USE ATTAINABILITY ANALYSIS

for Waters Located on Los Alamos National Laboratory as described in Sections 20.6.4.126 and 128 NMAC New Mexico Water Quality Standards, July 17, 2005

Prepared by the New Mexico Environment Department
Surface Water Quality Bureau
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INTRODUCTION

The New Mexico Water Quality Control Commission's 2005 amendments to the State's surface water quality standards (20.6.4 NMAC) added Segments 126 and 128, both located on Los Alamos National Laboratory (LANL) property, as newly classified surface waters. The segment descriptions, designated uses and criteria from the 2005 amendments are included as Attachment 1. A map showing these segments is presented in Attachment 2.

For Segment 126, the recreational use was designated as secondary contact. For Segment 128, the recreational use was designated as secondary contact and the aquatic life use was designated as limited aquatic life. These uses are defined in 20.6.4.7 NMAC. Because secondary contact and limited aquatic life uses are not considered by EPA to satisfy the goal in Section 101(a)(2) of the Clean Water Act to provide for "the protection and propagation of fish, shellfish, and wildlife" and for "recreation in and on the water," the State is required by 40 CFR 131.10(j) to conduct a use attainability analysis (UAA).

The New Mexico Environment Department (NMED) has prepared this UAA to provide documentation as to the attainable recreation and aquatic life uses in Segments 126 and 128. The UAA relies on analyses of flow data from LANL stream gages, literature regarding the habitat requirements of fish species in the ecoregion, and the findings of an assessment of the physical, chemical and biological characteristics of LANL streams conducted by Lusk and MacRae (2002).

The UAA concludes that a secondary contact use is attainable in the two segments, and that a limited aquatic life use is attainable in Segment 128. Natural conditions of low flow and water level, the factor identified in 40 CFR 131.10(g)(2), prevent the attainment of primary contact uses in both segments as well as the attainment of a Section 101(a)(2) aquatic life use in Segment 128.

RECREATIONAL USES

Data collected by Lusk and MacRae (2002) and LANL stream gage data indicate that recreational use of Segments 126 and 128 is limited by low flows and water levels. Lusk and MacRae established six sampling stations on stream reaches included in Segment 126. Measurements (converted to English units) of stream discharge, wetted width and water depth at these stations are summarized in Table 1. These data indicate a maximum pool depth of approximately 9 inches and an average depth less than 5 inches. Photographs of typical pools and water levels at Lusk and MacRae sampling stations are shown in Attachment 3. Photographs, taken by representatives of the NMED Department of Energy Oversight Bureau, of stream reaches in Segment 128 are shown in Attachment 4.

Streamflow data from LANL gaging stations confirm that flow regimes in this area are dominated by low flows. Table 2 presents data from gaging stations on two streams in Segment 126. Mean and median daily flows are 0.1 cfs or lower for both streams. The data indicate that flows are very low on most days in the average year: less than 0.1 cubic feet per second (cfs) on 79% and 84% of days in the two streams respectively, and less than 0.2 cfs on 90% and 88% of days.

Table 3 presents data from gaging stations on stream reaches in Segment 128. Similar to the streams in Segment 126, these data also indicate low mean and median daily flows. In the average year, flows in these streams were less than 0.1 cfs on 77% to 100% of days.

Table 1
Dimensions of Streams in Segment 126

Stream Reach	Flow, cubic feet per second	Ave. Wetted Width, Feet	Max. Depth, inches	Mean Depth, inches
Segment 126				
Upper Cañon de Valle	0.1	2.3	7.1	2.0
Lower Cañon de Valle	0.15	2.3	4.7	2.4
Upper Sandia	0.55	4.3	9.1	3.5
Lower Sandia	0.3	4.4	8.9	4.7
Upper Pajarito	0.32	3.3	8.7	3.2
Lower Pajarito	0.3	5.2	5.1	2.4

Adapted from Lusk and MacRae (2002), pp. 230-231

Table 2
Streamflow data, Segment 126

Gaging Station	Period of Record	Mean Daily Disch., cfs	Median Daily Disch., cfs	Max. Daily Disch., cfs	% of days per year	
					Flow < 0.1 cfs	Flow < 0.2 cfs
Cañon de Valle below MDA-P	10/1/03 - 9/30/05	0.10	0.00	2.75	79%	90%
Water Canyon at SR-501	10/1/94 - 9/30/05	0.08	0.01	28.00	84%	88%

From LANL Water Quality Database, http://wqdbworld.lanl.gov

Table 3
Streamflow Data, Segment 128

Gaging Station	Period of Record	Mean Daily Disch., cfs	Median Daily Disch., cfs	Max. Daily Disch., cfs	% of days per year	
					Flow < 0.1 cfs	Flow < 0.2 cfs
Mortandad Canyon above Sediment Traps	10/1/96 - 9/30/05	0.00	0.00	1.70	99.9%	100%
Los Alamos Canyon above SR-4	10/1/94 - 10/1/05	0.31	0.00	15.91	78%	79%
Water Canyon at SR-4	1/1/95 - 9/30/05	0.05	0.00	10.64	94%	94%
Pajarito Canyon above Starmers Gulch	3/22/99 - 9/30/05	0.10	0.01	72.43	77%	80%

From LANL Water Quality Database, http://wqdbworld.lanl.gov

Higher flows do occur in these streams in response to rainfall and snowmelt events. Water levels tend to rise and then fall again very quickly, creating hazardous and sometimes destructive flash flood conditions. Lusk and MacRae (p. 49) discuss the effects of high-flow events on the fish cages they placed in the streams: “Cages frequently had large amounts of sediment deposited in them, were thrown from the stream, were ripped, or broken.” Stream gaging data provide the quantitative record of these events. The maximum daily discharge shown for Water Canyon in Table 2 is 28 cfs. The flow recorded for the previous day was only 0.02 cfs. Figures 1 depicts the hydrograph at this station in Water Canyon for a month in the summer of 2001. Figure 2 shows the spring 2005 hydrograph for Los Alamos Canyon near State Road 4. The pattern of rapidly changing water levels quickly returning to a low-flow condition is clearly evident in both hydrographs.

Figure 1

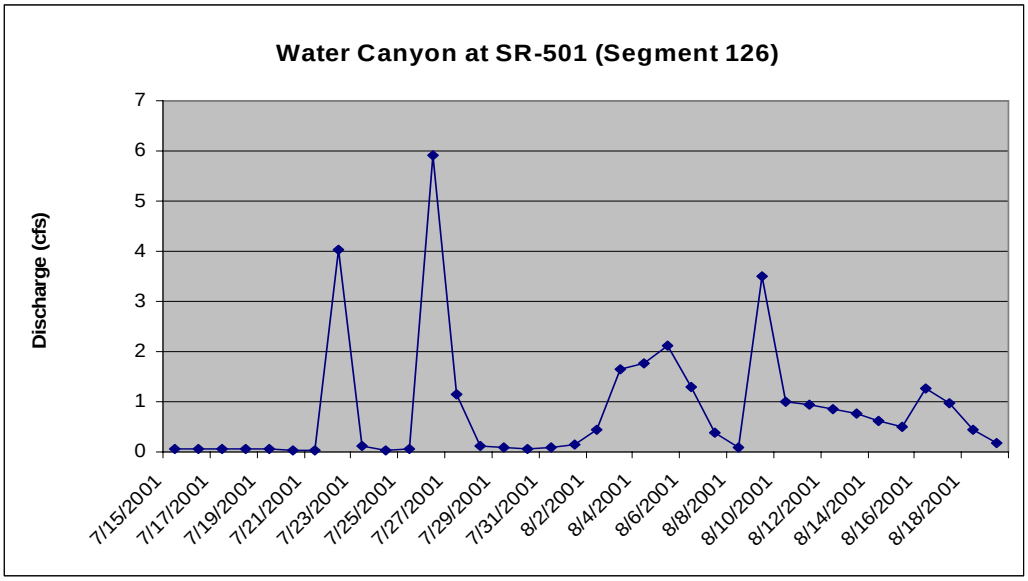
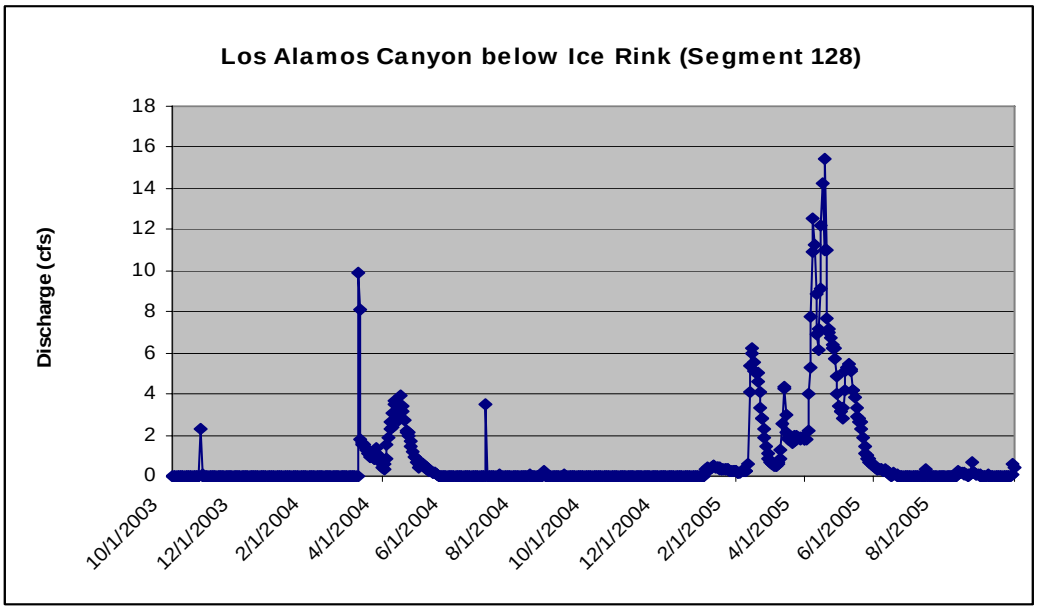


Figure 2



The term ”primary contact” in 20.6.4.7 NMAC is defined as “any recreational or other water use in which there is prolonged and intimate human contact with the water, such as swimming and water skiing, involving considerable risk of ingesting water ….” Guidance developed by EPA Region 6 on recreation standards (http://www.epa.gov/earth1r6/6wq/ecopro/watershd/standard/recguide.htm) recommends that water bodies with sufficient flow and depth to provide for total body immersion, generally 18 inches of water depth, be presumed to support primary contact activities. The flows and depths presented here for Segments 126 and 128 are too low on most days to provide either for total body immersion or for prolonged and intimate contact with the water. Occasional higher flows are of short duration and typically create conditions hazardous for recreational activities involving immersion.

Recreational use of the waters in Segments 126 and 128 is also limited by difficult and restricted access as the streams are located in narrow canyons on property owned by the Department of Energy. Access by the general public is not permitted in any of the streams and is restricted by fencing, signs and, in some areas, security patrols (Fisher 2005). Based on observations made by Lusk and MacRae, some secondary contact recreation does occur along stream reaches in both segments, but primary recreation was not observed.

With the exception of Los Alamos Canyon, none of the watercourses in Segments 126 and 128 is subject to human modifications such as impoundments or diversions that alter the natural flow regime. However, Los Alamos reservoir is located in the upper reaches of Los Alamos Canyon above Segment 128. Since the Cerro Grande fire in May 2000, the reservoir has operated as a pass-through system because the drain at the bottom of the dam is not working properly. Water exits the reservoir through the currently open drain and by flow over the spillway when the reservoir is full. Because the reservoir is operating as a pass-through system, it currently does not significantly affect the natural flow regime of the stream and is not considered to impair downstream uses. The county plans to rehabilitate the dam for recreational and water supply uses, although no timeframe has been established. If the dam is again operational at some point in the future, its impact on the downstream flow regime and uses may need to be reevaluated.

The waters of Segments 126 and 128 have not been assessed by the State for bacterial contamination nor did Lusk and MacRae sample for pathogens, but it is expected that water quality is generally not impaired for recreational uses. The surrounding area supports wildlife, including elk and deer; however, livestock grazing is not permitted on LANL property. Bacterial contamination resulting from the presence of wildlife or incidental livestock is not expected to exceed primary contact criteria, except perhaps during high flows. Sandia Canyon in Segment 126 receives treated effluent from a LANL wastewater treatment plant. Review of the 2006 and 2007 Discharge Monitoring Reports for this outfall revealed a maximum fecal coliform bacteria concentration (13 colonies/100 mL) that does not impair primary contact use.

In conclusion, secondary contact recreation is an existing and attainable use for the stream reaches in Segments 126 and 128. Hydrologic modifications do not currently affect recreational opportunities, and water quality likely supports both secondary and primary contact activities. Nevertheless, primary contact is not an attainable use because flows and water levels are generally too low for full body immersion or prolonged and intimate contact with the water. This is the factor identified in 40 CFR 131.10(g)(2): “Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use…” Hazardous high-flow conditions and restricted access also limit the feasibility of primary contact recreation.

SEGMENT 20.6.4.128 AQUATIC LIFE USE

Lusk and MacRae (2002) provide information from numerous sources indicating that ephemeral and intermittent streams in the Jemez mountains support aquatic life that includes aquatic invertebrates and perhaps amphibians, but not fish. Their electrofishing surveys in the Sandia, Pajarito and Valle Canyon stream reaches did not locate fish. These sampling stations were on Segment 126 stream reaches that are continuous with Segment 128 watercourses (see map in Attachment 2). The water bodies included in

Segment 128 are identified as ephemeral and intermittent and therefore do not flow for varying periods throughout the year. Support of a fishable use in these types of water bodies would require a source population of fish that could enter and occupy these waters during wet periods. Lusk and MacRae's data indicate there is no source population existing in upstream perennial waters in the canyons they surveyed, and the 700-ft drop from the Pajarito Plateau into White Rock Canyon is too steep for fish to migrate up from the Rio Grande.

Hatch, et al. (1998) and Sublette, et al. (1990) were reviewed to identify native species of fish that might inhabit waters in this region. Hatch, et al. list 27 fish species that are native to the Rio Grande drainage. Review of the literature and a corresponding map of Level III Ecoregions (Griffith, et al. 2006) shows that six of these native species might be found in the ecoregion that includes Segment 128 (Ecoregion 21). Habitat requirements for these six species are shown in Table 4.

Table 4
Distinctive Fish Species Native to the Rio Grande Drainage and Level III Ecoregion 21[1]

COMMON NAME	SCIENTIFIC NAME	HABITAT[2]
Rio Grande cutthroat trout	*Oncorhynchus clarki virginalis*	Prefers clear, cold streams and lakes.
Rio Grande chub	*Gila pandora*	Found in impoundments and pools of small to moderate streams.
fathead minnow	*Pimephales promelas*	Found in a wide variety of habitats in rivers, streams, lakes, and ponds.
longnose dace	*Rhinichthys cataractae*	Seeks the interstices between stones in gravel-rock substrates of riffle areas of streams or in the surge zone or deeper water of lakes.
Rio Grande sucker	*Catostomus plebeius*	Lives in small to large, middle elevation (2,000 - 2,600 m) streams usually over gravel an cobble, but also in backwaters and in pools below riffles.
white sucker	*Catostomus commersoni*	Inhabits lakes, streams, and rivers in New Mexico, usually above 1,372 m in elevation.

[1]*Adapted from Hatch, et al. (1998)*
[2]*Adapted from Sublette, et al. (1990)*

Lusk and MacRae list nine "Fish of the Jemez Mountains." Table 5 reproduces this list. Three of the species, rainbow trout, brown trout and brook trout, are not native to the Jemez mountains.

Based on the habitat requirements shown in Table 4 and the guild assignments in Table 5, populations of these species do not survive and propagate in ephemeral or intermittent streams. The waters in Segment 128, therefore, cannot support a Section 101(a)(2) aquatic life use. Because a number of non-fish aquatic life populations are sustained along these streams, the "limited aquatic life" use subcategory is appropriate to protect both existing and attainable aquatic life uses.

According to Appendix A of the 2006-2008 303(d)/305(b) Integrated Report (NMED/SWQB 2007), water quality in seven assessment units in Segment 128 was not supporting attainment of the limited aquatic life use. The listings related to limited aquatic life use were based on exceedence of criteria for four metals: aluminum, cadmium, copper, and zinc. The listings were based on stormwater data. Investigation into the probable sources of these metals continues. When metals occur in water in higher than natural concentrations they can be highly toxic and cause major disruptions of aquatic ecosystems; however, numerous aquatic life populations, e.g., Diptera, have been shown to be highly tolerant of contamination from metals. The aquatic life use may be significantly altered, but still attainable under these conditions. At this point, there is not enough information to conclude that these exceedences prevent eventual attainment of the limited aquatic life use or other subcategories of aquatic life use.

Table 5
Fish of the Jemez Mountains

COMMON NAME	SCIENTIFIC NAME	GUILD			
		Fully Aquatic	Semi Aquatic	Riparian	Terrestrial
Fish of the Jemez Mountains					
Rio Grande cutthroat trout	*Oncorhynchus clarki virginalis*	Yes	No	No	No
rainbow trout	*Oncorhynchus mykiss*	Yes	No	No	No
brown trout	*Salmo trutta*	Yes	No	No	No
brook trout	*Salvelinus fontinalis*	Yes	No	No	No
Rio Grande chub	*Gila pandora*	Yes	No	No	No
fathead minnow	*Pimephales promelas*	Yes	No	No	No
longnose dace	*Rhinichthys cataractae*	Yes	No	No	No
Rio Grande sucker	*Catostomus plebeius*	Yes	No	No	No
white sucker	*Catostomus commersoni*	Yes	No	No	No

Adapted from Lusk and MacRae (2002), p. 127

As discussed for recreational uses, the dam in Los Alamos Canyon is currently operating as a pass-through system. As such, it does not significantly affect the natural flow regime of the stream and is not considered to impair downstream uses. There are no other dams or diversions affecting the waters in Segment 128.

In conclusion, a limited aquatic life use is attainable on stream reaches in Segment 128. Because fish species in Ecoregion 21 cannot survive in ephemeral and intermittent streams, Segment 128 streams cannot attain the Section 101(a)(2) aquatic life use due to the factor identified in 40 CFR 131.10(g)(2).

REFERENCES:

Fisher, Frederick M. 2005. Direct Testimony in the Matter of the Triennial Review of Standards for Interstate and Intrastate Surface Waters, 20.6.4 NMAC. WQCC 03-05 (R).

Griffith, G. E., Omernik, J. M., McGraw, M. M., Jacobi, G. Z., Canavan, C. M., Schrader, T. S., Mercer, D., Hill, R., and Moran, B. C. 2006. Ecoregions of New Mexico (color poster with map, descriptive text, summary tables and photographs). Reston, Virginia. United States Geological Survey (map scale 1:1,400,000). http://www.epa.gov/wed/pages/ecoregions/nm_eco.htm.

Hatch, M.D., Cowley, D.E., Sublette, J.E., Jacobi, G.Z. and Hermann, S.J. 1998. *Native Fish Faunal Regions in New Mexico*, 54p (Appendix to Development of an Index of Biotic Integrity for Use in Water Resource and Fishery Management, Project No. 01, Federal Aid Grant F-59-R-7).

Lusk, J.D. and MacRae, R.K. 2002. *A Water Quality Assessment of Four Intermittent Streams in Los Alamos County, New Mexico*. United States Fish and Wildlife Service, New Mexico Ecological Services Field Office, Environmental Contaminants Program, Albuquerque, NM. 262p.

NMED/SWQB New Mexico Environment Department / Surface Water Quality Bureau.2007. *2006-2008 State of New Mexico Integrated Clean Water Act §303(d) / §305(b) Report*, Santa Fe, NM.

Sublette, J.E., M.D. Hatch and M. Sublette. 1990. *The Fishes of New Mexico*, University of New Mexico Press, Albuquerque, NM.

Attachment 1

SEGMENT DESCRIPTIONS, DESIGNATED USES, AND CRITERIA

20.6.4.126 RIO GRANDE BASIN - Perennial portions of Cañon deValle from Los Alamos national laboratory (LANL) stream gage E256 upstream to Burning Ground spring, Sandia canyon from Sigma canyon upstream to LANL NPDES outfall 001, Pajarito canyon from Arroyo de La Delfe upstream into Starmers gulch and Starmers spring and Water canyon from Area-A canyon upstream to State Route 501.

A. Designated Uses: coldwater aquatic life, livestock watering, wildlife habitat and secondary contact.

B. Criteria:

(1) In any single sample: pH within the range of 6.6 to 8.8 and temperature 24°C (75.2°F) or less. The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of E. coli bacteria 548 cfu/100 mL or less; single sample 2507 cfu/100 mL or less (see Subsection B of 20.6.4.14 NMAC).

20.6.4.128 RIO GRANDE BASIN - Ephemeral and intermittent portions of watercourses within lands managed by U.S. department of energy (DOE) within LANL, including but not limited to: Mortandad canyon, Cañada del Buey, Ancho canyon, Chaquehui canyon, Indio canyon, Fence canyon, Potrillo canyon and portions of Cañon de Valle, Los Alamos canyon, Sandia canyon, Pajarito canyon and Water canyon not specifically identified in 20.6.4.126 NMAC. (Surface waters within lands scheduled for transfer from DOE to tribal, state or local authorities are specifically excluded.)

A. Designated Uses: livestock watering, wildlife habitat, limited aquatic life and secondary contact.

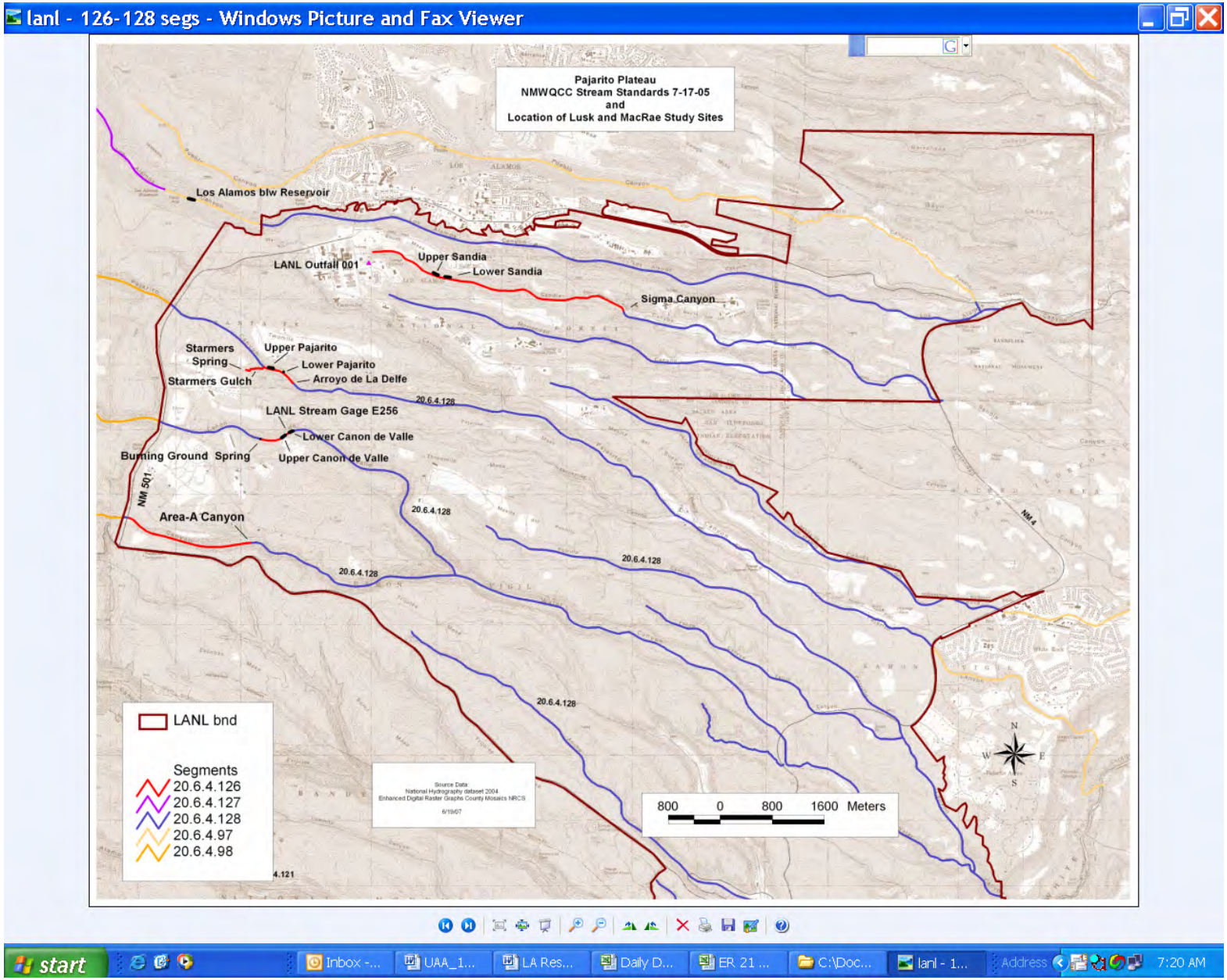
B. Criteria:

(1) The use-specific criteria in 20.6.4.900 NMAC, except the chronic criteria for aquatic life are applicable for the designated uses listed in Subsection A of this section.

(2) The monthly geometric mean of E. coli bacteria 548 cfu/100 mL or less; single sample 2507 cfu/100 mL or less (see Subsection B of 20.6.4.14 NMAC).

(3) The acute total ammonia criteria set forth in Subsection K of 20.6.4.900 NMAC (salmonids absent) are applicable to this use.

Attachment 2
Map of Segments 126 and 128



Attachment 3
Photos of Lusk and MacRae Sampling Stations in Segment 126

Cañon de Valle Creek

Sandia Canyon Creek

Pajarito Canyon Creek

Attachment 4
Photos of Stream Reaches in Segment 128

Single-stage Sampler in Ancho Canyon, July 2006

Installing Single-stage Sampler in Ancho Canyon July 2006

Attachment 4

Single-Stage Sampler in Cañon de Valle, July 2006

Attachment 4

Installing Single-stage Sampler in Water Canyon, July 2006

Attachment 4

Installing Single-Stage Sampler in Pueblo Canyon, July 2006

Attachment 4