Supplemental Survey to Ecological Assessment of the Low Level Waste Depository, Andrews County, Texas

Final Report- Revision 1

March 2007

Prepared by URS Corporation

Field Work Performed by Douglas Reagan

TABLE OF CONTENTS

Section Title **Page**

LIST OF TABLES

Table Title **Page**

INTRODUCTION

Ecosystems in the vicinity of the two proposed low-level radioactive waste (LLRW) disposal facilities (LLRW facilities), including the Federal Waste Facility- Non-Canister Disposal Unit, Federal Waste Facility- Canister Disposal Unit, and Compact Waste Facility, and surrounding area are typical of the much larger region of western Texas and adjacent areas of New Mexico. The terrain is gently rolling and is characterized by shallow washes, some of which are bordered by trees. Soil texture ranges from clay loam to fine sand. A few rocky outcrops are present approximately 2 km (~1.2 miles) west-northwest of the proposed LLRW disposal facilities.

Natural vegetation in the region consists primarily of low desert grassland with scattered shrubs and cacti. With few exceptions, the flora and fauna on and in the vicinity of the Site consists of species that occur widely throughout the region. Most of the area is or has been grazed.

The following characterization of flora and fauna present on and near the 1,338-acre Waste Control Specialists, LLC (WCS) site, hereafter referred to as the Site, is based on updated surveys conducted by URS and its subcontractors in March, April, and October 2004 and in June and September 2006. The original surveys were conducted seasonally between May 1996 through May 1997 (Ortega et al. 1997). The report by Ortega et al. (1997) is included in this appendix. The URS surveys were conducted to note any changes from previously documented conditions and to address specific issues of potential concern (e.g., possible presence of the lesser prairie chicken or sand dune lizard on or near the proposed Site). Ecological surveys were conducted in 2006 to establish baseline conditions and provide a basis for future monitoring. This section considers important species, their habitats, and their relative importance in the region.

1.0 AQUATIC ECOLOGY

Aquatic ecology studies have not been conducted in the Site area because there are no permanent and only occasionally ephemeral sources of surface water available on or in the vicinity of the Site. These are insufficient to support aquatic species. The Texas Commission on Environmental Quality (TCEQ), formerly the Natural Resource Conservation Commission (TNRCC) has confirmed that wetlands are not located in the vicinity of the proposed Site.

Pools of water are intermittently present in the vicinity of the Baker Spring outcrop, located approximately one mile (~1.6 km) west-northwest of the proposed Site. These pools may support amphibians (e.g., spadefoot toads [*Scaphiopus multiplicatus*] and the Texas toad [*Bufo speciosus*]) and invertebrates adapted to take advantage of such locations. The area was observed to be completely dry during the March 2004 Site survey. Ephemeral surface water pools and flooded roadside ditches on the site in June 2006 contained calling adult Texas toads (*Bufo speciosus*). Tadpoles of the species were observed by the thousands metamorphosing to the adult stage during the September 2006 surveys.

2.0 TERRESTRIAL ECOLOGY

The WCS Site is located in the High Plains region, also known as the Staked Plains or Llano Estacado, which is part of the central Great Plains. The southern part of the central Great Plains that includes Andrews County is also called the South Plains. The vegetation cover is predominantly arid grassland with scattered shrub cover.

Areas of pristine habitat do not exist near the proposed LLRW facilities. Cattle and other livestock have grazed the region in the past, when the area was primarily ranchland. As in other areas of desert grassland, overgrazing has reduced the importance of many native grasses and increased shrub cover. Yucca and snakeweed, which are overgrazing indicator species, are present over much of the area, as are invasive exotic weeds. Subsequent land development for other purposes has resulted in the removal of additional habitat and the fragmentation of remaining areas by the construction of roads and other rights-of-way. In spite of past and ongoing disturbances, the resulting mosaic of land uses supports diverse flora and fauna typical of the region.

2.1 Flora

The vegetation of the High Plains region is variously classified as mixed prairie, short-grass prairie and in some locations tall-grass prairie. Abundant grasses on Site include buffalo grass (*Buchloe dactyloides*), black grama (*Bouteloua eriopoda*), and blue grama (*Bouteloua gracilis*). Other important grasses are side-oats grama (*Bouteloua curtipendula*), little bluestem (*Schizachyrium scoparium*), western wheatgrass (*Agropyron smithii*), Indian grass (*Sorgastrum avenaceum*), and switchgrass (*Panicum virgatum*). Sand dropseed (*Sporobolus flexuosa*) and sandbur (*Cenchrus incertus*) are common on the sandy lands in the southern portion that includes Andrews County.

The High Plains region is characteristically free from trees or brush, but honey mesquite or mesquite (*Prosopis glandulosa*) and soapweed (*Yucca spp.*) have invaded some areas. Much of the Site and immediate vicinity has a shrub cover dominated by mesquite (*Prosopis glandulosa*). Sand sagebrush or sand sage (*Artemisia filifolia, Artemeisia filifolia*) and sand shinnery oak (*Quercus havardii*) are common on the deep sandy lands north and west of the Site. Forbs are common, but their abundance and diversity are greatly influenced by the amount and timing of rains. Snakeweed (*Gutierrezia sarothrae*), an indicator of overgrazing, is common over most of the Site.Lush herbaceous growth was observed on survey plots at the Site during September 2006, following heavy rains during July and August..

The area in Lea County, New Mexico, immediately west of the Site is described by Dick-Peddie (1993) as plains-mesa sand scrub. Sand sagebrush is described as the most ubiquitous shrub. Hairy grama (*Bouteloua hirsuta*), alkali sacaton (*Sporobolus airoides*), and mesa dropseed (*Sporobolus flexuosus*) are listed as common grasses, and broom snakeweed (*Gutierrezia sarothrae*) and fringed sage (*Artemisia frigida*) are shrubs that are often found in sand scrub.

Shinnery oak scrub is identified as one of the more unusual sand scrub areas found in southeastern New Mexico. In some areas, the vegetation is dominated by sand shin oak (*Q. havardii*) along with a lesser amount of sand sagebrush. Ranchers in nearby areas of western Texas have removed sand shin oak in an effort to improve range conditions for grazing.

During the supplementary survey of the Site and its vicinity in March 2004, current conditions were noted and any changes from the earlier surveys were to be documented. Only minor changes in land use (e.g., construction of new access roads and construction of facilities on adjacent properties) were observed. The survey confirmed that vegetation cover on and near the Site had not changed substantially from previous quantitative surveys. Small areas of vegetation south of the proposed LLRW facilities had been removed for development of existing RCRA landfills. Prickly pear and yucca plants were in evidence at several locations, scattered among the sparse grasses and mesquite. The buffalo wallows (playas) on Site had a denser cover of grasses and shrubs, consistent with the report prepared by Ortega et al. (1997).

Endangered and protected flora were not identified during the 1997, 2004, or 2006 surveys, and none are expected to occur on Site.

2.2 Fauna

During the update surveys in March and October 2004 and in June and September 2006, URS personnel and subcontractors added additional fauna to the list of species at the Site and vicinity. Habitats had not changed and observations of additional species by WCS and URS personnel may be due to seasonal variations. All surveys documented species observed on Site, and addressed the potential occurrence of threatened, endangered, and otherwise protected species.

Mammals – Mammals were surveyed by Ortega et al. (1997) and during 2006 surveys. Observation included trapping small mammals in the sample plots established for vegetation surveys and by observing the sign or call of medium-sized and large mammals encountered during any of the ecological surveys. A list of the mammals encountered on the Site and vicinity is included in Ortega et al. (1997).

Common species observed on the Site include northern grasshopper mouse (*Onychomys leucogaster*), hispid cotton rat (*Chaetodipus hispidus*), Ord's kangaroo rat (*Dipodomys ordii*), silky pocket mouse (*Perognathus flavus*), black-tailed jackrabbit (*Lepus californicus*), southern plains woodrat (*Neotoma micropus*), and deer mouse (*Peromyscus maniculatus*). The coyote (*Canis latrans*) was heard frequently on the Site and vicinity, and tracks of the raccoon (*Procyon lotor*) were observed in muddy areas in December 1996. A herd of 20 to 30 deer was occasionally observed within the boundaries of the WCS Site..

The observed diversity of mammals is consistent with expectations for disturbed grasslands and shrublands and indicates that all major functional groups (e.g., carnivores, omnivores, scavengers, and herbivores) are present.

The March 2004 survey confirmed that the deer herd present on and around the Site is mule deer (*Odocoileus hemionus*), rather than white-tailed deer, as tentatively indicated in the Ortega et al. (1997) report. A pair of collared peccaries, locally known as javelina, (*Tayassu tajacu*) was observed in the vegetation near the abandoned ranch house, east of the proposed LLRW facilities in March 2004. A group of seven individuals was observed in the same area during surveys in September 2006. Mule deer and peccaries are game species of interest in the region.

Birds – Birds were surveyed through observation and by call at the Site and its vicinity to document species, potential breeding species, seasonal migrants, and winter residents. Additional observations were made during a field reconnaissance visit in March 2004 and in June 2006. Typical species observed included are listed in Table 2.2-1.

Table 2.2-1. Common bird species.

Species	Resident	Spring	Summer	Game
American kestrel (*Falco sparverius*),	X			
Barn owl (*Tyto alba*)	X			
Barn swallow (*Hirundo rustica*)	X			
Chihuahuan raven (*Corvus cryptoleucus*)	X			
Flycatchers (family Tyrannidae)		X		
Greater roadrunner (*Geococcyx californicus*)	X			
Horned lark (*Eremophila alpestris*)			X	
Hummingbirds (family Trochilidae)		X		
Scaled quail (*Callipepla squamata*)	X			X
Sparrows (old world family Passeridae)	X			
Swainson's hawk (*Buteo swainsoni*),	X			
Turkey vulture (*Cathartes aura*),	X			
White-crowned sparrow (*Zonotricha albicolis*)			X	
Wrens (family Troglodytidae)		X		

A barn owl (*Tyto alba*) was observed at Baker Spring during the March 2004 survey. A recently dead specimen was found in the same area during the June 2006 surveys. The species is common in all four southwestern deserts. Barn owls hunt for rodents along desert washes, where trees are present. Suitable habitat exists at Baker Spring and in the vicinity of the abandoned ranch house located on the easternmost portion of the Site. No washes or trees are present in areas of proposed Site development. A list of birds encountered and likely to occur in the region and their residency status at the Site and its vicinity is presented by Ortega et al. (1997), and provided in this appendix.

All bird species encountered on and near the Site are consistent with the range information provided in Ortega et al. (1997) and references cited therein and with other records from the Site vicinity. It is likely many of the summer resident species breed and raise their young on or in the vicinity of the Site.

Historically, a WCS ranch manager reported seeing a female lesser prairie chicken (*Tympanuchus pallidicinctus*) near the Site (Ortega et al. 1997), but the sighting was never verified. Although the Site is outside the known range of the species, areas of suitable habitat (e.g., shinnery oak) are present within a 5 km (~3.1-mile) radius of the Site. On the basis of this report, a survey of the Site and the vicinity (5 km) radius was conducted in April 2004 (Lyons, 2004) to determine species presence or document the occurrence of leks. The Lyons report is provided in this appendix. No active leks or prairie chickens were detected during the Lyons survey, which included standard methods. Surveys were conducted by a researcher who was familiar with standard techniques used to census this species in New Mexico and Texas. New Mexico's Department of Game and Fish completed a lesser prairie chicken survey in 2000, examining the northern portion of Lea County, along with portions of Chavis, Roosevelt, and De Baca counties (Massey and Dunn, 2000). The New Mexico report did not include the area adjacent to the WCS Site; the Lyons' report is provided in this appendix. The U.S. Fish and Wildlife Service currently list the lesser prairie chicken as a Candidate Species, Category 1. Recent decline in population numbers of the lesser prairie chicken, a species that prefers

shinnery oak habitat, has shifted concern on public lands towards protection of this habitat. Texas allows limited hunting of lesser prairie chickens in the Panhandle region.

Reptiles and Amphibians – The presence of reptiles and amphibians was noted by investigators whenever they were on the Site and its vicinity. One amphibian, the Texas toad (Bufo speciosus) was observed on the Site during the June and September surveys in 2006. Species typically encountered during surveys included the New Mexico spadefoot [toad] (*Scaphiopus multiplicatus*), Texas toad (*Bufo speciosus*),ornate box turtle (*Terrapene ornata*), Texas spotted whiptail lizard (*Cnemidophorus gularis*), and western coachwhip snake (*Masticophis flagellum*). In addition, the Site is populated with western diamondback rattlesnakes (*Crotalus atrox*), prairie rattlesnakes (*Crotalus viridis viridis*), and plains hognose snakes (*Heterodon nasicus nasicus*), .

The reptiles and amphibians observed on and near the Site are consistent with those expected in the area, based on the home range maps presented in Raun and Gehlbach (1972). A complete list of reptiles and amphibians encountered on and near the proposed Site is listed in Ortega et al. (1997), and provided in this appendix. The sand dune lizard, recently listed by the U.S. Fish and Wildlife Service as a Candidate species, occurs in the region but was not found on the Site. This species inhabits sand dune "blowouts" topped by shinnery oak. Although sandy soils and shinnery oak occur north and west of the Site, none occurs on the Site. Site development is unlikely to adversely affect the species. Threats to its survival come from removal of shinnery oak to improve grazing and surface disturbance for oil and gas development in the region.

Invertebrates – In August and September 1996, invertebrates were collected in the five sample plots using pit traps and by sweep-netting at locations over the entire 14,865-acre WCS property (Ortega et al., 1997). Invertebrates commonly encountered included scorpions (Scorpionida) and wind-scorpions (Solifugae), ground beetles (Carabidae), long-horned beetles (Cerambicidae), wasps (Chalcidoidae), leafhoppers (Cicadellidae), ants (Formicidae), blister beetles (Meloidae), grasshoppers (Orthoptera), stink bugs (Pentatomidae), darkling beetles (Tenebrionidae), cicadas (Cicadidae), weevils (Curculionidae), praying mantis (Mantidae), grasshoppers and crickets (Orthoptera), picture-wing flies (Otitidae), walking sticks (Phasmidae), ambush bugs (Phymatidae), scarab beetles (Scarabaeidae), Shield-back bugs (Scutelleridae), and hornets (Vespidae). Their distribution among the sample plots was fairly uniform, and all are considered typical inhabitants of the habitats present on Site.

Invertebrates were sampled in June and September 2006 using pit traps and sweep nets. Crab spiders (Salticidae) were collected in northern and southern plots. Large numbers of velvet mites (Trombidiidae) emerged across the site after a brief rain event. Twenty-five families of insects were collected. Ants, grasshoppers, wasps, and moths were common.

3.0 IMPORTANT SPECIES

Consistent with the criteria provided by the U.S. Nuclear Regulatory Commission (NRC), important species identified during surveys included those of regulatory concern, game species, species that affect the well-being of other important species, species that serve as indicators of radionuclides or chemical contaminants, and those that could pose potential hazards to facility development. Each group is addressed in the following sections:

3.1 Species of Regulatory Concern

Ortega et al. (1997) identified five species listed as federal and/or state threatened or endangered (U.S. Fish and Wildlife Service, 1999; Texas Parks and Wildlife Department, 2006) that occur or could occur on the Site and its vicinity and four game species that occur or could occur on the Site and its vicinity. Species that were listed in 2006 as federal and/or state threatened or endangered that could occur on the Site and in the vicinity are summarized in Table 3.1-1:

Table 3.1-1. Species of Regulatory Concern

Species	Suitable Habitat at WCS	Federal Endangered	Texas Endangered	Federal Threatened	Texas Threatened	Federal Candidate Species, Category 1
Birds						
American Peregrine Falcon (*Falco peregrinus*)	No. WCS may be on migration route		X			
American Swallow-tailed Kite (*Elanoides forficatus*)	No. WCS may be on migration route				X	
Bald Eagle (*Haliaeetus leucocephalus*)	No. WCS may be on migration route				X	
Lesser Prairie Chicken (*Tympanuchus pallidicinctus*)	Marginal habitat present Not observed on WCS property					X
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	No. WCS may be on migration route	X	X			
Whooping Crane (*Grus americana*)	No. Not observed on or near Site.	X	X			
Mammals						
Black-tailed Prairie dog (*Cynomys ludovicianus*)	No. Not observed on or near Site.					X
Reptiles						
Texas Horned Lizard (*Phrynosoma cornutum*)	Yes. Observed on the Site.				X	
Sand Dune Lizard (*Sceloperus arenicolus*)	Suitable habitat exists on WCS property near but not on the Site					X

3.2 Economically Important Species

Game species of importance are summarized in Table 3.2-1. Development of the Site will not have a significant impact on these species in Andrews County. All of these species were observed on or in the vicinity of the Site between 1997 and 2006.

Table 3.2-1. Economically Important Species

Species	Hunting Permitted in		Hunting Permitted in	
	Texas	Andrews Co.	New Mexico	Lea Co.
Mule deer (*Odocoileus hemionus*)	Yes	Yes	Yes	Yes
Scaled quail (*Callipepla squamata*)	Yes	Yes	Yes	Yes
Mourning dove (*Zenaida macroura*)	Yes	Yes	Yes	Yes
Northern bobwhite (*Colinus virginianus*)	Yes	Yes	Yes	Yes
Collared peccary (*Tayassu tajacu*)	Yes	Yes	Yes	Yes
Lesser prairie chicken (*Tympanuchus pallidicinctus*)	Yes	No	No	No

Source: Texas Parks and Wildlife http://www.tpwd.state.tx.us/hunt/regs/2004/county_listing/a/#andrews

New Mexico Department of Game and Fish http://www.wildlife.state.nm.us/recreation/hunting/index.htm

3.3 Other Species of Potential Concern

Guidance contained in NUREG-5615 (NRC, 1990) indicates that deep-rooted plants and burrowing animals on Site may potentially affect the design and operation of the closure system. While the plants in a vegetated waste disposal cover system design can minimize drainage and erosion, there is the potential that their roots could grow into the waste, which could create a preferential infiltration pathway for water when they decay. Burrows of animals such as prairie dogs, ground squirrels, gophers, and ants could also allow water to drain into the waste. Animals also bring soil to the surface, which, if their burrows have penetrated the waste, could result in dispersal of and exposure to the waste (Link et al., 1995).

Native prairie grasses and shrubs in Andrews County are known to be deep-rooted. In addition, burrowing animals such as the Mexican ground squirrel (*Citellus mexicanus*), pocket gophers, and ants have been encountered on the Site. Therefore, the design of the LLRW disposal facilities will take their presence into account by incorporating a biointrusion barrier in the multi-layer cover system and instituting other appropriate controls.

None of the plant or animal species present or expected to occur on the Site belong to groups that have been identified as particularly sensitive to radiation.

4.0 IMPACTS AND MITIGATION

Impacts of Site development and operation are expected to have insignificant negative impacts on the ecosystems and their constituent species. Vegetation types found on and near the Site, which are widespread in the region, have characteristics indicative of prior disturbance (e.g., grazing and surface disturbance). The only endangered or threatened species known or likely to inhabit the Site is the Texas horned lizard. Site development will temporarily reduce the area of available habitat on Site and may result in the incidental loss of a few individual lizards during land clearing. Minor and insignificant habitat loss for game species will also occur as the result of Site development.

Habitat restoration will occur over much of the Site, which should compensate for the temporary disturbance and create more favorable (i.e., better quality) habitat for affected species. Areas of existing habitat will be protected from further disturbance during Site facility operation. The type and quality of habitat to be restored will be based on a quantitative assessment of the severity, extent, and duration of habitat service losses using Habitat Equivalency Analysis (HEA).

HEA methodology provides an appropriate mechanism for determining the type, extent (i.e., acreage, and quality of habitats to be restored as mitigation for physical disturbances related to site development and operation). The method has been widely used in contamination assessments for similar purposes. The unit of measure is discounted service acre years (DSAYs). Implementation of the process will be initiated following receipt of the LLRW facility license. Texas State trustee agencies (e.g., TCEQ, TP&W) will be involved in the HEA analysis, as appropriate. The HEA process will be performed by URS under contract to WCS. A management and monitoring plan will be developed as part of the HEA detailing the types and quality of data on Site ecology to be collected and the amount and types of restoration and other mitigation measures to be implemented will also be developed following receipt of the LLRW disposal license.

REFERENCES

Bonham, C.D., 1989, Measurements for Terrestrial Vegetation, John Wiley & Sons, New York.

Lyons, E.K., 2004, Survey of Lesser Prairie Chickens at the Low Level Waste Depository, Andrews County, Texas.

Massey, M. and B. Dunn, 2000, Survey for Active Lesser Prairie-Chicken Leks: Spring 2000 Revised Report November 1, 2000, New Mexico Department of Game and Fish Project W-104-R-40.

Ortega, L. M., et al., 1997, Ecological Assessment of the Low Level Waste Repository, Andrews County, Texas.

Raun, G. G. and F. R. Gehlbach. 1972. Amphibians and reptiles in Texas: Taxonomic synopsis bibliography and county distribution maps. Bulletin No. 2, Dallas Museum of Natural History.

Reagan, D. P. 2004. Habitat Characterization and Rare Species Survey for the Proposed Low Level Waste Repository, Andrews County, Texas.