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August 8, 2005

Arizona Corporation Commission
Docket Control – Utilities Division
1200 W. Washington Street
Phoenix, Arizona 85008

Re: Duke Energy Arlington Valley, LLC
2005 Land Management Plan Annual Report
Docket No: L-00000P-01-0117

As a follow up to the Land Management Annual Report letter delivered on June 17, 2005, please find attached an original and fifteen (13) copies of Duke Energy Arlington Valley, LLC's Annual Report on the Land Management Plan. The report includes the annual report from the University of Arizona on the re-vegetation efforts and Ducks Unlimited on the seasonal wetlands.

This report is being filed in compliance with Condition 14 (d) in ACC Amended Decision No. 64495.

If you have any questions on this report please call Michael Holcomb at (623) 882-2223.

Very truly yours,

Freddy Alvarez

Duke Energy Arlington Valley, LLC

File: 400.080.50

cc: Brian K.Bozzo, Compliance Manager

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Duke Energy Arlington Valley, LLC

Annual Report on the Land Management Plan for the Arlington Valley Energy Project

July 2005

L-00000P-01-0117

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Background

On July 25, 2000, the Arizona Corporation Commission ("A.C.C.") issued Decision No. 62740, amended in Decision No. 62995, November 3, 2000 granting a Certificate of Environmental Compatibility ("C.E.C.") to Duke Energy Arlington Valley, LLC ("Duke Energy"). This Certificate was granted with 14 specific conditions. Condition 13 was added to address concerns raised by the Power Plant and Transmission Line Siting Committee regarding the manner in which Duke Energy was to manage the property it had acquired for water rights.

Specifically, Condition 13 states:

> Applicant shall implement a Land Management Plan that includes:
> (i) Installation of a professionally designed landscape plan for the entrance of the facility and along Elliot Road.
> (ii) A comprehensive revegetation program that will restore a large portion of the property with plant communities similar to the adjacent desert lands.
> (iii) A partnership with The Arizona Game and Fish Department to provide enhanced wildlife habitat on lands that border Centennial Wash.
> (iv) An annual report (for six years) submitted to the Arizona Corporation Commission setting forth the status of the Land Management Plan.

A similar condition was included in A.C.C. Decision No. 64717 approving the C.E.C. for Arlington Valley Energy Facility II.

In April 2000, Duke Energy prepared a document entitled Land Management Plan for the Arlington Valley Energy Project. This document was entered into the record, as Exhibit A-6, during Duke Energy's CEC hearing before the Power Plant and Transmission Line Siting Committee. The Land Management Plan divides the property into five distinct zones. Duke Energy and its partners in the Land Management Plan set forth unique management plans for each of the five zones. The five zones and management objectives were set forth in the Land Management Plan as follows:

Zone 1: Landscape Plan

Duke Energy will retain a professional landscaping firm to design and implement a landscape plan for the southern edge of Elliot Road in front of the facility and both sides of the entrance road to the facility to help screen the facility from view.

Zone 2: Agricultural Lands Reclamation – actively farmed

This zone will remain in active agricultural production as long as reasonable to maintain the irrigation ditches in good working order and prevent potential dust and weed problems. When it is no longer reasonable to keep the land in agriculture, the land will be folded into the active reclamation activities described under Zone 3.

Zone 3: Agricultural Lands Reclamation – fallow agricultural land

This zone includes fallow agricultural lands. In order to better understand how to effectively implement a long-term revegetation strategy, Duke Energy contracted with the University of Arizona. Pursuant to this contract, the University will undertake a study that would investigate revegetation on arid lands. The preliminary plan for the investigation was set forth in the April 2000 Land Management Plan. A revised plan is included in the detailed discussion below.

Zone 4: Wildlife Habitat Management Area

This zone was set aside for cooperative efforts to utilize the land for a wildlife habitat area. To that end, Duke Energy has develop a wetland on this property.

Zone 5: Centennial Wash

The Land Management Plan proposes to leave this area intact.

Management Plan Report

Zone 1: Elliot Road and Facility Entrance Road.
Goal: Develop a visual buffer between the facility and Elliot Road.
Progress:

As described in the previous Management Plan Report, Duke Energy worked with Todd & Associates, Inc. in upgrading the initial landscape concept plans for the Elliot Road frontage and entry road to include substantially more landscape area along the entirety of the Elliot Road frontage. This allowed for additional berming and plant material to provide visual buffering from the roadway.

Duke Energy contracted with Valley Crest to install the final landscape and irrigation per plans prepared by Todd and Associates, Inc. The landscape and irrigation was 100% complete and fully operational in November 2002.

The landscape palette, consisting of arid adapted plant species, and specifically those tolerant to salt and alkalinity, has proven to be successful. The landscape is flourishing, and the loss of plant materials has been minimal. The largest contributor to loss and damage has come from rabbits, primarily to the Brittle Bush (Encelia farinosa) shrubs closest to the roadway and at the far east end of the frontage near Wintersburg Wash. The shrubs were replaced in kind during the maintenance period, and have since grown to sufficient size to better withstand damage. In addition to the Brittle Bush, some of the Saguaro Cacti have been lost due to a "sunburn" condition that is believed to have resulted from transplantation. Duke Energy is currently working with its landscape partners to assess the condition of the Saguaro Cacti and to develop appropriate modifications to its landscape management practices. Native vegetation seedlings have begun to grow within the landscape area, including Brittle Bush, Mesquite, and Acacias.

The trees shall be allowed to remain low branching as per their native character to provide maximum screening potential, as well as to provide shading and habitat for wildlife. Shrubs shall also be allowed to grow in their natural state, and under no circumstances be sheared or artificially pruned. In addition, native seedlings and starts from the new landscape materials shall be allowed to grow to further naturalize the landscape. Maintenance is basically limited to control of weed growth and removal of dead or diseased material.

Seasonal schedules have been installed into the irrigation system controller programming to provide maximum watering efficiency and to insure maximum growth potential to the new landscape. As plants continue to mature, schedules are adjusted to minimize the water usage, while still ensuring the health and appearance of the landscape.

Zone 2 and 3: Agricultural Lands.

Goal: Reestablish arid adapted vegetation that is self-sustaining and representative of adjacent plant communities.

Duke Energy contracted with the University of Arizona, Office of Arid Lands Studies to undertake a study to investigate the best methods for large-scale revegetation on arid lands. The preliminary plan for the investigation was set forth in the April 2000 Land Management Plan. The University of Arizona's 2005 annual report is attached.

Zone 4: Wildlife Habitat Management Area
Goal: Provide enhanced wildlife habitat in the project area.

Under an agreement to provide survey and design services to Duke Energy, Ducks Unlimited, Inc. (DU) has performed engineering and survey related activities at the site of Duke Energy's Arlington Valley Energy Project, Arlington, Arizona. This effort was the first part in the development of a habitat enhancement master plan.

Concurrent with the master planning efforts, DU engineers and biologists completed a comprehensive engineering plan for the enhancement of wetland habitat on 62.4 acres. In December 2003, the engineering plan was implemented for the conversion of irrigated agricultural land into shallowly flooded wetlands. The "moist soil" wetland area is being supplied with water from a groundwater well and pump, as well as existing and constructed water delivery infrastructure. The wetland area is divided into eleven separate management units of which six will be managed for moist soil habitats and five will be managed for desert riparian habitats.

The final planning components for the wetland habitats are the vegetation establishment and water management plans. DU has developed the moist soils wetland vegetation planting and water management plans. Implementation of the moist soil wetland plans began during the late spring of 2005. Six species of wetland vegetation seed have been purchased and planting began in the spring of 2005, with completion scheduled for spring 2006. Initial watering of the moist soil wetlands will occurred immediately after seeding. The project is expected to provide functioning wildlife habitat by winter 2005.

The University of Arizona (UA) will undertake vegetation establishment in the desert riparian habitats. Planting selected species common to riparian habitat in the nearby washes will follow an aggressive weed control program. Vegetation planting occurred in the spring of 2005. Irrigation of these habitat types will utilize the same water conveyance and delivery system of the moist soil wetland management units. An annual wetlands management report from Ducks Unlimited is attached.

Zone 5: Centennial Wash
Goal: Protect existing riparian vegetation

The project contains only a small portion of land that has not been extensively managed for agricultural production. This area located in the southeastern portion of the site is in Centennial Wash and contains a functioning riparian ecosystem. Duke Energy continues to maintain the area in its current state.

Conclusion

The Land Management Plan for the Arlington Valley Energy Project is progressing well. Duke Energy continues to work with its outside contractors including the University of Arizona, the Arizona Game and Fish Department, and Duck's Unlimited. These efforts have resulted in the implementation of the landscape plan, the desert planting of over 927 acres, and the initiation of a 62 acre wetland habitat.

REVEGETATION OF ABANDONED FARMLAND AT ARLINGTON VALLEY ENERGY

T. M. Bean and M. M. Karpiscak
University of Arizona
June 2005

Summary of revegetation efforts

The University of Arizona has continued to study and implement a comprehensive revegetation program to restore a large portion of the Arlington Valley Energy property with self-sustaining native plant communities similar to the adjacent desert lands. The primary purpose of the revegetation program is to return these former agricultural lands to beneficial use as open space that will attract wildlife and enhance the surrounding environment. The scope of the project is large: approximately 1,810 ac of retired agricultural land exists on the site, having lain fallow for a period of 5-15 years, as well as an additional 910 ac of currently farmed agricultural lands.

A total of approximately 927 ac has been revegetated as of the date of this report. A small experimental planting of 16 ac was made in March 2001, followed by a scaled-up planting of 206 ac in November 2001, and a large-scale implementation planting of 630 ac in March 2003. An additional 60 ac was planted in the northeast corner of the property during late 2004 and early 2005. A small (17 ac) desert riparian planting was made in cooperation with Ducks Unlimited in May 2005. Table 1 presents species included in each of the revegetation plantings. Results of the March 2001 and November 2001 plantings and preliminary results from the March 2003 planting were presented in previous reports. No further assessments of survivorship or recruitment in these plantings were possible due to the El Niño conditions experienced in the fall and winter of 2004-05.

Rainfall for the area was above normal for the October through March period. This abundant rainfall, as shown in Figure 1, in turn produced an abundance of cool-season annuals that hid transplants and their offspring, making it impossible to conduct accurate field surveys. In addition, this available moisture made it difficult to get personnel and equipment into the field for planting activities. Not enough time has elapsed since the rain delayed 2004/2005 plantings to accurately assess success, although initial planting survival appears high and is consistent with survivorship in previous one-gallon plantings.

This report briefly describes the status of the most recent plantings and also discusses future plantings on the retired agricultural lands owned by Arlington Valley Energy. Please refer to past reports for detailed descriptions of the March and November 2001 plantings and observations from the March 2003 planting. Areas revegetated through May 2005 are displayed in Figure 2.

April 2005 Planting

A 60 acre planting was made in April 2005 using one-gallon transplants in the northeast corner of the Arlington Valley Energy property. The species list remains largely the same, with the exception of the exclusion of two short-lived herbaceous species, *Baileya multiradiata* (desert marigold) and *Sphaeralcea ambigua* (desert globemallow). We decided to exclude these species based on their relatively short lifespans (~2 yr), which left empty spaces as they senesced and

died, leaving an opening for the potential invasion by exotics. As the 60-ac planting was visible from Elliot Rd., it has been given extra care to keep weed densities at a minimum and has shown high initial survivorship among planted species.

Desert Riparian Planting with Ducks Unlimited

We planted 17 acres of desert riparian vegetation in a cooperative project with Ducks Unlimited. Details of the wetland planting are presented in a planting scheme prepared by Ducks Unlimited (Figure 3). This effort is an opportunity to investigate the use of different native community assemblages and different irrigation methods. The plantings occurred in flood-irrigated level basins (Figure 4) that occur next to seasonal wetlands (Figure 5) holding food crops for migrating waterfowl and shorebirds. Our goal is for the desert riparian vegetation to provide cover and an additional food source for wildlife. Many difficulties were experienced with the planting, most of which involved a very wet October 2004 to April 2005 period. The high clay content soils reduced drainage from the ponds and permitted the growth of an abundant annual cover. This cover could not be removed until the soil had dried sufficiently to support the required farm machinery that was needed to remove the annual cover, prepare the seedbed and apply the seed or place the one-gallon plants at the appropriate locations in the cells. The wet winter prevented planting until May 2005. Following the planting of the one-gallon transplants and the distribution of the selected seed the fields within the ponds were flood irrigated (Figure 5). Some fields appear to be draining sufficiently at present, but due to poor quality irrigation water and an inevitable buildup of salts, drainage will likely decrease over time. It will be critical to manage the salt build up in these ponds so that waterlogging is reduced and plant mortality minimized. Only time will determine the success of this planting, so it will be monitored closely.

Future plantings

We had planned to seed approximately 40 acres in November of 2004 but held off because of the heavy winter rains and subsequent crop of winter annuals. The idea with this planting was to investigate a way of reducing plant material costs in the revegetation program, as well as providing a method that is much less time consuming and strenuous for the planters. However, this method will only be effective if we can gain more predictability over the resulting stand of vegetation from a given seed mixture seeded at a given time of year. Until such information is obtained, we will continue to utilize the proven method of drip-irrigated, hand-planted one-gallon transplants. We may attempt another seeding in the coming year.

Much of the property south of the railroad has begun to recover naturally and we will not intervene. To do so would probably cause more damage than good because of the soil disturbances involved in planting and infrastructure installation. However, fallow agricultural lands that do not appear to be recovering on their own occur in Parcel 1 and will be revegetated using the standard approach. We will plant some 200 acres in fall 2005 just south of the generating facility since this area will not be needed for expansion of the facility. In 2005 we will complete an assessment of the status of the plant community south of the railroad tracks and will determine the exact location and any need for additional plantings.

Current status

Approximately 1,810 ac of retired agricultural land exists on the site, having lain fallow for a period of 5-15 years, as well as an additional 910 ac of currently farmed agricultural lands. A total of approximately 927 ac has been revegetated as of the date of this report. A small experimental planting of 16 ac was made in March 2001, followed by a scaled-up planting of 206 ac in November 2001, and a large-scale implementation planting of 630 ac in March 2003. An additional 60 ac was planted in the northeast corner of the property during late 2004 and early 2005. A small (17 ac) desert riparian planting was made in cooperation with Ducks Unlimited in May 2005. Table 1 presents species included in each of the revegetation plantings. Results of the March 2001 and November 2001 plantings and preliminary results from the March 2003 planting were presented in previous reports. No further assessments of survivorship or recruitment in these plantings were possible due to the El Niño conditions experienced in the fall and winter of 2004-05.

At several locations within the study areas we have established permanent photostations to document the status of the recovery efforts. In addition, several of these have been added to a U.S Geological Survey (USGS) collection of photo stations originally established by Dr. Raymond M. Turner now retired from the USGS. Dr. Turner came to the field and took photographs at several locations using a large format camera. The photographs in Figures 6.1 to 6.3 document the changes at one of the locations originally established by the University of Arizona Team in March 2003. This site was then rephotographed in August 2004 and March 2005. The March 2003 photo shows the field shortly after the field was planted with one-gallon plants. The plants in the photo are a combination of the transplants as well as scattered tumbleweed. Figure 6.2 (August 2004) shows the growth of the transplants as well as the continued presence of scattered tumbleweed. The abundant rainfall of late 2004 and early 2005 produced a rather dense cover of mostly native annuals in the March 2005 photograph. The larger plants in the photograph are mostly the one-gallon transplants from March 2003.

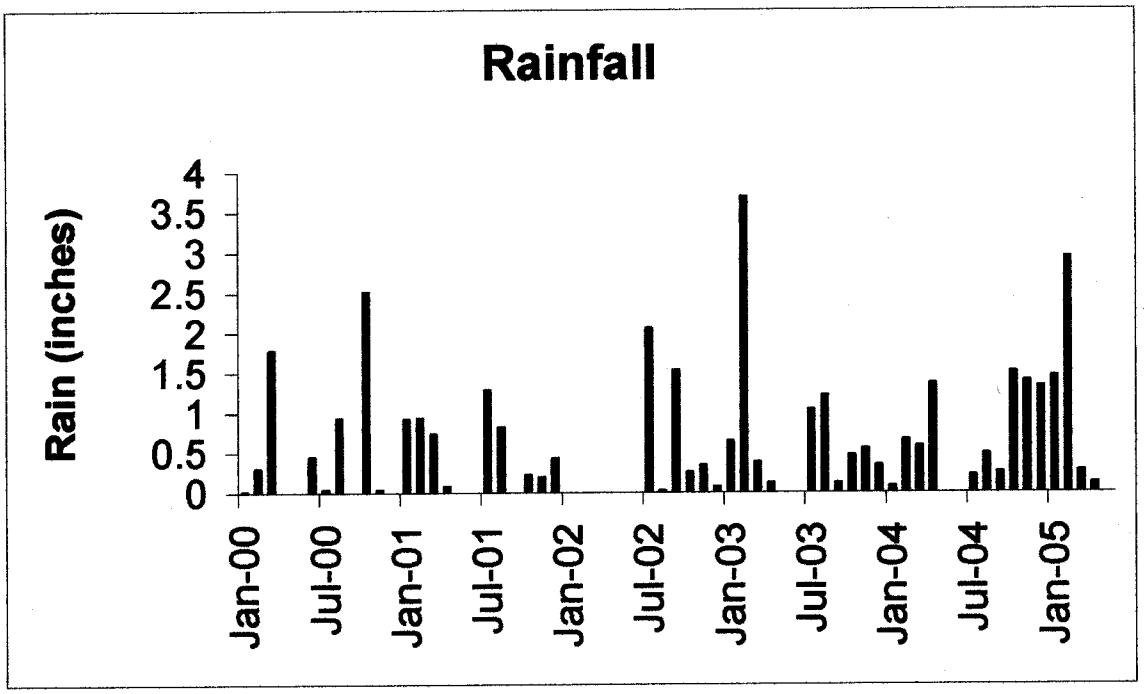


Figure 1. Rain as recorded at Buckeye, Arizona 2000 – 2005.

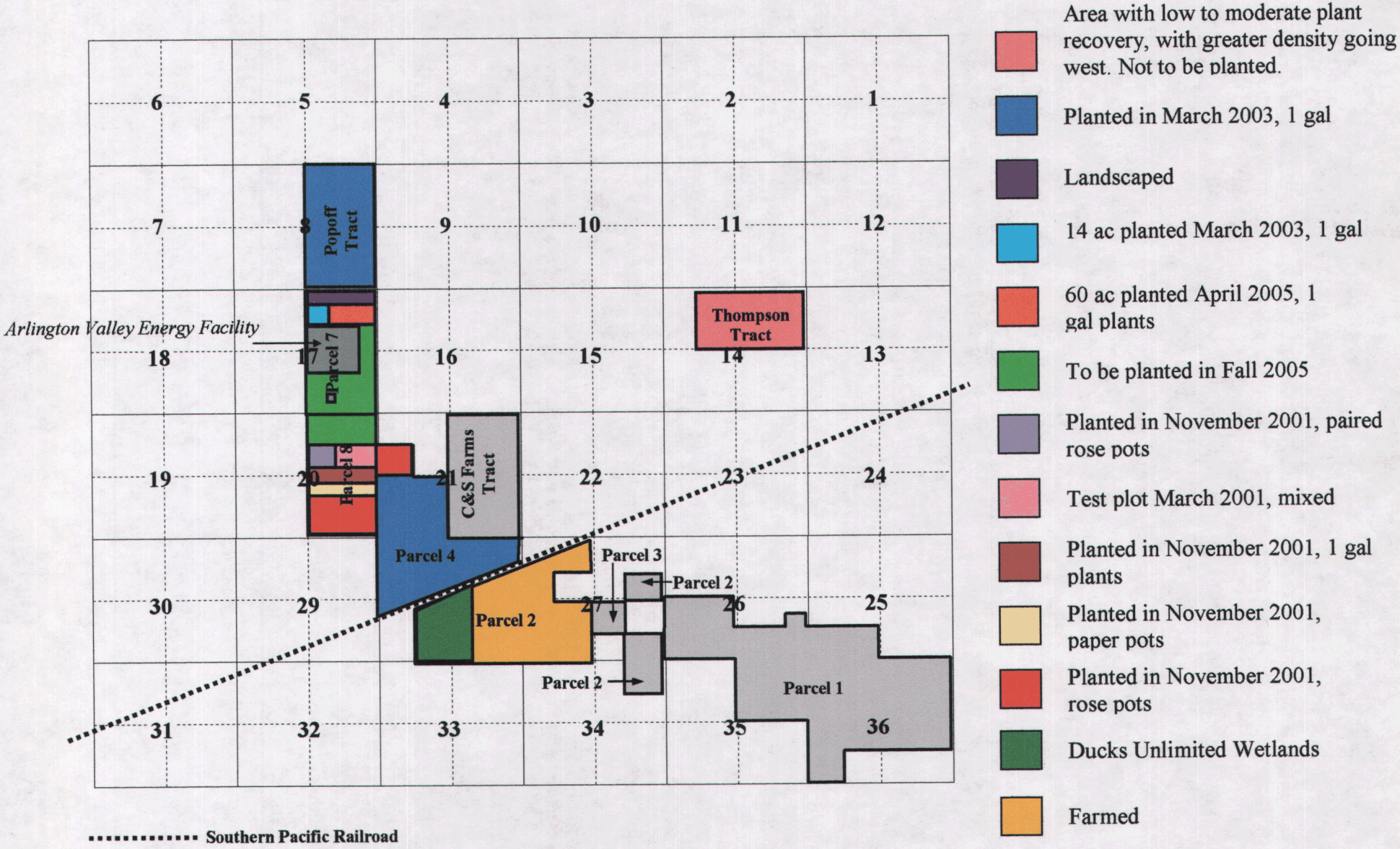


Figure 2. Map of Duke Energy Arlington Valley, LLC property

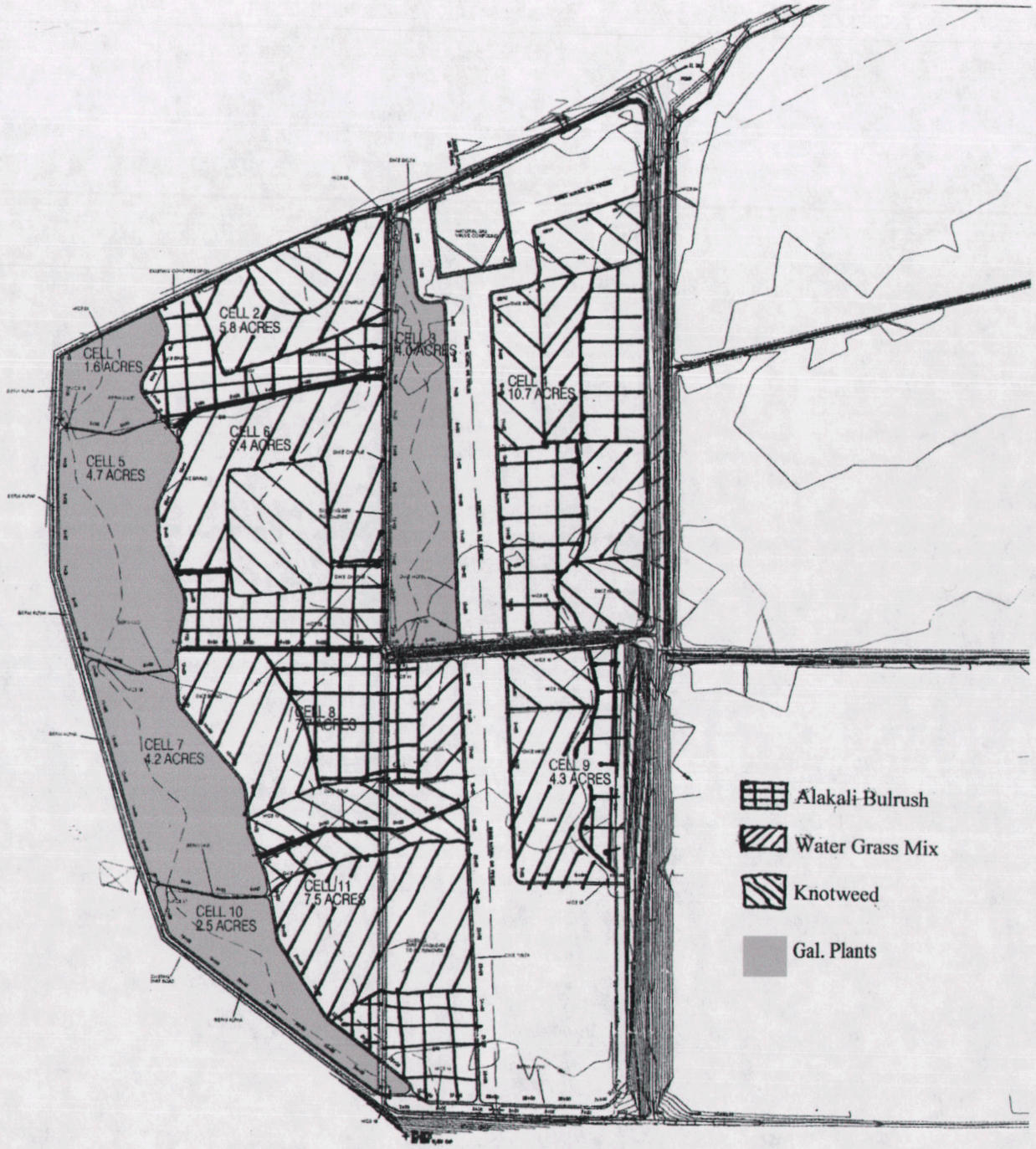


Figure 3. Planting scheme for the Ducks Unlimited Seasonal Wetlands. (Base map provided by Ducks Unlimited)

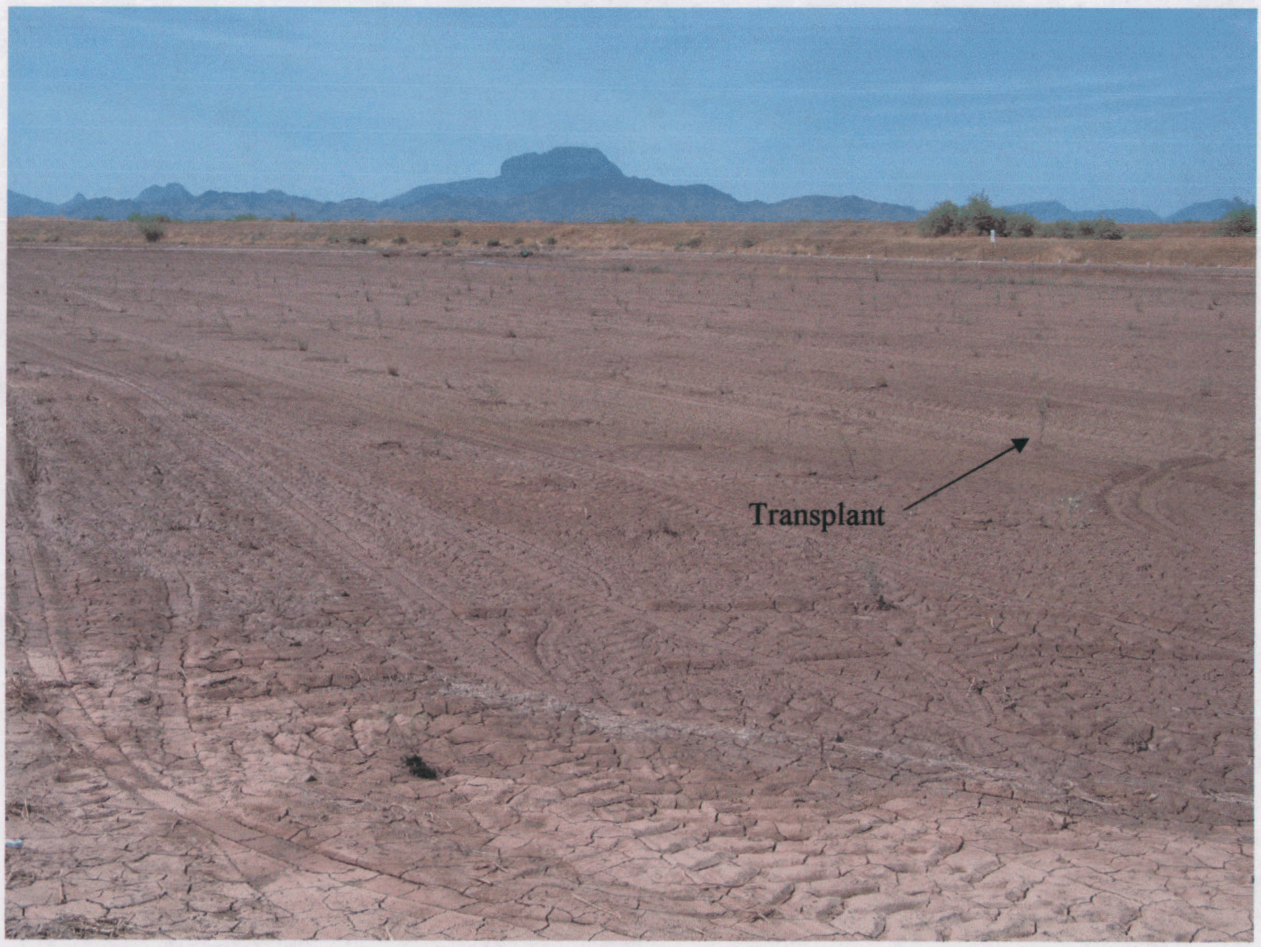


Figure 4. Flood-irrigated Desert Riparian cell at the Ducks Unlimited Wetland.

Figure 5. Flood-irrigated cell at the Ducks Unlimited Seasonal Wetland.

Figure 6.1. March 2003

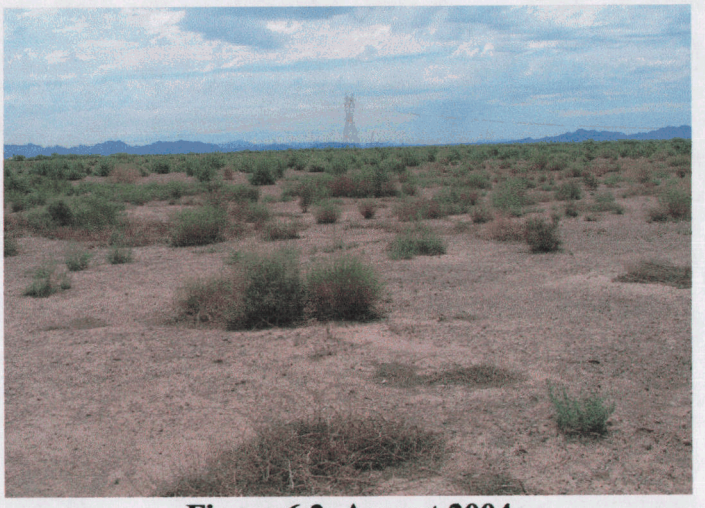


Figure 6.2. August 2004

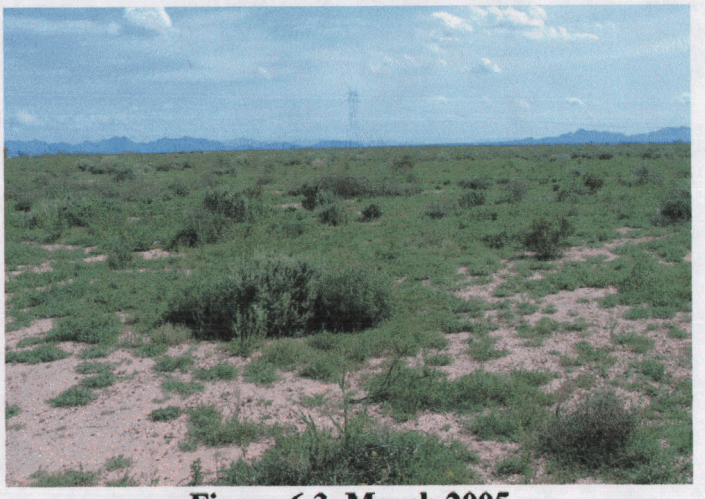


Figure 6.3. March 2005

Table 1. Species included in each of the revegetation plantings at Arlington Valley Energy to date.

Botanical name	Common name	March 2001	November 2001	March 2003	April 2005	May 2005
Acacia greggii	Catclaw acacia	S, OG	RP	OG	OG	OG
Ambrosia deltoidea	Triangleleaf bursage	S, RP	NP	NP	NP	NP
Ambrosia dumosa	White bursage	S	RP, PP, OG	OG	OG	NP
Aristida purpurea	Purple threeawn	S	RP	OG	OG	OG
Atriplex canescens	Fourwing saltbush	S	RP, PP, OG	OG	OG	OG
Atriplex lentiformis	Quailbrush	S	RP, PP, OG	OG	OG	OG
Atriplex polycarpa	Desert saltbush	S, OG	RP, PP, OG	OG	OG	OG
Baileya multiradiata	Desert marigold	S	OG	OG	NP	NP
Bouteloua aristidoides	Needle grama	S	NP	NP	NP	NP
Calliandra eriophylla	Fairy duster	S	NP	NP	NP	NP
Cassia covesii	Desert senna	S	NP	OG	OG	NP
Festuca microstaycha	Desert fescue	S	NP	NP	NP	NP
Larrea tridentata	Creosotebush	S, RP	RP, PP, OG	OG	OG	NP
Lesquerella gordoni	Gordon's bladderpod	S	NP	NP	NP	NP
Lycium exsertum	Woflberry	S, OG	RP	OG	OG	OG
Muhlenbergia porteri	Bush muhly	NP	NP	OG	OG	OG
Olneya tesota	Ironwood	S	NP	NP	NP	OG
Opuntia acanthocarpa	Buckhorn cholla	S	NP	NP	NP	NP
Parkinsonia microphylla	Littleleaf paloverde	S	RP	OG	OG	NP
Parkinsonia florida	Blue paloverde	NP	NP	NP	NP	OG
Plantago ovata	Indianwheat	S	NP	NP	NP	NP
Pleuraphis rigida	Big galleta	S	RP, PP, OG	OG	OG	OG
Prosopis velutina	Velvet mesquite	S, OG	RP	OG	OG	OG
Sphaeralcea ambigua	Desert globemallow	S	RP	OG	NP	NP
Sphaeralcea coulteri	Coulter's globemallow	S	NP	NP	NP	NP
Zizyphus obtusifolia	Graythorn	NP	NP	NP	NP	OG

"S" = seed
"RP" = rose pots
"PP" = paper pots
"OG" = 3.8-l pots
"NP" = not planted

Table 2. Density and cover species and their offspring from selected plantings at Arlington Valley Energy as of spring 2004.

	Mar 2004 one-gallons				Nov 2001 one-gallons				Nov 2001 paperpots				Nov 2001 rosepots			
	Transplants		Volunteers		Transplants		Volunteers		Transplants		Volunteers		Transplants		Volunteers	
Species	#/ac	%	#/ac	%	#/ac	%	#/ac	%	#/ac	%	#/ac	%	#/ac	%	#/ac	%
Acacia greggii	3.6	0.1											3.6	0.7		
Ambrosia dumosa	3.6	0.8			10.9	3.3			3.6	0.8	10.9	0.7	14.5	3.4		
Aristida purpurea	3.6	0.1														
Atriplex canescens	10.9	2.6			10.9	5.3	69.0	4.2	18.2	6.9	3.6	0.1	3.6	1.4		
Atriplex lentiformis	7.3	2.3			10.9	5.9	18.2	3.2	3.6	2.3						
Atriplex polycarpa	3.6	0.9			12.9	11.2	116.2	5.4	3.6	0.9	29.0	2.3	10.9	4.6		
Baileya multiradiata	14.5	2.5	98.0	3.1												
Muhlenbergia porteri	3.6	0.3														
Larrea tridentata	25.4	5.2			38.1	14.7			21.8	3.9						
Lycium exsertum	10.9	0.8											7.3	2.0		
Parkinsonia microphylla	7.3	0.5														
Pleuraphis rigida	3.6	0.3			10.9	3.1			3.6	0.6						
Prosopis velutina	7.3	1.4									29.0	1.0	14.5	5.6	21.8	1.5
Sphaeralcea ambigua	3.6	0.6	29.0	2.2			10.9	0.3								
Total	108.9	18.4	127.0	5.3	110.7	43.4	214.2	13.1	54.5	15.5	72.6	4.2	54.5	17.6	21.8	1.5

Duke Energy Arlington Valley Project

Spring Moist Soil Wetland Monitoring Report

Prepared by:
Ducks Unlimited, Inc.
3074 Gold Canal Drive
Rancho Cordova, CA 95670

June 2005

BACKGROUND

Ducks Unlimited, Inc. (DU) has developed and implemented a design for the establishment of approximately 58 acres of managed wetlands at the Duke Energy Arlington Valley Energy Project site. Of this amount, approximately 18 acres are desert riparian wetlands and approximately 40 acres are moist soil wetlands. The earthmoving component of the wetland project was completed in early spring of 2004. The vegetation establishment component was initiated in May 2005.

As part of the final establishment of the moist soil wetland area for wildlife and wildlife habitat, Duke Energy contracted DU to monitor and report on the development of the wetland vegetation and water management infrastructure components of the project. Monitoring will occur twice a year with a report submitted to Duke Energy after each site visit. Each report will include documentation of current vegetation and infrastructure condition, recommendations for management over the next several months, and expected results from the recommended management actions.

The moist soil wetland project is a managed habitat that relies on people to deliver and drain water in an adequate and timely manner. Hence, water and project infrastructure must be carefully managed and maintained for wetland vegetation to grow and thrive. The monitoring program, with subsequent management recommendations, should be undertaken over the next several years to ensure that the project is managed properly and develops into a healthy functioning wetland system. For most new wetlands, successful and complete development can take several years. This project should be fully established (*i.e.*, mature wetland vegetation communities) in about 3 years. Over time, the wetland project will mature and provide a fertile feeding refuge for wintering migratory waterbirds for the greater Arlington Valley and southern Arizona.

PROJECT EVALUATION

Vegetation

The initial moist soil monitoring site visit was undertaken on June 1, 2005. Leon Hardison Farms initiated moist soil vegetation planting on May 8, 2005. Vegetation was planted in accordance to the Vegetation Planting Map as provided with the Moist-Soil Wetland Vegetation Establishment and Water Management Plan (Plan) submitted to Duke Energy June 3, 2004. The Plan recommended a planting period in early spring (late February to early March) to take advantage of cooler temperatures and typically high soil moisture content. However, this planting time period was unattainable as the lengthy and unusually rainy spring saturated the site thereby preventing tractor access. Wet site conditions persisted through April and the area was not conducive to planting until early May. Attachment A contains a detailed activity list and timeline of actions by Leon Hardison Farms associated with the planting process. Planted moist soil wetland vegetation species include: alkali bulrush (*Scirpus maritimus*), barnyard grass (*Echinochloa muricata*), Japanese millet (*Echinochloa crus-galli*), and smartweed (*Polygonum lapathifolium*).

Due to the planting occurring in late spring, temperatures were above optimal for germination of both alkali bulrush and smartweed. As a result virtually neither of these two species were observed to have germinated. Additionally, these species also germinate at a higher rate after being saturated for a lengthy period (~ 1 year). The lack of germination by these two species is not presently a concern and the 2006 growing season should see substantial germination. Watergrass, on the other hand, readily germinates in relatively warmer temperatures, with a later irrigation timing, without a saturation period and has sprouted nicely throughout the project site where planted.

The initial moist soil unit irrigation occurred on May 10, 2005 in accordance with methods outlined the Plan. Water was pumped onto the upper project units, impounded and then drained to subsequent units. The water conveyance infrastructure worked as designed with the exceptions noted in the Infrastructure section below. Instructions were given to Leon Hardison Farms on June 1, 2005 to continue irrigation as needed to develop a thriving crop of watergrass.

Levee side slopes were not planted as of June 1, 2005. Species to be planted are a mixture of salt grass (*Distichlis spicata*) and alkali sacaton (*Sporabolus airoides*). Planting of levee side slopes will occur in the fall of 2005.

The soils at the site appeared to be quite adequate for the development moist soil wetlands. The ground inside the units had surface cracking indicating the presence of tight, water-holding soils (*i.e.*, clays).

Infrastructure

Construction of the water management infrastructure was completed in the spring of 2004. Major infrastructure components include: a concrete lined irrigation supply ditch on the north end of the project, multiple wetland basin levees, wetland basin water control structures, an interior water supply ditch, and a drainage ditch on the south end of the project. During the June site visit, these project components were observed and their condition evaluated. Detailed observations are included below.

All levees were in excellent condition. Some rain erosion was observed on all of the levees throughout the project. Once established, a vegetation ground cover will reduce erosion and minimize future levee maintenance actions. Planting and establishing the grass seed mix on the levees should be a high priority for the fall of 2005. One moist soil unit wetland levee was breached by Leon Hardison Farms to facilitate unit drainage and reduce extended ponding on newly planted vegetation.

All water control structures were in excellent structural condition. Several of the units' central drainage swales were still holding water after irrigation and did not provide adequate drainage to the unit's outlet structure. Leon Hardison Farms excavated material from in front of the structures to provide positive and complete drainage in the holding units. Leon Hardison Farms noted that many of the water control structures' stop-logs were not watertight and they used tarps to seal them during irrigation. See notes on individual units below for specific infrastructure observations and recommendations.

The north concrete, central supply ditch and associated water control structures were in excellent structural condition. During the site visit, the sump pump was being used to irrigate the adjacent crop fields and excess water was entering the central supply ditch from the inlet pipe. There is no valve to prevent water from entering the supply ditch when the sump pump is irrigating the crop fields. Additionally, the outlet structure

(#12) from the supply ditch to the sump had most of its boards in place and there was several inches of standing water in the ditch. Water was back-filling into Units 4 and 6 from the supply ditch keeping much of these units ponded and saturated. The boards in structure #12 were removed and the water in the supply ditch was drained into the sump.

RECOMMENDATIONS

The project is working as designed and planned. Below are various management and maintenance recommendations for the continued development of the project's vegetation and infrastructure. Regular attention to these recommendations will ensure the project's continued success. All of the recommendations below are important, however the most critical project management concern is water management, particularly its removal from each unit following irrigation. The vegetation chosen for this project is dependent on moist, but not entirely saturated, soils. Hence, draining water from the units is extremely important. Complete (*i.e.*, all standing water removed from the unit) and positive (*i.e.*, water coming in from the unit's inlet structure and going out through the unit's outlet structure) drainage of ponded water will encourage the moist soil wetland vegetation to germinate and prevent loss of newly sprouted plants by allowing oxygen back into the soil column. Each unit's outlet structure should be connected to its central swale so water can easily and completely drain. Water should not be allowed to "back-fill" in to any unit from any outlet structure.

Final ditch – The final drainage ditch should be regularly cleaned of accumulated silt and weeds. There is only a low gradient from the Unit # 11 outlet (WCS #14) to the sump. This traps silt and subsequently prevents complete drainage of Unit 11. Silt accumulation should be evaluated after each irrigation and removed as needed.

Central ditch – The central supply ditch (between Units 4 and 9) should be kept drained when the sump pump is in use for the adjacent agricultural fields and when not irrigating any moist soil wetland units. Boards in WCS # 12 should be removed to allow water to drain into the sump. Installation of a valve on the ditch inlet pipe would prevent water from entering the ditch when irrigating the adjacent agricultural fields.

Most of the units (1, 4, 6, 8, and 9) off the ditch were back-filling from the standing water leaking through the various water control structures. Back-filling should be prevented by either removing water from the ditch, placing a tarp over the stop-logs, or installing both sets of stop-logs and filling in dirt between the two rows.

Water management – Proper and precise water management is most critical early in the growing season. When moist soil wetland vegetation is very small, impounding water for an extended time can over top and kill new growth, as well as prevent additional germination. With taller and older vegetation this is not as high of a concern. Further, maintaining impounded water for extended periods with mature wetland vegetation can effectively control most weeds. As outlined in the Plan, water should be impounded to an average depth across the unit of no more than 4" (never over topping any desirable vegetation). Water should be removed from the unit after the target depth has been reached.

Winter inundation in 2005 may differ from the recommendations outlined in the Plan. Since vegetation germination was less than expected for bulrush and smartweed, not flooding certain units will protect the planted seed bank for the following year's growing season. This issue will be addressed in more detail in the fall monitoring report.

Wetland vegetation & irrigation – Vegetation should be irrigated as necessary over the next several months in order to develop a healthy and thriving wildlife food crop. Irrigation of moist soil wetland units should cease when the watergrass has begun to develop seed heads and not be irrigated again until after the second monitoring report and as directed. Wetland vegetation should be allowed to senesce and be left standing "as is" until the fall irrigation. Winter inundation will be outlined in the fall monitoring report, but is expected to commence in October in time for the fall migration and continue until late January when most birds have begun migrating back north.

Levee cuts – The levee cuts in Unit 2 should be repaired to the designed specifications of the constructed levees. The existing water control structures should be utilized in the future for water supply and drainage. This first year is critical for establishment of both moist soil and desert riparian vegetation, so prompt and adequate water management is essential. The cuts should be able to provide this. However, in subsequent years, the vegetation should be more tolerant of both very dry and very wet conditions and the existing water control structures should be adequate for proper water management.

Levee grass seed – The grass seed mix designated for the levee side slopes should be planted this fall when conditions permit. Establishment of these species will help reduce and eliminate erosion on levees, as well as reduce weeds. Bermuda grass should not be included in any planting mix as it will invade the moist soil wetland units and is not beneficial to migratory waterbirds.

Weed control – Weeds in the moist soil units should be controlled as soon as possible. Prompt control of Bermuda grass and tamarisk will reduce long-term maintenance needs and costs. These two species will likely be the most prevalent and difficult to control within the units. Tumbleweed is expected in the drier sites (e.g., on the levees) and should be controlled as needed. Application of herbicide should be performed with caution to avoid damage to moist soil wetland vegetation or the adjacent wetland riparian plants.

EXPECTATIONS AND FUTURE PERFORMANCE

If the above recommendations are followed, the moist soil wetland project should develop a substantial watergrass food source this fall for waterfowl. Proper management and maintenance of water, vegetation and infrastructure will be necessary. With the onset of the monsoon rains, some additional erosion will occur on the levees. This should be limited, but any problems (e.g., large cuts, slumping banks, etc.) should be addressed as soon as possible. Silt will continue to accumulate in the drainage swales, ditches, and in front of water control structures as part of the on-going normal project

operation. Silt accumulations should be removed as necessary to maintain adequate drainage.

With proper irrigation and drainage, the current watergrass crop will grow to approximately knee height by the time it develops a seed head. After irrigation ceases (approximately in late August), vegetation will begin to brown and die. Over the next several months, seeds will fall to the ground. These seeds are both food for waterfowl as well as the source of the next year's plant crop. The smartweed and alkali bulrush seeds are not expected to germinate this year, but should in the 2006 growing season from the seeds planted this spring.

The next monitoring period will be in September of 2005 after vegetation has senesced and before the fall/winter irrigation begins. During this visit vegetation growth will be evaluated and infrastructure condition will be documented. The report will outline recommended management of moist soil units through winter including which units should be flooded, as well as when and for how long. Additionally, the report will include recommendations for irrigation amounts and timing during the following spring.

SUMMARY

The Duke Energy Arlington Valley moist soil wetland project is developing well. The project vegetation germination did not occur as hoped and water management infrastructure needs some fine-tuning. However, this should be expected in the early stages of any wetland project. The condition of the water management infrastructure is excellent overall. Some excavation is needed to fully develop drainage within the units themselves and drainage from the entire project. The vegetation was not planted at the desired time and two of the three species did not germinate. Proper water management should ensure a well developed watergrass crop and prepare the alkali bulrush and smartweed seeds for germination in spring 2006. The levees should be planted this fall with the salt grass/alkali sacaton grass mix. The project should continue to be monitored for adequate drainage, weed spread, and wetland vegetation development. Appropriate management actions should be undertaken to address any observed problems.

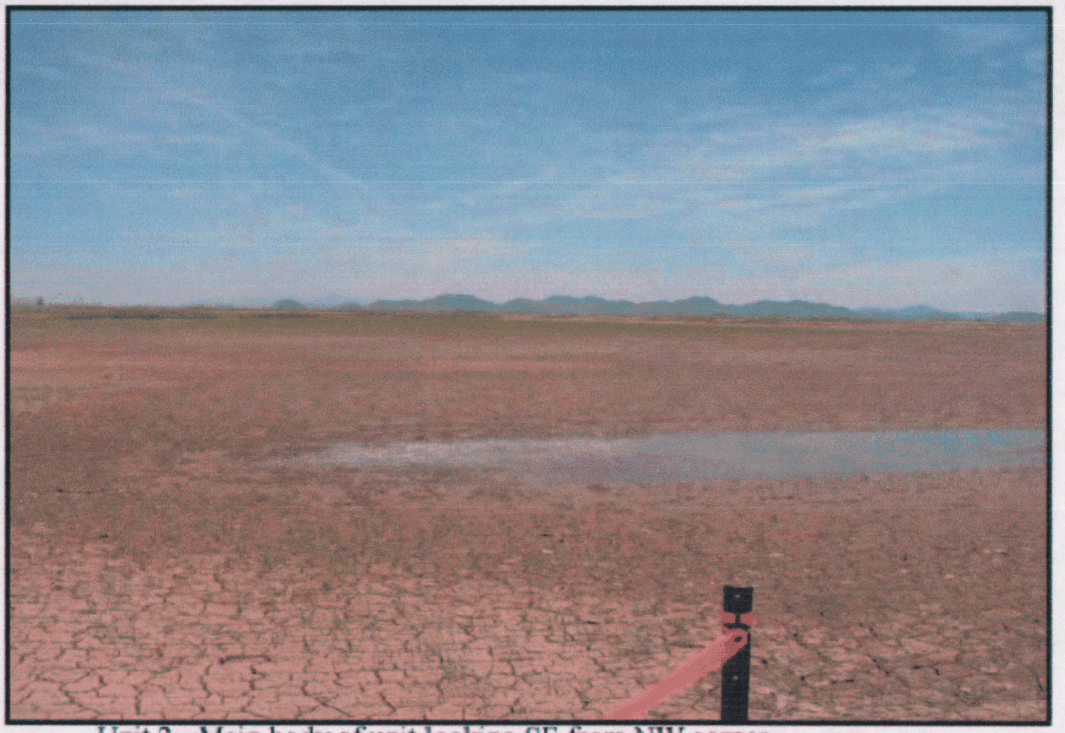
PHOTO DOCUMENTATION

Photo documentation of moist soil wetland unit vegetation, outlet water control structures, and levee side slopes with associated management recommendations.

UNIT OBSERVATIONS AND RECOMMENDATIONS

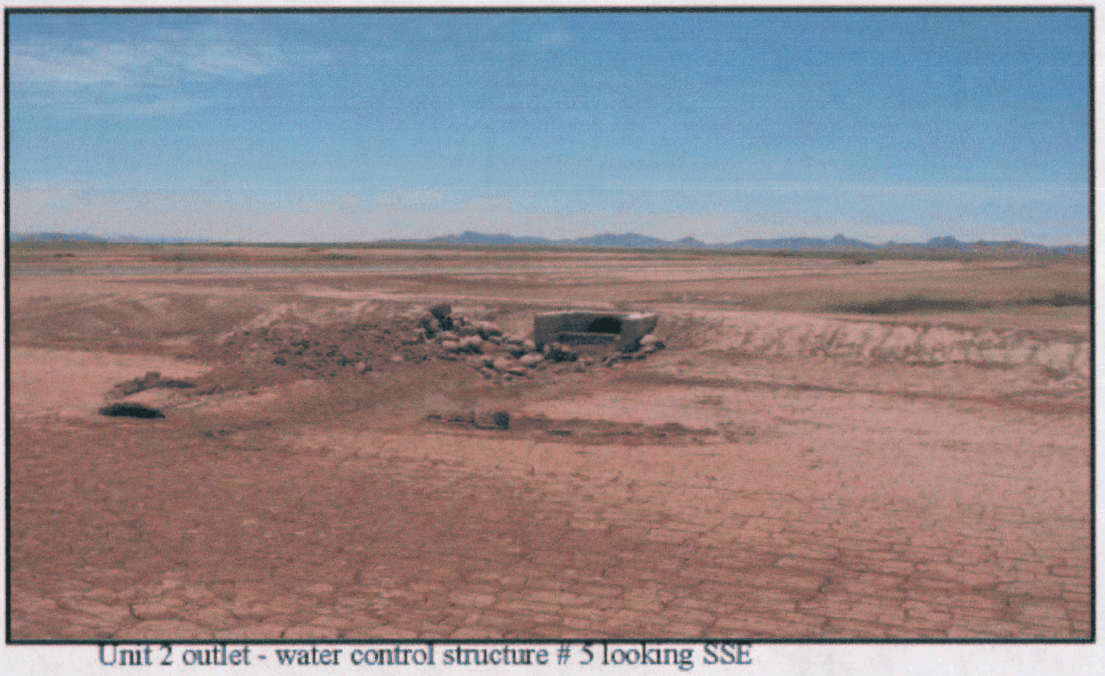
Permanent photo points were established for all moist soil wetland units. Stakes with flagging were set in the northwest corner of each unit. Main unit body and western levee pictures were taken from this point.

Unit 2 – This Moist Soil Wetland Unit was in good condition. Watergrass was sprouting, but had not grown to heights similar to those in Unit 4. The outlet structure was in excellent shape. The Unit's central drainage swale did not reach the structure and additional excavation was needed to provide positive drainage to the outlet. Hardison Farms extended the swale to the structure. Hardison Farms also cut the levee to provide additional drainage to Unit 6. This cut should be repaired and the water control structure utilized for drainage. Now that several irrigations have been performed, the immediacy of water supply to "downstream" units is much less and additional drainage is not needed. Some additional excavation of material is needed in front of structure 5 to provide adequate and smooth drainage.



Unit 2 - Main body of unit looking SE from NW corner

Unit 2 Levee Bravo looking south.



Unit 2 outlet - water control structure # 5 looking SSE

Unit 2 -Levee foxtrot cut

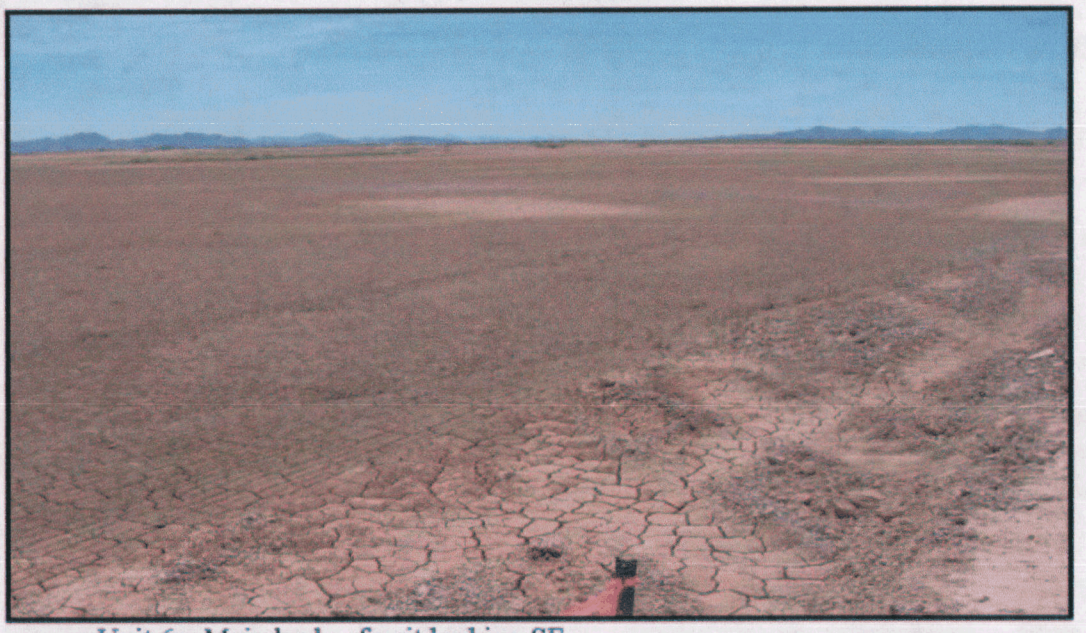
Unit 4 – This unit had the most prolific growth of watergrass of all the moist soil wetland units. All infrastructure was sounds and adequate. Excavation is needed in front of water control structure 9 to connect the central drainage swale to the structure. This will provide positive and complete drainage for the unit.

Unit 4 – water control structure 9 looking south.

Unit 4 – Main body of unit looking SE.

Unit 4 – Levee echo looking south.

Unit 6 – This unit had the least amount of germination at the time of the site visit. All infrastructure was in excellent condition. The structure was set low so Hardison Farms excavated the central drainage swale to water control structure 6 to provide for positive and complete drainage of the unit. Future similar actions may be necessary.

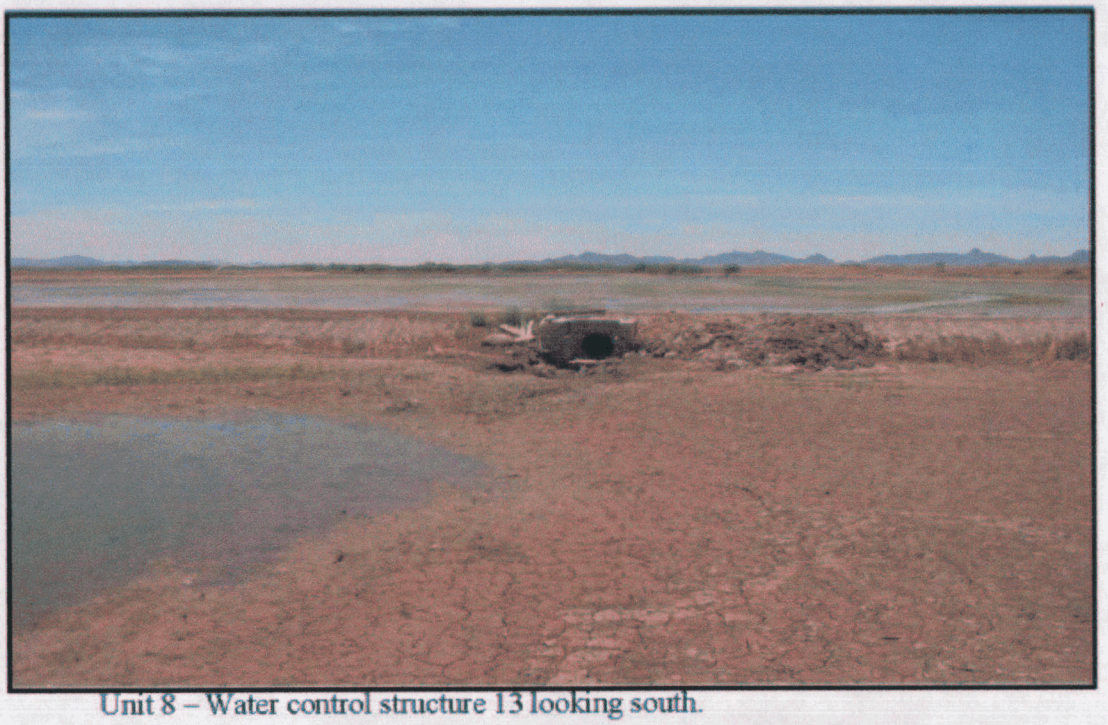


Unit 6 – Main body of unit looking SE.

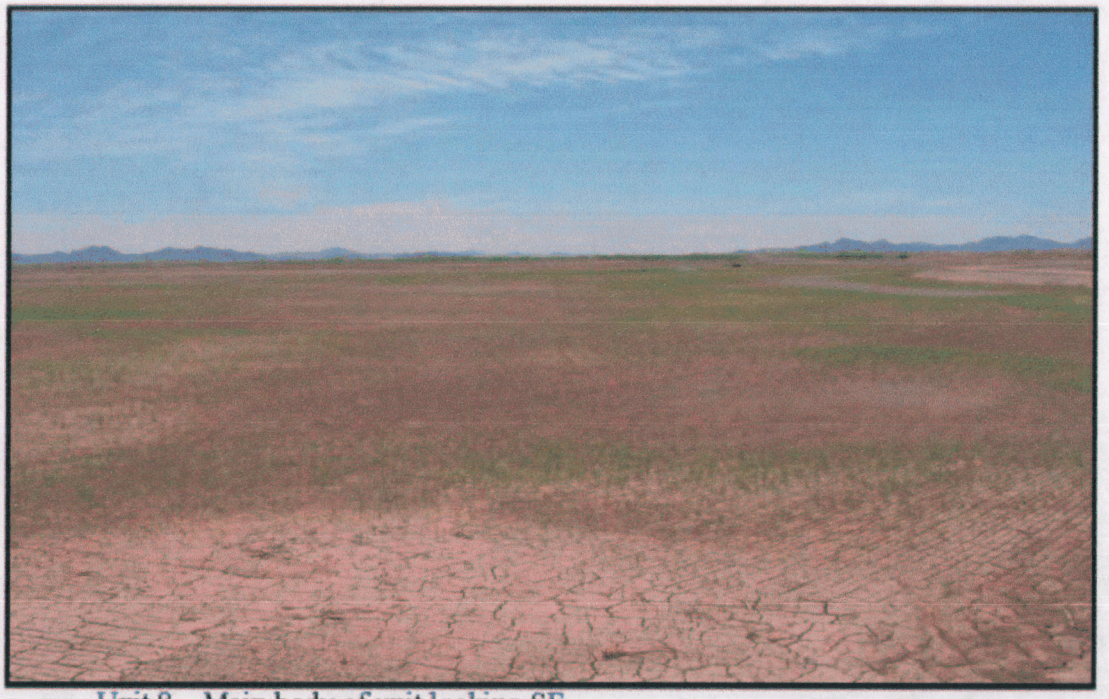
Unit 6 – Levee bravo looking south.

Unit 6 – Water control structure 8 looking SSW.

Unit 8 – This unit had moderate watergrass germination at the timeof the site visit. All infrastructure was in excellent condition. The central drainage swale needed excavation in front of water control structure 13 to provide positive and complete drainage. Additional excavation is still needed.



Unit 8 – Water control structure 13 looking south.

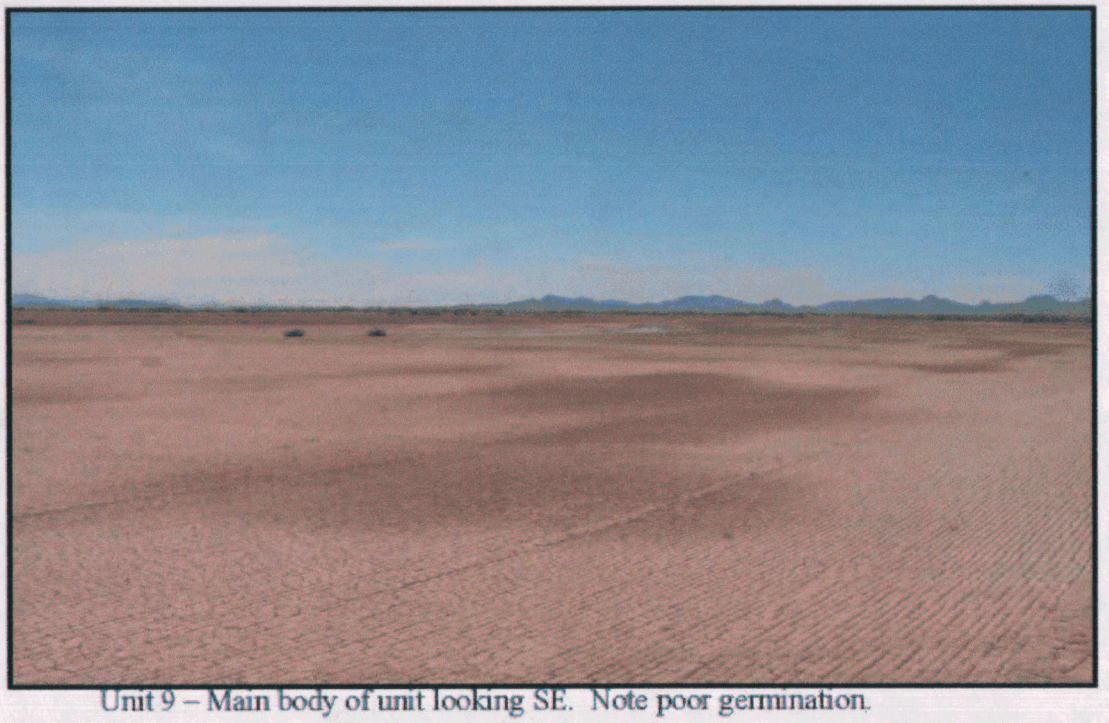


Unit 8 – Main body of unit looking SE.

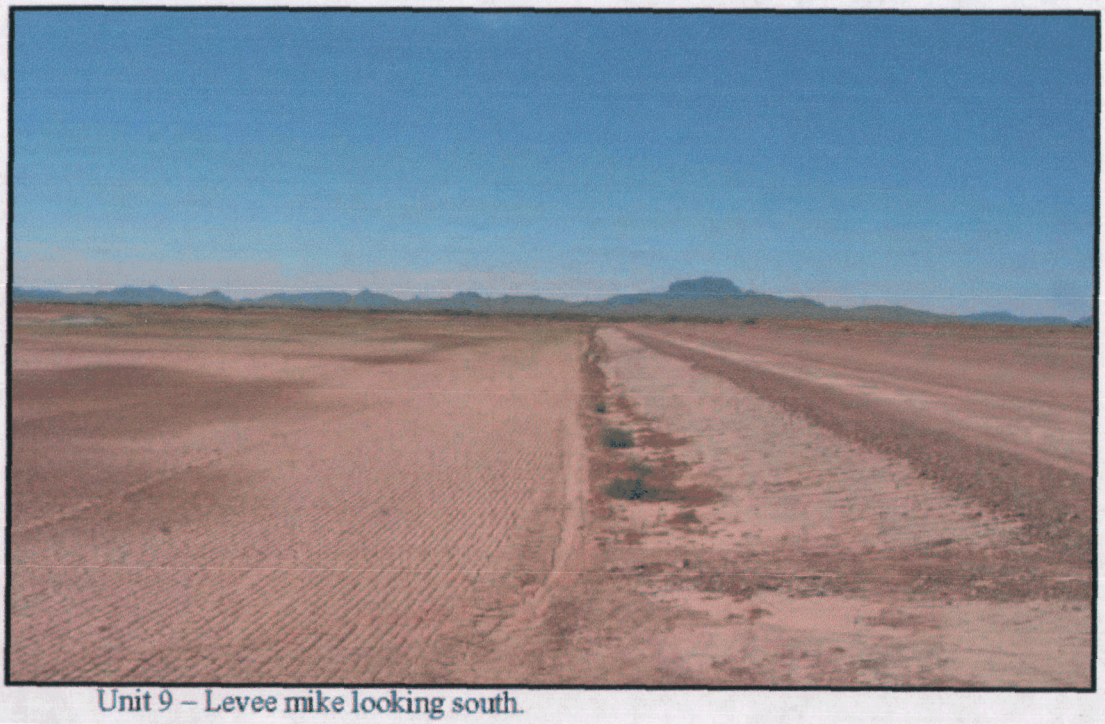
Unit 8 – Levee bravo looking south.

Unit 9 – This unit has the second least germination of water grass. All infrastructure appeared to be in excellent condition. Water control structure (# 19) was set approximately 1-foot lower in elevation than designed. Excavation in front of the structure was necessary to provide positive and complete drainage.

Unit 9 – Water control structure 19 looking south. Note structure elevation.

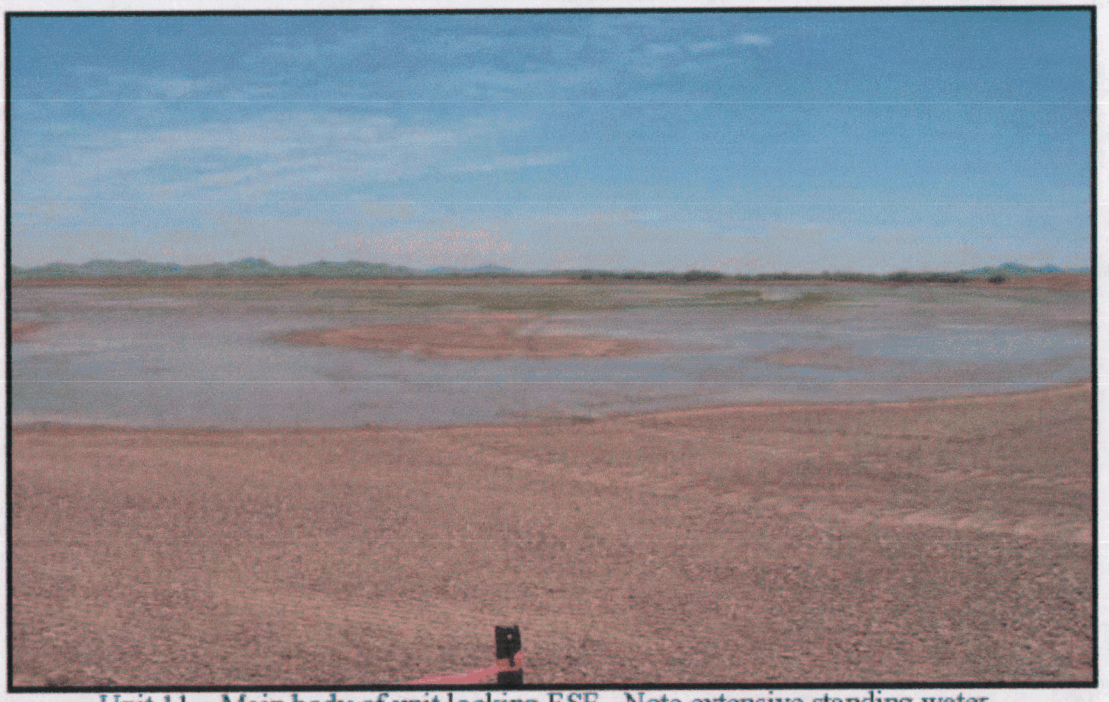


Unit 9 – Main body of unit looking SE. Note poor germination.



Unit 9 – Levee mike looking south.

Unit 11 – All infrastructure in this unit is in excellent condition. Substantial standing water was observed in this unit. Watergrass germination was occurring throughout the unit but only in shallowly flooded and moist soil areas, and not in the deeper (~4 inches) water. Water was backing into the unit from the final drainage ditch. Closer inspection of the ditch revealed reduced flows due to silt accumulation and blockage from weeds. Hardison Farms had excavated some of the silt buildup, but much more is needed to provide adequate drainage of Unit 11.



Unit 11 – Main body of unit looking ESE. Note extensive standing water.

Unit 11 – Water control structure 14. Note standing water.

Unit 11 – Levee bravo looking south.

Final drainage ditch looking west. Note silt and vegetation blockage and standing water.