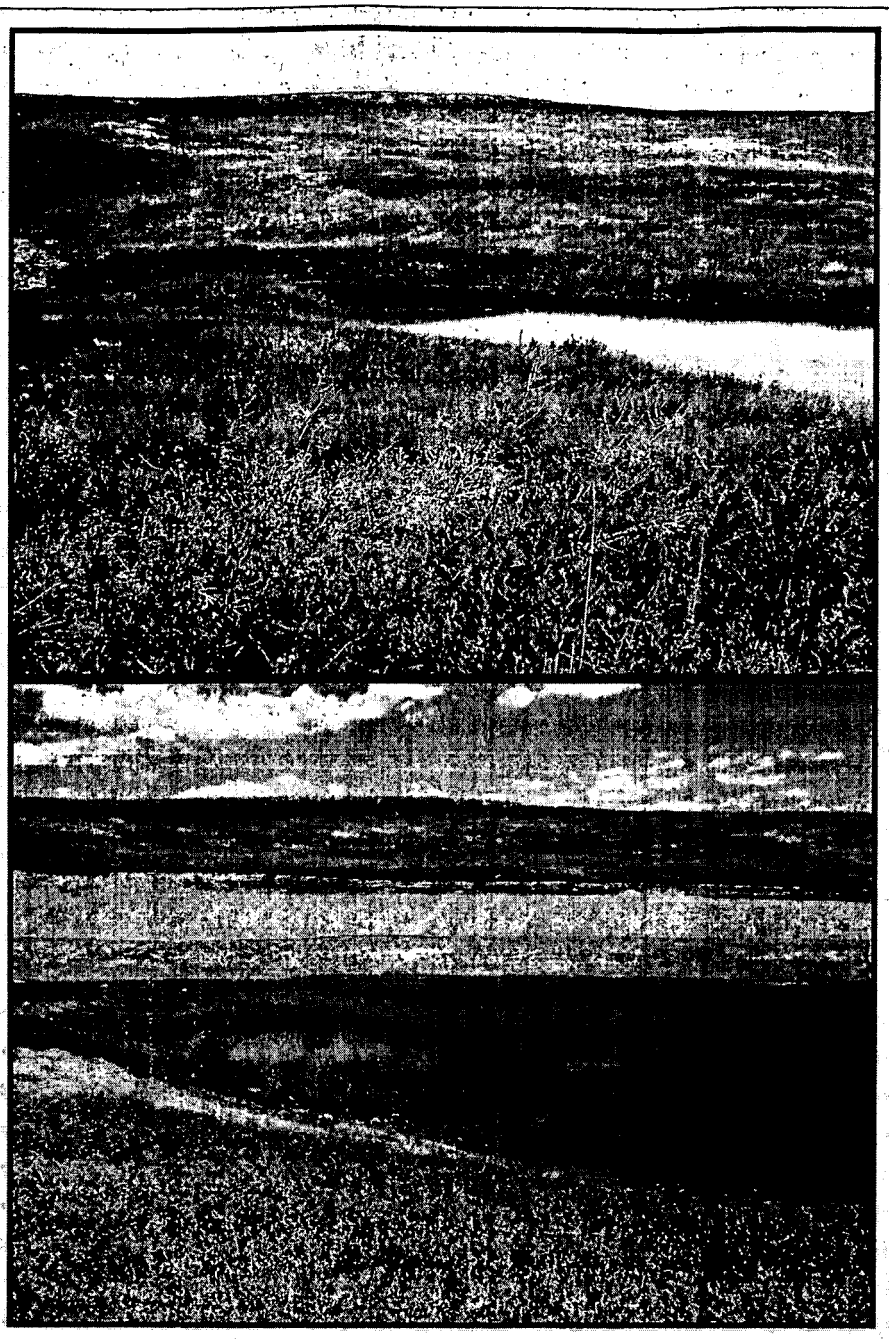


Photopoint 7 (B-2 Pond)

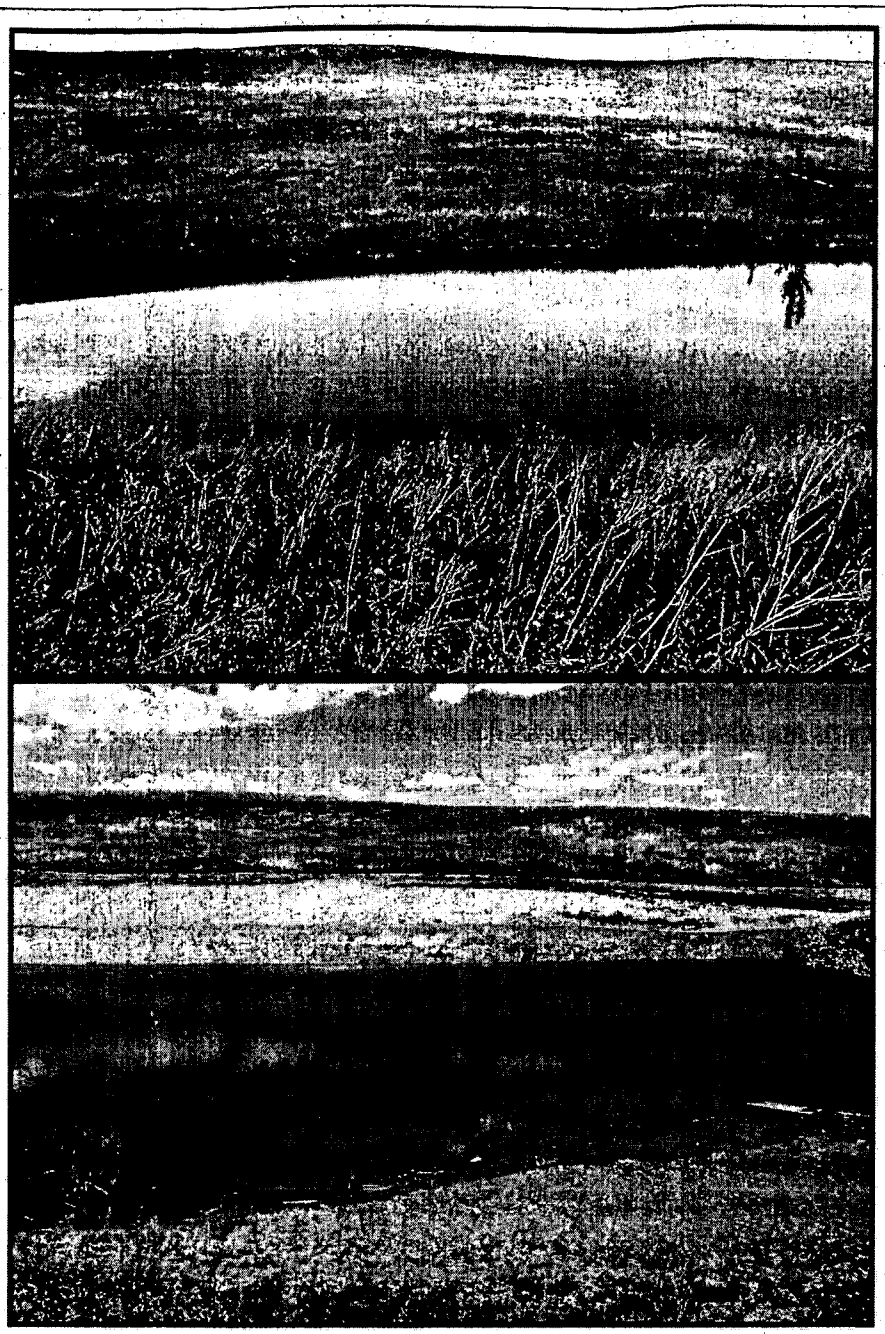


Photopoint 8

Photopoint 9



Photopoint 10



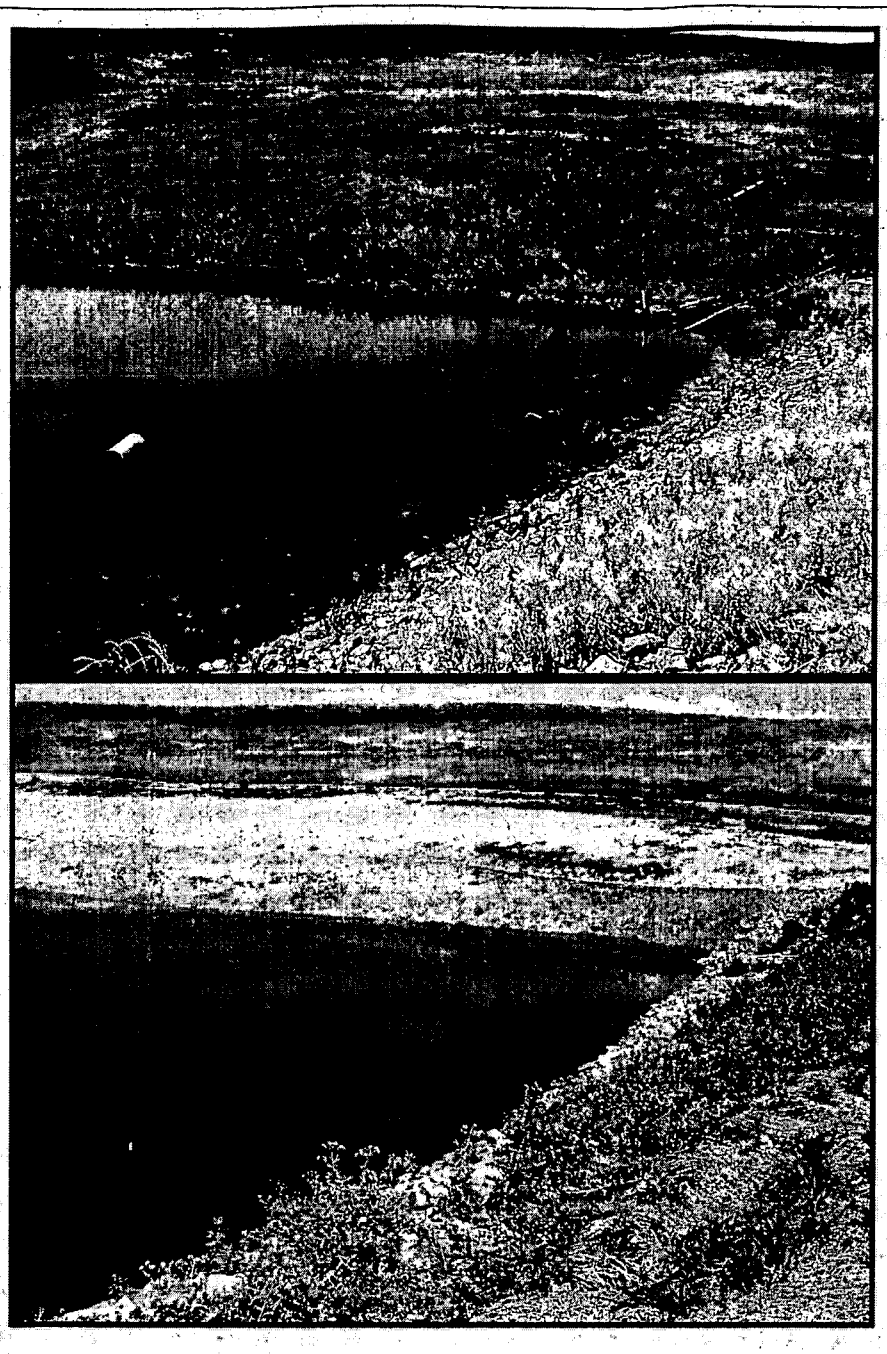
Pond Remediation

B-Series, Photopoints 11-18

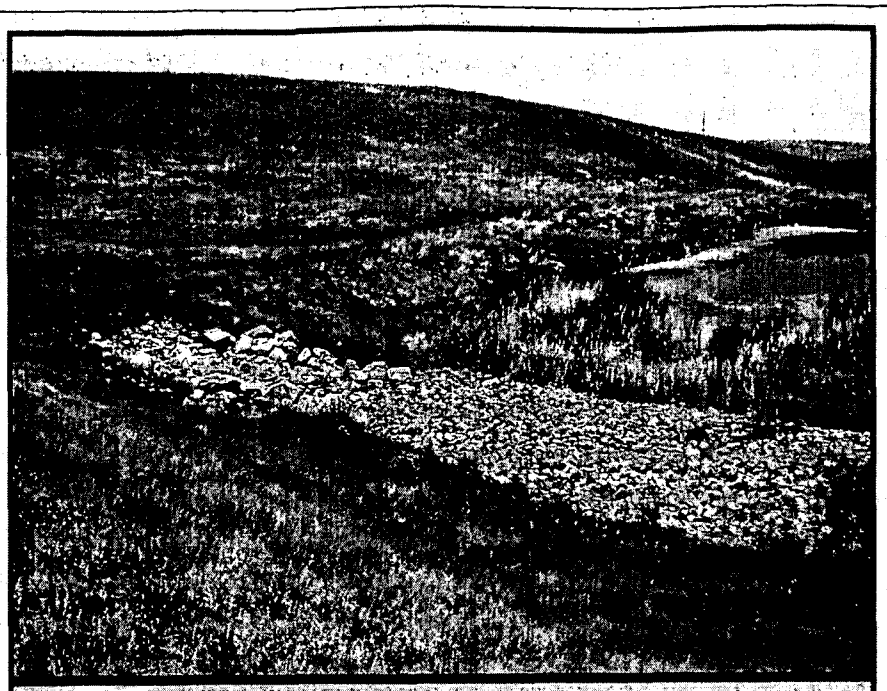
6/28/2004 **08/26/05**

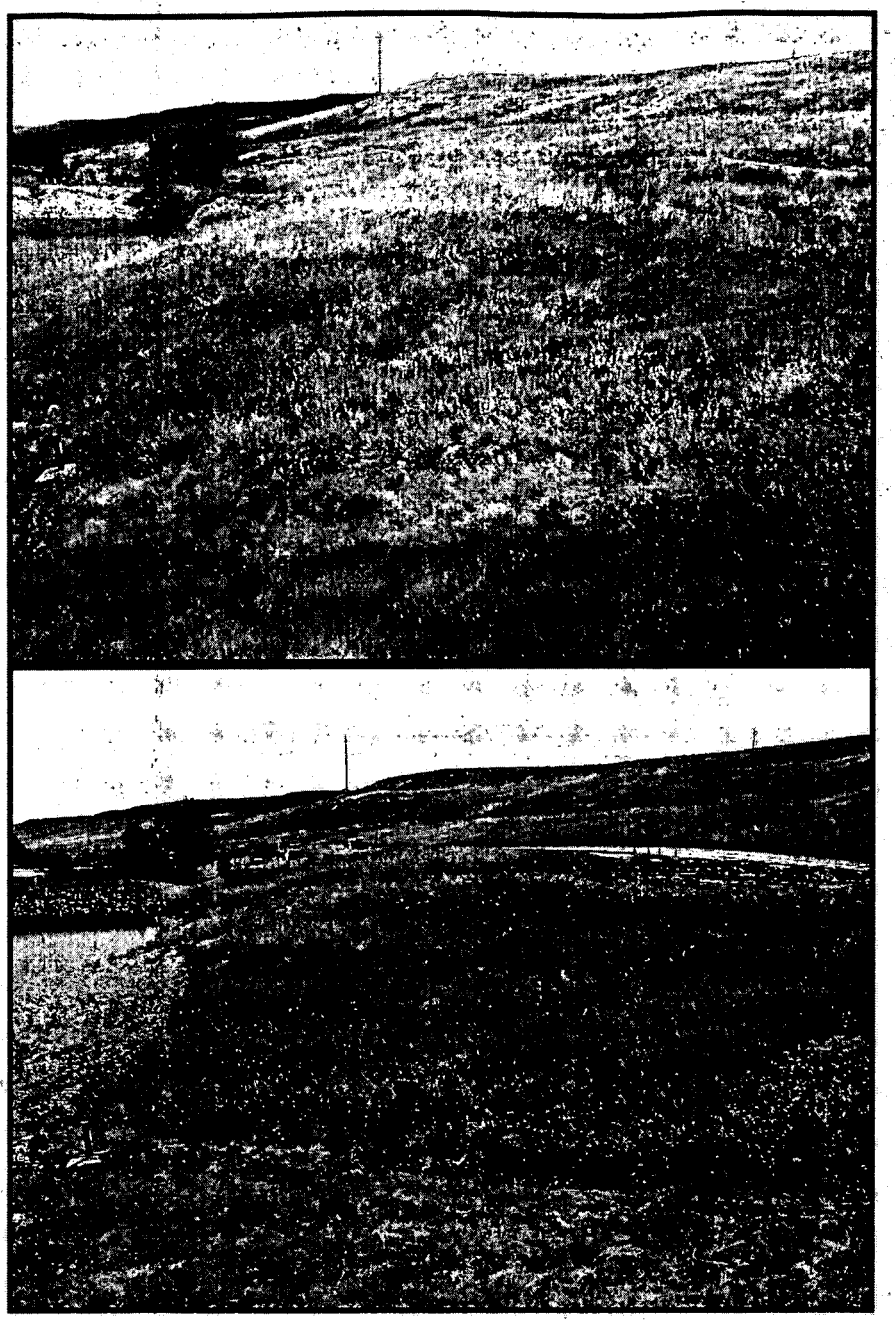
Photopoint 11

Photopoint 12 (B-2 Pond)

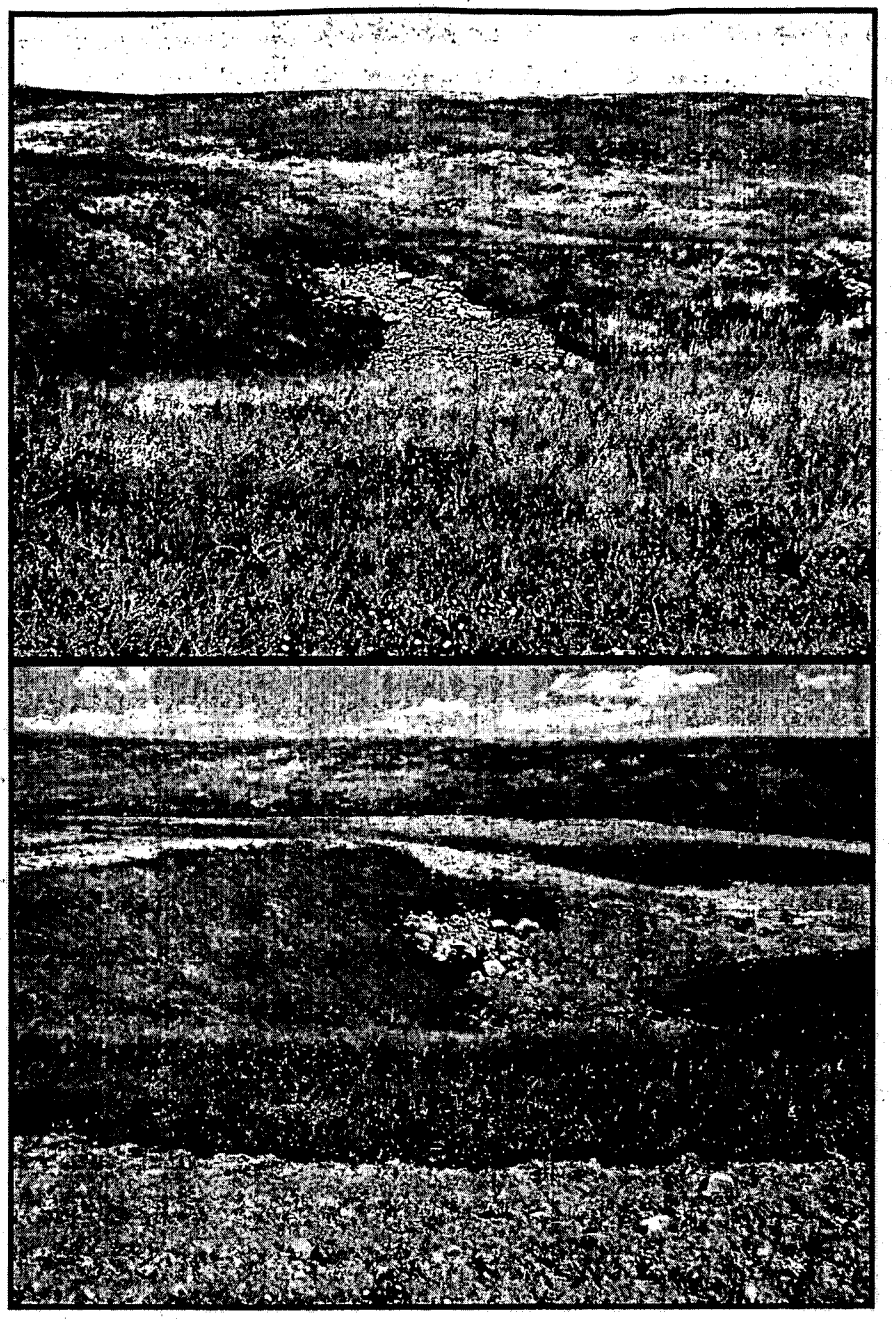


Photopoint 13 (B-3 Pond)



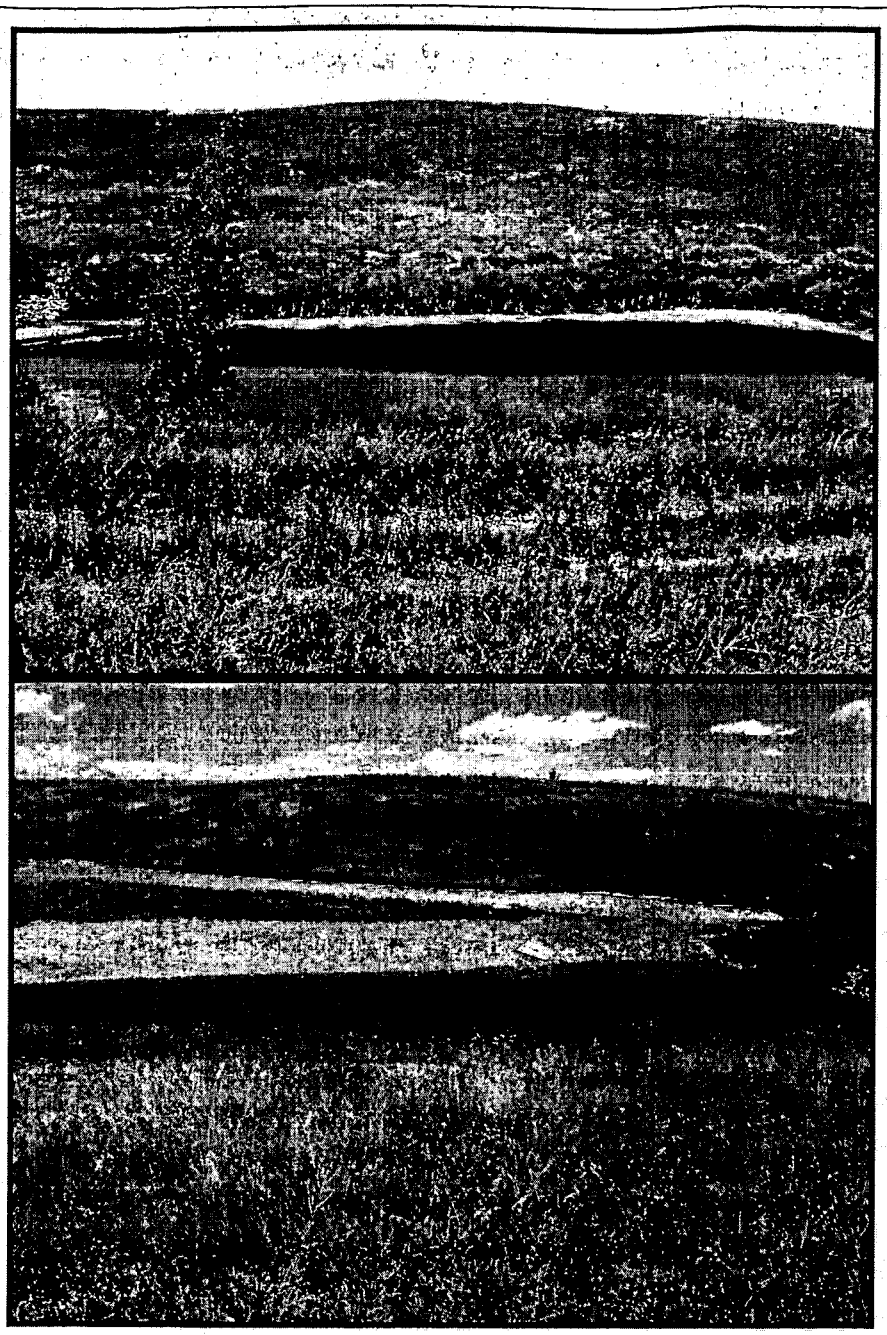


Photopoint 14

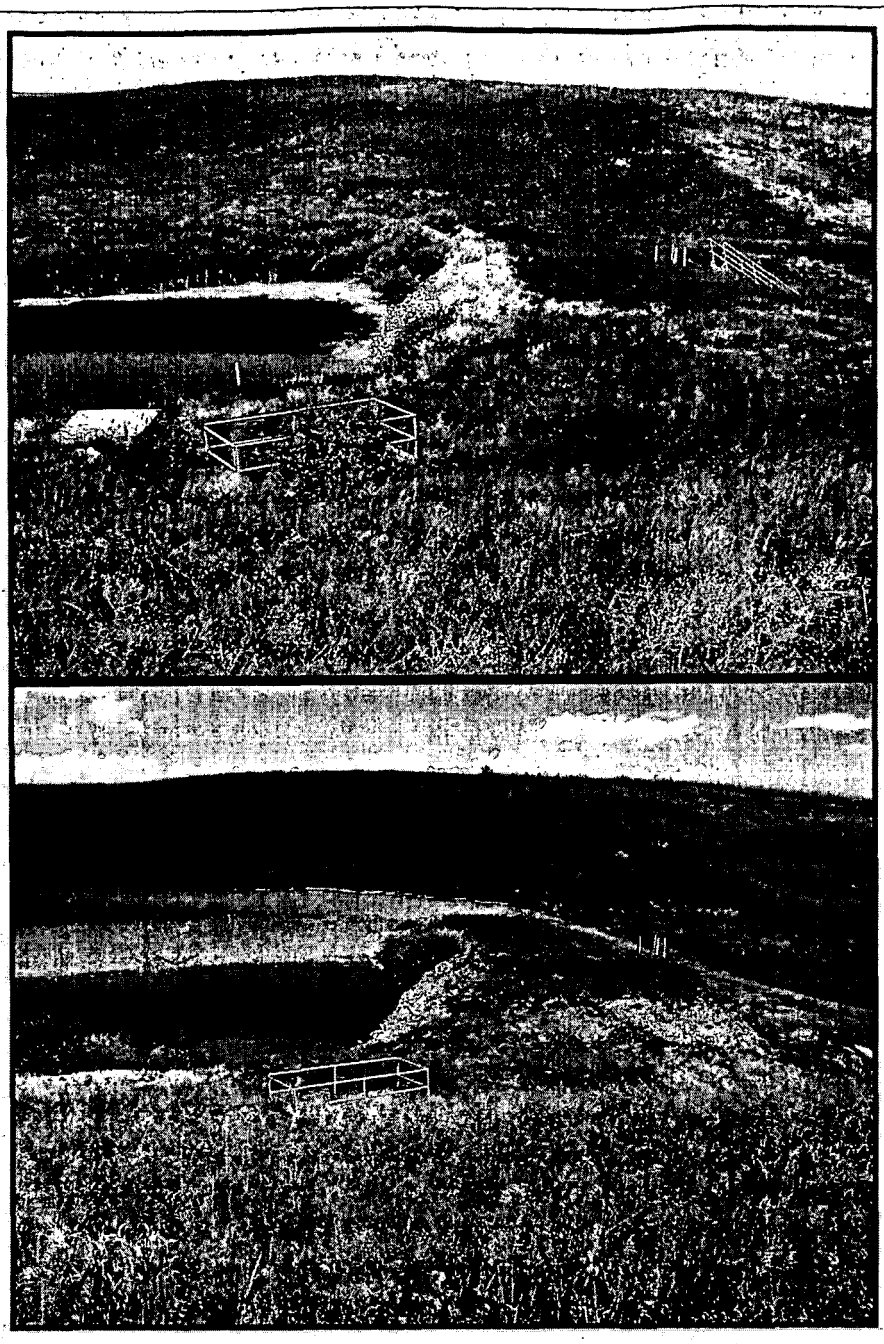


Photopoint 15

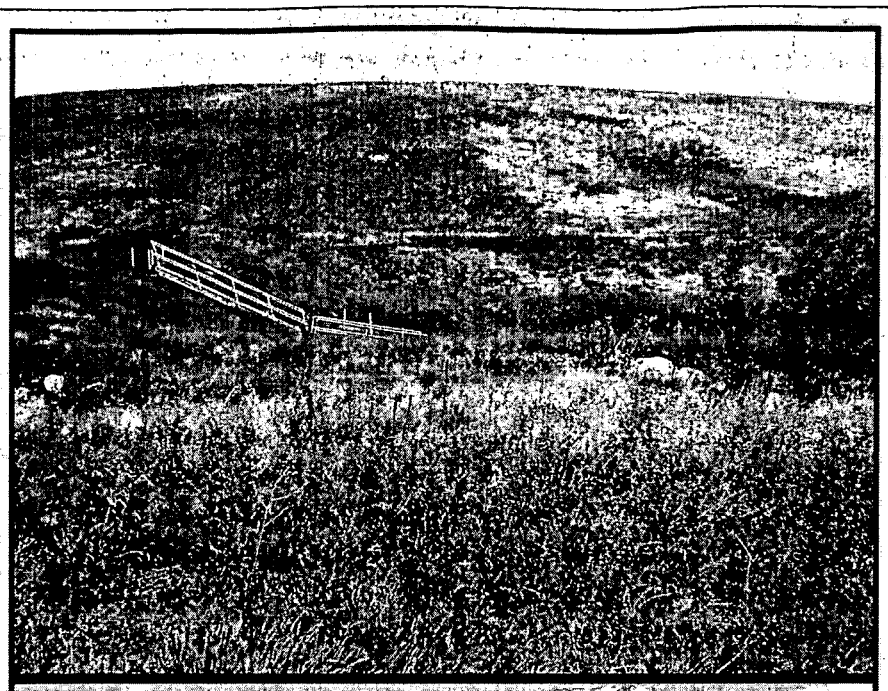
Photopoint 16



Photopoint 17



Photopoint 18

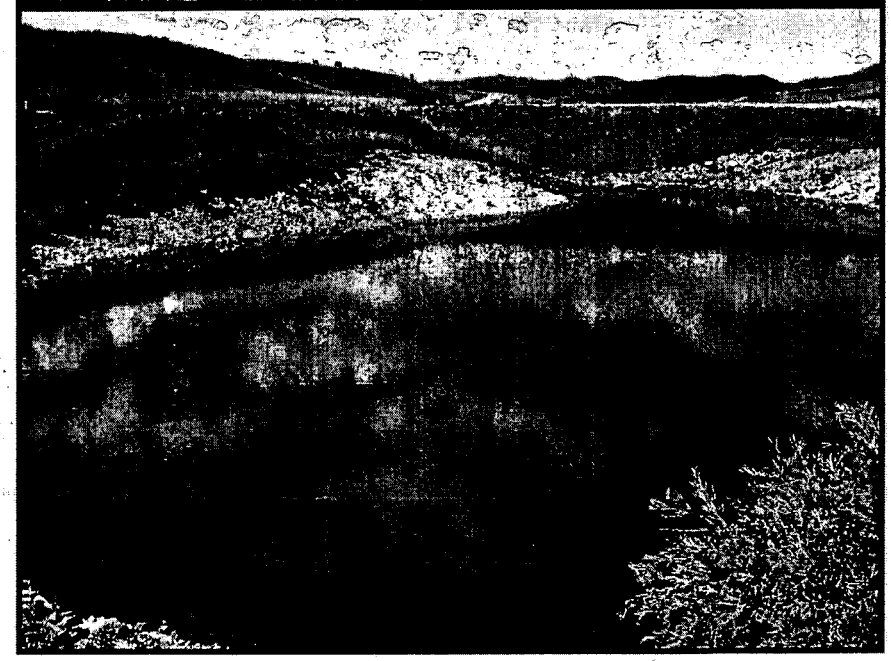


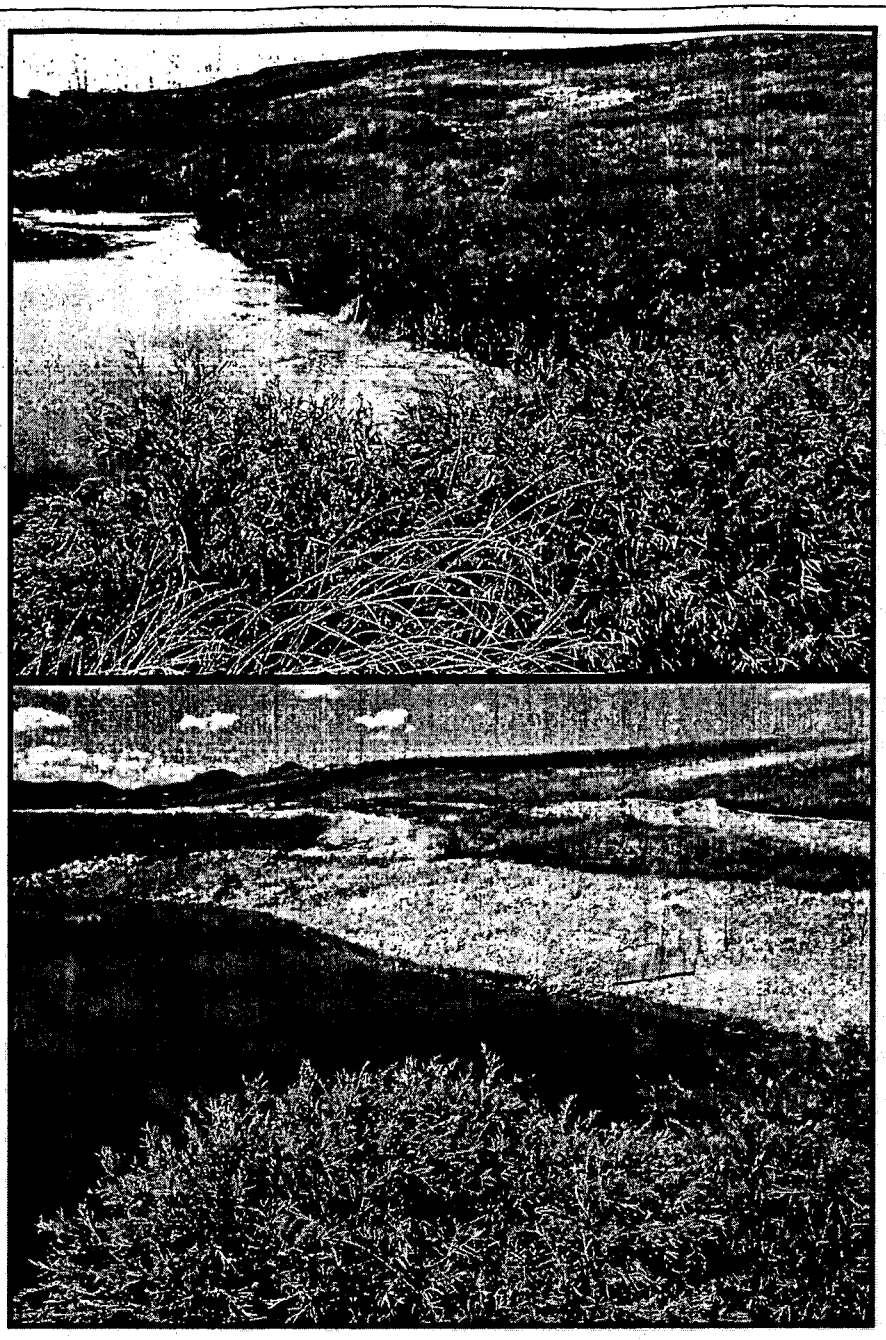
Pond Remediation

B-Series, Photopoints 19-26

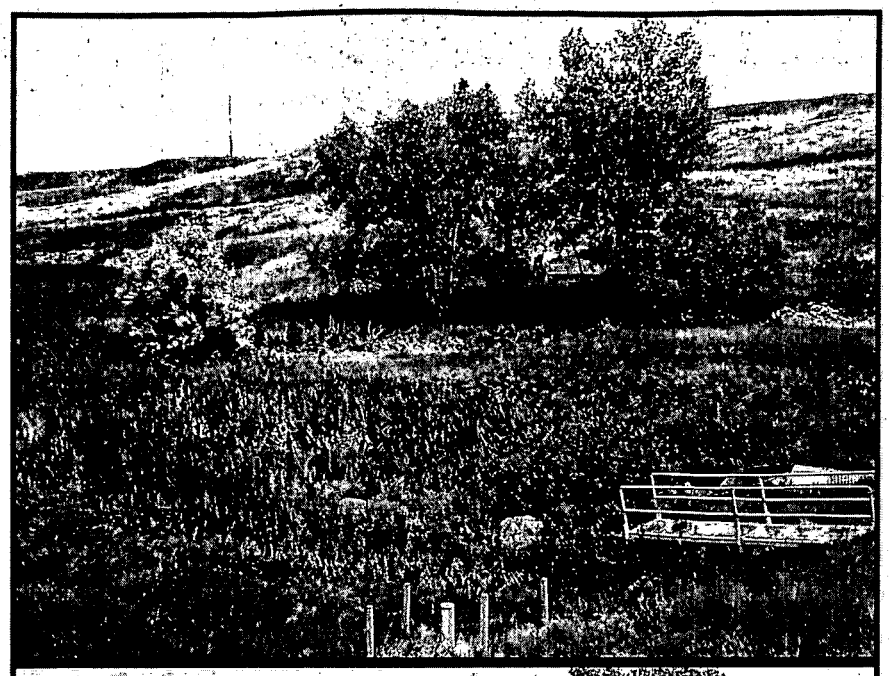
6/28/2004 **08/26/2005**

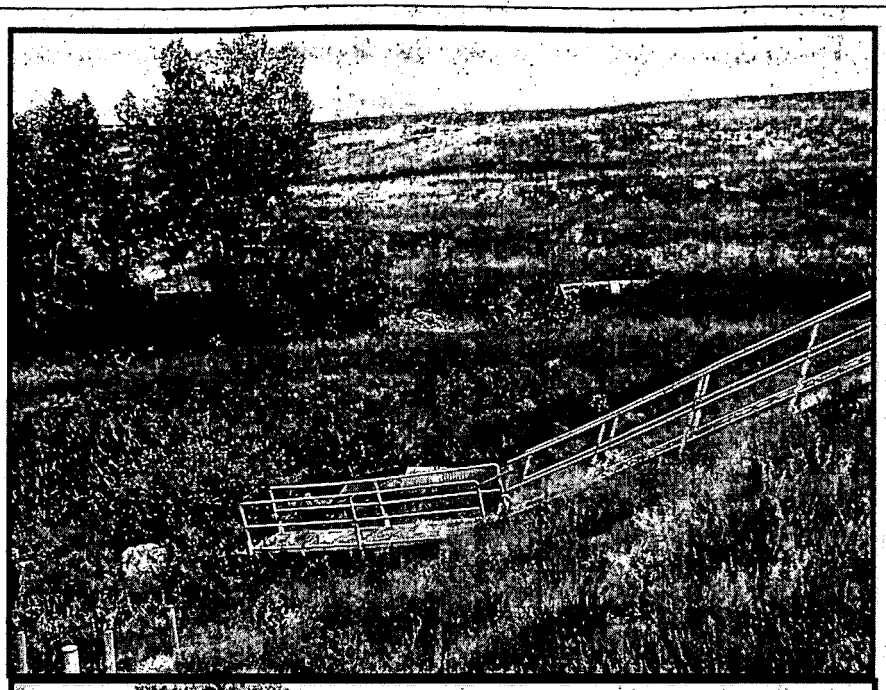
Photopoint 19 (B-3 Pond)





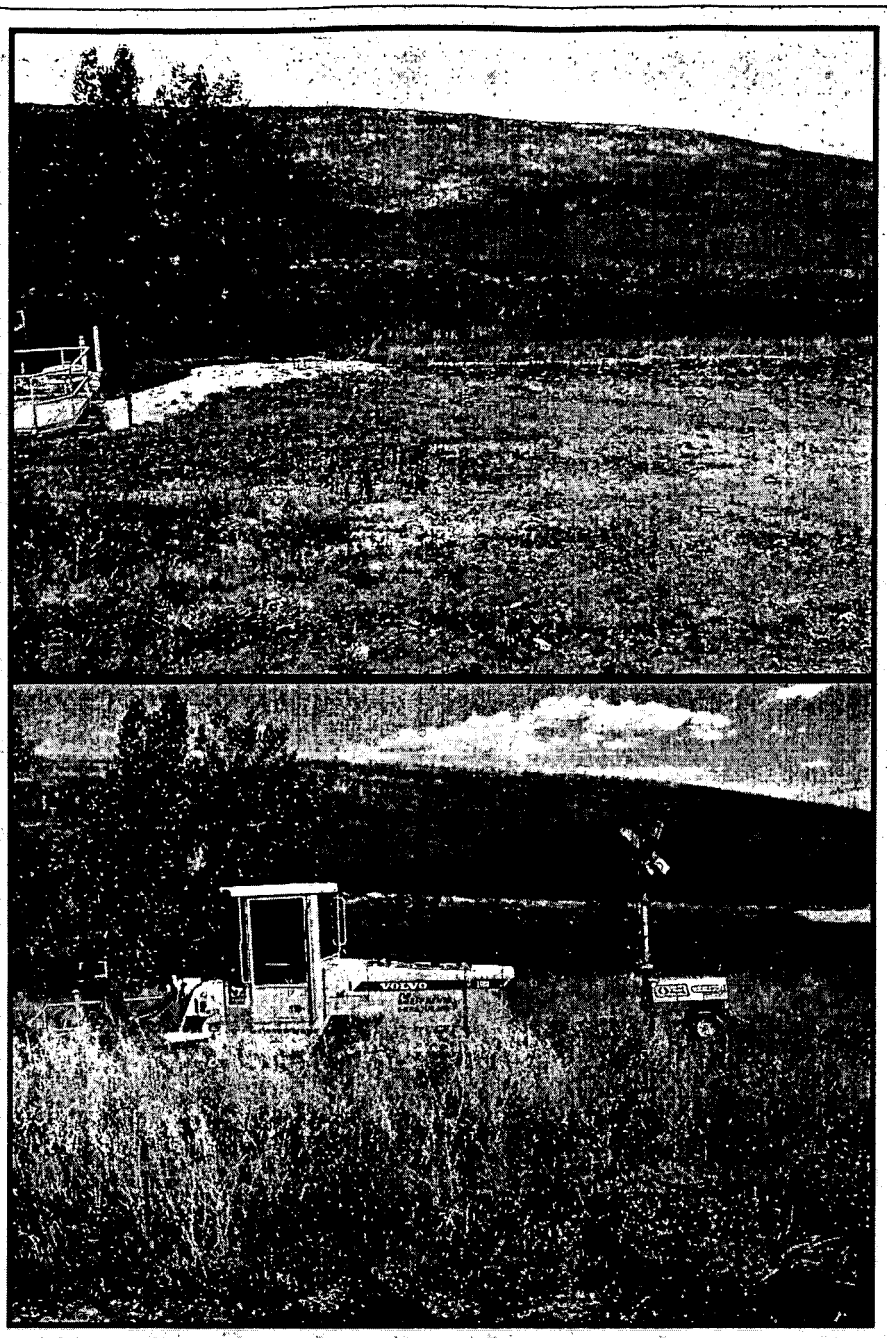
Photopoint 20



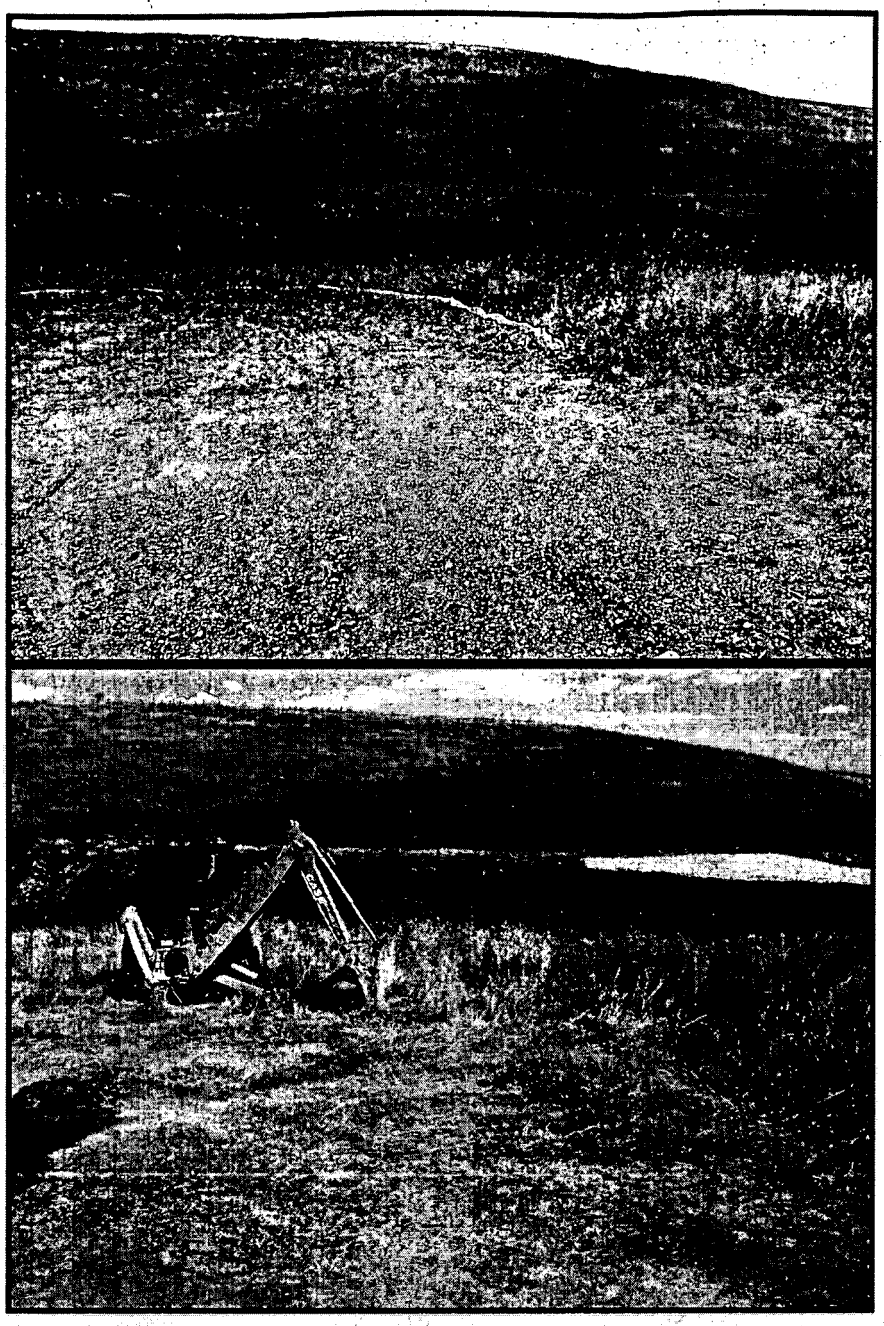


Photopoint 21

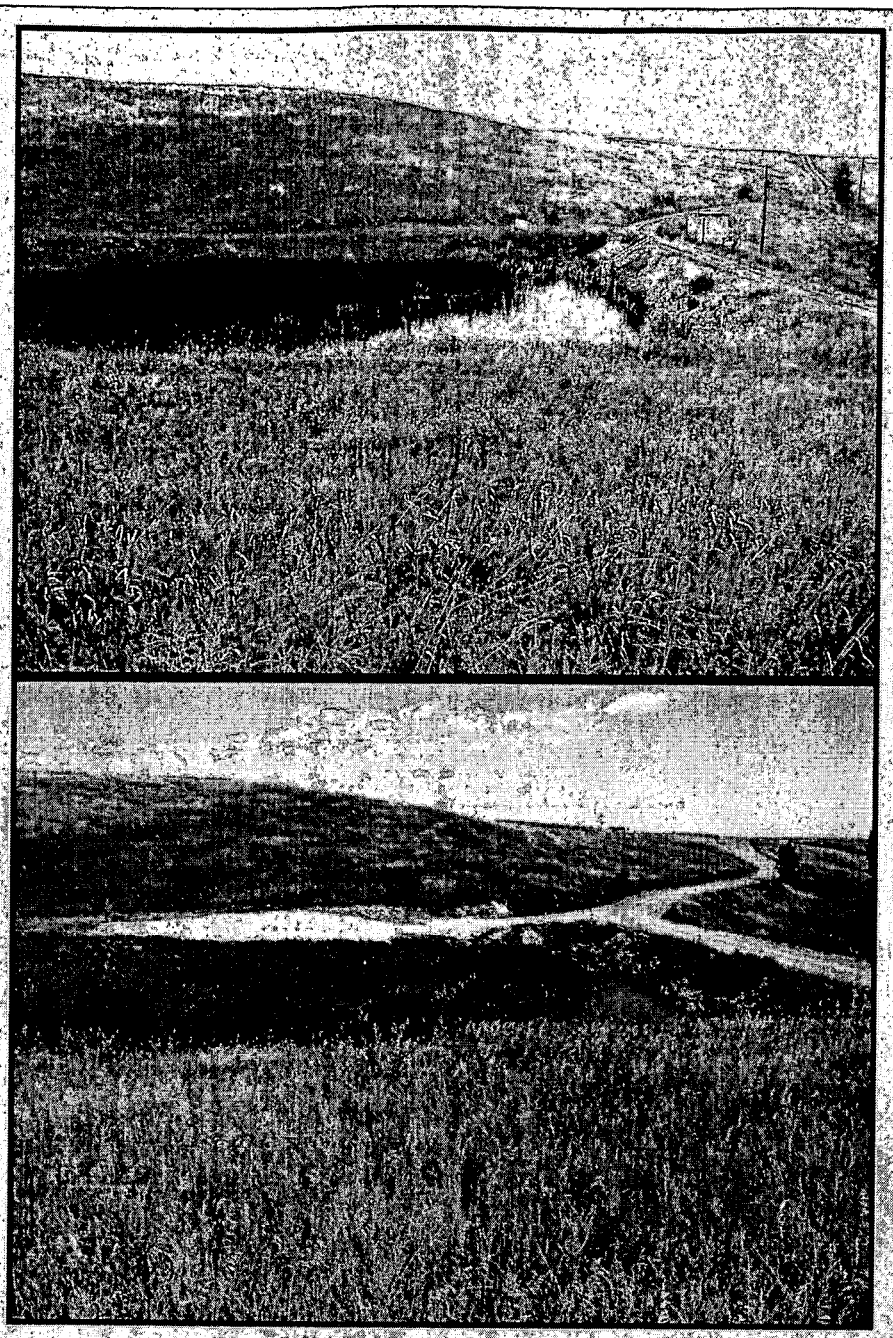
Photopoint 22



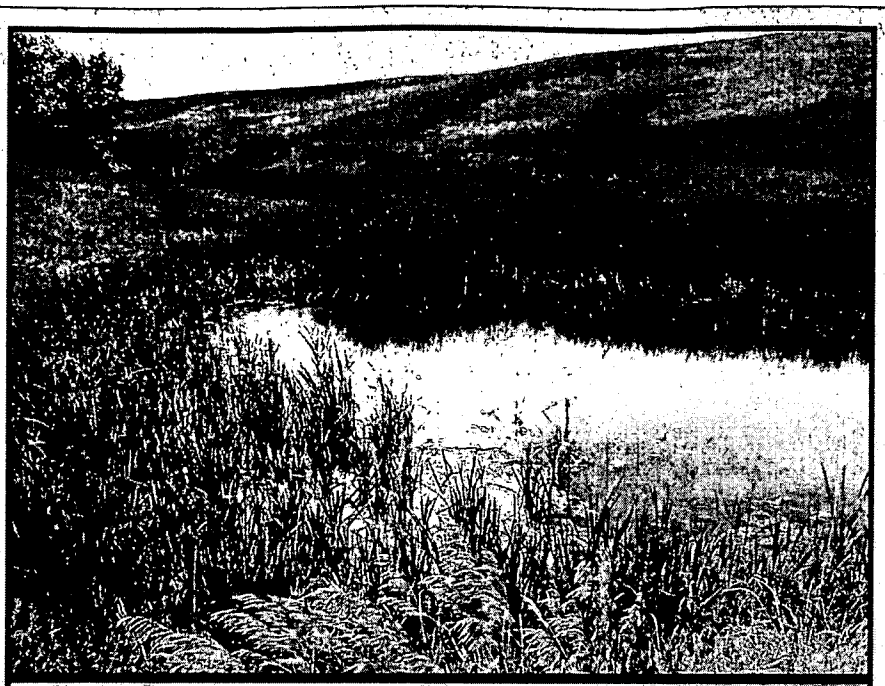
Photopoint 23

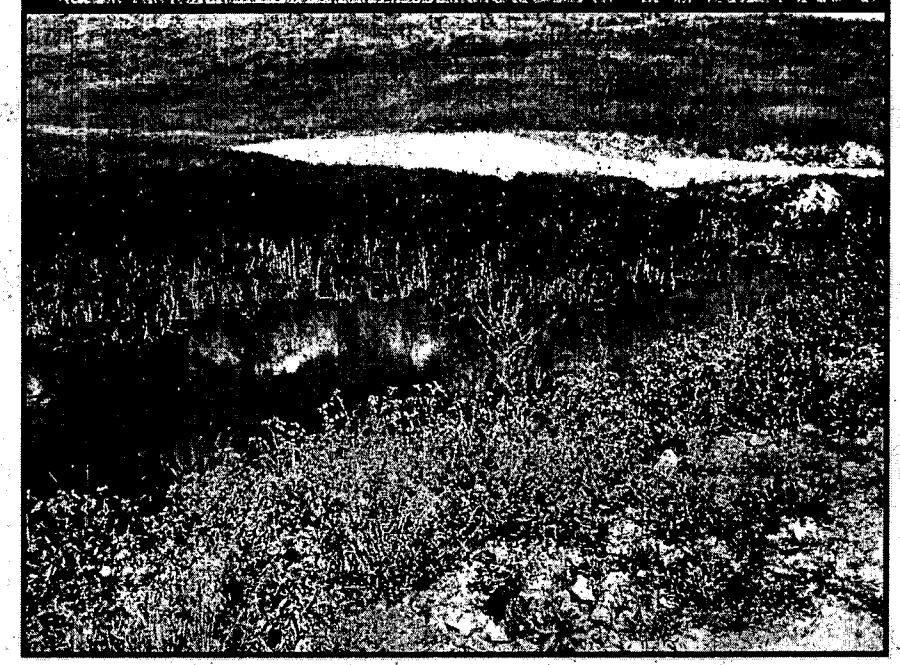


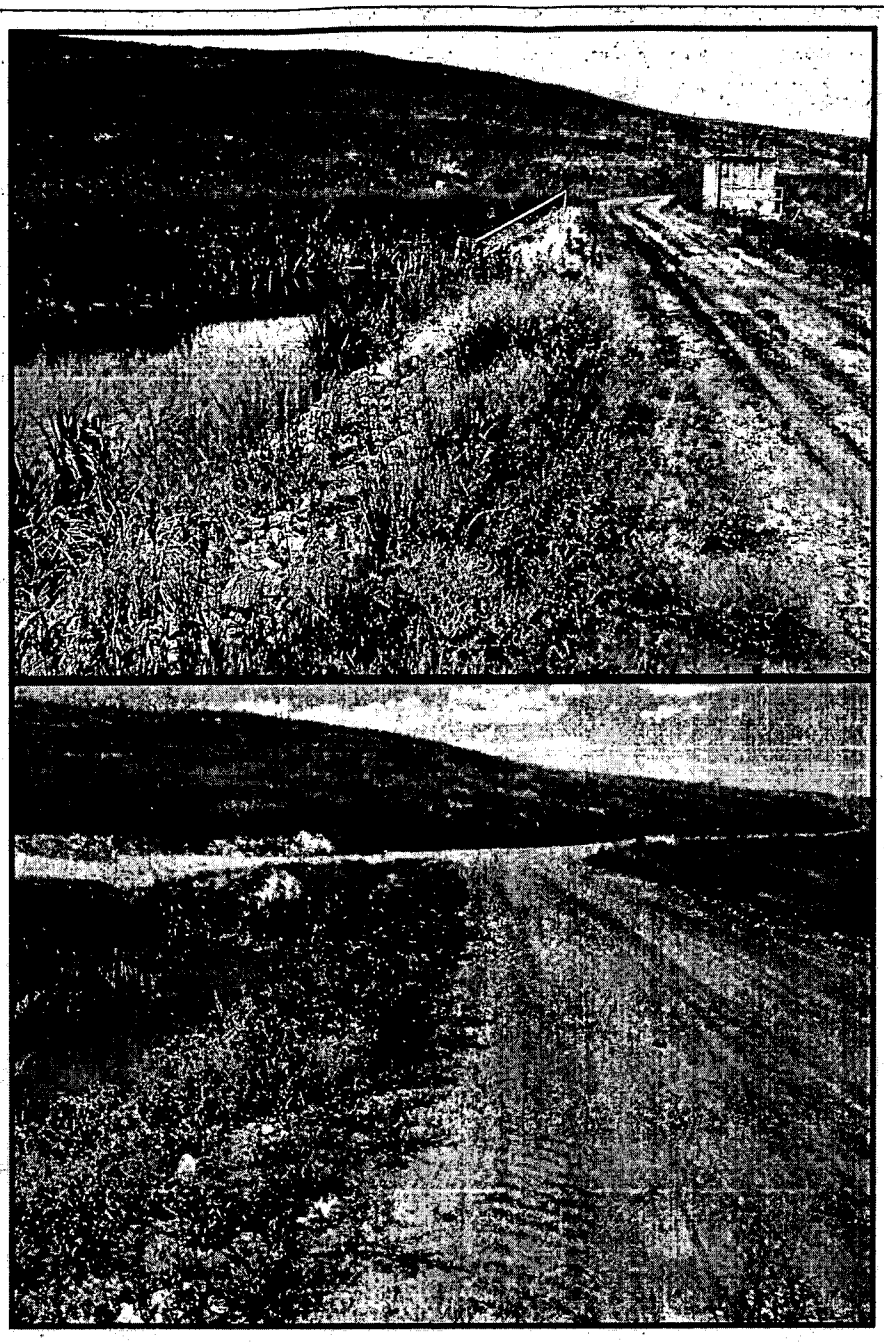
Photopoint 24



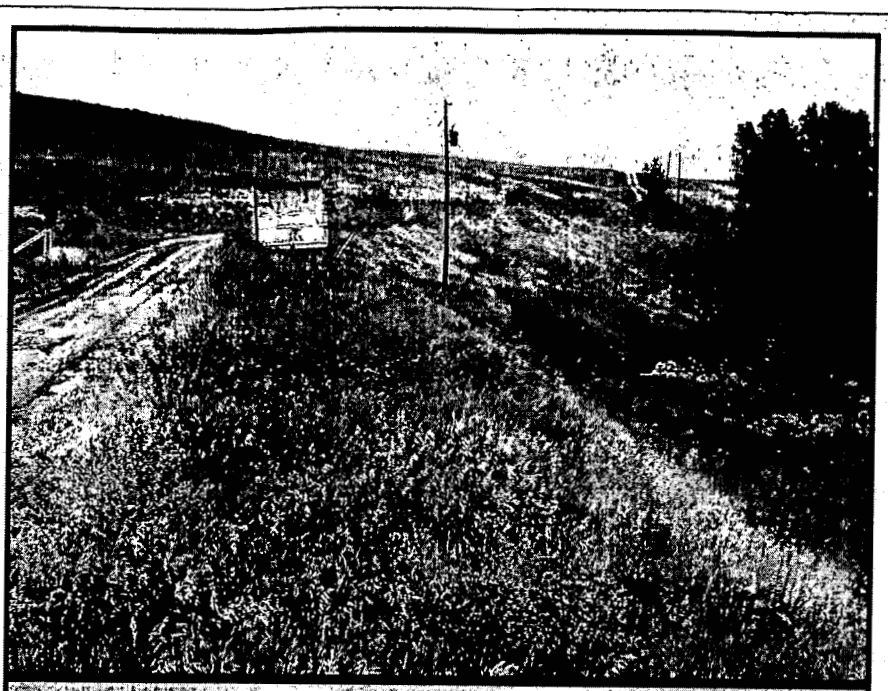
Photopoint 25 (B-4 Pond)







Photopoint 26

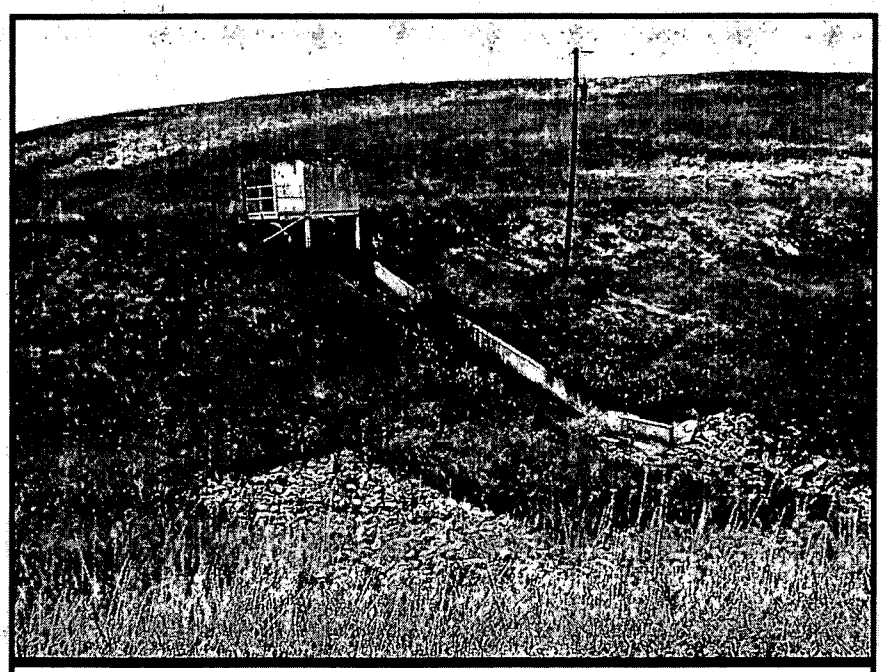


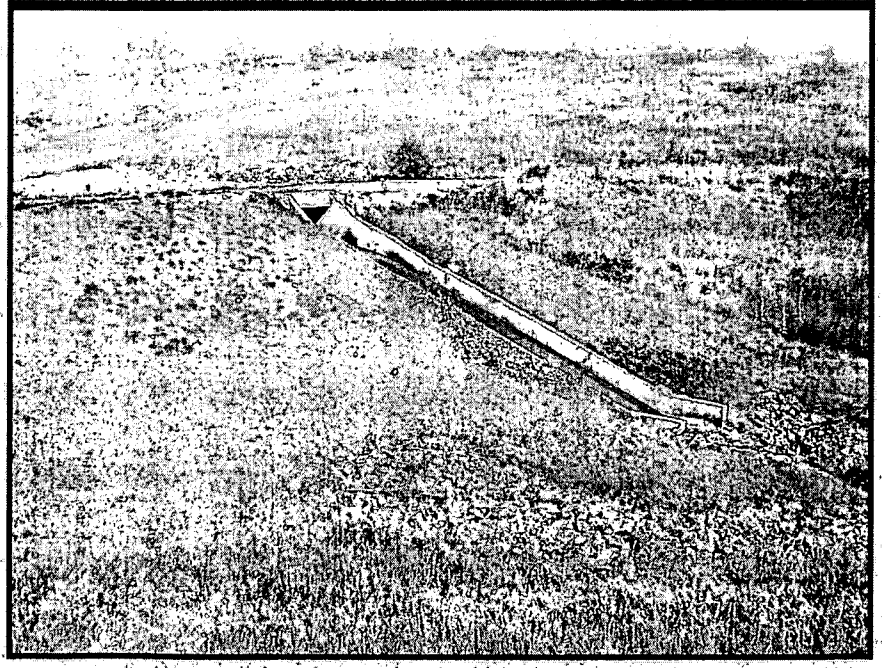
Pond Remediation

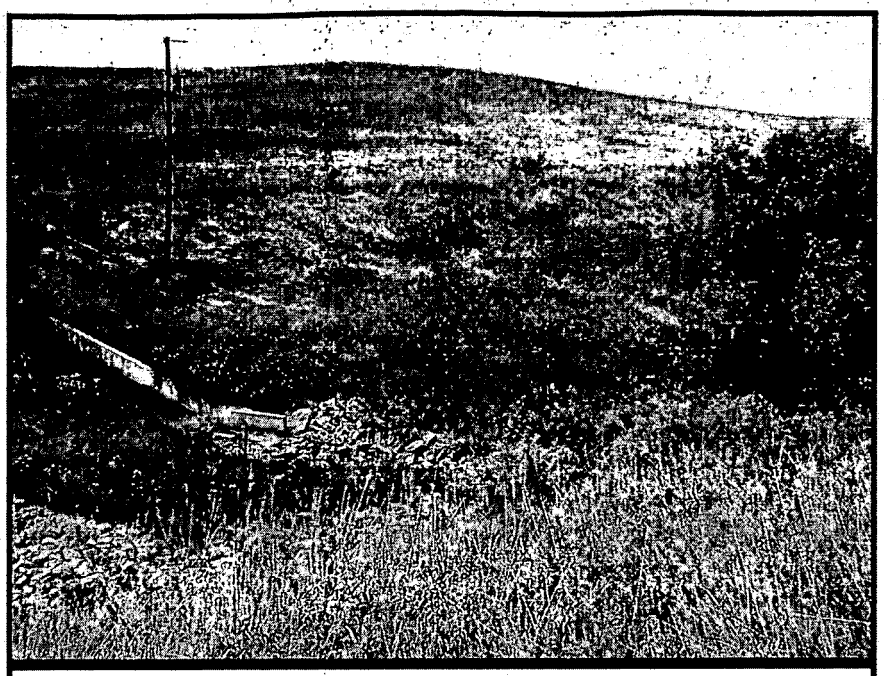
B-Series, Photopoints 27-32

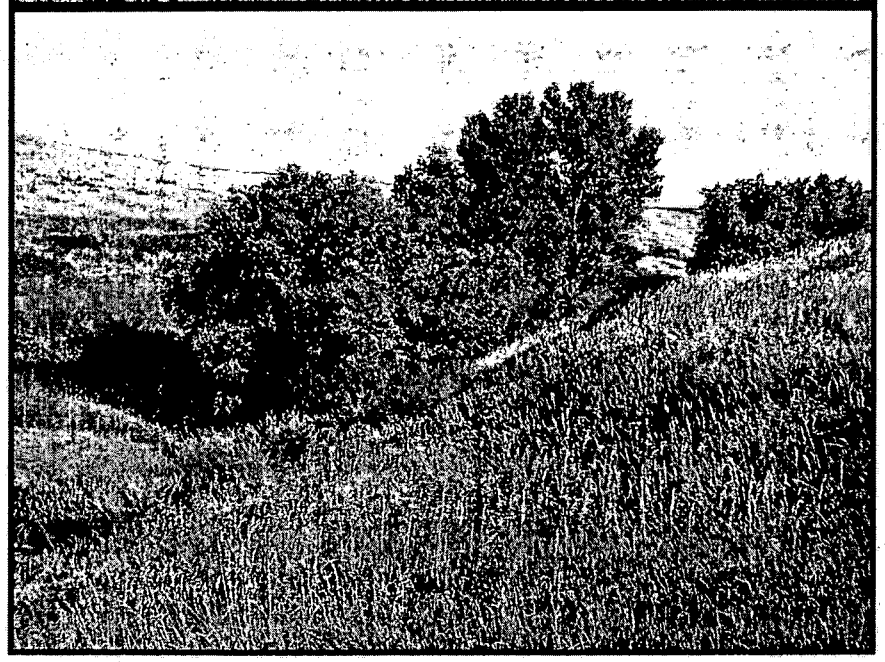
6/28/2004 **8/26/2005**

Photopoint 27

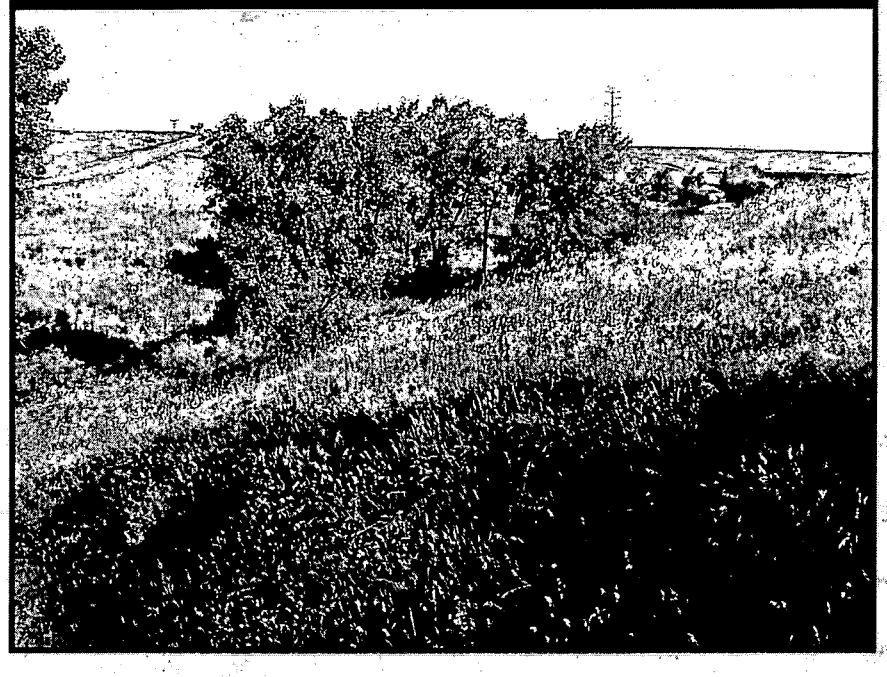




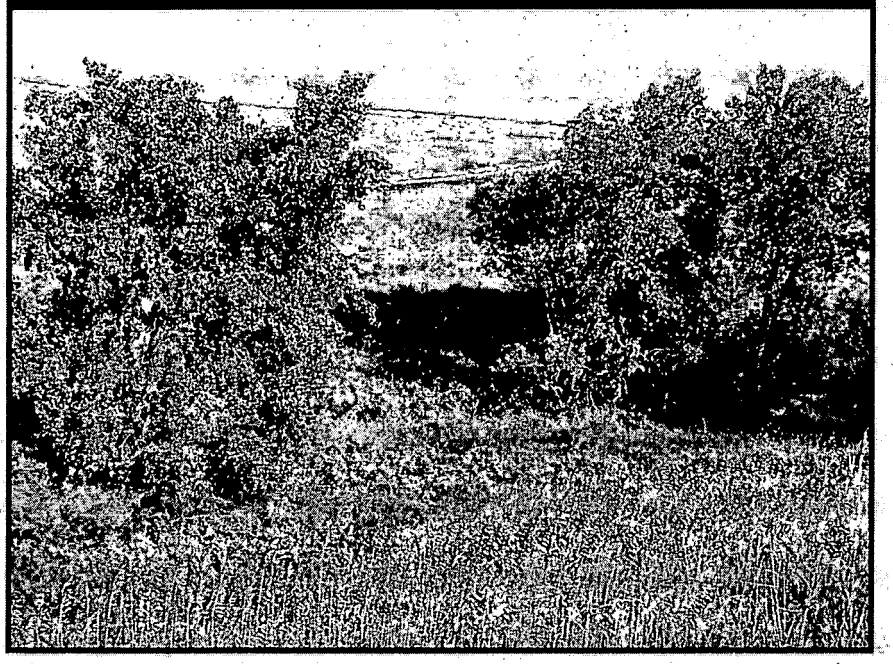




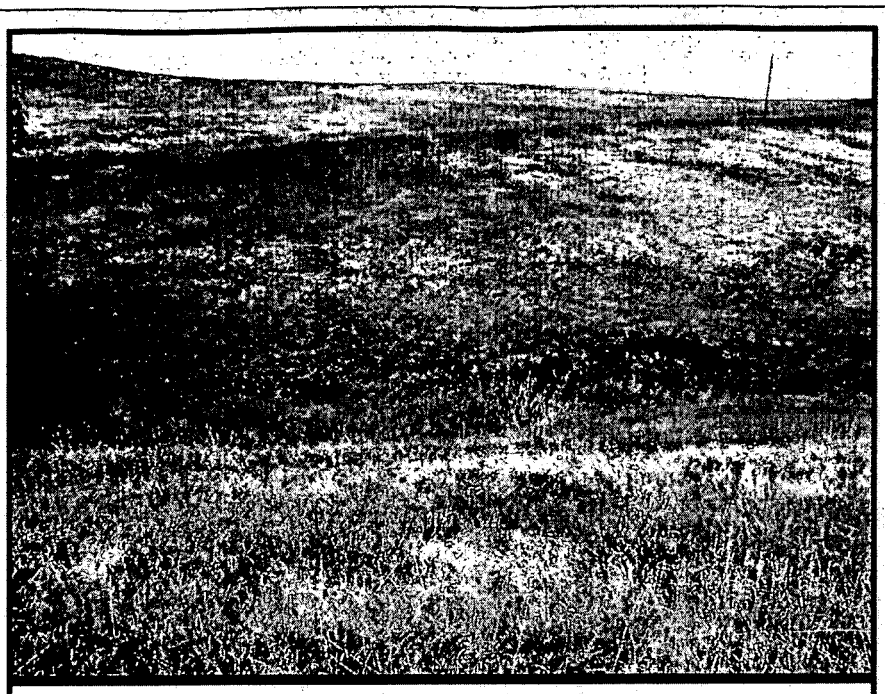
Photopoint 28

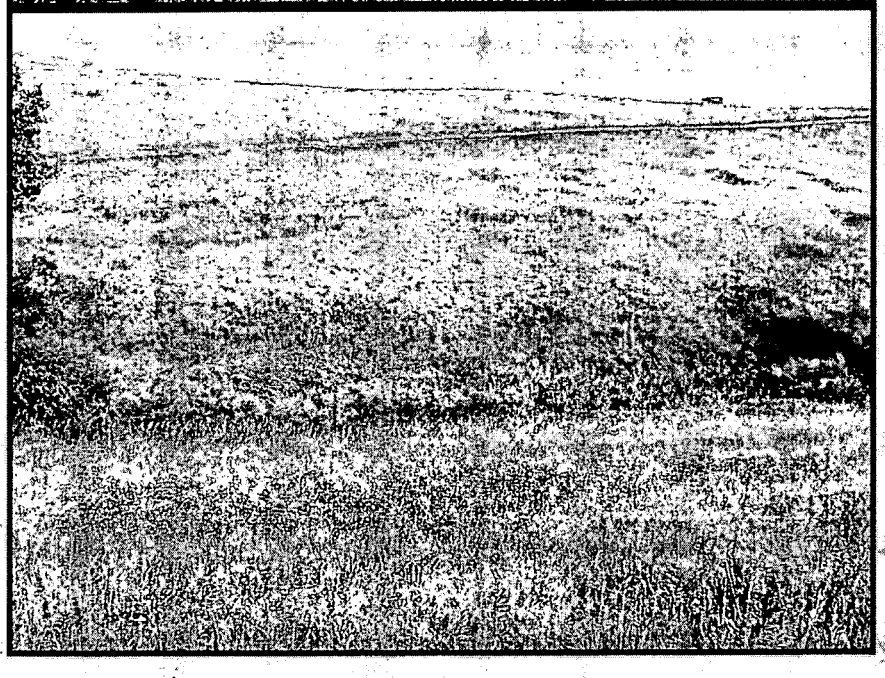


Photopoint 29

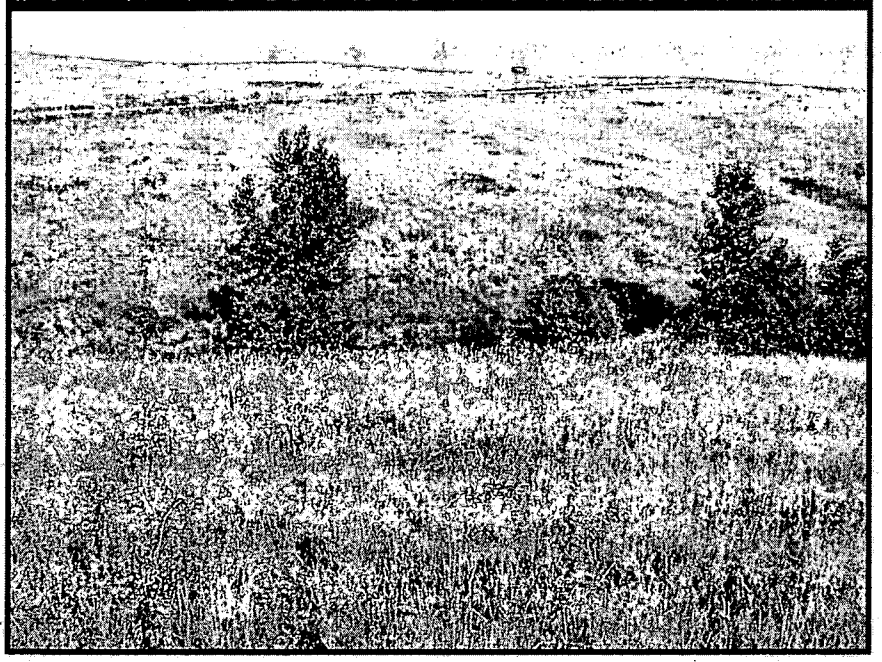


Photopoint 30





Photopoint 31



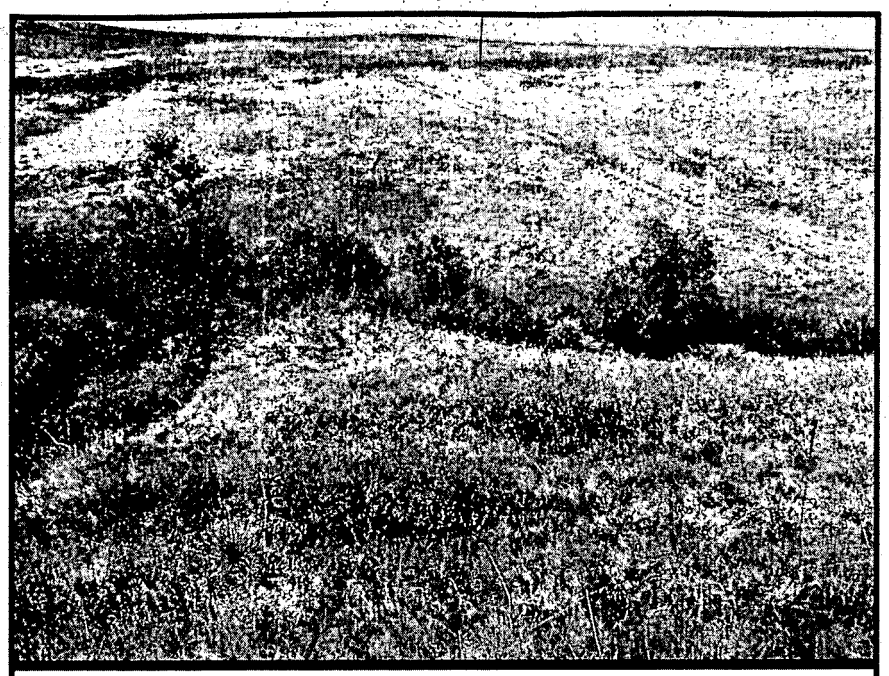
Photopoint 32

Pond Remediation

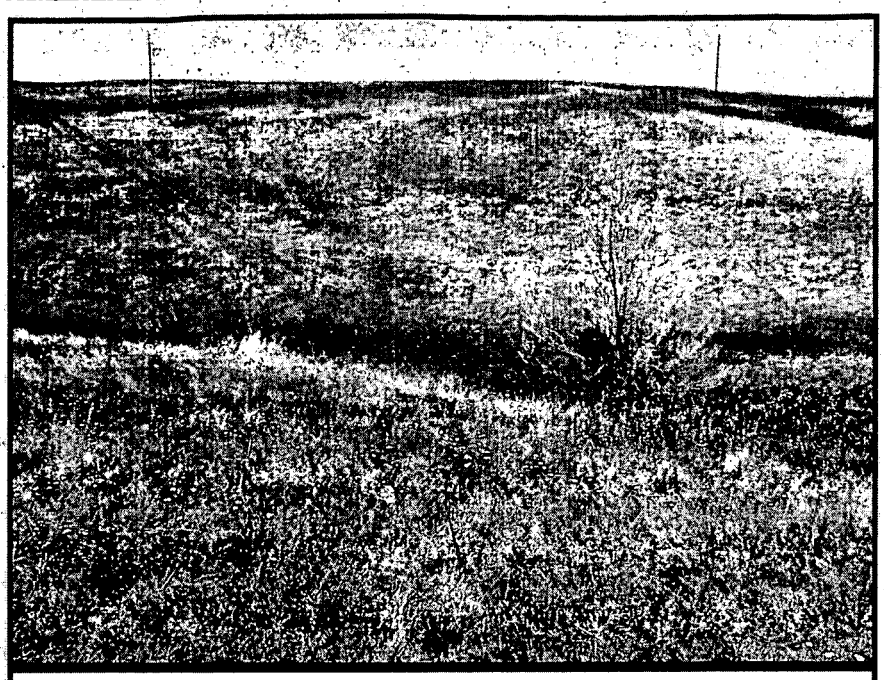
B-Series, Photopoints 33-39

6/28/2004 **8/29/2005**

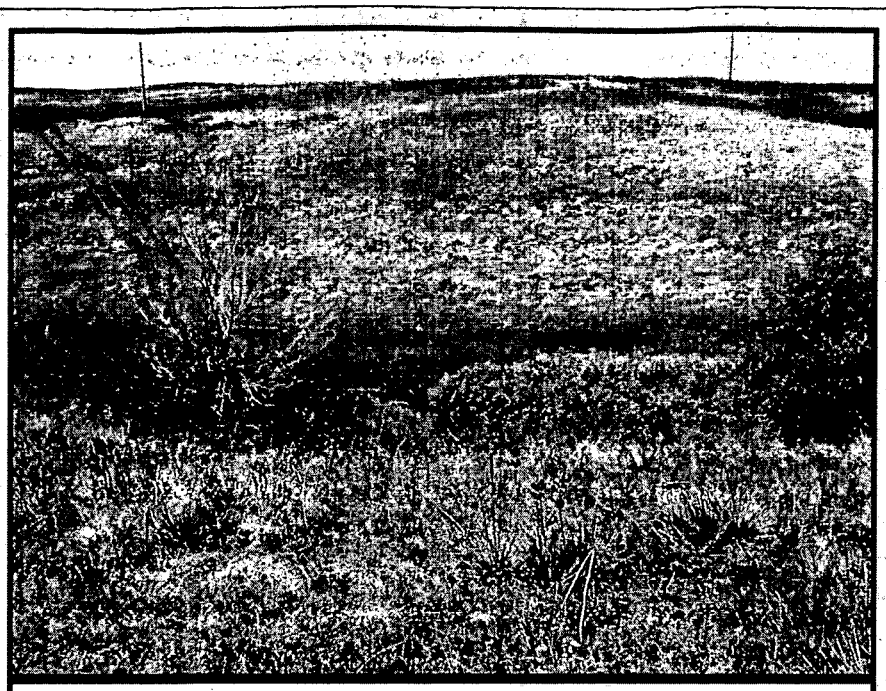
Photopoint 33



Photopoint 34

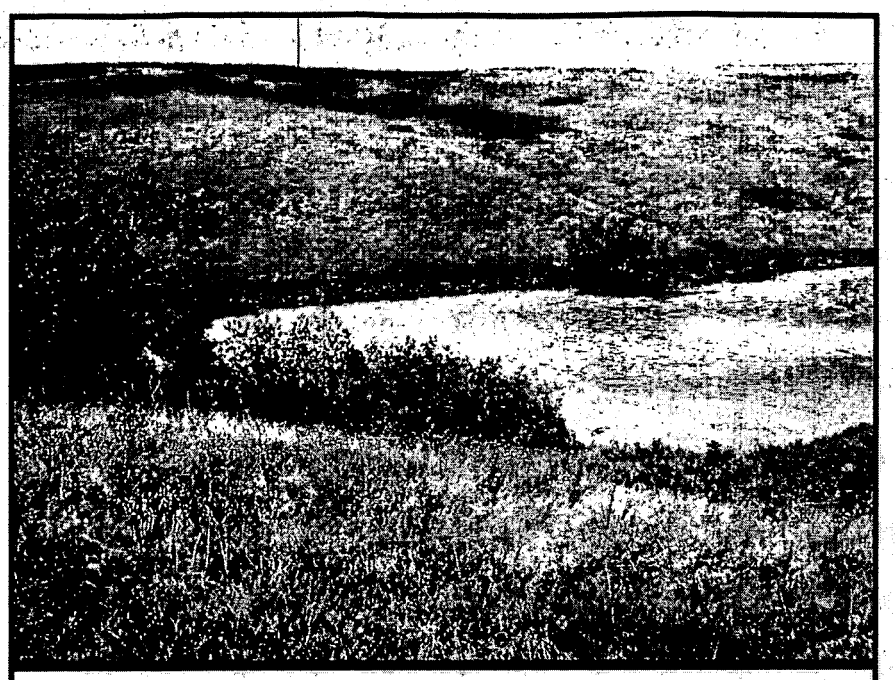


Photopoint 35

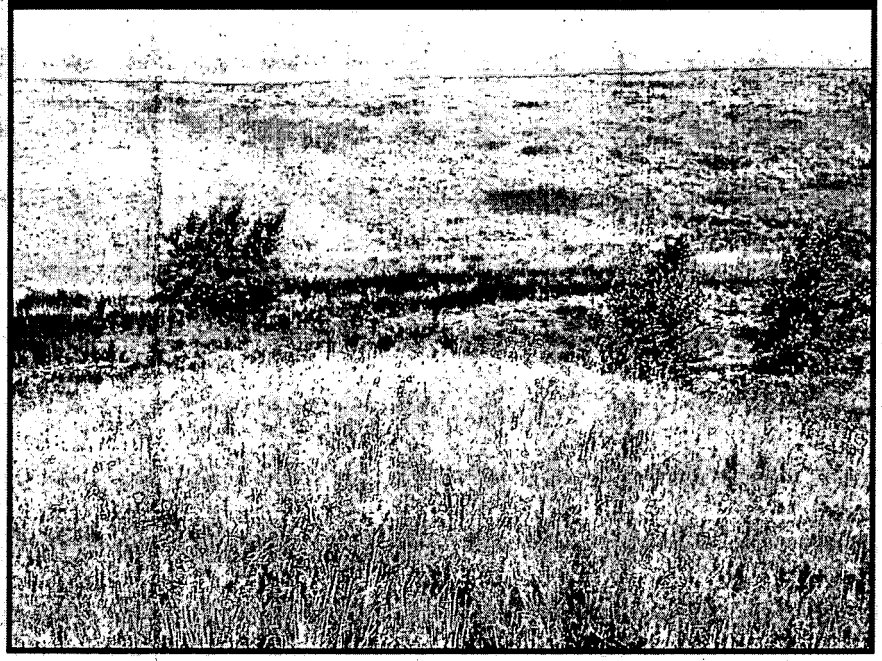


Photopoint 36

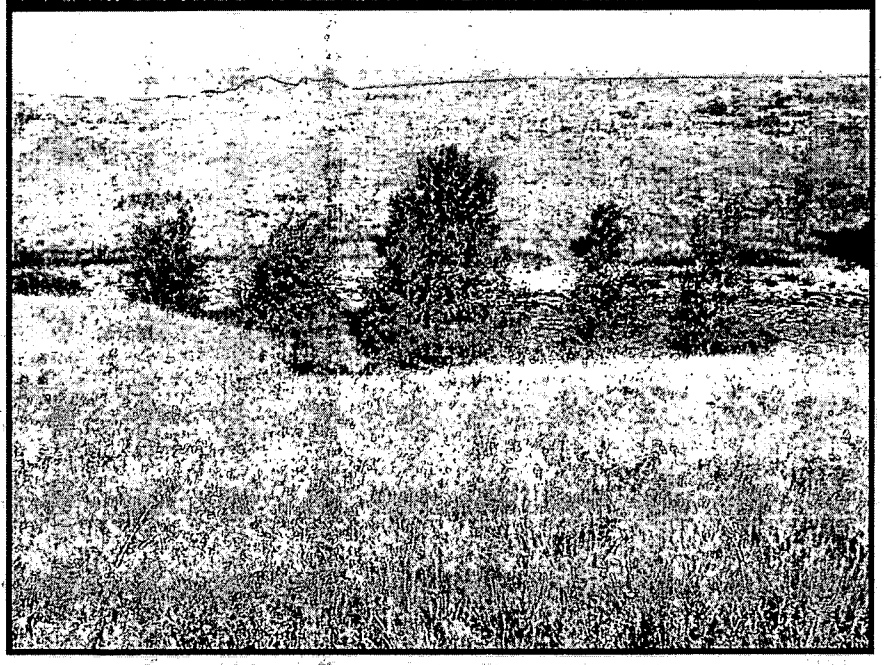
Photopoint 37

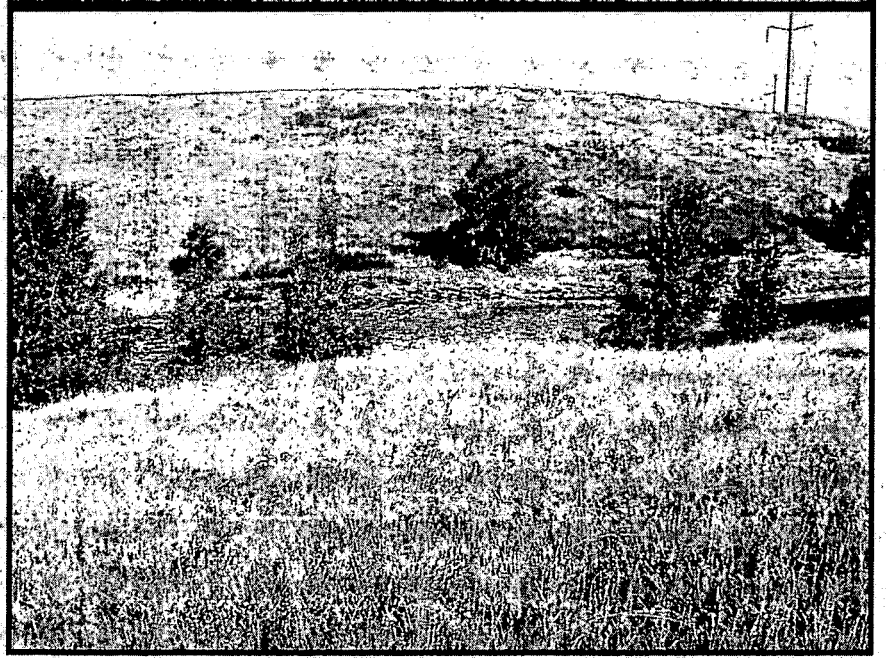


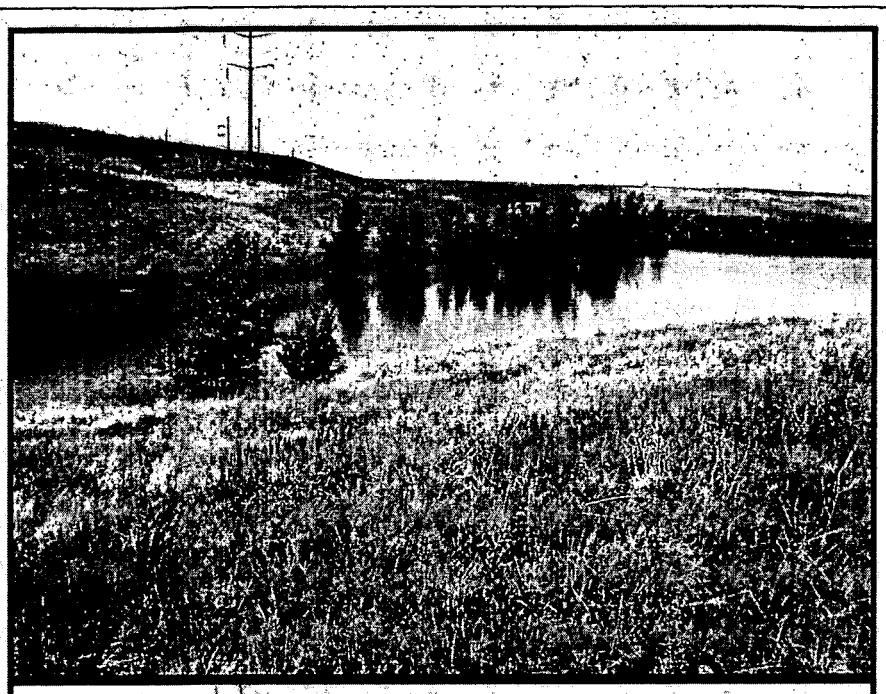
Photopoint 38

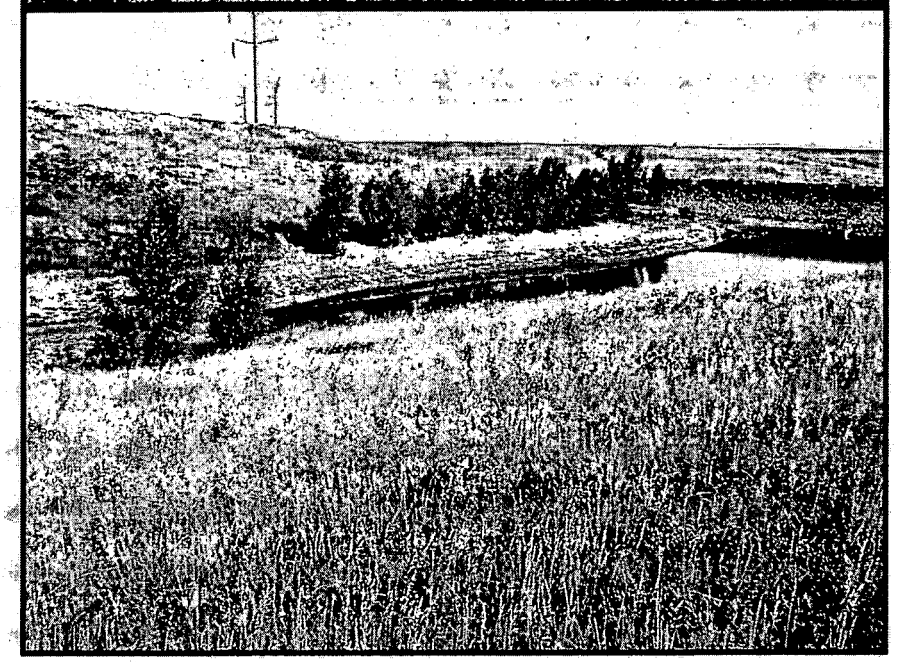


Photopoint 39 (B-5 Pond)







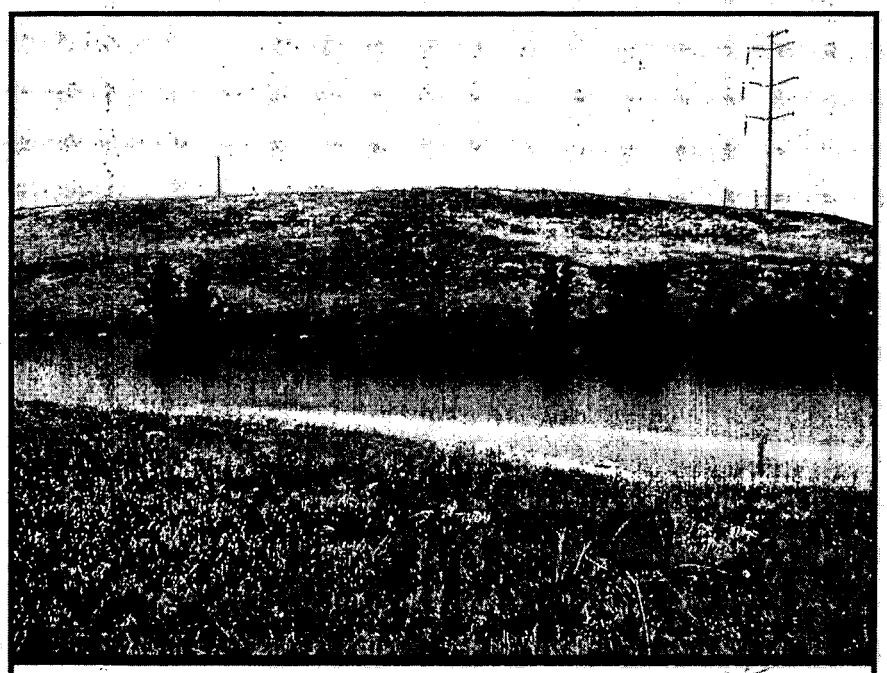


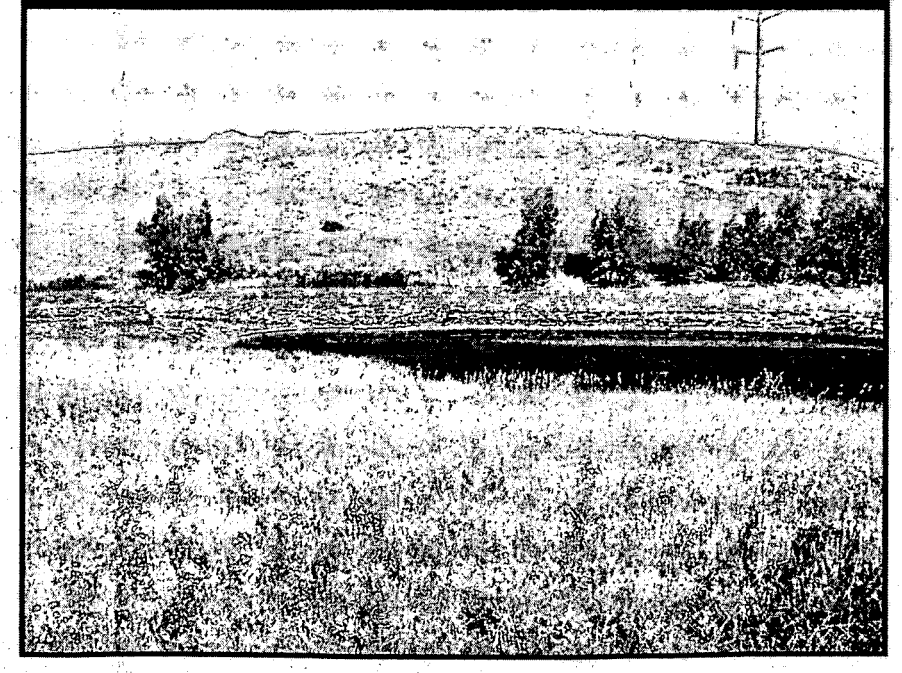
Pond Remediation

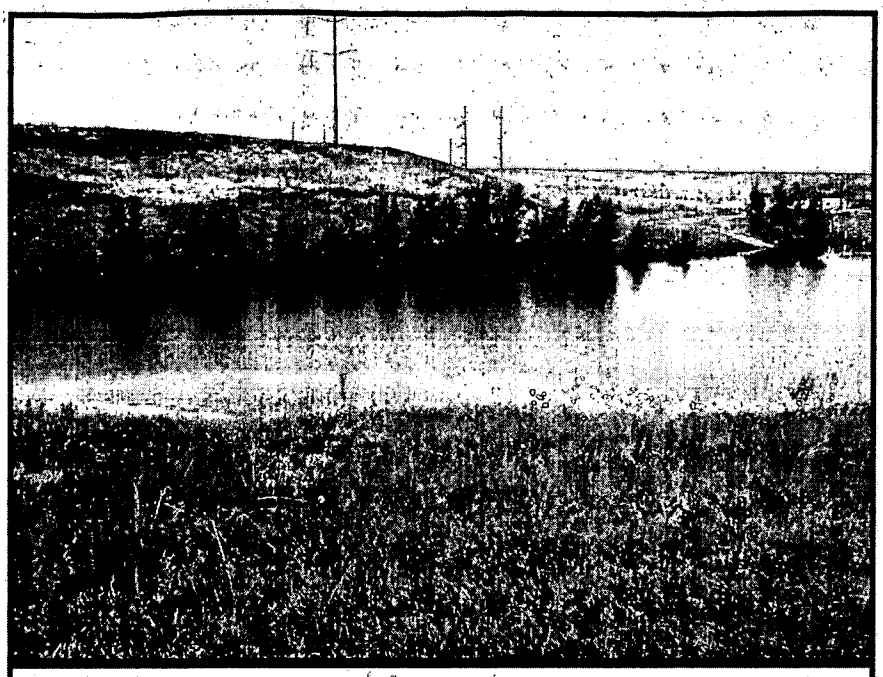
B-Series, Photopoints 40-43

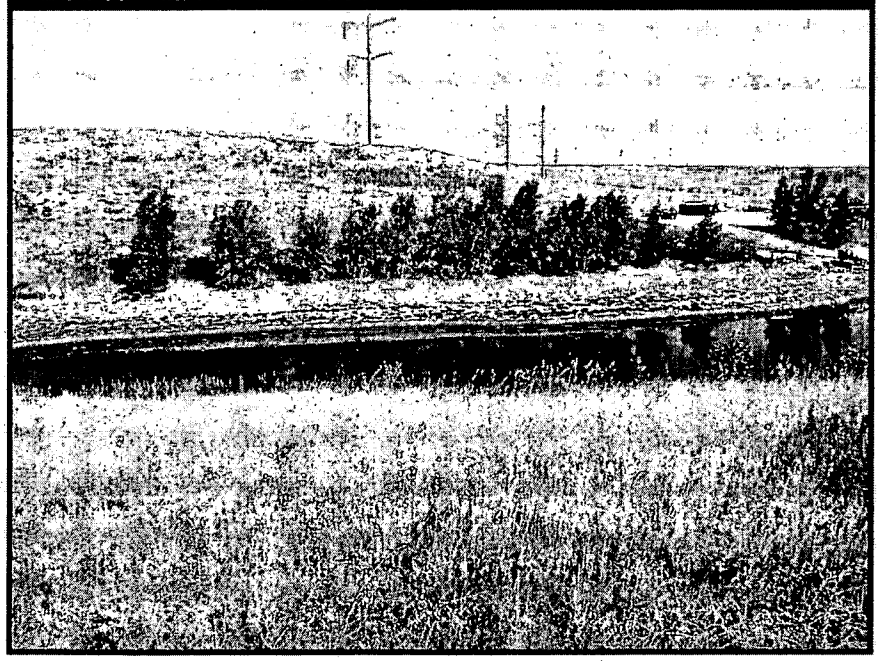
6/28/2004 **8/29/2005**

Photopoint 40

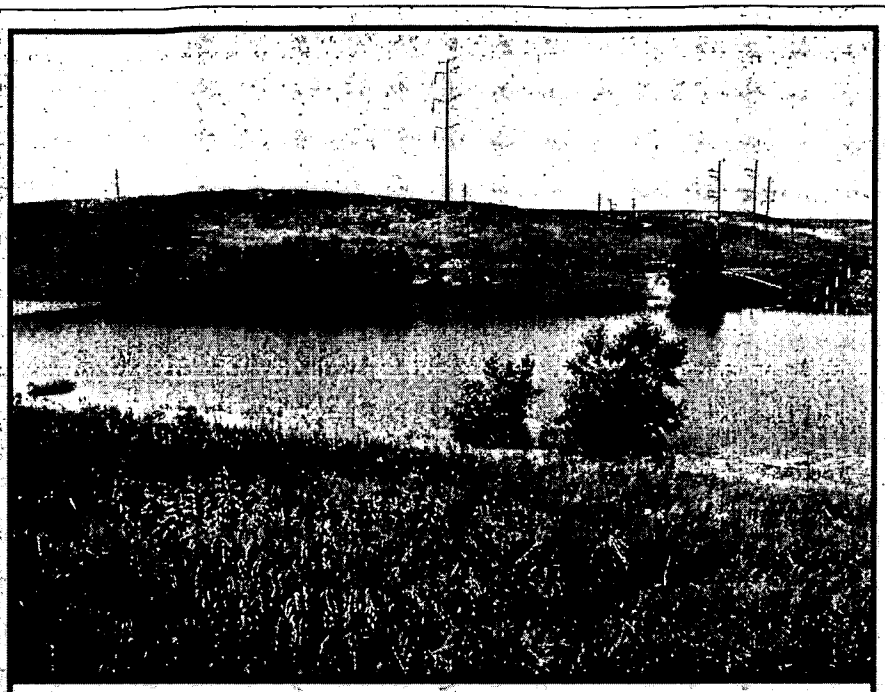


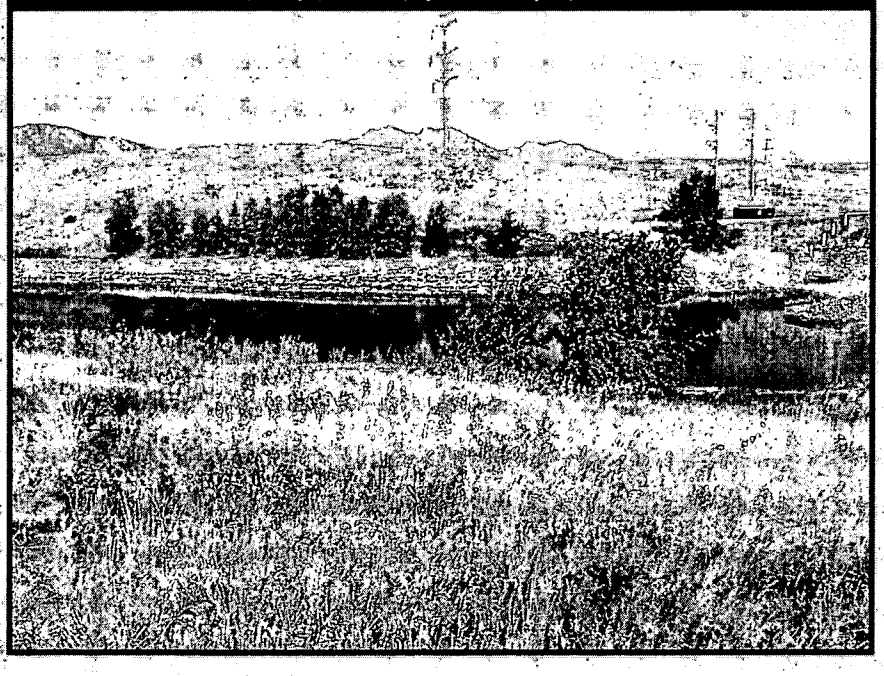


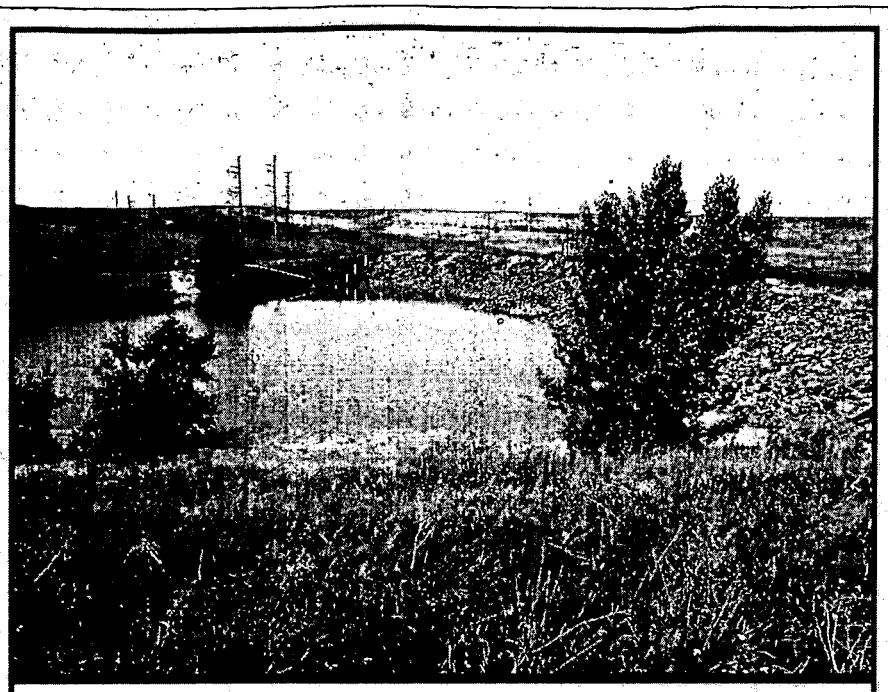


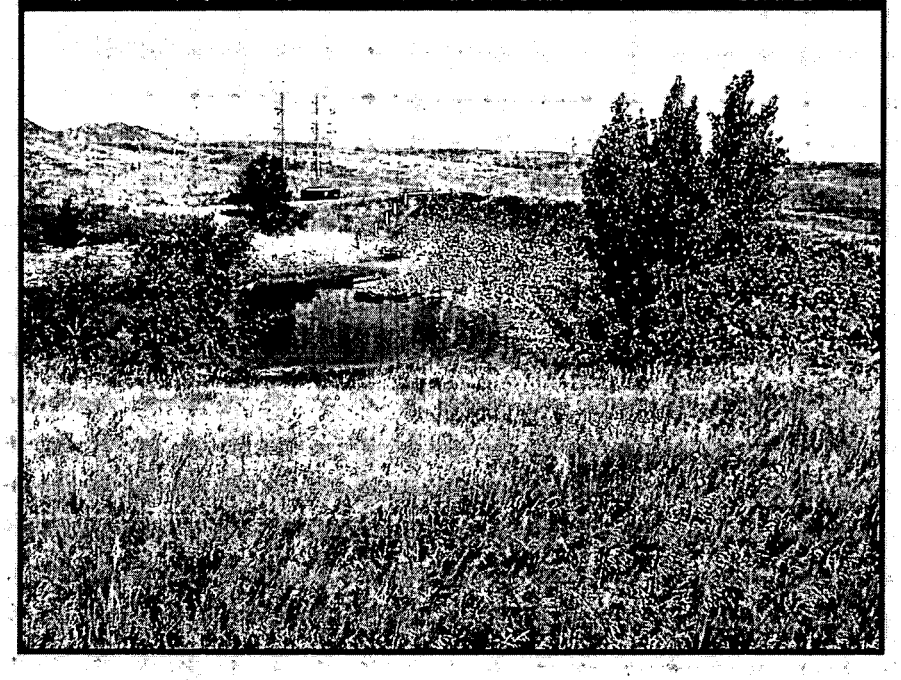


Photopoint 41

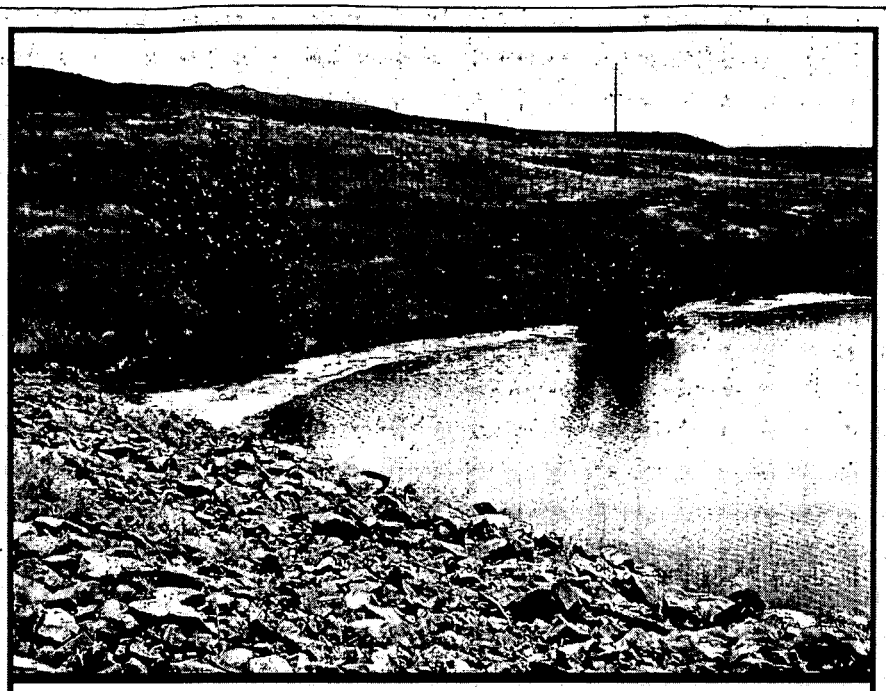


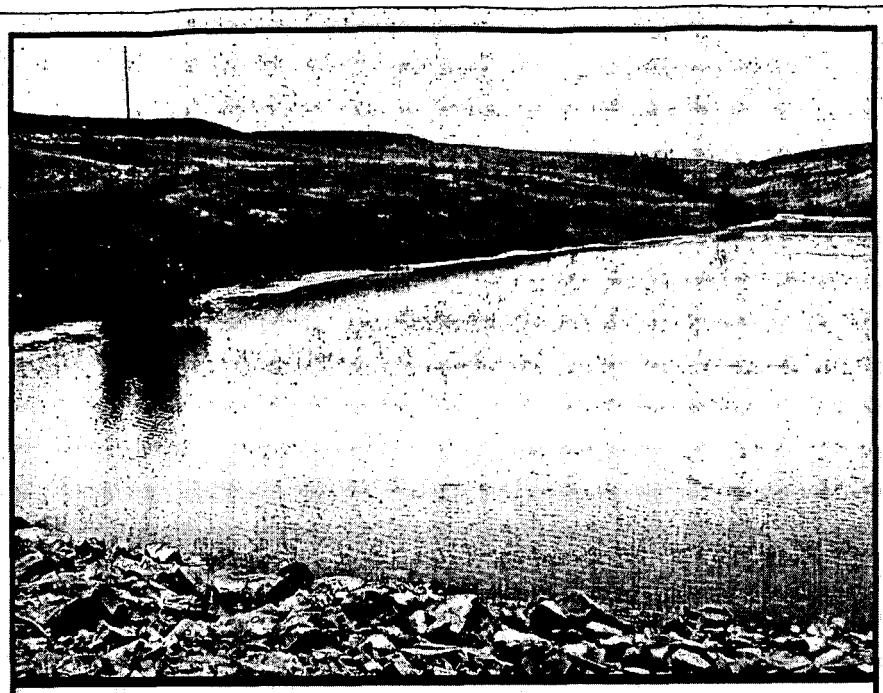


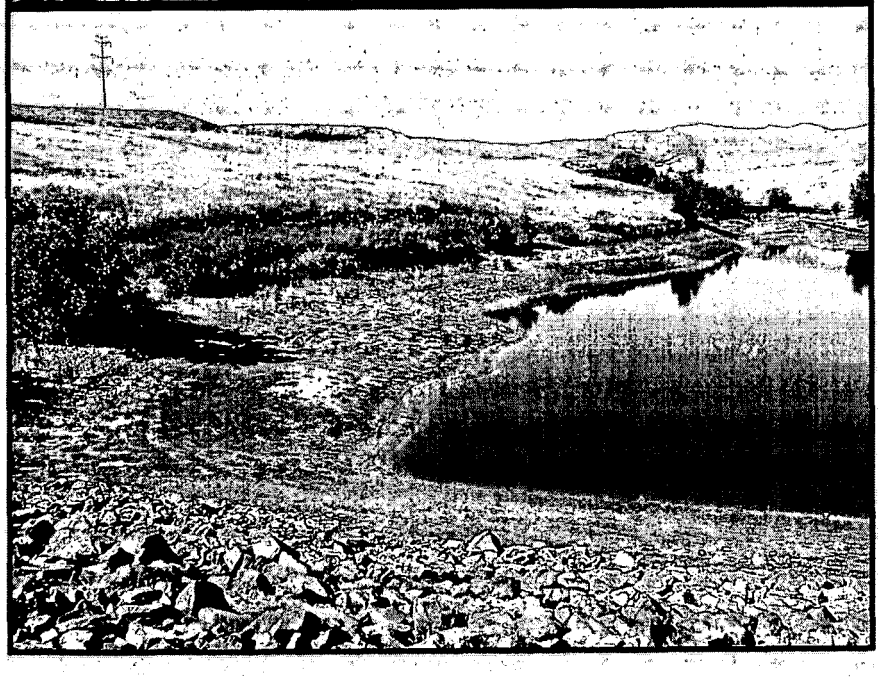


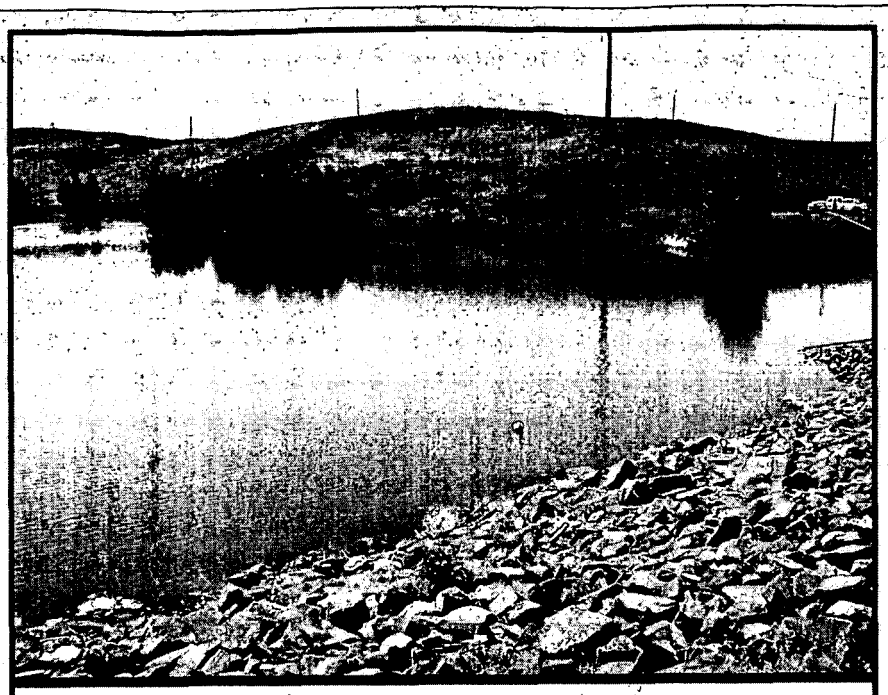


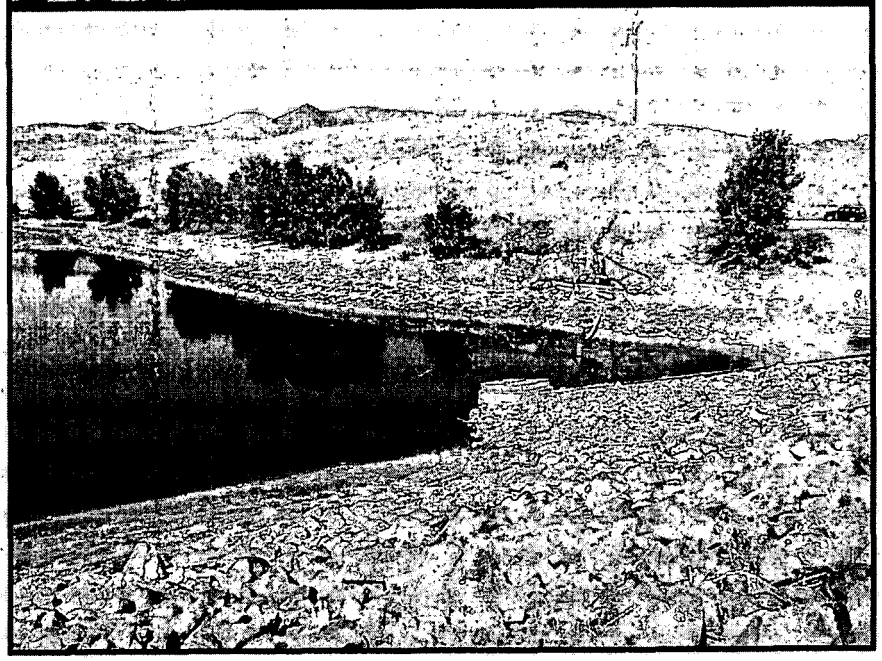
Photopoint 42 (B-5 Pond)

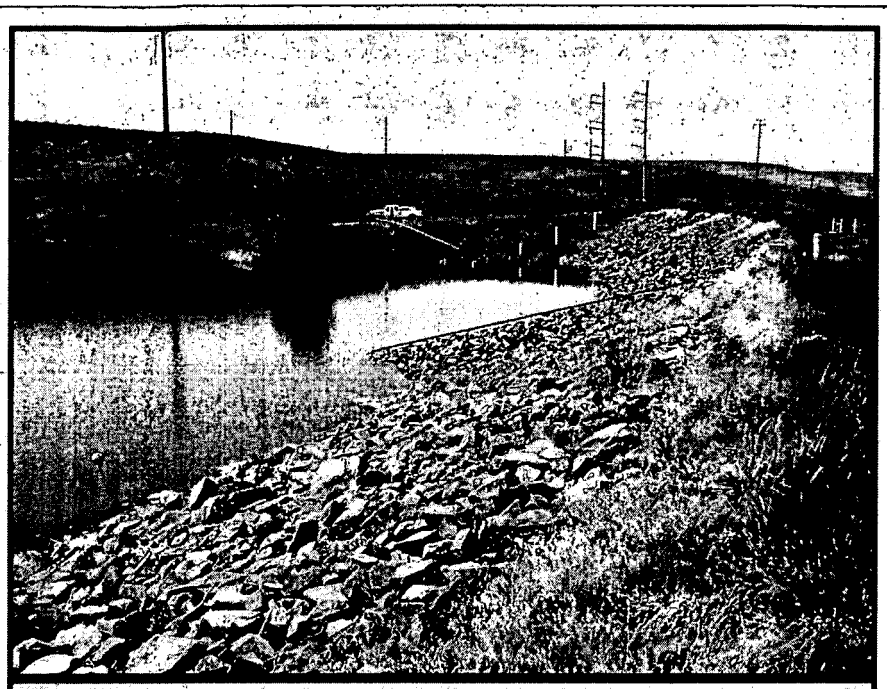


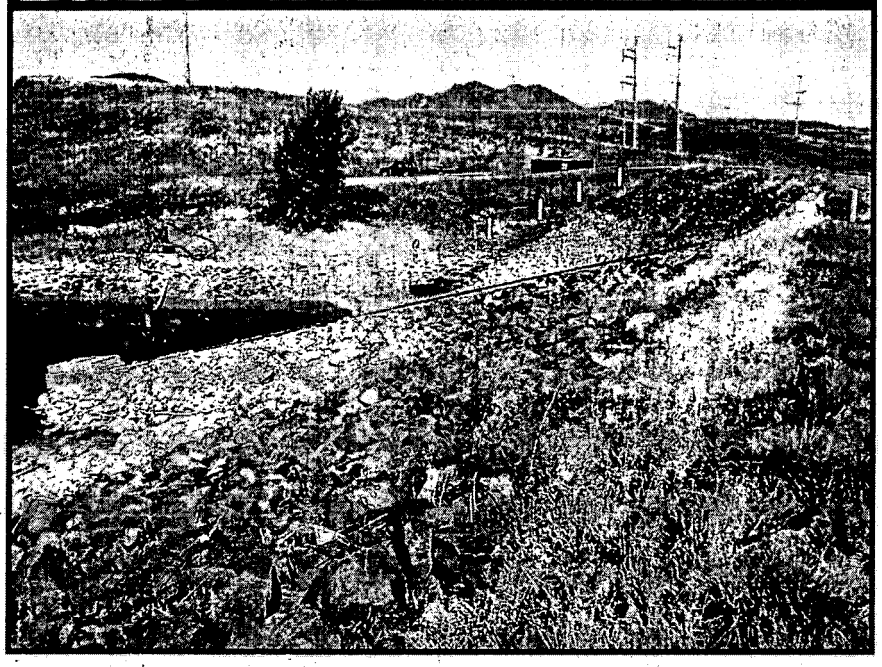




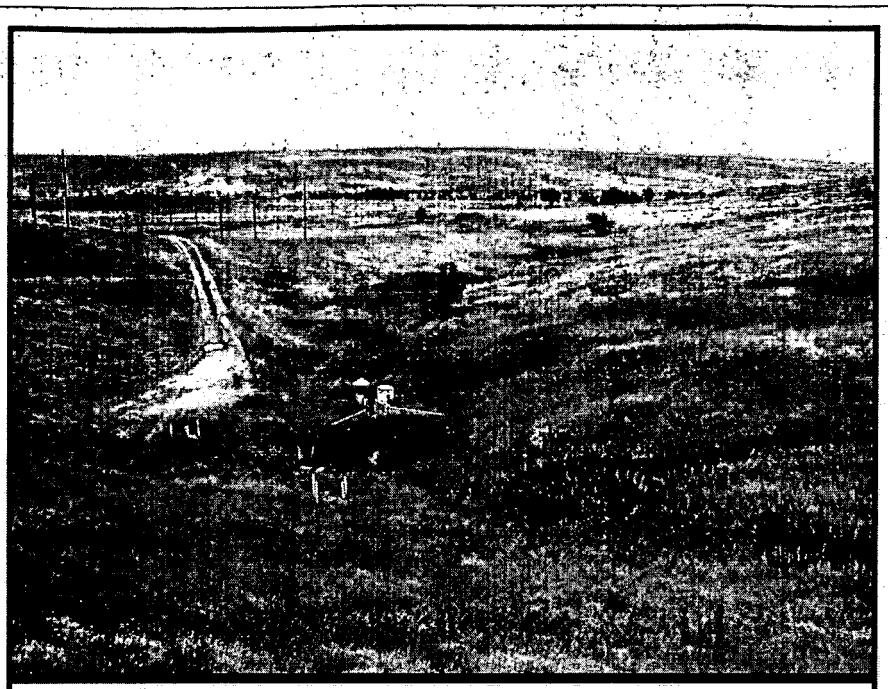


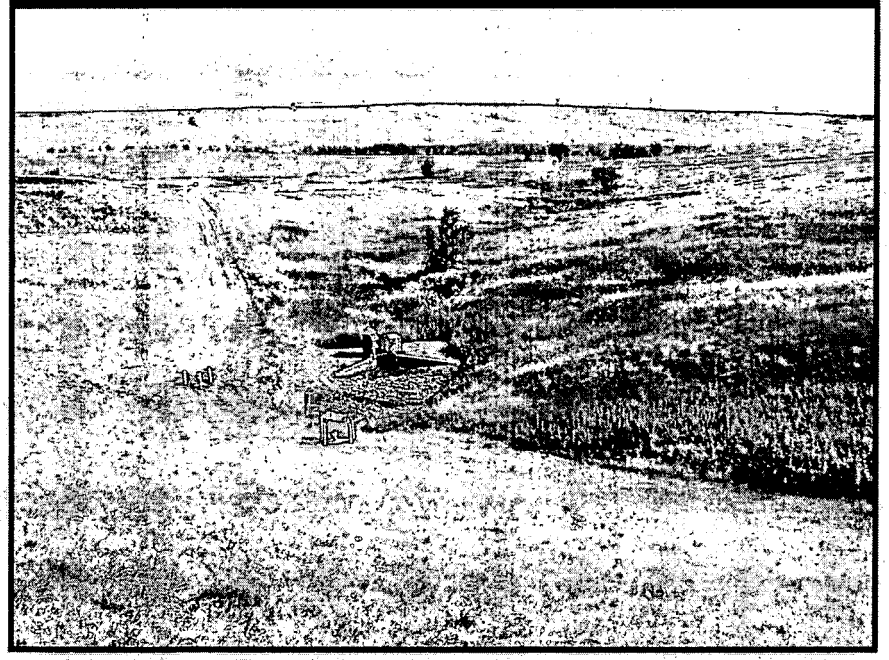


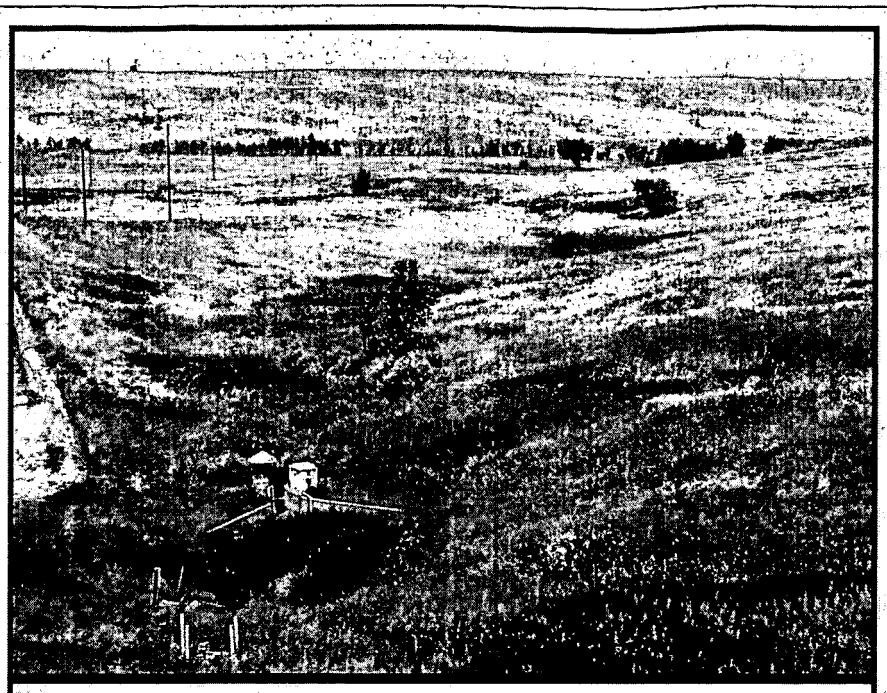


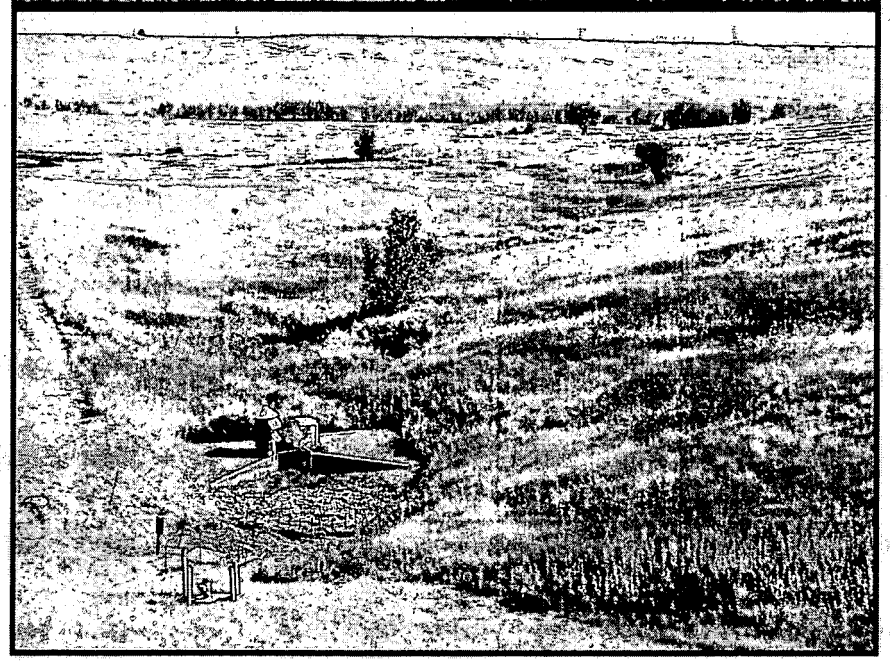


Photopoint 43



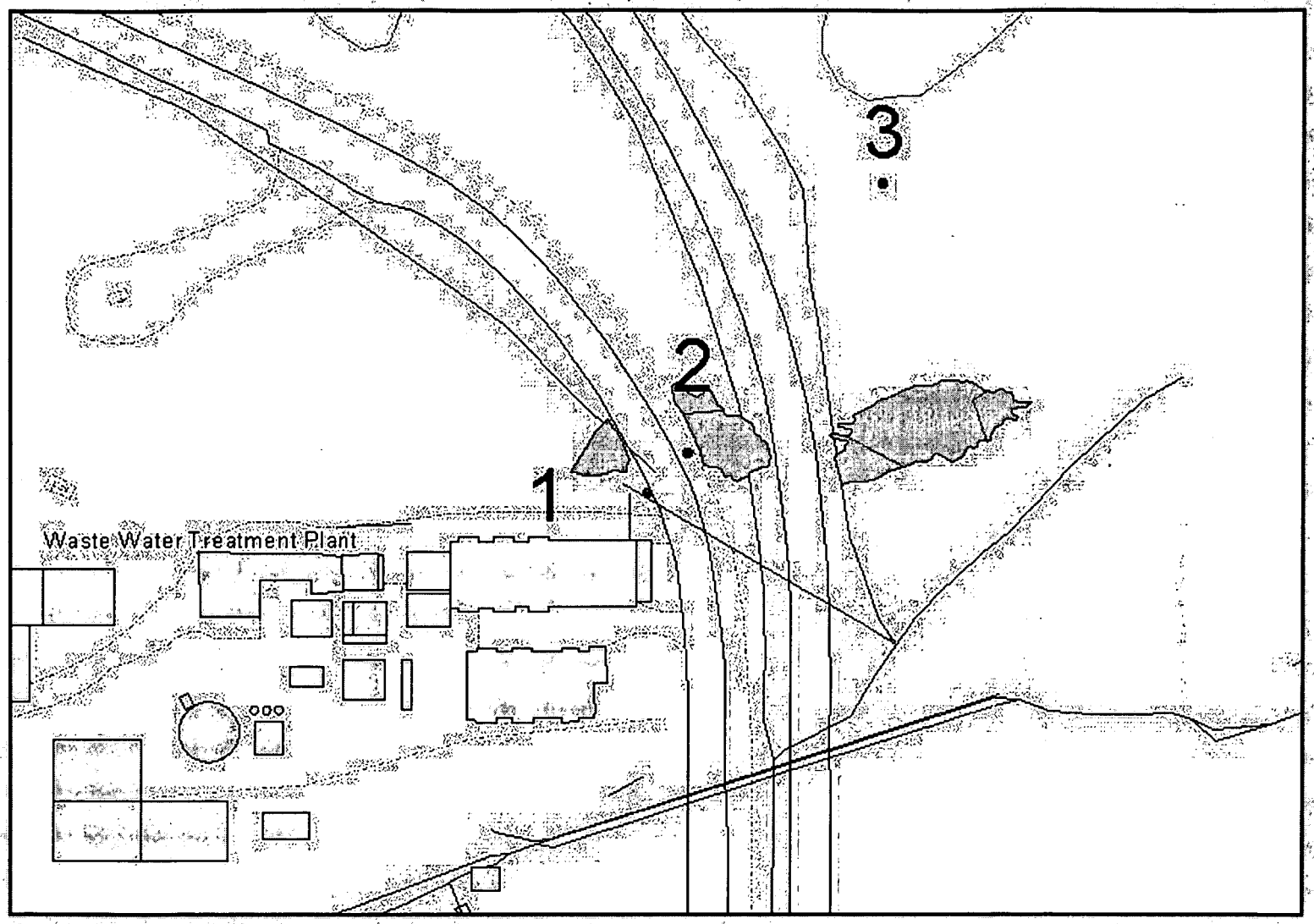






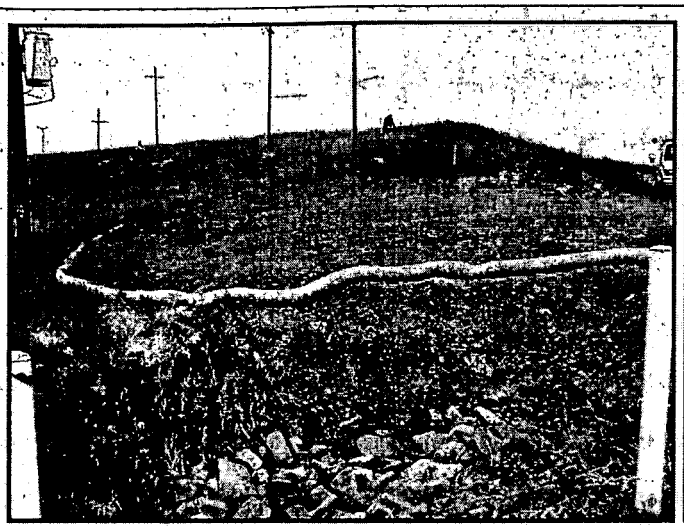
Old Process Waste Line

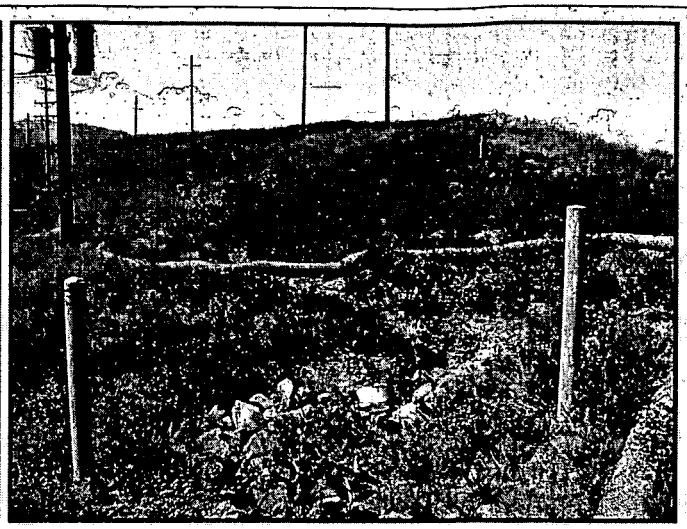
(clicking on any photopoint on the map will take you to the corresponding monitoring photos)



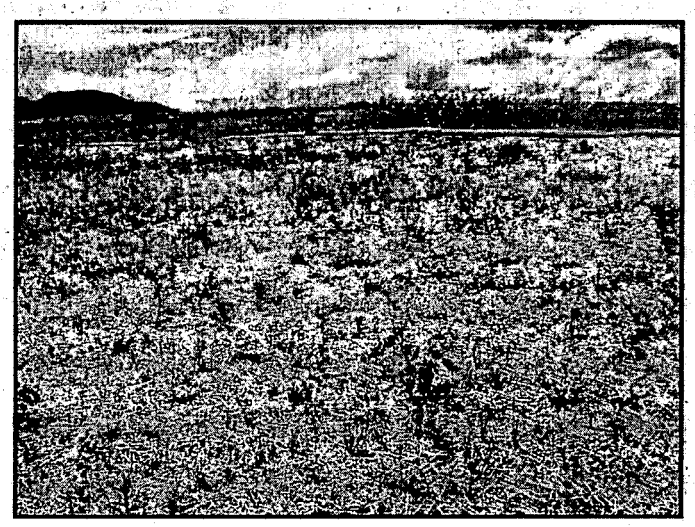
Photopoint 1

05/2004 09/2004



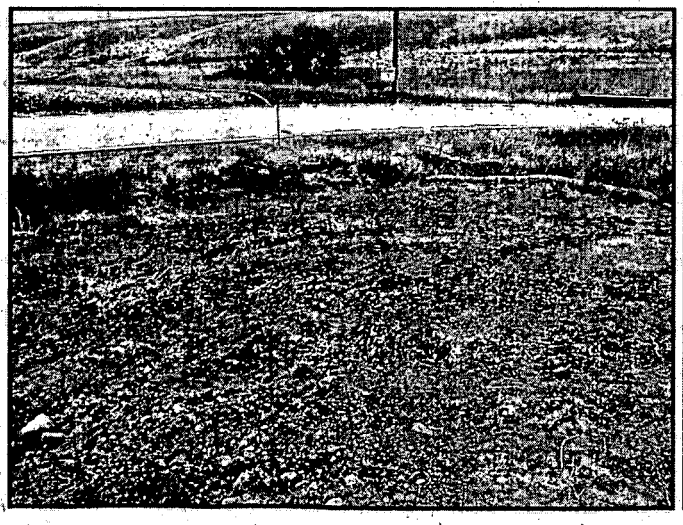


08/2005

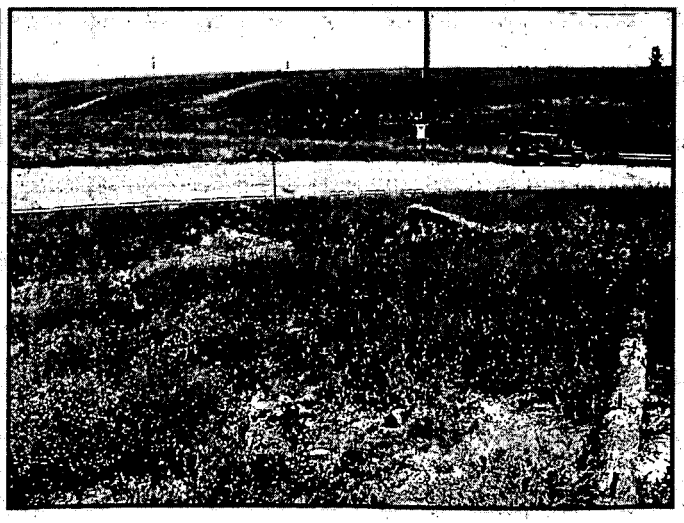


Photopoint 2

05/2004



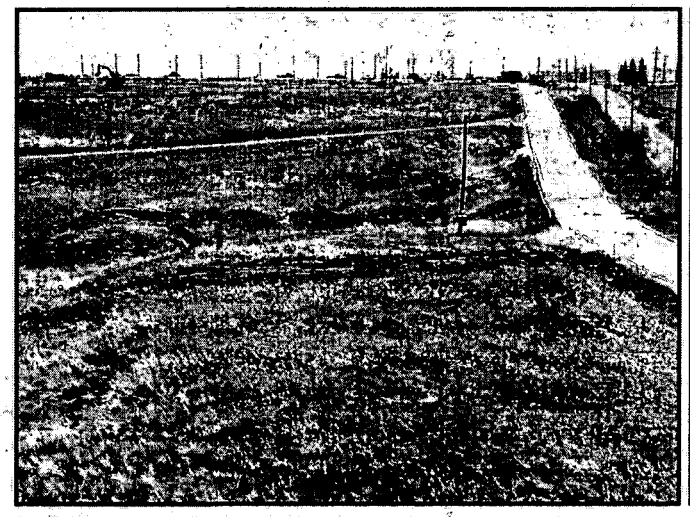
09/2004



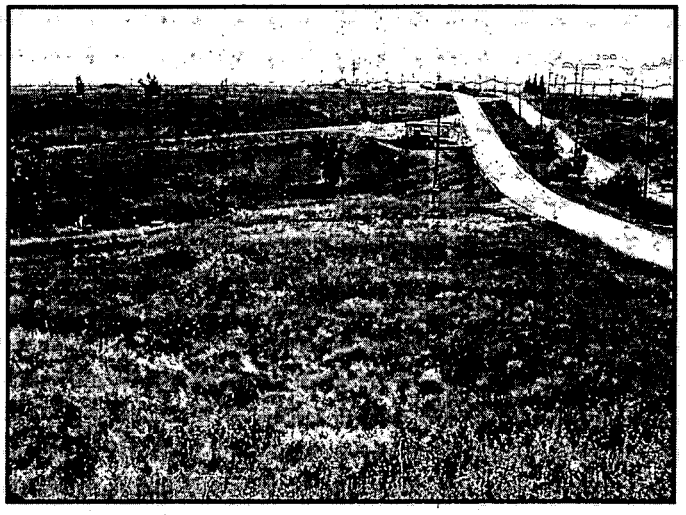
08/2005

Photopoint 3

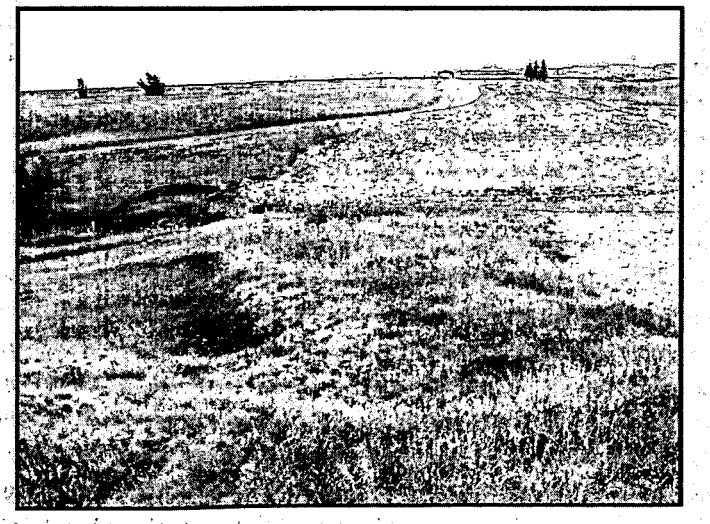
05/2004



09/2004

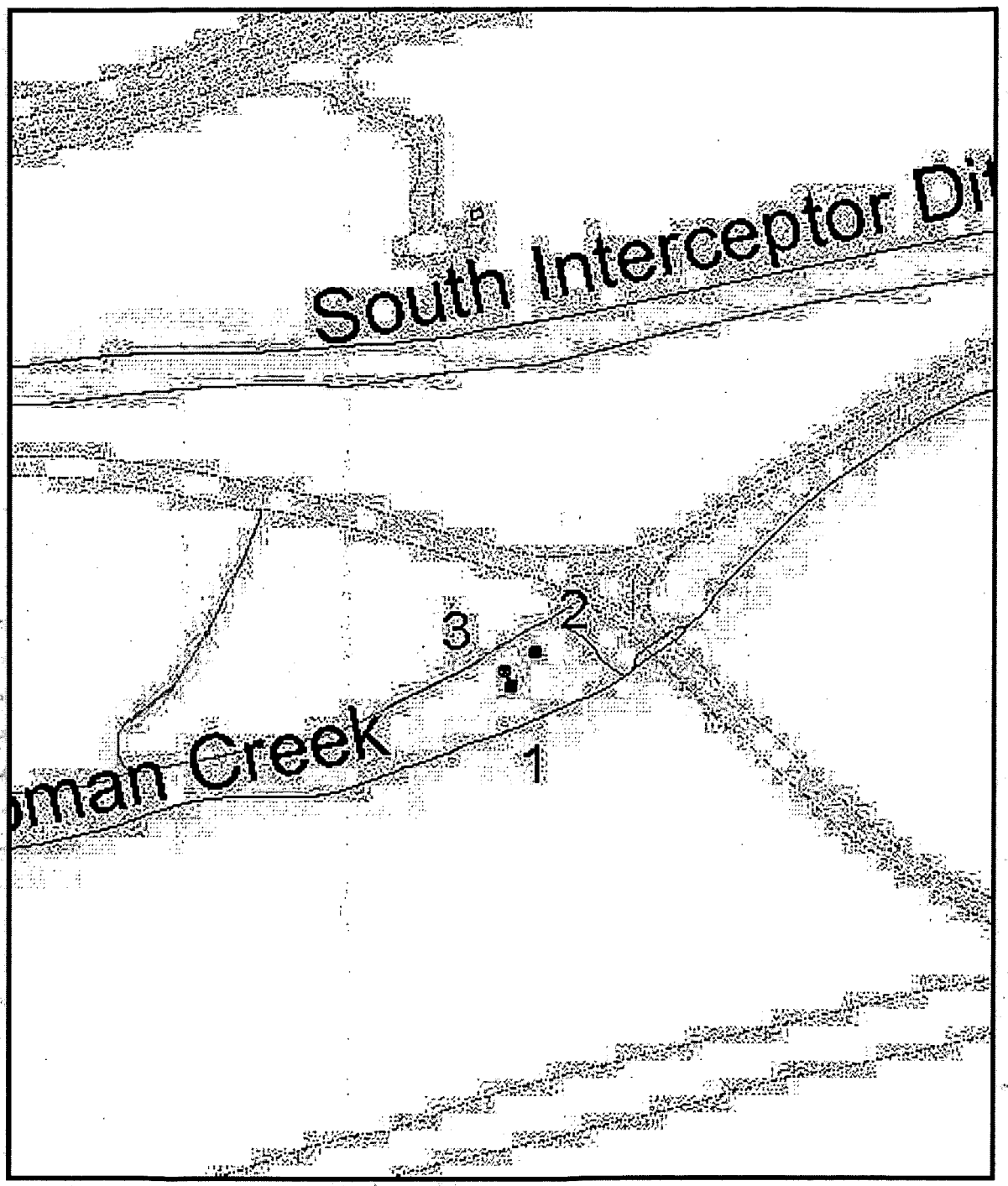


08/2005

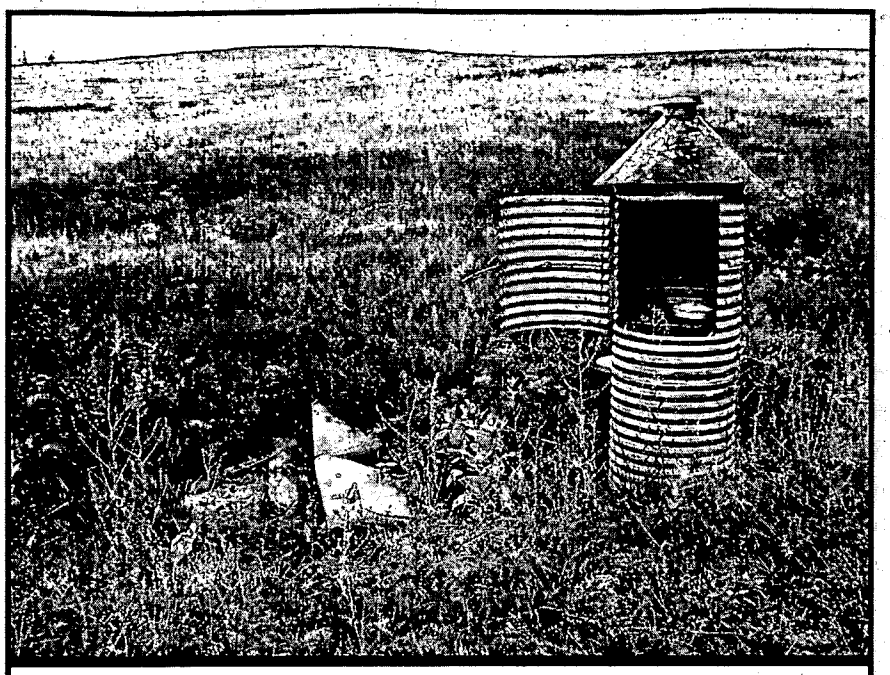


Surface Water Equipment Removal

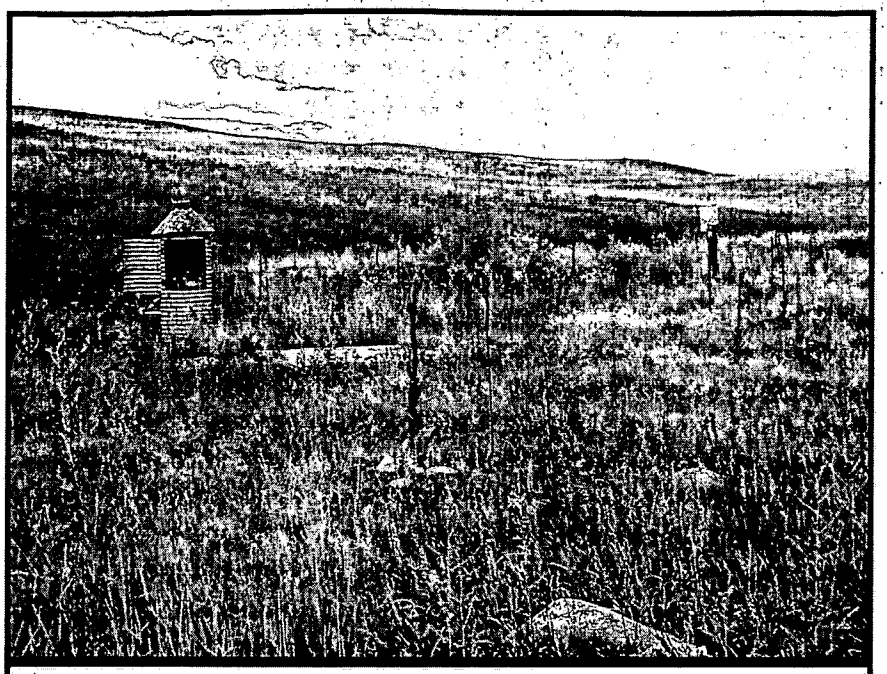
(clicking on any photopoint on the map will take you to the corresponding monitoring photos)



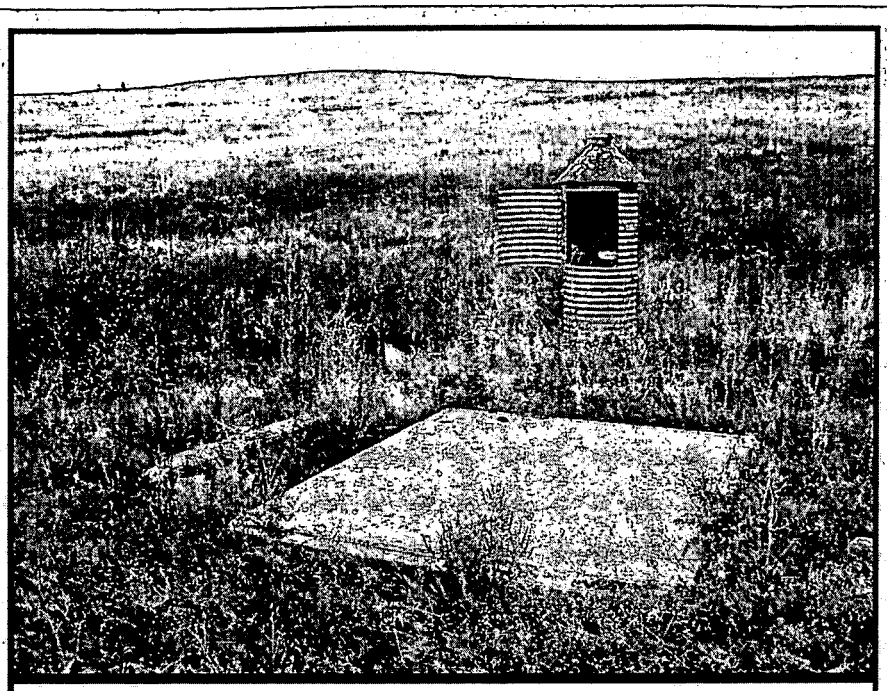
Photopoint 1



Photopoint 2



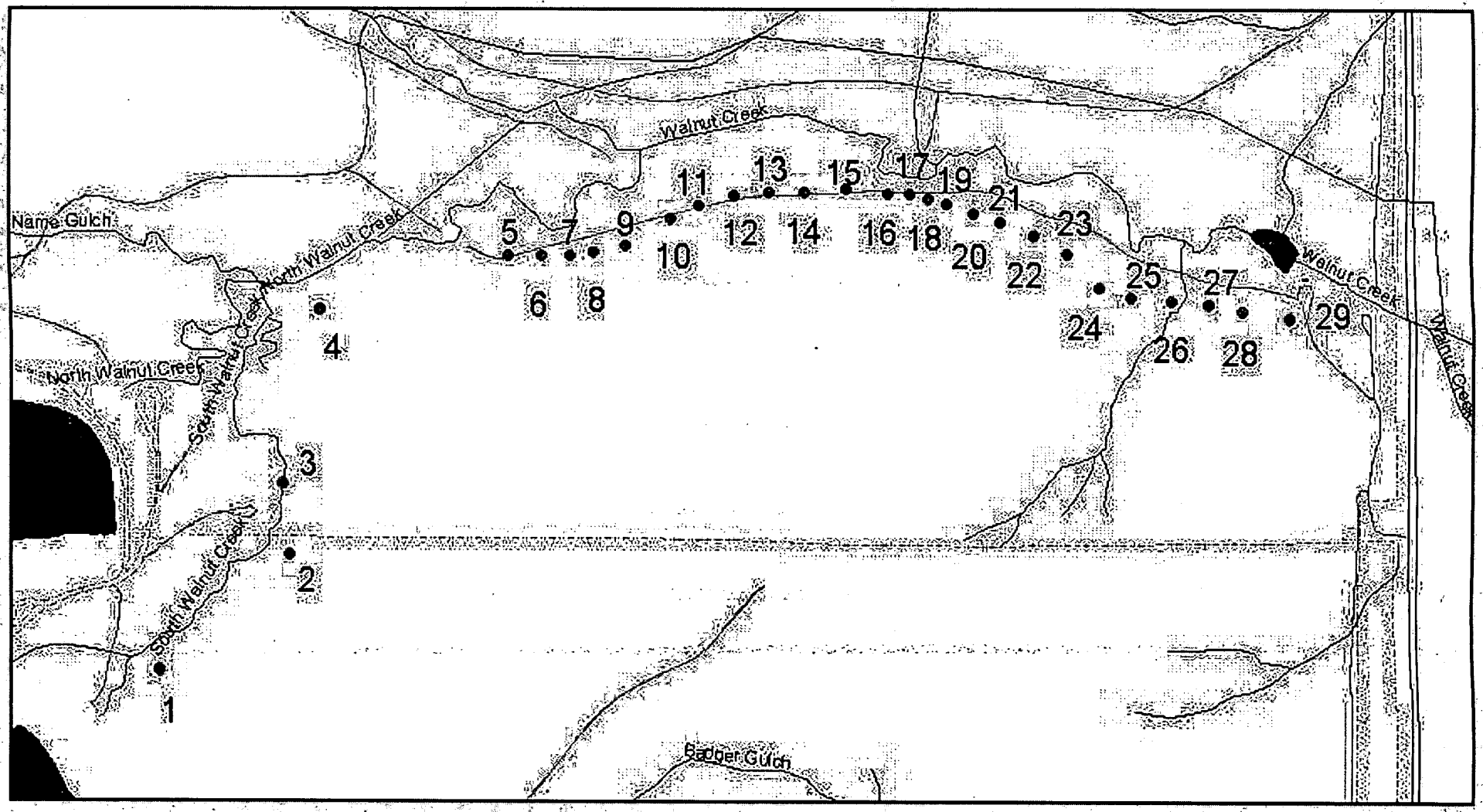
Photopoint 3



Walnut Creek Riparian Corridor Monitoring Map

(clicking on any photopoint on the map will take you to the corresponding monitoring photos,

then clicking on any photo will enlarge that photo)

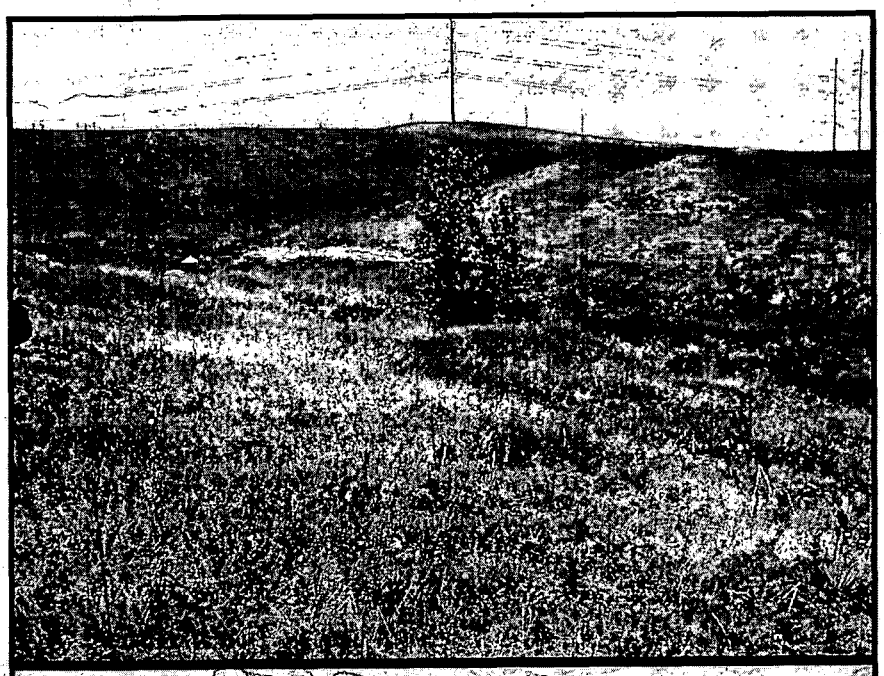


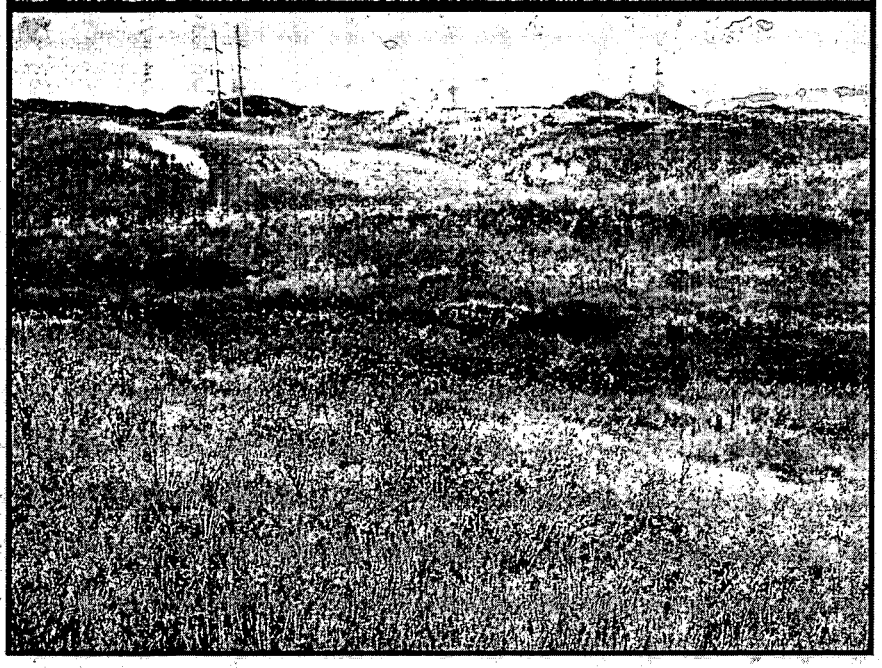
Walnut Creek Riparian Corridor Monitoring

Photopoints 1-3

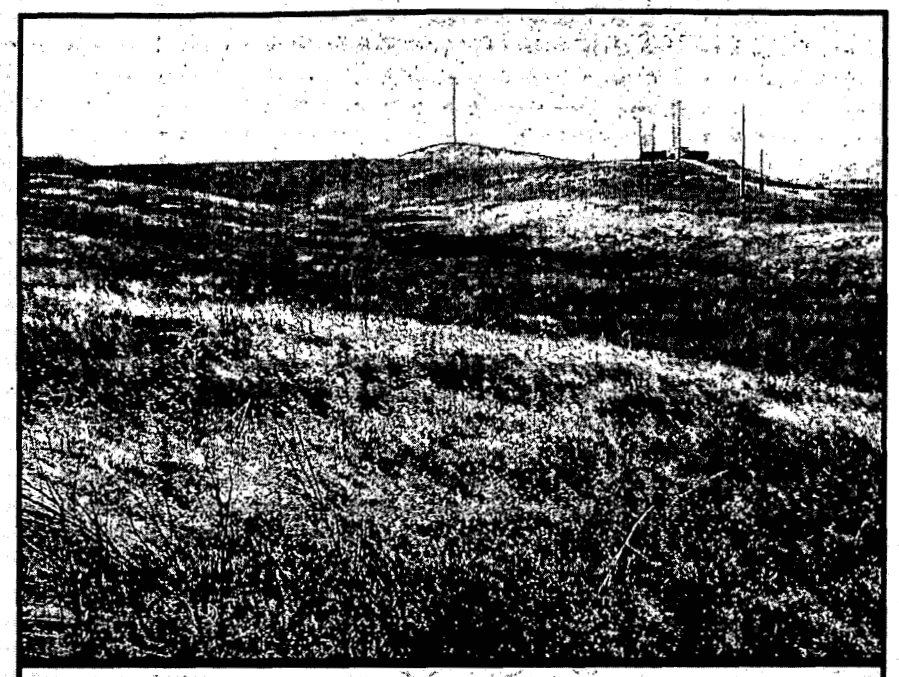
6/29/2004 **8/26/2005**

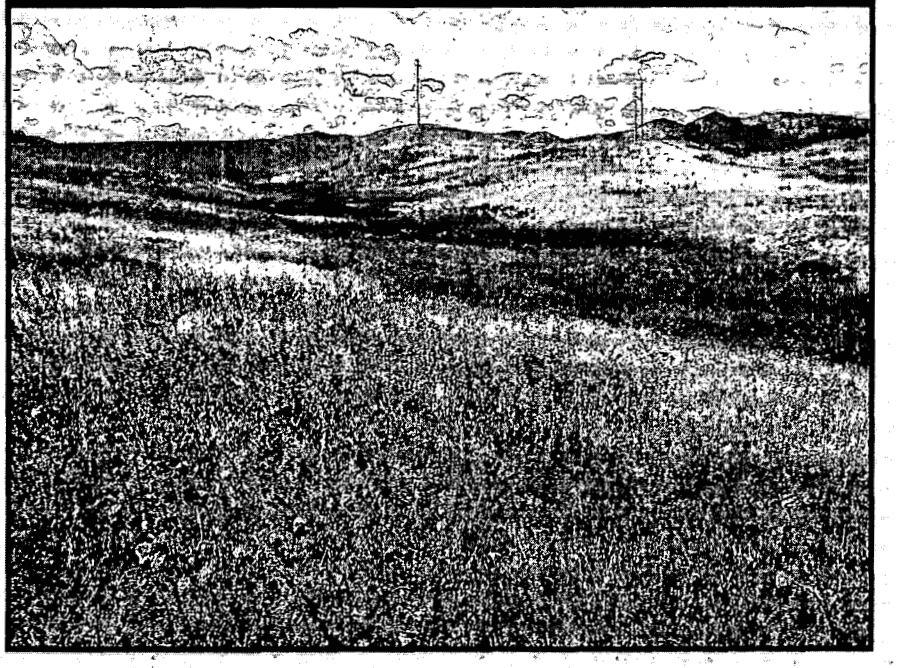
Photopoint 1

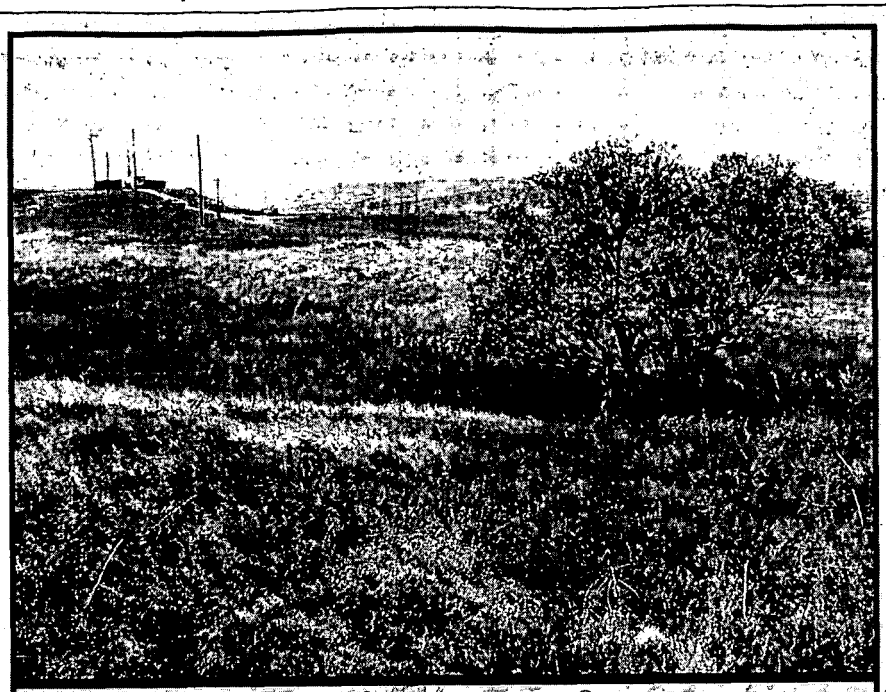


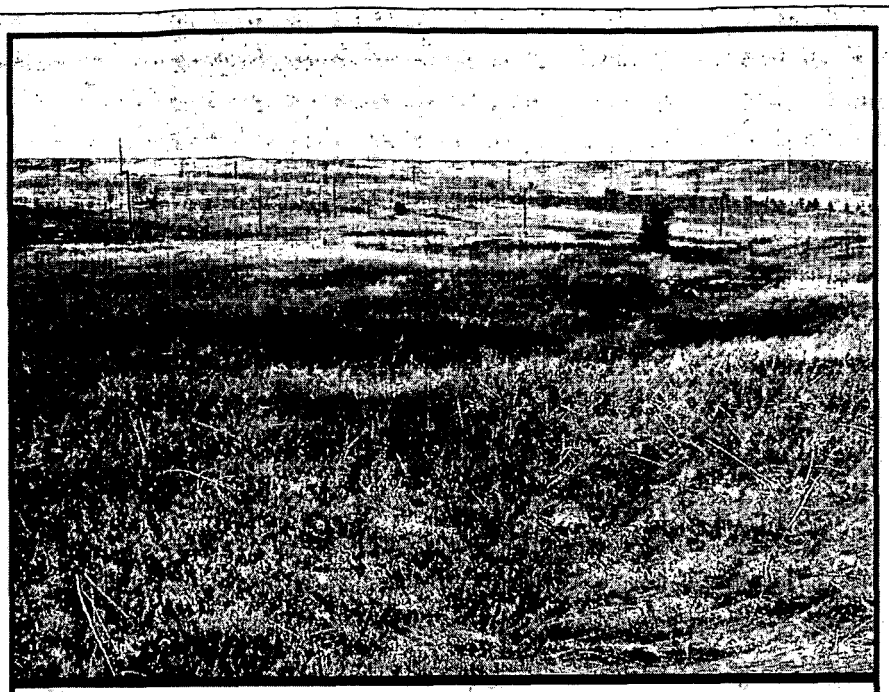


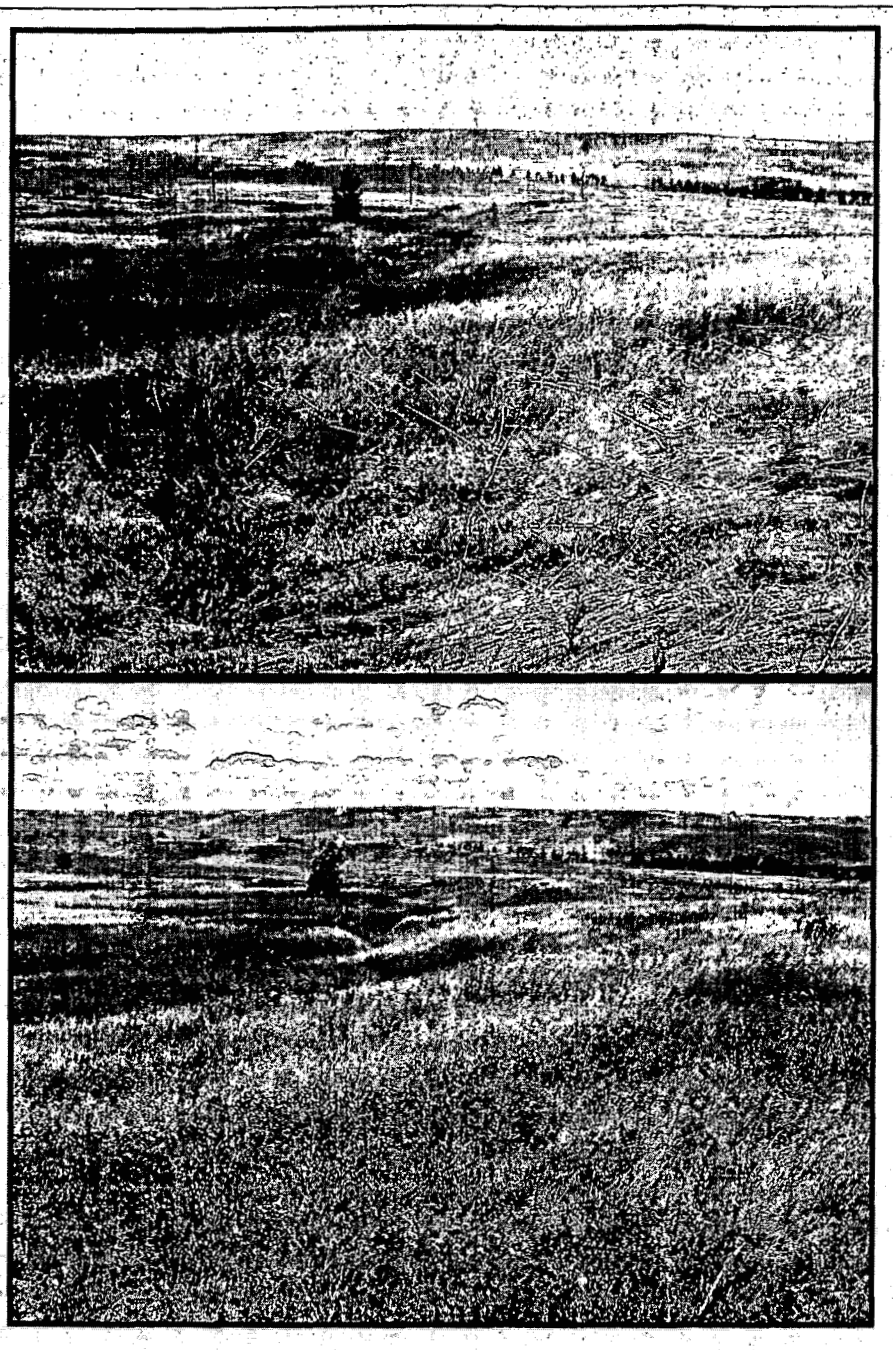
Photopoint 2



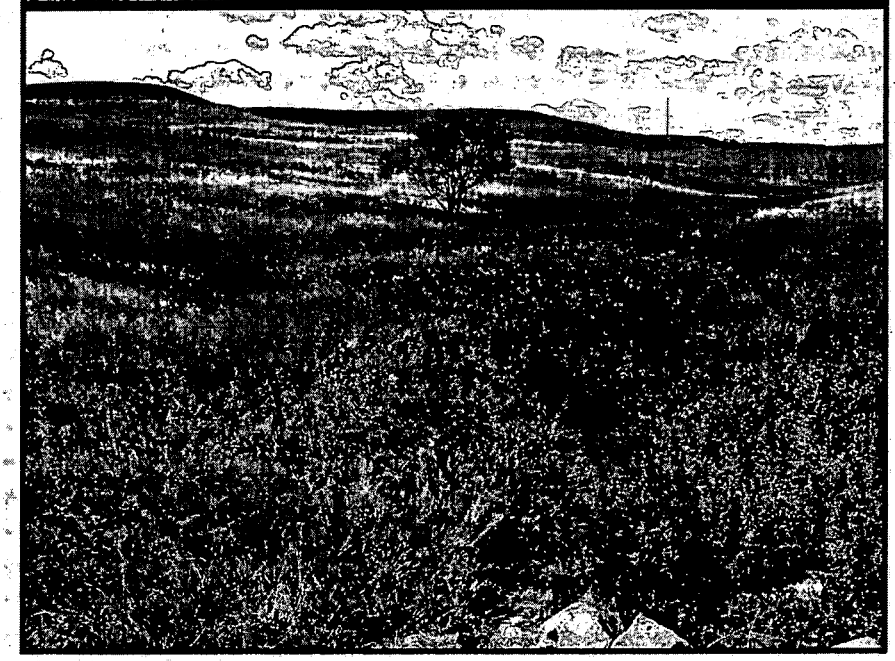








Photopoint 3

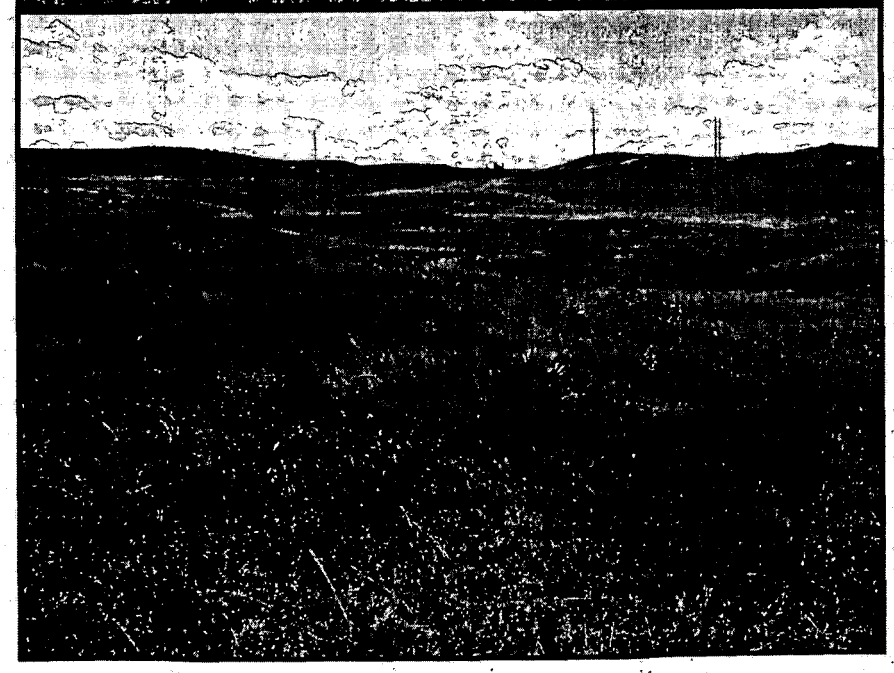


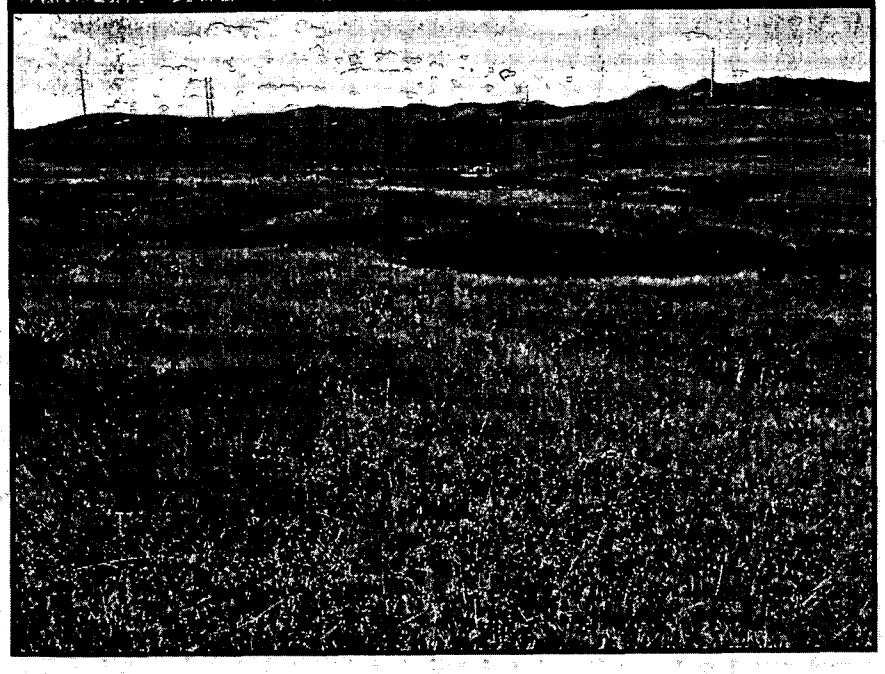
Walnut Creek Riparian Corridor Monitoring

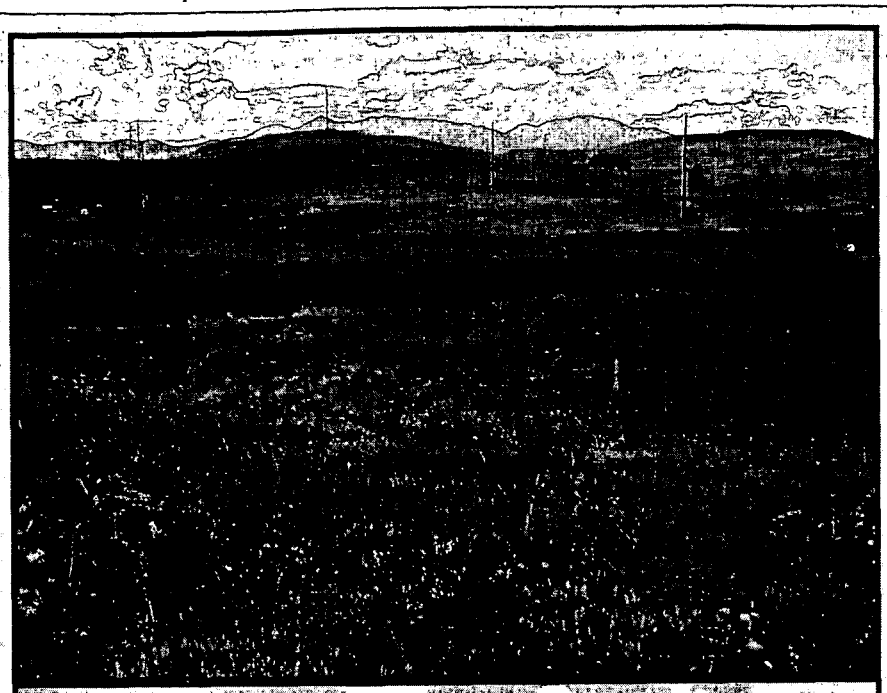
Photopoints 4-9

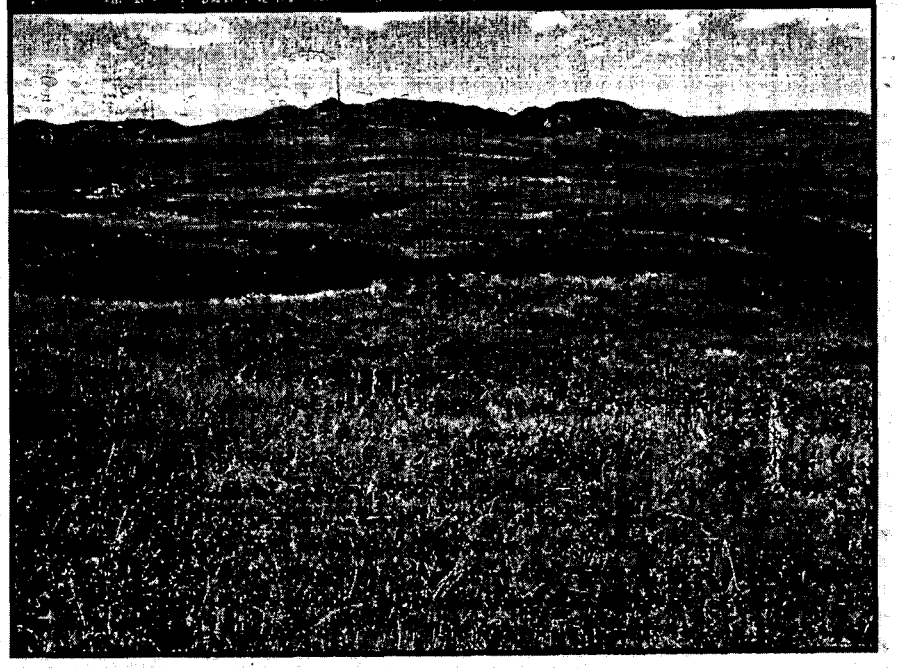
7/27/2004 **8/26/2005**

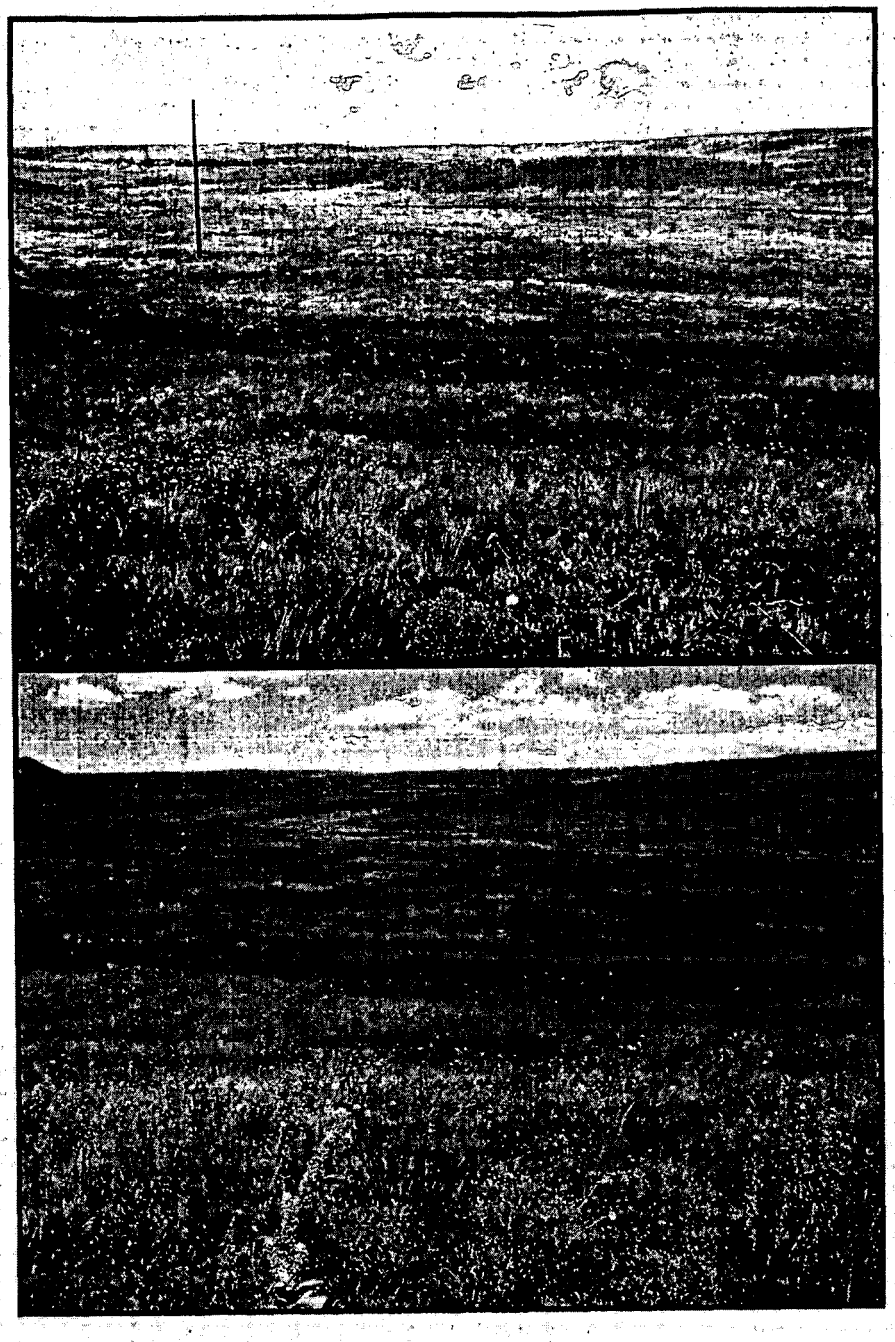
Photopoint 4

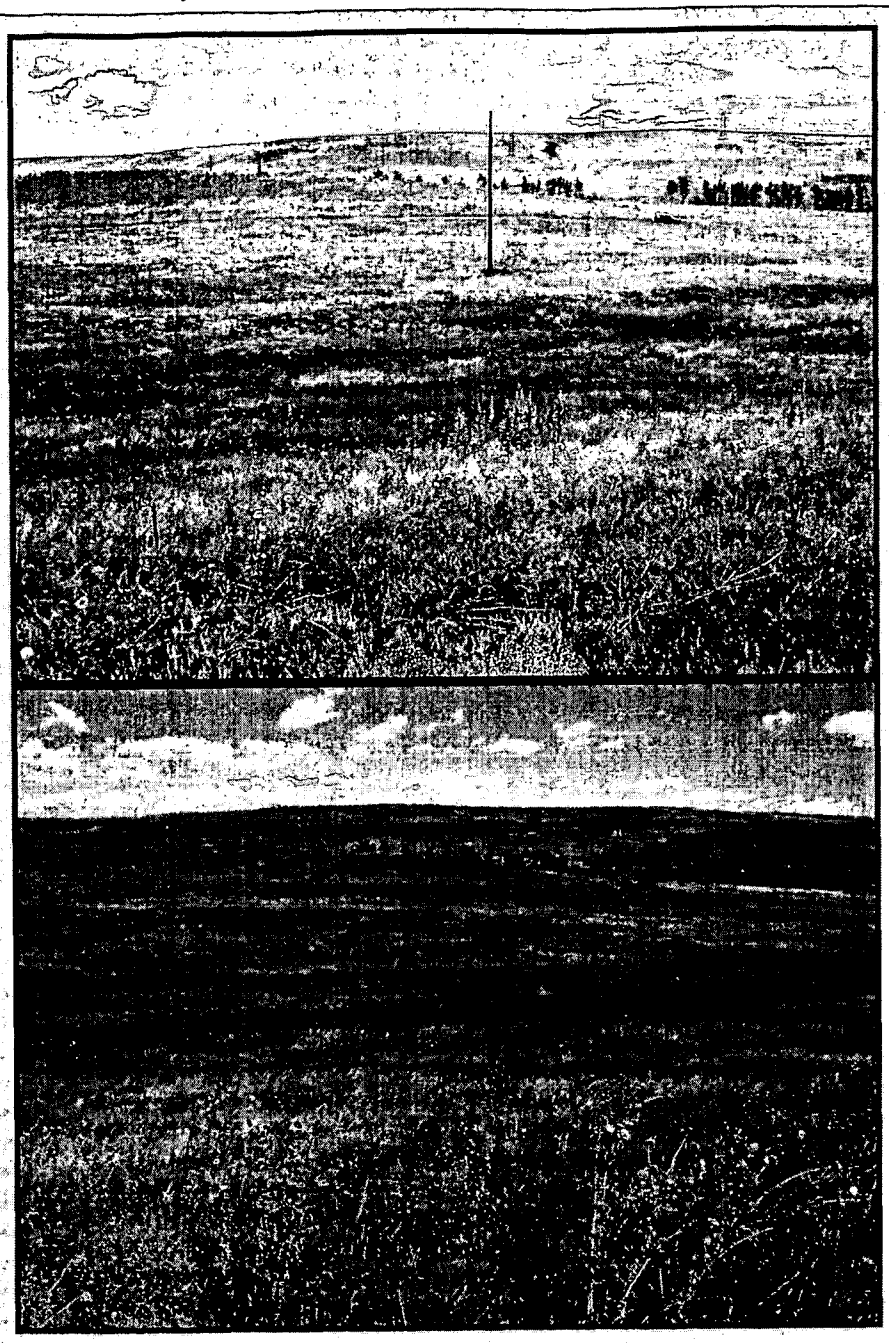


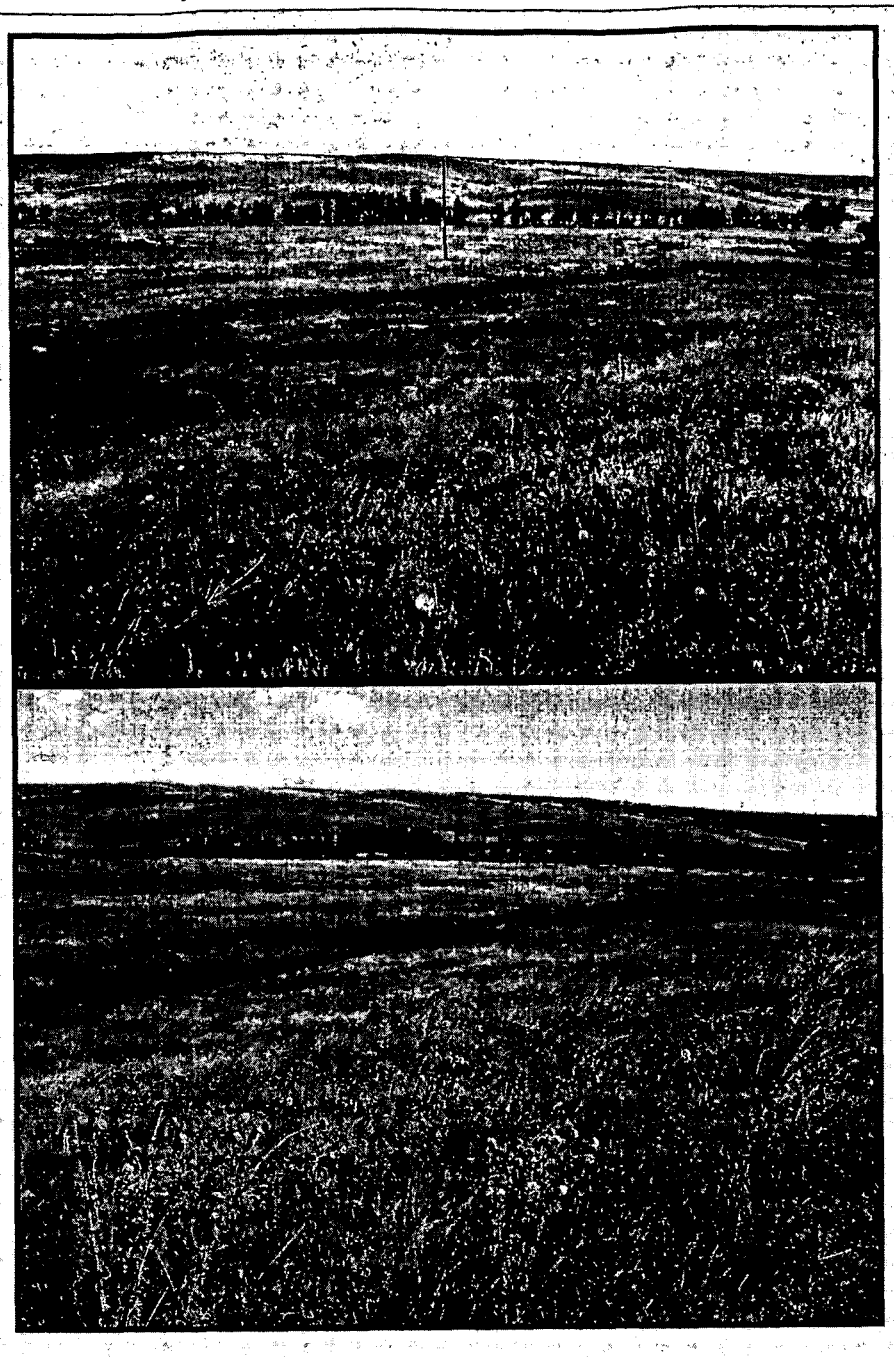




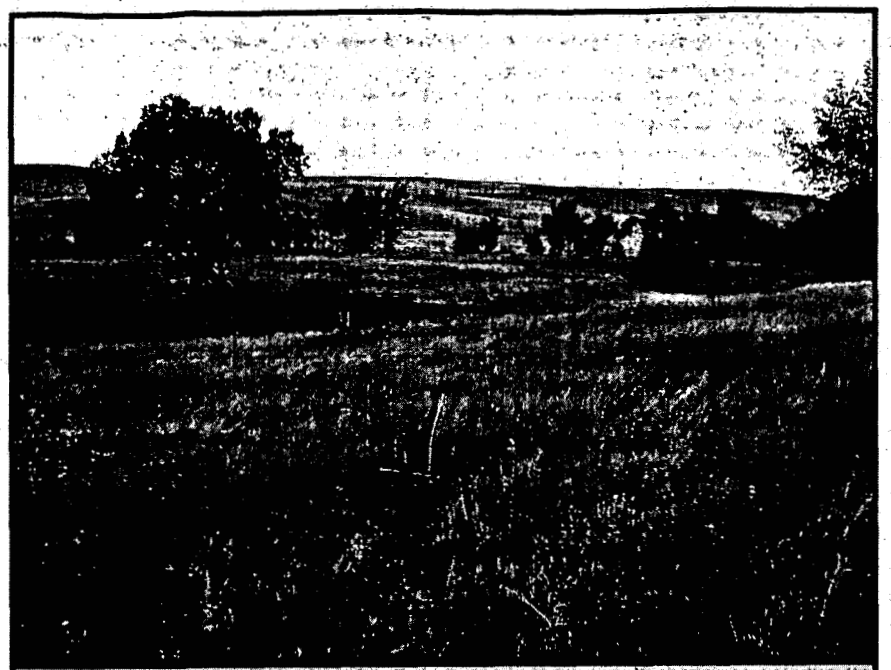


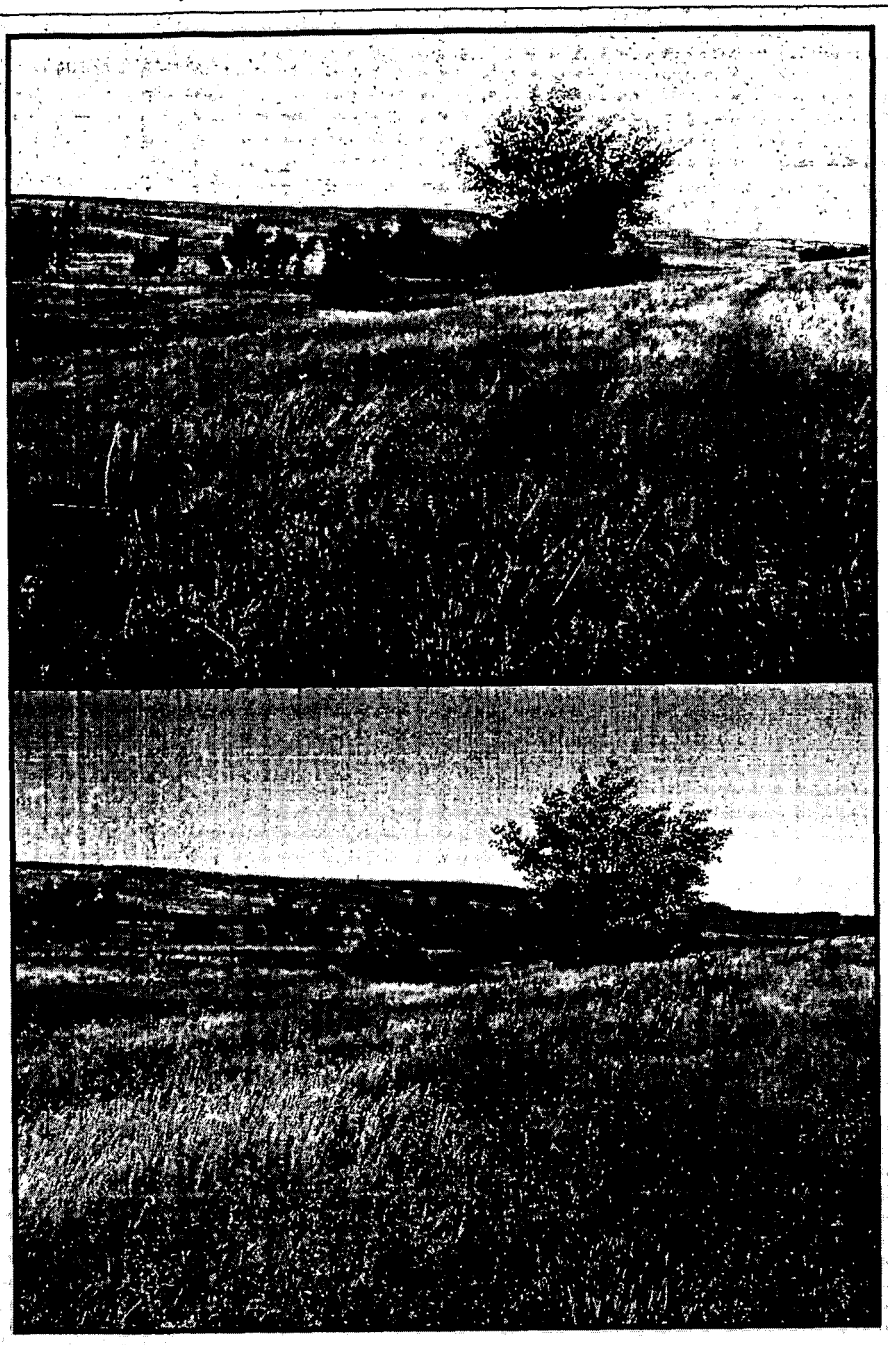




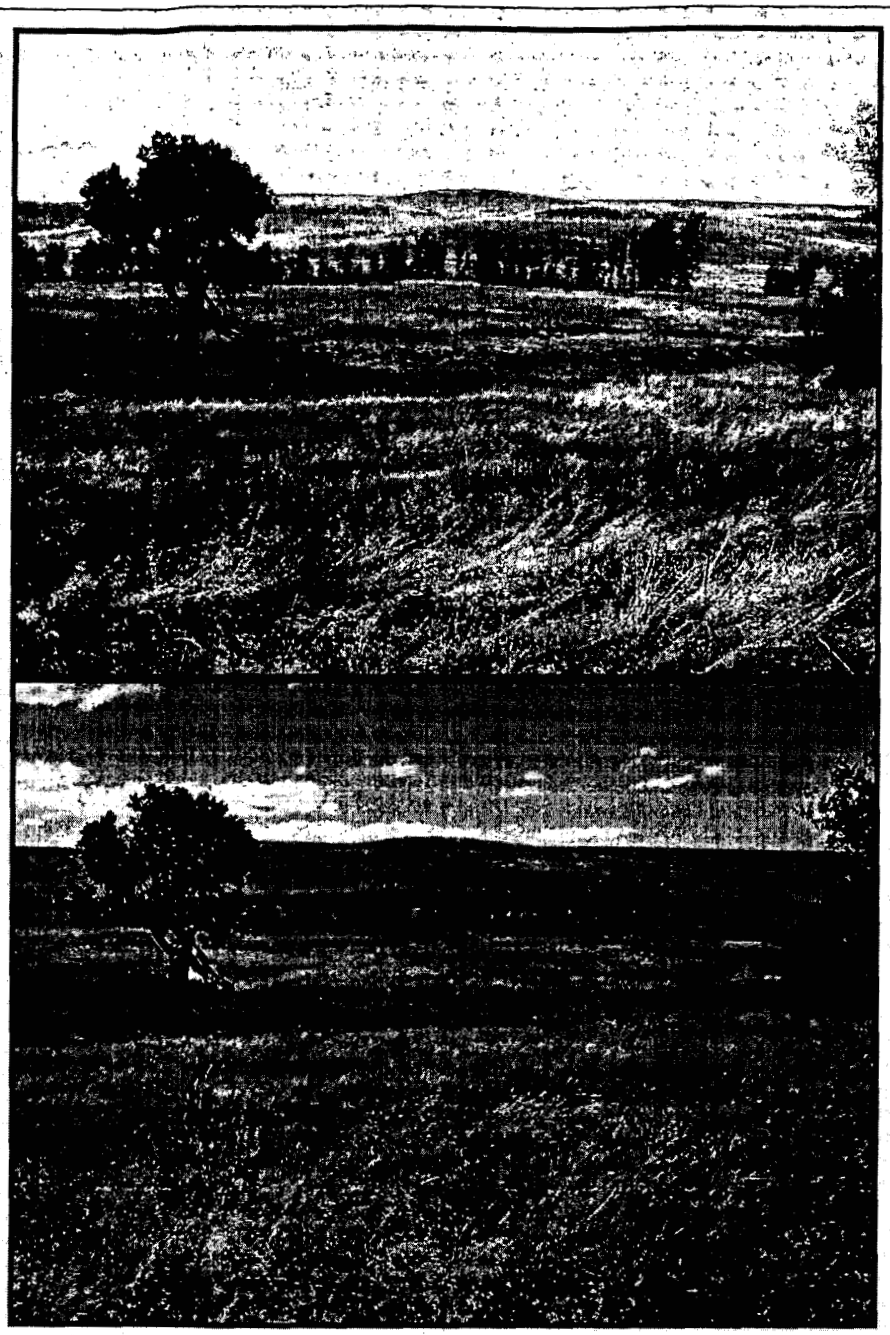


Photopoint 5

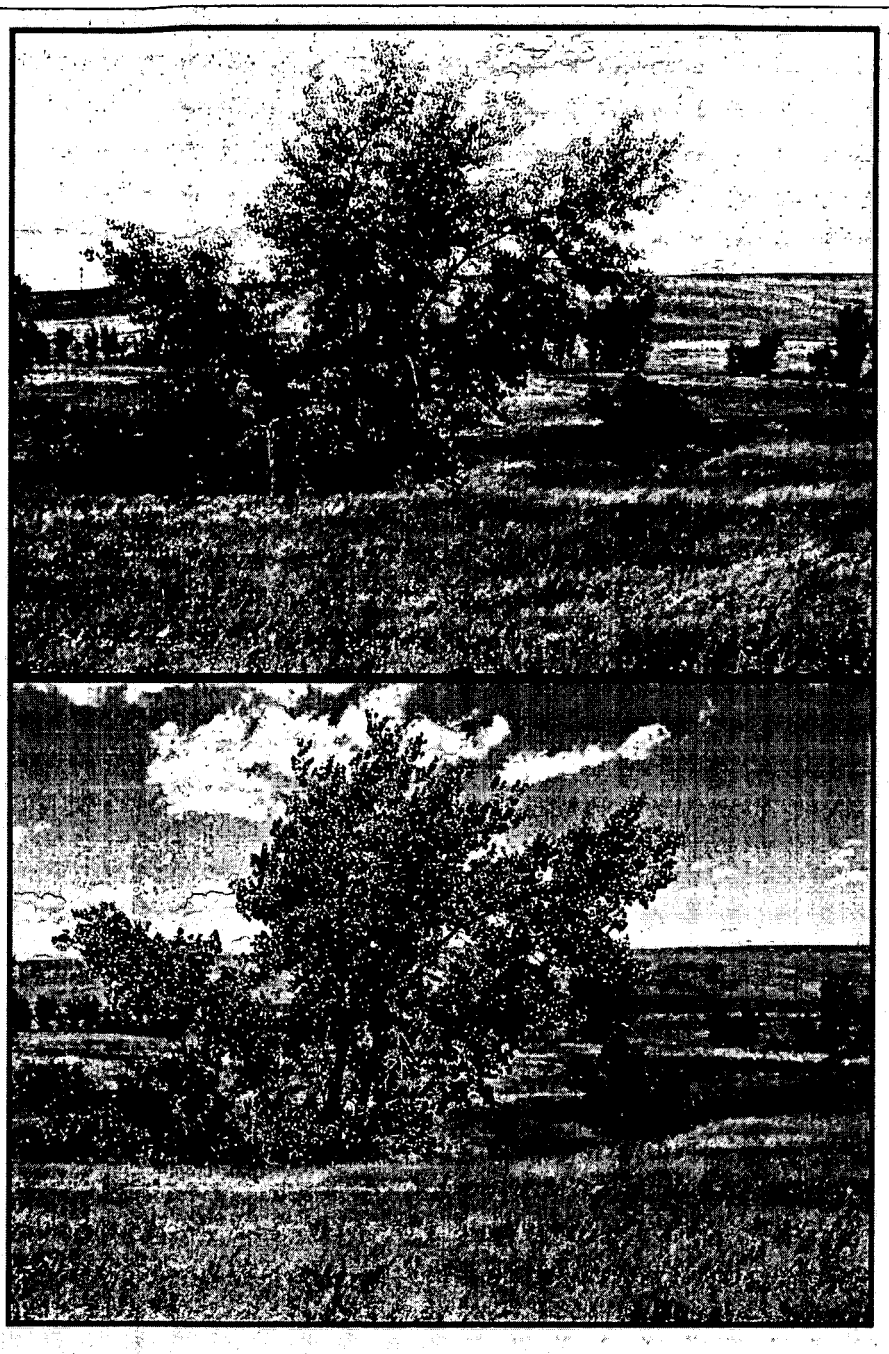




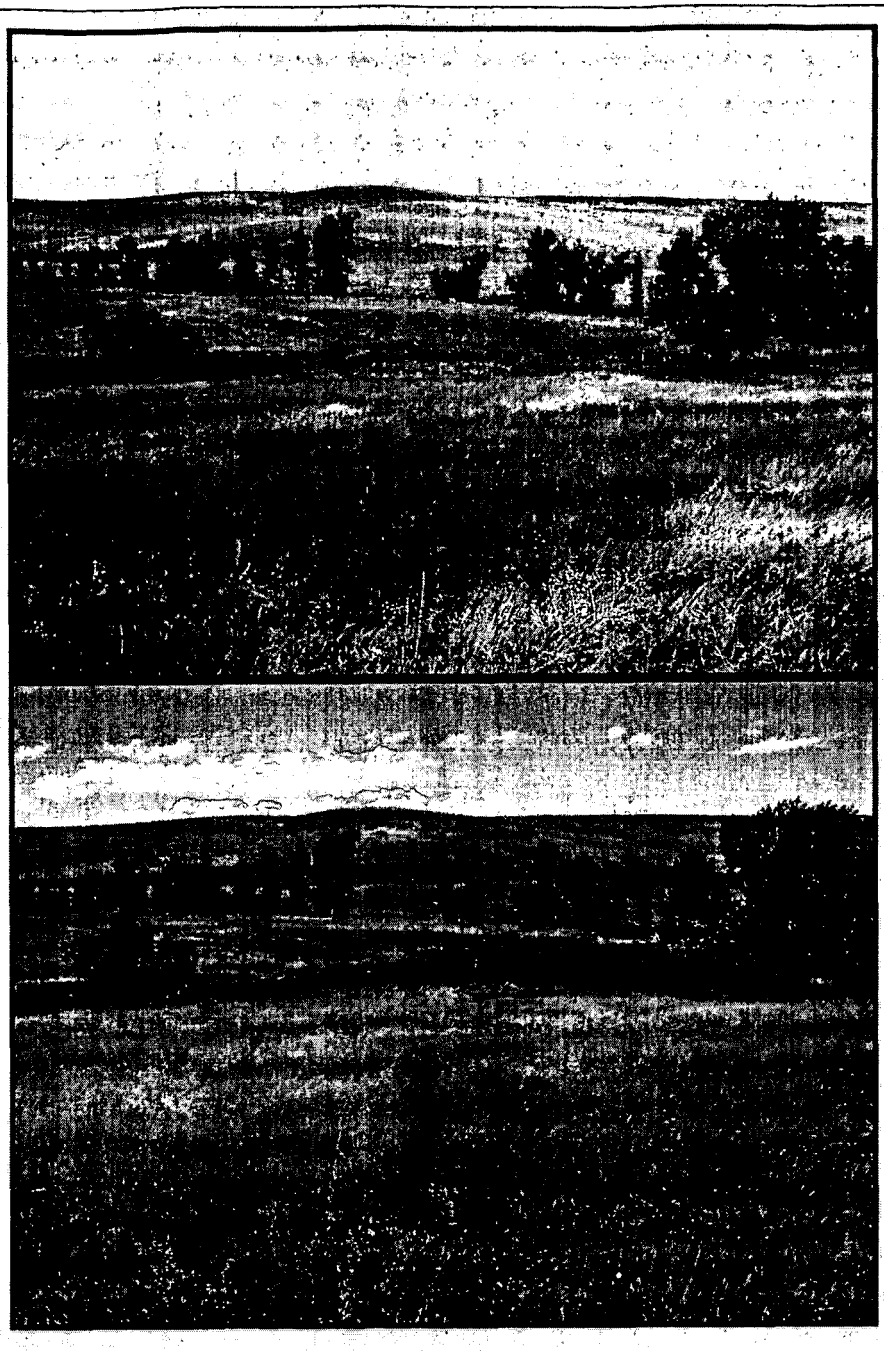
Photopoint 6



Photopoint 7



Photopoint 8



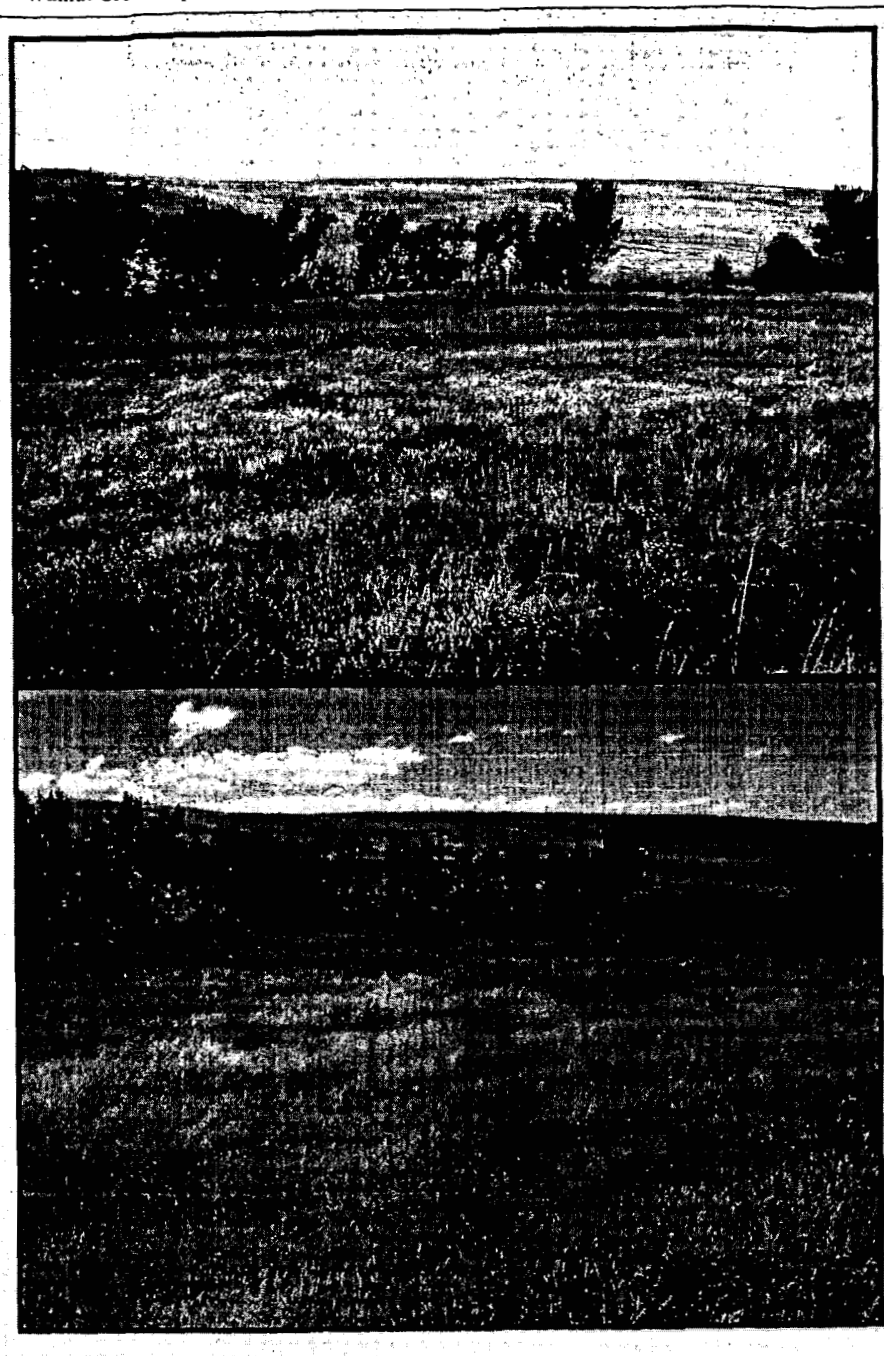
Photopoint 9

Walnut Creek Riparian Corridor Monitoring

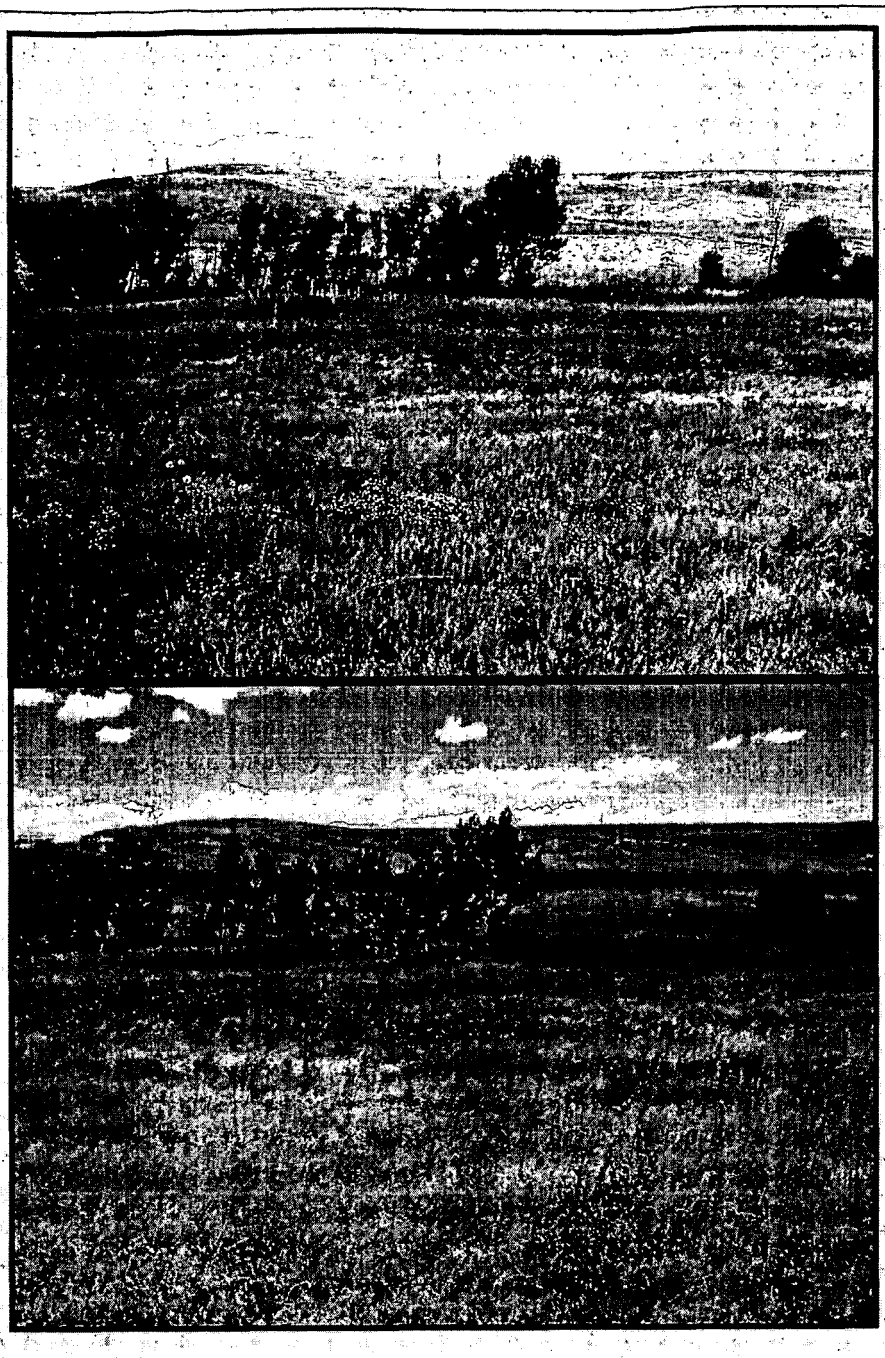
Photopoints 10 -19

7/27/2004 **8/26/2005**

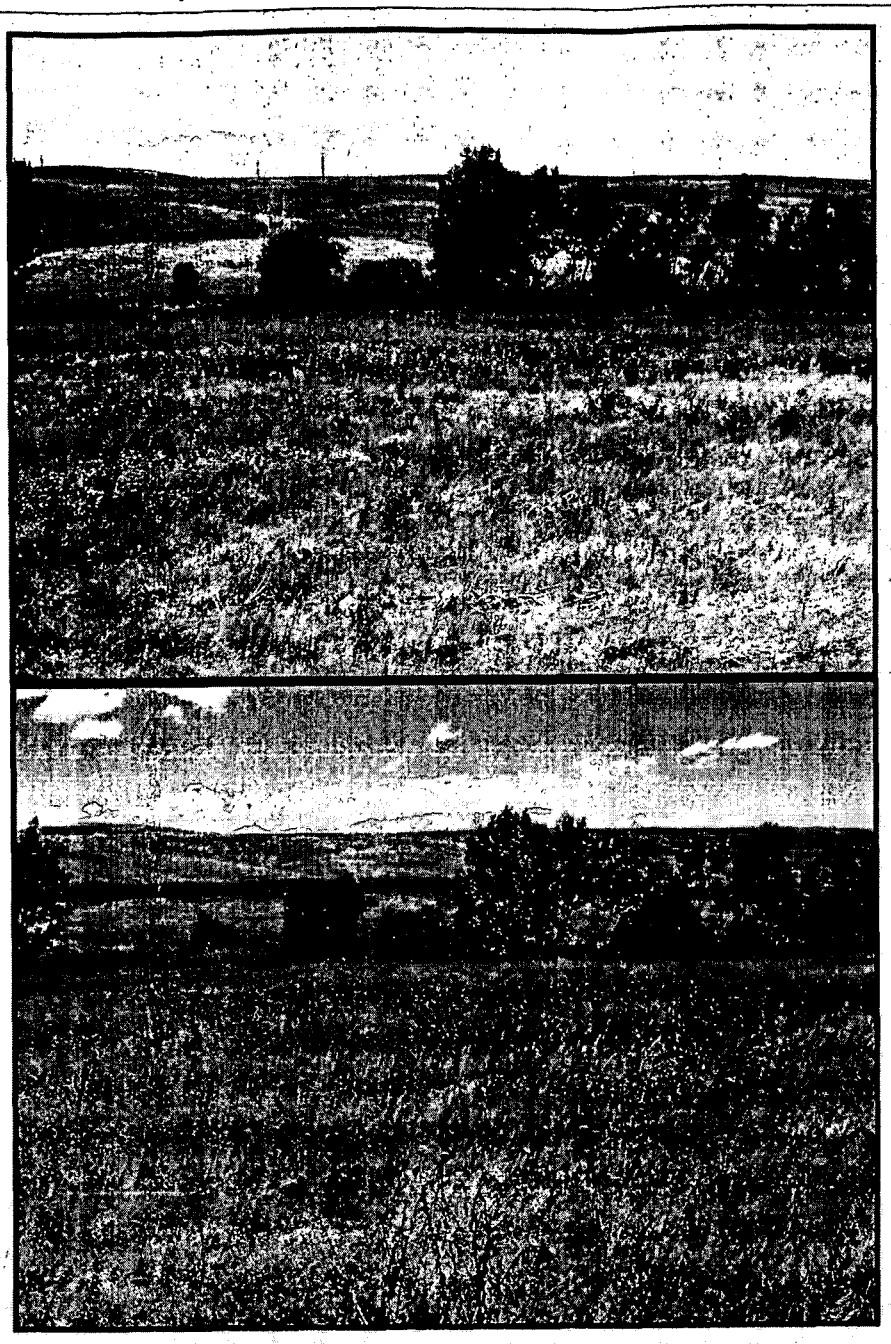
Photopoint 10



Photopoint 11

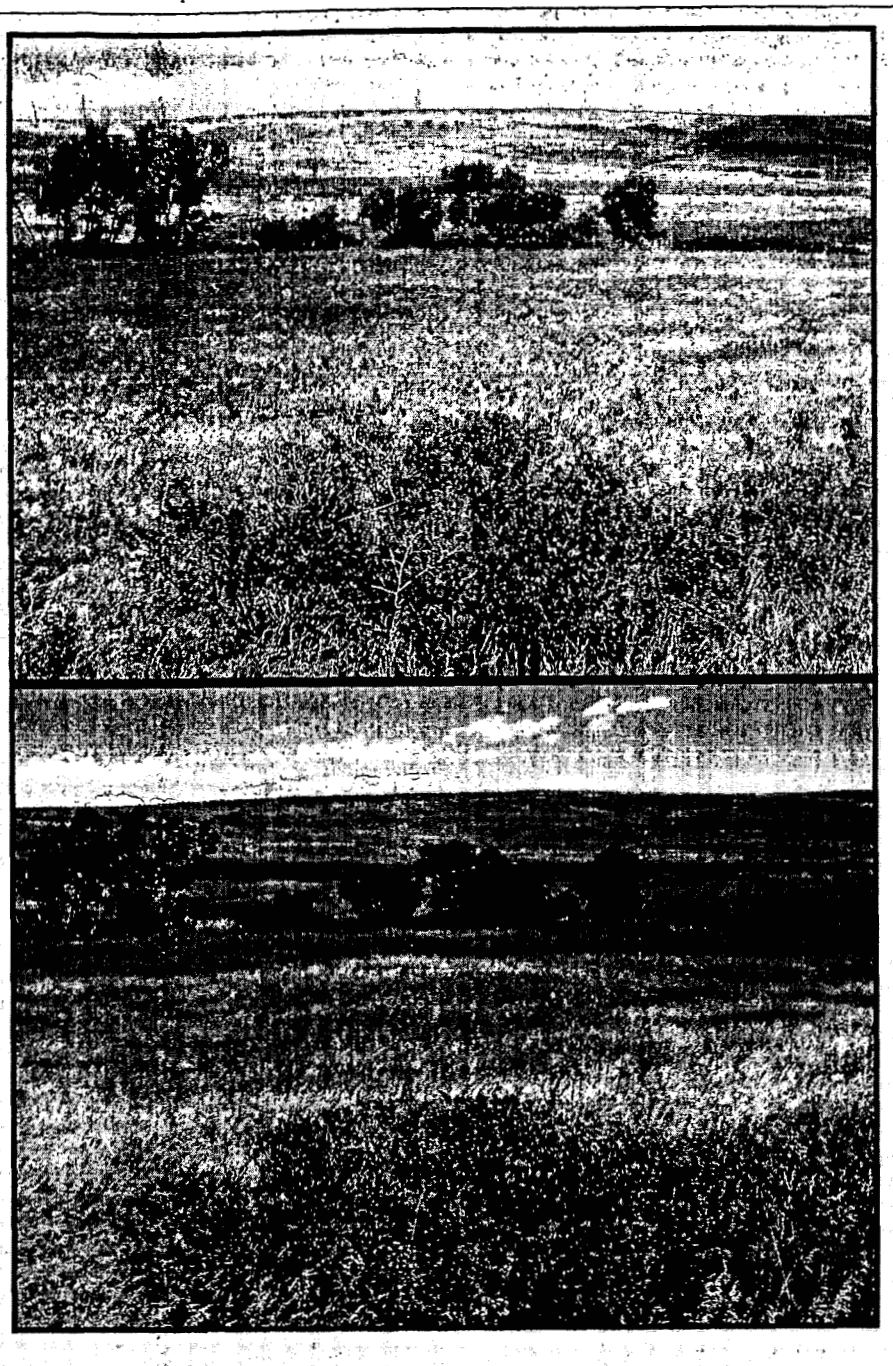


Photopoint 12

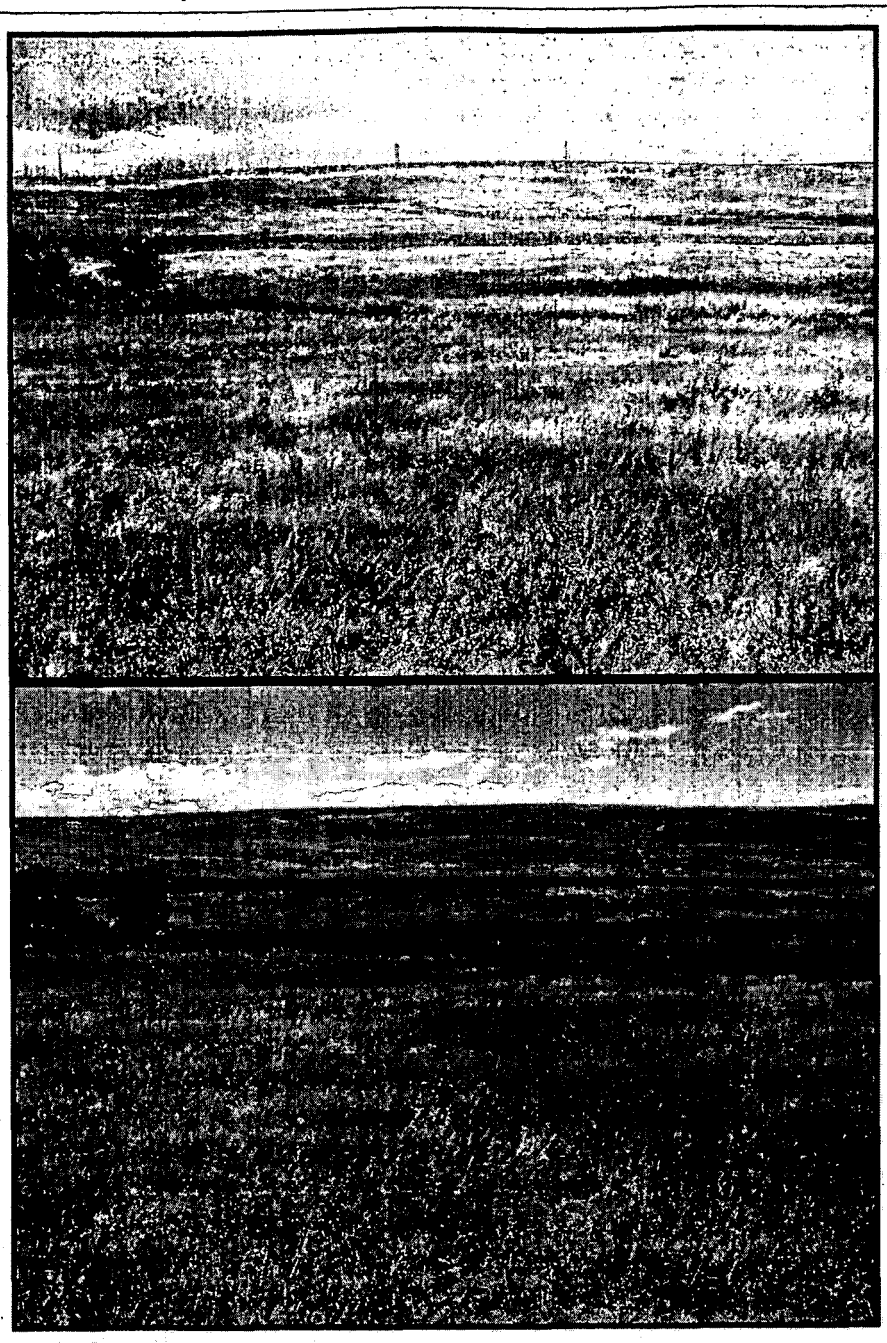


Photopoint 13

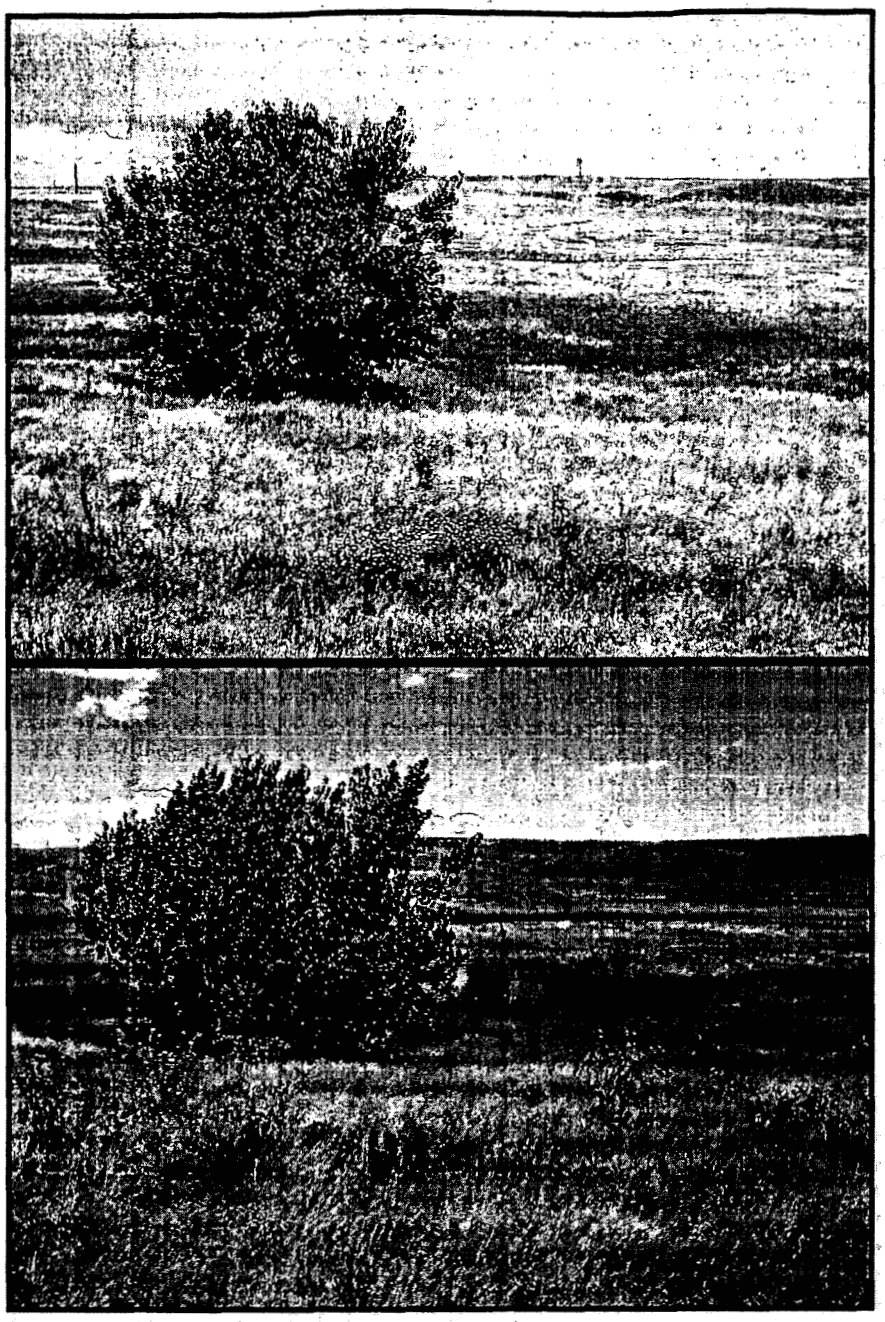
Photopoint 14



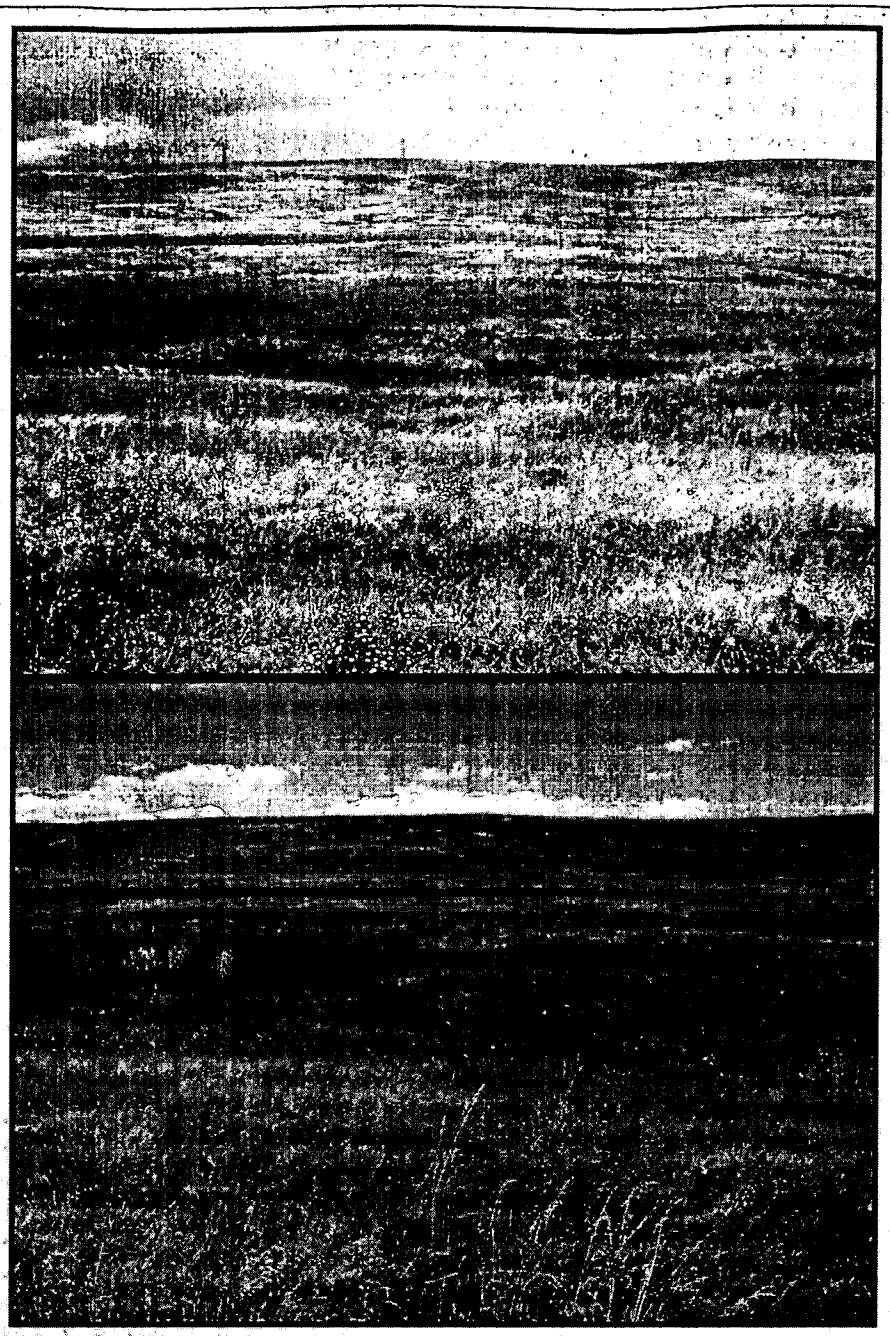
Photopoint 15



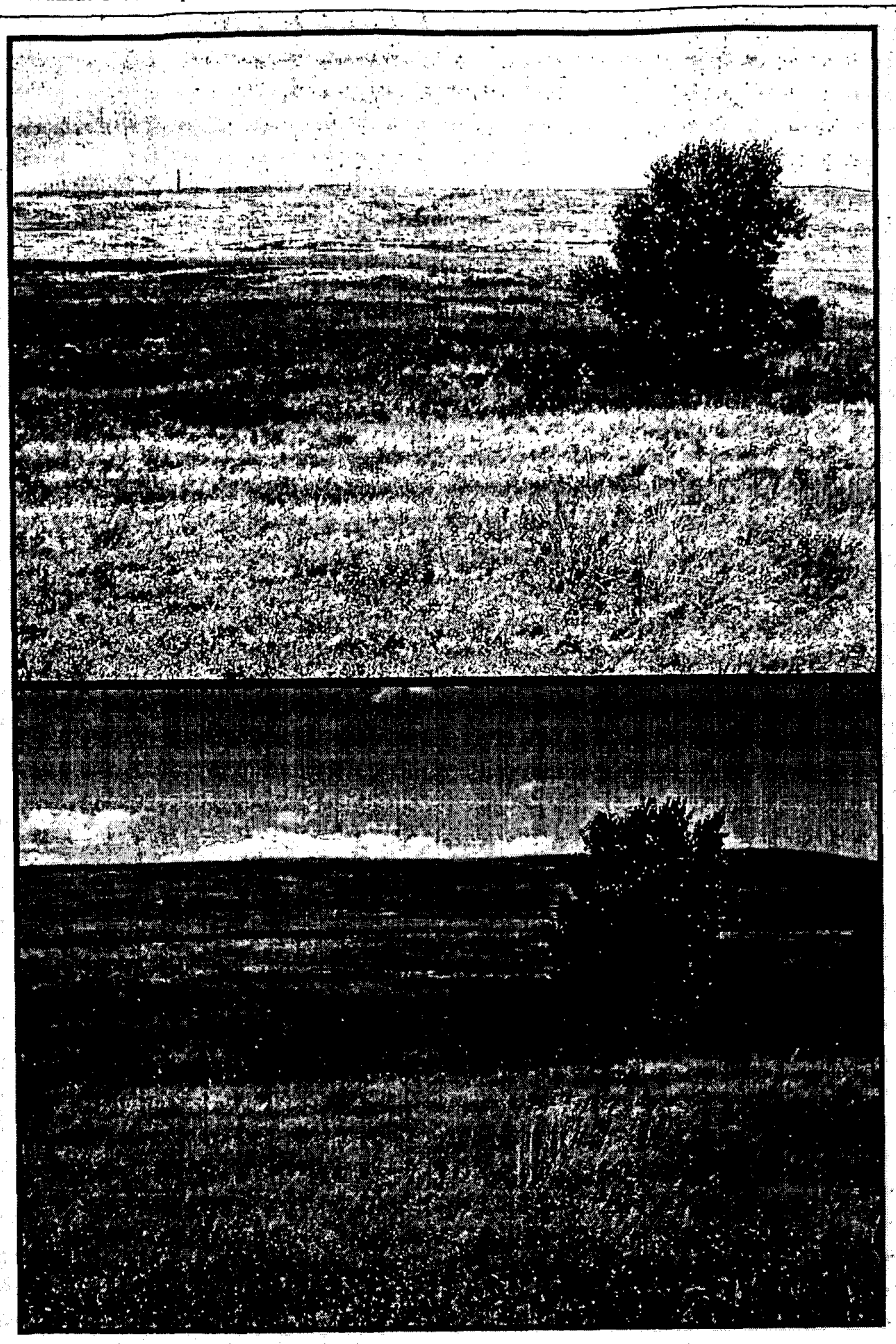
Photopoint 16



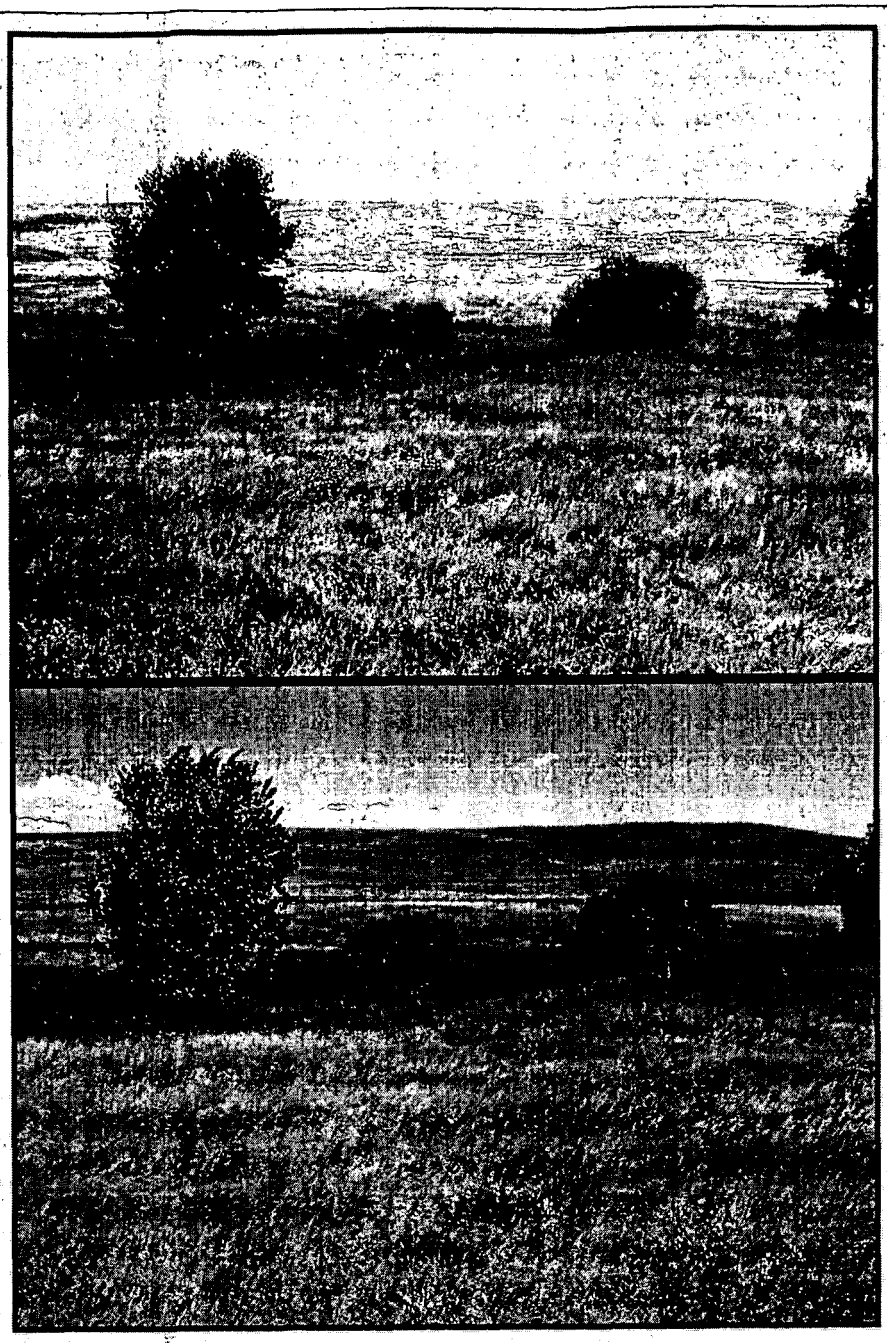
Photopoint 17



Photopoint 18



Photopoint 19

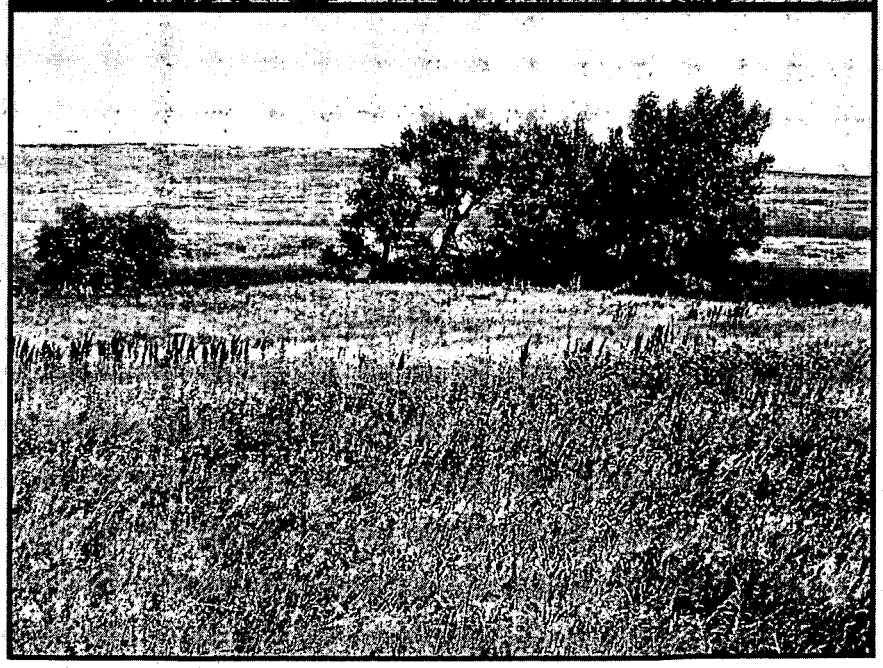


Walnut Creek Riparian Corridor Monitoring

Photopoints 20-29

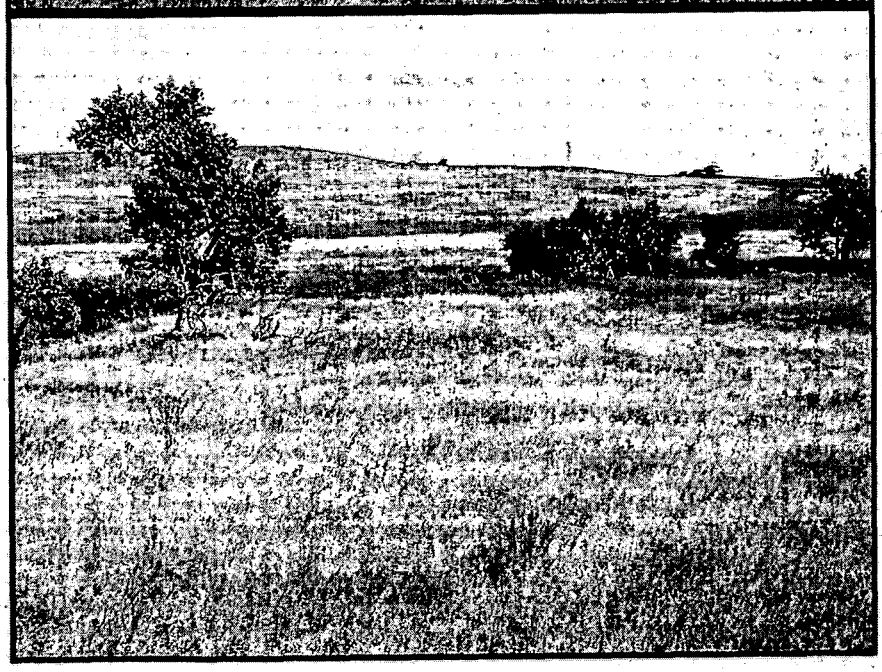
7/27/2004 **8/29/2005**

Photopoint 20



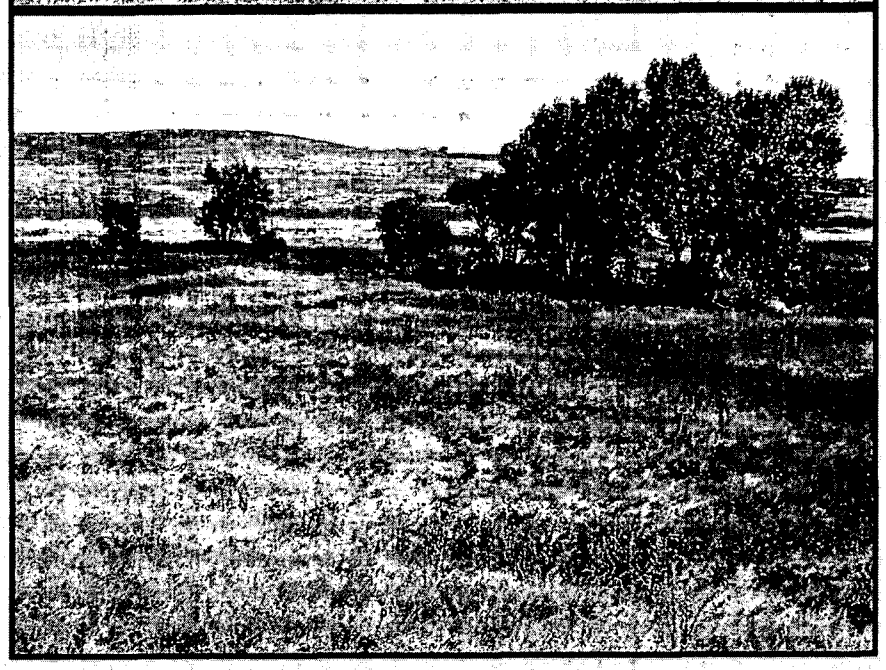
Photopoint 21

Photopoint 22



Photopoint 23

Photopoint 24

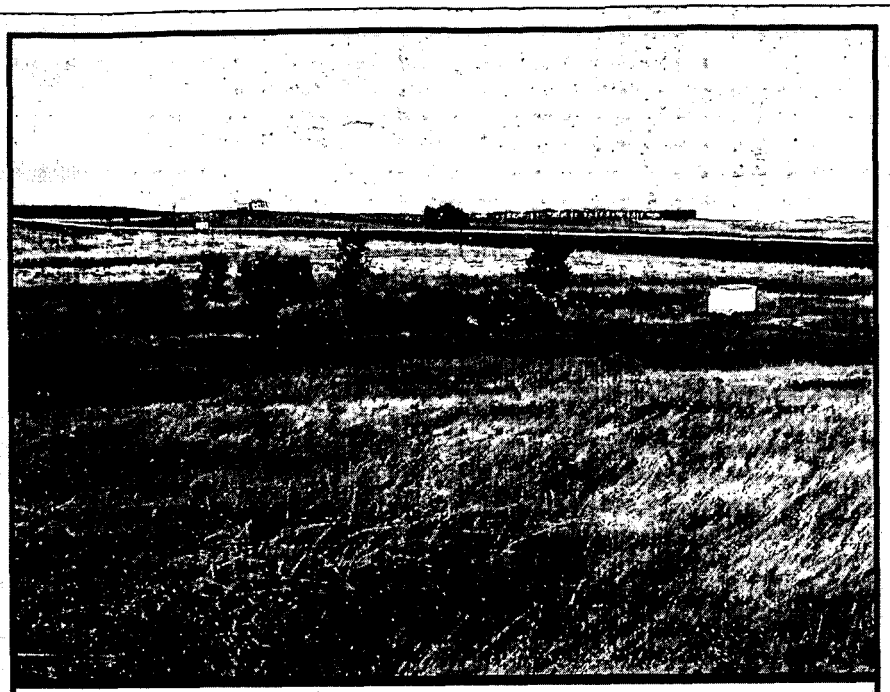


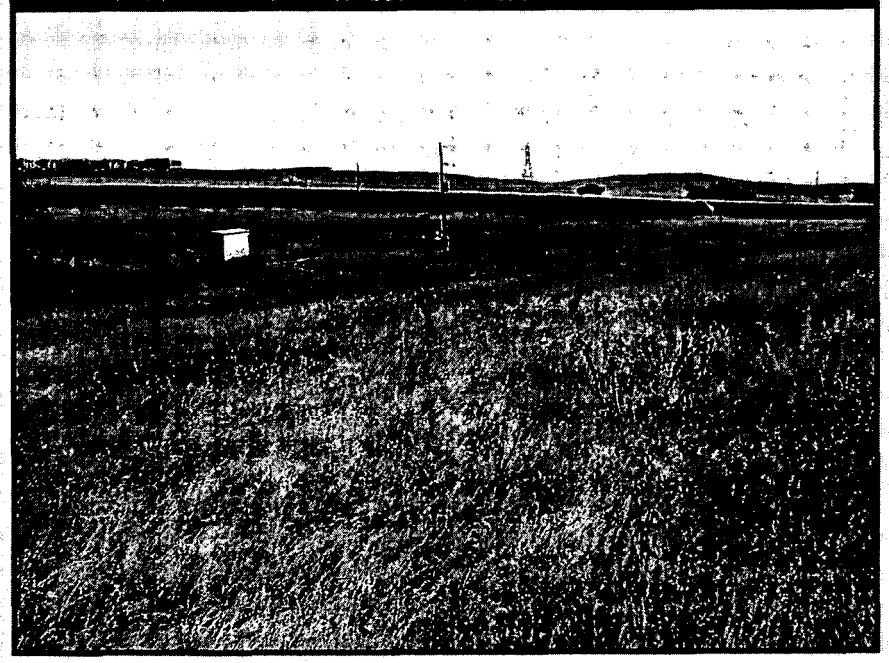
Photopoint 25

Photopoint 26

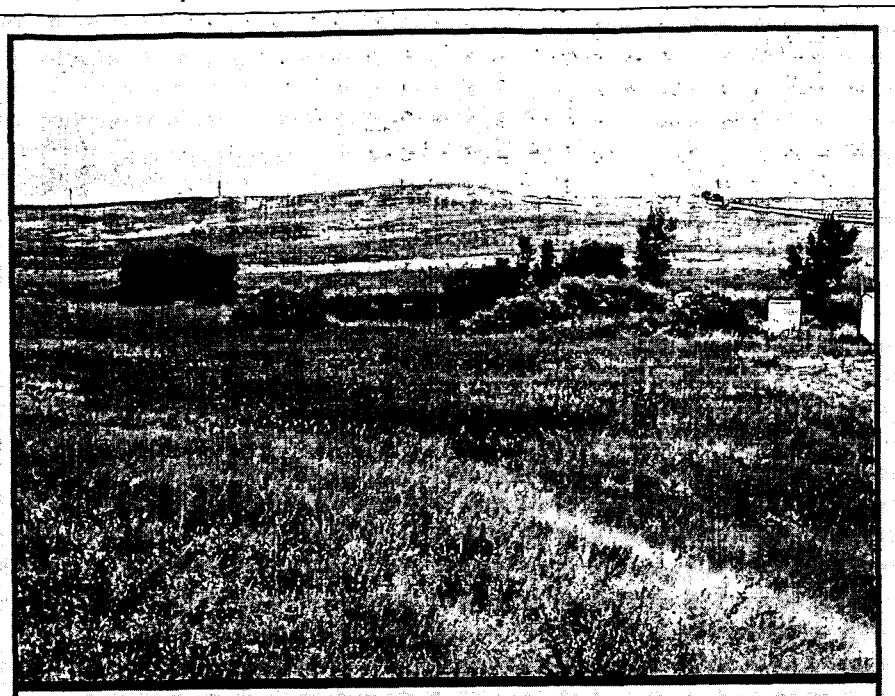
Photopoint 27

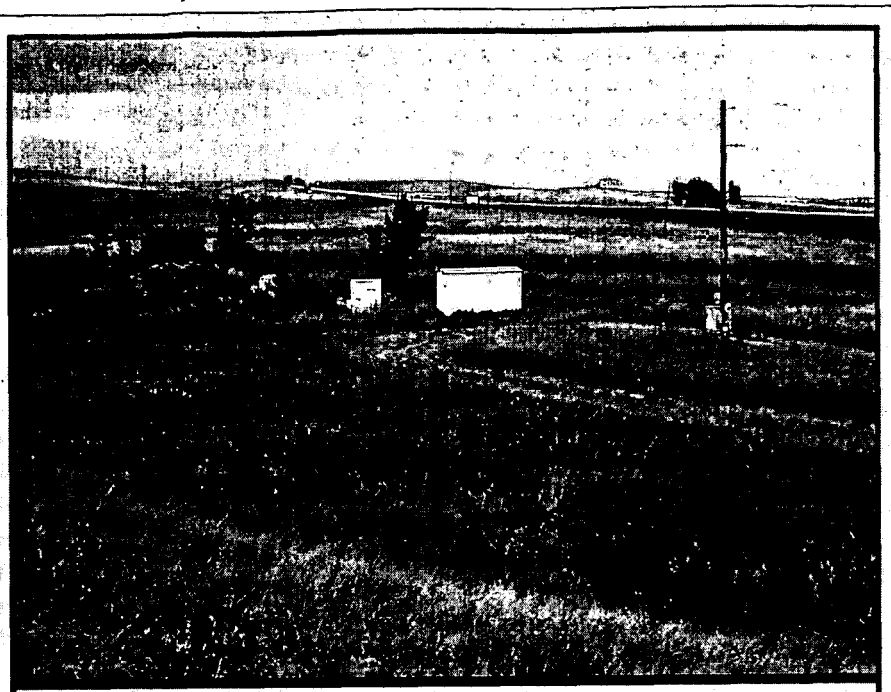
Photopoint 28

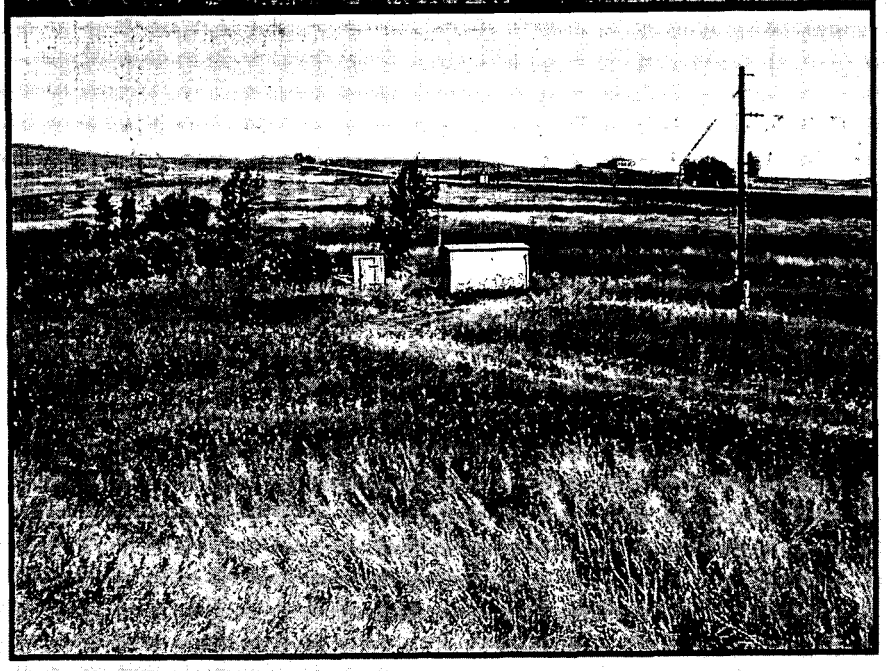


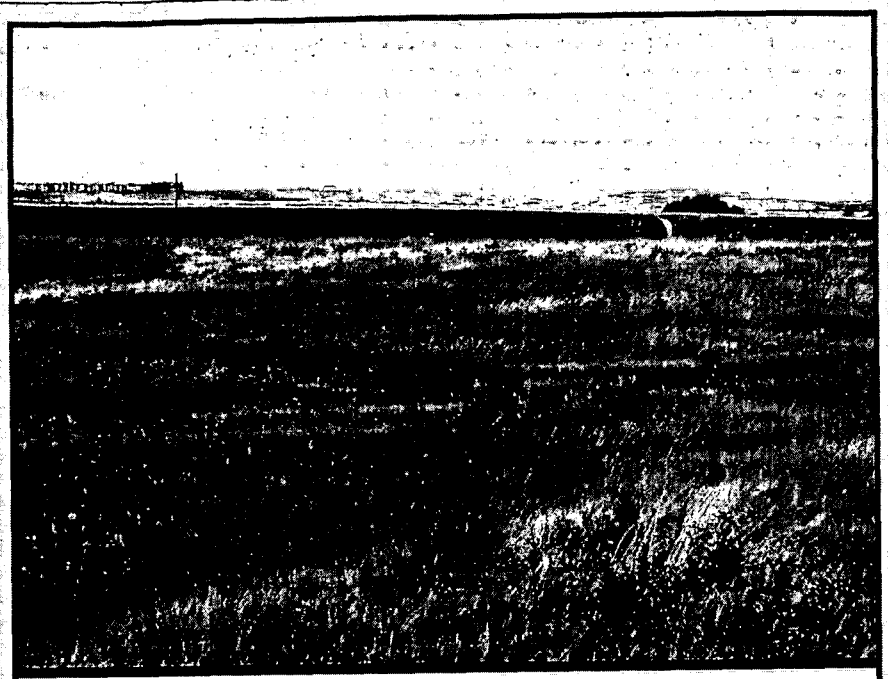


Photopoint 29



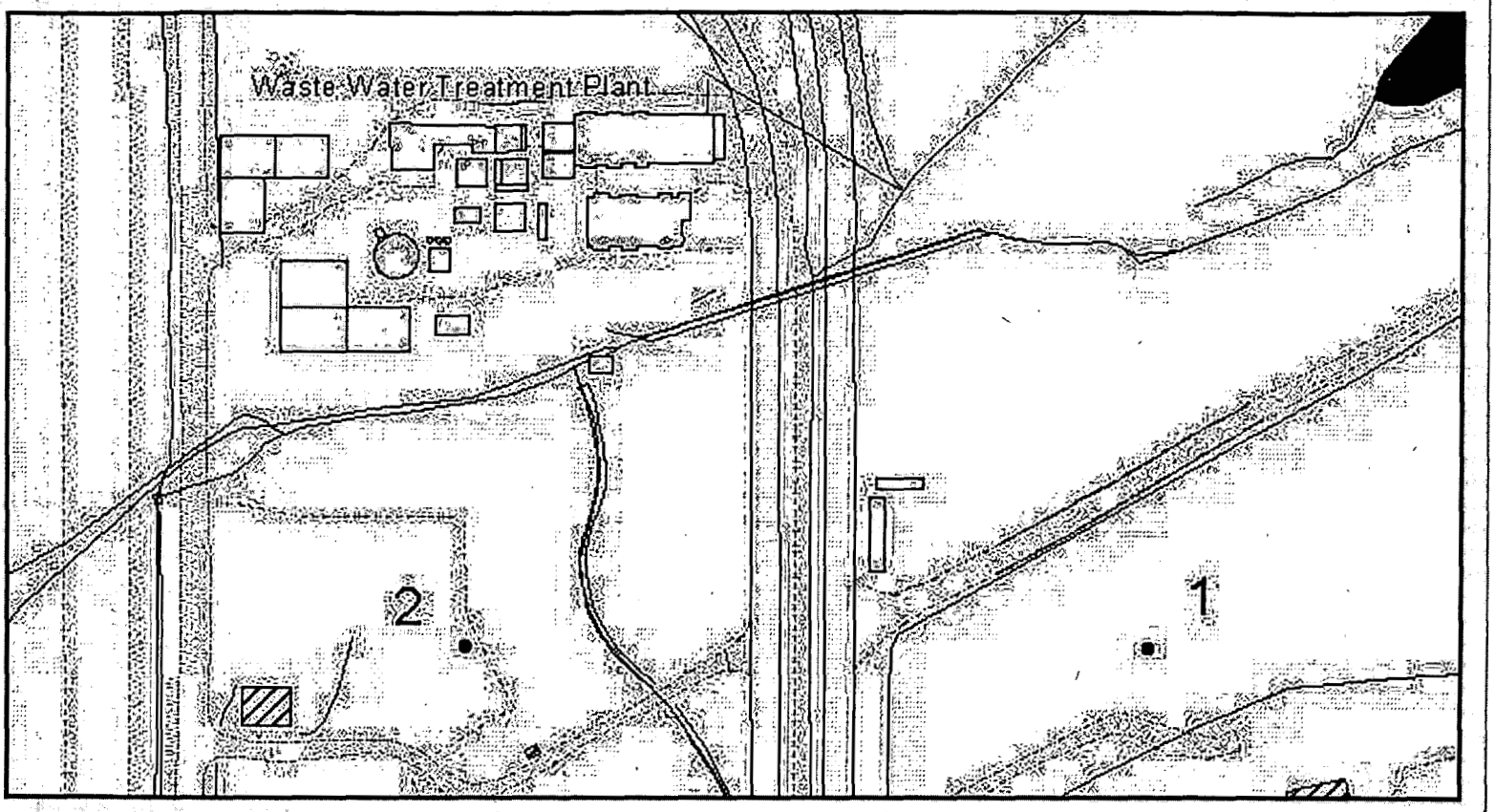






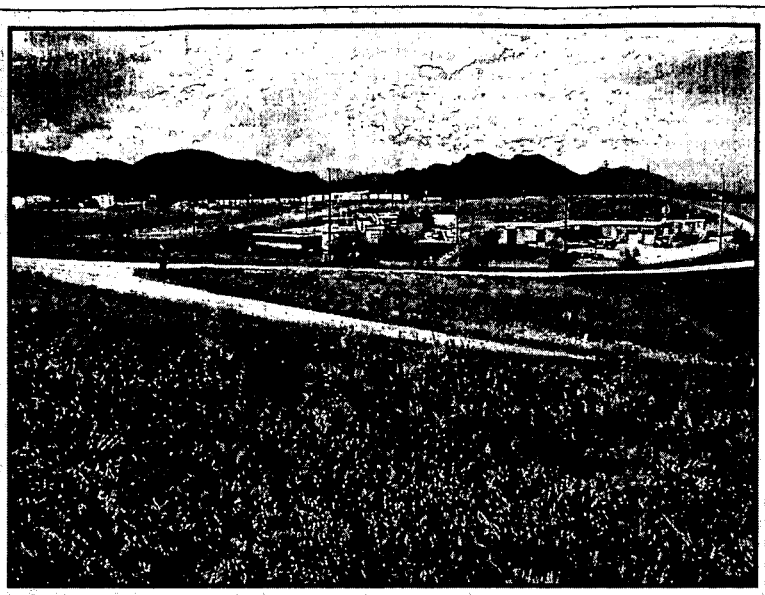
Waste Water Treatment Plant

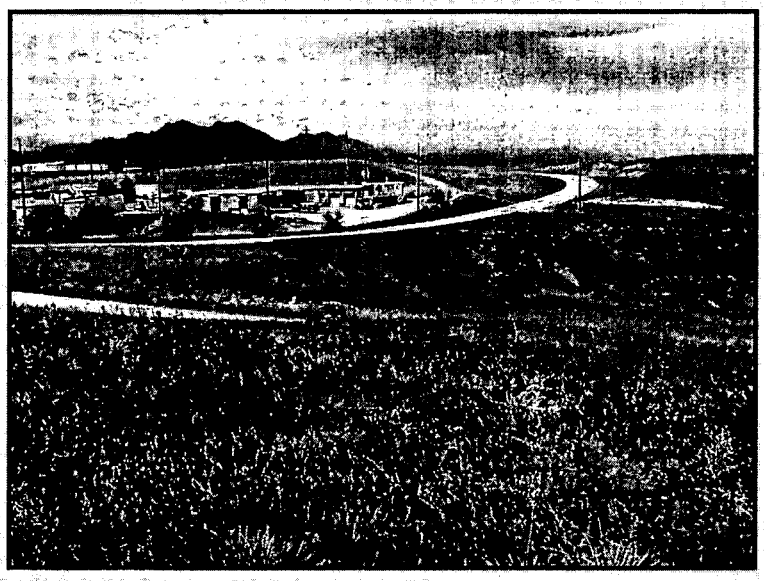
(clicking on any photopoint on the map will take you to the corresponding monitoring photos)

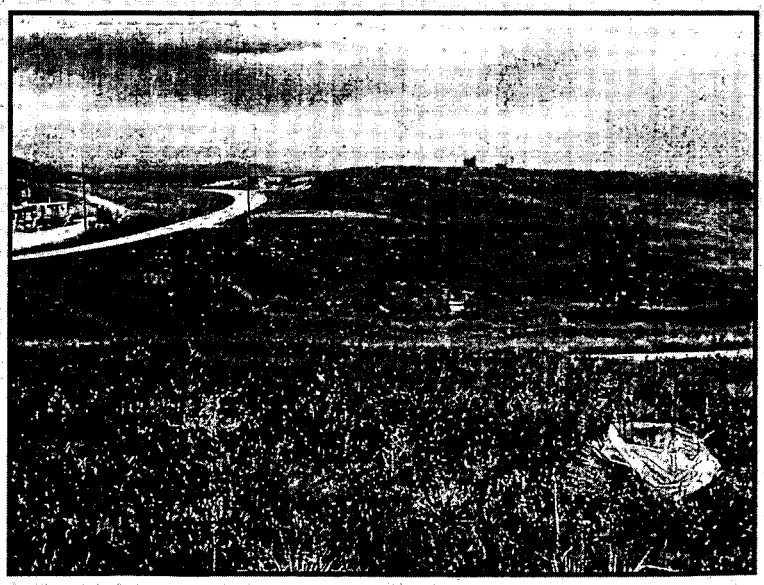


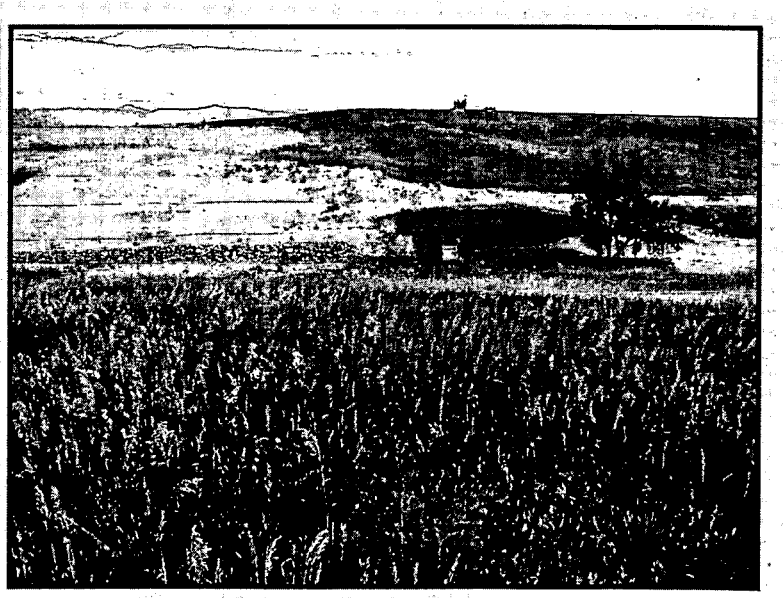
Photopoint 1

7/27/04 **8/25/05**



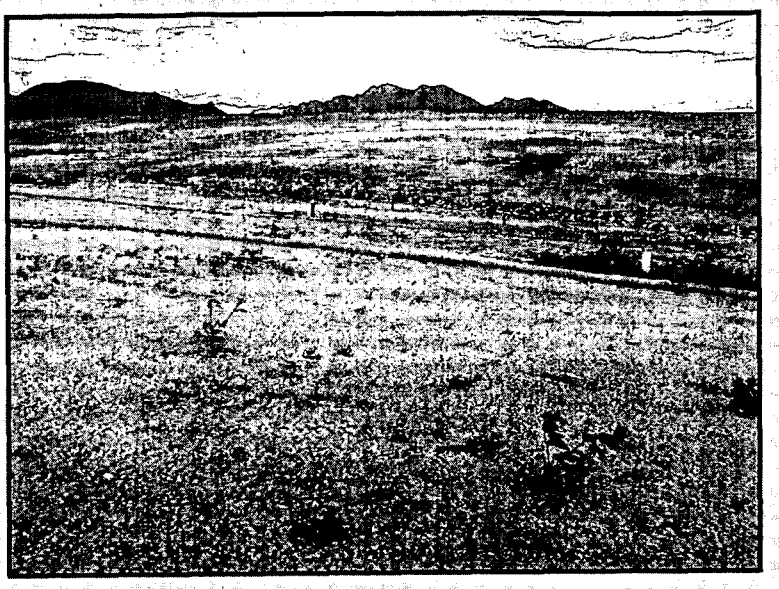


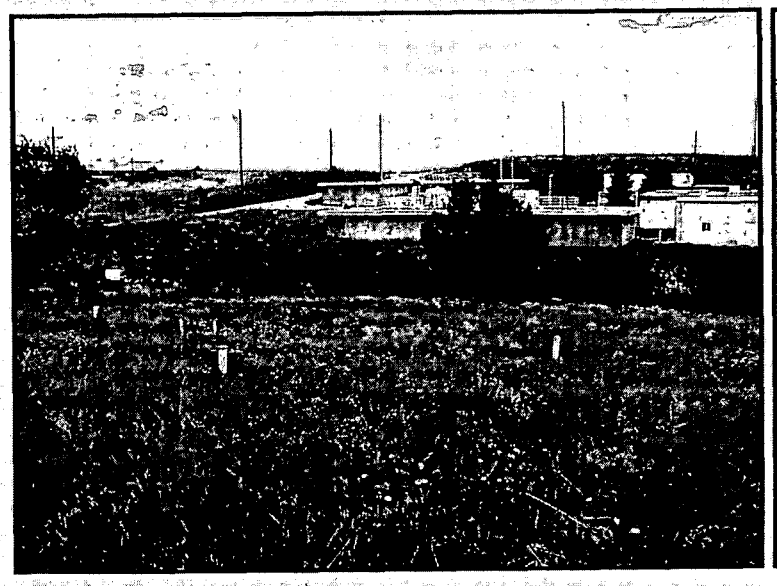


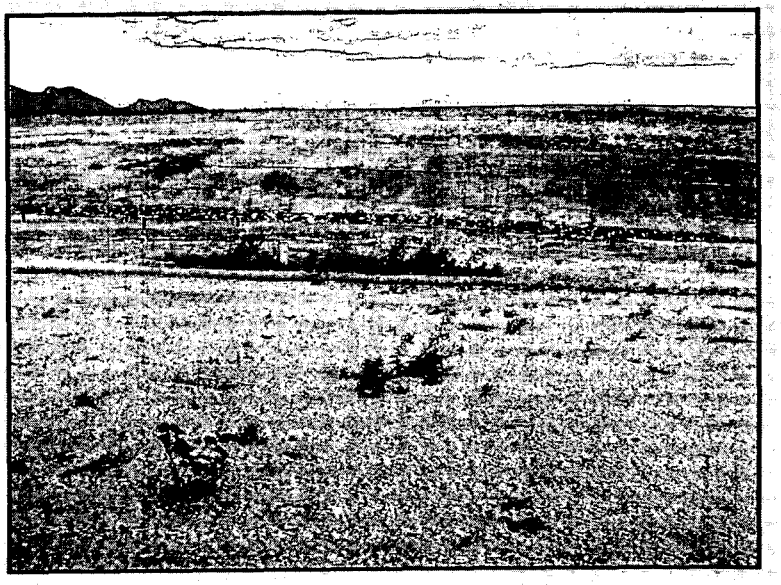


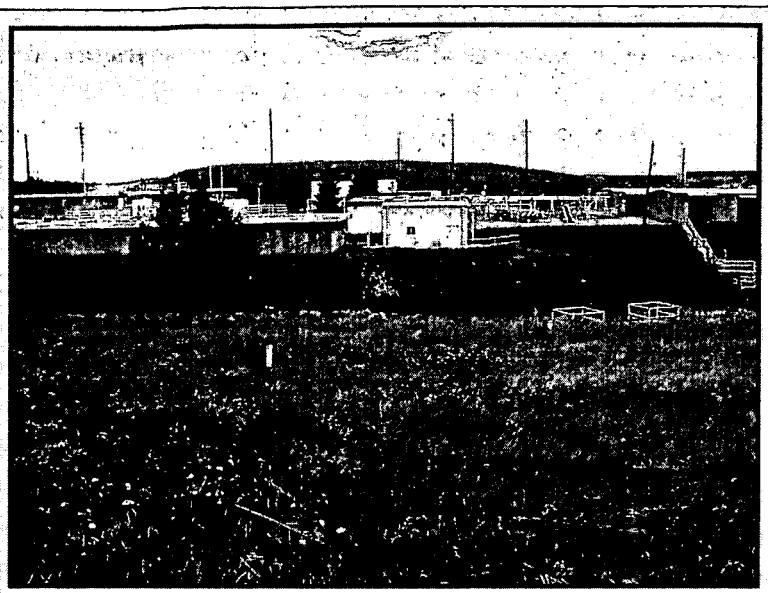
Photopoint 2

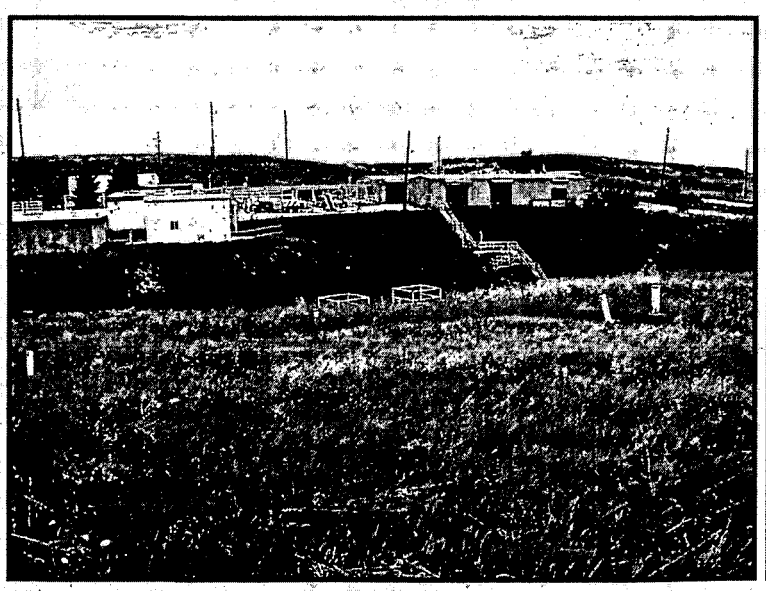
7/27/04 **8/25/05**





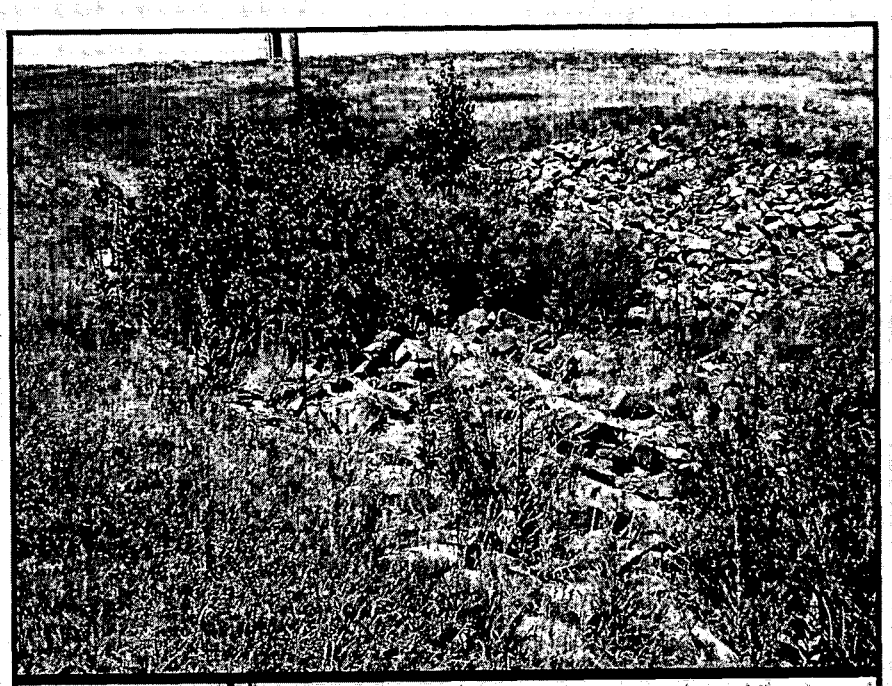






Woman Creek Bypass Rip-Rap Repair Project

7/18/05 **9/23/05**



Qualitative Revegetation Evaluation Form Form # 0027

Date 9/13/05
Observer(s) JKN
Location ID OLF

Photographs taken today? (Y) N

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGCAI
AGSMI

Any evidence of nutrient or water deficiencies? If so, describe. no

Are noxious weeds present? (Y) (N) – none observed – but area only recently completed

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

ERCI1 – 1 plant seen starting to grow

Are other weedy species present? Y (N) – not yet

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

Total Vegetation Cover (Estimate to nearest percent) ~ 9.

Suggestions for management: Watch for noxious weeds. Control weeds + reseed areas as needed.

Other comments: Area just + completed yesterday. Some seed has germinated in a few spots within area. Most of area will probably remain bare all winter.

Completed by: Joy K Nel (Print) JKN (Sign) Date 9/13/05

Qualitative Revegetation Evaluation Form Form # 00020

Date 8/25/05
Observer(s) HKN
Location ID BPWL

Photographs taken today? Y (N)

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

Area was mostly destroyed by the B-pond, N. Access Road & WWTP & PC#4 construction,

Nothing to evaluate. Will do so under the PC#4 documents now. 8/25/05

Any evidence of nutrient or water deficiencies? If so, describe

Are noxious weeds present? Y N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

Are other weedy species present? Y N 8/25/05

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

Total Vegetation Cover (Estimate to nearest percent)

Suggestions for management:

Other comments: 8/25/05

Completed by: Print Sign Date 8/25/05

Qualitative Revegetation Evaluation Form Form # 00022

Date 8/30/05 B pond 8/28/05

Observer(s) JKN

Location ID B pond Remediation Area

Photographs taken today? Y (N) — taken earlier

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGCA1 — 1
BOGR1 — 1
AGSM1 — 1
BOCU1 — 1

Any evidence of nutrient or water deficiencies? If so, describe. none

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CIAR1 — 1
COAR1 — 1
LIDA1 — 1 plant seen & pulled

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

MEOF1 — 1
BRIN1 — 1 not mapped since entire area was BRIN1 before

Total Vegetation Cover (Estimate to nearest percent) 10%

Suggestions for management: Weed control will be needed to control some more weeds. Still some spots at this pt. but this will be pulled by project leg.

Other comments: Veg has started coming up throughout area. Still sparse in most places. Need to give some time.

Completed by: [illegible] Print [illegible] Sign Date 8/29/05

Qualitative Revegetation Evaluation Form Form # 0021

Date 8/26/05
Observer(s) KN
Location ID well ~~[illegible]~~ 2005 - above A-1 pond

Photographs taken today? (Y) N

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGSMI - 3 -

Any evidence of nutrient or water deficiencies? If so, describe. none

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CIAR1 - 1
CEDI1 - 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

BRIN1 - 2

Total Vegetation Cover (Estimate to nearest percent) 95%

Suggestions for management: Water for weeds, recall if needed.

Other comments: Area was only treated during well installation. Area was reseeded on 7/6/05 w/ native seed mix. Veg is coming back with time.

Completed by: [illegible] (Print) [illegible] (Sign) Date 8/29/05

00025

Qualitative Revegetation Evaluation Form Form #

Date 8/29/15
Observer(s) JKN
Location ID FC#3

Photographs taken today? Y (N) Taken earlier

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

8/29/15
AGSMI - ~~2~~ 1
AGCAI - 3

Any evidence of nutrient or water deficiencies? If so, describe. Need rain bad - some very dry

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CIARI - 1
CEDIV - 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

MEOFI - 2
TRAEI - 1

Total Vegetation Cover (Estimate to nearest percent) 10 - 20 %

Suggestions for management: Some areas are going to be treated by [illegible] since they have been reinstated. Weed [illegible] will be needed + additional seeding at some [illegible] in the future

Other comments: Many areas not looking too bad. Other areas spotty. Overall pretty good for 1st yr.

Lots of HEAVY grazing this year.

Completed by: [illegible] (Print) [illegible] (Sign) Date 8/29/05

Qualitative Revegetation Evaluation Form Form #: 00012

Date 8/18/05
Observer(s) JKN KK
Location ID WWTP, North Acres Rd.

Photographs taken today? (Y) N

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGCA1 - 2
AGSM1 - 1

Any evidence of nutrient or water deficiencies? If so, describe. none

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

ONAC1 - 1
CIAR1 - 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

PACA1 - 1
LASE1 - 1
MEOF1 - 1
BRTE1 - 1

Total Vegetation Cover (Estimate to nearest percent) 20%

Suggestions for management: Weed Control

Other comments: Grass is coming up. Is sparse at some location. Overall lake pretty good.

Completed by: [illegible] KN (Print) [illegible] KN (Sign) Date 8/10/05

Qualitative Revegetation Evaluation Form Form #. 0014

Date 8/18/05
Observer(s) JKN KK
Location ID East Trench

Photographs taken today? (Y) N

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

BUDA1 – 2
AGCA1 – 1
AGSM1 – 1

Any evidence of nutrient or water deficiencies? If so, describe. none

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CEDI1 – 3
CIAR1 – 1

Very weedy area

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

MEDF1 – 3

Total Vegetation Cover (Estimate to nearest percent) 80%

Suggestions for management: needs weed control - spray for CEDI
Also make weed to grass grass [illegible] close to grass. To weed shade grass weeds. Reseed again

Other comments: Area looks bad. All CEDA & MEDPI. Need to spray

Completed by: [illegible] Print [illegible] Sign Date 8/18/05

Qualitative Revegetation Evaluation Form Form #. 00015

Date 8/19/05
Observer(s) KN
Location ID Well Installation

Photographs taken today? (Y) N

Are seeded plant species present? Y (N) – nothing was seeded since area was only Trayed

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

Any evidence of nutrient or water deficiencies? If so, describe.

Are noxious weeds present? Y N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

Are other weedy species present? Y N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

Total Vegetation Cover (Estimate to nearest percent)

Suggestions for management:

Other comments: Veg has fully recovered from trampling resulting from well installation. There is no additional work or monitoring needed at this location.

Completed by: [illegible] (Print) [illegible] (Sign) Date 8/29/05

Qualitative Revegetation Evaluation Form Form # 00011

Date 7/18/05
Observer(s) [illegible]
Location ID [illegible]

Photographs taken today? (Y) N

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGCAI - 4
ARSPI - 1
BUDA [illegible]

Any evidence of nutrient or water deficiencies? If so, describe. None

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CIARI - 1
CEDII - 1 >few plants

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CHALI - 1

Total Vegetation Cover (Estimate to nearest percent) 70 %

Suggestions for management: Control not needed.

Other comments: Area looks very good. Lots of AGCAI & AGSUI conjug

Completed by: [illegible] Date 8/12/05

Print Sign

Qualitative Revegetation Evaluation Form Form # 2016

Date 8/22/05
Observer(s) JKN
Location ID Culvert Removal - Wa[illegible] Creek

Photographs taken today? (Y) N

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGSMI - 2
BOER 1
BUDA 1

Any evidence of nutrient or water deficiencies? If so, describe. none

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

VETHI - 1
CEDI 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

ALMI - 2
AMPSI - ~~3~~ - a native species
BRJA1 - ~~2~~ 1
BRTE1 - 1 8/22/05

Total Vegetation Cover (Estimate to nearest percent) 90 %

Suggestions for management: None at this time

Other comments: Area looks good. Lots of native vegetation in the area that was burned in prior. No bare spots. No further noxious control surveys are needed.

Completed by: Joyce M (Print) [signature] (Sign) Date 8/22/05

Qualitative Revegetation Evaluation Form Form # 00019

Date 8/25/05
Observer(s) JKN
Location ID C-1 pond revegetation

Photographs taken today? Y (N) – took early in the summer

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGCA1 – 2
AGSM1 – 1
BUDA1 – 1

Any evidence of nutrient or water deficiencies? If so, describe. none

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CANV1 – 1
CIAR1 – 1
CEDI1 – 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

MEOF1 – 3
LASE1 – 1
POAR1 – 1
HEAN – 2

Total Vegetation Cover (Estimate to nearest percent) 50%

Suggestions for management: Weed control - need to [illegible] for weeds so we can [illegible]

Other comments: Veg has come up very well for 1st year. Weeds are main issue [illegible] seeded sp. do not [illegible] yet.

Completed by: Joy K [illegible] (Print) Joy K [illegible] (Sign) Date 8/23/05

Qualitative Revegetation Evaluation Form Form # 00030

Date 10/6/05
Observer(s) JKN
Location ID Functional Channel 1

Photographs taken today? Y (N) – will take when completed

Are seeded plant species present? Y (N)

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

Used dry seed rapeseed mix – seed 1st week Oct 2005
Nothing growing yet

Any evidence of nutrient or water deficiencies? If so, describe.

Are noxious weeds present? Y N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

Are other weedy species present? Y N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

Total Vegetation Cover (Estimate to nearest percent)

Suggestions for management: _____

Other comments: Only just seeded - nothing growing yet
Need to seed more wetted spots.

Completed by: _____ Date 10/6/05
Print Sign

Qualitative Revegetation Evaluation Form

Form # 0029

Date 10/6/05
Observer(s) JKN
Location ID Wetland at Road Crossing to PLF

Photographs taken today? Y (N) taken earlier in week

Are seeded plant species present? Y (N)

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

Area seeded today - not going yet

Any evidence of nutrient or water deficiencies? If so, describe.

Are noxious weeds present? Y N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

10/6/05

Are other weedy species present? Y N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

Total Vegetation Cover (Estimate to nearest percent)

Suggestions for management: 10/6/05

Other comments: Area cordoned today - nothing growing yet

Completed by: [illegible] (Print) [illegible] (Sign) Date 10/6/05

*Preble's Mouse Mitigation Debit/Credit Spreadsheet**

Preble's Meadow Jumping Mouse Mitigation Tracking Spreadsheet for Part II activities in the PBA
10/10/2005

GIS Ref #	Date Project Initiated	Date Project Completed	Project Description	Impacted Acres	Mitigation Ratio	Acres to Mitigate	Mitigation Project	Total Debit (-) Acres	Date Mitigation Initiated	Mitigation Agency Concurrence Date	Total Credit (+) Acres (In-situ)	Balance [Debit (-)/ Credit (+)]	Comment
A	5/3/2004	5/12/2004	OPWL east	0.0141 Lower Quality 0.0 Higher Quality	1.5 : 1 2 : 1	0.0212 0.0	Road and Culvert Removals	NA	5/12/2004		NA	NA	Removed as a separate impact because area re-disturbed as part of B Pond Remediation, WWTP, North Access Road Removal projects. Area had not been approved as habitat yet, so area should not be double counted. Now accounted for in totals for GIS Ref# R.
B	5/3/2004	5/12/2004	OPWL east	0.0189 Lower Quality 0.0 Higher Quality	1.5 : 1 2 : 1	0.0284 0.0	Miscellaneous	-0.0284	5/12/2004		[0.0284]	-0.0284	Disturbance amount reduced by 0.0469 acres because this portion of the OPWL East project was redisturbed by the B Pond Remediation, WWTP, North Access Road Removal projects. This portion of the OPWL area had not been approved as habitat yet, so area should not be double counted. Now accounted for in totals for GIS Ref# R. The portion of the polygon outside the redisturbed area is the amount that remains.
C	5/3/2004	5/12/2004	OPWL east	0.0111 Lower Quality 0.0 Higher Quality	1.5 : 1 2 : 1	0.0167 0.0	Pond Remediation and Removal Projects	-0.0167	5/12/2004		[0.0111]	-0.0167	
D	5/17/2004	5/25/2004	OPWL west	0.0147 Lower Quality 0.0 Higher Quality	1.5 : 1 2 : 1	0.0221 0.0	Waste Water Treatment Plant	NA	5/25/2004		NA	NA	Removed as a separate impact because area re-disturbed as part of B Pond Remediation, WWTP, North Access Road Removal projects. Area had not been approved as habitat yet, so area should not be double counted. Now accounted for in totals for GIS Ref# R.
E	5/17/2004	5/25/2004	OPWL west	0.0073 Lower Quality 0.0 Higher Quality	1.5 : 1 2 : 1	0.0110 0.0	Miscellaneous	NA	5/25/2004		NA	NA	Removed as a separate impact because area re-disturbed as part of B Pond Remediation, WWTP, North Access Road Removal projects. Area had not been approved as habitat yet, so area should not be double counted. Now accounted for in totals for GIS Ref# R.
F	5/17/2004	5/25/2004	OPWL west	0.0305 Lower Quality 0.0 Higher Quality	1.5 : 1 2 : 1	0.0458 0.0	Road and Culvert Removals	NA	5/25/2004		NA	NA	Removed as a separate impact because area re-disturbed as part of B Pond Remediation, WWTP, North Access Road Removal projects. Area had not been approved as habitat yet, so area should not be double counted. Now accounted for in totals for GIS Ref# R.
G	6/17/2004	6/28/2004	OLF Geotechnical Sampling	0.1375 Lower Quality 0.0472 Higher Quality	1.5 : 1 2 : 1	0.2063 0.0944	Original Landfill Project	NA	6/28/2004		NA	NA	Removed as a separate impact because portions of area re-disturbed as larger part of OLF Project and also to make tracking easier. Counted as part of the overall OLF Project. Now accounted for in totals for GIS Ref# V.
H	5/3/2004	6/17/2004	2004 Herbicide Applications		60:1		2004 Herbicide Applications (30 acres/annually for 3 yrs to offset 0.51 acres mitigation needed)		5/3/2004		0.1700	0.1700	
I	7/12/2004	7/20/2004	Culvert Removal Woman Creek	0.0390 Lower Quality 0.0341 Higher Quality	1.5 : 1 2 : 1	0.0585 0.0682	Road and Culvert Removals	-0.1267	7/20/2004		[0.0731]	-0.1267	
J	7/6/2004	7/28/2004	Well Installations	0.00 Lower Quality 0.0645 Higher Quality	1.5 : 1 2 : 1	0.00 0.1290	Well Installations	-0.1290	8/3/2004		[0.0639]	-0.1290	Polygon modified from original 8/3/04 data due to error. In-situ remediation is 0.0006 acres smaller than impacts due to concrete well pad loss. Five wells drilled, only 2 were used. Three were dry.
K	8/30/2004	5/15/2005	B Pond Remediation	0.1642 Lower Quality 0.00 Higher Quality	1.5 : 1 2 : 1	0.2463 0.00	Road and Culvert Removals	NA			NA	NA	Removed as a separate impact because area re-disturbed as part of B Pond Remediation, WWTP, North Access Road Removal projects. Area had not been approved as habitat yet, so area should not be double counted. Now accounted for in totals for GIS Ref# R.
L	8/30/2004	5/15/2005	B Pond Remediation	0.0005 Lower Quality 0.00 Higher Quality	1.5 : 1 2 : 1	0.0008 0.00	Miscellaneous	NA			NA	NA	Removed as a separate impact because area re-disturbed as part of B Pond Remediation, WWTP, North Access Road Removal projects. Area had not been approved as habitat yet, so area should not be double counted. Now accounted for in totals for GIS Ref# R.
M	11/18/2004	12/30/2004	East Shooting Range	0.70 Lower Quality 0.14 Higher Quality	1.5 : 1 2 : 1	1.05 0.28	NA	-1.3300	12/30/2004		[0.8400]	-1.3300	Consulted under seperate BA. Mitigation addressed by PBA.
N	12/1/2004	Ongoing	East Trenches	0.1645 Lower Quality 0.00 Higher Quality	1.5 : 1 2 : 1	0.195 0.00	Pond Remediation and Removal Projects	-0.2468			0.000	-0.2468	Moved from Part I to Part II of PBA due to ongoing disturbance. Updated disturbance acreage on 9/27/05 because after last changing of iron filings they expanded into an area where connexes were placed last summer. Added this area to the permanent loss. Previous acreage was 0.13 of lower quality habitat.
O	1/12/2005	1/12/2005	Well Installations	0.0016 Lower Quality 0.00 Higher Quality	1.5 : 1 2 : 1	0.0024 0.00	Well Installations	-0.0024	1/12/2005		[0.0013]	-0.0024	In-situ remediation is 0.0003 acres smaller than impacts due to concrete well pad loss. One well installed.

*Preble's Mouse Mitigation Debit/Credit Spreadsheet**

GIS Ref #	Date Project Initiated	Date Project Completed	Project Description	Impacted Acres	Mitigation Ratio	Acres to Mitigate	Mitigation Project	Total Debit (-) Acres	Date Mitigation Initiated	Mitigation Agency Concurrence Date	Total Credit (+) Acres (In-situ)	Balance [Debit (-)/ Credit (+)]	Comment
P	12/22/2004	3/4/2005	C-1 Pond Notching	1.4193 Lower Quality 0.1658 Higher Quality	1.5 : 1 2 : 1	2.1290 0.3316	Pond Remediation and Removal Projects	-2.4606	3/4/2005		[2.2091]	-2.4606	Credit amount includes in-situ restored (1.5331 acres) and new habitat created where roads and spillway were located (0.6760 acres).
Q	1/10/2005	5/24/2005	Functional Channel #3	0.5768 Lower Quality 0.0589 Higher Quality	1.5 : 1 2 : 1	0.8652 0.1178	Road and Culvert Removals	-0.9830	5/24/2005		[0.8589]	-0.9830	Credit amount inlcudes in-situ restored (0.5768 acres) and new habitat where N. Access Road was located (0.2821 acres).
R	8/30/2004	5/15/2005	B Pond Remediation, WWTP, North Access Road Removal in South Walnut Creek	5.4397 Lower Quality 0.8582 Higher Quality	1.5 : 1 2 : 1	8.1596 1.7164	B Pond Remediation, WWTP, North Access Road Removal	-9.8760	5/15/2005		[6.0648]	-9.8760	Credit amount is 0.2331 less than total disturbance that could return because some areas ended up under riprap. The overall value for this line value incorporates the disturbances previously listed in GIS Ref #s A, D, E, F, G, and a portion of B. This area is located in Functional Channel #4.
S	5/1/2005	6/15/2005	2005 Herbicide Applications		60:1		2005 Herbicide Applications (30 acres/annually for 3 yrs to offset 0.51 acres mitigation needed)		5/1/2005		0.1700	0.1700	
T	6/29/2005	7/6/2005	Well Installations	0.0516 Lower Quality 0.0025 Higher Quality	1.5 : 1 2 : 1	0.0774 0.0050	Well Installations	-0.0824	7/6/2005		[0.0541]	-0.0824	One well installed. No loss due to concrete pad placement because the existing well was removed and a new one put in.
U	7/15/2005	9/1/2005	Dam Maintenance	3.1600 Lower Quality 0.2200 Higher Quality	1.5 : 1 2 : 1	4.7400 0.4400	Dam Maintenance and Safety Activities	-5.1800	NA		0.0000	-5.1800	Used number listed in PBA Part II as conservative estimate of impacts.
V	6/7/2004	9/12/2005	Original Landfill Project	6.7398 Lower Quality 2.8997 Higher Quality	1.5 : 1 2 : 1	10.1097 5.7994	Original Landfill Project	-15.9091	9/12/2005		[9.6395]	-15.9091	Items listed in Row G were combined with this row for the final OLF impacts because of overlaps in the disturbances. Therefore Row G has been excluded from the calculations.
W	9/12/2005	10/10/2005	North Access Road Removal (NW of B371)	0.4657 Lower Quality 0.0076 Higher Quality	1.5 : 1 2 : 1	0.6986 0.0152	Road and Culvert Removals	-0.7138	10/10/2005		[0.6148]	-0.7138	Total area not restored because North Walnut Creek channel was lined with riprap where the culvert beneath the road was taken out. So cannot count this area as habitat. However, the Total Credit (in-situ) value does include the areas that were once beneath the North Access Road. These areas were seeded after project completion and should now become habitat., so they are included as additional credit.
X	9/12/2005	9/15/2005	Surface Water Equipment Removals	0.0271 Lower Quality 0.0094 Higher Quality	1.5 : 1 2 : 1	0.0407 0.0188	Surface Water Equipment Removals	-0.0595	9/15/2005		[0.0365]	-0.0595	
Y	8/15/2005	8/16/2005	C-2 Woman Creek Bypass Riprap Repair	0.1538 Lower Quality 0.0073 Higher Quality	1.5 : 1 2 : 1	0.2307 0.0146	Pond Remediation and Removal Projects	-0.2453	9/16/2005		[0.1611]	-0.2453	
Z	9/15/2005	9/30/2005	Culvert Removal North Walnut Creek (on road to Present Landfill)	0.0000 Lower Quality 0.0000 Higher Quality	1.5 : 1 2 : 1	0.0000 0.0000	Road and Culvert Removals		9/30/2005		[0.7993]	0.0000	This credit comes from the conversion of the road and storage area (on the way to the Present Landfill) that was ripped and seeded west of North Access Road. The acreage that should return to habitat is: 0.7993 acres.
							Total Acreage	-37.3897			0.3400	-37.0497	
										Total Potential Credit	[21.7959]		

NOTE: Only acreage values greater than 0.0002 acres are incorporated in this spreadsheet. The reason is that the GPS unit being used becomes inaccurate for polygons smaller than this.

In the Total Credit column the brackets indicate that the credit has not been applied yet. After USFWS concurrence for that project, the brackets will be removed and the credits applied.

The yellow shaded rows at the top of the spreadsheet have been consolidated into GIS Ref # R due to overlaps in the disturbances.

The blue shaded rows at the top of the spreadsheet have been consolidated into GIS Ref # V due to overlaps in the disturbances.

*Preble's Mouse Mitigation Debit/Credit Spreadsheet**

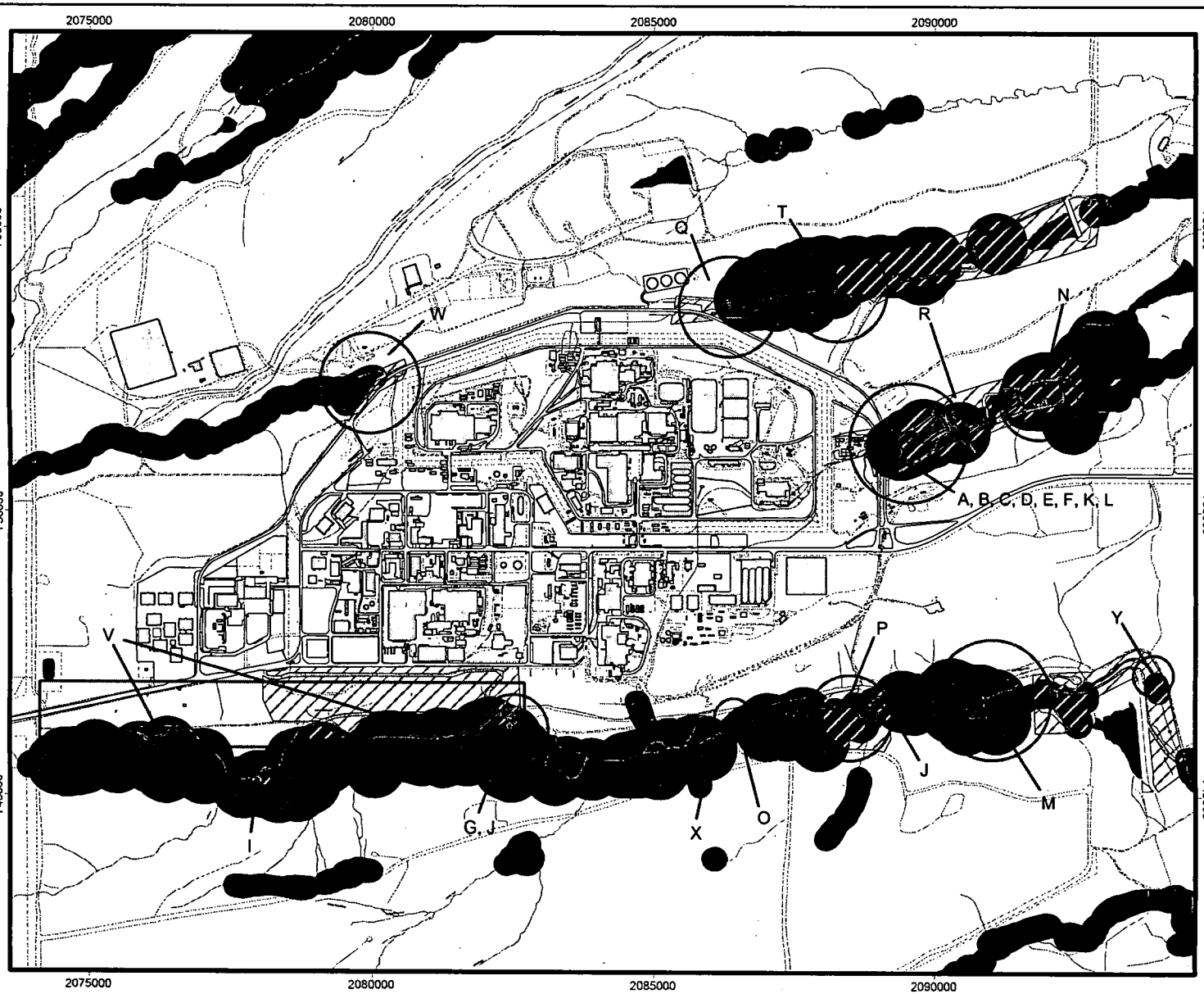
Credit Project	Total Credit (+) Acres	Comments
Conservation Easement	60.0000	Section 16 Conservation Easement Purchase
IA Created/Linked Habitat Areas	44.8211	Includes potential created/linked PMJM habitat areas in Functional Channels - FC#1, FC#2, FC#3, and FC#4. Areas were delineated as the wetlands plus a 100 ft. buffer around the outside edge (like what was done on the PMJM Protection Areas Map).
Total	104.8211	

Preble's Mouse GIS Methodology

A geographic information system (GIS) has been used for determining impacts to Preble's mouse habitat as required by the Programmatic Biological Assessment (PBA), Part II. The GIS methodology used to determine final impacts to the Preble's mouse habitat is outlined below. The PBA Part II listed several projects that would adversely affect the Preble's mouse habitat. Based on estimated project footprints a projected impact of "X" acres was determined for each project. However, the PBA also states that actual impacts, not the estimated impacts, would be used for mitigation purposes. This document outlines the methods used to determine and account for the actual impacts that need to be mitigated.

1. After project completion, the actual disturbance area on the ground is delineated using a geographic positioning system (GPS). We use a Trimble GPS system to walk the edges of the disturbances. Disturbances are defined as areas disturbed by construction activities and/or areas of trampled vegetation. Typically the data are collected as line features because given the many bends and twists that need to be accounted for it is too easy to corrupt a polygon feature by crossing back over a line. So field data are collected as line features.
2. The data from the GPS is downloaded to a computer and then corrected using base station files from a local base station (such as CompassCom in Denver or the USFS in Ft. Collins). Data are corrected with Pathfinder Office software.
3. After correcting the data are exported as a line feature shapefile.
4. The data are then moved to the Site GIS on the network drive and placed into the appropriate directory. The GIS drive is GISSRV\Ecology\. The Preble's mouse directory for all the PBA data is GISSRV\Ecology\Projects\FY2004\04-003504-0035. It contains a subdirectory for each of the different projects. The name of these field data files are typically the date followed by the initials of the person who collected it.
5. The software used to conduct the GIS analyses and manipulate the data is ArcView 3.2. The Preble's mouse PBA Part II ArcView project file is called PBA Pt II Mitigation Tracking.apr and is found at GISSRV\Ecology\Projects\FY2004\04-003504-0035.
6. The line shapefile collected in the field is opened in ArcView and a new empty polygon shapefile is created. Within the polygon shapefile, new polygon or polygons are traced over the lines in the line feature shapefile to create the actual project disturbance polygon file for the project disturbance. It is named appropriately for the specific project that was delineated. After it is created and QA'ed, the area and perimeter of the polygons are updated. [Note: In ArcView the area and perimeter must be updated each time a change is made to a polygon because otherwise it retains the data from the originating polygon.]
7. To determine the actual impacts to Preble's habitat the actual project disturbance polygon file is used as a cookie cutter to clip out the Preble's mouse protection area locations in the project area. The GeoWizard in ArcView is used for this process. This new file (call it the actual PMJM project footprint file) is then used to determine the total actual acreage of Preble's mouse habitat impacted by the project. The area and perimeter are updated in the new actual PMJM project footprint file after being clipped with the actual project footprint file and is used to calculate the total impacts to Preble's habitat by the project.
8. Per the PBA requirements there are two different mitigation ratios used for impacts to Preble's mouse habitat. There are impacts to lower quality habitat (mitigated at a 1.5:1 ratio) and higher quality habitat (2:1 ratio). Habitat quality is based on the type of vegetation present. The 1996 RFETS vegetation map is used to determine the vegetation type present at a given location for Preble's mitigation. Higher quality habitat is defined as all woody vegetation classifications and short marsh, tall marsh, and wet meadow wetland types. Lower quality habitat is defined as all grassland classifications, mud flats, and other disturbed community types. Open water, riprap, concrete, roads, and structures are not considered habitat for the Preble's mouse.

9. To determine the quality of the habitat impacted by a project, the actual PMJM project footprint file is used as a cookie cutter to clip out the 1996 RFETS vegetation map. This new file (call it the PMJM habitat quality file) then shows what specific vegetation types were impacted in the project area. The area and perimeter of the PMJM habitat quality file are updated after being clipped. The different habitat types representative of lower and higher quality habitat are sorted and then the total acreage of lower and higher quality habitat impacted by the project is calculated.
10. This information is then added to the Preble's mouse debit/credit mitigation spreadsheet to keep a running total of current debit/credits for impacts to Preble's mouse habitat at the Site.



Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking

October 10, 2005

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter matches projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

500 0 500 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

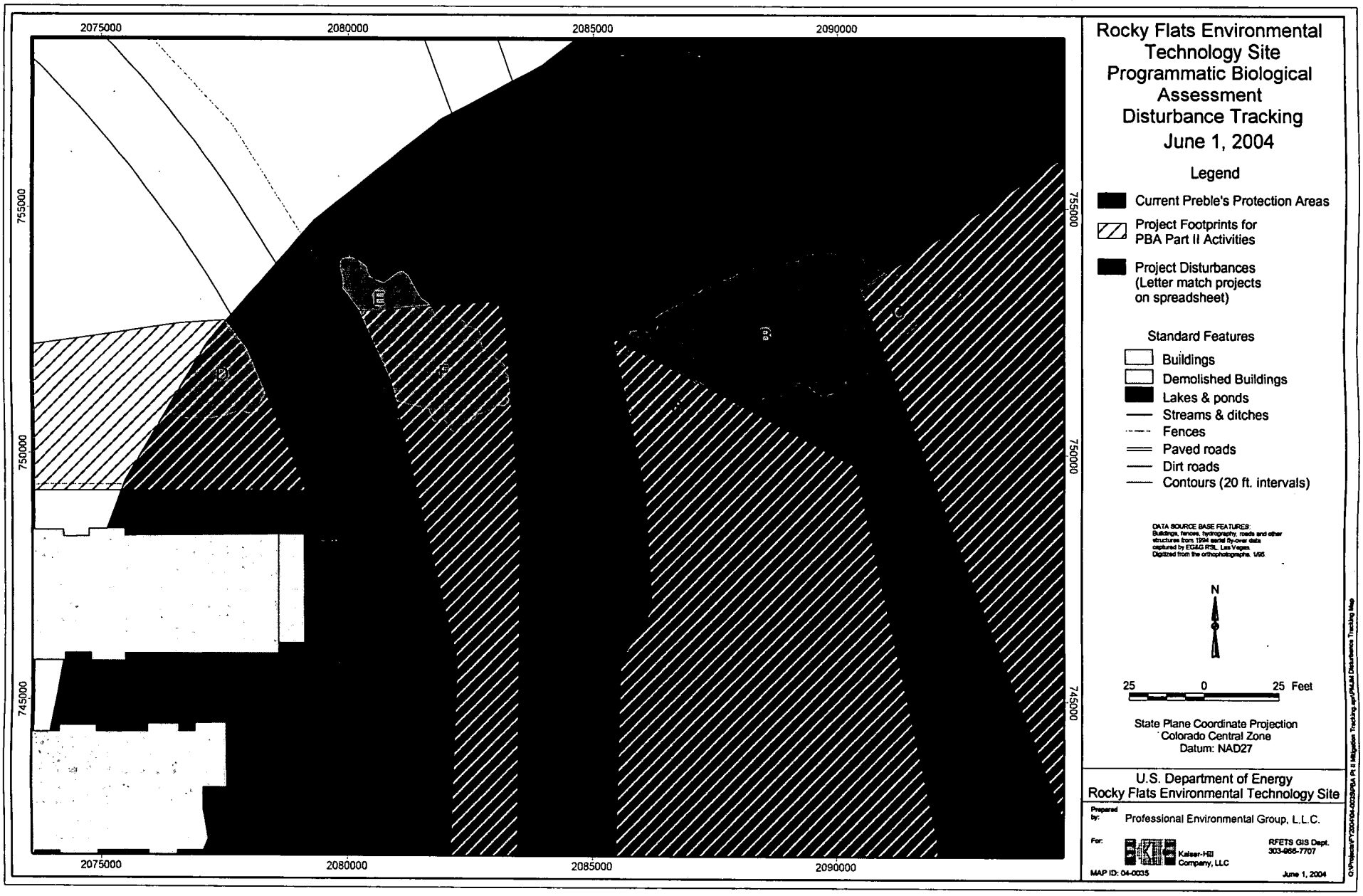
For: Kaiser-Hill Company, LLC

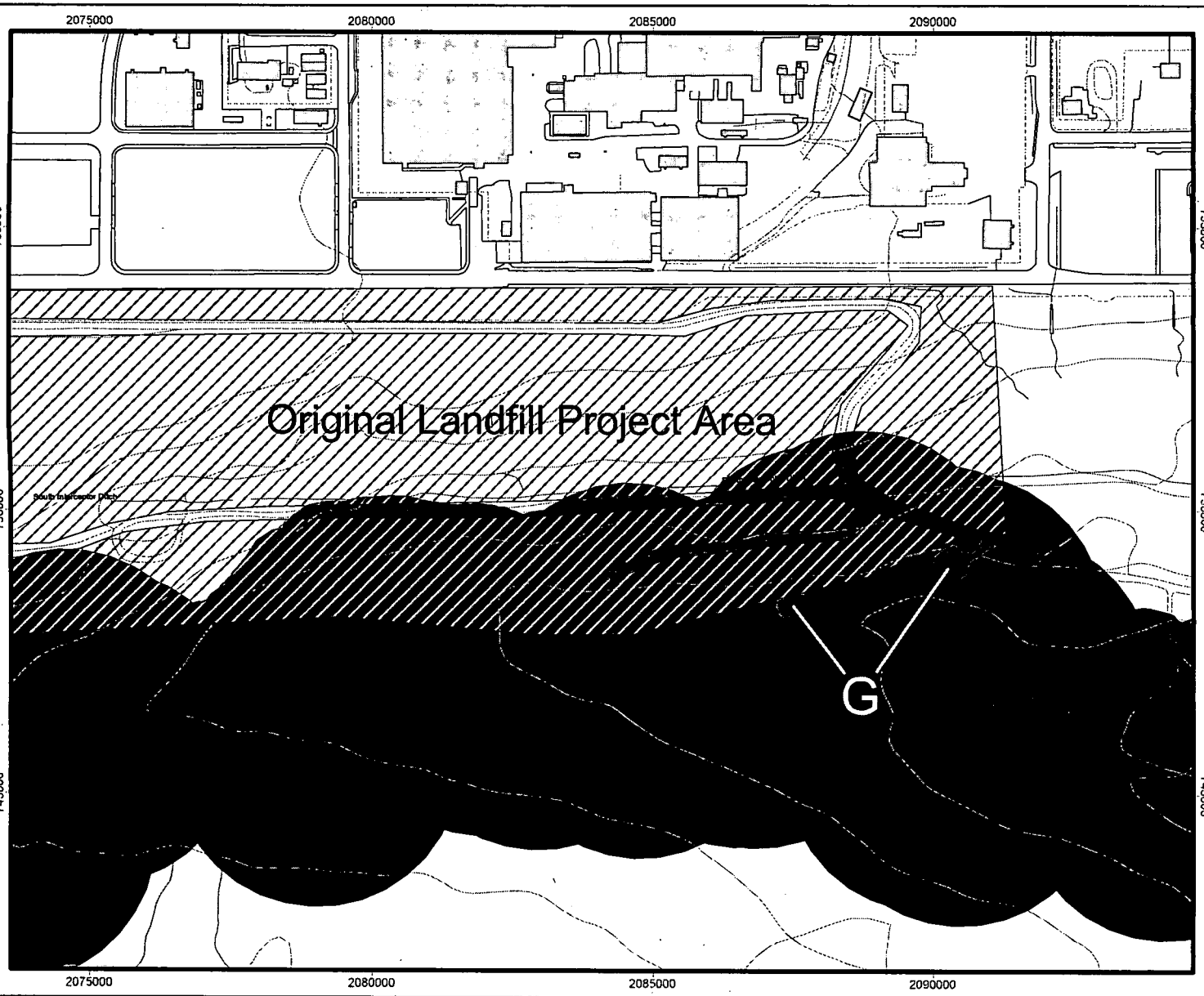
RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

October 10, 2005

C:\Projects\FY2004\04-0035\PBA Pt II Mitigation Tracking.apr\Overall PBA Pt II Disturbance Tracking Map 101005


2075000
2080000
2085000
2090000
755000
750000
745000
Rocky Flats Environmental Technology Site
Programmatic Biological Assessment
Disturbance Tracking
June 1, 2004
Legend
Current Preble's Protection Areas
Project Footprints for PBA Part II Activities
Project Disturbances (Letter match projects on spreadsheet)
Standard Features
Buildings
Demolished Buildings
Lakes & ponds
Streams & ditches
Fences
Paved roads
Dirt roads
Contours (20 ft. intervals)
DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas
Digitized from the orthophotographs, 1/95
N
25 0 25 Feet
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27
U.S. Department of Energy
Rocky Flats Environmental Technology Site
Prepared by:
Professional Environmental Group, L.L.C.
For:
Kaiser-Hill Company, LLC
RFETS GIS Dept.
303-966-7707
MAP ID: 04-0035
June 1, 2004



Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking

July 1, 2004

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter match projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas
Digitized from the orthophotographs, 1/95

N

200 0 200 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

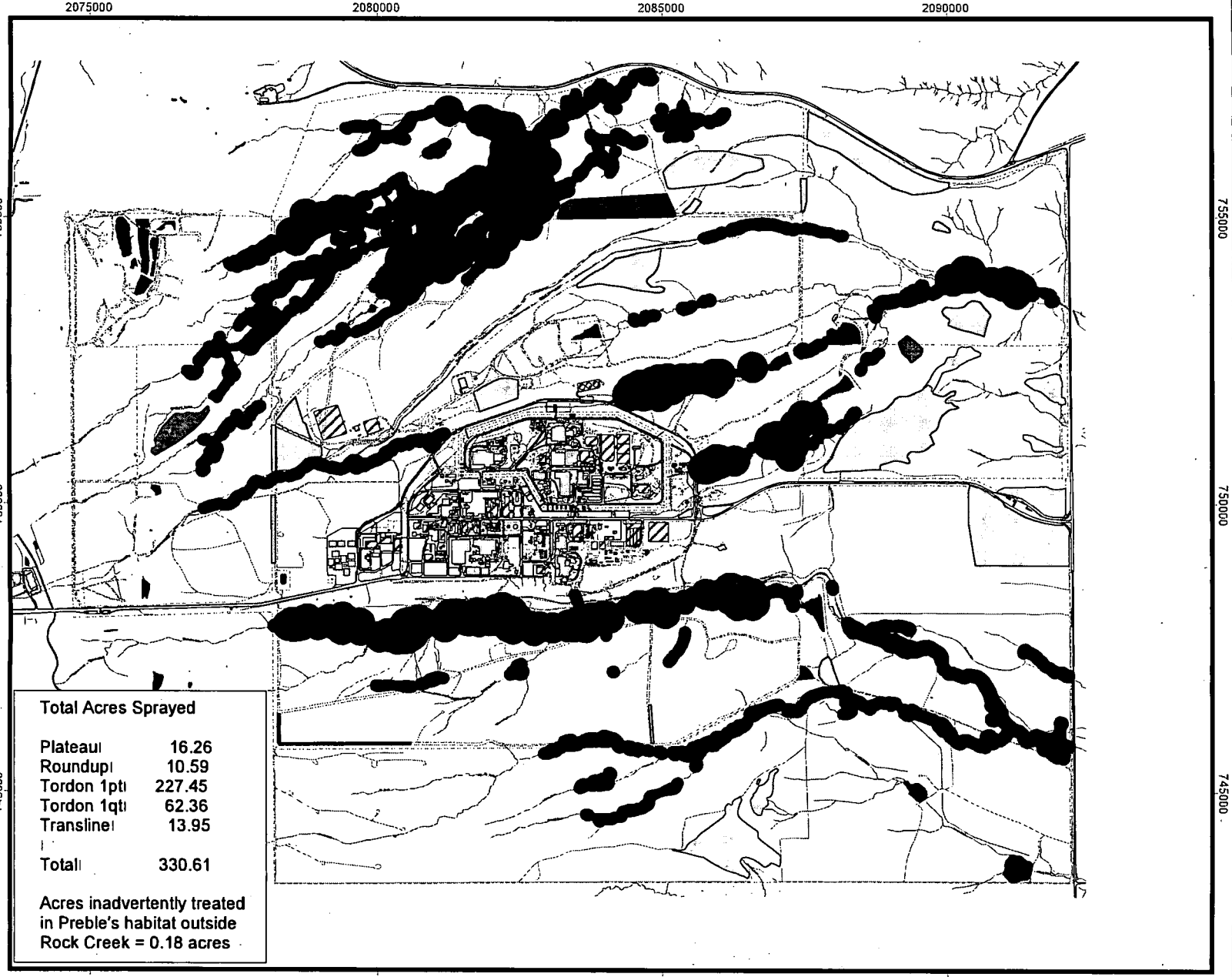
For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

July 1, 2004

Q:\Projects\FY2004\04-0035\PBA Pt II Mitigation Tracking.apr\PbA Disturbance Tracking Map 2



Total Acres Sprayed

Plateau	16.26
Roundup	10.59
Tordon 1pt	227.45
Tordon 1qt	62.36
Transline	13.95
Total	330.61

Acres inadvertently treated in Preble's habitat outside Rock Creek = 0.18 acres

Rocky Flats Environmental Technology Site 2004 Broadcast Herbicide Application Locations PBA Part II Credit Tracking

Figure 1

Legend

- Roundup
- Plateau
- Transline
- Tordon 22K 1pt/acre
- Tordon 22K 1 qt/acre
- Current Preble's Protection Areas

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EDAO RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

1000 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

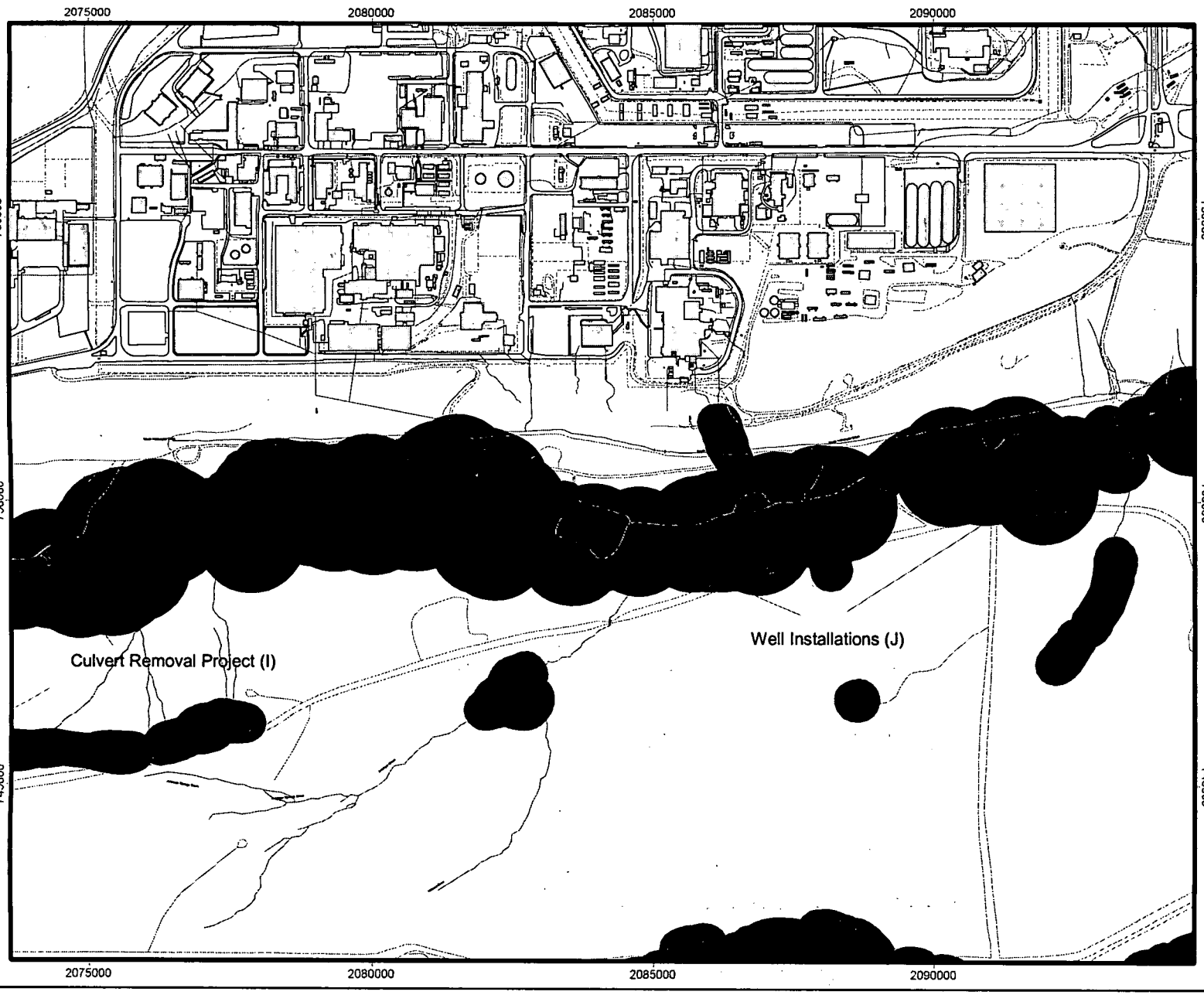
For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0021

July 1, 2004

O:\Projects\F/2004\04-0021\Final herb appl 2004 apr\PBA Pt II Credit Tracking



Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking

August 3, 2004

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter match projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas
Digitized from the orthophotographs, 1/95

N

500 0 500 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

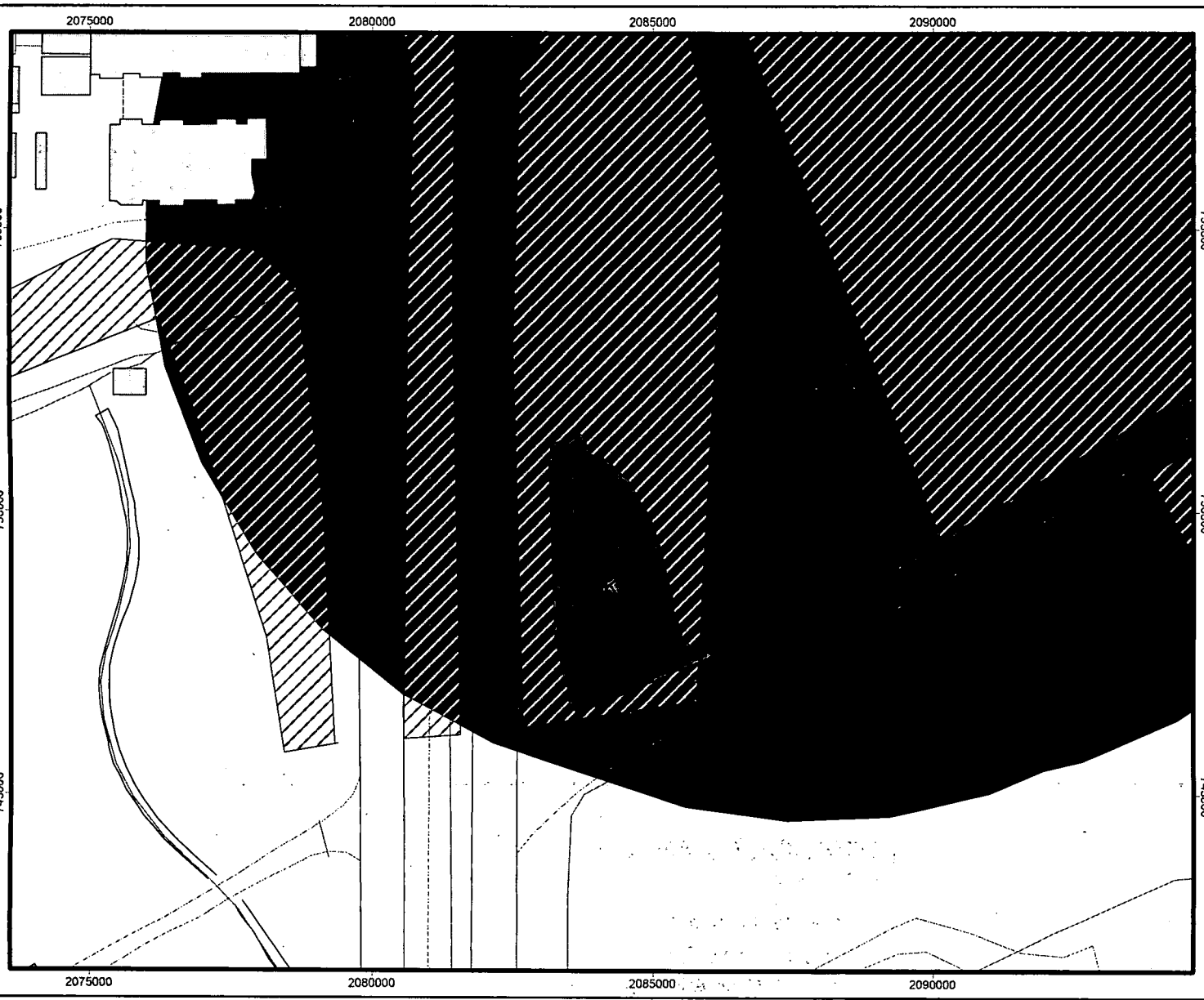
For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

August 3, 2004

O:\Projects\FY2004\04-0035\PBA Pt II Mitigation Tracking.apr\PNJM Disturbance Tracking Map 3



Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking

September 8, 2004

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter match projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95

N

50 0 50 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

September 8, 2004

G:\Projects\FY2004\04-0035\PBA Pt II Mitigation Tracking.apr\PBA Disturbance Tracking Map 5

2075000
2080000
2085000
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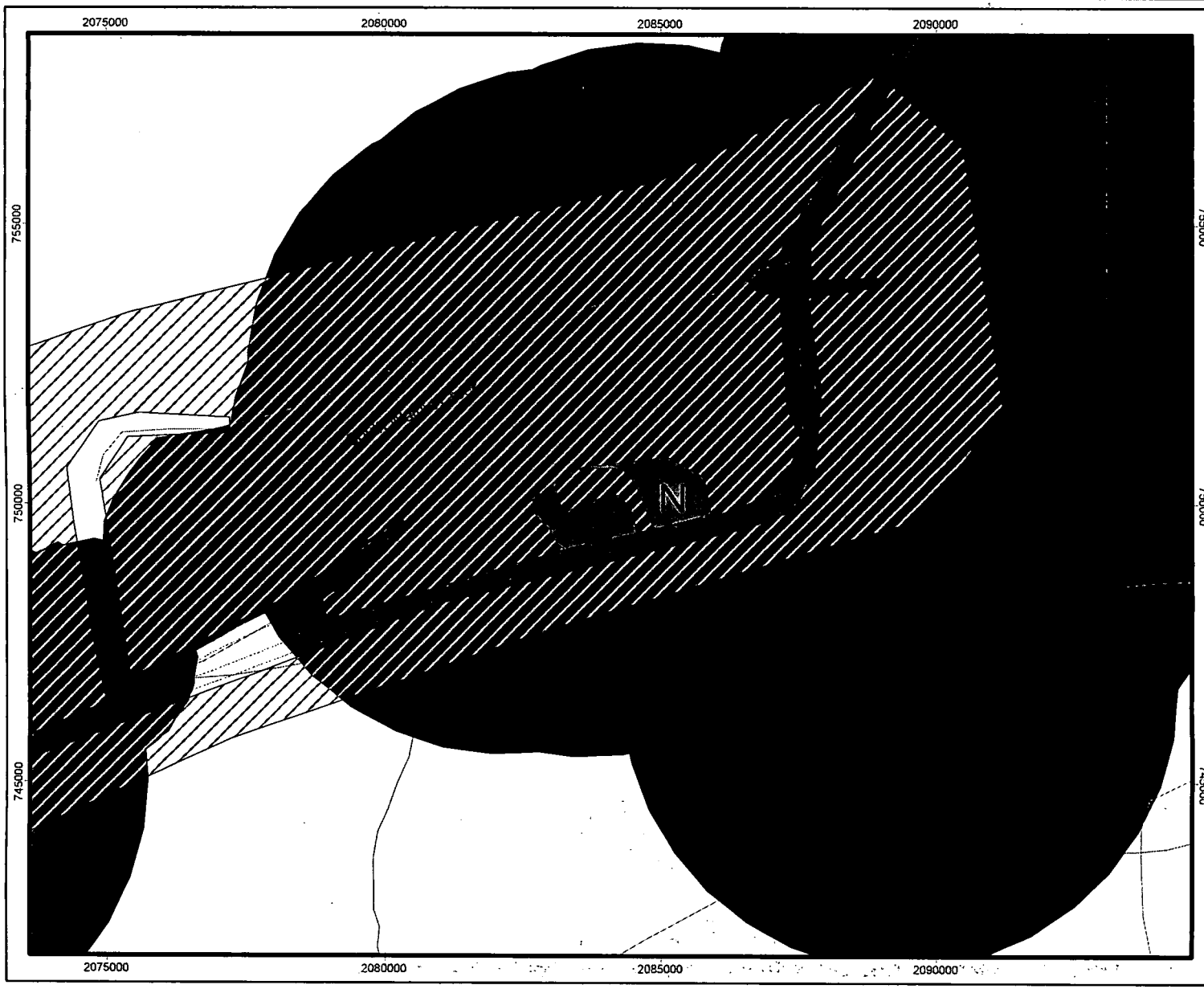
East Shooting Range Project
East Shooting Range
Programmatic Biological
Assessment
Disturbance Tracking
January 3, 2005
Legend
Current Preble's Protection Areas
Project Footprints for
PBA Part II Activities
Project Disturbances
(Letter match projects
on spreadsheet)
Standard Features
Buildings
Demolished Buildings
Lakes & ponds
Streams & ditches
Fences
Paved roads
Dirt roads
Contours (20 ft. intervals)
DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other
structures from 1994 aerial fly-over data
captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.
N
200
0
200 Feet
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27
U.S. Department of Energy
Rocky Flats Environmental Technology Site
Prepared by:
Professional Environmental Group, L.L.C.
For:
Kaiser-Hill Company, LLC
RFETS GIS Dept.
303-966-7707
MAP ID: 04-0035
January 3, 2005



East Trenches Update 09/27/05) Programmatic Biological Assessment Disturbance Tracking October 10, 2005

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter match projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95.

N

100 0 100 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

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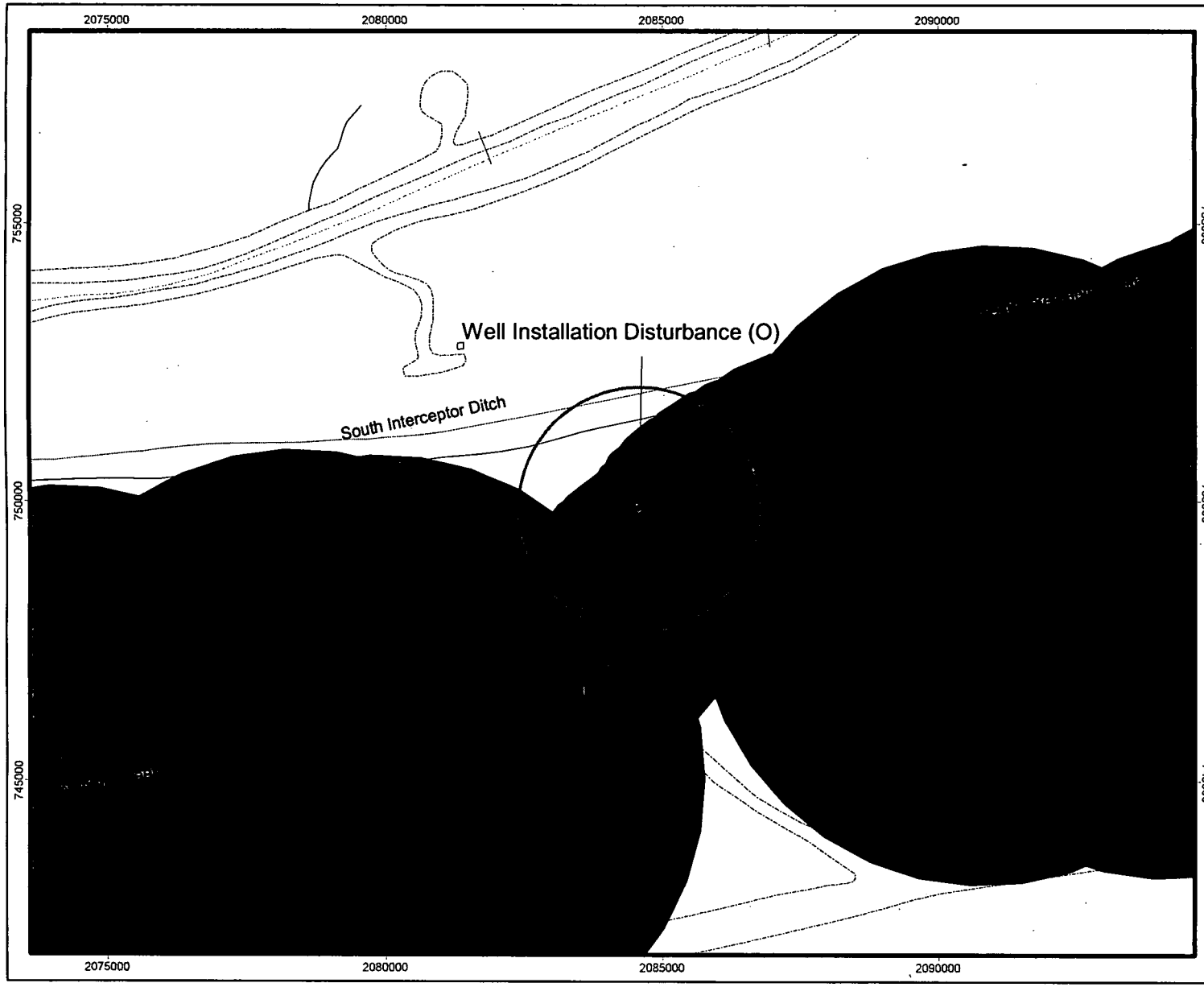
For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

October 10, 2005

G:\Projects\FY2004\04-0033\PBA Pt II Mitigation Tracking.apr\East Trenches Update 092705



Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking

February 7, 2005

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter match projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95.

N

100 0 100 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

February 7, 2005

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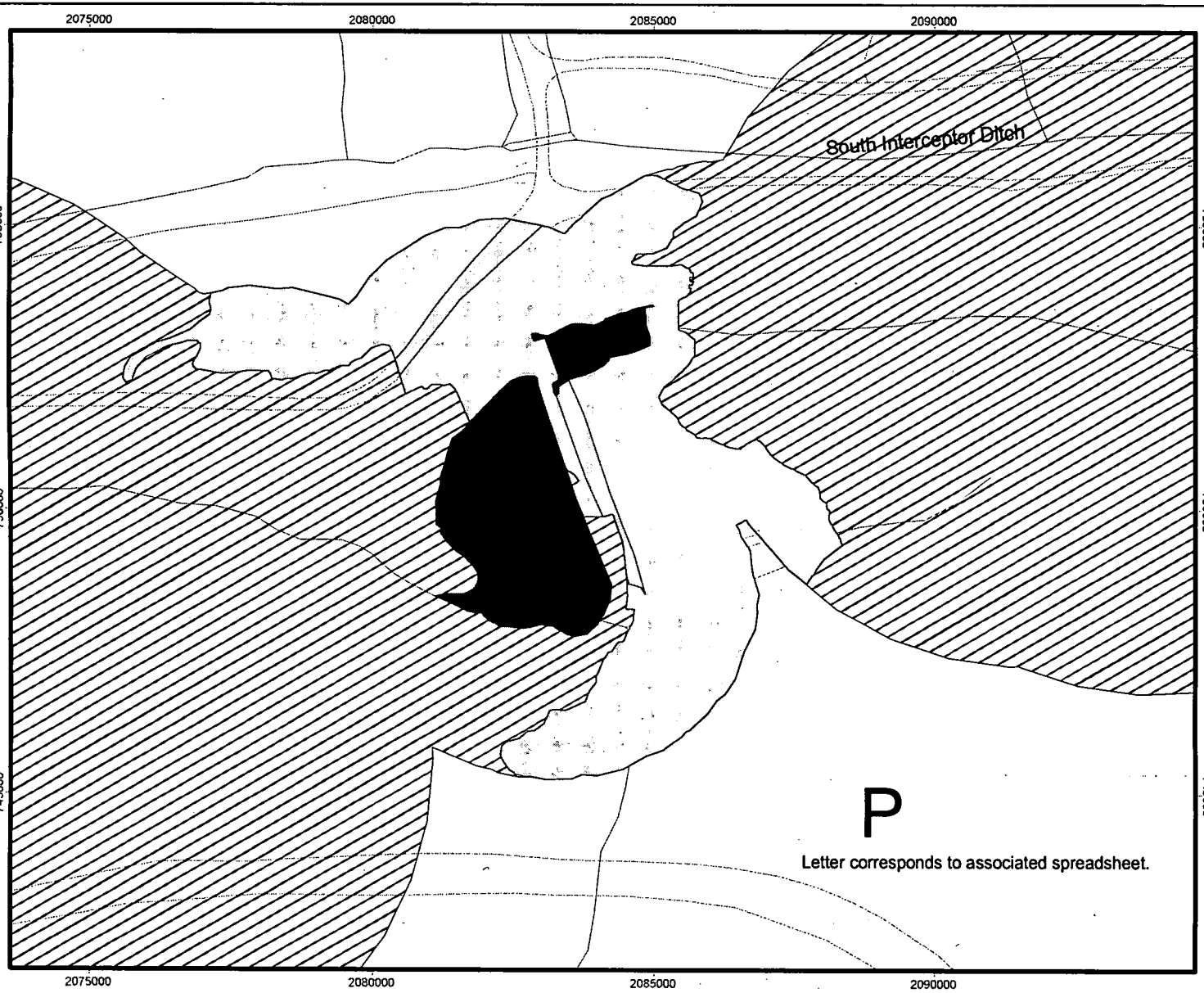


C-1 Pond Dam Notch Programmatic Biological Assessment Disturbance Tracking

Legend

- Current Preble's Protection Areas
- Temporary Disturbance
- Non-Habitat Remaining (previously none habitat [road, riprap])
- Permanent Loss (new spillway)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

100 0 100 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

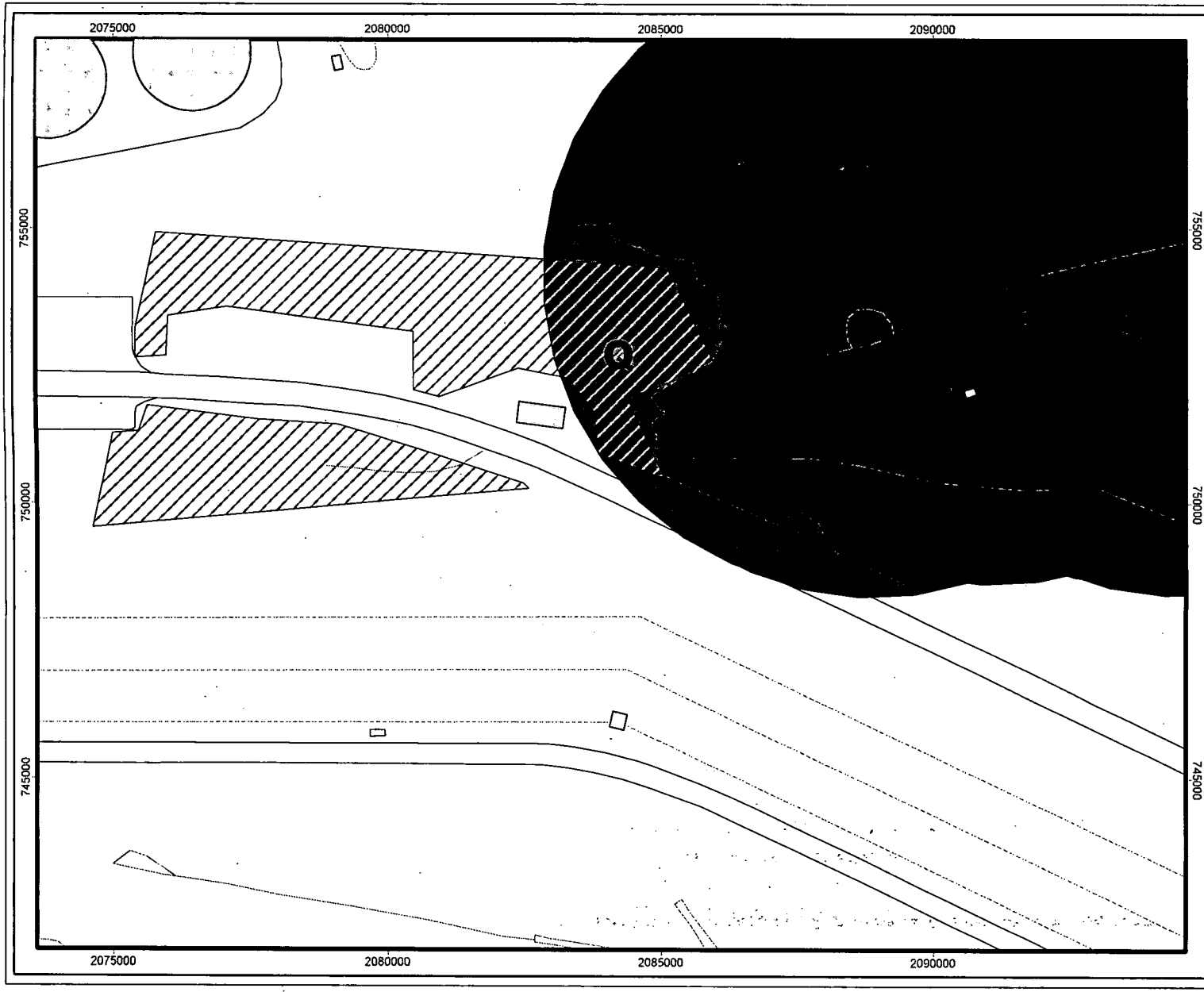
For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

April 5, 2005

O:\Projects\FY2004\04-0035\PBA Pt II Mitigation Tracking.apr\C-1 Pond



Functional Channel #3 Programmatic Biological Assessment Disturbance Tracking

June 7, 2005

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter match projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

100 0 100 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

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For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

June 7, 2005

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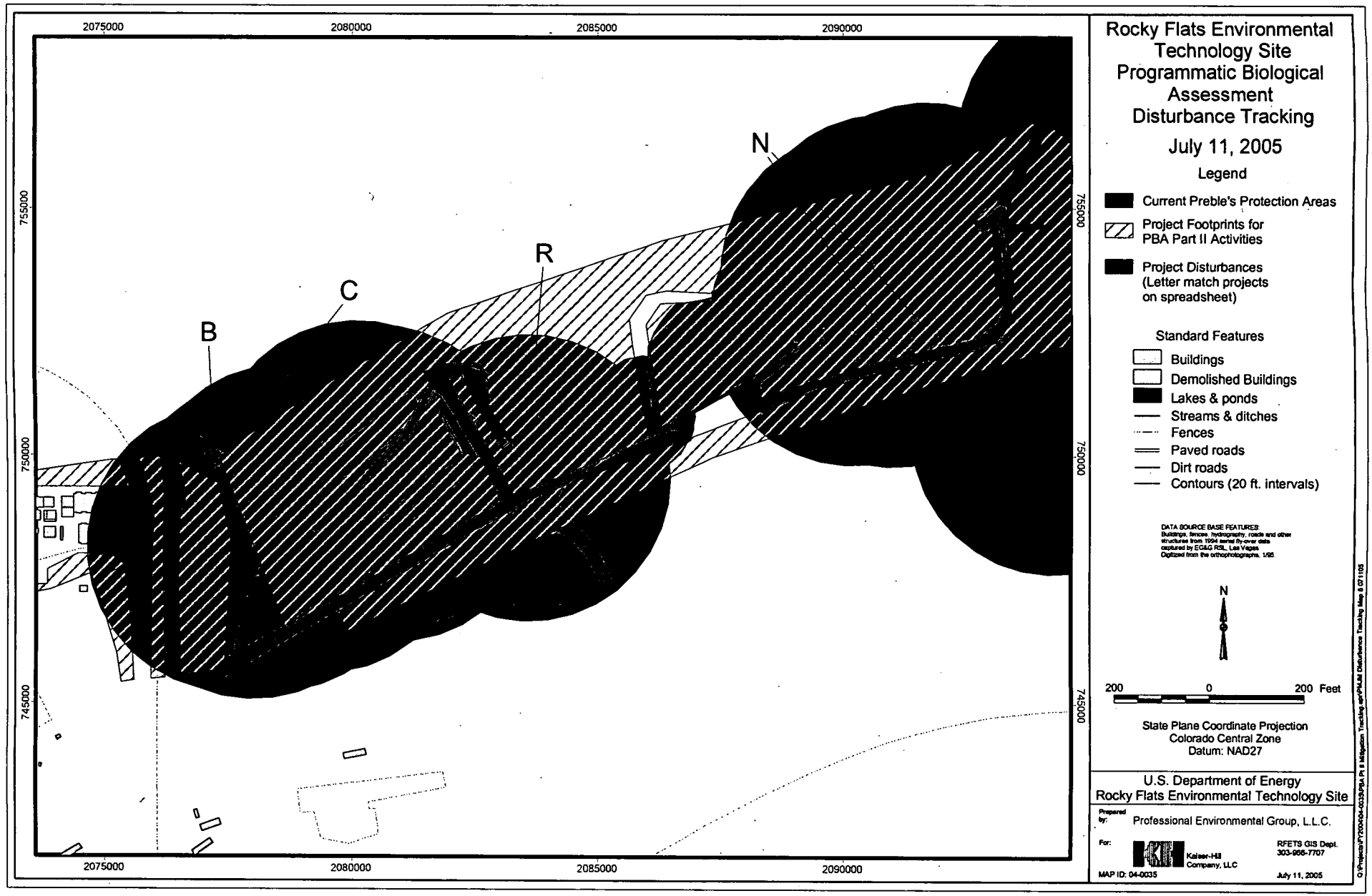
2075000
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2090000
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745000
B
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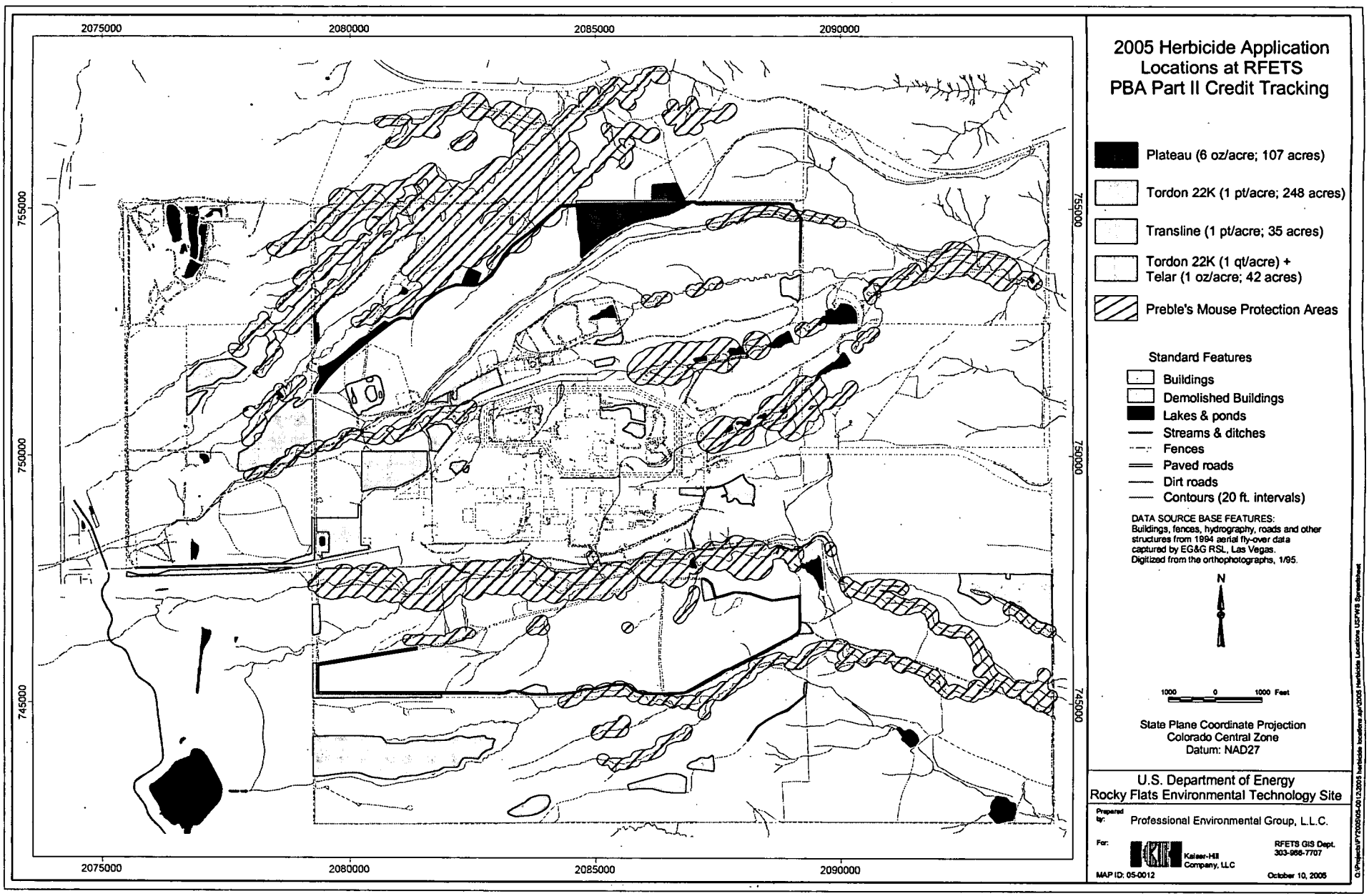
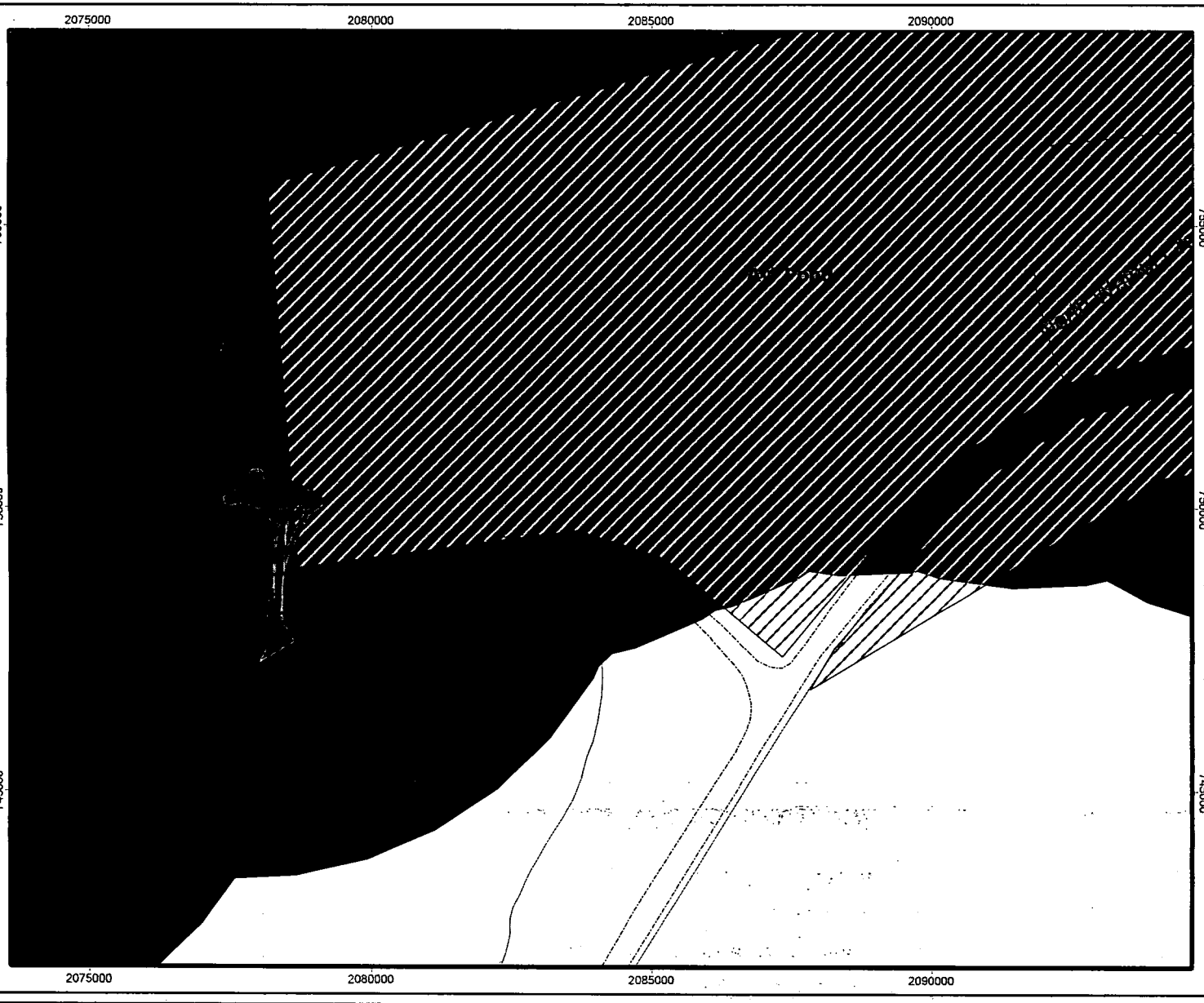
R
N
Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking
July 11, 2005
Legend
Current Preble's Protection Areas
Project Footprints for PBA Part II Activities
Project Disturbances (Letter match projects on spreadsheet)
Standard Features
Buildings
Demolished Buildings
Lakes & ponds
Streams & ditches
Fences
Paved roads
Dirt roads
Contours (20 ft. intervals)
DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.
N
200 0 200 Feet
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27
U.S. Department of Energy
Rocky Flats Environmental Technology Site
Prepared by: Professional Environmental Group, L.L.C.
For: Kaiser-Hill Company, LLC
RFETS GIS Dept.
303-966-7707
MAP ID: 04-0035
July 11, 2005


2075000
2080000
2085000
2090000
755000
750000
745000
2005 Herbicide Application Locations at RFETS PBA Part II Credit Tracking
Plateau (6 oz/acre; 107 acres)
Tordon 22K (1 pt/acre; 248 acres)
Transline (1 pt/acre; 35 acres)
Tordon 22K (1 qt/acre) + Telar (1 oz/acre; 42 acres)
Preble's Mouse Protection Areas
Standard Features
Buildings
Demolished Buildings
Lakes & ponds
Streams & ditches
Fences
Paved roads
Dirt roads
Contours (20 ft. intervals)
DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.
N
1000 0 1000 Feet
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27
U.S. Department of Energy
Rocky Flats Environmental Technology Site
Prepared by: Professional Environmental Group, L.L.C.
For: Kaiser-Hill Company, LLC
RFETS GIS Dept.
303-966-7707
MAP ID: 05-0012
October 10, 2005



Well Installation Programmatic Biological Assessment Disturbance Tracking

August 4, 2005

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter match projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

0 100 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

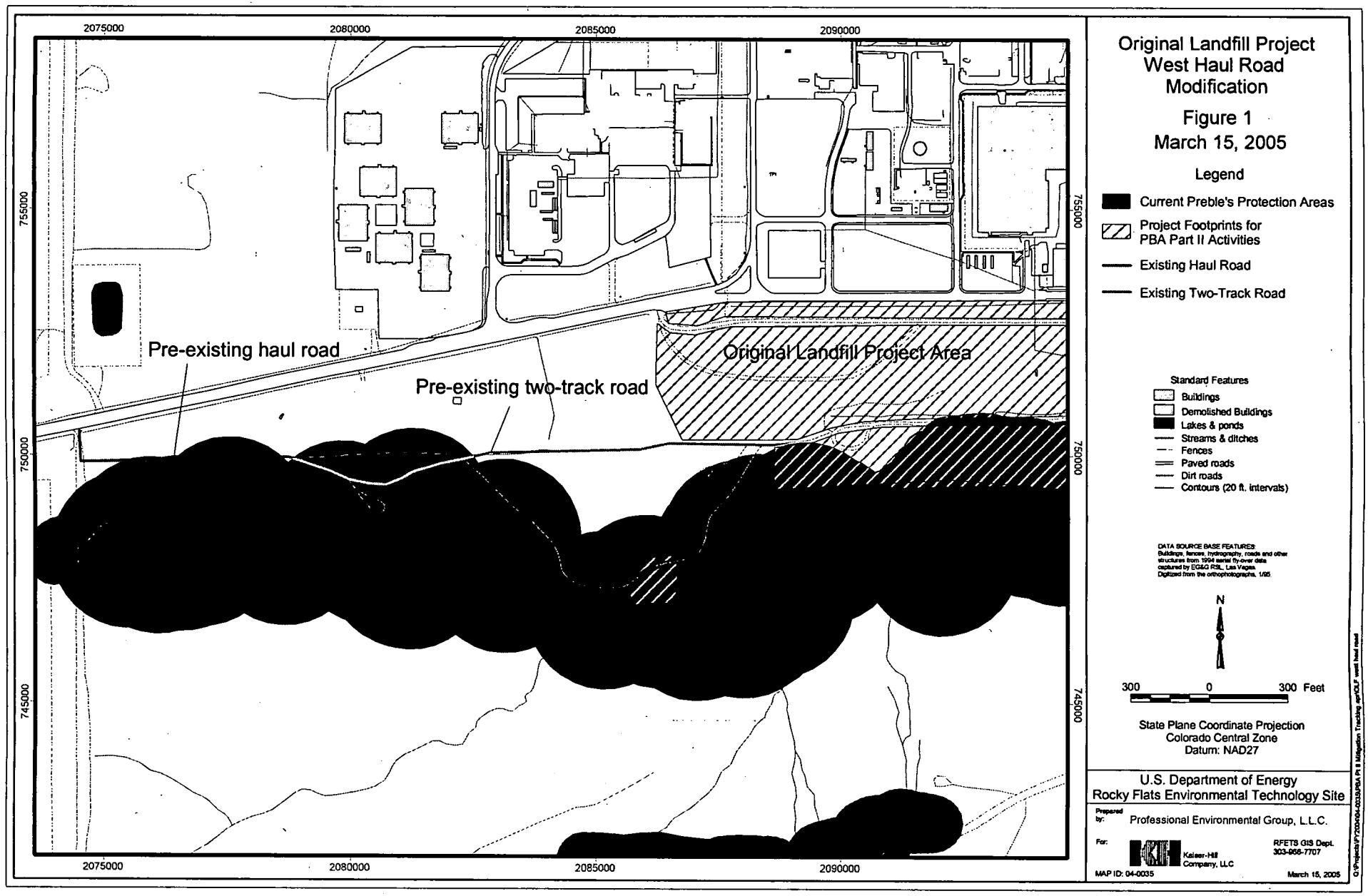
For: Kaiser-Hill Company, LLC

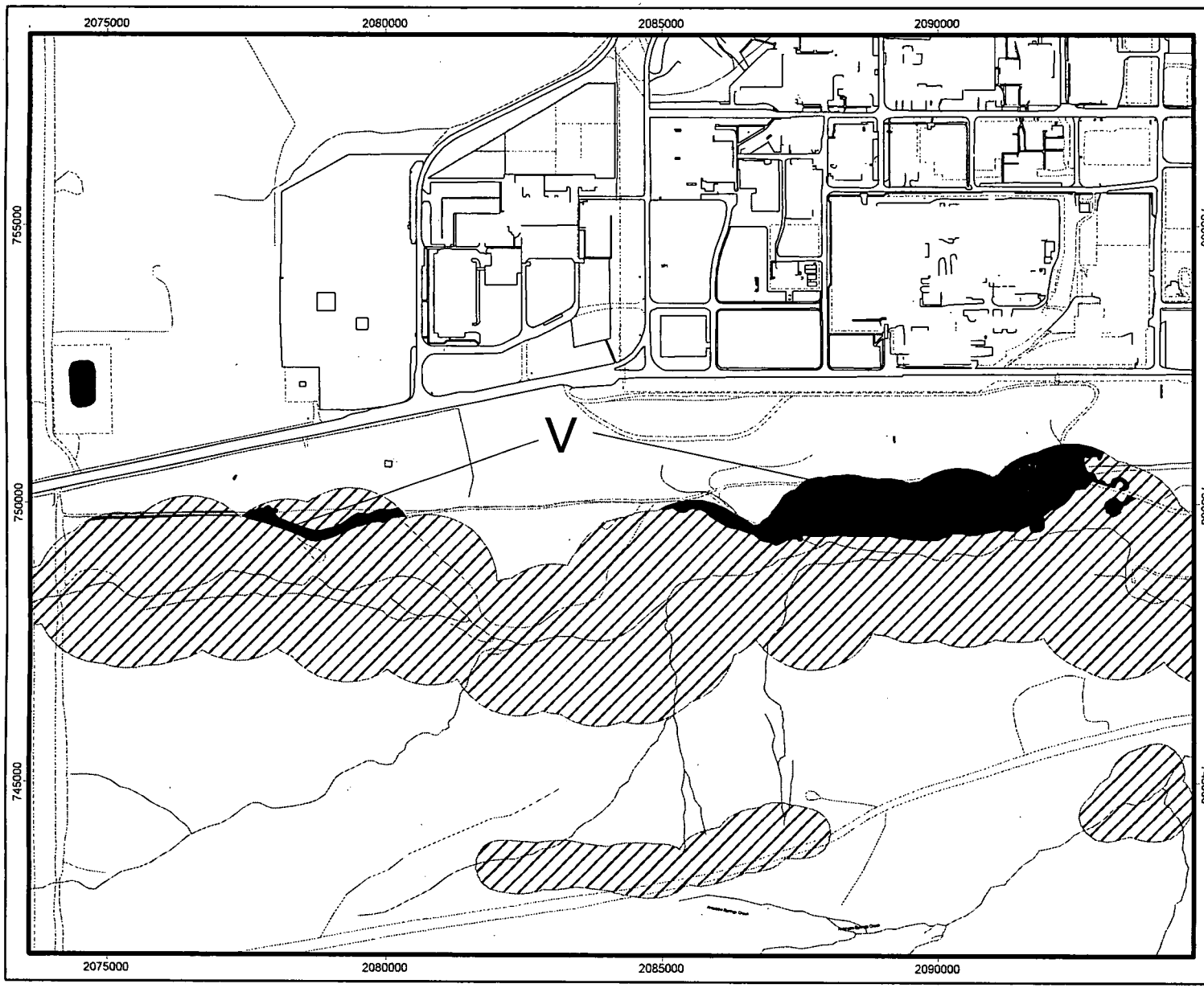
RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

August 4, 2005

G:\Projects\FY2004\04-0033\PBA Pt II Mitigation Tracking.apr\Well Installations\Well Installation GIS


2075000
2080000
2085000
2090000
755000
750000
745000
Pre-existing haul road
Pre-existing two-track road
Original Landfill Project Area
Original Landfill Project
West Haul Road
Modification
Figure 1
March 15, 2005
Legend
Current Preble's Protection Areas
Project Footprints for PBA Part II Activities
Existing Haul Road
Existing Two-Track Road
Standard Features
Buildings
Demolished Buildings
Lakes & ponds
Streams & ditches
Fences
Paved roads
Dirt roads
Contours (20 ft. intervals)
DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.
N
300 0 300 Feet
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27
U.S. Department of Energy
Rocky Flats Environmental Technology Site
Prepared by:
Professional Environmental Group, L.L.C.
For:
Kaiser-Hill Company, LLC
RFETS GIS Dept.
303-966-7707
MAP ID: 04-0035
March 15, 2005



Final Original Landfill Project Programmatic Biological Assessment Disturbance Tracking

October 10, 2005

Legend

- Current Preble's Protection Areas
- Project Disturbances (Letter matches projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

300 0 300 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

October 10, 2005

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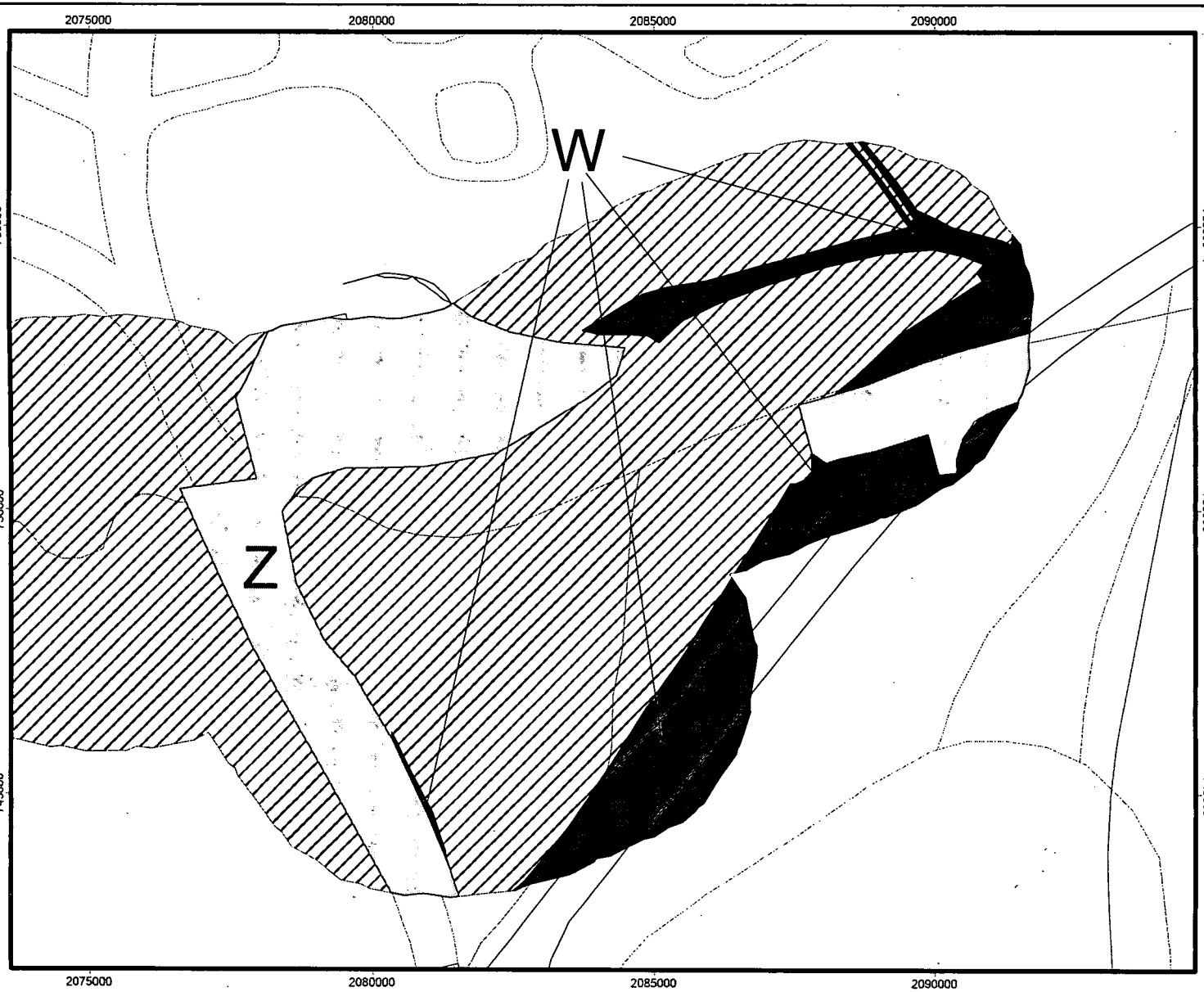

North Access Road (B371 Area) Programmatic Biological Assessment Disturbance Tracking

October 7, 2005

Legend

- Current Preble's Protection Areas
- Project Disturbances (Letter matches projects on spreadsheet)
- Riprap area along North Walnut Creek
- Credit Area where road and rock/sand storage area were located

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

50 0 50 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

October 7, 2005

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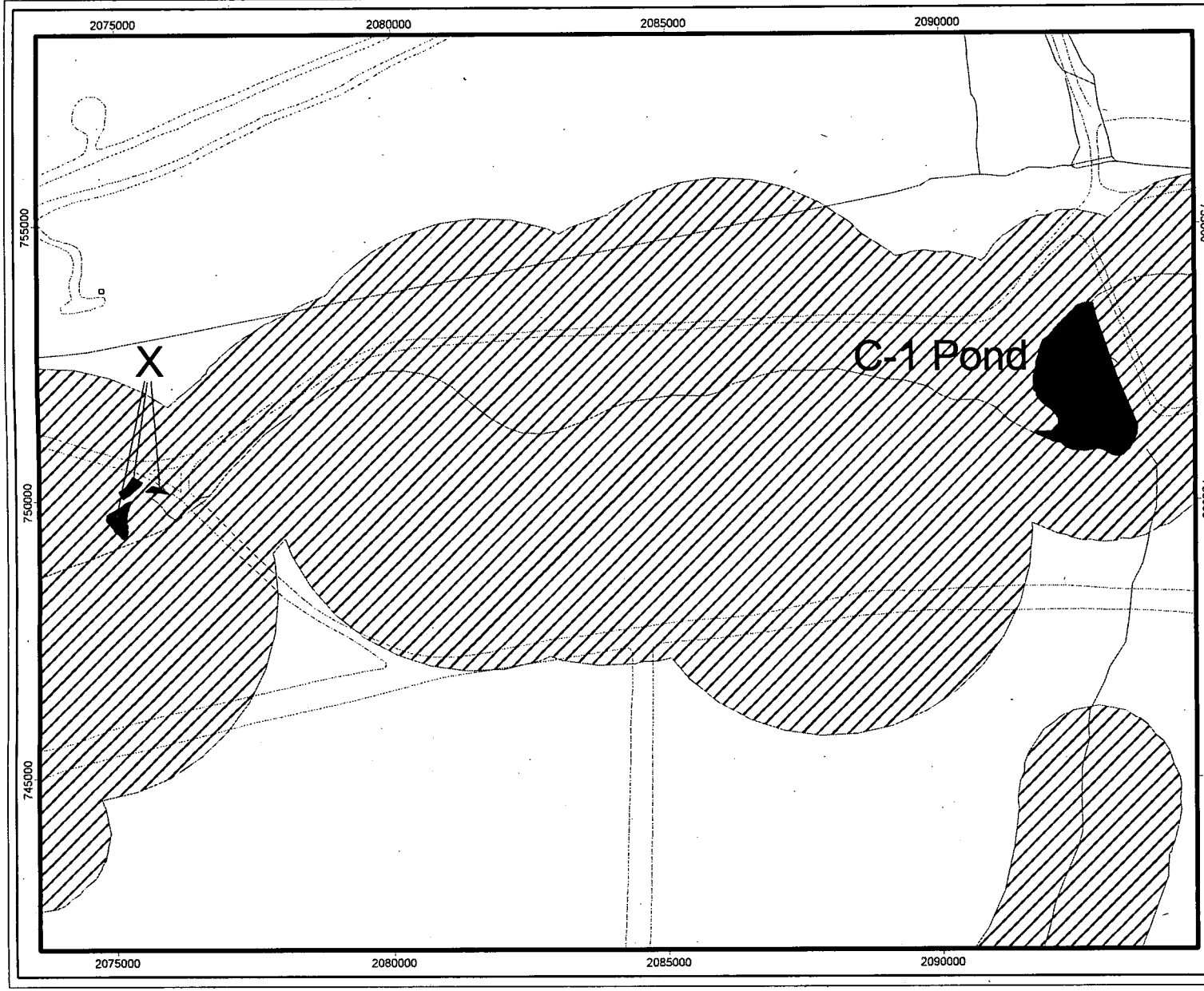

Surface Water Equipment Removal Programmatic Biological Assessment Disturbance Tracking

October 10, 2005

Legend

- Current Preble's Protection Areas
- Project Disturbances (Letter matches projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

100 0 100 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

October 10, 2005

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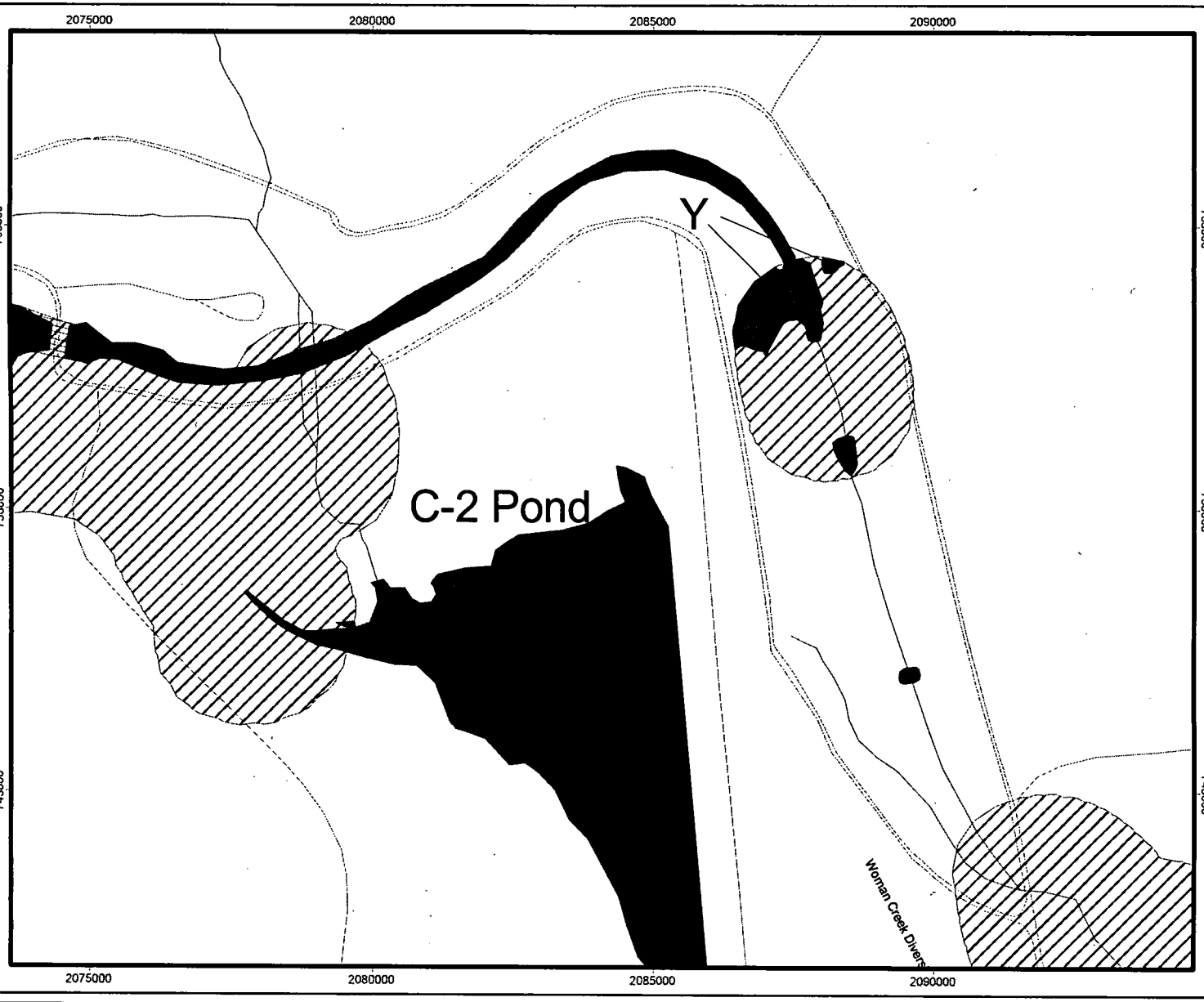

Woman Creek Bypass Riprap Repair Programmatic Biological Assessment Disturbance Tracking

October 10, 2005

Legend

- Current Preble's Protection Areas
- Project Disturbances (Letter matches projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

100 0 100 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

October 10, 2005

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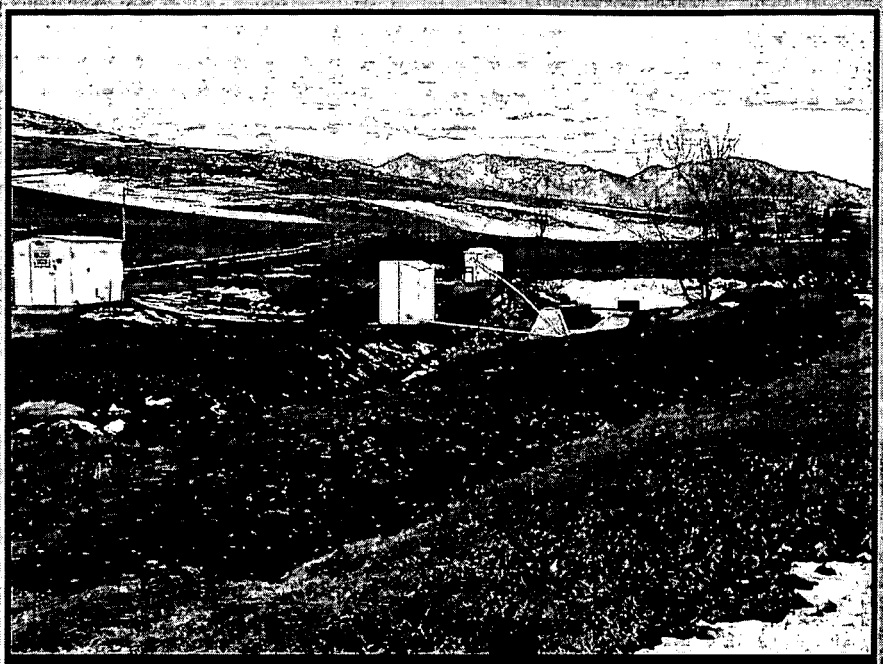
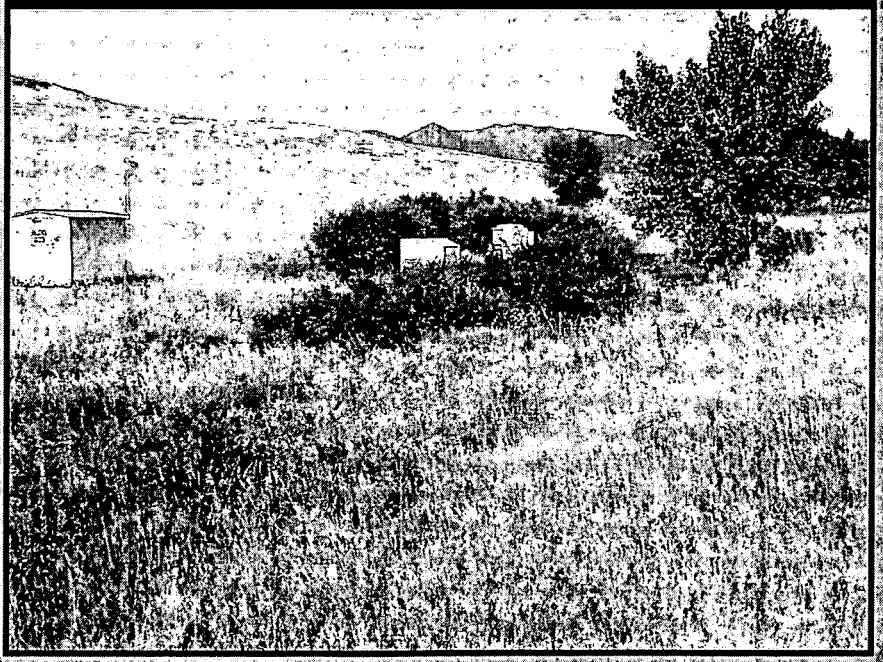
2005 Water Measurement Flume Replacement Project Report

for the Rocky Flats Environmental Technology Site





(click below to access a particular section of the report)

- Report Text (PDF Version)

- Appendix A: Photomonitoring:
  - Flume GS03 photos
  - Flume SW093 photos
  - Shrub Enhancement Area photos
- Appendix B: Qualitative Habitat Assessment Forms

Preble's Mouse Mitigation Monitoring Report for the Water Measurement Flume Replacement Project at the Rocky Flats Environmental Technology Site 2005 Annual Report USFWS Biological Opinion # ES/GJ-6-CO-02-F-18

Introduction

This report is being submitted to the United States Fish and Wildlife Service (USFWS) in order to comply with terms and conditions outlined in USFWS Biological Opinion (BO) # ES/GJ-6-CO-02-F-18. The BO addresses impacts to the federally-listed Preble's meadow jumping mouse, (Preble's mouse, *Zapus hudsonius preblei*), from the Water Measurement Flume Replacement Project at Rocky Flats Environmental Technology Site (Rocky Flats). Term number four under the "Terms and Conditions" of the Incidental Take Statement specifies that monitoring of mitigation, revegetation, and enhancement efforts will be conducted and that a report of the monitoring data, including photographs, needs to be submitted to the USFWS by December 1 after each growing season. This report is being submitted to satisfy the conditions of term number four for 2005.

Methodology

The pre-existing vegetation monitoring took place on August 7, 2002, during the height of the growing season. Originally three flumes were planned for replacement. During the duration of the project, however, it was decided that GS10 would not be replaced. Work, and therefore monitoring, was only conducted at GS03 and SW093. Therefore the 2005 report only reports data for the latter two flumes. During 2005, monitoring was conducted on August 1.

At both of the project locations (GS03 and SW093; Figure 1), two linear transects were originally placed parallel to the stream channel in 2002 (one on each side of the stream). The length of the transects varied depending on the size of the project area at each location. The transect endpoints were permanently marked with rebar and flagging. Four- 0.5 m^2 rectangular quadrats were randomly placed along each transect, for a total of eight quadrats for each project location. Species richness within each quadrat was recorded for those species rooted within the quadrat. Overall herbaceous vegetation, litter, and bare ground cover were visually estimated for each quadrat. Cover estimates were conducted using the following cover class system: 0 = 0%, 1 = <5%, 2 = >5% - 25%, 3 = >25% - 50%, 4 = >50% - 75%, and 5 = >75%. Cover class midpoints were used to determine the percent of cover for each of the aforementioned variables (1 = 2.5%, 2 = 15%, 3 = 37.5%, 4 = 62.5%, 5 = 87.5%). Photographs of each project areas were taken from selected locations. These photo points were marked with a flag and mapped with a GPS unit. Summaries were made of the 2005 data and compared to the 2002, 2003, and 2004 data.

In 2005 at SW093, approximately 5-6 meters of the western end of both transects (one each on the north and south side of the streams) were destroyed by construction activities. This impacted three of the eight quadrat locations at SW093. Quadrats continued to be placed in the original positions during 2005, thus these three quadrats were largely riprap. However, for conducting basal cover and noxious weed cover analyses in 2005, these quadrats were not included. So for these analyses at SW093 in 2005 n = 5, instead of n = 8 as in previous years. No changes were made to the GS03 data.

Mitigation shrub plantings were installed at the two flume locations and along the stream at the habitat enhancement area in Woman Creek in mid-June 2003 (Figure 1). Reseeding of the two flume locations was conducted during the same time period. Total counts of the number of trees and shrubs planted were made at each location after planting was completed. Counts of the number of surviving plants for each year was made on September 8-9, 2003, August 9, 2004, and August 1, 2005. Summaries were made of the tree/shrub count data to compare the number of planted individuals to the number surviving in late summer 2005. Photo monitoring results are presented in Appendix A and qualitative habitat assessments are found in Appendix B.

Success criteria outlined in the Biological Assessment (BA) and BO were as follows:

1. Successful recovery of the herbaceous cover (graminoids and forbs) will be met when the disturbed areas have returned to 80% of the pre-disturbance overall vegetation cover.
2. Noxious weed cover of less than 5%.
3. Tree and shrub survival success is defined as at least 80% survival of the planted material.

Results and Discussion

Appendix A contains the photo monitoring results for GS03, SW093, and the mitigation enhancement area and include both pre- and post-construction conditions at each location. At all three areas the vegetation has re-established and continues to develop and grow, providing habitat for the Preble's mouse. The following summaries of the quantitative vegetation data that have been collected for the past four years substantiate that the vegetation in 2005 meets and exceeds the success criteria outlined in the BA/BO.

Table 1 compares the species richness for the two project locations for 2002 (pre-construction) and 2003-2005 (post-construction). At GS03, total species richness increased from 12 species in 2002 to a high of 34 species in 2003 and then dropped to 21 species in 2005. The large initial increase was attributable to the abundance of early successional and weedy species that came up after the area was disturbed at GS03. At SW093, the total species richness increased from 11 species in 2002 to 18 species in 2004. In 2005, a total of 16 species were observed. The lower species richness observed at SW093 compared to GS03 is probably attributable to the shady conditions present at SW093. For many of the early successional and weedy species found at GS03 in 2003, full sunlight is required to germinate and establish. These conditions are not available at SW093 where tree canopy provides shady conditions. At both locations, post-construction species richness is higher than the pre-construction conditions. While there is no success criteria related to species richness, the data shows a greater diversity of vegetation is present in 2005 at both locations than was present was prior to the project. This is an improvement for both locations because prior to the projects the both areas were largely dominated by smooth brome (*Bromus inermis*) and/or meadow fescue (*Festuca pratensis*).

Table 2 compares the average cover of bare ground, litter and herbaceous vegetation (graminoid and forb) for the two project locations between years. Bare ground cover increased from 2002 to 2003 at both locations due to the project disturbances. In 2004 and 2005, however, the amount of bare ground has continued to decrease at both locations. The amount of bare ground cover in 2005 is still substantially higher than the pre-construction amounts at both locations. The higher bare ground amount at SW093 compared to GS03 is likely attributable to the shady conditions present along the transects which result in less herbaceous cover and hence less litter to cover the bare ground. Litter cover decreased initially at both locations from 2002 to 2003 as a result of the disturbance. However in 2005, litter cover at GS03 has returned to approximately 79% of the pre-disturbance amounts. At SW093 in 2005, litter cover has decreased to the lowest amounts since project activities disturbed the area. Some of this lower litter value may be attributable to the loss of three quadrats in 2005. But it is also likely that it is a response to the shady conditions at SW093. It may take much longer for litter amounts to return to pre-disturbance levels at SW093 than at GS03 due to the shady conditions. It is expected however, that in time, litter cover will increase as current year live vegetation growth dies back and becomes matted down by winter snows. Herbaceous cover (grass and forb) continues to do well at both locations. At GS03, pre-construction foliar cover was 56.3% in 2002. In 2005, total foliar cover was 81.25%. At SW093, the original herbaceous cover was only 13.1% (largely due to the shady conditions at that location). In 2005, total herbaceous foliar cover was 38.5%. Both locations currently have more vegetation cover than was present prior to project activities. Both locations exceed the BO success criterion to be at least 80% of pre-construction vegetation (herbaceous) cover.

Noxious weed cover data is summarized in Table 3. Pre-construction noxious weed cover was 7.19% at GS03 and 3.44% at SW093 in 2002. In 2003, noxious weed cover doubled at GS03 while it decreased by two-thirds at SW093. In 2005, noxious weed cover was only 1.25% at GS03 and 3% at SW093. The success criterion requirement is that less than 5% of the total foliar cover is to come from noxious weed species. Therefore in 2005 both GS03 and SW093 have met this criteria. NOTE: The BA/BO states that noxious weed cover will be

determined through the use of the most recent Colorado state noxious weed list. The 2002, 2003, 2004,and 2005 values were calculated using the noxious weed list in effect during those respective years.

Tree and shrub survival data are presented in Table 4. At GS03 in 2005, 100% of the snowberry (*Symphoricarpos occidentalis*) and 80% of the chokecherry (*Prunus virginiana*) was still surviving. No counts were made of the coyote willow (*Salix exigua*) because the willows had continued to increase and grown together to the point where it was not practical to get an accurate count of either the potted or staked plant material. Along the south side of the stream where no willow was present prior to the flume replacement project a solid stand of willow approximately 18 meters long and one to three meters wide and one to one and one half meters tall was present in 2005. Additionally, along the north side of the stream where the willow had been clipped off prior to the project activities to provide the willow stakes, the willow have regenerated abundantly from the underground root stock and additional planted willow stakes. The root stocks had been buried under one to two feet or more of soil during the re-grading and contouring of the streambank. But the willow shoots have come up and filled in the north side of the stream bank abundantly. The establishment and survival of the woody vegetation at GS03 has done very well. The survival rates for the woody species at GS03 are at or above the success criterion of 80% survival of woody species.

At SW093, a portion of the mitigation plantings that were west of the flume location, were destroyed as part of the creation of functional channel three at the Site during land reconfiguration activities. The underground culvert that for decades had carried the water from North Walnut Creek west of SW093 was removed and the water allowed to flow above ground once again. Just west of the SW093 flume, however, the stream channel was configured using riprap and grouted riprap to reduce the stream flow velocities and potential erosion problems upstream of the flume. The plantings directly west of the flume at these locations were destroyed. All five of the planted plains cottonwood trees (*Populus deltoides*) were removed in addition to several planted coyote willows (no actual count available [probably around 10 or so]). However, by the end of the summer in 2005, numerous new willow stems were observed coming up through the riprap and on both sides of the flume where none had been planted. Additionally, five or more plains cottonwood trees have sprouted and come up on their own adjacent to the flume and are continuing to grow. So the loss of the planted cottonwoods and some of the coyote willows have already been offset by natural regrowth. In addition to these plants, west of the flume approximately 450 feet, 94 coyote willow stakes were planted in a wetland area of the functional channel three during the spring of 2005. As of fall 2005, 100% survival of these willows was observed. Also as part of the phytoremediation project, 335 plains cottonwood and 435 coyote willow stakes were planted along Walnut Creek, covering approximately one acre in area, starting just to the east of the SW093 flume. Even if only a few of these plants survive, they will more than offset the loss of the few plants lost at the SW093 flume itself. Of the chokecherry and snowberry material that was planted at the SW093 area, 100% of these are still growing (Table 4). So even with the loss of some of the planted material at SW093, the natural regrowth of these species around the flume has replaced these plants, along with the additional planting of several hundred plains cottonwood and coyote willow above and below the flume location. Thus the overall abundance of available woody plant material at or near SW093 exceeds the 80% survival criterion of what was originally planted.

At the mitigation enhancement area, a total of 371 potted shrubs were planted in 2003. In 2005, 96% of the snowberry, 100% of the chokecherry, and 93% of the golden currant (*Ribes aureum*) had survived. This exceeds the 80% survival criterion listed in the BO. In many of the new shrub patches, new stems are growing up between the original potted plants which suggests the plants have not only survived but are now expanding and filling in the spaces between the plants. These planting have increased the structural diversity of the vegetation along this reach of lower Woman Creek at the Site and should enhance the quality of the habitat for the Preble's mouse and other wildlife species.

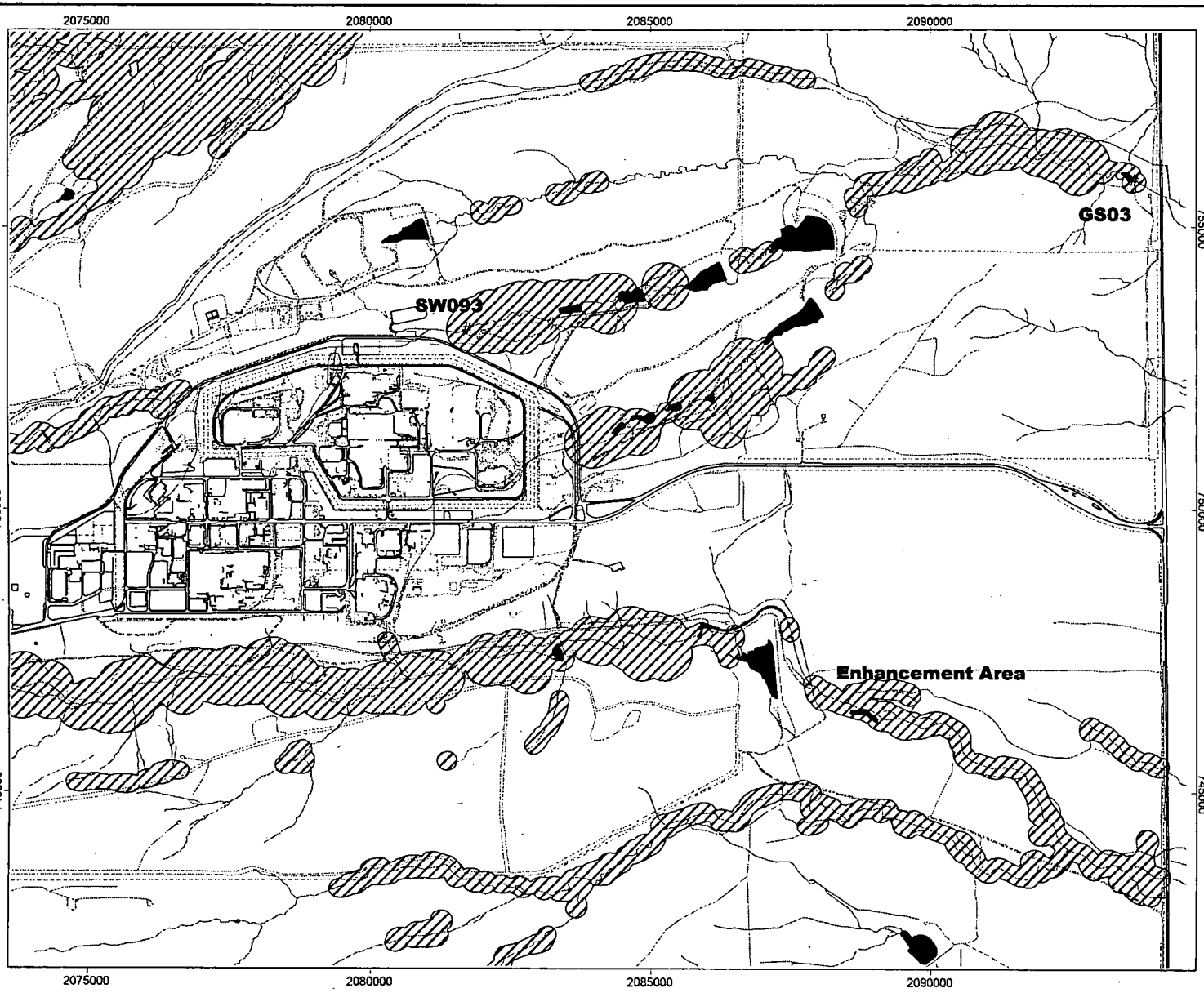
Currently the shrub survival rates at GS03, SW093, and the mitigation enhancement area are all above the 80% survival rates required by the BA/BO. The high shrub survival rates are attributable to several factors. During the summer of 2003 after the shrubs were planted, the plants were watered through the use of DriWater® tubes and weekly watering. The use of DriWater® tubes provided a slow continual watering of the potted plant material at all three locations. These tubes were changed once after the original plant installation

during the growing season of 2003. The original intention was to use these tubes for all water needs for the plants during 2003. However, because of the low precipitation received at the Site during the summer of 2003 and the withering condition of many of the plants, the decision was made to supplement the DriWater® tubes with additional weekly watering of the planted materials to enhance the survival chances of the shrubs. The BO had stated that the use of only the DriWater® tubes would not be considered supplemental watering during the first growing season, however, given the low precipitation situation during 2003, it was decided the additional watering was necessary to prevent incurring large costs involved in replanting much of the plant material. This reset the clock for monitoring shrub survival at these locations by a year. The BO states that monitoring would be continued for a minimum of three growing seasons total and for at least two years once watering was stopped. During 2004 and 2005, no supplemental watering of the shrubs was conducted. Thus 2005 constitutes the end of two growing seasons without supplemental watering.

Based on the 2005 monitoring data, the vegetation that has become re-established at GS03, SW093, and the mitigation enhancement area, meets or exceeds the success criteria outlined in the BA/BO. Total herbaceous vegetation cover at both GS03 and SW093 is greater than what was present at these locations before the project occurred (thus far exceeding 80% of the pre-disturbance vegetation cover). The noxious weed cover at GS03 and SW093 is less than the 5% limit listed as a success criterion for noxious weeds in the BA. And lastly, the woody plant survival success is at or above the 80% survival success criterion at all three locations. Therefore DOE requests concurrence from the USFWS that these three locations have been established, meet the success criteria as listed in the BA, and future monitoring and reporting for this project no longer needs to be conducted.

Conclusions

Pre- and post-construction mitigation monitoring for the Water Measurement Flume Replacement Project was conducted from 2002 to 2005. The 2005 data was compared to previously collected data. Success criteria for total vegetation cover, noxious weed cover, and tree and shrub survival were met at each of the three mitigation locations for their respective requirements. It is expected that the vegetation which has already established will continue to develop and mature on its own. Therefore, DOE requests concurrence from the USFWS that these three locations have been re-established, meet the success criteria as listed in the BA, and future monitoring and reporting for this project no longer needs to be conducted.



Flume Project Locations

Figure 1

Project Locations

Enhancement Area

Current Preble's Mouse Protection Area

Standard Features

- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Wetlands data surveyed, compiled, and assembled by the U.S. Army Corps of Engineers, 1994.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95.

N

1000 0 1000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

RFETS GIS Dept.
303-966-7707

MAP ID: 06-0003

October 27, 2005

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Table 1: Species Richness (Species List) Summary for Each of the Two Flume Replacement locations at Rocky Flats Environmental Technology Site

	GS03				SW093			
Species	**2002**	**2003**	**2004**	**2005**	**2002**	**2003**	**2004**	**2005**
Agropyron caninum			X				X	X
Agropyron intermedium		X		X		X	X	X
Agropyron repens	X			X	X			
Agropyron smithii	X		X	X		X	X	X
Agrostis stolonifera					X			
Ambrosia psilostachya		X	X	X			X	X
Aster falcatus					X			
Barbarea vulgaris			X	X				
Bromus inermis	X	X	X	X	X	X	X	X
Bromus japonicus		X	X	X				X
Bromus tectorum				X				
Camelina microcarpa							X	
Carex praegracilis	X							
Centaurea diffusa		X	X	X		X	X	X
Chenopodium album		X	X					
Chenopodium sp.		X						
Cirsium arvense	X	X	X	X	X	X	X	X
Convolvulus arvensis						X	X	X
Cynoglossum officinale					X			
Descurainia pinnata		X						
Echinochloa crusgallii		X						
Elymus canadensis				X			X	X
Erodium cicutarium			X					
Festuca pratensis	X	X	X	X				
Glycyrrhiza lepidota	X	X	X			X		
Grindelia squarrosa			X	X			X	X
Helianthus annuus		X	X			X		
Hordeum jubatum				X				
Juncus bufonius					X			
Kochia scoparia		X	X				X	
Lactuca serriola		X	X	X			X	X
Medicago lupulina		X	X					
Melilotus alba			X					
Melilotus officinalis		X	X	X		X	X	X
Mertensia lanceolata		X						
Oenothera villosa			X					
Panicum capillare		X	X					
Poa compressa	X	X		X				X
Poa pratensis	X	X		X	X	X	X	
Polygonum arenastrum		X				X	X	
Polygonum pensylvanicum		X						
Polygonum persicaria		X						
Polygonum ramosissimum			X					
Psoralea tenuiflora			X					
Rosa arkansana	X							
Rumex crispus		X						
Rumex sp.		X	X					
Salix exigua					X	X	X	X
Salsola iberica		X	X					
Scorzonera laciniata								X
Setaria viridis		X	X					
Solidago missouriensis					X			
Stipa viridula	X			X				

	GS03				SW093			
Species	**2002**	**2003**	**2004**	**2005**	**2002**	**2003**	**2004**	**2005**
Symphoricarpos occidentalis	X	X	X	X	X	X	X	
Thlaspi arvense		X						
Trifolium repens		X						
Unknown		X	X			X		
Verbascum thapsus		X	X					
Verbena bracteata		X	X	X				
Total Number of Species	12	34	30	21	11	14	18	16

Table 2. The Average Cover Summary at the Two Flume Replacement Project Flume Locations

	Bare Ground Cover				Litter Cover				Herbaceous Cover			
Location	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005
GS03	0.30%*	22.80%*	14.40%*	8.13%*	87.50%*	38.40%*	40.00%*	69.06%*	56.30%*	56.30%*	50.00%*	81.25%*
SW093	3.10%*	48.80%*	43.10%*	48.50%**	87.50%*	31.30%*	35.90%*	24.00%**	13.10%*	16.60%*	25.90%*	38.50%**

* Sample size: n = 8

** Sample size: n = 5

Table 3. The Average Noxious Weed Cover Summary at the Two Flume Replacement Project Locations

	Average Noxious Weed Foliar Cover			
Location	**2002**	**2003**	**2004**	**2005**
GS03	7.19%*	14.4%*	3.75%*	1.25%*
SW093	3.44%*	0.09%*	3.13%*	3%**

* Sample size: n = 8

** Sample size: n = 5

NOTE: The BA/BO states that the most recent Colorado noxious weed list will be used to determine noxious weed status. In May 2004 and again in May 2005, the Colorado Noxious Weed Act was revised. This resulted in a different list of species that were considered noxious weeds in 2004/2005 as compared to 2002/2003. Some of the difference in noxious weed cover during those respective years is a result of these changes.

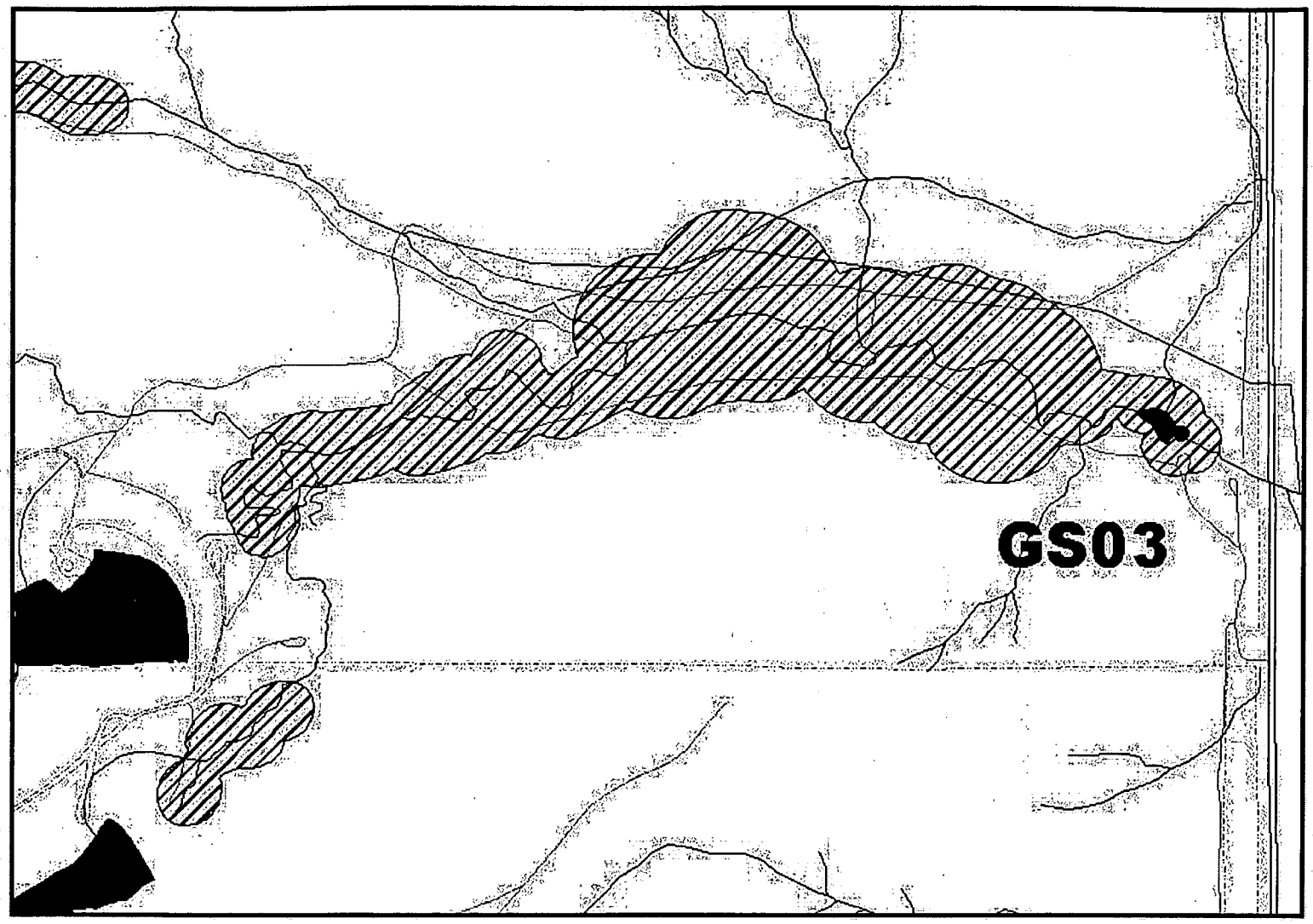
Table 4. Woody Plant Survival Summary for Flume Project.

	Site														
	SW093					GS03					Enhancement Area				
Species	2003 # Planted	2003 # Surviving	2004 # Surviving	2005 # Surviving	% Survival	2003 # Planted	2003 # Surviving	2004 # Surviving	2005 # Surviving	% Survival	2003 # Planted	2003 # Surviving	2004 # Surviving	2005 # Surviving	% Survival
Snowberry	10	10	10	10	100.0	10	10	10	10	100.0	221	221	221	212	95.9
Chokecherry	5	5	5	5	100.0	5	5	4	4	80.0	90	90	90	90	100.0
Golden Current	0	0	0	0	0.0	0	0	0	0	0.0	60	59	58	56	93.3
Coyote Willow (potted)	29	27	27	NA*	NA	25	23	27	NA*	NA	0	0	0	0	0.0
Coyote Willow (stakes)	0	0	0	0	0.0	127	50	85	NA*	NA	0	0	0	0	0.0
Plains Cottonwood	5	5	5	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0
Total (w/stakes)	NA	NA	NA	NA	NA	167	88	126	NA	NA	NA	NA	NA	NA	NA
Total (w/out stakes)	49	47	47	NA	NA	40	38	41	NA	NA	371	370	369	358	96.5

NA = No Longer Applicable

* In 2005 the individual coyote willow stakes and potted plants had grown together to the point where it was no longer possible to count the individuals that had been planted. There is good establishment of those planted stems and numerous additional stems that have come up between these plants. There is a good stand of coyote willow that has become established at these locations.

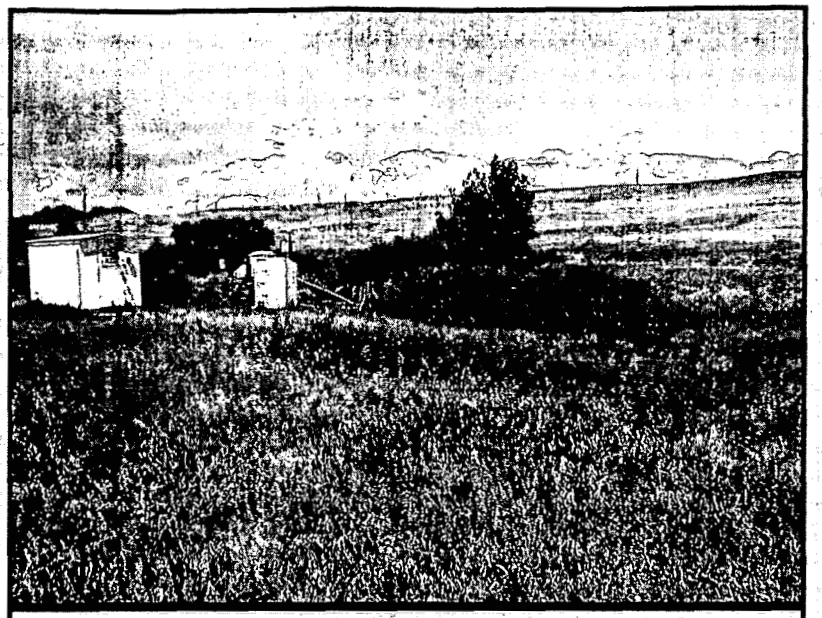
Flume GS03

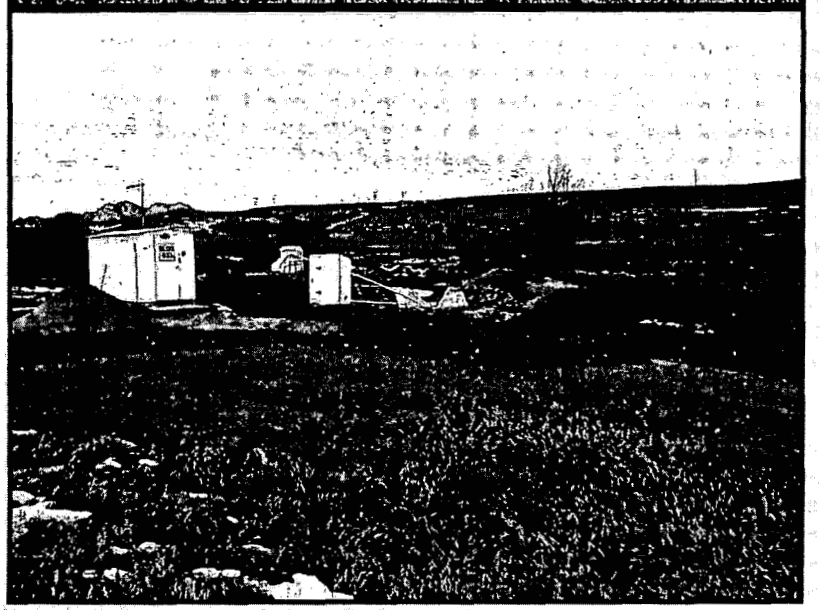


(click on the photos to enlarge them)

Photopoint 1

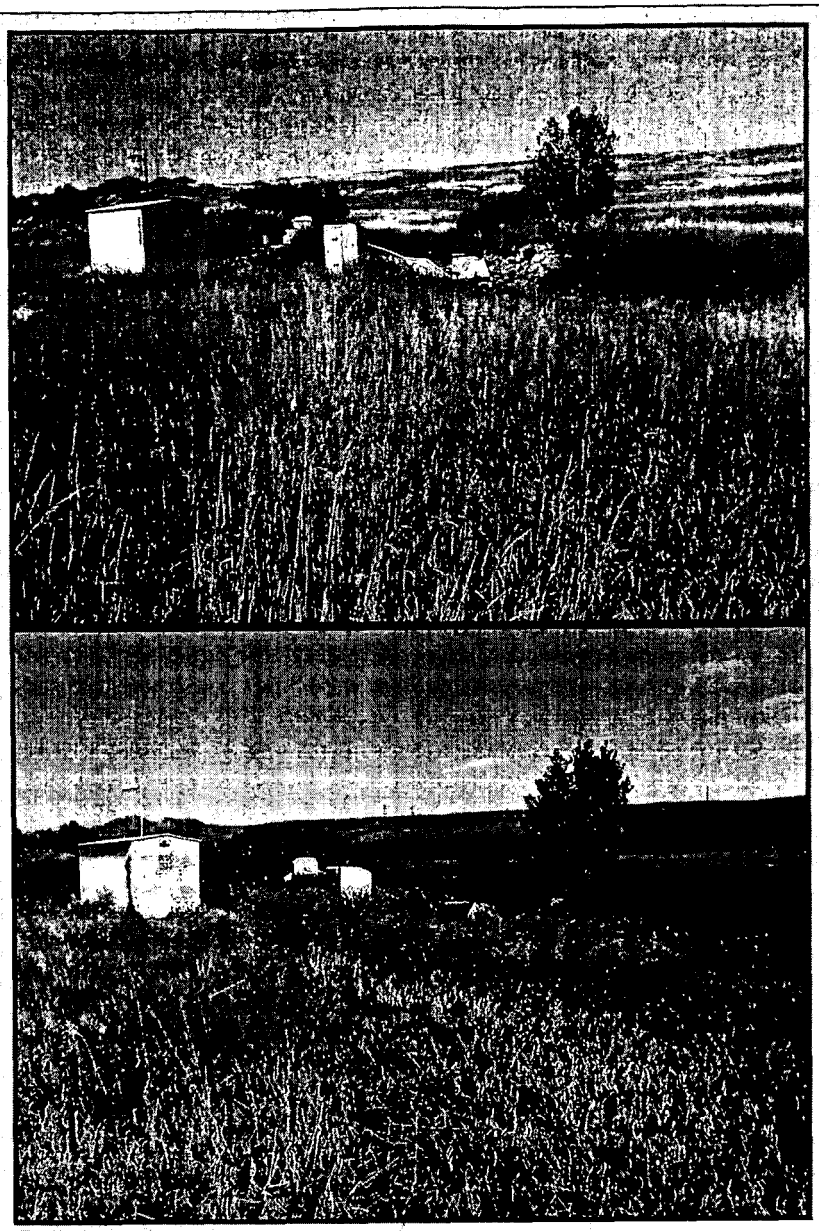
Summer 2002 **Spring 2003**



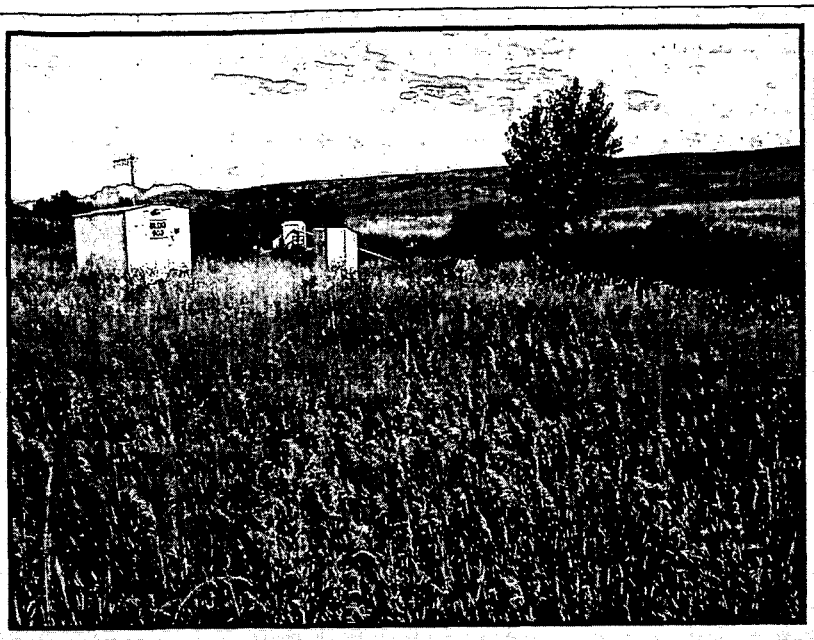


Summer 2003

Summer 2004



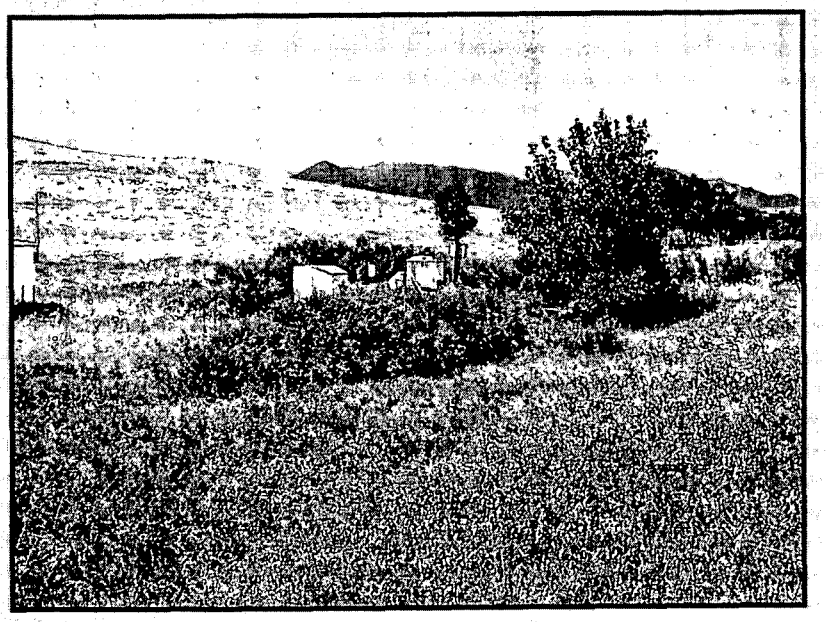
Summer 2005

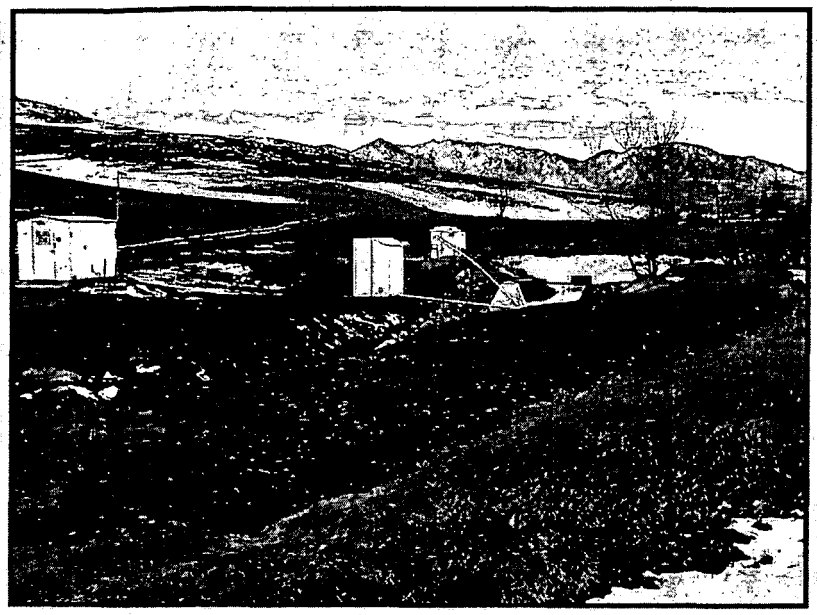


Photopoint 2

Summer 2002

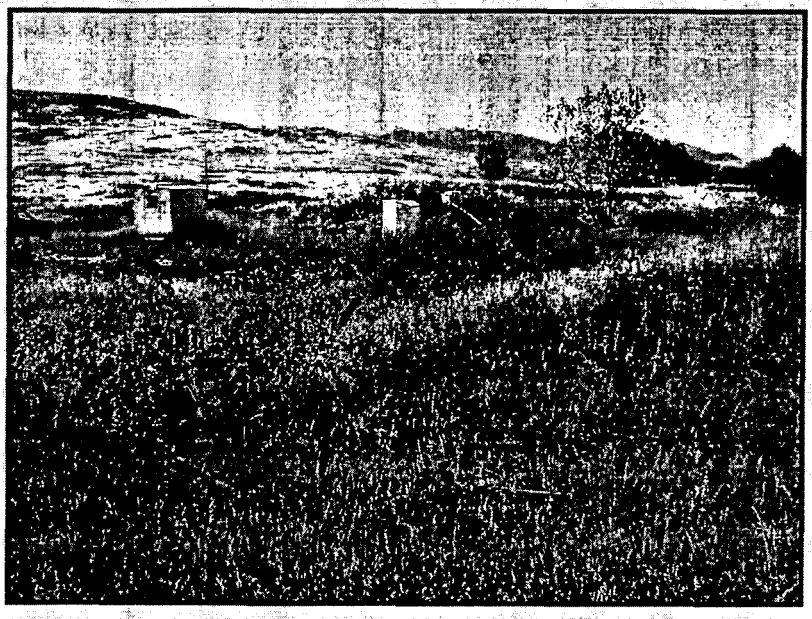
Spring 2003

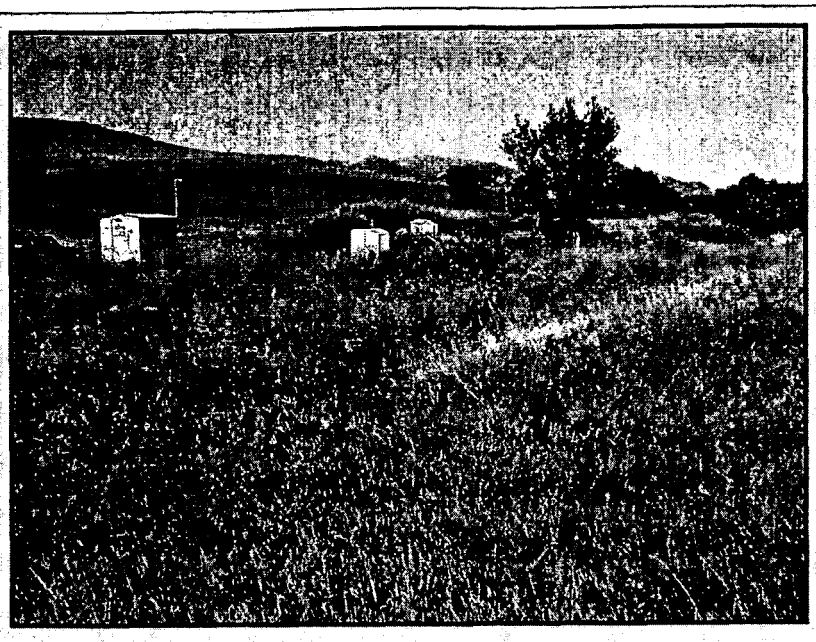




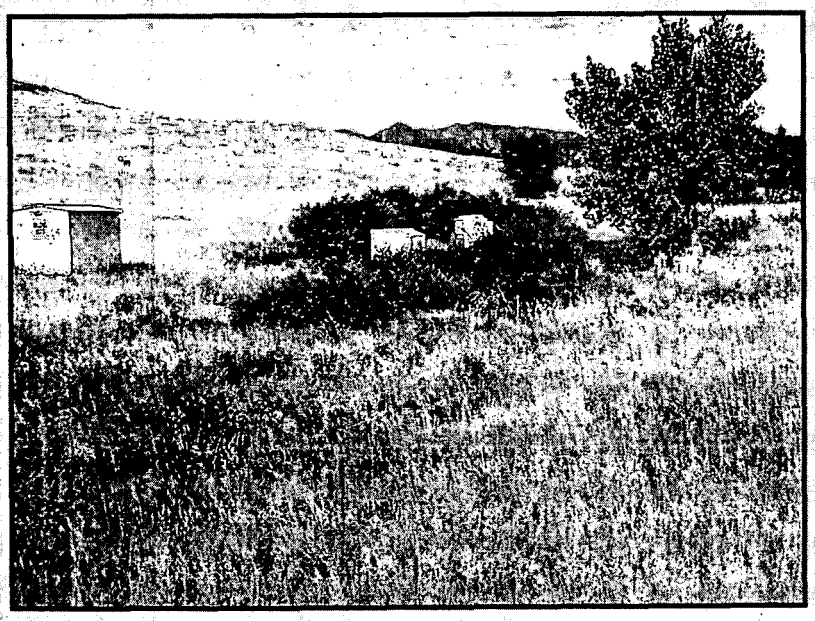
Summer 2003

Summer 2004



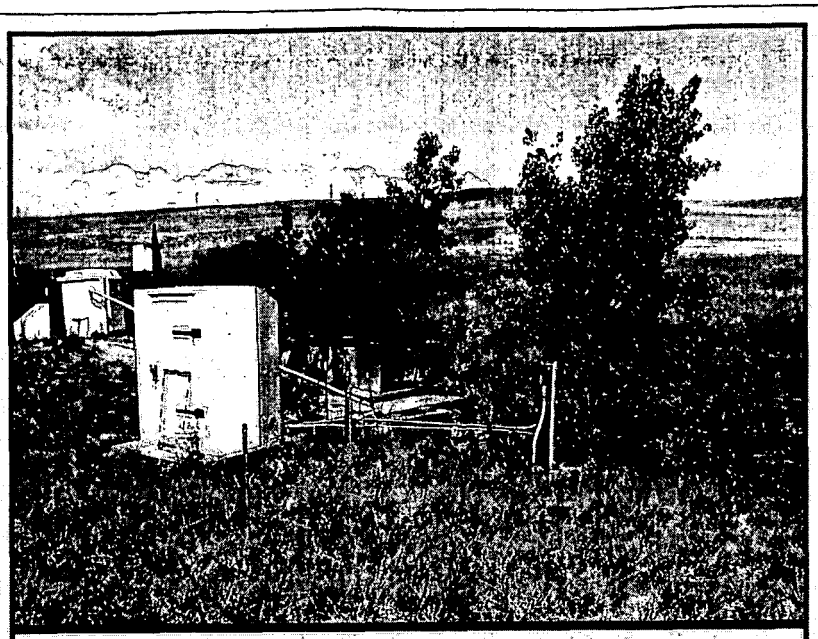


Summer 2005



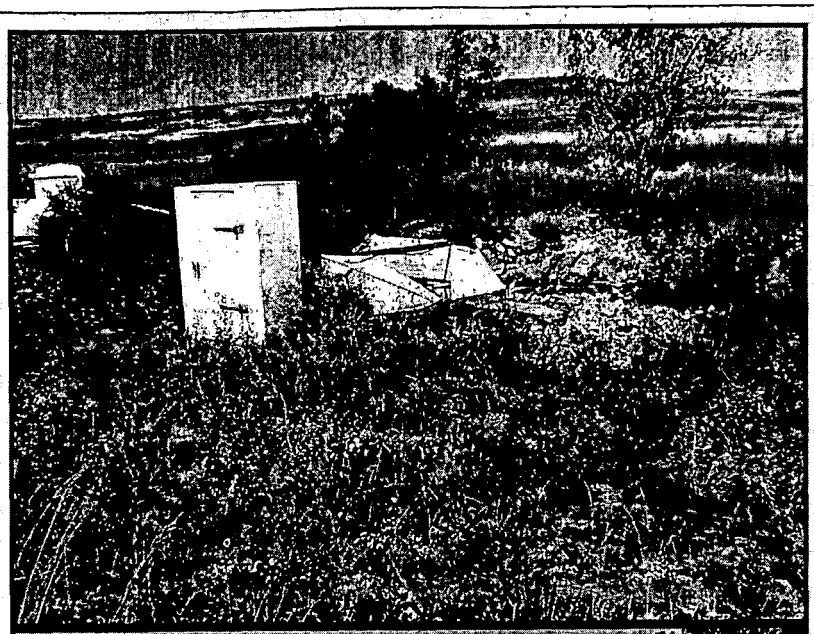
Photopoint 3

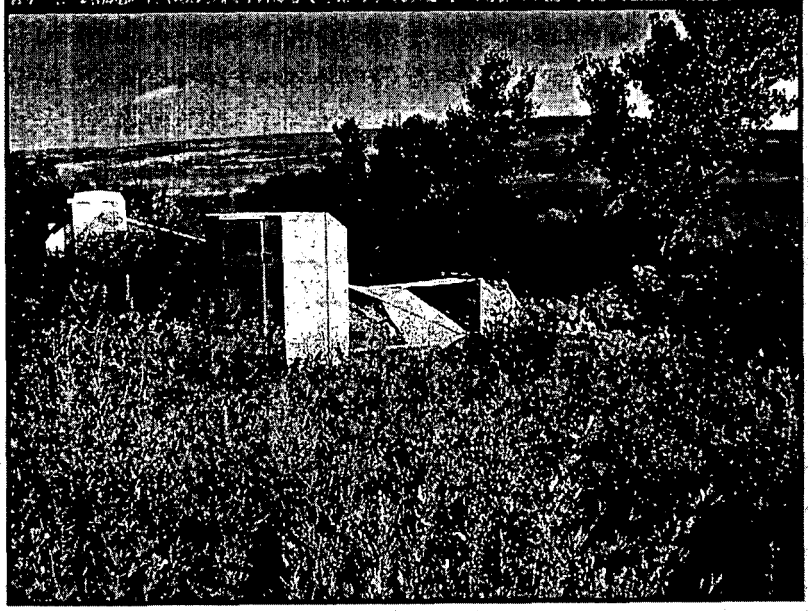
Summer 2002 **Spring 2003**



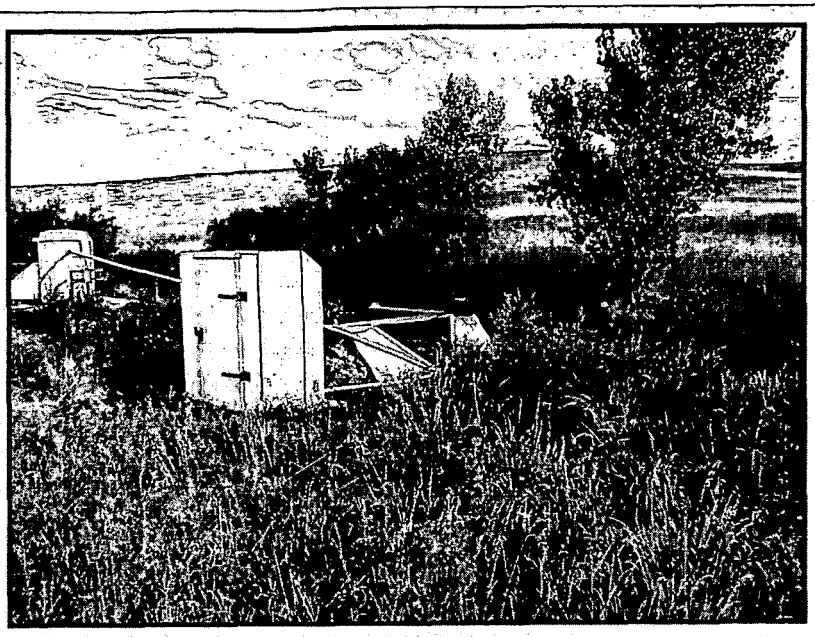
Summer 2003

Summer 2004

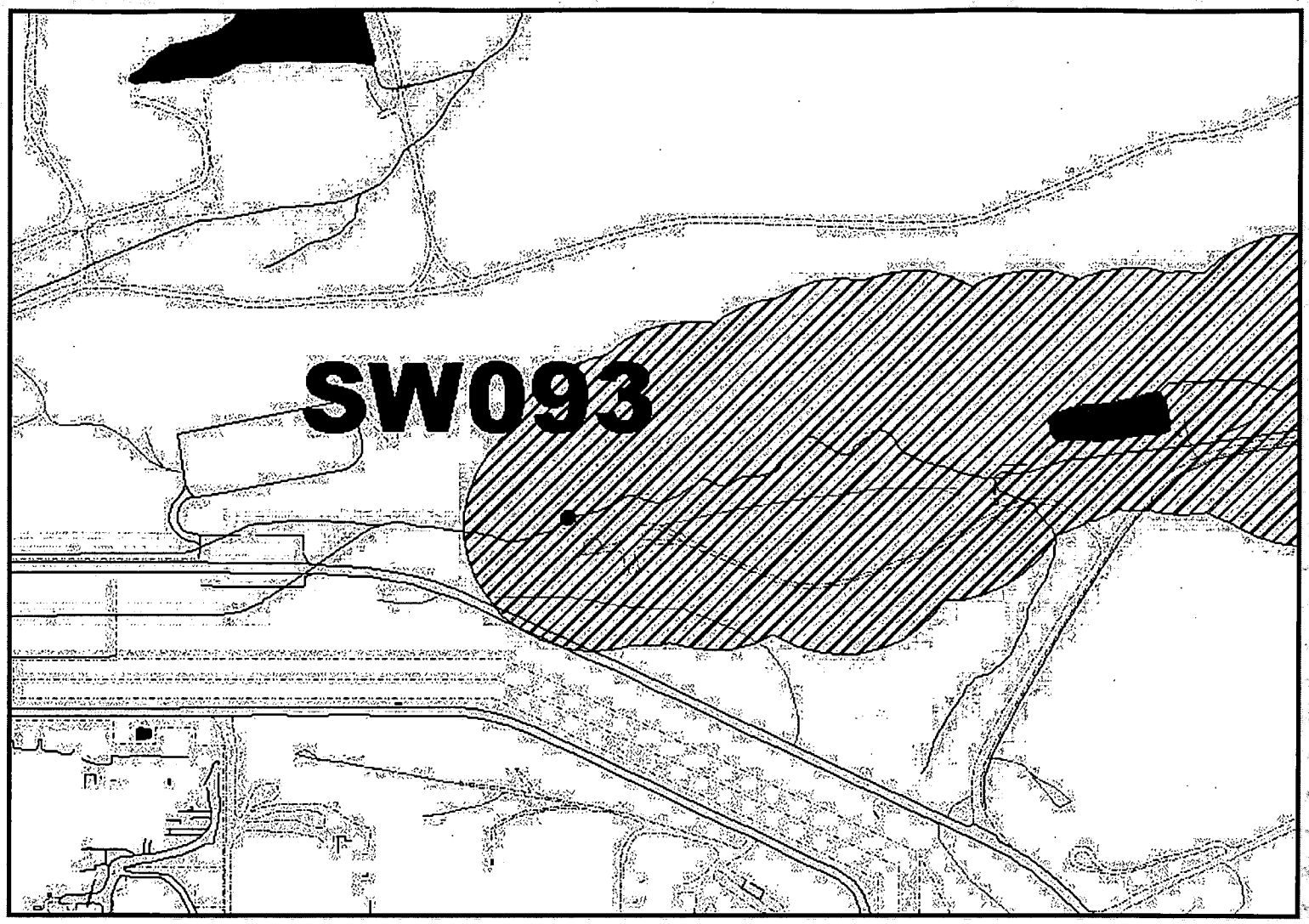




Summer 2005



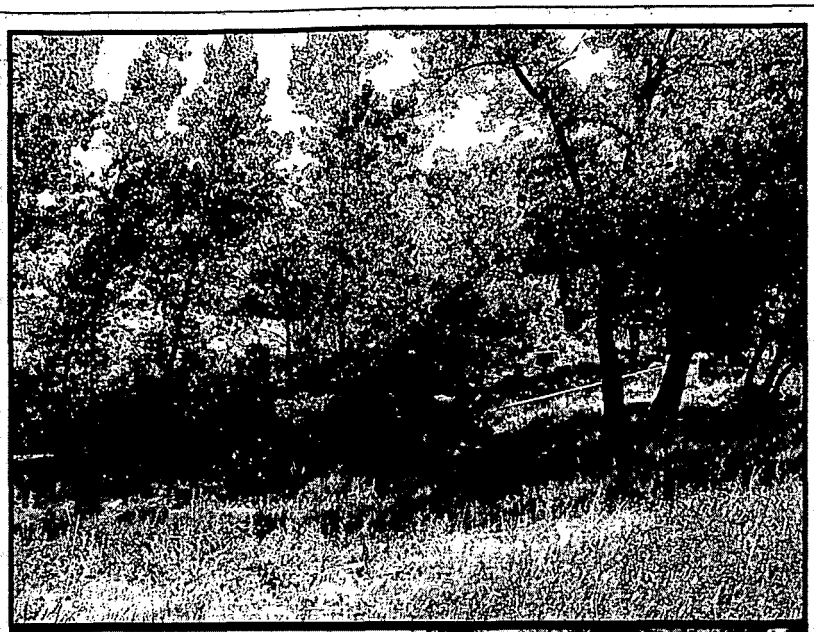
Flume SW093



(click on the photos to enlarge them)

Photopoint 1

Summer 2002 **Spring 2003**

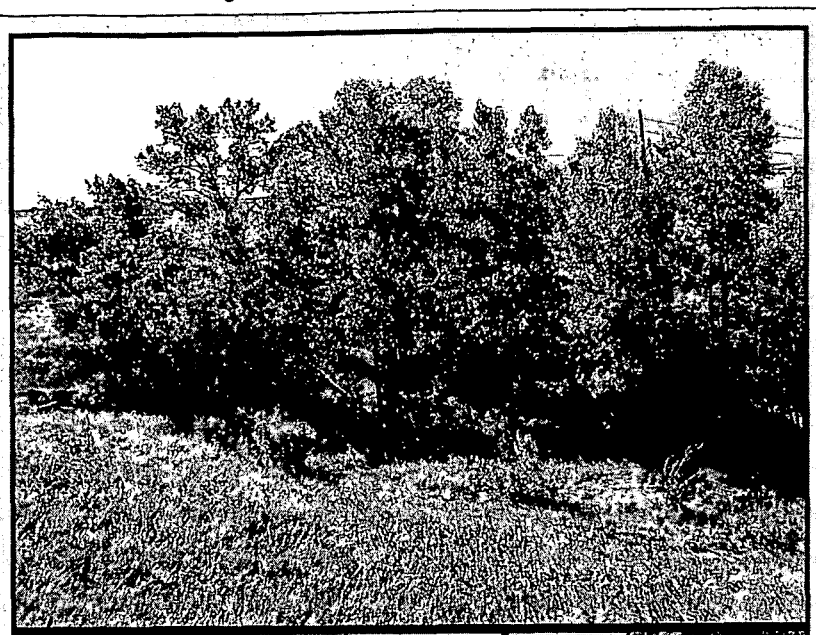


Summer 2004

Summer 2005

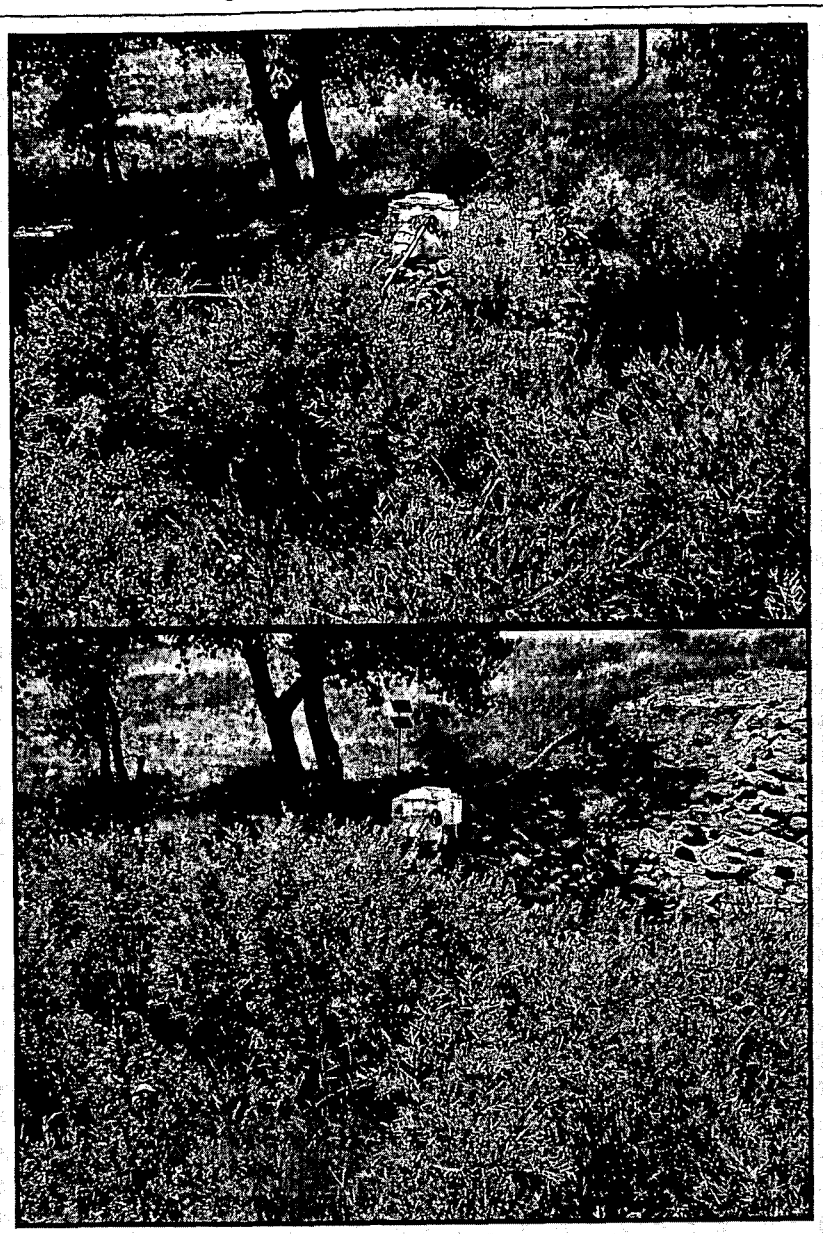
Photopoint 2

Summer 2002 **Spring 2003**



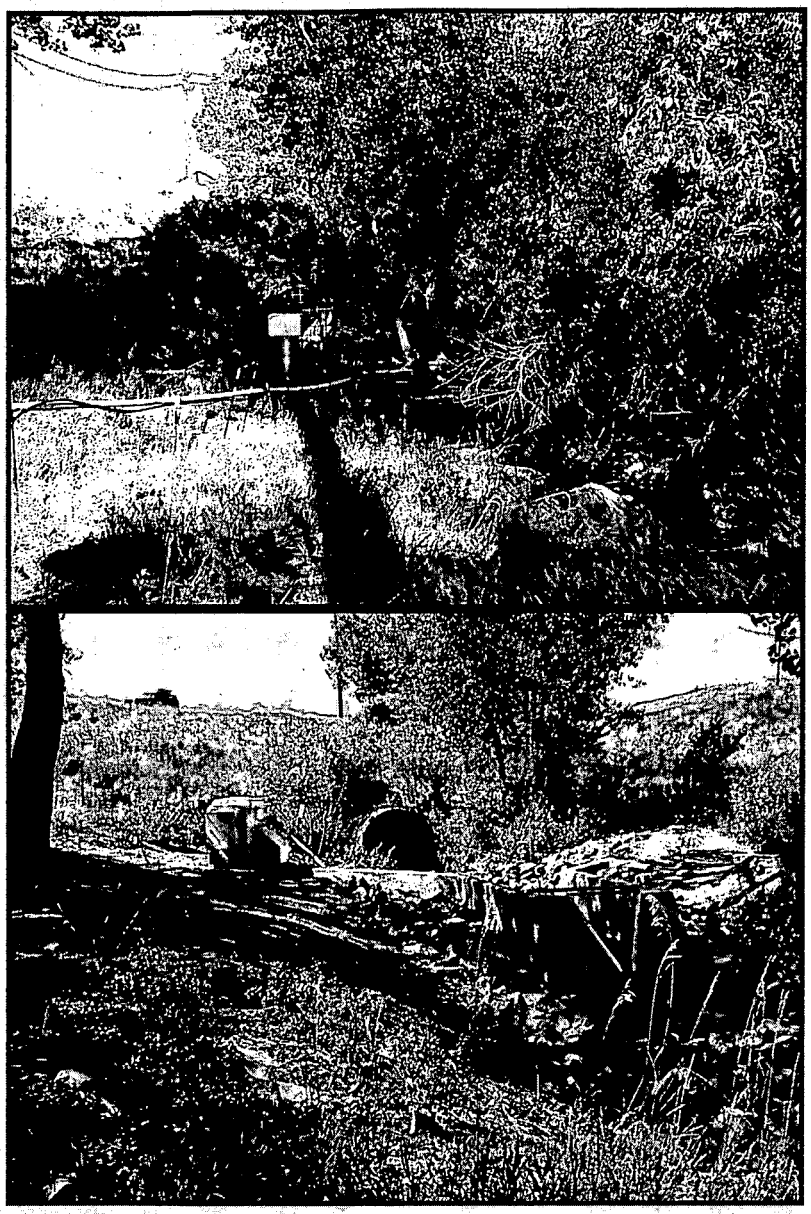
Summer 2004

Summer 2005



Photopoint 3

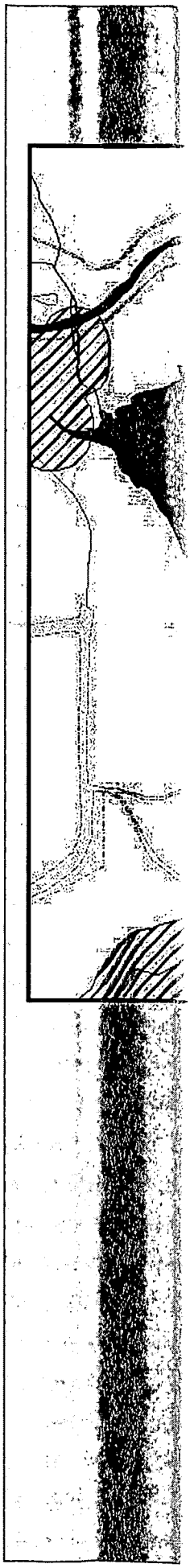
Summer 2002 **Spring 2003**

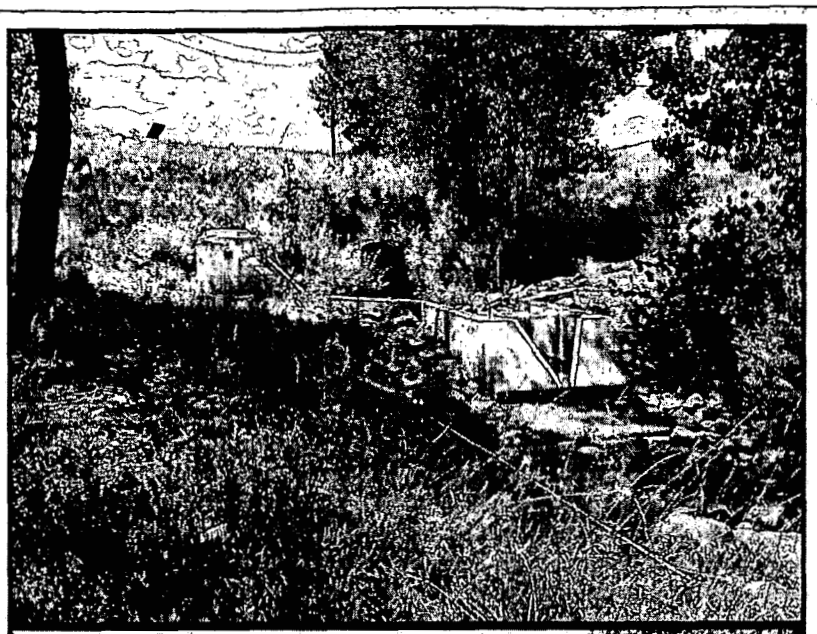


Summer 2004

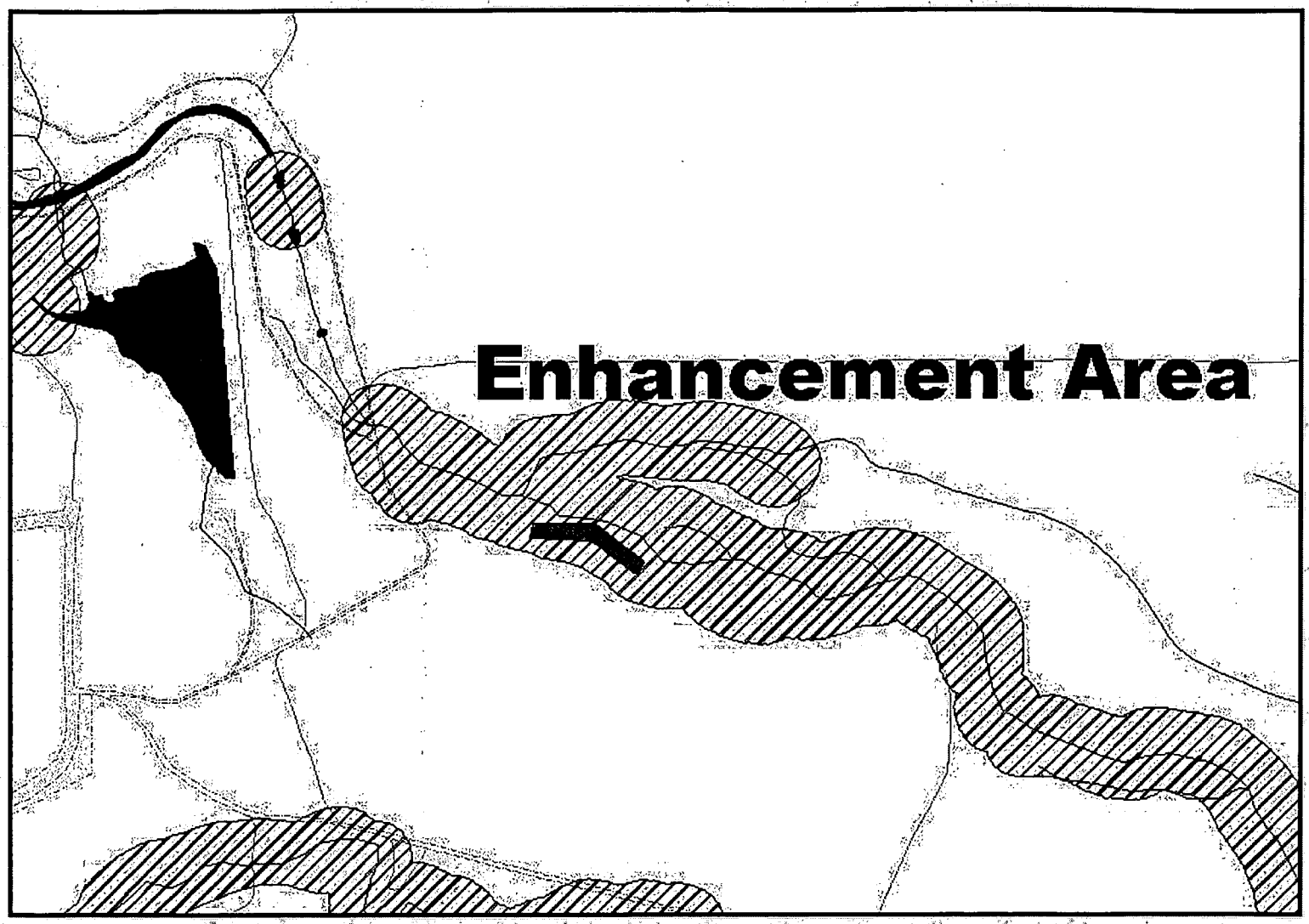
Summer 2005

Shrub Mitigation Area





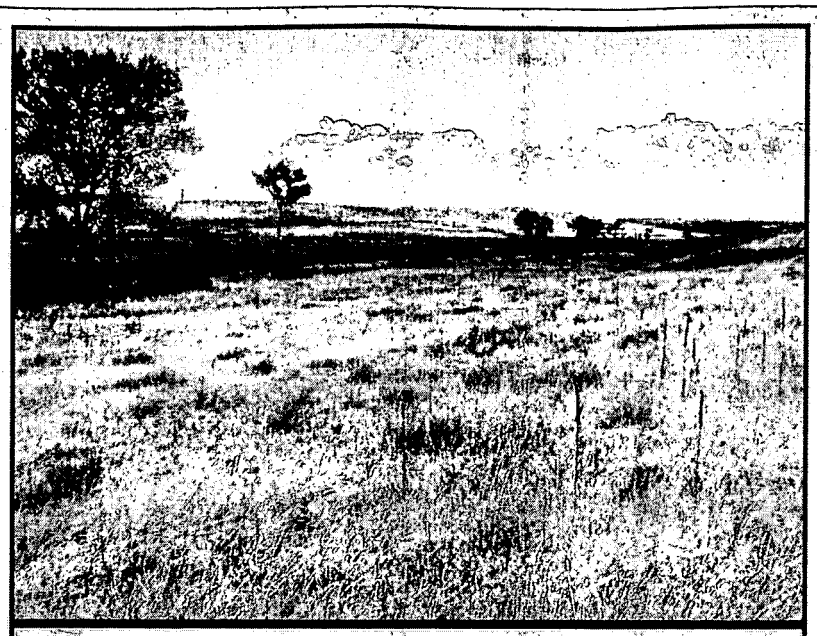
Shrub Enhancement Area

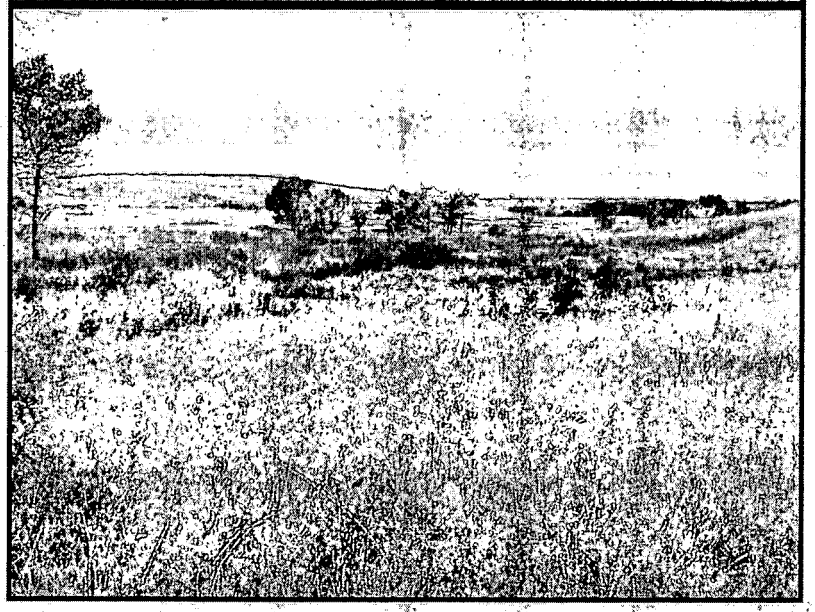


(click on the photos to enlarge them)

Photopoint 1

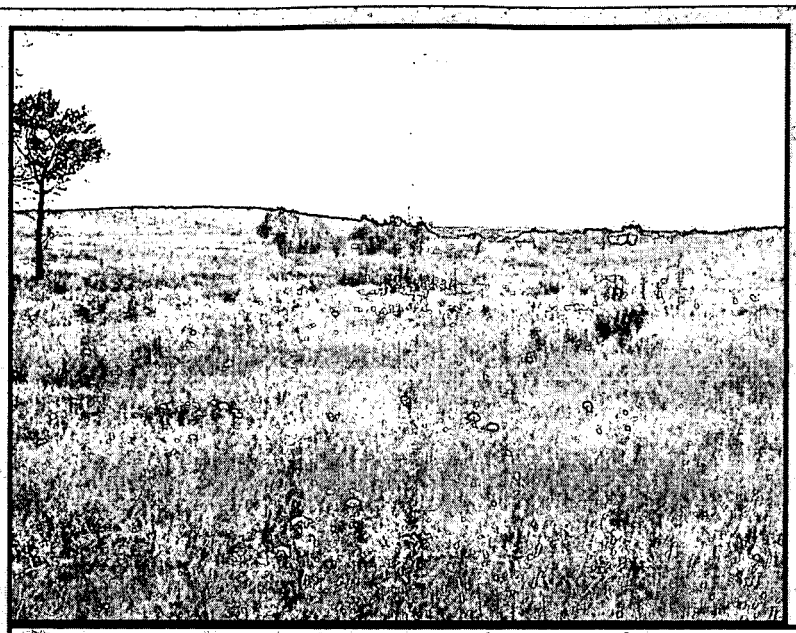
Summer 2002 **Spring 2003**

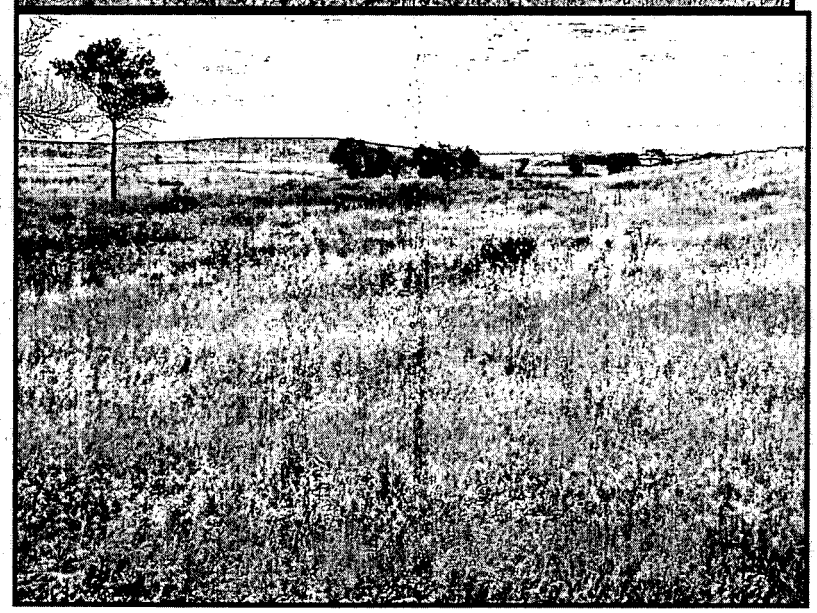




Summer 2004

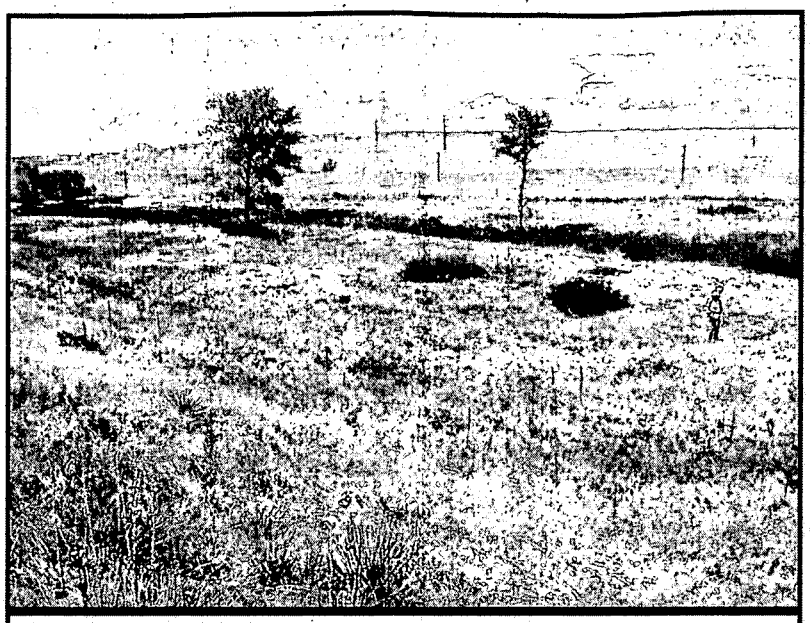
Summer 2005

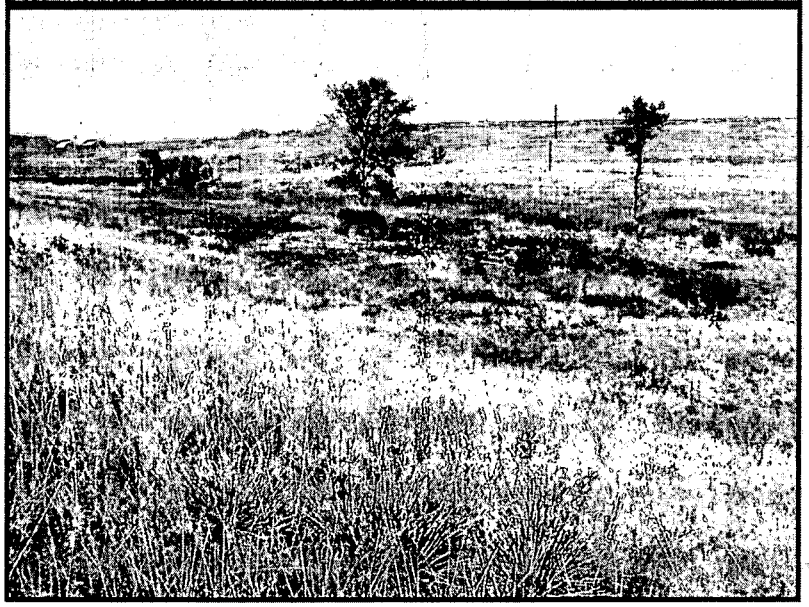




Photopoint 2

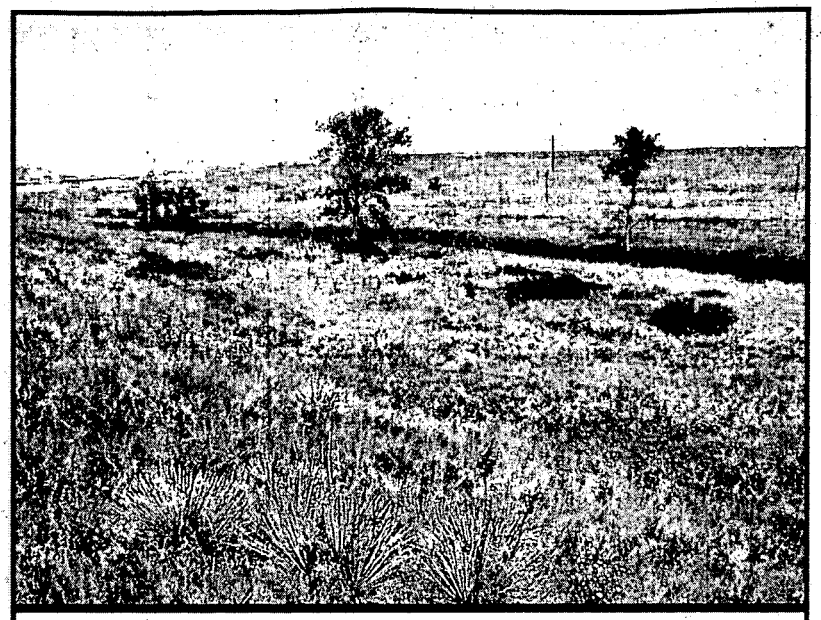
Summer 2002 **Spring 2003**





Summer 2004

Summer 2005



Qualitative Revegetation Evaluation Form Form # 00024

Date 8/29/05
Observer(s) JKN
Location ID SW093

Photographs taken today? Y (N) | take earlier summer

Are seeded plant species present? (Y) | N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGCA1 - 1
AGSM1 - 2
ELCA1 - 1
BOCU1 - 1

Any evidence of nutrient or water deficiencies? If so, describe. none

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CEDI1 - 1
CIAR1 - 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

BRJN1 - 1
MEOF1 - 1

Total Vegetation Cover (Estimate to nearest percent) 70%

Suggestions for management: weed control as needed, reseeding as needed

Other comments: Area looks pretty good. Most [illegible] hoped into fill — provides open space [illegible] should look pretty good. Planted shrubs [illegible] doing well.

Completed by: [illegible] Print [illegible] Sign Date 8/27/05

Qualitative Revegetation Evaluation Form Form # 20023

Date 8/29/05
Observer(s) KN
Location ID 6503

Photographs taken today? Y (N) taken earlier

Are seeded plant species present? (Y) N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

AGSM - 1
AGCA - 1
ELCA - 1

Any evidence of nutrient or water deficiencies? If so, describe. None

Are noxious weeds present? (Y) N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

CEDI - 1
CIAR - 1

Are other weedy species present? (Y) N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

BRJA - 1
MEOF - 1
FEPR - 2
LASE - 2

Total Vegetation Cover (Estimate to nearest percent) 90 %

Suggestions for management: Continued weed control for CIARI & CEDA
occasional reseeding for pcom spots

Other comments: 1/6 of AMPSI — N side of st

Completed by: [illegible] Print [illegible] Sign Date 8/29/05