

LLOYD 500 BUILDING, SUITE 1892/500 N.E. MULTNOMAH STREET/PORTLAND, OREGON 97232

C-N

89-18

Refer: David Klinger - 503/231-6121 (Portland, Oregon) Ron Anglin - 702/423-5128 (Fallon, Nevada)

March 10, 1989

TEST RESULTS CONFIRM TOXIC WATER AT STILLWATER, FISH AND WILDLIFE SERVICE ANNOUNCES

A report showing high toxicity in waters flowing into Nevada's Stillwater Wildlife Management Area has been received by the U.S. Fish and Wildlife Service's Pacific Regional Office and will be the subject of discussions by Federal and State resource agencies, regional director Marvin Plenert announced today in Portland, Oregon.

Tests by the Fish and Wildlife Service's National Fisheries Contaminant Research Center in August 1988 have shown a high rate of mortality when various test species were exposed to water from at least two drains that supply the refuge. The results were presented this week at a meeting of the Department of the Interior's Irrigation Drainwater Technical Review Committee and the National Academy of Sciences in Albuquerque, New Mexico, where nine ongoing contaminant reconnaissance surveys from various locations were reviewed.

"These results show there is a serious water quality problem in at least some of the water that supplies the refuge," Plenert said. "It is my intention to move forward promptly toward a solution to this problem by conferring with all of the agencies with a stake in Stillwater's future."

Using several species of fish and aquatic invertebrates, researchers documented high toxicity in water in at least two drains--"TJ Drain" and "Hunter Drain"--that supply the site. Varying levels of toxicity were recorded from water from three other sources, and no test organisms died from water taken from two additional sites.

Researchers detected measurable concentrations of at least 14 elements in the water they tested, and their test results suggest a strong relationship between the combined presence of at least four metals-arsenic, boron, lithium, and molybdenum-and the observed mortality of test organisms.

(over)

On-site Toxicity of Irrigation Drainwater from Stillwater National Wildlife Refuge to Aquatic Organisms

1988 Progress Report

by

Susan E. Finger

Steven J. Olson

and

Ann C. Livingstone

National Fisheries Contaminant Research Center

U.S. Fish and Wildlife Service

Rt. 2, 4200 New Haven Road

Columbia, MO 65201

February 28, 1989

EXECUTIVE SUMMARY

The toxicity of water from seven locations in the Stillwater Wildlife Management Area was evaluated in a series of on-site tests conducted over a 10 day period with bluegill, larval fathead minnows, and daphnids. Tests were also conducted with two saltwater species, mysids and larval sheephead minnows, at one location (Hunter Drain) where salinity exceeded 15%. In all assessments, organisms were exposed to full-strength drainwater and dilutions of 50, 25, and 12.5%. Dilution water was reconstituted to the appropriate ionic balance for each location so that salinity, hardness, alkalinity, pH, and sulfates remained constant across all treatments. This water was used as a control; well water transported from the National Fisheries Contaminant Research Center was used as an additional control to evaluate the condition of the test organisms. Another series of tests were conducted concurrently using the appropriate receiving water for dilution of drainwater.

TJ Drain and Hunter Drain were identified as locations with the greatest toxicity problems. Mortality was high for all species at these locations and no organisms survived exposure to full-strength or 50% drainwater from Hunter Drain. Groundwater collected from a well in the vicinity of TJ Drain was also acutely toxic and may have influenced the

water quality of TJ Drain. D-Line Canal and Paiute Drain were not toxic to any species tested. Water from Lead Lake was moderately toxic to all three species; cumulative mortality was 60% for bluegill and fathead minnows and 80% for daphnids. Lead Lake receives water from D-Line Canal, TJ Drain, and Paiute Drain, however, the water quality of Lead Lake was most similar to that of TJ Drain. Although concentration of salts in Lead Lake may be naturally increased by evaporation, our observations suggest that continued addition of water from TJ Drain will further degrade the water quality of Lead Lake.

Water quality of Hunter and TJ drains fluctuated dramatically during the 10-day study. These changes occurred rapidly and, in themselves, represent a significant stress to aquatic life. Changes in salinity and conductivity corresponded with changes in concentrations of contaminants. No individual contaminant was detected at acutely toxic concentrations, however, a strong relationship was defined between the combined presence of four metals --arsenic, boron, lithium, and molybdenum --- and the mortality observed in our tests. TJ and Hunter drains had consistently higher levels of these four elements than did D-Line Canal and Paiute Drain where no appreciable mortality occurred. Low levels (<4.0 ug/L) of selenium were measured in filtered water from TJ Drain, Hunter Drain, Diagonal Drain, and Stillwater Point Reservoir; mercury was not detected in any sample.

602918

Conductivity was also strongly related to the presence of arsenic, boron, lithium, and molybdenum and therefore, was related to mortality of organisms in the drainwater. It appears that conductivity may be valuable in assessing the acceptability of water for use by Stillwater Refuge, however, it is not known if this criterion may be extended for use in assessing groundwater toxicity or in evaluating problems in other areas where agricultural drainage is of concern. Cumulative mortality (percent) of bluegill, fathead minnow larvae, and daphnids after 10 days of exposure to water collected from seven locations in the Stillwater National Wildlife Refuge. Dilution water was reconstituted to the same ionic balance as the drainwater maintaining a constant salinity across all treatments, including controls.

Location Species	<pre>% drainwater</pre>				
	100	50	25	12.5	recon control
D-Line Canal Bluegill Fathead Daphnid	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
Paiute Drain Bluegill Fathead Daphnid	0 0 0	0 0 0	10 0 10	0 0 0	10 0 5
TJ Drain Bluegill Fathead Daphnid	90 85 100	70 45 100	30 ⁻ 20 25	20 10 10	0 0 5
Lead Lake Bluegill Fathead Daphnid	60 60 80	30 30 50	10 10 20	0 0 0	0 0 0
Hunter Drain Bluegill Fathead Daphnid	100 100 100	100 100 100	60 60 75	40 40 50	20 0 10
Diagonal Drain Bluegill Fathead Daphnid	80 30 25	40 10 10	20 . 10 10	10 5 5	10 0 0
Stillwater Point Bluegill Fathead Daphnid	20 25 25	0 10 0	10 5 0	0 0 5	0 5 0

602920

4