H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

H. T. HARVEY & ASSOCIATES
REBUTTAL OF DR. ELLIS' "EXPERT REPORT REGARDING FORMER UNION PACIFIC RAILROAD YARD: IMMINENT AND SUBSTANTIAL ENDANGERMENT TO THE ENVIRONMENT"

Prepared by

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28 February 2008 Project 2818-01

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INTRODUCTION

H. T. Harvey & Associates was retained by Lawyers for Clean Water on behalf of Humboldt Baykeeper and the Ecological Rights Foundation to prepare this report rebutting certain opinions offered by Dr. Steven G. Ellis, in the Matter of Humboldt Baykeeper and Ecological Rights Foundation v. Union Pacific Railroad Company, North Coast Railroad Authority, and CUE VI, LLC.

Provided with the 29 January 2008, "*Biotic Characterization of Clark Slough and the "Balloon Tract*" by Dr. Scott Terrill, Dr. Sharon Kramer, Mr. Brian Cleary, and Ms. Lorrie Bott (Expert Report) are the qualifications of Dr. Scott Terrill, Dr. Sharon Kramer, and Ms. Lorrie Bott, along with a list of their publications.

A list of their testimony at deposition and trial during the last four years was provided with their Expert Report in this matter; no additional testimony at deposition or trial has occurred since the time of their Expert Report.

A list of the documents that were utilized in the investigation and in the preparation of this report was provided with the H. T. Harvey & Associates Expert Report in this matter. A list of additional documents that have been provided to H. T. Harvey & Associates after submission of their Expert Report and/or were used in their investigation and in the preparation of this report are referenced in this rebuttal report.

Compensation to H. T. Harvey & Associates, for the work that has resulted in this report and for future work including testimony at trial will be at the rates that were provided with the H. T. Harvey & Associates Expert Report in this matter. Dr. Scott Terrill's time is billed as a Principal, Dr. Sharon Kramer's time is billed as Senior Associate Ecologist, and Ms. Lorrie Bott's time is billed as Ecologist 2. Either Dr. Terrill or Dr. Kramer or Ms. Bott or the staff of H. T. Harvey & Associates, under their supervision, has done all work that is summarized in this rebuttal report.

This report is in response to the document by Dr. Steve Ellis entitled "Expert Report Regarding Former Union Pacific Railroad Yard: Imminent and Substantial Endangerment to the Environment" (14 p.). Specifically, we address comments from pages 3, 4, 5, 6 and 11 of his report, as described below.

PURPOSE OF THE FISH SURVEY

As stated in the last paragraph, Page 11 of 14 in the Ellis report "The presence of fish and invertebrates in the slough demonstrate that discharges from the site are not acutely toxic to these species and that copper entering the slough does not constitute an imminent and substantial endangerment to the slough environment."

Fish and invertebrates were surveyed in Clark Slough on 31 July 2007 (Figure 1) using a protocol specifically established by the U.S. Fish and Wildlife Service to evaluate presence of tidewater goby (*Eucyclogobius newberryi*), a fish species listed as endangered under the federal Endangered Species Act. Although several other species of fish and one invertebrate species (juvenile Dungeness crab) were collected, the protocol was not specifically designed to survey for those species or to evaluate the "health" of the slough.

Another survey was conducted on 10 January 2008 (Figure 1) using fish traps, with a goal of capturing specimens for laboratory analysis. A report summarizing this survey is attached as Exhibit A. Besides being conducted at a different time of year, and with different gear (traps vs small nets), this survey was conducted at much higher tide conditions than the 31 July 2007 survey. Regardless of these differences, many of the same species were captured in both surveys, and no new species were captured in January 2008.

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Clark Slough: Fish Survey Locations

Proj No. 2818-01	Date Feb. 2008	Figure 1
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NO SPECIFIC SURVEYS WERE CONDUCTED FOR INVERTEBRATES

As stated in Paragraph 2 on Page 6 of 14 of the Ellis report "Some or all of these species may actually be present at the site and other species not listed may also be present".

The only marine invertebrates observed at the site were juvenile *Cancer magister*, which were incidentally captured in the tidewater goby survey and trap surveys described above. The methods used in the tidewater goby survey and the fish trap survey do not adequately sample either epifaunal or infaunal invertebrates. The list presented in the report of marine invertebrate species that may be present at the site represent a compilation from various sources (see Table 1 of Expert Report).

FISH SPECIES AND NUMBERS COLLECTED AT CLARK SLOUGH

As stated in the last paragraph of Page 11 of 14 of the Ellis report: "In the approximately 530-foot section of the slough from the upstream side of Waterfront Drive to the downstream side of the railroad culvert, a total of 254 Dungeness crab[s], 108 S[s]tickleback[s], 11 S[s]taghorn sculpin, 3 P[p]rickley sculpin, 3 G[g]reenling, and 1 S[s]tarry flounder were observed".

The species numbers identified in Dr. Ellis' report are incorrect.

The total numbers and species captured on the 31 July 2007 survey were:

- threespine stickleback (*Gasterosteus aculeatus*) (n=117)
- starry flounder (*Platichthys stellatus*) (n=3)
- staghorn sculpin (*Leptocottus armatus*) (n=14)
- coastrange sculpin (*Cottus aleuticus*) (n=3) (Note: Some of the fish, identified in this survey as coastrange sculpin, may have been prickly sculpin (*Cottus asper*) which are similar in appearance and occupy similar habitat)
- saddleback gunnel (*Pholis ornata*) (n=2)
- juvenile Dungeness crab (*Cancer magister*) (n=243)
-

All of these fish and crab species were released/returned alive to the area of capture.

The total numbers and species captured on the 10 January 2008 survey were:

- threespine stickleback (*Gasterosteus aculeatus*) (n=3)
- staghorn sculpin (*Leptocottus armatus*) (n=3)
- prickly sculpin (*Cottus asper*) (n=2)
- juvenile Dungeness crab (*Cancer magister*) (n=3)
-

All of these fish and crab species were retained and frozen on dry ice.

PRESENCE OF FISH AND INVERTEBRATES AND ENDANGERMENT

On Page 11 of 14 of the report Ellis states: "The presence of fish and invertebrates in the slough demonstrate that discharges from the site are not acutely toxic to these species and that copper entering the slough does not constitute an imminent and substantial endangerment to the slough environment."

Presence of fish and Dungeness crabs in Clark Slough is not an indication that impairment to these species is not occurring, nor can it be said that the presence of these species is evidence that the discharges from the Balloon Track into Clark Slough is not causing an impairment to the species surveyed. Some of the species captured on the 31 July 2007 and 10 January 2008 surveys are considered to be relatively sedentary, and so they may be exposed to conditions within Clark Slough for a large portion of their life cycle (Moyle 2002). Although these fish species and juvenile Dungeness crab may spend a portion of their life cycle in the slough, many are likely move out into the bay at some point, especially Dungeness crab and starry flounder. Sublethal toxicological effects may be occurring to these species, such as reproductive impairment, growth abnormalities, growth inhibition, immune response effects, developmental effects, and genetic effects (Sijm and Opperhuizen 1996, Collier et al. 1998, Payne et al. 2003). Although the juvenile Dungeness crabs will leave the slough before adulthood, the other invertebrates that may be present in the slough will spend most of their entire life cycle there. Moreover, any fish or invertebrates that are acutely or severely impaired (e.g., sick or dead) are likely to be eaten by the myriad predatory fish and birds known to be in the Clark Slough area and are unlikely to be observed.

We performed a biotic characterization of the Balloon Tract and Clark Slough. This characterization included descriptions of biotic habitats present on site, including plant and animal species observed on the site during brief survey windows. In addition to species observed during the site visits, the characterization includes a discussion of some additional species likely to occur on the site, based on an understanding of distribution and ecological requirements of these species in the region. Such a characterization is not intended to provide information regarding the reproductive success or survivorship of the organisms associated with the site. The presence of organisms does not necessarily indicate that the organisms are not suffering from sublethal toxicological effects such as those as described above, at this site relative to other sites.

Areas or habitats that attract organisms, but in which deaths exceed births and immigration exceeds emigration, are known as population sinks. Thus, to gain an understanding of whether a site is a population source or sink, longer term studies are necessary. Ideally, such studies should include measurements of life-history parameters such as relative survivorship, reproductive success and emigration and immigration for the species of interest (Pulliam 1988, 1996). Chronic contaminant exposure can lead to an area being an ecological sink, in which case the mere presence of a species is not an indication that the species is doing well in that area (for example with respect to marsh frogs and estuarine fish, see Matson et al. 2006 and Collier et al. 1998, respectively). A population modeling approach and case study for estuarine fish (the mummichog) exposed to dioxin-like contaminants was undertaken using a species-specific matrix model that incorporated results of short-term laboratory studies and a reference population exposed to dioxin. Projections of population growth for this population, subject to

high-level multigenerational exposures, were consistent with increased risk of extirpation (local extinction) from the direct toxicity of dioxin-like compounds (Nacci et al. 2002).

DITCH AND CONNECTIVITY WITH CLARK SLOUGH

As stated in Paragraph 1 of Page 4 of 14 of the Ellis report: "The ditches in these areas generally contain standing water during wet weather periods and it is my understanding that they dry up during dry conditions. Furthermore, it is my understanding that the amount of water, if any, that ultimately reaches Clark Slough from these ditches has not been established. It is my understanding that fish and aquatic invertebrates do not move into these ditches when they contain water."

As stated in the 3rd paragraph on Page 4 of 14 of the Ellis report: "Monitoring data analyzed for this expert report was [were] also collected from Station D which monitors flow from a ditch that enters Clark Slough just upstream of the railroad culvert. It is my understanding that this ditch generally contains standing water during wet weather periods and dries up during dry conditions. It is my understanding that fish and aquatic invertebrates do not move into this ditch when it contains water."

If the ditch is hydrologically connected to the Slough, especially during high tides, it may be possible for some of the species observed to use the ditch as long as water quality conditions were sufficient to support them. The salinity regime, as well as other environmental conditions in the ditch is unknown. As Dr. Ellis notes in his report, the ditch on the western side of the site discharges into Clark Slough. Thus, provided environmental conditions were adequate and given that there is a connection between the slough and the western (Station D) ditch through which water flows, marine organisms in Clark Slough could move into and out of the ditch. Gammarid amphipods and isopods can move into the water column and swim with tidal currents, as well as crawl over surfaces. The pelagic larvae of polychaetes and bivalves could be carried into the ditch in tidal currents from Clark Slough and establish populations there.

In particular, fish species such as the staghorn sculpin (*Leptocottus armatus*) are known to move with the tides, i.e., they "follow the tides coming into mud flats at high tide to feed. Not having accurate time pieces, [they] sometimes find themselves stranded on the flats. When this unfortunate event occurs, the sculpins bury themselves in the mud and await the next tide. Fortunately, staghorn sculpins can breathe air. Unfortunately, blue herons, which eat large quantities of staghorns, can search out buried ones, apparently with ease." (from Love 1996, as cited in Moyle 2002).

RECEPTORS OF EXPOSURE TO CONTAMINANTS

As stated in the third paragraph, Page 5 of 14 of the Ellis report: "The aquatic life residing in Clark Slough is the environmental receptors that have the greatest exposure to site stormwater contaminants."

First, aquatic organisms residing in Clark Slough are not the only environmental receptors, and might not have the greatest exposure to site contaminants. Aquatic organisms on site are also exposed to contaminants in surface waters. Additionally, aquatic organisms are not the only receptors at this site, nor are aquatic organisms at the highest trophic level. A number of terrestrial vertebrates feed on aquatic organisms, including fish, amphibians and invertebrates. Some environmental contaminants, including dioxin, bioaccumulate up the food chain, thus exposing organisms in higher trophic levels to increasing levels of contaminant concentrations. Terrestrial predators observed at, or near, Clark Slough and the Balloon Tract during site visits by Terrill include the Great Blue Heron, the Black-crowned Night Heron and the site provides habitat for other species of ardeids found in the area. As noted above, staghorn sculpin are known to be vulnerable to predation by herons (Love 1996, as cited in Moyle 2002); it is likely that Snowy Egret, Great Egret, Great Blue Heron, and Black-crowned Night Heron would be likely predators of any fish occurring in mud or in shallow water. In addition to these species, shorebirds (such as the dowitchers and Least Sandpipers observed on site) and other waterbirds, feed on benthic invertebrates, fish, aquatic plants, etc. associated with Clark Slough. These species, in turn, provide prey for yet higher level predators, such as the Peregrine Falcon observed on the site, and other raptors. These animals would be exposed to relatively high bioconcentrations as occupiers of a high trophic level.

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EXHIBIT A.
SAMPLE ANALYSIS REPORT

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

25 February 2008

Ms. Layne Friedrich
Lawyers for Clean Water, Inc.
1004-A O'Reilly Avenue
San Francisco, California 94129

RE: Sample Analysis Report for Specimens Analyzed by TestAmerica, Inc.

Dear Ms. Friedrich:

On 10 January 2008 fish specimens were collected in Clark Slough, Eureka, California, for the purpose of analysis for specific organic chemicals and metals. Fish were collected using four small mesh fish traps baited with frozen salmon; the bait was place in a container that would not allow trapped fish to ingest it. Traps were set and retrieved at locations noted on Figure 1, in the slough upstream of the tidegate at Waterfront Drive and continuing parallel along Waterfront Drive.

Species, total numbers, and sizes collected were:

Threespine stickleback (*Gasterosteus aculeatus*) (n=3, total lengths 61, 62, 63 mm)
Staghorn sculpin (*Leptocottus armatus*) (n=3, total lengths 125, 130, 132 mm)
Prickly sculpin (*Cottus asper*) (n=2, total lengths 135, 164 mm)
Juvenile Dungeness crab (*Cancer magister*) (n=3)

The number of each species captured by each trap are noted below.

Trap #	*G. aculeatus*	*L. armatus*	*C. asper*	*C. magister*
1	1	3		
2				
3	2		2	3
4				

In addition, some water quality (temperature and salinity) measurements were taken, as noted below.

Time	Trap #	Salinity (ppt)	Temperature (°C)
10:23	4	8.6	9.1
10:27	1	4.3	9.2
13:50	1	3.5	9.4
14:13	4	6.7	10.2
16:15	1	2.8	9.9
16:27	4	5.5	10.3

After capture, all specimens were frozen on dry ice in ziplock plastic bags, and kept on dry ice in a Styrofoam ice chest until received by the TestAmerica, Inc. Specimens were shipped on 11 January 2008 and received by TestAmerica, Inc. on 12 January 2008. This entire process was conducted under Chain of Custody.

Directions provided to the laboratory were to store the specimens until the laboratory could determine if there was adequate mass of each species to split the sample and have still have sufficient quantity of tissue to process for analysis of furans, PCBs, Arsenic and Copper.

Sincerely,

Sharon H. Kramer
Senior Associate Fisheries Ecologist