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FISH KILL REPORT RELEASED

OLYMPIA--The August fish kill in the Black and Chehalis rivers was caused by pollution not natural environmental conditions, according to a report released today by the Department of Ecology.

"Although water quality in the Black and Chehalis rivers was not ideal for salmon, trout and whitefish in early August, this fish kill was not caused by the ambient river conditions," said Ecology Director Chris Gregoire. "However, on and after the afternoon of August 8, the day the fish kill was reported to Ecology, our investigators were not able to find physical evidence of pollutants actively entering the Black River."

Gregoire said the investigation is continuing and Ecology is taking action to tighten pollution requirements for fish farms and other wastewater dischargers located on the Black River.

"We are not closing the book on this case, nor are we saying that enforcement actions won't be taken at a later date. The report we are issuing today summarizes the results of the investigation to date and actions we feel are necessary to prevent future problems."

Gregoire said Ecology, the departments of Fisheries and Wildlife, and the Chehalis Tribe conducted one of the most exhaustive investigations ever of a fish kill in Washington.

Gregoire said it appears that something toxic entered the Black River about August 6 nine miles upstream from the confluence of the Black and Chehalis rivers. Ecology was notified and responded to the incident on August 8.

"Although our spill responders were on the scene shortly after being notified on August 8, they failed to take water samples that day," Gregoire said. "However, water samples collected by Fisheries and private citizens were analyzed by Ecology."

Gregoire said the agency should have also notified the Chehalis Tribe of the fish kill. "This was a unique event because a second fish kill occurred downstream several days after the initial kill. From now on, we will put out a widespread warning during all fish kill incidents."

Gregoire said Ecology learned a lot from the incident and the experience will be used to improve response should there be future fish kills of this kind.

During the investigation, Ecology inspected four fish-farms, several dairies, a blueberry farm, a turf farm and several businesses that handle chemicals. Several tips about possible illegal dumping of chemicals into the river were also investigated.

"Numerous samples of water, sediments and fish were collected by Ecology and analyzed for literally hundreds of pollutants," Gregoire said.

Eleven people who reported stinging eyes while swimming in the river on August 7 and 8 were also interviewed.

According to the report, all fish in a nine-mile stretch of the Black River were assumed to be killed.

Fisheries estimates show that 320 adult chinook salmon, 100,000 coho salmon fingerlings, 16,500 cutthroat trout, 118,000 forage fish (sculpins, dace, shiners, suckers and lampreys), 320 mountain whitefish, and 3 adult steelhead trout were killed.

The report concluded that facilities along the river need to have their wastewater discharge permits upgraded.

The Global Aqua facility is receiving special attention because it is the largest fish-rearing facility on the Black River and is located where the fish kill began.

The report also identified several corrective actions that are needed. Among the actions underway or being considered are:

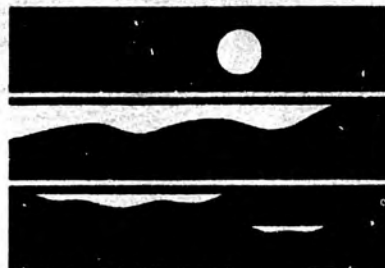
- o a short-term cooperative water quality monitoring study by Ecology and the Chehalis Tribe;
- o an immediate increase in inspections of water pollution sources in the greater Chehalis River watershed to get a better idea of what pollutants are getting into the water and to ensure that facilities have the required permits;
- o an assessment of whether an intensive Ecology water quality study is needed in the Black River; and
- o an assessment of whether an ambient water quality monitoring station on the Black River should be established by Ecology.

Ecology has also been working for the past year on a new general permit for fish-rearing facilities. Ecology is drafting the permit with the help of governmental agencies, environmental organizations, the aquaculture industry and the public.

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Gregoire said the incident highlighted the need for investigators to receive notification of fish kills and spills as soon as possible.

"It is essential that people call Ecology immediately when they see a spill occur or if they observe an unusual number of dead fish."



WASHINGTON STATE
DEPARTMENT OF
E C O L O G Y

The Black River Fish Kill Report

October 1989
89-54

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1.0 SUMMARY

Between August 6 & 7, 1989, a fish kill occurred in the Black River and on August 10th & 11th in the Chehalis River in southwest Washington State. Evidence indicates a toxic agent(s) entered the Black River in the vicinity of river mile 9.2 on about August 6, 1989 and moved downstream entering the Chehalis River near Oakville on about August 11, 1989, resulting in a substantial fish kill. In addition, in the Black River, in the vicinity of the fish kill and downstream of it, plant nutrients such as ammonia, nitrites, nitrates and phosphates were measured in elevated amounts. Increased amounts of these nutrients can cause increased algae and rooted plant growth which can at high concentrations, in turn, reduce the amount of oxygen available for fish and other aquatic organisms.

Based on the apparent conditions of carcasses and indications of residents and witnesses, a discharge likely occurred around August 6. The Department of Ecology was notified and responded to the fish kill on August 8. There are a variety of industrial and commercial enterprises in this vicinity of the Black River where the fish kill occurred. Virtually all possible pollutant sources were investigated. This report discloses all the significant findings regarding water chemistry and upland activities surrounding the fish kill event.

Although the ambient water quality in the Black and Chehalis River was not ideal for salmon, trout, and whitefish in early August 1989, this fish kill event was not caused by ambient river conditions. However, on and after the afternoon of August 8 (the date of the first fish kill report and investigation), investigators were not able to find physical evidence of pollutants being actively discharged into the Black River.

2.0 BACKGROUND

The Black River starts at Black Lake near Olympia and flows southwest to the Chehalis River which empties into the Pacific Ocean. The Black River has a shallow gradient (about 5 feet/mile). It slowly meanders through marshes and swamps over much of its course. The water is discolored black by organic material from which its name is derived.

According to Washington Department of Fisheries, Washington Department of Wildlife, and Chehalis Indian Nation fisheries biologists, the Black River supports significant populations of coho salmon, cutthroat trout, bass, sunfish, and forage fish (suckers, dace, shiners, sculpins, etc.). Salmon and trout spawning is primarily in tributary creeks such as Waddell Creek (r.m. 17.3). Those anadromous fish rear in the tributaries and the river and migrate to sea. The bass, sunfish, and forage fish are resident fishes and spawn and rear throughout the watershed. The river contains unique and valuable habitat for those species.

The river and shoreline from about r.m. 15.5 to r.m. 10 is a slough surrounded by swamp. This area has been designated as a conservation zone and habitat management area by State and County governments (Figure 1). The area is a unique habitat characterized by large pond lilies and osprey nests along the shoreline which takes on the appearance of a southeastern United States swamp.

Four aquaculture facilities discharge into the Black River below r.m. 10.5, near Rochester: Swecker, Carlson, Steelhammer, and Global Aqua (Figure 2). Steelhammer discharges to the river through Rochester Slough at r.m. 9.6 (a tributary flood channel). Swecker and Carlson discharge to the river through channels in a swamp at r.m. 10.5 and r.m. 10.3 respectively. Global Aqua discharges to the river through springs from r.m. 9.3 to r.m. 7.8. In this reach, the channel becomes weed choked and navigation is impossible in some areas.

Other commercial enterprises include the Black River Ranch (Dairy) (r.m. 13), Weyerhaeuser Tree farm (r.m. 14), Drew's Blueberry farm (r.m. 7.2), and Emerald Turf farm (r.m. 7.0). While these operations do not have direct discharges to the river, they may exert some influence on the river through nonpoint discharge and/or groundwater.

Water quality data are almost nonexistent for the Black River. The Chehalis Indian Nation (the CIN) has collected water temperature data at the School Land Road boat launch (r.m. 8.5) in July and August from 1985 to 1989 (the data are presented in Attachment 2). Temperature ranges from 15 degrees Celsius to 18.5 degrees Celsius. The average temperature for August was 15.5 degrees Celsius (59.9 degrees Fahrenheit). According to WDF those temperatures in the Black River were ideal for salmon and trout and the Black River does not have a history of fish kills.

The Chehalis River from the City of Chehalis to the Satsop River (tidal influence point) is also a shallow stream gradient similar to the Black River and supports similar fish species.

Unlike the Black River, the Chehalis River in this reach has a history of fish kills associated with high temperatures and low dissolved oxygen (D.O.). Those kills in the Chehalis River are annual events and severity of kill is flow and weather dependent.

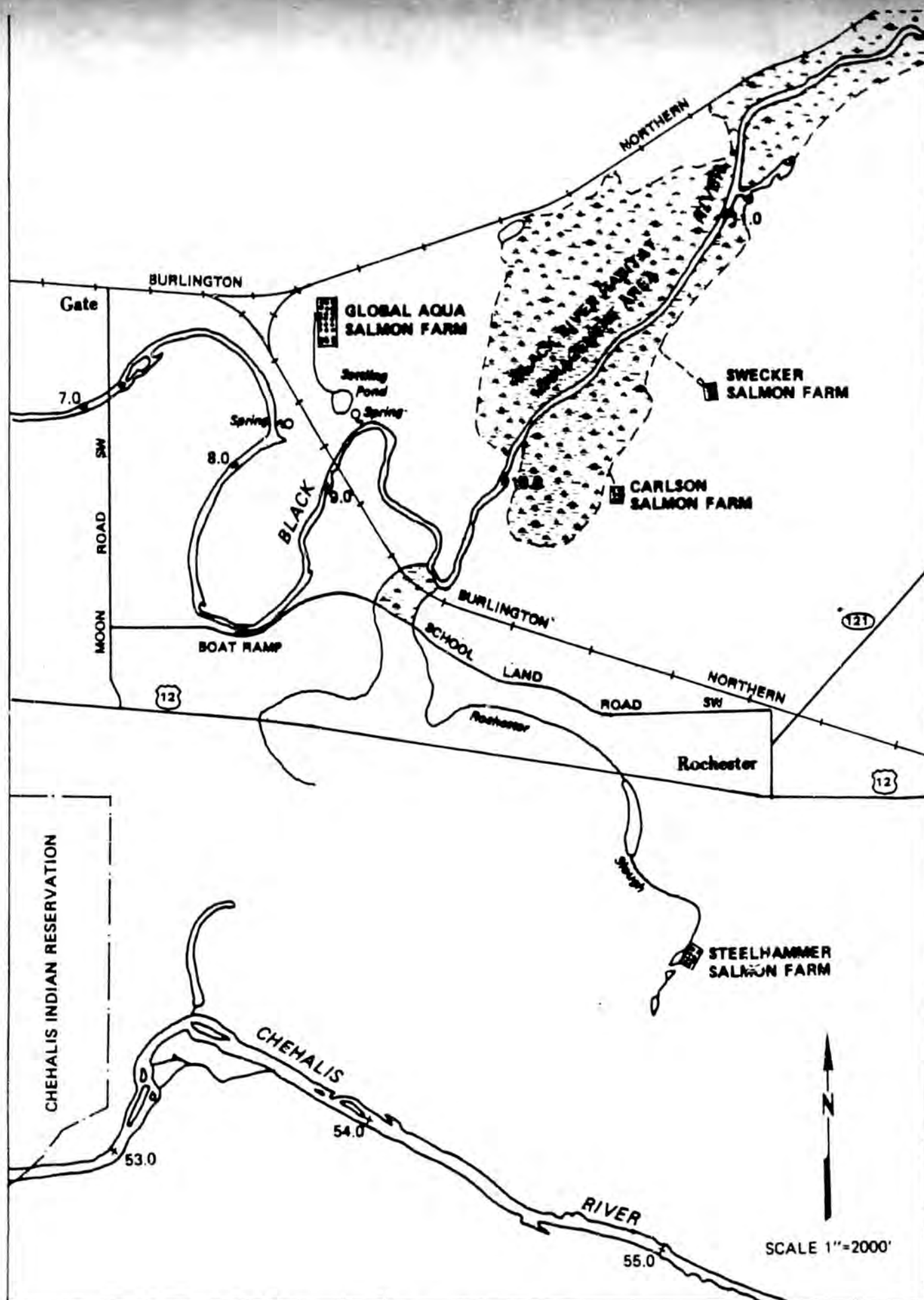


Figure 2. LANDMARKS ASSOCIATED WITH THE BLACK RIVER FISH KILL, SALMON FARMS, AUGUST 6-7, 1989.

3.0 INVESTIGATIONS/INSPECTIONS/SURVEYS DESCRIPTIONS

During the course of this incident, several investigations were conducted by Washington Department of Ecology (Ecology), Washington Department of Fisheries (WDF), and the Chehalis Indian Nation (CIN). This section describes those investigations/-inspections. Section 4.0 will describe the results/findings of those investigations. The subsections of Section 3.0 correspond numerically to related subsections in Section 4.0. Section 3.0 describes investigation methods, and Section 4.0 provides the related findings.

3.1 Ecology Complaint Investigations - Ecology received several leads concerning the fish kill. Reports typically involved suspected dumping or illegal discharges into the river. Each lead was followed up with an investigation. Ecology personnel conducted numerous investigations and interviews. Their purpose was to determine who or what was responsible for the fish kill. Investigators looked for abnormal operating procedures, discharges, chemical usage, and made other relevant observations.

3.2 WDF Stream Fish Carcass Surveys - WDF conducted stream surveys on August 8 & 9, 1989, noting carcasses and general stream conditions. Their objective was to determine the severity and the starting point of the fish kill. They waded and drifted the river noting carcasses, fish activity, and made other relevant observations.

3.3 Chehalis Indian Nation (CIN) Field Surveys - The CIN conducted daily field surveys starting on August 10, 1989 and ending on August 20, 1989 on the Black and Chehalis Rivers noting fish activity, carcasses, and making other relevant observations. Their purpose was to determine the number of salmon and trout mortalities in the Black River and Chehalis River.

3.4 Ecology Shoreline and Stream Fish Carcass Surveys - Ecology conducted stream surveys on August 11 and 13, 1989, noting carcasses and general stream conditions. Their objective was to determine where the fish kill started and find a responsible party. They walked the shoreline and drifted the river noting carcasses, fish activity, and other relevant observations.

3.5 Ecology Aquaculture Facility Inspections - Ecology conducted inspections at aquaculture facilities from August 11-21, 1989. Aquaculture facilities along the Black river discharge directly to the river. Water and sediment samples were collected at the locations described in Table 1.

Table 1. Washington Department of Ecology Aquaculture Facility Inspection Sample Locations. Ecology. Black River Fish Kill, August 6-7, 1989.

Date	Facility	Matrix	Location
8/17	Steelhammer	W	Rochester Slough at School Land Road.
8/18	Steelhammer	S	Discharge channel south of Tanglewood Trailer Park.
8/18	Steelhammer	W	Rochester Slough at School Land Road.
8/18	Carlson	W	Source well at Carlson Salmon Farm.
8/18	Carlson	W	Effluent channel
8/18	Swecker	W	Drainage channel near duck blind access road.
8/18	Swecker	S	Drainage channel below last rearing pond.
8/18	Swecker	W	Black River at Swecker duck blind.
8/10	Global Aqua	S	Settling Pond.
8/11	Global Aqua	W	Source Well.
8/11	Global Aqua	W	Standing water in raceway discharge.
8/11	Global Aqua	W	Standing water in settling pond.
8/11	Global Aqua	S	Settling Pond.
8/16	Global Aqua	W	Standing water in discharge channel.

NOTE: Matrix S = sediment
Matrix W = water

Water samples were analyzed by the Ecology Manchester Laboratory for the following parameters: pH, conductivity, alkalinity, hardness, chemical oxygen demand (COD), total organic carbon (TOC), total ammonia as nitrogen (NH₃-N), nitrite-nitrate (NO₂+NO₃-N), ortho-phosphate (O-PO₄-P), total phosphate (T-PO₄-P), and total chloride (T-Cl).

Selected water and sediment samples were analyzed for the following elements antimony (Sb), arsenic (As), beryllium (Be), cadmium (Cd), copper (Cu), lead (Pb), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), zinc (Zn); and the following classes of organic chemicals, acid/base-neutral organics, volatile organics (VOA), pesticides/PCB, organo-phosphate pesticides, and herbicides. A complete list of the latter is in Attachment 3. Standard methods were used to analyze samples.

In addition to sample collection, investigators looked for abnormal operating procedures, discharges, chemical usage, and made other relevant observations.

3.6 Ecology Black River Ambient Water Quality Surveys - Black River water quality investigations were conducted by Ecology from August 16-18, 1989. The purpose of those investigations was to collect ambient water quality data upstream and downstream of the fish kill and determine if the kill was caused by natural conditions or other factors. Water and sediment samples were collected at Little Rock (r.m. 17.2), the boat ramp on highway 121 (r.m. 15.3), near Mima (r.m. 13.0), Black River habitat management area (r.m. 11.0), near Carlson fish farm (r.m. 9.8), Global Aqua (r.m. 9.3), the railroad bridge (r.m. 9.2), Big Rock (r.m. 7.8), Moon Road SW bridge, Gate (r.m. 7.1).

Water samples were analyzed for the same parameters as in section 3.5. Dissolved oxygen (D.O.), temperature, pH, conductivity, and barometric pressure were collected in the field.

Selected water and sediment samples were analyzed for the same metals and pesticides mentioned in section 3.5.

In addition to sample collection, investigators noted carcasses, aquatic vegetation, and made other relevant observations.

3.7 Ecology Chehalis River Ambient Water Quality Survey - A Chehalis River receiving water survey was conducted by Ecology on August 15, 1989. The purpose of the survey was to gather ambient water quality data and determine whether a toxic plume was moving down the Chehalis River. Water and sediment samples were collected at Montesano (r.m. 14.0), Keys Road (r.m. 21.0), Porter (r.m. 33.0), and Sickman Ford Bridge (r.m. 44.0).

Surface water samples were analyzed for the same parameters as in section 3.5. Dissolved oxygen (D.O.), temperature, pH, conductivity, and barometric pressure were collected in the field.

Selected water and sediment samples were analyzed for the same metals and pesticides mentioned in section 3.5.

In addition to sample collection, investigators noted carcasses, aquatic vegetation, and made other relevant observations.

Ecology also collected surface D.O. samples at the Sickman Ford bridge. Their purpose was to determine if oxygen was being depleted in the Chehalis River during night time hours.

4.0 RESULTS

Data indicate the Black River was highly nutrient enriched (eutrophic) and ambient water quality conditions in the Black River prior to the kill were approaching stressful levels for mountain whitefish, salmon, and trout. These fish species are temperature and dissolved oxygen (D.O.) sensitive. These fish require temperatures below 20°C and D.O. levels above 8.0 ppm to maintain healthy populations. Daytime temperatures were approaching 20°C and night time D.O.'s were below 8.0 ppm indicating stressful conditions, but not acute conditions.

The data indicate a few fish were dying possibly of stress related diseases in the Black and Chehalis Rivers prior to the August 6-7, 1989 kill. According to WDF and CIN fisheries biologists, all but a few were surviving under the existing, somewhat stressful conditions.

4.1 Ecology Complaint Inspections

At 1400 on August 8, 1989, a complainant reported to Ecology Southwest Regional Office (SWRO), that his children had been swimming in the Black River at Big Rock (r.m. 7.8) on the previous day, August 7, and they had complained of irritated eyes and skin, and they had seen a few dead fish (Attachment 1). The report was passed on to SWRO spill response unit. At about 1445, the complainant was contacted to confirm the report.

Ecology responded to the scene at 1500, August 8, 1989. They inspected the Black River shoreline at the School Land Road boat launch (r.m. 8.5), Drew's blueberry farm (r.m. 7.2), Big Rock (r.m. 7.8), and from the Moon Road SW bridge (r.m. 7.1) (Figure 1). They did not see any stressed fish or fish carcasses along the shoreline. Their search was restricted to the shoreline because of the heavy aquatic weed growth. They were unable to search the open channels through the weed growth. Two children at the School Land Road boat launch told the Ecology inspectors, they had seen "a couple of dead fish a few days back". The Ecology inspectors returned to the SWRO at about 1700.

That evening and the following day (August 9) WDF employees using waders and a boat were able to conduct a closer search. They searched the clear channel (through the weeds) and found fish carcasses from r.m. 9.2 to 7.1. (see section 4.2).

On August 9, 1989, Ecology interviewed the owners of Drew's Blueberry Farm (Drew's) which is near the Moon Road SW bridge. According to Drew's, nothing had been sprayed on the fields for

about one month as they were harvesting blueberries. Water and sediments were tested for herbicides and pesticides and none were found.

Additional complaints were investigated by Ecology, SWRO. Those investigations are summarized in Table 2.

Ecology also interviewed eleven people that had been swimming in the river during the kill. The information is summarized in Table 3.

These swimmers indicated the river was cloudy which is unusual for the Black River. According to the swimmers, the Black River water is normally black and clear, not cloudy. These data indicate something abnormal was in the Black River between r.m. 8.5 and r.m. 7.0 on August 7 and 8, 1989. Ammonia (NH₃-N) found in the ambient water samples could have caused the irritation, provided the levels were higher.

Table 2. Washington Department of Ecology Complaint Report
Follow-up Investigation Summary. Black River Fish Kill
August 6-7, 1989.

Date	River Mile	Complaint Report	Findings
8/17	7.2	A site near Gate had been used to produce pesticides & had been used as a dump.	The underground pesticide storage tanks had been removed. No discharge found.
8/16	9.5	A company in Rochester was dumping solvent into storm drain.	The site has no drain leaving the site. No evidence of a spill.
8/16	?	A tree farm was spraying pesticides near Gate.	Information not adequate to find spray site.
8/18	14.0	A possible clandestine drug manufacturing operation was dumping waste into the river.	Referred to Sheriff. Sheriff was not aware of a lab operation in the area.
8/18	13.0	A Dairy was discharging manure into river.	Dairy was not discharging to the river.
8/18	14.0	A forklift punctured a pesticide container at a tree nursery near Gate.	No spill found, but containers of Pydrin, Dacolil 2787 and Benomyl on site.
8/23	14.0	A green truck near Dodd Road was seen dumping blue containers on 8/7/89.	No evidence of dumping found.
8/18	52.0 of the Chehalis River	Someone was dumping copper sulfate into Chehalis R. near Independence.	Found 36 barrels full of copper sulfate on site. No evidence of dumping found.

Table 3. Black River Swimmer Interview Summary. Black River Fish Kill, August 6-7, 1989.

Swimmer	Date-Time	Location	Description
#1	8/7-1300	Turf Farm Pump (r.m. 7.0)	Irritated eyes for 24 hours.
#2	8/7-1300	Turf Farm Pump (r.m. 7.0)	Irritated eyes for 24 hours. Upset stomach for for 36 hrs.
#3	8/7-1300	Below Moon Rd. (r.m. 7.0)	Irritated eyes for 18 hrs. Rash and sores on stomach.
#4	8/7-1300	Below Moon Rd.	Irritated eyes.
#5	8/7-1500	Big Rock (r.m. 7.8)	Irritated eyes.
#6	8/7-1500	Big Rock (r.m. 7.8)	Irritated eyes. River salty to taste.
#7	8/7-1500	Big Rock (r.m. 7.8)	Eyes okay, but wore goggles.
#8	8/8-1200	Below Moon Rd. (r.m. 7.0)	Irritated eyes for 24 hrs.
#9	8/8-1200	Below Moon Rd. (r.m. 7.0)	No Problems, but swim was brief.
#10	8/8-1600	Above School Land Rd. boat launch (r.m. 8.5)	Irritated eyes for 18 hrs. Eyes were light sensitive.
#11	8/8-1600	Above School Land Rd. boat launch (r.m. 8.5)	Irritated eyes for 18 hrs. Eyes were light sensitive

4.2 WDF Stream Fish Carcass Surveys August 8-9, 1989

WDF Stream Survey August 8, 1989 - At 1800 on August 8, 1989, a local resident reported several dead fish near his property (r.m. 6.5) to WDF. WDF responded and arrived on scene at about 1900. WDF waded a 200 yard reach of the river near r.m. 6.5. WDF observed hundreds of trout, coho salmon fry, juvenile lamprey, sculpin, and crayfish carcasses in channels and weed beds. The experienced investigators estimated the fish had been dead for 24 to 48 hours, fixing the fish kill date on August 6 or 7, 1989. They collected a subsample of trout, coho, and sculpin carcasses (Attachment 3).

WDF Stream Survey August 9, 1989 - On August 9, 1989, WDF conducted a carcass survey. WDF drifted the Black River from r.m. 10.3 to r.m. 7.2, Moon Road SW bridge. Their report says, in part, "At 10 a.m. WDF launched a canoe at r.m. 9.8 and paddled upstream to r.m. 10.3. At the launch point and upstream no dead fish were found, only live fish. They proceeded downstream and encountered the first dead fish just below the train trestle (r.m. 9.2). From this point down to r.m. 8.0 they found a few dead fish. The number of dead fish greatly increased below r.m. 8.0 and continued to increase through r.m. 7.2 where they pulled out (Table 5). Mortalities included the following species: coho salmon fry, trout fry (age 0+), cutthroat trout (up to 12"), sculpins, large scale suckers, lampreys, crayfish and freshwater clams. The only live fish observed below r.m. 8.0 were cyprinid fry (approximately 3/4 inches in length)" (see attachment 3). Cyprinids are resistant to many pollutants. These data suggest the fish kill started near r.m. 9.2.

WDF collected surface water samples at r.m. 9.7, 9.2, 8.0, and 7.5. The respective nutrient levels (NO₂+NO₃-N) were 1.08, 2.01, 1.17, and 1.30 ppm respectively. Those levels were significantly higher than levels found in the subsequent August 16-18 samples (.01 ppm to .70 ppm) although the data are somewhat compromised by sample preservation and holding time problems. They do indicate an unusually enriched condition probably existed in the river on August 9, 1989.

4.3 Chehalis Indian Nation (CIN) Stream Surveys - On August 10, 1989, CIN fishery technicians, drifted the Black River from the School Land Road boat launch (r.m. 8.5) to the Highway 12 bridge boat launch (r.m. 4.1). From r.m. 8.5 to r.m. 7.1 (Moon Road SW bridge), they found the following carcasses: 3 coho salmon fingerlings (avg. 3 in.) and 1 squawfish (16 in.). From r.m. 7.1 to r.m. 4.1, they found the following carcasses: 4 native sea-run cutthroat (12 -14 in), 1 sucker (18 in.) and 1 red-sided shiner. They noted the water was murky and aquatic plants were very thick throughout the river.

At 1045, on August 10, 1989, CIN technicians noted live fish at the Howanut bridge (r.m. 1.1), but the water was starting to get murky indicating conditions were changing. CIN also visited the Moon Road SW bridge and observed several stressed lamprey larvae and numerous fish carcasses. A detailed accounting is included in Attachment 6.

On August 11, 1989, CIN fisheries technicians drifted the Chehalis River from the Sickman Ford bridge (r.m. 44.0) to the Oakville boat launch (r.m. 42.2). They found 31 adult Chinook carcasses and 16 stressed adult Chinook. The mortalities were concentrated near the Sickman Ford bridge.

From August 11 to August 21, 1989, CIN collected 240 adult carcasses. The gill tissue from two fish were analyzed for copper and zinc. Those analyses revealed no significant difference between adult Chinook salmon upstream (control) and Chinook carcasses within the kill area (test). The results are shown in Table 4.

Table 4. Adult Chinook salmon gill tissue copper and zinc analysis results. Values are wet weight. Black River Fish Kill, August 6-7, 1989.

Fish	Location	Cu	Zn
		(ug/Kg)	(ug/Kg)
Control	Chehalis R. near Independence (r.m. 50.0)	0.7	33.3
Test	Chehalis R. near Sickman Ford Bridge (r.m. 44)	0.7	27.2

4.4 Ecology Shoreline and Stream Fish Carcass Surveys - On August 11, 1989, Ecology surveyed the shoreline of the Black River, in the vicinity of the kill. It was suspected the carcasses were not visible from the shore. Needing a view from bank to bank including midstream sections, Ecology drifted the Black River on Sunday, August 13, 1989 from the Highway 121 boat launch to the School Land Road boat launch searching the river from shore to shore. The observations are summarized in Table 5. The purpose of the trip was to determine the kill starting point.

Following an intensive mid channel search from a drift boat, Ecology found no fish carcasses above r.m. 9.2, but found carcasses from r.m. 9.2 to 8.5 (see Table 5). Those carcasses were found along the clear channel between the heavy shoreline weed growth. They did not find any carcasses along the shoreline

explaining why previous shoreline searches had not yielded carcasses. Further, Ecology's findings corroborate WDF's boat survey of August 9, 1989. It is possible that scavengers had eaten many of the dead fish by the time Ecology investigators completed this survey.

4.5 Ecology Aquaculture Facility Inspections - Ecology inspected Swecker Salmon Farm (August 18 and 21), Carlson Salmon Farm (August 9 and 18), Steelhammer Salmon Farm (August 17, 18 and 21), and Global Aqua (August 9, 11, 16 and 18). Detailed inspection reports are included in Attachment 4. Ecology's inspections revealed all farms except Global were operating normally.

Table 5. Washington Departments of Ecology and Fisheries Black River Shoreline and River Surveys on August 8-11, 1989. Black River Fish Kill, August 6-7, 1989.

Type	Location	Date	Observation
B	Little Rock bridge - ECY (r.m. 17.2)		8/13 No dead fish or plants.
S	Highway 121 Boat launch near Little Rock - ECY (r.m. 15.3)		8/11 Water clear, small fish dimpling water surface. Live fish & aquatic insects present. No carcasses.
S	Highway 121 Canoe Rental Shop - ECY (r.m. 14.2)		8/11 Same as above.
B	Highway 121 Canoe Rental Shop - ECY (r.m. 14.2)		8/13 No dead fish or plants.
B	Swecker aqua- culture facility ECY (r.m. 10.5)	8/13	No dead fish or plants.
B	r.m. 10.3 - WDF		8/9 No dead fish.
B	r.m. 9.8 - WDF	8/9	No dead fish.
S	Across from Goodrich Farm - ECY (r.m. 9.5)		8/11 No carcasses. No fish seen live aquatic insects along shoreline.
S	Goodrich Farm - ECY (r.m. 9.5)		8/11 Area choked with aquatic plants. Live small fish and aquatic insects present along shoreline.
S	Drainage ditch along upstream boundary of Global Aqua - ECY (r.m. 9.4)	8/11	No carcasses nor live fish or aquatic insects found.

Table 5 - Continued

Type	Location	Date	Observation
S	Near Global Aqua well - ECY (r.m. 9.3)		8/11 No carcasses nor live fish or aquatic insects found along the shoreline.
B	Global Aqua aquaculture facility upstream end - ECY (r.m. 9.3)		8/13 No dead fish or plants.
S	Railroad bridge - ECY (r.m. 9.2)		8/11 Area choked with aquatic plants. No fish present. Live aquatic insects seen along shoreline.
B	Railroad bridge - ECY (r.m. 9.2)		8/13 One sculpin carcass 200 ft. upstream of bridge.
B	Below RR bridge - WDF (r.m. 9.1)		8/11 Dead fish.
S	School Land Rd. boat launch - ECY (r.m. 8.5)		8/11 Area choked with aquatic plants. No fish present. Two earthworm carcasses.
B	School Land Rd. boat launch - ECY (r.m. 8.5)		8/13 One sculpin carcass.
B	r.m. 8.0 - WDF 8/9 r.m. 7.2.		Dead fish density same as
S	Big Rock - ECY 8/11 (r.m. 7.8)		Five live sculpin observed. No fish carcasses along shoreline.
B	r.m. 7.2 - WDF 8/9		Dead fish density increased significantly.
S	Moon Road SW bridge - ECY (r.m. 7.1)	8/11	Area choked with aquatic plants. No fish present.
W	r.m. 6.5 - WDF 8/8		Numerous dead trout, sculpins, lamprey and mussels.

NOTE:

S = Shoreline Survey
 B = Boat Survey
 W = Wader Survey

ECY = Wash. Department of Ecology
 WDF = Wash. Department of Fisheries

Several factors suggested Global Aqua warranted a further look. These factors include the farm's proximity to fish carcasses, the fact that the hatchery had been shutdown at the time of the fish kill (an abnormal situation), and the observation that the last of the cleanup water moving through the facility had percolated into the ground through its drainage channel and settling pond prior to seeping into the Black River.

On August 9, 1989, Ecology returned to the fish kill site and visited Global Aqua (Global). The facility had recently ceased fish rearing operations and was shutdown. According to Global, the facility had been shutdown because of disease problems (Frunculosis). The hatchery is permitted to use up to 12 million gallons of well water daily. According to Global, the water had been shut off on August 2 and the entire system allowed to drain through a series of rearing and holding ponds eventually discharging through a drainage channel and into a 5 acre settling pond.

According to Global, the tanks were cleaned and flushed as follows. The water was shutoff on August 3, 1989. Fish remaining in the rearing tanks were allowed to suffocate. The fish suffocation would have reduced oxygen in the tank water to a low level because the fish would have respired the oxygen. After a time, this anoxic water plus the residual fish sludge and feces were flushed into the drainage channel. Those sludges and feces typically have very high NH₃-N, total organic carbon, and chemical oxygen demand levels.

Water from the drainage channel and settling pond percolates rapidly into the ground. Under normal operating conditions the channel and pond percolate several million gallons per day into the ground and do not have an overland discharge to the river. It is accepted that Global's discharge enters the river through springs located at r.m. 9.3 and 7.8. Ecology conducted an inspection tour with Global and found the settling pond empty and no evidence of an overland discharge to the river.

Aerial photographs taken on August 6, 1989 revealed the Global settling pond was one-half full indicating the springs along the riverbank from r.m. 9.3 to 7.8 which are fed by Global's drainage channel and settling pond water was probably discharging during the August 6 to 7 kill. See "springs" in Figure 2.

According to a local resident, flows from the springs near r.m. 7.8 dropped significantly on August 4, 1989 and flows declined until they stopped on August 7, 1989. The timing of those observations correlate with the water shutoff at Global (Table 6) and the aerial photo data, and also corroborate the groundwater link between Global and the Black River.

During Ecology's inspections, Global personnel stated Global's shutdown started on July 27, 1989 and was completed by August 9, 1989. Again, the shutdown of several million gallons per day of well water flowing through the facility meant that as these flows diminished, the final effluent to the drainage channel and settling pond would be concentrating during the warm sunny days. Table 6 summarizes the shutdown operation.

Ecology also noted opened and used drums and bags of "Paracide - F", sodium thiosulfate, "Pentahydrate", formaldehyde, and chlorine on site.

Global records indicate chlorine had been used on three occasions from July 1 to August 4, 1989 to disinfect tools and the resulting chlorinated water had been neutralized with sodium thiosulfate (a substance which can deplete oxygen) prior to discharging the water into the settling pond. Ecology tested the settling pond and the Black River at r.m. 7.2 on August 9 for residual chlorine on the off chance that a residual remained and found no residual chlorine. The chances of finding a chlorine residual 24 hours after a discharge are unlikely.

Table 6. Summary of Events Relating to Global Aqua operation shutdown July-August, 1989. Black River Fish Kill August 6-7, 1989.

Date	Sequence of Events
7/27	Shut off pump on one of two wells reducing flow to about 3 million gallons/day (Global).
8/3	Shut off remaining fresh water well pump. Removed remaining fish from site (Global).
8/4	Flow from springs into Black River near r.m. 7.8 reduced by one half (Local Long-Time Resident).
8/6	Aerial photos show water in settling pond, about 1/2 full (Ecology).
8/7	Swimmers from r.m. 8.0 - 7.0 experience eye and skin irritation, and see murky water conditions, fish carcasses.
8/7	Flow from springs into Black River near r.m. 7.8 has ceased (Local Resident).
8/9	Settling pond dry (Ecology).

NOTE: Comments from local residents confirm Ecology's understanding that the springs are hydraulically connected to Global Aqua's drainage channel and settling pond. Springs only flow when Global Aqua is operating.

Global records indicate formaldehyde (a toxic substance and a carcinogen) was used on six occasions from June 20 to July 13, 1989 to treat eggs for disease problems and was not used in August. Residual formaldehyde was found in sediment samples taken in the channel between the rearing tanks and settling pond on August 10, 1989 at 0.10 ppm and 12.74 ppm, respectively, indicating the formaldehyde had not completely degraded 27 days after the last reported use.

Water samples collected at r.m. 7.8 and 7.1 were analyzed for formaldehyde on August 9 in the off chance that formaldehyde could be found and none was found. Like chlorine, the chances of finding formaldehyde 24 hours after a discharge to a flowing stream are unlikely.

On August 16, 1989, Ecology collected a water sample from the drainage channel between Global's fish rearing tanks and their settling pond. Ten days after the fish kill and thirteen days after the water was shut off, this water had an extremely high ammonia concentration (703 ppm). This channel water was not only very high in ammonia, but also very high in organic matter (total organic carbon value, 2190 ppm; chemical oxygen demand, 11,000 ppm). The toxicity of total ammonia as nitrogen (NH₃-N) is dependent on pH and temperature. Total NH₃-N would have been acutely toxic at 12 ppm in the Black River using a pH of 7.5 and temperature of 19 degrees Celsius (66.2 F°) which were the averages measured during the Black River ambient water quality survey (Table 7). Total NH₃-N would have been toxic at 3.7 ppm in the Chehalis River using a pH of 8.2 and a temperature of 19.5 degrees Celsius (67.1 F°) which were the averages found during the Chehalis River ambient water quality survey (Section 4.7).

Table 7. Washington Department of Ecology Black River Ambient Water Quality Survey Temperature and Dissolved Oxygen Data, August 17-18, 1989. Black River Fish Kill August 6-7, 1989.

R.M.	Date-Time	Depth (m)	Temp. (°C)	D.O. (ppm)	% Sat.	Barom. (in. Hg)	Cond. (uMHOS/cm)
17.2	8/17-1630	0.0	19.2	7.3			125
	8/18-0545	0.0	18.4	6.7	70.3	30.12	116
	8/18-0755	0.0	17.9	6.5	67.5	30.12	93
15.3	8/18-0820	0.0	14.7	6.3	61.2	30.18	99
13.0	8/18-1020	0.0	18.8	11.1	117.1	30.20	100
		5.0	10.7	2.6	23.1	30.20	100
11.0	8/18-1125	0.0	17.8	11.8	122.2	30.20	89
	-1125	5.0	15.6	6.0	59.3	30.20	100
9.8	8/17-1340	0.0	18.8	8.0			110
	-1330	B		<1.1			118
9.3	8/17-1425	0.0	18.1	8.9			115
	-1415	B		3.9			119
	8/18-0522	0.0	18.1	9.4	98.1	30.12	100
	-1210	0.0	19.5	11.2	120.2	30.20	100
	-1210	2.5	18.4	9.4	98.4	30.20	100
7.7	8/17-1530	0.0	19.2	8.8			125
7.1	8/18-0505	0.0	17.4	6.7	68.9	30.20	100
	-1305	0.0	19.8	9.5	102.8	30.03	113
4.0	8/18-0453	0.0	17.8	8.6	89.2	30.20	100

NOTE: B = Bottom
Cond. = Conductivity
Barom. = Barometric Pressure

Water of the quality found in the drainage channel would, if discharged into the Black River in sufficient quantity, result in both ammonia toxicity and anoxia in the river. Minimum dilution ratios of roughly 60:1 for $\text{NH}_3\text{-N}$ plus 1,000:1 for chemical oxygen demand, would be required to prevent severe impacts to the river. An additional dilution ratio of roughly 500:1 would be required to prevent severe impacts downstream from the nitrogenous oxygen demand of the total $\text{NH}_3\text{-N}$ as it oxidized to NO_3 (nitrate). The quantity of water, and therefore the concentration of pollutants, discharged to the Black River through the channel and settling pond during the Global shut down and cleaning operation is unknown.

4.6 Ecology Black River Ambient Water Quality Surveys - The results of the Black River ambient water quality surveys are presented in this section.

Temperatures - Surface water temperatures within the Black River study area ranged from 14.7 degrees Celsius (58.5 $^{\circ}\text{F}$) to 19.8 degrees Celsius (67.6 $^{\circ}\text{F}$) (Table 7).

Dissolved Oxygen (D.O.) - Surface D.O. levels within the Black River study area varied with location, ranging from 6.3 ppm to 11.8 ppm (Table 7).

At r.m. 13, 9.8, and 9.3, D.O.'s near the bottom of the river (5m) were very low (2.5, <1.1, and 3.9 ppm respectively). D.O. at these concentrations is inadequate to support healthy fish populations. The water temperature and D.O. data indicate the water column was stratified, with a low D.O. layer near the bottom typical of eutrophic lakes.

Ecology collected D.O. samples in the Black and Chehalis River just before daylight (4:53 a.m. to 5:45 a.m.) to determine if the respiration and decay of aquatic plants and algae were depleting the oxygen and causing fish kills. The data indicate surface D.O.'s were not depleted significantly and were adequate to support fish (Table 7). Trout and salmon are supported by oxygen levels above 5 ppm. Thus it was concluded, natural D.O. depletion did not cause the fish kill.

Nutrients - Based on nutrient data collected during the Black River surveys (see Table 8), and despite a spike at r.m. 15.3, total nutrient concentrations (nitrite, nitrate, ammonia and phosphates) increase an average of about three-fold below r.m. 10 (Figure 4).

Total phosphate concentrations above r.m. 10 average 0.06 ppm (range 0.05 to 0.08 ppm); while concentrations downstream from r.m. 10 average 0.13 ppm (range 0.08 to 0.19 ppm) (Figure 5).

Similarly NO₂+NO₃-N concentrations increase dramatically: a mean of 0.18 ppm above r.m. 10 increasing to 0.51 ppm downstream of r.m. 10 (Figure 3). NH₃-N (ammonia) concentrations increase significantly at r.m. 9.3 (Figure 6).

This three-fold increase in nutrient concentrations (Table 8) (Figure 3-5) correlates with a clear increase in density of rooted aquatic plants and algae. Ecology Environmental Investigation/Laboratory Services summarized the aquatic plants in this reach of the Black River (Attachment 5).

Table 8. Washington Department of Ecology Black River Ambient Water Quality Survey Temperature and Nutrient Data, August 17-18, 1989. Black River Fish Kill August 6-7, 1989.

R.M.	Date-Time	Depth m	Temp (°C)	pH	Nutrients			
					NO ₂ + NO ₃ -N ppm	NH ₃ -N ppm	O-PO ₄ -P ppm	T-PO ₄ -P ppm
17.2	8/18-0755	0.0	17.9	7.3	0.01	0.02	0.02	0.06
15.3	8/18-0820	0.0	14.7	7.1	0.41	0.03	0.02	0.06
13.0	8/18-1020	0.0	18.8	7.5	0.02	0.01	0.01	0.05
11.0	8/18-1125	0.0	<u>17.8</u>	<u>7.4</u>	<u>0.29</u>	<u>0.01</u>	<u>0.02</u>	<u>0.08</u>
	<u>Averages</u>		<u>17.3</u>	<u>7.2</u>	<u>0.18</u>	<u>0.02</u>	<u>0.02</u>	<u>0.06</u>
9.9	8/17-1340	0.0	18.8	8.0	0.51	0.01		0.11
9.3	8/17-1425	0.0	18.1	7.3	0.70	0.09		0.11
	8/18-1210	0.0	19.5	7.4	0.52	0.04	0.04	0.19
7.8	8/17-1530	0.0	19.2	7.3	0.70	0.05		0.08
7.1	8/18-1305	0.0	<u>19.8</u>	<u>7.6</u>	<u>0.64</u>	<u>0.02</u>	<u>0.02</u>	<u>0.15</u>
	<u>Averages</u>		<u>19.1</u>	<u>7.5</u>	<u>0.51</u>	<u>0.04</u>	<u>0.03</u>	<u>0.13</u>

BLACK RIVER FISH KILL August 6-7, 1989

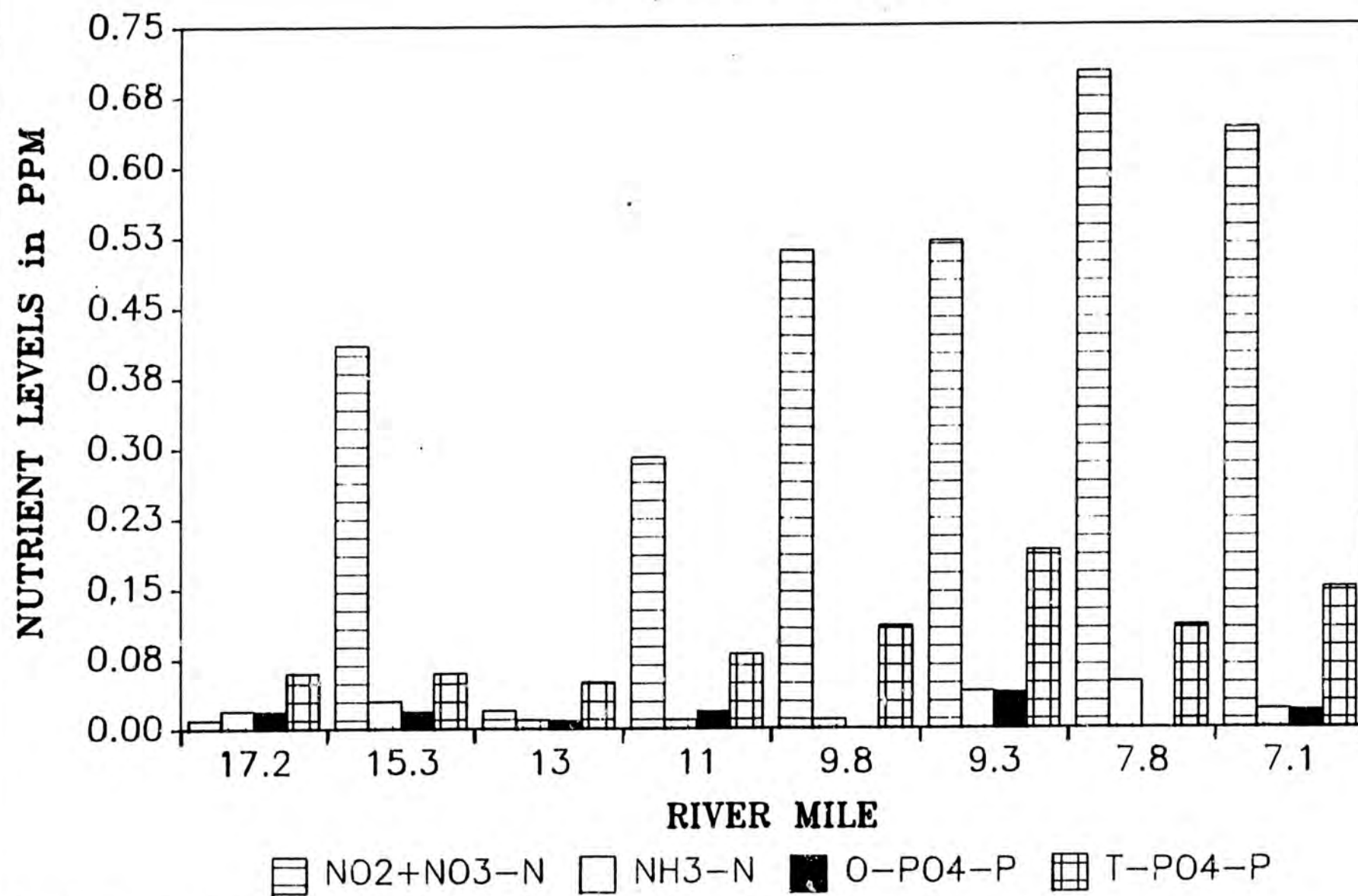


Figure 3. Black River Surface Water
Nutrient Data
Black River Fish Kill, August 6-7, 1989

BLACK RIVER FISH KILL AUGUST 6-7, 1989

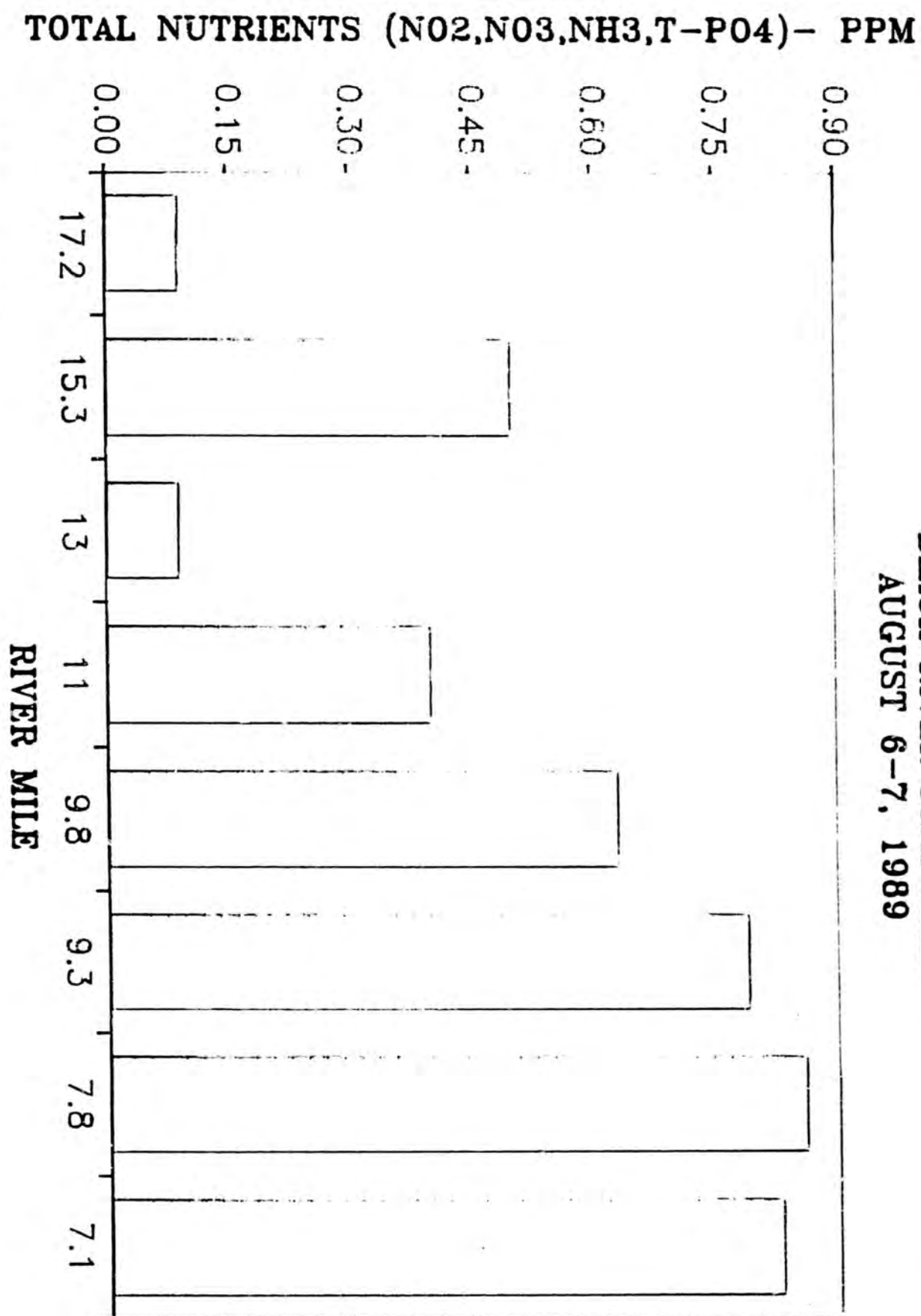


Figure 4. Black River Surface Water
Total Nutrient Data.
Black River Fish Kill, August 6-7, 1989

BLACK RIVER FISH KILL
August 6-7, 1989

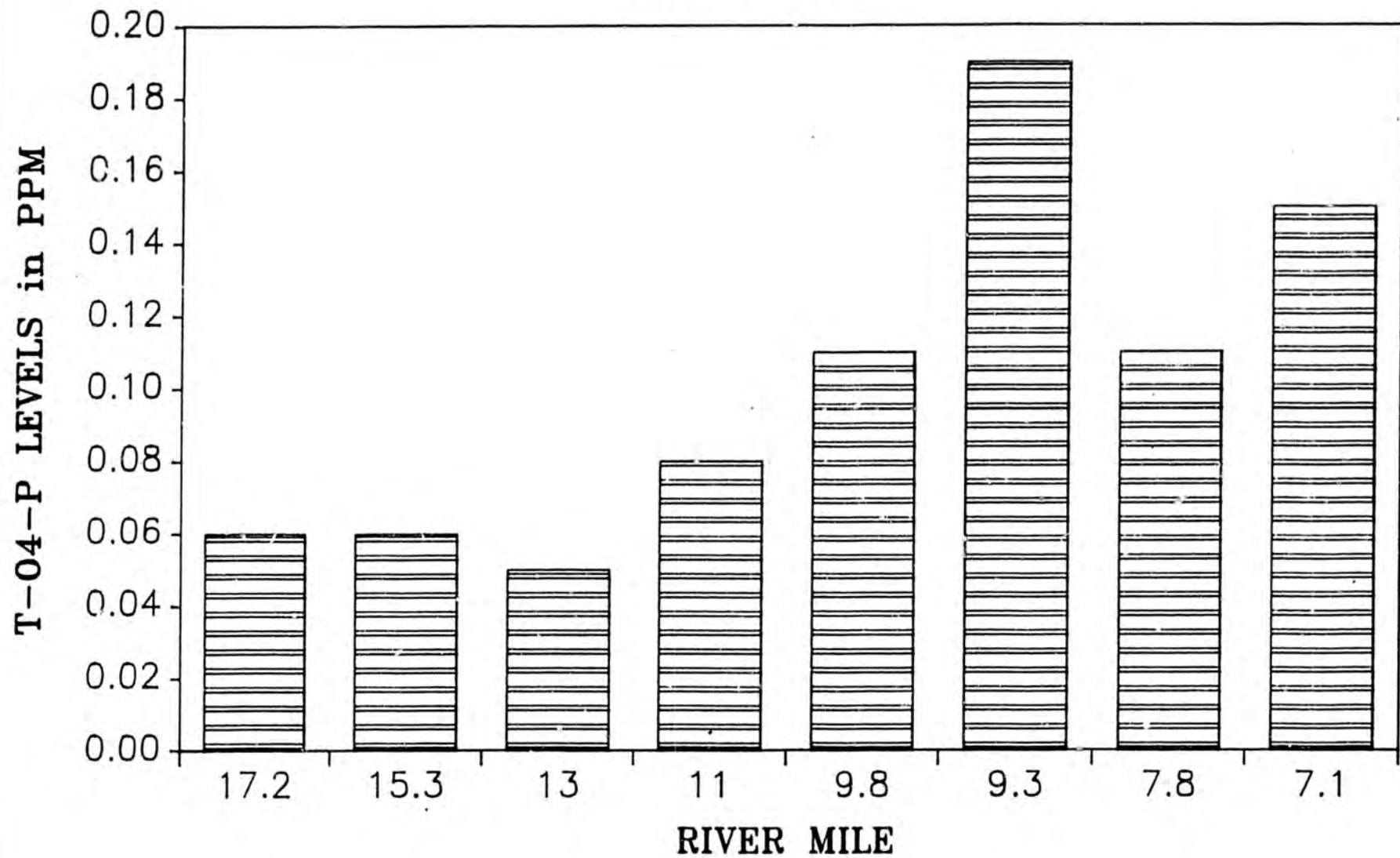


Figure 5. Black River Surface Water
Total Phosphate Data
Black River Fish Kill, August 6-7, 1989

BLACK RIVER FISH KILL
August 6-7, 1989

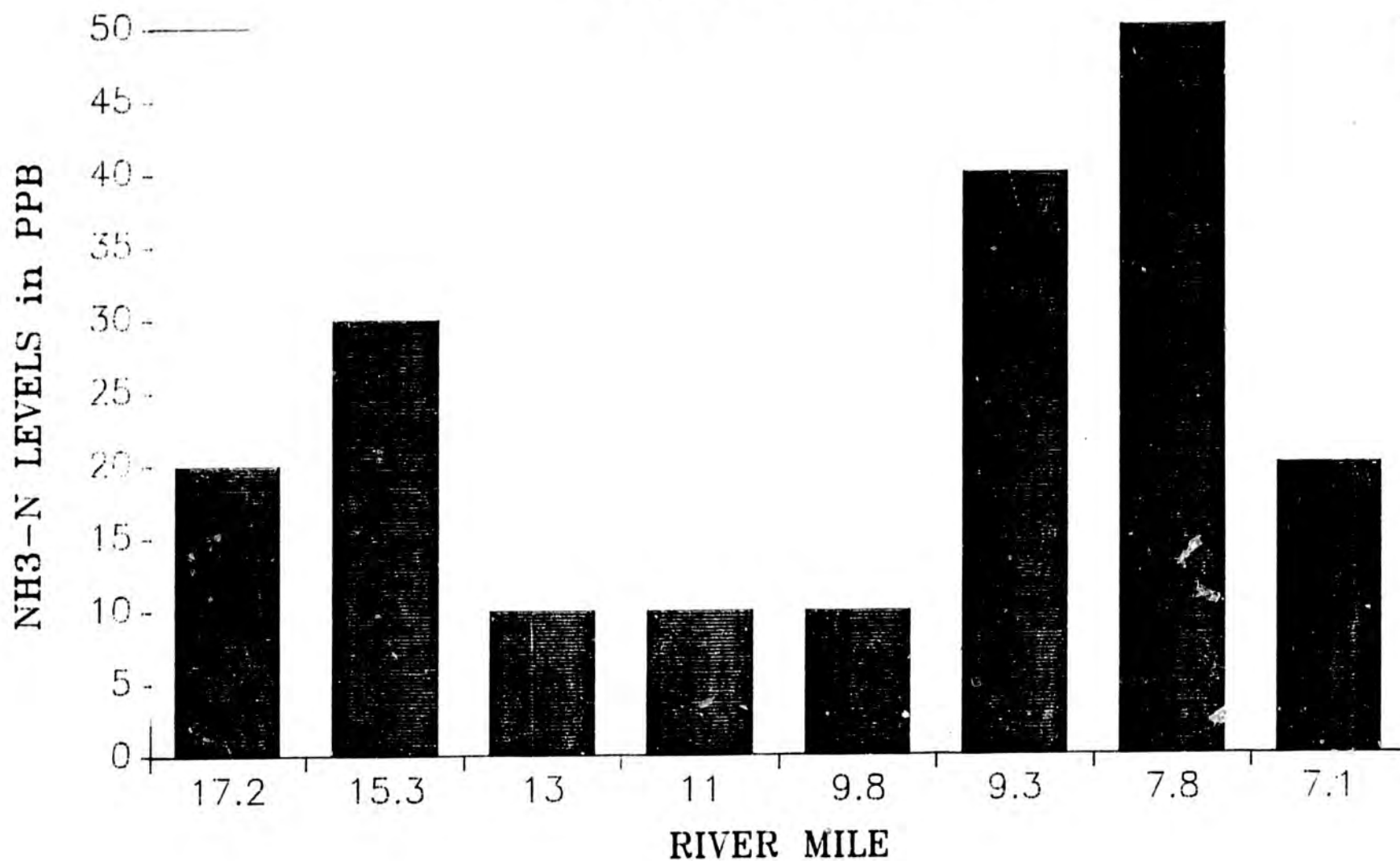


Figure 6. Black River Surface Water
Ammonia Data
Black River Fish Kill, August 6-7, 1989

The increase in nutrient concentrations and aquatic plant density below r.m. 10 is a problem which aggravates conditions in the river. High productivity typically leads to dramatic swings in oxygen concentrations. This is particularly troublesome in a stream like the Black River which has a very low velocity and thus little capacity for physical reaeration.

The combination of low river velocity, high nutrient concentrations, high productivity, and stratified pools is one which can put the lower Black River at risk to conditions which induce anoxia (Table 8).

It should be noted that while these nutrients, ammonia in low concentrations is quite a good plant nutrient, contribute to the degradation of water quality, they do not normally cause acute, widespread mortality as seen in this fish kill. Conversely, ammonia in adequate concentration, can be lethal.

Pesticides and Other Observations - No pesticides or herbicides were found in the Black River sediment samples and metals were below toxic levels.

One mountain whitefish carcass was found on August 18, 1989 near r.m. 13.0. Judging from the state of decomposition, the carcass was less than 48 hours old. This carcass indicates a limited summer kill was occurring which is normal.

On that same day, several freshwater clam carcasses were noted at r.m. 9.5 and r.m. 7.1. The carcasses at r.m. 9.5 were floating on the surface and were in an advanced state of decay. The clam carcasses were analyzed for metals and pesticide residuals. The analysis did not find significant metal concentrations or pesticides.

The data indicate ambient water quality in the Black River was adequate to support fish.

4.7 Ecology Chehalis River Ambient Water Quality Survey - On August 15, 1989, Ecology's Chehalis River study revealed surface D.O.'s of 10.2, 12.8, 11.7, and 11.6 ppm at river miles 14, 21, 33, and 44 respectively. The average surface water pH and temperature were 8.2 and 19.5 C°, respectively. These conditions were adequate to support fish and other aquatic life.

Ecology also noted one decomposing adult Chinook carcass near the Satsop River (r.m. 21.1) and several fresher Chinook carcasses upstream of Davis Creek (r.m. 42.5).

Analysis of the Chehalis River water and sediment samples did not find significant metal concentrations or pesticides.

Ecology's sample revealed a surface D.O. of 9.9 ppm at r.m. 44.0 (Sickman Ford bridge, Oakville). These data indicate surface D.O. in the Chehalis River was adequate during night time hours to support fish.

The data indicate ambient water quality in the Chehalis River was adequate to support fish and that the kill occurred in the reach of the Chehalis above Davis Creek.

5.0 FISH MORTALITY ESTIMATE

The fish mortality estimate and resource loss is discussed in this section.

5.1 Black River Fish Mortality Estimate

For the purposes of this report, it was assumed that 100% of the fish in the Black River from r.m. 9.2 to the mouth were killed.

WDF collected 16 fish: 3 coho salmon fingerlings, 3 resident cutthroat trout, and 10 forage fish (sculpins, dace, shiners, suckers, and lamprey) carcasses in about 200 yards. The reach was choked with aquatic vegetation hiding the majority of the carcasses making an accurate carcass count impossible.

WDF estimated about 100,000 coho fingerlings died as a result of the kill. Their estimate is based on WDF coho smolt trapping data collected over the last four years and applying fingerling survival rates to smolt production (Attachment 7).

For the purposes of this report, it was assumed by WDW that the density of cutthroat trout was about one per 7.1 square meters. The surface area of the affected reach was $118,422 \text{ m}^2$ (9.2 mi. x 1,609 m/mi. x 8m).

Applying the cutthroat density to the surface area provided a cutthroat mortality estimate ($118,422 \text{ m}^2 \times .14 \text{ fish/m}^2$) of 16,579 or roughly 17,000.

Again, for the purposes of this report it was assumed the forage fish density was one fish per square meter resulting in a forage fish mortality estimate of approximately 118,422.

5.2 Chehalis River Fish Mortality Estimate

The CIN counted 240 adult Chinook salmon carcasses and 1 adult steelhead trout carcass in the Chehalis River downstream from the Black River. Because of predation and fish size it was assumed by CIN 75% of the Chinook and 33% of the steelhead were collected resulting in a mortality estimate of 320 ($240/.75$) and 3 ($1/.33$) respectively (Table 9).

For the purposes of this report it was estimated that 320 mountain whitefish also died as a result of this incident.

Table 9. Chehalis River Fish Mortality Estimate. Black River Fish Kill, August 6-7, 1989.

Species	No. Fish Collected	Percent Collected	Mort. Est.
Chinook	240	75	320
Steelhead	1	33	3
Whitefish	Est.	NA	320

6.0 CONCLUSIONS

Based on the facts available, the Department of Ecology has concluded:

- o Although the ambient water quality in the Black and Chehalis River was not ideal for salmon, trout, and whitefish in early August 1989, this fish kill event was not caused by ambient river conditions.
- o The fish kill was caused by a pollutant(s) discharged to the river resulting in an acute mortality.
- o The fish kill in the Black River probably occurred on August 6, 1989 and began in the vicinity of river mile 9.2.
- o Subsequent to the kill, the Black River contained elevated levels of ammonia, nitrites, nitrates, and phosphorous. Lethal levels of an acutely toxic substance in either river could not be found due to the very rapid (usually within less than 24 hours) dilution, dissipation and evaporation of the pollutant(s).
- o On and after the afternoon of August 8 (the date of the first fish kill report and investigation), investigators were not able to find physical evidence of pollutants being actively discharged into the Black River.
- o Results of the Black River fish kill investigation indicate discharge permits in this area warrant upgrading (see Section 7.0 Corrective Actions).

7.0 CORRECTIVE ACTION

The investigation of the August fish kill revealed that chronic water quality problems associated with elevated levels of nutrients exist in the lower Black River. This situation presents a stressful environment for fish and other aquatic organisms especially during late summer and reduces the recreational/boating value of the river. However, limited information exists regarding flows and overall water quality of the entire Black River.

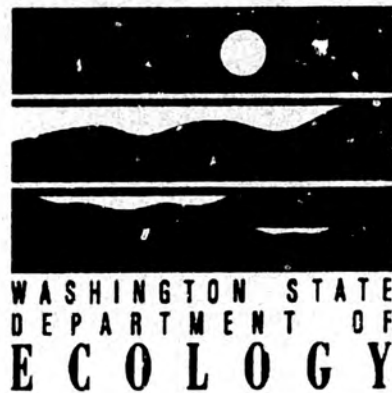
As a result of the extensive investigation, Ecology has identified several corrective actions that will provide better water quality information and better control potential sources of pollution. The following actions are currently underway or will be carried out as indicated:

1. Ecology and the Chehalis Tribe will conduct a short-term cooperative ambient water quality monitoring study. Water samples will be collected monthly by tribal members from October 1989 through June 1990 at two monitoring stations along the Black River. The samples will be sent to Ecology for analysis. Ecology will train tribal members in appropriate sample collection techniques and assist in selecting the two water monitoring stations.
2. Ecology will immediately increase inspections of point and nonpoint sources of water pollution in the greater Chehalis River watershed to identify the source and type of pollutants entering the water. Facilities identified as requiring wastewater discharge permits will be brought into the permit program. Facilities having wastewater discharge permits will be reviewed for compliance with current technological and water quality standards. If needed, these facilities will be required to upgrade their operations to ensure water quality in the Black and Chehalis rivers is protected.
3. Because wastewater from the Global Aqua fish-rearing operation is not monitored due to its ground discharge, the facility will immediately undergo a review and wastewater permit upgrade. Global Aqua is currently working cooperatively with Ecology to implement interim control measures prior to permanent facility modifications.

In a related action, Ecology has been working with the aquaculture industry to develop a policy regarding water quality requirements for fish production facilities. The purpose of the fin-fish discharge permit policy is to provide a consistent and predictable permitting process that ensures

environmental protection. All fish-rearing facilities on the Black River will be subject to any additional requirements that result from the new policy.

4. Upon completion of the short-term Black River water quality monitoring study, Ecology will assess the need for an intensive water quality study in the Black River. Pending an evaluation of priorities, the study would likely be conducted from mid-summer to early winter, 1990.
5. To provide a better understanding of water quality trends, Ecology will evaluate establishing an ambient water quality monitoring station on the Black River.



Appendices
to the Black River
Fish Kill Report

October 1989
89-57

ATTACHMENT 1

SWPO Complaint Tracking Form

DATE
753-1650

GP

4. Recorder ROBERT W. RYAN DEPARTMENT OF ECOLOGY ENVIRONMENTAL REPORT 1. ID number 10508

2. Date 8-8-89 3. Time 2:45 PM 5. Region SWR 6. County THURSTON 7. Waterway BLACK RIVER 8. WRIA _____

9. Repo address _____ city: RE wishes emergency _____

10. Incident location: ROCKMISTAKE / GATE
AREA, BLACK RIVER
city: GATE WA.

11. Alleged violator: UNKNOWN
address: _____
city: _____
contact person: _____
phone: _____

12. Media: ☐ A air ☐ GW grnd wtr ☐ S soil ☒ SW surf wtr ☐ O other _____

13. Material: ☐ G gas/particu ☐ H haz mat ☐ OP oil/polr ☐ SW sol wast ☐ WW waste water ☐ O other _____
chemical UNKNOWN quantity _____

14. Source: ☐ AG agricul ☐ AQ aqecul ☐ C commerc ☐ D domestic ☐ FP for pres ☐ M municip ☐ NP non-pt ☐ U unknown ☐ O other _____

15. Ecology referral: ☐ HC hazwast inspec/CU ☐ I industr ☐ SH shoreland ☐ SW sol haz wast ☐ S spill ☐ W waste red/recyc ☒ WQ water qual
☐ WR water res ☐ O other _____ section head _____ inspector CLOUD date investigated _____

16. Outside referral ☐ A air auth ☒ CH co health ☐ CD conv dist ☐ CO coast ad ☐ EP ops ☐ O other DEPT. OF FISH & WILDLIFE
name: SUE DAVES phone: 754-4111 (DAVE STILLER)

17. Narrative (who, where, when)

CHILDREN OF HAD BURNING / SWALLOW EYES AFTER SWIMMING
IN THE BLACK RIVER MONDAY.

MR ALSO STATED HE HAD NOTICED DEAD FISH IN THE
RIVER. HE STATED THAT THE FISH FARMS MAYBE DISCHARGING
CHEM. INTO THE RIVER.

DOE SPILL TEAM RESPONDED AND TOOK PH. TEST ON WATER. SITE SHOULD
BE REVIEWED BY BOAT DURING CLEANSING / FLUSHING PROCESS OF FISH
TANKS / FACILITIES.

POSSIBLE SPILL / DISCHARGE OF UNKNOWN CHEM. INTO BLACK RIVER

ATTACHMENT 2

Chehalis Water Data

2.0

Water Temperature - 1510.5 h. - 1500 - 1500

2. KM 8.9

(Temps. late morning)

(Celsius)

1985

Day

July

1

1989

2

1988

3

1987

4

1986

1985

150

150

160

16.50

15

160

180

13.50

160

160

180

180

170

180

EFFICIENCY LINE • 22-208



EFFICIENCY LINE • 22 208

31

30

29

28

27

26

25

24

23

22

21

20

19

18

17

16

15

14

13

12

11

10

9

8

7

6

5

4

3

2

1

50

August

1

1734

2

1768

3

1789

4

1810

225

15°

17°

18°

16°

17°

16°

16°

18°

16°

17°

18°

16°

16°

ATTACHMENT 3

Dave Seiler, WDF Fish Carcass Survey Report

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
PLANNING, RESEARCH AND HARVEST MANAGEMENT

MEMO

TO: Greg Sorlie and Pat Lee
FROM: Dave Seiler *DS*
SUBJECT: Black River Fish Kill

August 17, 1989

This memo documents Department of Fisheries' involvement in the initial investigation of the Black River fish kill.

On Tuesday, August 8, 1989, I received a phone call at 3pm at my office from Mr. Rich Hendricks, a resident of lower Black River (approximately 1/2 mile downstream of Gate). He stated that "something is wrong with the river". On Monday evening his grandchildren swam in the river and as a consequence, suffered severe eye irritation. When he began finding dead fish on Tuesday it became obvious that something was indeed wrong.

I advised him to call the Department of Ecology. He stated that he already had and was transferred five times and felt like he never did connect with anyone that would handle the report. He was very frustrated. I told him that I would come down but that he still needed to persist in reporting this to Ecology because they were the proper agency to respond to such a complaint. Mr. Hendricks called me at home about 6pm and reported that the closer he looked in the river the more dead fish he found. No one had responded to his complaint yet and he was even more concerned for the health of his family as it became clear that a serious fish kill had occurred. I told him I would be down shortly.

As soon as my wife, Kay (an Ecology inspector) got home from work we drove down to Mr. Hendricks' place, arriving there at 7:15 pm. For a moment, I considered the possibility of a natural fish kill as the water temperature was warm (69.5 F). This notion evaporated as I proceeded upstream. The bottom was littered with dead sculpins, lampreys, and crayfish. Even the freshwater mussels were dead. As these species are more tolerant of warm temperatures and low DO's than salmonids, it became apparent that this kill did not result from natural conditions.

I proceeded upstream about 200 yards criss-crossing the channel where possible and inspecting near both banks. I found dead fish everywhere and saw no sign of anything alive except one moribund lamprey. I collected coho salmon fry and cutthroat trout in addition to the other species listed above. I retained a sample (5-10 fish) of each species for possible tissue analysis. Based on the condition of the bodies, I estimate that they died at least 24 hours to 48 hours earlier, possibly even more than this. During my survey I detected no unusual odor or any

other evidence in the water or on the dead fish that gave me any clues as to a contaminant or the cause of death.

We returned home around 9:30 pm and at this time, Kay called the spill hotline number and was immediately contacted by Bob Warren. She appraised him of the severity of the fish kill. He was somewhat surprised because that same evening, he had driven the spill van down to the Moon Road bridge and had not seen any dead fish.

First thing in the morning (Wednesday, Aug. 9) I sent two of my staff, Mike Ackley and Pete Topping down to the Black River to determine the upstream extent of the kill. I also reported my observations of the previous night to Bill Young, Ecology water quality inspector, and advised him that my staff were enroute to the river. I also contacted Fisheries' pathology lab to inquire about tissue analysis. Pathologists were not available at this time so I was referred to Ray Brunson, USFWS. He advised me that the fish samples had been dead too long to be analyzed.

At 10 am, Mike and Pete launched a canoe at River Mile 9.8 and paddled upstream to R.M. 10.3. At the launch point and upstream no dead fish were found, only live fish. They proceeded downstream and encountered the first dead fish just below the train tressel (R.M.9.2). From this point down to R.M. 8.0 they found a few dead fish. The number of dead fish greatly increased below R.M. 8.0, and continued to increase through R.M. 7.2 where they pulled out. Mortalities included the following species: coho salmon fry, trout fry (age 0+), cutthroat trout (up to 12"), sculpins, large scale suckers, lampreys, crayfish and freshwater clams. The only live fish observed below R.M. 8.0 were cyprinid fry (approximately 3/4" in length).

During the float trip, four water samples were collected (table). Before the trip, the plastic sample bottles were rinsed with distilled water. At the time of collection each bottle was labeled as to location.

Sample #	River Mile	Location within channel
1	9.2	@ surface, 5' off left bank
2	8.0	@ surface, mid-channel
3	7.5	@ surface, mid-channel
4	9.7	@ surface, 2' off left bank

Mike and Pete returned to the office around 3pm. At this time I coordinated with Ecology personnel (Bob Warren and Bill Young) and we shared observations. I offered the water samples for analysis but they stated that there would be no point in analyzing these samples because they did not know what to analyze for and whatever it was would be gone by this time. We still have these samples but they have not been refrigerated.

At around 3:30 pm I contacted Gene Deschamps, fish biologist for the Chehalis Tribe at Oakville, and informed him of the fish kill and asked

him if he would survey lower Black River to determine the downstream extent of the kill. He said they would begin on Thursday morning. At 2 pm Thursday afternoon Gene reported that the kill extended downstream past the Highway 12 bridge but apparently had not reached the lower Black River bridge (R.M. 1.2) as live fish were observed here. Gene said they would float the stretch between these bridges on Friday, August 11.

The next report I received from Gene came around 6 pm on Saturday, August 12. At this time he reported that they were recovering dead adult chinook from the Chehalis River below the confluence of the Black River. We both thought it important to advise Ecology of this development but could not find Bill Young's home phone number. I gave Gene Ecology's spill hotline number and he was able to make contact through this channel.

During our two surveys we did not attempt any systematic counting of densities of dead bodies as it was apparent to me that such an approach was simply inappropriate for assessing the loss of juvenile fish in this situation for several reasons.

1. Visibility is very poor in the Black River. Aquatic vegetation is extremely heavy and the water is also very dark. Even where the weeds were not too thick, visibility was less than two feet. Every time I reached into a mass of weed growth I found dead fish, usually coho. It soon became apparent that the visible (floating) fish represented the "tip of the iceberg".

2. Extremely heavy brush extends well out from the banks further precluding carcass recovery and visibility.

3. In addition to these problems, the length of time that had elapsed since the kill would render any estimate based on a dead count unusable due to downstream transport and removal by predators. Two of the larger trout (10-12") had what appeared to be bird peck wounds. Birds probably removed most of the smaller fish such as coho fry that were on the surface.

We have evaluated Black River coho production and survival over a number of years and based on these studies could produce an estimate of the coho salmon loss. If a resource damage assessment is called for you may count on our help.

DES:des

cc: Ed Manary
Gene DiDonato
Kahler Martinson
Lloyd Phinney
Tony Floor
Tom Cooney
Dennis Austin
Rich Lincoln
Brian Edie

ATTACHMENT 4

Lab Data Sheets: General Chemistry, Metals, Organics

Black River Fish Kill Sample Inventory
Black River Fish Kill, August 6 - 7, 1989

October 4, 1989

LAB NO. ?	DATE	TIME	COLLECTOR	LOCATION	RIVER	RM	DEPTH	MATRIX	ANALY
FIELD	8/18	505	Bernhardt	GATE	BLACK	7.10	0	W	G
FIELD	8/18	453	Bernhardt	HWY-12	BLACK	4.00	0	W	G
FIELD	8/18	345	Bernhardt	LITTLE ROCK	BLACK	17.00	0	W	G
FIELD	8/18	1125	Kittle	R.M. 11	BLACK	11.00	0	W	G
FIELD	8/18	413	Bernhardt	SICKMAN FORD	CHEHALIS	44.00	0	W	G
FIELD	8/18	522	Bernhardt	200 YDS ABOVE RR	BLACK	9.30	0	W	G
FIELD	8/18	1210	Kittle	R.M. 9.35	BLACK	7.80	0	W	G
FIELD	8/18	1020	Kittle	R.M. 13	BLACK	13.00	0	W	G
337093	8/11	1545	Pickett	GLOWELL	GLOBAL		0	W	GF
337094	8/11	1600	Pickett	GLQ POND	GLOBAL		0	W	GF
337095	8/11	1605	Pickett	GLQ SETT	GLOBAL		0	W	GF
337096	8/11	1610	Pickett	GLQ SEDS	GLOBAL		8	S	GFS
337099	8/15	1300	Pelletier	MONTESANO	CHEHALIS	14.00	0	W	GFOM
337100	8/15	1730	Pelletier	KEYS RD.	CHEHALIS	21.00	0	W	GFOM
337101	8/15	1850	Pelletier	PORTER	CHEHALIS	33.00	0	W	GFOM
337102	8/15	1930	Pelletier	SICKMAN FORD	CHEHALIS	44.00	0	W	GFOM
337104 *	8/9	1100	Fagerness	BIG ROCK	BLACK	7.70	0	W	GFOM
337105	8/12	1000	Warren	CANOE LAUNCH	BLACK	14.20	0	W	GFOM
337116	8/16	1930	Kittle	LITTLE ROCK	BLACK	17.00	0	W	GM
337117	8/16	1845	Kittle	RR Bridge	BLACK	9.20	0	W	GM
337118	8/16	1750	Kittle	Moon Street	BLACK	7.10	0	W	GM
337119	8/16	1630	Kittle	Little Rock	BLACK	17.00	0	W	GM
337121	8/16	1830	Pickett	Channel	GLOBAL		0	W	G
337122	8/16	1500	Pickett	Settling Pond	GLOBAL		0	W	G
337124	8/17	1330	Yake	RM9.8 (BR-1B)	BLACK	9.80	8	W	G
337125	8/17	1340	Yake	RM9.8 (BR-1S)	BLACK	9.80	0	W	G
337126	8/17	1415	Yake	RM 9.3 (BR-2B)	BLACK	9.30	8	W	G
337127	8/17	1425	Yake	RM9.3 (BR-2S)	BLACK	9.30	0	W	G
337128	8/17	1530	Yake	BIG ROCK (BR-3S)	BLACK	7.70	0	W	G
347153	8/18	1725	Pickett	SWKSLU01	SWECKER		0	W	G
347154	8/18	1430	Pickett	RCHSLU02	ROCH SL.		0	W	G
347155	8/18	1520	Pickett	CRLWELL	CARLSON		0	W	G
347156	8/18	1530	Pickett	CRLEFF01	CARLSON		0	W	G
347157	8/18	1715	Pickett	SWKSED	SWECKER		8	S	GOM
347158	8/18	1415	Pickett	SSFSED01	Steelham		8	S	GOM
347159	8/17	1445	Pickett	RCHSLU01	Steelham		0	W	G
347160	8/18	755	Kittle	Little Rock	BLACK	17.00	0	W	G
347161	8/18	820	Kittle	R.M. 15.3	BLACK	15.30	0	W	G
347162	8/18	1020	Kittle	R.M. 13	BLACK	13.00	0	W	G
347163	8/18	1125	Kittle	R.M. 11	BLACK	11.00	0	W	G
347164	8/18	1210	Kittle	R.M. 9.35	BLACK	9.30	0	W	G
347165	8/18	1305	Kittle	Moon Street	BLACK	7.10	0	W	G
347166	8/21	945	Pickett	SWKBLR-01	ROCH. SL.	9.60	0	W	GM
347167 *	8/9		WDF	WDF-01	BLACK	9.20	0	W	GM
347168 *	8/9		WDF	WDF-02	BLACK	8.00	0	W	GM
347169 *	8/9		WDF	WDF-03	BLACK	7.50	0	W	GM
347170 *	8/9		WDF	WDF-04	BLACK	9.70	0	W	GM
348000	8/18	755	Kittle	Little Rock	BLACK	17.00	8	S	OM
348001	8/18	820	Kittle	RM 15.3	BLACK	15.30	8	S	OM
348002	8/18	1020	Kittle	RM 13.0	BLACK	13.00	8	S	OM

?/* = Sample results questionable due to no preservation.

G = General Chemistry M = Metals O = Organics S = Sulfate

Matrix: W = Water S = Sediment Depth: B = Bottom

Black River Fish Kill Sample Inventory
 Black River Fish Kill, August 6 - 7, 1989

October 4, 1989

LAB NO. ?	DATE	TIME	COLLECTOR	LOCATION	RIVER	RM	DEPTH	MATRIX	ANALY
348003	8/18	1125	Kittle	RM 11.0	BLACK	11.00	B	S	OM
348004	8/18	1305	Kittle	Moon Street	BLACK	7.10	B	S	OM

F = Formaldehyde Analysis

.....
 ?/* = Sample results questionable due to no preservation.
 G = General Chemistry M = Metals O = Organics S = Sulfate
 Matrix: W = Water S = Sediment Depth: B = Bottom

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

M E M O R A N D U M

TO: Steve Hunter
FROM: Despina Strong *DS*
SUBJECT: Chehalis River / Total Phosphate BOD data
DATE: August 30, 1989

The total phosphate analysis is now completed. The results can be found on the enclosed final update of the Chehalis River report.

The BOD analysis was requested on only two samples, 337021 and 337066. The BOD values for the above two samples are 6400 mg/L and 3 mg/L respectively.

Let me know if any additional information is needed from General Chemistry.

DS:db

SAMPLE ORIGIN	SAMPLE ID#	pH std units	CONDUCTANCE umhos/cm	ALKALINITY mg/l	HARDNESS mg/l	CHL mg/l	TOC mg/l	OPH mg/l	NO3 mg/l	NO2/NO3 mg/l	TOTAL P mg/l	CHLORIDE mg/l	SULFATE mg/l	CYANIDE mg/l	TURBIDITY NTU	PHENOL ug/l	150 mg/l
PAUL PICKETT/ BLACK RIVER	337153	6.7	135	-	51	10.3	2.96	-	0.29	3.00	0.26	-	-	-	-	-	-
	337154	HC	HC	HC	HC	12.3	2.39	-	0.1	0.19	0.52	-	-	-	-	-	-
	337155	6.6	120	-	45	17.0	2.15	-	-	-	-	-	-	-	-	-	-
	337156	6.7	119	-	46	0.60	1.27	-	0.43	2.09	0.16	-	-	-	-	-	-
	337159	6.5	114	-	42	40.2	6.66	-	-	-	-	-	-	-	-	-	-
CAVE HALLOCK/ CHEHALIS RIVER	337160	6.8	90	-	-	20.6	4.21	0.02	0.02	0.61 U	0.06	-	-	-	-	-	-
	337161	6.7	95	-	-	13.5	2.31	0.02	0.03	0.41	0.06	-	-	-	-	-	-
	337162	6.9	95	-	-	17.6	3.97	0.01 U	0.0 U	0.62	0.05	-	-	-	-	-	-
	337163	7.0	97	-	-	15.0	3.00	0.02	0.0 U	0.29	0.00	-	-	-	-	-	-
	337164	7.1	110	-	-	19.7	2.90	0.04	0.04	0.52	0.19	-	-	-	-	-	-
	337165	7.1	110	-	-	23.3	3.06	0.05	0.02	0.44	0.15	-	-	-	-	-	-
PAUL PICKETT/	337166	7.0	110	-	40	20.9	0.00	-	0.02	0.30	0.12	-	-	-	-	2 U	4
BILL YOUNG/ CHEHALIS	337167	6.6	117	-	-	17.5	4.62	-	0.01 U	2.01	0.25	-	-	-	1.7	-	-
	337168	6.3	114	-	-	11.0	3.94	-	0.32	1.17	0.15	-	-	-	0.6	-	-
	337169	6.3	113	-	-	13.0	4.11	-	0.01	1.30	0.18	-	-	-	0.4	-	-
	337170	7.0	112	-	-	12.7	3.07	-	0.01 U	1.06	0.13	-	-	-	1.2	-	-

s: Sediment (7.1 % solids)

* -: No Analysis Requested

NA: Not analyzed; analysis not completed due to instrument problem

J: Estimated value

U: Compound analyzed but not detected

HC: No Container provided for this analysis

GENERAL CHEMISTRY RESULTS : CHEHALIS AND BLACK RIVER FISH KILL PROJECT

Page 1 of 2

SAMPLE ORIGIN	SAMPLE ID#	pH std units	CONDUCTANCE uohms/cm	ALKALINITY mg/l	HARDNESS mg/l	COD mg/l	TOC mg/l	CPH4 mg/l	HS mg/l	NO2/NO3 mg/l	TOTAL P mg/l	CHLORIDE mg/l	SULFATE mg/l	CYANIDE mg/l	TURBIDITY NTL	PHOSPH ug/l	TSS mg/l
PAUL PICKETT/ GLOBAL AQUA	337093	8.0	0	-	-	-	5.16	-	-	-	-	6.48	-	-	-	-	-
	337094	6.9	-	-	-	-	351	-	-	-	-	519	-	-	-	-	-
	337095	7.0	-	-	-	-	61.9	-	-	-	-	86.1	-	-	-	-	-
	337096	6.6	-	-	-	-	8	-	-	-	-	73.5	0.47	-	-	-	-
BILL YOUNG/ BLACK RIVER	337099	7.1	290	-	50	-	3.00	0.01 U	0.01 U	0.03	0.05	-	-	0.02 U	-	-	-
	337100	7.3	123	-	30	-	6.00	0.01 U	0.01 U	0.03	0.07	-	-	0.02 U	-	-	-
	337101	7.5	120	-	30	-	3.57	0.01 U	0.03 J	0.23	0.07	-	-	0.02 U	-	-	-
	337102	7.5	124	-	40	-	2.61	0.02	0.01 U	0.33	0.00	-	-	0.02 U	-	-	-
	337104	7.3	116	-	61	-	23.8	-	0.06	0.35	0.19	6.81	-	-	-	-	-
	337105	6.8	96	-	37	-	7.10	-	0.01 U	0.01 U	0.04	4.26	-	-	-	-	-
LEW KITTLE/ BLACK RIVER	337116	8.2	126	-	53	-	-	-	-	-	-	-	-	-	-	-	-
	337117	7.3	115	-	50	-	-	-	-	-	-	-	-	-	-	-	-
	337118	7.3	121	-	43	-	-	-	-	-	-	-	-	-	-	-	-
	337119	6.8	124	-	46	-	-	-	-	-	-	-	-	-	-	-	-
PAUL PICKETT/ BLACK RIVER	337121	7.3	5540	-	-	11,000	2190	-	703	0.06	0.01	-	-	-	-	-	-
	337122	6.7	635	-	-	220	34.2	-	12.3	0.01	0.66	-	-	-	-	-	-
BILL YACE/ BLACK RIVER	337124	6.8	117	48	-	15.1	-	-	0.37	0.35	0.18	-	-	-	-	-	-
	337125	7.4	112	44	-	16.0	-	-	0.01	0.51	0.11	-	-	-	-	-	-
	337126	6.9	124	45	-	15.4	-	-	0.12	0.73	0.13	-	-	-	-	-	-
	337127	7.0	111	44	-	13.4	-	-	0.09	0.70	0.11	-	-	-	-	-	-
	337128	7.2	121	44	-	15.4	-	-	0.05	0.70	0.08	-	-	-	-	-	-

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

M E M O R A N D U M

TO: Dickey Hunter
FROM: Steve Twiss *ST*
SUBJECT: Black River/Chehalis River Fish Kill Sample Results
DATE: August 17, 1989

Samples from the Black and Chehalis Rivers numbered 337099, 337100, 337101, 337102, 337104 and 337105 were received by the Manchester Laboratory on August 16, 1989. Samples numbered 337116, 337117, 337118 and 337119 were received on August 17, 1989. These samples were analyzed by ICP on an "as is" (not digested) basis. All the metals on the priority pollutant list were not detected in these samples with the exceptions of thallium and mercury. Mercury was not analyzed for and the levels of thallium were at or near the instrumental detection limit. The thallium levels are therefore not significant.

Other analytes, that were not requested, were detected in the samples. The following list gives the analytes detected and the range of concentrations found.

Analyte	Range of Results (in ppb)	Method Reporting Limit (in ppb)
Aluminum	Not Detected-102	25
Barium	3-5	1
Calcium	8,870-10,990	1
Iron	62-253	5
Potassium	Not Detected-3,200	500
Magnesium	3,440-7,380	1
Manganese	Not Detected-33	1
Sodium	4,760-43,400	15
Strontium	Not Detected-66	1
Vanadium	Not Detected-6.5	2
Silica	8,560-11,700	10

It is felt that these levels are not significant in relation to the fish kill on the Black/Chehalis River system.

ST:mb

Final Report
Laboratory Analysis of Selected Parameters
Formaldehyde / MBTH Spectrophotometric



ANALYTICAL
RESOURCES
INCORPORATED

Matrix: Waters

Project No: Global Aqua/Black River
Chehalis River

Analytical
Chemists &
Consultants

Data Release Authorized: *MRP*
Prepared 08/17/89 - MAC:B

QC Report No: 3463 - WDOE
TSR: 08/15/89 & 08/16/89

333 Ninth Ave. North
Seattle, WA 98109-5187
(206) 621-6490
(206) 621-7523 (FAX)

Sample Data:

Lab ID	Client Sample NO	Formaldehyde	
		Distilled (mg/L)	w/o Distill (mg/L)
GLQWELL 3463 A	337093	<0.05	-
GLQACE 3463 B	337094	<0.05	-
POND 3463 C	337095	0.10	-
GLQSETT 3463 D	327096	12.74	-
GLQSEDS 3463 E	337104	<0.10	<0.10
	3463 F	<0.10	<0.10
	3463 G	<0.10	<0.10
	3463 H	<0.10	<0.10
	3463 I	<0.10	<0.10
	3463 J	<0.10	<0.10

Method Blank Analysis:

	Distilled (mg/L)
Method Blank 1	<0.10
Method Blank 2	<0.10
Method Detection Limit (MDL):	0.10

Check Standard:

(Calculated Amount)
Standard Value

	Distilled (mg/L)	w/o Distill (mg/L)
	0.14	0.09
	0.11	0.11

Duplicate Analysis:

	Distilled (mg/L)		Distilled (mg/L)
3463C	0.10	3463H	<0.10
3463CDUP	0.10	3463HDUP	<0.10
RPD	0.0%	RPD	-

Spike Analysis:

	Distilled (mg/L)	(ANALYTICAL) (mg/L)
3463C	0.10	0.10
3463CSPK	0.24	0.51
Spike Amount:	0.99	0.44
%Rec	14.1%	93.2%

Spike Analysis:

	Distilled (mg/L)
3463J	<0.10
3463JSPK	0.47
Spike Amount:	0.99
%Rec	47.5%

2

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

M E M O R A N D U M

To: Steve Hunter

From: Dick Hunsaker *OH*

Subject: Analysis Results for Black River/Chehalis River
Fish Kill.

Date: August 24, 1989

Samples from the Black and Chehalis Rivers collected on August 15, 1989 were received at the Manchester Environmental Laboratory on August 16, 1989 for analysis of acid/base-neutral organics, Volatile Organics (VOA), pesticides/PCB's, organo-phosphorous pesticides and herbicides.

Attached are the organic analysis results. All of the organic analysis has been completed and preliminary results were reported by phone and in my August 18th memo. Only the Volatile Organic Analysis (VOA) has yet to be reviewed and verified but no significant levels of compounds were detected.

Results for General Chemistry and Metals are discussed in the separate memorandum.

CC
Bill Yake

=> Transaction #: 08220811 Laboratory: (WE) Ecology, Manchester Lab
Work Group: (71) Pest/PCB - PP Scan
Instrument: (GCT-EC) Tracor GC 222 No.1, Ni-63 EC Detector
Method: (EP2-608) GC Ext Scan
Chemist: (RKC) Cummings, Randy ESD Hours Worked:

Project: DOE-222A BLACK/CHEHALIS RIVER FISH KILL Prj Ele#: C32B5
Prj Off: Young, Bill DOE Analysis Due: 890816 Revised Due:

*** Sample Records in Transaction ***

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	89337099		890815	STA 1	
02	89337100		890815	STA 2	
03	89337101		890815	STA 5	
04	89337102		890815	STA 6	
05	89337099	LBK1	890815	STA 1	

Record Type: TRNIN3 Date Verified: 8-22-89 By: P. J. [Signature]
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 22-AUG-89 08:19:58 Status: N Batch: (In CUR DB)

Transaction #: 08220811 Seq #: 01 (71) Pest/PCB - PF Scan
 Proj Code : DOE-222A BLACK/CHENALIS RIVER FISH KILL PB #: C3285

Sample No.: 89 337099

Alternate Keys:

Sample Matrix: (10) Water-Total Units: (11) ug/l %Slts:
 JA Code: () Unspecified Peaks Total:
 Date Extracted: 890816 Date Analyzed: 890816 # Days to Ext/Anal: 1/ 2

Line	Par #	Parameter Description	Units	Value
1	309002	Aldrin	ug/l	0.004U
2	47749	Chlordane	ug/l	0.04U
3	60571	Dieldrin	ug/l	0.007U
4	50293	4,4'-DDT	ug/l	0.007U
5	72559	4,4'-DDE	ug/l	0.007U
6	72548	4,4'-DDD	ug/l	0.007U
7	959988	alpha-Endosulfan	ug/l	0.007U
8	33213659	beta-Endosulfan	ug/l	0.007U
9	1031078	Endosulfan sulfate	ug/l	0.007U
10	72208	Endrin	ug/l	0.007U
11	7421934	Endrin aldehyde	ug/l	0.007U
12	76448	Heptachlor	ug/l	0.004U
13	1024573	Heptachlor epoxide	ug/l	0.004U
14	319846	alpha-BHC	ug/l	0.004U
15	319857	beta-BHC	ug/l	0.004U
16	58899	gamma-BHC (Lindane)	ug/l	0.004U
17	319868	delta-BHC	ug/l	0.004U
18	8001352	Toxaphene	ug/l	0.3U
19	12674112	PCB - 1016	ug/l	0.05U
20	11104282	PCB - 1221	ug/l	0.05U
21	11141165	PCB - 1232	ug/l	0.05U
22	53469219	PCB - 1242	ug/l	0.05U
23	12672296	PCB - 1248	ug/l	0.05U
24	11097691	PCB - 1254	ug/l	0.05U
25	11096825	PCB - 1260	ug/l	0.05U
26	72435	Methoxychlor	ug/l	0.008U
27	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	84 (I.S.) PR
28	-200045	IntStd: Hexabromobenzene	% Recov	100 (I.S.) PR

Transaction #: 08220811 Seq #: 02 (71) PCB/PCB - PP Scan
 Proj Code: DOE-222A BLACK/CHEMICALS RIVER FISH KILL PG #: C3285

Sample No.: 89 337100 Alternate Keys:

Sample Matrix: (10) Water-Total Units: (11) ug/l
 QA Code: () Unspecified Peaks Total: 62
 Date Extracted: 890816 Date Analyzed: 890816 # Days to Ext/Anal: 1/ 2

Line	Par #	Parameter Description	Units	Value	std:
1	309002	Aldrin	ug/l	0.004U	
2	57749	Chlordane	ug/l	0.04U	
3	60571	Dieldrin	ug/l	0.007U	
4	50293	4,4'-DDT	ug/l	0.007U	
5	72559	4,4'-DDT	ug/l	0.007U	
6	72548	4,4'-DDD	ug/l	0.007U	
7	959988	alpha-Endosulfan	ug/l	0.007U	
8	33213659	beta-Endosulfan	ug/l	0.007U	
9	1031078	Endosulfan sulfate	ug/l	0.007U	
10	72208	Endrin	ug/l	0.007U	
11	7421934	Endrin aldehyde	ug/l	0.007U	
12	76448	Heptachlor	ug/l	0.004U	
13	1024573	Heptachlor epoxide	ug/l	0.004U	
14	119846	alpha-BHC	ug/l	0.004U	
15	319857	beta-BHC	ug/l	0.004U	
16	58899	gamma-BHC (Lindane)	ug/l	0.004U	
17	319868	delta-BHC	ug/l	0.004U	
18	8001352	Toxaphene	ug/l	0.3U	
19	12674112	PCB - 1016	ug/l	0.05U	
20	11104282	PCB - 1221	ug/l	0.05U	
21	11141165	PCB - 1232	ug/l	0.05U	
22	53469219	PCB - 1242	ug/l	0.05U	
23	12672296	PCB - 1248	ug/l	0.05U	
24	11097691	PCB - 1254	ug/l	0.05U	
25	11096825	PCB - 1260	ug/l	0.05U	
26	72435	Methoxychlor	ug/l	0.008U	
27	-10386842	Instcd: 4,4-Dibromooctatluor	# Recov	62	(I.S.) PR
28	-200045	Instcd: Hexabromobenzene	# Recov	110	(I.S.) PR

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Transaction #: 08220811 Seq #: 03 (71) Pest/PCB - PF Scan
Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE # : C32B5

Sample No.: 89 337101

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

#Slds:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890818

Days to Ext/Anal: 1/ 2

Line	Par #	Parameter Description	Units	Value	
1	309002	Aldrin	ug/l	0.004U	
2	57749	Chlordane	ug/l	0.04U	
3	60571	Dieldrin	ug/l	0.007U	
4	50293	4,4'-DDT	ug/l	0.007U	
5	72559	4,4'-DDE	ug/l	0.007U	
6	72548	4,4'-DDD	ug/l	0.007U	
7	33213699	beta-Endosulfan	ug/l	0.007U	
8	1031078	Endosulfan sulfate	ug/l	0.007U	
9	72208	Endrin	ug/l	0.007U	
10	7421934	Endrin aldehyde	ug/l	0.007U	
11	76448	Heptachlor	ug/l	0.004U	
12	1024573	Heptachlor epoxide	ug/l	0.004U	
13	319846	alpha-BHC	ug/l	0.004U	
14	319857	beta-BHC	ug/l	0.004U	
15	58899	gamma-BHC (Lindane)	ug/l	0.004U	
16	319868	delta-BHC	ug/l	0.004U	
17	8001352	Toxaphene	ug/l	0.3U	
18	12674112	PCB - 1016	ug/l	0.05U	
19	11104282	PCB - 1221	ug/l	0.05U	
20	11141165	PCB - 1232	ug/l	0.05U	
21	53469219	PCB - 1242	ug/l	0.05U	
22	12672296	PCB - 1248	ug/l	0.05U	
23	11097691	PCB - 1254	ug/l	0.05U	
24	11096825	PCB - 1260	ug/l	0.05U	
25	72435	Methoxychlor	ug/l	0.08U	
26	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	66	(I.S.) PR
27	-200045	IntStd: Hexabromobenzene	% Recov	110	(I.S.) PR
28					

Transaction #: 08220811 Seq #: 04 (71) Pest/PCB - PP Scan
 Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE # : C32B5

Sample No.: 89 337102

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (1) ug/l

tSlds:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890816

Days to Ext/Anal: 1/ 2

Line	Par #	Parameter Description	Units	Value	
1	309002	Aldrin	ug/l	0.004U	
2	57749	Chlordane	ug/l	0.04U	
3	60571	Dieldrin	ug/l	0.007U	
4	50293	4,4'-DDT	ug/l	0.007U	
5	72559	4,4'-DDE	ug/l	0.007U	
6	72548	4,4'-DDD	ug/l	0.007U	
7	959988	alpha-Endosulfan	ug/l	0.007U	
8	33213659	beta-Endosulfan	ug/l	0.007U	
9	1031078	Endosulfan sulfate	ug/l	0.007U	
10	72208	Endrin	ug/l	0.007U	
11	7421934	Endrin aldehyde	ug/l	0.007U	
12	76448	Heptachlor	ug/l	0.004U	
13	1024573	Heptachlor epoxide	ug/l	0.004U	
14	319846	alpha-BHC	ug/l	0.004U	
15	319857	beta-BHC	ug/l	0.004U	
16	58899	gamma-BHC (Lindane)	ug/l	0.004U	
17	319868	delta-BHC	ug/l	0.004U	
18	8001352	Toxaphene	ug/l	0.3U	
19	12674112	PCB - 1016	ug/l	0.05U	
20	11104282	PCB - 1221	ug/l	0.05U	
21	11141165	PCB - 1232	ug/l	0.05U	
22	53469219	PCB - 1242	ug/l	0.05U	
23	12672296	PCB - 1248	ug/l	0.05U	
24	11097691	PCB - 1254	ug/l	0.05U	
25	11096825	PCB - 1260	ug/l	0.05U	
26	72435	Methoxychlor	ug/l	0.008U	
27	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	45	(I.S.) PR
28	-200045	IntStd: Hexabromobenzene	% Recov	110	(I.S.) PR

Transaction #: 08220811 Seq #: 05 (71) Pest/PCB - PP Scan
 Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE # : C32B5

Blank ID : LSK 9228
 Sample No.: 89 337099

Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Sds:
 QA Code: (LSK1) Lab Blank Sample #1 Peaks Total:
 Date Extracted: 890816 Date Analyzed: 890816 # Days to Ext/Anal: 1/ 2

Line	Pat #	Parameter Description	Value
1	309002	Aldrin	0.01U
2	57749	Chlordane	0.10U
3	60571	Dieldrin	0.01U
4	50293	4,4'-DDT	ug/l 0.02U
5	72559	4,4'-DDE	ug/l 0.02U
6	72548	4,4'-DDD	ug/l 0.02U
7	959988	alpha-Endosulfan	ug/l 0.02U
8	33213659	beta-Endosulfan	ug/l 0.02U
9	1031078	Endosulfan sulfate	ug/l 0.02U
10	72208	Endrin	ug/l 0.02U
11	7421934	Endrin aldehyde	ug/l 0.02U
12	76448	Heptachlor	ug/l 0.01U
13	1024573	Heptachlor epoxide	ug/l 0.01U
14	319846	alpha-BHC	ug/l 0.01U
15	319857	beta-BHC	ug/l 0.01U
16	58899	gamma-BHC (Lindane)	ug/l 0.01U
17	319868	delta-BHC	ug/l 0.01U
18	8001352	Toxaphene	ug/l 0.7U
19	12674112	PCB - 1016	ug/l 0.13U
20	11104282	PCB - 1221	ug/l 0.13U
21	11141165	PCB - 1232	ug/l 0.13U
22	53469219	PCB - 1242	ug/l 0.13U
23	12672296	PCB - 1248	ug/l 0.13U
24	11097691	PCB - 1254	ug/l 0.13U
25	11096825	PCB - 1260	ug/l 0.13U
26	72435	Methoxychlor	ug/l 0.02U
27	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov 68 (I.S.) PR
28	-200045	IntStd: Hexabromobenzene	% Recov 110 (I.S.) PR

--> Transaction #: 08220829 Laboratory: (WE) Ecology, Manchester Lab
Work Group: (73) Herbicide Scan
Instrument: (GCT-EC) Tracor GC 222 No.1, N1-63 EC Detector
Method: (EP2-608) GC Ext Scan
Chemist: (RKC) Cummings, Randy ESD Hours Worked:
Project: DOE-222A BLACK/CHWALIS RIVER FISH KILL Prj Ele#: C32B5
Prj Off: Young, Bill DOE Analysis Due: 890816 Revised Due:

*** Sample Records in Transaction ***

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	89337099		890815	STA 1	
02	89337100		890815	STA 2	
03	89337101		890815	STA 5	
04	89337102		890815	STA 6	
05	89337099	LBK1	890815	STA 1	

Record Type: TRNIN3 Date Verified: 8-22-89 By: *[Signature]*
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 22-AUG-89 08:35:36 Status: N Batch: (In CUR DB)

Transaction #: 08220829 Seq #: 01 (73) Herbicide Scan
 Proj Code : DOE-222A BLACK/CHWALIS RIVER FISH KILL

PE # : C3285

Sample No.: 89 337099

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l %stds:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890817

Days to Ext/Anal: 1/ 1

Line	Par #	Parameter Description	Units	Value
1	94757	2,4-D	ug/l	.01U
2	94826	2,4-DB	ug/l	.04U
3	93765	2,4,5-T	ug/l	.005U
4	93801	2,4,5-TB	ug/l	.005U
5	93721	2,4,5-TP (Silvex)	ug/l	.005U
6	94746	MCPA	ug/l	0.5U
7	93652	MCPB	ug/l	0.5U
8	94815	MCPB	ug/l	0.5U
9	87865	Pentachlorophenol	ug/l	.005U
10	4901513	2,3,4,5-Tetrachlorophenol	ug/l	.005U
11	1918009	Dicamba	ug/l	.005U
12	1689845	Bromoxynil	ug/l	.005U
13	1689834	Ioxynil	ug/l	.005U
14	88857	Dinoseb	ug/l	.005U
15	1918021	Picloram	ug/l	.005U
16	-118766	IntStd: 2,4,6-Tribromophenol % Recov		95 (I.S.) PR

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Transaction #: 08220829 Seq #: 02 (73) Herbicide Scan
Proj Code : DOE-222A BL/ CHEHALIS RIVER FISH KILL

PE # : C32B5

Sample No.: 89 337100

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Sds:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890817

Days to Ext/Anal: 1/ 1

Line	Par #	Parameter Description	Units	Value
1	94757	2,4-D	ug/l	.01U
2	94826	2,4-DB	ug/l	.04U
3	93765	2,4,5-T	ug/l	.005U
4	93801	2,4,5-TB	ug/l	.005U
5	93721	2,4,5-TP (Silvex)	ug/l	.005U
6	94746	MCPA	ug/l	0.5U
7	93652	MCPB	ug/l	0.5U
8	94815	MCPB	ug/l	0.5U
9	87865	Pentachlorophenol	ug/l	.009
10	4901513	2,3,4,5-Tetrachlorophenol	ug/l	.00
11	1918009	Dicamba	ug/l	.005U
12	1689845	Bromoxynil	ug/l	.005U
13	1689834	Ioxynil	ug/l	.005U
14	88857	Dinoseb	ug/l	.005U
15	1918021	Picloram	ug/l	.005U
16	-118766	Intstd: 2,4,6-Tribromophenol	% Recov	100 (I.S.) PR

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Transaction #: 08220829 Seq #: 03 (73) Herbicide Scan
Proj Code : DOE-222A BLACK/CHWALIS RIVER FISH KILL

PE # : C32B5

Sample No.: 89 337101

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Slde:

JA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890817

Days to Ext/Anal: 1/ 1

Line	Par #	Parameter Description	Units	Value
1	94757	2,4-D	ug/l	.01U
2	94826	2,4-DB	ug/l	.04U
3	93765	2,4,5-T	ug/l	.005U
4	93801	2,4,5-TB	ug/l	.005U
5	93721	2,4,5-TF (Silvex)	ug/l	.005U
6	94746	MCPA	ug/l	0.5U
7	93652	MCPB	ug/l	0.5U
8	94815	MCPA	ug/l	0.5U
9	87865	Pentachlorophenol	ug/l	.05U
10	4901513	2,3,4,5-Tetrachlorophenol	ug/l	.05U
11	1918009	Dicamba	ug/l	.05U
12	1689845	Bromoxynil	ug/l	.05U
13	1689834	Toxynil	ug/l	.05U
14	88857	Dinoseb	ug/l	.005U
15	1918021	Picloram	ug/l	.005U
16	-118766	IntStd: 2,4,6-Tribromophenol % Recov		105 (I.S.) FR

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Transaction #: 08220829 Seq #: 04 (73) Herbicide Scan
Proj Code: DOE-222A BLACK/CHEHALIS RIVER FISH KILL

PE #: C32B5

Sample No.: 89 337102

Alternate Keys:

Sample Matrix: (10) Water-Total

Units: (11) ug/l

#Slits:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890817

Days to Ext/Anal:

1/ 1

Line	Par #	Parameter Description	Units	Value
1	94757	2,4-D	ug/l	.01U
2	94826	2,4-DB	ug/l	.04U
3	93765	2,4,5-T	ug/l	.005U
4	93801	2,4,5-TB	ug/l	.005U
5	93721	2,4,5-TP (Silvex)	ug/l	.005U
6	94746	MCPA	ug/l	0.5U
7	93652	MCPB	ug/l	0.5U
8	94815	MCPB	ug/l	0.5U
9	87865	Pentachlorophenol	ug/l	.005U
10	4901513	2,3,4,5-Tetrachlorophenol	ug/l	.005U
11	1918009	Dicamba	ug/l	.005U
12	1689845	Bromoxynil	ug/l	.005U
13	1689834	loxynil	ug/l	.005U
14	88857	Dinoseb	ug/l	.005U
15	1918021	Picloram	ug/l	.005U
16	-118766	IntStd: 2,4,6-Tribromophenol	% Recov	113 (I.S.) PR

Transaction #: 08220829 Seq #: 05 (73) Herbicide Scan
Proj Code: DOE-222A BLACK/CHWALIS RIVER FISH KILL

PE #: C3285

Blank ID: BW 9228H
Sample No.: 89 337099

Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Sids:
QA Code: (LBN1) Lab Blank Sample #1 Peaks Total:
Date Extracted: 890816 Date Analysed: 890817 # Days to Ext/Anal: 1/ 1

Line	Par #	Parameter Description	Units	Value
1	94757	2,4-D	ug/l	.02U
2	94826	2,4-DB	ug/l	.08U
3	93765	2,4,5-T	ug/l	.01U
4	93801	2,4,5-TB	ug/l	.01U
5	93721	2,4,5-TP (Silvex)	ug/l	.01U
6	94746	MCPA	ug/l	1U
7	93652	MCPP	ug/l	1U
8	94815	MCPB	ug/l	1U
9	87865	Pentachlorophenol	ug/l	.01U
10	4901513	2,3,4,5-Tetrachlorophenol	ug/l	.01U
11	1918009	Dicamba	ug/l	.01U
12	1689845	Bromoxynil	ug/l	.01U
13	1689834	Toxynil	ug/l	.01U
14	AAAA57	Dinoseb	ug/l	.01U
15	1918021	Picloram	ug/l	.01U
16	-118766	IntStd: 2,4,6-Tribromophenol % Recov		85 (I.S.) PR

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*** Lab Analysis Report ***

Page 1

--> Transaction #: 08220801 Laboratory: (WE) Ecology, Manchester Lab
Work Group: (77) Pesticide - Organophosphate
Instrument: (GCT-EC) Tracor GC 222 No.1, Ni-63 EC Detector
Method: (EP2-608) GC Ext Scan
Chemist: (RHR) Rieck, Bob ESD Hours Worked:
Project: DOE-222A BLACK/CHERHALIS RIVER FISH KILL Prj Ele#: C32B5
Prj Off: Young, Bill DOE Analysis Due: 890816 Revised Due:

*** Sample Records in Transaction ***

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	89337099		890815	STA 1	
02	89337100		890815	STA 2	
03	89337101		890815	STA 5	
04	89337102		890815	STA 6	
05	89337099	LBK1	890815	STA 1	

Record Type: TRNIN3 Date Verified: 8-22-89 By: *[Signature]*
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 22-AUG-89 08:08:16 Status: N Batch: (in CUR DB)

Transaction #: 08220801 Seq #: 01 (77) Pesticide - Organophosphate
 Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE # : C32B5

Sample No.: 89 337099

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

ISLds:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890816

Days to Ext/Anal: 1/ 2

Line	Par #	Parameter Description	Units	Value
1	86500	Azinphos (Guthion)	ug/l	0.02U
2	700100	Acetamethaphos	ug/l	0.02U
3	56724	Coumaphos	ug/l	0.02U
4	78488	DEF	ug/l	0.02U
5	333415	Diazinon	ug/l	0.02U
6	62737	Dichlorvos (DDVP)	ug/l	0.02U
7	60515	Dimethoate	ug/l	0.02U
8	78342	Dioxathion	ug/l	0.02U
9	298044	Disulfoton (Di-syston)	ug/l	0.02U
10	2104645	EPM	ug/l	0.02U
11	563122	Ethion	ug/l	0.02U
12	2642719	Ethyl Azinphos (Ethyl Guthio	ug/l	0.02U
13	55389	Fenthion	ug/l	0.02U
14	150505	Folex	ug/l	0.02U
15	732116	Imidan	ug/l	0.02U
16	121755	Malathion	ug/l	0.02U
17	298000	Methyl Parathion	ug/l	0.02U
18	7786347	Mevinphos	ug/l	0.02U
19	6923224	Monocrotophos	ug/l	0.02U
20	56382	Parathion	ug/l	0.02U
21	2275141	Phencapton	ug/l	0.02U
22	298022	Phorate	ug/l	0.02U
23	299843	Ronnel	ug/l	0.02U
24	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	ND? (I.S.) PR
25	-200045	IntStd: Hexabromobenzene	% Recov	ND? (I.S.) PR

Transaction #: 08220801 Seq #: 02 (77) Pesticide - Organophosphate
 Proj Code : DOE-222A BLACK/CHERHALIS RIVER FISH KILL PE # : C3285

Sample No.: 89 337100

Alternate Keys:

Sample Matrix: (10) Water-Total

Units: (11) ug/l

Voids:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analysed: 890816

Days to Ext/Anal: 1/ 2

Line	Pat #	Parameter Description	Units	Value
1	86500	Asinphos (Guthion)	ug/l	0.02U
2	786196	Carbophenothion	ug/l	0.02U
3	56724	Coumaphos	ug/l	0.02U
4	78488	DEF	ug/l	0.02U
5	333415	Diazinon	ug/l	0.02U
6	62737	Dichlorvos (DDVP)	ug/l	0.02U
7	60515	Dimethoate	ug/l	0.02U
8	78342	Dioxathion	ug/l	0.02U
9	298044	Disulfoton (Di-Syston)	ug/l	0.02U
10	2104645	EPN	ug/l	0.02U
11	563122	Ethion	ug/l	0.02U
12	2642719	Ethyl Asinphos (Ethyl Guthio	ug/l	0.02U
13	55389	Fenthion	ug/l	0.02U
14	150505	Folex	ug/l	0.02U
15	732116	Imidan	ug/l	0.02U
16	121755	Malathion	ug/l	0.02U
17	298000	Methyl Parathion	ug/l	0.02U
18	7786347	Mevinphos	ug/l	0.02U
19	6923224	Monocrotophos	ug/l	0.02U
20	56382	Parathion	ug/l	0.02U
21	2275141	Phencapton	ug/l	0.02U
22	298022	Phorate	ug/l	0.02U
23	299843	Ronnel	ug/l	0.02U
24	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	ND? (I.S.) PR
25	-200045	IntStd: Hexabromobenzene	% Recov	ND? (I.S.) PR

Transaction #: 08220801 Seq #: 03 (77) Pesticide - Organophosphate
 Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE #: C3285

Sample No.: 89 337101

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Slits:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890818

Days to Ext/Anal: 1/ 2

Line	Par #	Parameter Description	Units	Value
1	86500	Asinphos (Guthion)	ug/l	0.02U
2	786196	Carbophenothion	ug/l	0.02U
3	56724	Coumaphos	ug/l	0.02U
4	78488	DEF	ug/l	0.02U
5	333415	Diazinon	ug/l	0.02U
6	62737	Dichlorvos (DDVP)	ug/l	0.02U
7	60515	Dimethoate	ug/l	0.02U
8	78342	Dioxathion	ug/l	0.02U
9	298044	Disulfoton (Di-Syston)	ug/l	0.02U
10	2104645	EPN	ug/l	0.02U
11	563122	Ethion	ug/l	0.02U
12	2642719	Ethyl Asinphos (Ethyl Guthio	ug/l	0.02U
13	55389	Fenthion	ug/l	0.02U
14	150505	Folex	ug/l	0.02U
15	732116	Imidan	ug/l	0.02U
16	121755	Malathion	ug/l	0.02U
17	298000	Methyl Parathion	ug/l	0.02U
18	7786347	Mevinphos	ug/l	0.02U
19	6923224	Monocrotophos	ug/l	0.02U
20	56382	Parathion	ug/l	0.02U
21	2275141	Phencapton	ug/l	0.02U
22	298022	Phorate	ug/l	0.02U
23	299843	Ronnel	ug/l	0.02U
24	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	ND? (I.S.) PR
25	-200045	IntStd: Hexabromobenzene	% Recov	ND? (I.S.) PR

Transaction #: 08220801 Seq #: 04 (77) Pesticide - Organophosphate
 Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE # : C32B5

Sample No.: 89 337102

Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slde:
 QA Code: () Unspecified Peaks Total:
 Date Extracted: 890816 Date Analyzed: 890818 # Days to Ext/Anal: 1/ 2

Line	Par #	Parameter Description	Units	Value
1	86500	Asinphos (Guthion)	ug/l	0.02U
2	786196	Carbophenothion	ug/l	0.02U
3	56724	Coumaphos	ug/l	0.02U
4	78488	DEF	ug/l	0.02U
5	333415	Diazinon	ug/l	0.02U
6	62737	Dichlorvos (DDVP)	ug/l	0.02U
7	60515	Dimethoate	ug/l	0.02U
8	78342	Dioxathion	ug/l	0.02U
9	298044	Disulfoton (Di-Syston)	ug/l	0.02U
10	2104645	EPM	ug/l	0.02U
11	563122	Ethion	ug/l	0.02U
12	2642719	Ethyl Asinphos (Ethyl Guthio	ug/l	0.02U
13	55389	Fenthion	ug/l	0.02U
14	150505	Folex	ug/l	0.02U
15	732116	Imidan	ug/l	0.02U
16	121755	Malathion	ug/l	0.02U
17	298000	Methyl Parathion	ug/l	0.02U
18	7786347	Mevinphos	ug/l	0.02U
19	6923224	Munocrotophos	ug/l	0.02U
20	56382	Parathion	ug/l	0.02U
21	2275141	Phencapton	ug/l	0.02U
22	298022	Phorate	ug/l	0.02U
23	299843	Ronnel	ug/l	0.02U
24	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	ND? (I.S.) PR
25	-200045	IntStd: Hexabromobenzene	% Recov	ND? (I.S.) PR

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Washington State Department of Ecology
*** Lab Analysis Report ***

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Transaction #: 08220801 Seq #: 05 (77) Pesticide - Organophosphate
Proj Code: DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE #: C3285

Blank ID: BW 9228

Sample No.: 89 337099

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

Slits:

QA Code: (LBR1) Lab Blank Sample #1

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890816

Days to Ext/Anal: 1/ 2

Line	Par #	Parameter Description	Units	Value
1	86500	Azinphos (Guthion)	ug/l	0.05U
2	786196	Carbophenothion	ug/l	0.05U
3	56724	Coumaphos	ug/l	0.05U
4	78488	DDP	ug/l	0.05U
5	333415	Diazinon	ug/l	0.05U
6	62737	Dichlorvos (DDVP)	ug/l	0.05U
7	60515	Dimethoate	ug/l	0.05U
8	78342	Dioxathion	ug/l	0.05U
9	298044	Disulfoton (Di-syston)	ug/l	0.05U
10	2104645	EPN	ug/l	0.05U
11	563122	Ethion	ug/l	0.05U
12	2642719	Ethyl Azinphos (Ethyl Guthio	ug/l	0.05U
13	55389	Fenthion	ug/l	0.05U
14	150505	Folex	ug/l	0.05U
15	732116	Imidan	ug/l	0.05U
16	121755	Malathion	ug/l	0.03U
17	298000	Methyl Parathion	ug/l	0.05U
18	7786347	Mevinphos	ug/l	0.05U
19	6923224	Monocrotophos	ug/l	0.05U
20	56382	Parathion	ug/l	0.05U
21	2275141	Phenacpton	ug/l	0.05U
22	298022	Phorate	ug/l	0.05U
23	299843	Ronnel	ug/l	0.05U
24	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	ND? (I.S.) PR
25	-200045	IntStd: Hexabromobenzene	% Recov	ND? (I.S.) PR

23-AUG-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 1

==> Transaction #: 08219904 Laboratory: (WB) Ecology, Manchester Lab
Work Group: (68) B/N/Acid Scan
Instrument: (GCMS-W1) DOE1 GC/MS INCOS-5100 Capillary Colu
Method: (EP2-625) GC/MS Ext Scan
Chemist: (LAB) Lab (General R/O) Hours Worked: _____
Project: DOE-222A BLACK/CHEHALIS RIVER FISH KILL Prj Ele#: C32B5
Prj Off: Young, Bill DOE Analysis Due: 890816 Revised Due:

*** Sample Records in Transaction ***

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	89337099		890815	STA 1	
02	89337100		890815	STA 2	
03	89337101		890815	STA 5	
04	89337102		890815	STA 6	
05	89337102	LBK1	890815	STA 6	

Record Type: TRNIN3 Date Verified: 8/23/89 By: [Signature]
Transaction Status: Edited Transaction... First Printing... Unverified.
Processed: 23-AUG-89 09:17:11 Status: E Batch: (In CUR DB)

Transaction #: 08219904 Seq #: 01 (68) B/N/Acid Scan
 Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL

PE # : C3285

Sample No.: 89 337099

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

Isids: —

QA Code: () Unspecified

Peaks Total: —

Date Extracted: 890816 Date Analyzed: 890816

Days to Ext/Anal: 17

0

Line	Par #	Parameter Description	Units	Value
1	108952	Phenol	ug/l	0.8U
2	111444	bis(2-Chloroethyl) Ether	ug/l	0.8U
3	95578	o-Chlorophenol	ug/l	0.8U
4	541731	1,3-Dichlorobenzene	ug/l	0.8U
5	106467	1,4-Dichlorobenzene	ug/l	0.8U
6	100516	Benzyl Alcohol	ug/l	0.8U
7	95501	1,2-Dichlorobenzene	ug/l	0.8U
8	95487	2-Methylphenol	ug/l	0.8U
9	39638329	bis(2-Chloroisopropyl) Ether	ug/l	0.8U
10	106445	4-Methylphenol	ug/l	0.8U
11	621647	N-Nitroso-di-n-Propylamine	ug/l	0.8U
12	67721	Hexachloroethane	ug/l	0.8U
13	98953	Nitrobenzene	ug/l	0.8U
14	78591	Isophorone	ug/l	0.8U
15	88755	2-Nitrophenol	ug/l	0.8U
16	105679	2,4-Dimethylphenol	ug/l	0.8U
17	65850	Benzoic acid	ug/l	4UJ
18	111911	bis(2-Chloroethoxy) Methane	ug/l	0.8U
19	120832	2,4-Dichlorophenol	ug/l	0.8U
20	120821	1,2,4-Trichlorobenzene	ug/l	0.8U
21	91203	Naphthalene	ug/l	0.8U
22	106478	4-Chloroaniline	ug/l	0.8U
23	87683	Hexachlorobutadiene	ug/l	0.8U
24	59507	4-Chloro-3-Methylphenol	ug/l	0.8U
25	91576	2-Methylnaphthalene	ug/l	0.8U
26	90120	Naphthalene, 1-Methyl-	ug/l	0.8U
27	77474	Hexachlorocyclopentadiene	ug/l	2UJ
28	88062	2,4,6-Trichlorophenol	ug/l	0.8U
29	95954	2,4,5-Trichlorophenol	ug/l	4U
30	91587	2-Chloronaphthalene	ug/l	0.8U
31	88744	2-Nitroaniline	ug/l	4U
32	131113	Dimethylphthalate	ug/l	0.8U
33	208968	Acenaphthylene	ug/l	0.8U
34	99092	3-Nitroaniline	ug/l	4UJ
35	83329	Acenaphthene	ug/l	0.8U
36	51285	2,4-Dinitrophenol	ug/l	4UJ
37	100027	4-Mitrophenol	ug/l	4U
38	132649	Dibenzofuran	ug/l	0.8U
39	121142	2,4-Dinitrotoluene	ug/l	0.8U
40	606202	2,6-Dinitrotoluene	ug/l	0.8U
41	84662	Diethylphthalate	ug/l	0.8U
42	7005723	4-Chlorophenyl-phenylether	ug/l	0.8U
43	86737	Fluorene	ug/l	0.8U
44	100016	4-Nitroaniline	ug/l	4UJ
45	534521	4,6-Dinitro-2-methylphenol(D	ug/l	4UJ
46	86306	N-Nitrosodiphenylamine	ug/l	0.8U
47	101553	4-Bromophenyl-phenylether	ug/l	0.8U
48	118741	Hexachlorobenzene	ug/l	0.8U
49	87865	Pentachlorophenol	ug/l	4UJ
50	85018	Phenanthrene	ug/l	0.8U

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Transaction #: 08219904 Seq #: 01 (68) B/N/Acid Scan

Sample No.: 89 337099 (continued from previous page)

Line	Par #	Parameter Description	Units	Value	
51	120127	Anthracene	ug/l	0.8U	
52	86748	Carbazole	ug/l	0.8UJ	
53	84742	Di-n-Butylphthalate	ug/l	0.8BU	
54	206440	Fluoranthene	ug/l	0.8U	
55	129000	Pyrene	ug/l	0.8BU	
56	483658	Retene	ug/l	0.8U	
57	85687	Butylbenzylphthalate	ug/l	0.8U	
58	91941	3,3'-Dichlorobenzidine	ug/l	0.8UJ	
59	56553	Benzo(a)anthracene	ug/l	0.8U	
60	117817	BIS(2-ETHYLHEXYL) PHTHALATE	ug/l	0.8BU	
61	218019	Chrysene	ug/l	0.8U	
62	117840	Di-n-Octyl Phthalate	ug/l	0.8U	
63	205992	Benzo(b)fluoranthene	ug/l	0.8U	
64	207089	Benzo(k)fluoranthene	ug/l	0.8U	
65	50328	Benzo(a)pyrene	ug/l	0.8U	
66	193395	Indeno(1,2,3-cd)pyrene	ug/l	0.8U	
67	53703	Dibenzo(a,h)anthracene	ug/l	0.8U	
68	191242	Benzo(ghi)perylene	ug/l	0.8U	
69	-4165600	Surrog: D5-Nitrobenzene	% Recov	93	(Surr) PR
70	-321608	Surrog: 2-Fluorobiphenyl	% Recov	88	(Surr) PR
71	-1718510	Surrog: D14-Terphenyl	% Recov	135	(Surr) PR
72	200001	Surrog: Pyrene D10	% Recov	136	(Surr) PR
73	-4165622	Surrog: D5-Phenol	% Recov	37	(Surr) PR
74	-367124	Surrog: 2-Fluorophenol	% Recov	72	(Surr) PR

Transaction #: 08219904 Seq #: 02 (68) B/N/Acid Scan
Proj Code : DOE-222A BLACK/CHERLIS RIVER FISH KILL

PE # : C32B5

Sample No.: 89 337100

Alternate Keys:

3amp Matrix: (10) Water-Total

Units: (11) ug/l

%Sids: —

JA Code: () Unspecified

Peaks Total: —

Date Extracted: 890816 Date Analyzed: 890816

Days to Ext/Anal: 17

0

Line	Par #	Parameter Description	Units	Value
1	108952	Phenol	ug/l	0.9U
2	111444	bis(2-Chloroethyl)Ether	ug/l	0.9U
3	95578	o-Chlorophenol	ug/l	0.9U
4	541731	1,3-Dichlorobenzene	ug/l	0.9U
5	106467	1,4-Dichlorobenzene	ug/l	0.9U
6	100516	Benzyl Alcohol	ug/l	0.9U
7	95501	1,2-Dichlorobenzene	ug/l	0.9U
8	95487	2-Methylphenol	ug/l	0.9U
9	39638329	bis(2-Chloroisopropyl)Ether	ug/l	0.9U
10	106445	4-Methylphenol	ug/l	0.9U
11	621647	N-Nitroso-di-n-Propylamine	ug/l	0.9U
12	67721	Hexachloroethane	ug/l	0.9U
13	98953	Nitrobenzene	ug/l	0.9U
14	78591	Isophorone	ug/l	0.9U
15	88755	2-Nitrophenol	ug/l	0.9U
16	105679	2,4-Dimethylphenol	ug/l	0.9U
17	65850	Benzoic acid	ug/l	4UJ
18	111911	bis(2-Chloroethoxy)Methane	ug/l	0.9U
19	120832	2,4-Dichlorophenol	ug/l	0.9U
20	120821	1,2,4-Trichlorobenzene	ug/l	0.9U
21	91203	Naphthalene	ug/l	0.9U
22	106478	4-Chloroaniline	ug/l	0.9U
23	87683	Hexachlorobutadiene	ug/l	0.9U
24	59507	4-Chloro-3-Methylphenol	ug/l	0.9U
25	91576	2-Methylnaphthalene	ug/l	0.9U
26	90120	Naphthalene, 1-Methyl-	ug/l	0.9U
27	77474	Hexachlorocyclopentadiene	ug/l	2UJ
28	88062	2,4,6-Trichlorophenol	ug/l	0.9U
29	95554	2,4,5-Trichlorophenol	ug/l	4U
30	91587	2-Chloronaphthalene	ug/l	0.9U
31	88744	2-Nitroaniline	ug/l	4U
32	131113	Dimethylphthalate	ug/l	0.9U
33	208968	Acenaphthylene	ug/l	0.9U
34	99092	3-Nitroaniline	ug/l	4UJ
35	51285	2,4-Dinitrophenol	ug/l	4UJ
36	100027	4-Nitrophenol	ug/l	4U
37	132649	Dibenzofuran	ug/l	0.9U
38	121142	2,4-Dinitrotoluene	ug/l	0.9U
39	606202	2,6-Dinitrotoluene	ug/l	0.9U
40	84662	Diethylphthalate	ug/l	0.9U
41	7005723	4-Chlorophenyl-phenylether	ug/l	0.9U
42	86737	Fluorene	ug/l	0.9U
43	100016	4-Nitroaniline	ug/l	4UJ
44	534521	4,6-Dinitro-2-methylphenol (p	ug/l	4UJ
45	86306	N-Nitrosodiphenylamine	ug/l	0.9U
46	101553	4-Bromophenyl-phenylether	ug/l	0.9U
47	118741	Hexachlorobenzene	ug/l	0.9U
48	87865	Pentachlorophenol	ug/l	4UJ
49	85018	Phenanthrene	ug/l	0.9U

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Transaction #: 06219904 Seq #: 02 (68) M/M/Acid Scan

Sample No.: 89 337100 (continued from previous page)

Line	Par #	Parameter Description	Units	Value	
51	120127	Anthracene	ug/l	0.90	
52	86748	Carbazole	ug/l	0.90	
53	84742	Di-n-butylphthalate	ug/l	0.90	
54	206440	Fluoranthene	ug/l	0.90	
55	129000	Pyrene	ug/l	0.90	
56	483658	Retene	ug/l	0.90	
57	85687	Butylbenzylphthalate	ug/l	0.90	
58	91941	3,3'-Dichlorobenzidine	ug/l	0.90	
59	56553	Benzo(a)anthracene	ug/l	0.90	
60	117817	BIS(2-ETHYLBUTYL) PHTHALATE	ug/l	0.28	
61	218019	Chrysene	ug/l	0.90	
62	117840	Di-n-Octyl Phthalate	ug/l	0.90	
63	205992	Benzo(b)fluoranthene	ug/l	0.90	
64	207089	Benzo(k)fluoranthene	ug/l	0.90	
65	50328	Benzo(a)pyrene	ug/l	0.90	
66	193395	Indeno(1,2,3-cd)pyrene	ug/l	0.90	
67	53703	Dibenzo(a,h)anthracene	ug/l	0.90	
68	191242	Benzo(ghi)perylene	ug/l	0.90	
69	-4165600	Surrog: D5-Mitrobenzene	% Recov	91	(Surf) PR
70	-321608	Surrog: 2-Fluorobiphenyl	% Recov	89	(Surf) PR
71	-1718510	Surrog: D14-Terphenyl	% Recov	117	(Surf) PR
72	200001	Surrog: Pyrene D10	% Recov	116	(Surf) PR
73	-4165622	Surrog: D5-Phenol	% Recov	43	(Surf) PR
74	-367124	Surrog: 2-Fluorophenol	% Recov	70	(Surf) PR

Transaction #: 08219904 Seq #: 03 (68) B/N/Acid Scan
 Proj Code: DOE-222A BLACK/CHUMALIS RIVER FISH KILL

PK #: C3285

Sample No.: 89 337101

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

#Slits: —

QA Code: () Unspecified

Peaks Total: —

Date Extracted: 890816 Date Analyzed: 890816

Days to Ext/Anal: 17 0

Line	Par #	Parameter Description	Units	Value
1	108952	Phenol	ug/l	0.8U
2	111444	bis(2-Chloroethyl)Ether	ug/l	0.8U
3	95578	o-Chlorophenol	ug/l	0.8U
4	541731	1,3-Dichlorobenzene	ug/l	0.8U
5	106467	1,4-Dichlorobenzene	ug/l	0.8U
6	100516	Benzyl Alcohol	ug/l	0.8U
7	95501	1,2-Dichlorobenzene	ug/l	0.8U
8	95487	2-Methylphenol	ug/l	0.8U
9	39638329	bis(2-Chloroisopropyl)Ether	ug/l	0.8U
10	106445	4-Methylphenol	ug/l	0.8U
11	621647	N-Nitroso-di-n-Propylamine	ug/l	0.8U
12	67721	Hexachloroethane	ug/l	0.8U
13	98953	Nitrobenzene	ug/l	0.8U
14	78591	Isophorone	ug/l	0.8U
15	88755	2-Nitrophenol	ug/l	0.8U
16	105679	2,4-Dimethylphenol	ug/l	0.8U
17	65850	Benzoic acid	ug/l	4UJ
18	111911	bis(2-Chloroethoxy)Methane	ug/l	0.8U
19	120832	2,4-Dichlorophenol	ug/l	0.8U
20	120821	1,2,4-Trichlorobenzene	ug/l	0.8U
21	91203	Naphthalene	ug/l	0.8U
22	106478	4-Chloroaniline	ug/l	0.8U
23	87683	Hexachlorobutadiene	ug/l	0.8U
24	59507	4-Chloro-3-Methylphenol	ug/l	0.8U
25	91576	2-Methylnaphthalene	ug/l	0.8U
26	90120	Naphthalene, 1-Methyl-	ug/l	0.8U
27	77474	Hexachlorocyclopentadiene	ug/l	2UJ
28	88062	2,4,6-Trichlorophenol	ug/l	0.8U
29	95954	2,4,5-Trichlorophenol	ug/l	4U
30	91587	2-Chloronaphthalene	ug/l	0.8U
31	88744	2-Nitroaniline	ug/l	4U
32	131113	Dimethylphthalate	ug/l	0.8U
33	208968	Acenaphthylene	ug/l	0.8U
34	99092	3-Nitroaniline	ug/l	4UJ
35	83329	Acenaphthene	ug/l	0.8U
36	51285	2,4-Dinitrophenol	ug/l	4UJ
37	100027	4-Nitrophenol	ug/l	4U
38	132649	Dibenzofuran	ug/l	0.8U
39	121142	2,4-Dinitrotoluene	ug/l	0.8U
40	606202	2,6-Dinitrotoluene	ug/l	0.8U
41	84662	Diethylphthalate	ug/l	0.8U
42	7005723	4-Chlorophenyl-phenylether	ug/l	0.8U
43	86737	Fluorene	ug/l	0.8U
44	100016	4-Nitroaniline	ug/l	4UJ
45	534521	4,6-Dinitro-2-methylphenol(D	ug/l	4UJ
46	86306	N-Nitrosodiphenylamine	ug/l	0.8U
47	101553	4-Bromophenyl-phenylether	ug/l	0.8U
48	118741	Hexachlorobenzene	ug/l	0.8U
49	87865	Pentachlorophenol	ug/l	4UJ
50	85018	Phenanthrene	ug/l	0.8U

(continued on next page)

Transaction #: 08219904 Seq #: 03 (68) B/N/Acid Scan

Sample No.: 89 337101 (continued from previous page)

Line	Par #	Parameter Description	Units	Value	
51	120127	Anthracene	ug/l	0.8U	
52	86748	Carbazole	ug/l	0.8UJ	
53	84742	Di-n-Butylphthalate	ug/l	0.8BU	
54	206440	Fluoranthene	ug/l	0.8U	
55	129000	Pyrene	ug/l	0.8BU	
56	483658	Retene	ug/l	0.8U	
57	85687	Butylbenzylphthalate	ug/l	0.8U	
58	91941	3,3'-Dichlorobenzidine	ug/l	0.8UJ	
59	56553	Benzo(a)anthracene	ug/l	0.8U	
60	117817	NTS(2-ETHYLMERITYL) PHTHALATE	ug/l	0.2BJ	
61	218019	Chrysene	ug/l	0.8U	
62	117840	Di-n-Octyl Phthalate	ug/l	0.8U	
63	205992	Benzo(b)fluoranthene	ug/l	0.8U	
64	207089	Benzo(k)fluoranthene	ug/l	0.8U	
65	50328	Benzo(a)pyrene	ug/l	0.8U	
66	193395	Indeno(1,2,3-cd)pyrene	ug/l	0.8U	
67	53703	Dibenzo(a,h)anthracene	ug/l	0.8U	
68	191242	Benzo(ghi)perylene	ug/l	0.8U	
69	-4165670	Surrog: D5-Nitrobenzene	% Recov	89	(Surr) PR
70	-321608	Surrog: 2-Fluorobiphenyl	% Recov	84	(Surr) PR
71	-1718510	Surrog: D14-Terphenyl	% Recov	110	(Surr) PR
72	200001	Surrog: Pyrene D10	% Recov	114	(Surr) PR
73	-4165622	Surrog: D5-Phenol	% Recov	43	(Surr) PR
74	-367124	Surrog: 2-Fluorophenol	% Recov	66	(Surr) PR

Transaction #: 08219904 Seq #: 04 (68) B/N/Acid Scan
Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL

PE # : C3285

Sample No.: 89 337102

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

#Slits:

QA Code: () Unspecified

Peaks Total:

Date Extracted: 890816 Date Analyzed: 890816

Days to Ext/Anal: 17 0

Line	Par #	Parameter Description	Units	Value
1	108952	Phenol	ug/l	0.8U
2	111444	bis(2-Chloroethyl)Ether	ug/l	0.8U
3	95578	o-Chlorophenol	ug/l	0.8U
4	541731	1,3-Dichlorobenzene	ug/l	0.8U
5	106467	1,4-Dichlorobenzene	ug/l	0.8U
6	100516	Benzyl Alcohol	ug/l	0.8U
7	95501	1,2-Dichlorobenzene	ug/l	0.8U
8	95487	2-Methylphenol	ug/l	0.8U
9	39638329	bis(2-Chloroisopropyl)Ether	ug/l	0.8U
10	106445	4-Methylphenol	ug/l	0.8U
11	621647	N-Nitroso-di-n-Propylamine	ug/l	0.8U
12	67721	Hexachloroethane	ug/l	0.8U
13	98953	Nitrobenzene	ug/l	0.8U
14	78591	Isophorone	ug/l	0.8U
15	88755	2-Nitrophenol	ug/l	0.8U
16	105679	2,4-Dimethylphenol	ug/l	0.8U
17	65850	Benzoic acid	ug/l	4UJ
18	111911	bis(2-Chloroethoxy)Methane	ug/l	0.8U
19	120832	2,4-Dichlorophenol	ug/l	0.8U
20	120821	1,2,4-Trichlorobenzene	ug/l	0.8U
21	91203	Naphthalene	ug/l	0.8U
22	106478	4-Chloroaniline	ug/l	0.8U
23	87683	Hexachlorobutadiene	ug/l	0.8U
24	59507	4-Chloro-3-Methylphenol	ug/l	0.8U
25	91576	2-Methylnaphthalene	ug/l	0.8U
26	90120	Naphthalene, 1-Methyl-	ug/l	0.8U
27	77474	Hexachlorocyclopentadiene	ug/l	2UJ
28	88062	2,4,6-Trichlorophenol	ug/l	0.8U
29	95954	2,4,5-Trichlorophenol	ug/l	4U
30	91587	2-Chloronaphthalene	ug/l	0.8U
31	88744	2-Nitroaniline	ug/l	4U
32	131113	Dimethylphthalate	ug/l	0.8U
33	208968	Acenaphthylene	ug/l	0.8U
34	99092	3-Nitroaniline	ug/l	4UJ
35	83329	Acenaphthene	ug/l	0.8U
36	51285	2,4-Dinitrophenol	ug/l	4UJ
37	100027	4-Nitrophenol	ug/l	4U
38	132649	Dibenzofuran	ug/l	0.8U
39	121142	2,4-Dinitrotoluene	ug/l	0.8U
40	606202	2,6-Dinitrotoluene	ug/l	0.8U
41	84662	Diethylphthalate	ug/l	0.8U
42	7005723	4-Chlorophenyl-phenylether	ug/l	0.8U
43	86737	Fluorene	ug/l	0.8U
44	100016	4-Nitroaniline	ug/l	4UJ
45	534521	4,6-Dinitro-2-methylphenol(D	ug/l	4UJ
46	86306	N-Nitrosodiphenylamine	ug/l	0.8U
47	101553	4-Bromophenyl-phenylether	ug/l	0.8U
48	118741	Hexachlorobenzene	ug/l	0.8U
49	87865	Pentachlorophenol	ug/l	4UJ
50	85018	Phenanthrene	ug/l	0.8U

(continued on next page)

Transaction #: 08219904 Seq #: 04 (68) B/N/Acid Scan

Sample No.: 89 337102 (continued from previous page)

Line	Par #	Parameter Description	Units	Value		
51	120127	Anthracene	ug/l	0.8U		
52	86748	Carbazole	ug/l	0.8UJ		
53	84742	Di-n-Butylphthalate	ug/l	0.8BU		
54	206440	fluoranthene	ug/l	0.8U		
55	129000	Pyrene	ug/l	0.8BU		
56	483658	Retene	ug/l	0.8U		
57	85687	Butylbenzylphthalate	ug/l	0.8U		
58	91941	3,3'-Dichlorobenzidine	ug/l	0.8UJ		
59	56553	Benzo(a)anthracene	ug/l	0.8U		
60	117817	BIS(2-ETHYLHEXYL) PHTHALATE	ug/l	0.2BJ		
61	218019	Chrysene	ug/l	0.8U		
62	117840	Di-n-Octyl Phthalate	ug/l	0.8U		
63	205992	Benzo(b)fluoranthene	ug/l	0.8U		
64	207089	Benzo(k)fluoranthene	ug/l	0.8U		
65	50328	Benzo(a)pyrene	ug/l	0.8U		
66	193395	Indeno(1,2,3-cd)pyrene	ug/l	0.8U		
67	53703	Dibenzo(a,h)anthracene	ug/l	0.8U		
68	191242	Benzo(ghi)perylene	ug/l	0.8U		
69	-4165600	Surrog: D5-Nitrobenzene	% Recov	87	(Surr)	PR
70	-321608	Surrog: 2-Fluorobiphenyl	% Recov	81	(Surr)	PR
71	-1718510	Surrog: D14-Terphenyl	% Recov	114	(Surr)	PR
72	200001	Surrog: Pyrene D10	% Recov	123	(Surr)	PR
73	-4165622	Surrog: D5-Phenol	% Recov	39	(Surr)	PR
74	367124	Surrog: 2-Fluorophenol	% Recov	66	(Surr)	PR

Transaction #: 08219904 Seq #: 05 (68) B/N/Acid Scan
 Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL

PE #: C32B5

Blank ID : BW9228

Sample No.: 89 337102

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Slds: —

QA Code: (LBK1) Lab Blank Sample #1

Peaks Total: —

Date Extracted: 890816 Date Analyzed: 890816

Days to Ext/Anal: —

17 0

Line	Par #	Parameter Description	Units	Value
1	108952	Phenol	ug/l	2U
2	111444	bis(2-Chloroethyl)Ether	ug/l	2U
3	95578	o-Chlorophenol	ug/l	2U
4	541731	1,3-Dichlorobenzene	ug/l	2U
5	106467	1,4-Dichlorobenzene	ug/l	2U
6	100516	Benzyl Alcohol	ug/l	2U
7	95501	1,2-Dichlorobenzene	ug/l	2U
8	95487	2-Methylphenol	ug/l	2U
9	39638329	bis(2-Chloroisopropyl)Ether	ug/l	2U
10	106445	4-Methylphenol	ug/l	2U
11	621647	N-Nitroso-di-n-Propylamine	ug/l	2U
12	67721	Hexachloroethane	ug/l	2U
13	98953	Nitrobenzene	ug/l	2U
14	78591	Isophorone	ug/l	2U
15	88755	2-Nitrophenol	ug/l	2U
16	105679	2,4-Dimethylphenol	ug/l	2U
17	65850	Benzoic acid	ug/l	10UJ
18	111911	bis(2-Chloroethoxy)Methane	ug/l	2U
19	120832	2,4-Dichlorophenol	ug/l	2U
20	120821	1,2,4-Trichlorobenzene	ug/l	2U
21	91203	Naphthalene	ug/l	2U
22	106478	4-Chloroaniline	ug/l	2U
23	87683	Hexachlorobutadiene	ug/l	2U
24	59507	4-Chloro-3-Methylphenol	ug/l	2U
25	91576	2-Methylnaphthalene	ug/l	2U
26	90120	Naphthalene, 1-Methyl-	ug/l	2U
27	77474	Hexachlorocyclopentadiene	ug/l	4UJ
28	88062	2,4,6-Trichlorophenol	ug/l	2U
29	95954	2,4,5-Trichlorophenol	ug/l	10U
30	91587	2-Chloronaphthalene	ug/l	2U
31	88744	2-Nitroaniline	ug/l	10U
32	131113	Dimethylphthalate	ug/l	2U
33	208968	Acenaphthylene	ug/l	2U
34	99092	3-Nitroaniline	ug/l	10UJ
35	83329	Acenaphthene	ug/l	2U
36	51285	2,4-Dinitrophenol	ug/l	10UJ
37	100027	4-Nitrophenol	ug/l	10U
38	132649	Dibenzofuran	ug/l	2U
39	121142	2,4-Dinitrotoluene	ug/l	2U
40	606202	2,6-Dinitrotoluene	ug/l	2U
41	84662	Diethylphthalate	ug/l	2U
42	7005723	4-Chlorophenyl-phenylether	ug/l	2U
43	86737	Fluorene	ug/l	2U
44	100016	4-Nitroaniline	ug/l	10UJ
45	534521	4,6-Dinitro-2-methylphenol(D	ug/l	10UJ
46	86306	N-Nitrosodiphenylamine	ug/l	2U
47	101553	4-Bromophenyl-phenylether	ug/l	2U
48	118741	Hexachlorobenzene	ug/l	2U
49	87865	Pentachlorophenol	ug/l	10UJ
50	85018	Phenanthrene	ug/l	2U

(continued on next page)

Transaction #: 08219904 Seq #: 05 (68) B/N/Acid Scan

Sample No.: 89 337102 (continued from previous page)

Line	Par #	Parameter Description	Units	Value	
51	120127	Anthracene	ug/l	2U	
52	86748	Carbazole	ug/l	2UJ	
53	84742	Di-n-Butylphthalate	ug/l	0.5J	
54	206440	Fluoranthene	ug/l	2U	
55	129000	Pyrene	ug/l	0.4J	
56	483658	Retene	ug/l	2U	
57	85687	Butylbenzylphthalate	ug/l	2U	
58	91941	3,3'-Dichlorobenzidine	ug/l	2UJ	
59	56553	Benzo(a)anthracene	ug/l	2U	
60	117817	BIS(2-ETHYLHEXYL) PHTHALATE	ug/l	0.6J	
61	218019	Chrysene	ug/l	2U	
62	117840	Di-n-Octyl Phthalate	ug/l	2U	
63	205992	Benzo(b)fluoranthene	ug/l	2U	
64	207089	Benzo(k)fluoranthene	ug/l	2U	
65	50328	Benzo(a)pyrene	ug/l	2U	
66	193395	Indeno(1,2,3-cd)pyrene	ug/l	2U	
67	53703	Dibenzo(a,h)anthracene	ug/l	2U	
68	191242	Benzo(ghi)perylene	ug/l	2U	
69	-4165600	Surrog: D5-Nitrobenzene	% Recov	90	(Surr) PR
70	-321608	Surrog: 2-Fluorobiphenyl	% Recov	83	(Surr) PR
71	-1718510	Surrog: D14-Terphenyl	% Recov	128	(Surr) PR
72	200001	Surrog: Pyrene D10	% Recov	128	(Surr) PR
73	-4165622	Surrog: D5-Phenol	% Recov	68	(Surr) PR
74	-367124	Surrog: 2-Fluorophenol	% Recov	88	(Surr) PR

22-AUG-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 1

--> Transaction #: 08219903 Laboratory: (WE) Ecology, Manchester Lab

Work Group: (KA) Tent Ident B/M/acid C==

Instrument: (GCMS-M1) DOE1 GC/MS INCOS-5100 Capillary Colu

Method: (EP2-625) GC/MS Ext Scan

Chemist: (LAB) Lab (General R/O) Hours Worked: _____

Project: DOE-222A BLACK/CHEHALIS RIVER FISH KILL

Prg Ele#: C32B5

Prj Off: Young, Bill DOE Analysis Due: 890816 Revised Due:

*** Sample Records in Transaction ***

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	89337099		890815	STA 1	
02	89337100		890815	STA 2	
03	89337101		890815	STA 5	
04	89337102		890815	STA 6	
05	89337102	LAB1	890815	STA 6	

Record Type: TRNIN3 Date Verified: 8/23/89 By: C. J. [Signature]
Transaction Status: Edited Transaction...First Printing...Unverified.
Processed: 22-AUG-89 15:55:20 Status: E Batch: (In CUR DB)

12-AUG-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 2

Transaction #: 08219903 Seq #: 01 (6A) Tent Ident - B/N/Acid Scan
Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE # : C32B5

Sample No.: 89 337099

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

tslds: —

QA Code: () Unspecified

Peaks Total: —

Date Extracted:

Date Analyzed: 890821

Days to Ext/Anal: 07 6

Line	Par #	Parameter Description	Units	Value
1	1678917	CYCLOHEXANE, ETHYL-	ug/l	0.67J
2	286204	7-OXABICYCLO[4.1.0]HEPTANE	ug/l	0.65JB
3	95476	Total Xylenes	ug/l	1.4JB
4	108383	m-Xylene	ug/l	1.7JB
5	106423	p-Xylene	ug/l	0.35J
6	930687	2-CYCLOHEXEN-1-ONE	ug/l	0.42JB
7	128370	PHENOL, 2,6-BIS(1,1-DIMETHYL	ug/l	0.62JB

Transaction #: 08219903 Seq #: 02 (6A) Tent Ident - B/N/Acid Scan
Proj Code : D02-222A BLACK/CHENNAIS RIVER FISH KILL PE # : C32B5

Sample No.: 89 337100

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Slds: —

QA Code: () Unspecified

Peaks Total: —

Date Extracted:

Date Analyzed: 890821

Days to Ext/Anal: —

07 6

Line	Par #	Parameter Description	Units	Value
1	286204	7-OXABICYCLO(4.1.0)HEPTANE	ug/l	0.63JB
2	95476	Total Xylenes	ug/l	1.1JB
3	108383	m-Xylene	ug/l	1.0JB
4	930687	2-CYCLOHEXEN-1-ONE	ug/l	0.38JB
5	128370	PHENOL, 2,6-BIS(1,1-DIMETHYL	ug/l	0.70JB

22-AUG-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 4

Transaction #: 08219903 Seq #: 03 (6A) Tent Ident - B/N/Acid Scan
Proj Code : DOE-222A BLACK/CHEMALIS RIVER FISH KILL PE # : C3285

Sample No.: 89 337101

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Slds: —

QA Code: () Unspecified

Peaks Total: —

Date Extracted:

Date Analyzed: 890821

Days to Ext/Anal: —

07 6

Line	Par #	Parameter Description	Units	Value
1	1678917	CYCLOHEXANE, ETHYL-	ug/l	0.60J
2	286204	7-OXABICYCLO[4.1.0]HEPTANE	ug/l	0.59JB
3	95476	Total Xylenes	ug/l	1.1JB
4	108383	m-Xylene	ug/l	1.2JB
5	128370	PHENOL, 2,6-BIS(1,1-DIMETHYL	ug/l	0.73JB

22-AUG-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 5

Transaction #: 08219903 Seq #: 04 (6A) Tent Ident - B/M/Acid Scan
Proj Code : DOE-222A BLACK/CHEHALIS RIVER FISH KILL PE # : C32B5

Sample No.: 89 337102

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

#Slits: —

QA Code: () Unspecified

Peaks Total: —

Date Extracted:

Date Analyzed: 890821

Days to Ext/Anal: 07 6

Line	Par #	Parameter Description	Units	Value
1	1678917	CYCLOHEXANE, ETHYL-	ug/l	0.57J
2	286204	7-OXABICYCLO[4.1.0]HEPTANE	ug/l	0.56JB
3	95476	Total Xylenes	ug/l	1.1JB
4	108383	m-Xylene	ug/l	0.98JB
5	128370	PHENOL, 2,6-BIS(1,1-DIMETHYL	ug/l	0.63JB

2-AUG-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 6

Transaction #: 08219903 Seq #: 05 (6A) Tent Ident - B/N/Acid Scan
Proj Code : DOE-222A BLACK/CHERHALIS RIVER FISH KILL PE # : C32B5

Blank ID : BW9228
Sample No.: 89 337102

Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: (LBK1) Lab Blank Sample #1 Peaks Total:
Date Extracted: Date Analyzed: 890821 # Days to Ext/Anal: 0/ 6

Line	Par #	Parameter Description	Units	Value
1	286204	7-OXABICYCLO(4.1.0)HEPTANE	ug/l	1.3J
2	95476	Total Xylenes	ug/l	2.3J
3	108383	m-Xylene	ug/l	2.1J
4	930687	2-CYCLOHEXEN-1-ONE	ug/l	0.89J
5	128370	PHENOL, 2,6-BIS(1,1-DIMETHYL	ug/l	1.6J

HAZARDOUS WASTE SURrogate PERCENT RECOVERY
(Page 1)

Case No. DOE-222A/1011

Contract Laboratory MANCHESTER LAB

Contract No. C3105

SMO TRAFFIC NO.	VOLATILE			SEMI-VOLATILE					
	Toluen e-d8	BFB	1,2-Di chloro ethane -d4	Nitroben zene -d5 (S)	2-Fluorob iphenyl -d4 (SS)	Terphenyl -d1 (SS)	Pyrene -d10 (SS)	Phenol -d5 (S)	2-Fluorophen ol (SS)
	86 119	85 121	77 120	41 120	44 119	38 128	38 125	15 103	23 121
WB9337099	—	—	—	93	88	135*	138*	37	72
WB9337100	—	—	—	91	89	117	116	43	70
WB9337101	—	—	—	89	84	110	114	43	68
WB9337102	—	—	—	87	81	114	123	39	66
WBW9228	—	—	—	96	83	128	128	68	88

* VALUES ARE OUTSIDE OF CONTRACT
REQUIRED QC LIMITS

Comments:

Volatiles: — out of 12; outside of QC limit
Semi-Volatiles: 2 out of 30; outside of QC limit
Pesticides: 8 out of 8; outside of QC limit

FORM 11

WETTED BLANK SUMMARY

Case NO DOE-222A/1011 Region YOUNG Contractor MANCHESTER LAB Contract No C3105

File ID	analysis	Frac	x	y	ID	CAS number	Compound (HSL, TIC, unknown)	Conc.	Units	C
WBW9228	08/16/89	ABN	W	L	5100	84-74-2	Di-n-butylphthalate	0.5	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100	129-00-6	Pyrene	0.4	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100	117-81-7	bis(2-Ethylhexyl)phthalate	0.6	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100		C130 D4-1,4-DICHLOROBENZENE (IS-1)	20	ug/L	J
WRW9228	08/16/89	ABN	W	L	5100		C140 D8-NAPHTHALENE (IS-2)	20	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100		C160 D10-ACENAPHTHENE (IS-3)	20	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100		C180 D10-PHENANTHRENE (IS-4)	20	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100		C170 D12-CHRYSENE (IS-5)	20	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100		C175 D12-PERYLENE (IS-6)	20	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100	280-28-4	7-OXABICYCLO[4.1.0]HEPTANE	0.8	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100	95-47-6	BENZENE, 1,2-DIMETHYL-	1	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100	108-38-3	BENZENE, 1,3-DIMETHYL-	1	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100	930-68-7	2-CYCLOHEXEN-1-ONE	0.5	ug/L	J
WBW9228	08/16/89	ABN	W	L	5100	128-37-8	PHENOL, 2,6-BIS(1,1-DIMETHYLETHYL)-4-METHYL-	1	ug/L	J

Comments:

FORM IV

SAMPLE HOLDING TIMES AND DILUTIONS

Laboratory MANCHESTER LAB
Case Number DOE-222A

Page
08/18.

Sample number	M	L	Rcvd	VOA			BNA			PEST				
				Anal	Hid	Dil	Extr	Hid	Anal	Hid	Dil	Extr	Hid	Dil
W89337099	W	L	08/10				08/10	0	08/10	0	0.167			
W89337100	W	L	08/10				08/10	0	08/10	0	0.176			
W89337101	W	L	08/10				08/10	0	08/10	0	0.168			
W89337102	W	L	08/10				08/10	0	08/10	0	0.168			

Transaction #: 09011233 Seq #: 01 (10) Gen Inorg/Phys-Specified
(WE) Ecology, Manchester Lab
Project: (DOE-222B) BLACK RIVER NRDA C32B5 LJK
Param: (403 S) pH LAB Meter Std Unts

QA Code: () Normal Data
Instrument: (PH-CORN) Corning pH Meter 125 #14987 (DOE)
Method: (EP1-150.1) pH, Electrometric
Chemist: (MOH) O'Herron, Mary DOE Hours Worked:
Lab Prep: () Unspecified
Matrix: (10) Water-Total Date Preprd:
Units: (06) Std Unts Date Anlyzd: 890817

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	89 337116	8.2	STA 4	890816 (1)
2	89 337117	7.3	STA 3	890816 (1)
3	89 337118	7.3	STA 2	890816 (1)
4	89 337119	6.8	STA 1	890816 (1)

Record Type: TRNIN2 Date Verified: 89/09/05 By: Jensen, Nancy
Transaction Status: Verified Transaction...Ready to release.
Processed: 5-SEP-89 12:04:14 Status: V Batch: (In CUR DB)

DC

Case No. DOE-222A Contractor MANCHESTER LAB Contract No. C3185
 Instrument ID 5188
 Lab (Tune) ID WDF9228

<u>SAMPLE ID</u>	<u>LAB (FILE) ID</u>	<u>DATE AND TIME OF ANALYSIS</u>
W89337000	W337000	88/10/89 16:13
W89337100	W337100	88/10/89 16:00
W89337101	W337101	88/10/89 16:50
W89337102	W337102	88/10/89 17:52
WRW9228	WRW9228	88/10/89 14:12

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

M E M O R A N D U M

To: Steve Hunter
From: Dick Huntamer (D.H.)
Subject: Organic Analysis of Black/Chehalis Fish Kill Samples.
Date: August 18, 1989

Samples from the Black and Chehalis Rivers collected on August 15, 1989 were received at the Manchester Environmental Laboratory on August 16, 1989 for analysis of acid/base-neutral organics, Volatile Organics (VOA), pesticides/PCB's, organo-phosphorous pesticides and herbicides.

The acid/base-neutral, VOA and herbicide analysis has been completed. No significant levels of target priority pollutant organic compounds were detected in any of the above fractions. Quantification limits for the acid/base-neutral compounds were 1-5 ug/L (parts per billion, ppb) and for the VOA, one ppb. In addition, the acid/base-neutral and VOA analyses included a search for any significant amounts of non-priority pollutant target compounds which could be present in the sample. These compounds are usually referred to as Tentatively Identified Compounds (TIC). This search also failed to turn up any significant TIC compounds which are known to be toxic to fish at the levels detected.

No herbicides were detected in the samples. Pesticides/PCB's and organo-phosphorous pesticides are still being analyzed at this time. Results should be completed this afternoon.

Formaldehyde analysis results are attached. These included not only the samples mentioned above but additional samples 337104 and 337105 collected at the same time and samples 337093-96 (labeled 327093-96 on ARI report) collected at Global Aqua on August 11, 1989. Only samples 337095 (settling pond) and 337096 (sediment) had positive results for formaldehyde. All of the other samples were below the detection limit of 0.10 mg/L (part per million, ppm).

Results for General Chemistry and Metals are discussed in the attached memorandum.

1-SEP-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 1

Transaction #: 09011233 Seq #: 01 (10) Gen Inorg/Phys-Specified
(WE) Ecology, Manchester Lab
Project: (DOE-222B) BLACK RIVER NRDA C32B5 LJK
Param: (403 S) pH LAB Meter Std Unts

QA Code: () Normal Data
Instrument: (PH-CORN) Corning pH Meter 125 #14987 (DOE)
Method: (EP1-150.1) pH, Electrometric
Chemist: (MDH) O'Herron, Mary DOE Hours Worked:
Lab Prep: () Unspecified
Matrix: (10) Water-Total Date Preprd:
Units: (06) Std Unts Date Anlyzd: 890817

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	89 337116	8.2	STA 4	890816 (1)
2	89 337117	7.3	STA 3	890816 (1)
3	89 337118	7.3	STA 2	890816 (1)
4	89 337119	6.9 6.8	STA 1	890816 (1)

Record Type: TRNIN2 Date Verified: By:
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 1-SEP-89 12:47:10 Status: N Batch: (In CUR DB)

1-SEP-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 1

Transaction #: 09011237 Seq #: 01 (10) Gen Inorg/Phys-Specified
(WE) Ecology, Manchester Lab
Project: (DOE-222B) BLACK RIVER NRDA C32B5 LJK
Param: (95 S) Cond@25C Meter umho/cm

QA Code: () Normal Data
Instrument: (CONDOC) Conductivity Meter #XXXXXXX
Method: (EP1-120.1) Conductance, Specific
Chemist: (MOH) O'Herron, Mary DOE Hours Worked:
Lab Prep: () Unspecified
Matrix: (10) Water-Total Date Preprd:
Units: (03) umho/cm Date Anlyzd: 890817

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	89 337116	126	STA 4	890816 (1)
2	89 337117	115	STA 3	890816 (1)
3	89 337118	121	STA 2	890816 (1)
4	89 337119	124	STA 1	890816 (1)

Record Type: TRNIN2 Date Verified: _____ By: _____
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 1-SEP-89 12:47:10 Status: N Batch: (In CUR DB)

1-SEP-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 1

Transaction #: 09011238 Seq #: 01 (10) Gen Inorg/Phys-Specified
(WE) Ecology, Manchester Lab
Project: (DOE-222B) BLACK RIVER NRDA C32B5 LJK
Param: (900 S) Hard-Tot CaCO3 mg/l

QA Ccde: () Normal Data
Instrument: (TITRIT) Titrimetric Measurement
Method: (EP1-130.2) Hardness, Total (mg/l as CaCO3), Titrimetric, EDTA
Chemist: (MOH) O'Herron, Mary DOE Hours Worked:
Lab Prep: () Unspecified
Matrix: (10) Water-Total Date Preprd:
Units: (10) mg/l Date Anlyzd: 890817

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	89 337116	53	STA 4	890816 (1)
2	89 337117	50	STA 3	890816 (1)
3	89 337118	43	STA 2	890816 (1)
4	89 337119	46	STA 1	890816 (1)

Record Type: TRNIN2 Date Verified: _____ By: _____
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 1-SEP-89 12:47:10 Status: N Batch: (In CUR DB)

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

M E M O R A N D U M

TO: Dave Halleck
FROM: Margaret Stinson *MS*
SUBJECT: Black/Chehalis River
Contract Lab Results of Salmonid Bioassay
DATE: September 25, 1989

Biomed Research Laboratories has submitted the attached reports on the Hazardous Waste Designation Salmonid Bioassays requested on sediments from the Black/Chehalis Rivers (Sample Numbers 34-8000 through 34-8003). No mortality was reported for any of the samples. A single mortality was reported for the control test for sample 34-8000. This is well within the 10% control mortality allowed by the test protocol. Chemical parameters measured were all in the ranges appropriate for the test organism. Fish measurements and loading data conform with the requirements of the test protocol.



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1720-130th Ave. N.E., Bellevue WA 98005-2203
(206) 882-0448, Telex: 283803 BIOM, Fax: (206) 882-2678

LABORATORY REPORT

CUSTOMER:

WA State Dept of Ecology
Attn: Margaret Stinson
P.O. Box 307
Manchester, WA 98353

BIOMED NO: 11523
RECEIVED: 8/24/89
CLIENT SAMPLE I.D.: WDOE sample #34-8000

LABORATORY USE ONLY

LAB #: 8/29/89
11523
REPORT DATE
CUSTOMER P.O. #
APPROVED

TEST PROCEDURE:

The sample was tested for toxic properties in accordance with Washington State Department of Ecology "General Procedure for Static Basic Acute Fish Toxicity Test."

TEST RESULTS:

The test data are tabulated in detail on the following pages.

TEST DETAILS:

The sample was tested at 100 and 1000 ppm (mg/L) by weight in water.

The test organisms were rainbow trout (*Oncorhynchus mykiss*). The organism length ranged from 30 to mm, giving a short to long ratio of 1:2. The average length was 32 mm. The average weight was .40 grams.

10 fish were added to 38 liters of sample/water in each aquarium. This gave a flesh-to-mixture ratio of .11 grams/liter.

The test was started 8/24/89 at 1420 hours and completed on 8/28/89 at 1420 hours.

CONCLUSIONS:

100 ppm (mg/L)	0/30 Fish Died	0% Mortality
1000 ppm (mg/L)	0/30 Fish Died	0% Mortality
Control	1/30 Fish Died	3% Mortality

Respectfully Submitted,

Steven A. Lock

Development Associate
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DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory BioMed
 Analyst Steven Lock
 Beginning Date 8/24/89 Time 14:20
 Ending Date 8/28/89 Time 14:20
 Test Organism Rainbow Trout Oncorhynchus mykiss
 Required Test Temperature Range 11.5-12.5°C

Industry/Toxicant UPDE/ 34-8000
 Address PO Box 307 Manchester, WA 98353
 Collector W. E. W. S. L.
 Date Sample Collected 8/23/89 8/18/89

Laboratory Reference Number	Test Container No.	Conc (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25°C					Temperature (°C)					Total Hardness (mg/L CaCO ₃)		Total Alkalinity (mg/L CaCO ₃)		Conductivity (µMOS/cm)	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
control	1	0	0	0	0	0	0	10	—	—	—	8.75	—	—	—	—	7.0	12.5	—	—	—	—	18	24	126	12	46	40
"	2	0	0	1	0	0	0	10	—	—	—	8.70	—	—	—	—	7.8	12.5	—	—	—	—	20	20	128	13	41	43
"	3	0	0	0	0	0	0	10	—	—	—	8.94	—	—	—	—	7.2	12.5	—	—	—	—	138	18	224	13.8	64	44
11523	7	100	0	0	0	0	0	10	—	—	—	8.72	—	—	—	—	7.0	12.5	—	—	—	—	188	22	122	14	45	45
"	8	100	0	0	0	0	0	10	—	—	—	8.69	—	—	—	—	7.0	12.5	—	—	—	—	19	20	10.2	13.6	35	43
"	9	100	0	0	0	0	0	10	—	—	—	8.78	—	—	—	—	7.0	12.5	—	—	—	—	184	22	16.4	12.8	49	44
11523	10	1000	0	0	0	0	0	10	—	—	—	8.70	—	—	—	—	9.9	12.5	—	—	—	—	188	16	10.2	14.2	42	360
"	11	1000	0	0	0	0	0	10	—	—	—	8.74	—	—	—	—	7.3	12.5	—	—	—	—	184	24	12.4	14.6	47	45
"	12	1000	0	0	0	0	0	10	—	—	—	8.74	—	—	—	—	9.4	12.5	—	—	—	—	186	20	12.2	38	45	95

Sample Description 34-8000
 Average Weight 40g Mean Length 32mm Longest 35mm Shortest 30mm Ratio (long/short) 1.2
 Number of organisms per chamber 10 fish Ratio of fish to water 1:11g/L Comments No mortalities at either concentration

* Method on file with the Department of Ecology
 GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

DATA VERIFIED BY Steven A. Lock DATE 8/28/89



BIOMED, INCORPORATED

1720-130th Ave. N.E., Bellevue WA 98005-2203
(206) 882-0448, Telex: 283803 BIOM, Fax: (206) 882-2678

LABORATORY REPORT

CUSTOMER:

WA State Dept of Ecology
Attn: Margaret Stinson
P.O. Box 307
Manchester, WA 98353

BIOMED NO: 11524
RECEIVED: 8/24/89
Client Sample I.D.: WDOE Sample #34-8001

LABORATORY USE ONLY

LAB #: 11524
REPORT DATE 9/5/89
CUSTOMER P.O. #
APPROVED

TEST PROCEDURE:

The sample was tested for toxic properties in accordance with Washington State Department of Ecology "General Procedure for Static Basic Acute Fish Toxicity Test."

TEST RESULTS:

The test data are tabulated in detail on the following pages.

TEST DETAILS:

The sample was tested at 100 and 1,000 ppm (mg/L) by weight in water.

The test organisms were rainbow trout (*Oncorhynchus mykiss*). The organism length ranged from 28 to 43 mm, giving a short to long ratio of 1:5. The average length was 35 mm. The average weight was .64 grams.

10 fish were added to 38 liters of sample/water in each aquarium. This gave a flesh-to-mixture ratio of .17 grams/liter.

The test was started Sept. 1, 1989 at 1500 hours and completed on Sept. 5, 1989 at 1500 hours.

CONCLUSIONS:

100 ppm (mg/L)	0/30 Fish Died	0% Mortality
1000 ppm (mg/L)	0/30 Fish Died	0% Mortality
Control	0/30 Fish Died	0% Mortality

Respectfully submitted,

Steven A. Lock

Development Associate

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Laboratory

LUDE/ 34-8001

P.O. Box 307 Manchester, WA 98353

8/18/89

Beginning

Date 9/1/89

Analysis

Steven Zock

2

15177

Ending

6/5/94

2

15177

Test Questions

Radiolobio Torus Oncoclypeus mexicanus

Received Test Temperature Ranged

11.5-12.5°C

Sample Description

34-8001

Average Weight

649

Mean Length

3.5 mm

Longest

43000

Shorts

28 mm

Ratio long/short

15

Number of organisms per chamber:

112 fish

Burn of flesh in water:

17.1

Comments:

The mortalities

2

* Method on file with the Department of Ecology

GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

DATA VERIFIED BY

EHW > 10/30

DATE _____

8/5/89



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(206) 882-0448, Telex: 283803 BIOM, Fax: (206) 882-2678

LABORATORY REPORT

CUSTOMER:

WA State Dept of Ecology
Attn: Margaret Stinson
P.O. Box 307
Manchester, WA 98353

BIOMED NO: 11525
RECEIVED: 8/24/89
CLIENT SAMPLE I.D.: WDOE sample #34-8002

LABORATORY USE ONLY

LAB #: 11525
9/13/89
REPORT DATE
CUSTOMER P.O. #
APPROVED

TEST PROCEDURE:

The sample was tested for toxic properties in accordance with Washington State Department of Ecology "General Procedure for Static Basic Acute Fish Toxicity Test."

TEST RESULTS:

The test data are tabulated in detail on the following pages.

TEST DETAILS:

The sample was tested at 100 and 1000ppm (mg/L) by weight in water.

The test organisms were rainbow trout (*Oncorhynchus mykiss*). The organism length ranged from 32 to 40mm, giving a short to long ratio of 1:3. The average length was 36mm. The average weight was .50 grams.

10 fish were added to 38 liters of sample/water in each aquarium. This gave a fish-to-mixture ratio of .13 grams/liter.

The test was started Sept 7, 1989 at 1300 hours and completed on Sept 11, 1989 at 1300 hours.

CONCLUSIONS:

100 ppm (mg/L)	0/30 Fish Died	0% Mortality
1000 ppm (mg/L)	0/30 Fish Died	0% Mortality
Control	0/30 Fish Died	0% Mortality

Respectfully submitted,

Steven A. Lock

Development Associate

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DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Industry/Treatment: WDOE/ 34-8002
Address: P.O. Box 307, Manchester, WA 98353
Collector: _____
Date Sample Collected: 8/18/89

Laboratory: BiolMar
Analyst: Steven Lock
Beginning Date: 9/1/89 Time: 13:00
Ending Date: 9/10/89 Time: 1300
Test Organism: Rainbow Trout *Oncorhynchus mykiss*
Required Test Temperature Range: 11.5°C - 12.5°C

Laboratory Reference Number	Test Container No.	Conc. (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25°C					Temperature (°C)					Total Hardness (mg/L CaCO ₃)		Total Alkalinity (mg/L CaCO ₃)		Conductivity (µmhos/cm)	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
	1	T	0	0	0	0	0	10	—	—	—	9	7.3	—	—	—	8.0	12	—	—	—	—	24	30	32	44	45	61
	2	J	0	0	0	0	0	10	—	—	—	9	7.5	—	—	—	7.5	12	—	—	—	—	26	28	26	32	46	49
	3	↓	0	0	0	0	0	10	—	—	—	9	7.2	—	—	—	7.1	12	—	—	—	—	24	24	26	28	48	41
#11525	4	1000 ^µ	0	0	0	0	0	10	—	—	—	8	7.5	—	—	—	8.9	12	—	—	—	—	26	18	24	52	39	89
↓	5	↓	0	0	0	0	0	10	—	—	—	8	7.5	—	—	—	7.1	12	—	—	—	—	26	34	24	22	36	36
↓	6	↓	0	0	0	0	0	10	—	—	—	8	7.5	—	—	—	9.0	12	—	—	—	—	26	28	34	52	45	84
#11525	7	1000	0	0	0	0	0	10	—	—	—	7	8.5	—	—	—	7.2	12	—	—	—	—	24	24	28	28	60	40
↓	8	↓	0	0	0	0	0	10	—	—	—	7	7.6	—	—	—	7.6	12	—	—	—	—	30	20	34	46	40	54
↓	9	↓	0	0	0	0	0	10	—	—	—	7	7.5	—	—	—	7.2	12	—	—	—	—	24	32	18	24	40	43

Sample Description: 34-8002
Average Weight: 1.50g Mean Length: 36 mm Longest: 40 mm Shortest: 32 mm Ratio (long/short): 1.2
Number of organisms per chamber: 10 fish Ratio of flesh to water: 1.39/g Comments: No mortalities at either concentration.

* Method on file with the Department of Ecology.

GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

ECY 030-140

DATA VERIFIED BY

EHW > 10/30

DW > 11/30

DATE

9/1/89



BIOMED, INCORPORATED

1720-130th Ave. N.E., Bellevue WA 98005-2203
(206) 882-0448, Telex: 283803 BIOM, Fax: (206) 882-2678

LABORATORY REPORT

CUSTOMER:

WA state Dept of Ecology
Attn: Margaret Stinson
P.O. Box 307
Manchester, WA 98353

BIOMED NO: 11526
RECEIVED: 8/24/89
CLIENT SAMPLE I.D.: WDOE sample #34-8003

LABORATORY USE ONLY

LAB #: 11526
REPORT DATE 9/19/89
CUSTOMER P.O. #
APPROVED

TEST PROCEDURE:

The sample was tested for toxic properties in accordance with Washington State Department of Ecology "General Procedure for Static Basic Acute Fish Toxicity Test."

TEST RESULTS:

The test data are tabulated in detail on the following pages.

TEST DETAILS:

The sample was tested at 100 and 1000ppm (mg/L) by weight in water.

The test organisms were rainbow trout (*Oncorhynchus mykiss*). The organism length ranged from 33 to 45mm, giving a short to long ratio of 1:4. The average length was 39mm. The average weight was .64 grams.

10 fish were added to 38 liters of sample/water in each aquarium. This gave a flesh-to-mixture ratio of .17 grams/liter.

The test was started Sept. 14, 1989 at 1000 hours and completed on Sept 18, 1989 at 1000 hours.

CONCLUSIONS:

100 ppm (mg/L)	0/30 Fish Died	0% Mortality
1000 ppm (mg/L)	0/30 Fish Died	0% Mortality
Control	0/30 Fish Died	0% Mortality

Respectfully submitted,

Steven A. Lock

Development Associate

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DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Industry/Toxicant: WDDP/ 34-8003
Address: Box 307 Manchester, WA 98353
Collector: _____
Date Sample Collected: 8/18/82

Laboratory: BioMed
Analyst: Stefanovich
Beginning Date: 9/14/84
Ending Date: 9/18/84
Time: 11:00
Test Organism: Rainbow Trout Oncorhynchus mykiss
Required Test Temperature Range: 11.5°C - 12.5°C

Laboratory Reference Number	Test Con- tainer No.	Conc (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25°C					Temperature (°C)					Total Hardness (mg/L CaCO ₃)		Total Alkalinity (mg/L CaCO ₃)		Conductivity µMOS/cm	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
	1	T	0	0	0	0	0	10	—	—	—	8	7.1	—	—	—	7.1	12	—	—	—	—	14	14	34	22	60	38
	2	T	0	0	0	0	0	10	—	—	—	8	7.3	—	—	—	7.1	12	—	—	—	—	16	16	20	22	45	40
	3	↓	0	0	0	0	0	10	—	—	—	8	7.5	—	—	—	7.3	12	—	—	—	—	16	10	18	20	40	42
#11523	4	100	0	0	0	0	0	10	—	—	—	8	7.5	—	—	—	7.1	12	—	—	—	—	18	14	22	20	44	35
	5	↓	0	0	0	0	0	10	—	—	—	8	7.4	—	—	—	7.3	12	—	—	—	—	18	16	24	38	45	48
	6	↓	0	0	0	0	0	10	—	—	—	8	7.6	—	—	—	7.5	12	—	—	—	—	18	14	24	34	50	50
#11526	7	1000	0	0	0	0	0	10	—	—	—	7	7.1	—	—	—	7.3	12	—	—	—	—	20	16	18	18	45	45
	8	↓	0	0	0	0	0	10	—	—	—	7	7.3	—	—	—	7.6	12	—	—	—	—	20	14	22	24	37	50
	9	↓	0	0	0	0	0	10	—	—	—	7	7.7	—	—	—	7.4	12	—	—	—	—	18	12	22	26	49	50

Sample Description: 34-8003
Average Weight: 16.4g Mean Length: 39mm Longest: 45mm Shortest: 33mm Ratio long/short: 1.4
Number of organisms per chamber: 10 fish Ratio of flesh to water: 1.79/1 Comments: No mortalities, O₂ level

* Method on file with the Department of Ecology
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST
ECY 090-1-40

DATA VERIFIED BY: Stefanovich DATE: 9/18/84
____ EHW > 10/30
____ DW > 11/30

14-SEP-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 1

==> Transaction #: 09141552 Laboratory: (WE) Ecology, Manchester Lab
Work Group: (72) Pesticide Scan
Instrument: (GCT-NPD0) DOE0 Tracor GC 585, Ni-63, EC Detect
Method: (EP2-608) GC Ext Scan
Chemist: (RHR) Rieck, Bob ESD Hours Worked: _____
Project: DOE-222J BLACK RIVER NRDA Prg Ele#: B32D5
Prj Off: Kittle, Lew DOE Analysis Due: 890817 Revised Due:

*** Sample Records in Transaction ***

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	89377227		890817	COMP. A	
02	89377228		890817	CONTROL B	
03	89377229		890817	MUSSEL	
04	89377228	LMX1	890817	CONTROL B	
05	89377227	LBK1	890817	COMP. A	
06	89377227	LBK2	890817	COMP. A	

Record Type: TRNIN3 Date Verified: 9-15-89 By: Baill
Transaction Status: Edited Transaction...First Printing...Unverified.
Processed: 14-SEP-89 16:21:09 Status: E Batch: (In CUR DB)

14-SEP-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 2

Transaction #: 09141552 Seq #: 01 (72) Pesticide Scan
Proj Code : DOE-222J BLACK RIVER NRDA

PE # : B32D5

Sample No.: 89 377227

Alternate Keys:

Samp Matrix: (70) Tissue

Units: (22) ug/kg %Slds: _____

QA Code: () Unspecified

Peaks Total: _____

Date Extracted: 890911 Date Analyzed: 890913

Days to Ext/Anal: 25/ 2

Line	Par #	Parameter Description	Units	Value	
1	309002	Aldrin	ug/kg	1U	
2	57749	Chlordane	ug/kg	5U	
3	60571	Dieldrin	ug/kg	1U	
4	50293	4,4'-DDT	ug/kg	1U	
5	72559	4,4'-DDE	ug/kg	1U	
6	72548	4,4'-DDD	ug/kg	1U	
7	959988	alpha-Endosulfan	ug/kg	1U	
8	33213659	beta-Endosulfan	ug/kg	1U	
9	1031078	Endosulfan sulfate	ug/kg	1U	
10	72208	Endrin	ug/kg	1U	
11	7421934	Endrin aldehyde	ug/kg	1U	
12	76448	Heptachlor	ug/kg	1U	
13	1024573	Heptachlor epoxide	ug/kg	1U	
14	319846	alpha-BHC	ug/kg	1U	
15	319857	beta-BHC	ug/kg	1U	
16	58899	gamma-BHC (Lindane)	ug/kg	1U	
17	319868	delta-BHC	ug/kg	1U	
18	8001352	Toxaphene	ug/kg	34U	
19	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	105	(I.S.) PR
20	-200045	IntStd: Hexabromobenzene	% Recov	88	(I.S.) PR

14-SEP-89

Washington State Department of Ecology

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*** Lab Analysis Report ***

Transaction #: 09141552 Seq #: 02 (72) Pesticide Scan

Proj Code : DOE-222J BLACK RIVER NRDA

PE # : B32D5

Sample No.: 89 377228

Alternate Keys:

Samp Matrix: (70) Tissue

Units: (22) ug/kg %Slds: _____

QA Code: () Unspecified

Peaks Total: _____

Date Extracted: 890911 Date Analyzed: 890913

Days to Ext/Anal: 25/ 2

Line	Par #	Parameter Description	Units	Value
1	309002	Aldrin	ug/kg	1U
2	57749	Chlordane	ug/kg	5U
3	60571	Dieldrin	ug/kg	1U
4	50293	4,4'-DDT	ug/kg	1U
5	72559	4,4'-DDE	ug/kg	1U
6	72548	4,4'-DDD	ug/kg	1U
7	959988	alpha-Endosulfan	ug/kg	1U
8	33213659	beta-Endosulfan	ug/kg	1U
9	1031078	Endosulfan sulfate	ug/kg	1U
10	72208	Endrin	ug/kg	1U
11	7421934	Endrin aldehyde	ug/kg	1U
12	76448	Heptachlor	ug/kg	1U
13	1024573	Heptachlor epoxide	ug/kg	1U
14	319846	alpha-BHC	ug/kg	1U
15	319857	beta-BHC	ug/kg	1U
16	58899	gamma-BHC (Lindane)	ug/kg	1U
17	319868	delta-BHC	ug/kg	1U
18	8001352	Toxaphene	ug/kg	34U
19	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	105 (I.S.) PR
20	-200045	IntStd: Hexabromobenzene	% Recov	86 (I.S.) PR

14-SEP-89

Washington State Department of Ecology
*** Lab Analysis Report ***

Page 4

Transaction #: 09141552 Seq #: 03 (72) Pesticide Scan
Proj Code : DOE-222J BLACK RIVER NRDA

PE # : B32D5

Sample No.: 89 377229

Alternate Keys:

Samp Matrix: (70) Tissue

Units: (22) ug/kg %Slds: _____

QA Code: () Unspecified

Peaks Total: _____

Date Extracted: 890911 Date Analyzed: 890913

Days to Ext/Anal: 27 2

Line	Par #	Parameter Description	Units	Value
1	309002	Aldrin	ug/kg	3U
2	57749	Chlordane	ug/kg	10U
3	60571	Dieldrin	ug/kg	3U
4	50293	4,4'-DDT	ug/kg	3U
5	72559	4,4'-DDE	ug/kg	3U
6	72548	4,4'-DDD	ug/kg	3U
7	959988	alpha-Endosulfan	ug/kg	3U
8	33213659	beta-Endosulfan	ug/kg	3U
9	1031078	Endosulfan sulfate	ug/kg	3U
10	72208	Endrin	ug/kg	3U
11	7421934	Endrin aldehyde	ug/kg	3U
12	76448	Heptachlor	ug/kg	3U
13	1024573	Heptachlor epoxide	ug/kg	3U
14	319846	alpha-BHC	ug/kg	3U
15	319857	beta-BHC	ug/kg	3U
16	58899	gamma-BHC (Lindane)	ug/kg	3U
17	319868	delta-BHC	ug/kg	3U
18	8001352	Toxaphene	ug/kg	80U
19	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	98 (I.S.) PR
20	-200045	IntStd: Hexabromobenzene	% Recov	90 (I.S.) PR

*** Lab Analysis Report ***

Transaction #: 09141552 Seq #: 04 (72) Pesticide Scan

Proj Code : DOE-222J BLACK RIVER NRDA

PE # : B32D5

Sample No.: 89 377228

Alternate Keys:

Samp Matrix: (70) Tissue

Units: (94) % Recov %Slds: ____

QA Code: (LMX1) Lab Mtrx Spike #1 (% Rec

Peaks Total: ____

Date Extracted: 890911 Date Analyzed: 890913

Days to Ext/Anal: 25/ 2

Line	Par #	Parameter Description	Units	Value
1	309002	Aldrin	% Recov	98
2	57749	Chlordane	% Recov	NOT ADDED
3	60571	Dieldrin	% Recov	96
4	50293	4,4'-DDT	% Recov	102
5	72559	4,4'-DDE	% Recov	95
6	72548	4,4'-DDD	% Recov	98
7	959988	alpha-Endosulfan	% Recov	93
8	33213659	beta-Endosulfan	% Recov	96
9	1031078	Endosulfan sulfate	% Recov	98
10	72208	Endrin	% Recov	101
11	7421934	Endrin aldehyde	% Recov	36
12	76448	Heptachlor	% Recov	91
13	1024573	Heptachlor epoxide	% Recov	96
14	319846	alpha-BHC	% Recov	93
15	319857	beta-BHC	% Recov	95
16	58899	gamma-BHC (Lindane)	% Recov	92
17	319868	delta-BHC	% Recov	92
18	8001352	Toxaphene	% Recov	NOT ADDED
19	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	99 (I.S.) PR
20	-200045	IntStd: Hexabromobenzene	% Recov	91 (I.S.) PR

14-SEP-89

Washington State Department of Ecology
*** Lab Analysis Report ***

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Transaction #: 09141552 Seq #: 05 (72) Pesticide Scan
Proj Code : DOE-222J BLACK RIVER NRDA

PE # : B32D5

Blank ID : BT9254

Sample No.: 89 377227

Alternate Keys:

Samp Matrix: (70) Tissue

Units: (22) ug/kg %Slds: _____

QA Code: (LBK1) Lab Blank Sample #1

Peaks Total: _____

Date Extracted: 890911 Date Analyzed: 890912

Days to Ext/Anal: 25/ 1

Line	Par #	Parameter Description	Units	Value
1	309002	Aldrin	ug/kg	ND
2	57749	Chlordane	ug/kg	ND
3	60571	Dieldrin	ug/kg	ND
4	50293	4,4'-DDT	ug/kg	ND
5	72559	4,4'-DDE	ug/kg	ND
6	72548	4,4'-DDD	ug/kg	ND
7	959988	alpha-Endosulfan	ug/kg	ND
8	33213659	beta-Endosulfan	ug/kg	ND
9	1031078	Endosulfan sulfate	ug/kg	ND
10	72208	Endrin	ug/kg	ND
11	7421934	Endrin aldehyde	ug/kg	ND
12	73448	Heptachlor	ug/kg	ND
13	1024573	Heptachlor epoxide	ug/kg	ND
14	319846	alpha-BHC	ug/kg	ND
15	319857	beta-BHC	ug/kg	ND
16	58899	gamma-BHC (Lindane)	ug/kg	ND
17	319868	delta-BHC	ug/kg	ND
18	8001352	Toxaphene	ug/kg	ND
19	-10386042	IntStd: 4,4-Dibromooctafluor	% Recov	63 (I.S.) PR
20	-200045	IntStd: Hexabromobenzene	% Recov	70 (I.S.) PR

14-SEP-89

Washington State Department of Ecology

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*** Lab Analysis Report ***

Transaction #: 09141552 Seq #: 06 (72) Pesticide Scan

Proj Code : DOE-222J BLACK RIVER NRDA

PE # : B32D5

Blank ID : BT 9254D

Sample No.: 89 377227

Alternate Keys:

Samp Matrix: (70) Tissue

Units: (22) ug/kg

%Slds: _____

QA Code: (LBK2) Lab Blank Sample #2

Peaks Total: _____

Date Extracted: 890911 Date Analyzed: 890912

Days to Ext/Anal: 25/ 1

Line	Par #	Parameter Description	Units	Value
1	309002	Aldrin	ug/kg	ND
2	57749	Chlordane	ug/kg	ND
3	60571	Dieldrin	ug/kg	ND
4	50293	4,4'-DDT	ug/kg	ND
5	72559	4,4'-DDE	ug/kg	ND
6	72548	4,4'-DDD	ug/kg	ND
7	959988	alpha-Endosulfan	ug/kg	ND
8	33213659	beta-Endosulfan	ug/kg	ND
9	1031078	Endosulfan sulfate	ug/kg	ND
10	72208	Endrin	ug/kg	ND
11	7421934	Endrin aldehyde	ug/kg	ND
12	76448	Heptachlor	ug/kg	ND
13	1024573	Heptachlor epoxide	ug/kg	ND
14	319846	alpha-BHC	ug/kg	ND
15	319857	beta-BHC	ug/kg	ND
16	58899	gamma-BHC (Lindane)	ug/kg	ND
17	319868	delta-BHC	ug/kg	ND
18	8001352	Toxaphene	ug/kg	ND
19	-10386842	IntStd: 4,4-Dibromooctafluor	% Recov	87 (I.S.) PR
20	-200045	IntStd: Hexabromobenzene	% Recov	90 (I.S.) PR

ATTACHMENT 5

Pickett Facility Inspection & Miscellaneous Reports



INSPECTION REPORT

To Global Aqua - Black River

Date of Visit Aug 11, 1989

Name of Entity Same

City Cate County Thurston

Inspector Paul Pickett

Permit Number WA-003944-6

Permit Expires 4-16-86 (ext'd)

New Industry no

Person Contacted Oly Flatraaker, Tim Monfort

Type of Facility Aquaculture

Receiving Water Black River

Type of Treatment System Settling

Operation: ☐ Satisfactory ☒ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Facility not in operation. Recent fish-kill (8/6/89) raised concerns with this facility.

* Aug 3 - furunculosis outbreak; pumps stopped; stock destroyed & buried w/ lime, some liming of channels.

* Tanks on-site: 16-50' CC, 12-6m fiberglass circular, 12-3m sq. c., 24-2m square sq., 23-1 1/2m sq. c.

* Tanks in use on 8/3: 6m, 3m, 1 1/2m tanks. One 50m tank in use until end of July (#8).

Water in #10. ~~Water~~ Chlorine and floating buckets in #16. They say they disinfected most buckets.

Twenty-five barrels of formalin - mostly empty.

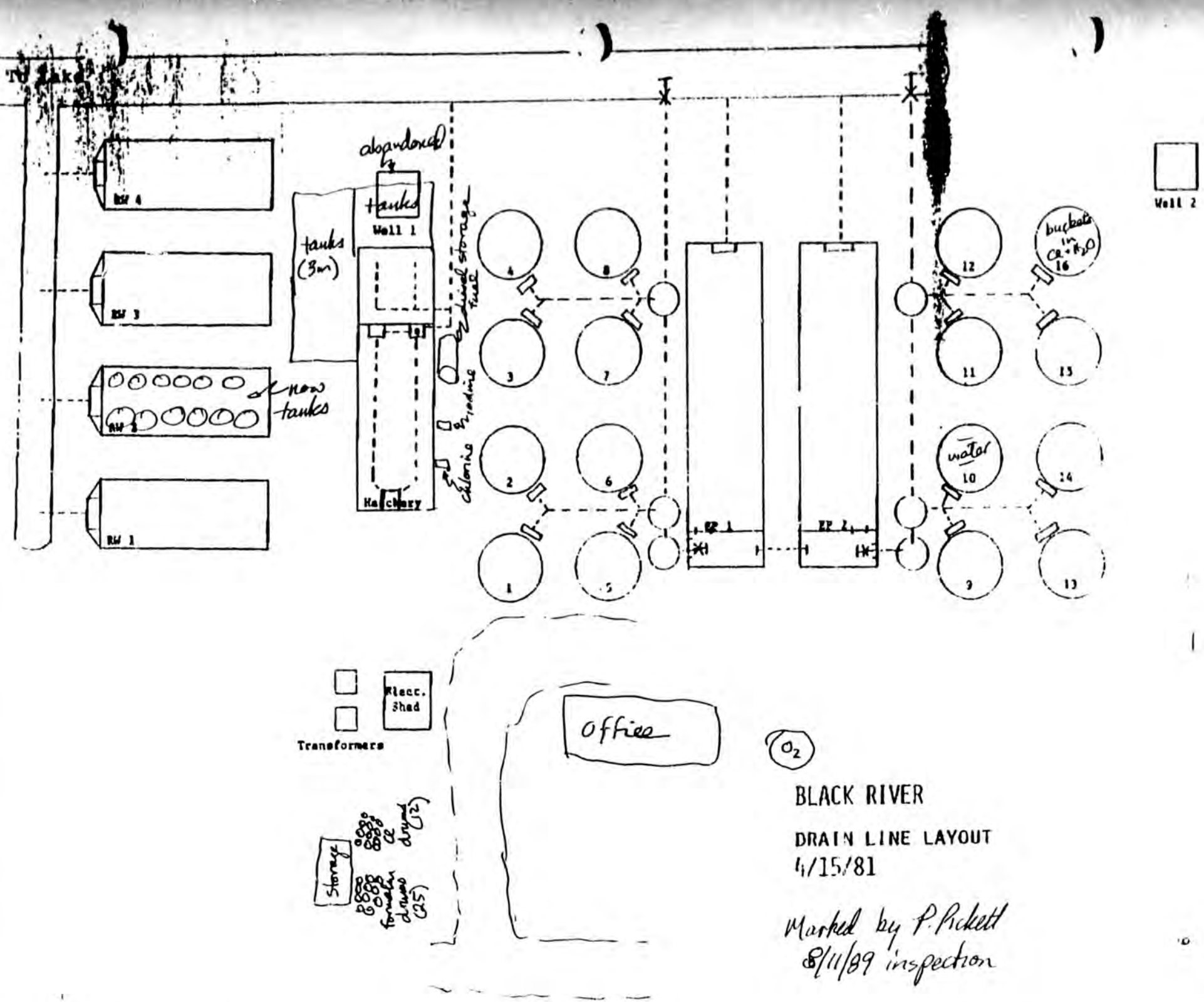
Twelve barrels of Chlorine - all full

One barrel of chl. at hatchery - half full

One barrel of rodnex at hatchery - half full

Three lined earth ponds - some lime

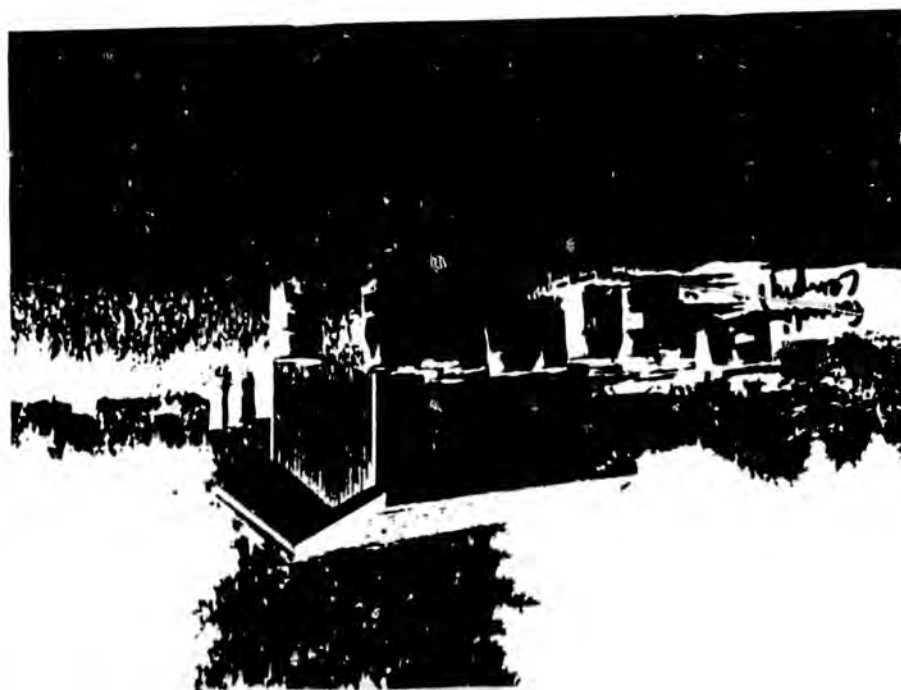
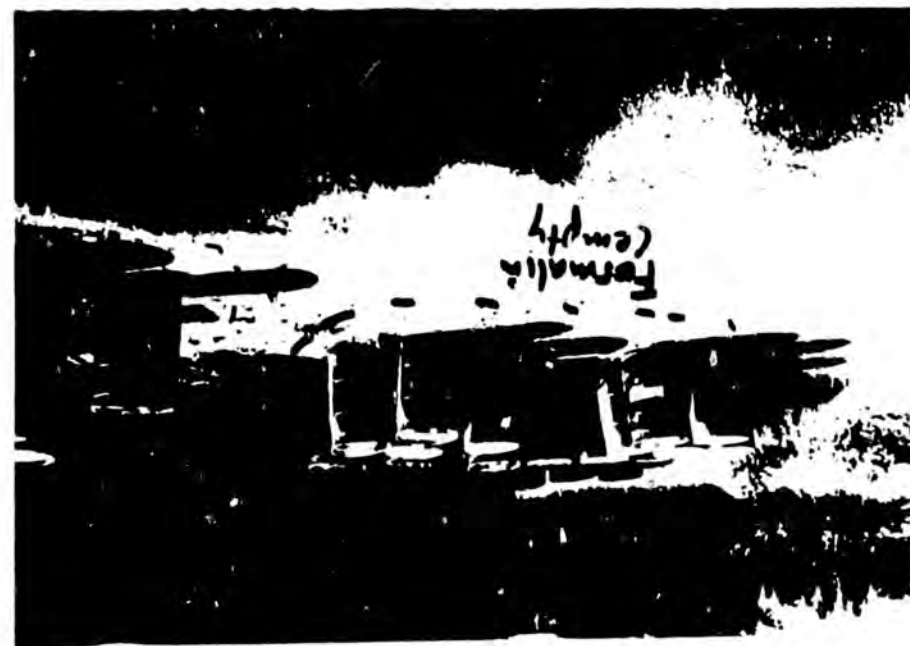
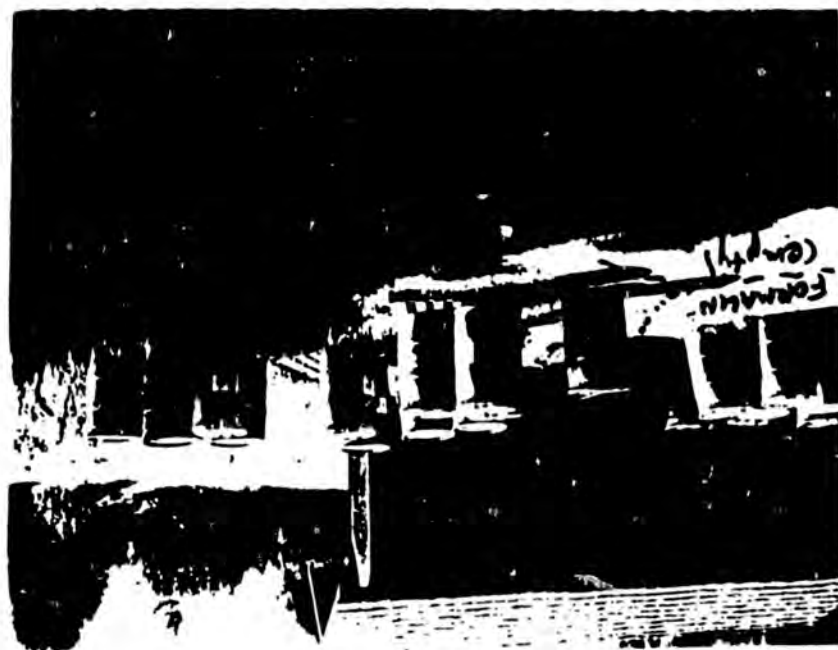
CC
(over)



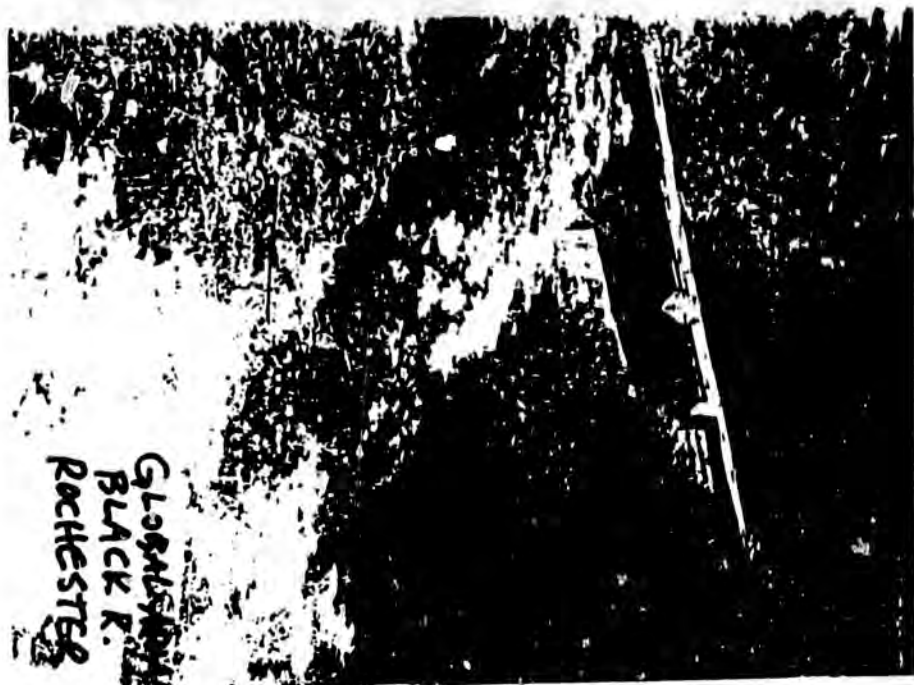
BLACK RIVER

DRAIN LINE LAYOUT
4/15/81

Marked by P. Pickett
8/11/89 inspection

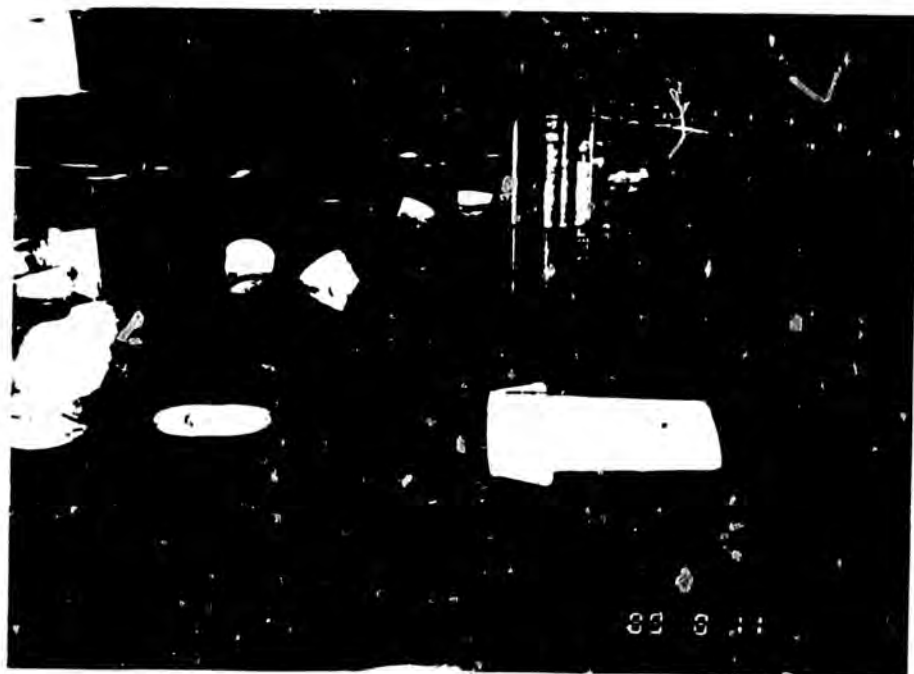


20th Century Plastics
1-800-421-4662
STOCK # PPV35



20th Century Plastics
1-800-421-4562
STOCK ★ PPV83







INSPECTION REPORT

To Rochester vicinity Inspector Paul Pickett
Date of Visit 8-14-89 Permit Number
Name of Entit. City Storm Drains, Steelhammer, Permit Expires
Global Aqua
City Rochester Country Thurston New Industry
Person Contacted Glen Steelhammer
Type of Facility Fish Rearing, Municipal Storm
Receiving Water Black River
Type of Treatment System

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Because of Black/Chehalis Fish Kill - went
to investigate Rochester Slough + visit Global Aqua.
[Stops are numbered on attached map.]

① Steelhammer Salmon Farm: No sign of mort's
fish usually live in the pool. Talked to Glen Steel
hammer. No problems at their facility. They use "2
tablespoons" of chlorine to wash tanks.

② Rochester Slough at Forstrom Rd: Saw muskrat w/young
no sign of mort's

③ Rochester Slough at Schooland Rd: No sign of mort's

⑤ Rochester Slough at BNRR: Slight flow, saw
frog, no mort's.

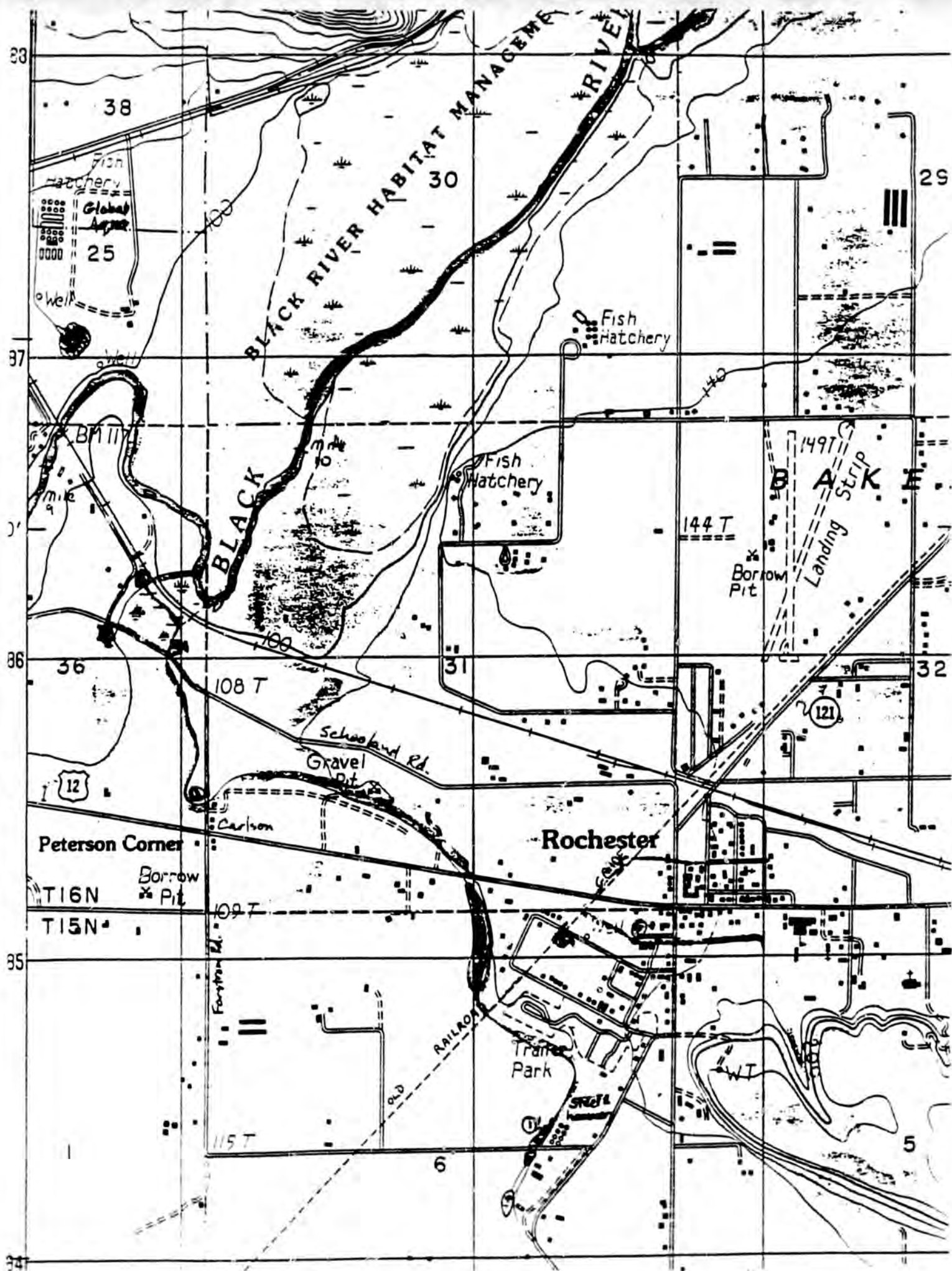
④ Unnamed Slough at Schooland Rd: Dry, no sign of spill

⑥ Rochester Storm Drainage at 104th Ave: Dry, no sign of spill

⑦ Betts Hill Storm Drain at 103rd Way: Dry, no sign of spill

cc

(over)



ALASKA LEGISLATURE SPECIAL COMMITTEE/SUBJECT FILE 8672
1878 SCOMM 75: MARICULTURE (FISH FARMING), 1987-1990

95

DISCUSSION AND MEETING RECORD

DATE: Aug 15, 1989

BY: Paul J. Pickett

REFERENCE: Global Aqua/Black

CONVERSATION/MEETING RECORDED

☒ NO ☐ YES — TAPE NO. _____

I MET WITH/SPOKE TO: Oly Flatraaker, Tim Montfort

OF: E.A.

TELEPHONE: 273-5925

ADDRESS (if applicable): _____

PARTICIPANTS: _____

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

SUMMARY OF MEETING/DISCUSSION: Barrels in Red Barn. Lime
bought from Wolf kill. Dan Potter returning today
One ton of lime. Imperial Limestone flour - now stored
in barn - 1 in channels one-half ton used.
Formalin: Atlantic have no resistance to formalin.
Fast treatment: ROMET, Terramycin
Most practical time for economic reasons - planned
for a couple months - minimum stock levels, no eggs
Formalin - fungicide for eggs. October to March 10-11 barrels
per year. No formalin use since March. Also costia
(protazone) treatment
Red Barn - John Deere spreader w/ lime (1 1/2 ton left.
Pressure Washer - 5 gal. of "Top gun" 1/2 gallon

NEEDED FOLLOWUP ACTION(S): _____

BY WHOM: _____



INSPECTION REPORT

Global Igua - Black River

Date of Visit Aug 16, 1964

Name of Entity Global Igua C.S.T.

City Redmond County Thurston

Person Contacted Mr. Monart, Gary Van

Type of Facility Igua unit

Receiving Water Black River (a cov)

Type of Treatment System

Inspector Paul T. Helt

Permit Number WA-003944-0

Permit Expires 9/66

New Industry

Operation: ☒ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Survey of Global Igua and surrounding area with Bill Yake. Went to RR bridge, then walked up river bank to mouth of Steelhammer Slough. Slough was discharging. Bill examined aquatic vegetation and observed notable insect-larval life up to slough.

At Global Igua - took samples from drainage channel for analysis (standing water).

Swirled sediment at Black River near T-A - white deposits that resemble diatomaceous or precipitates.

Thick & Tapered muddy. Children and deer killed - milk had "salty taste". Collected samples - noted "salty taste" - some from C-4 within pond.

DISCUSSION AND MEETING RECORD

DATE: Aug 16, 10 am

BY: Paul Pickett

REFERENCE: Black River Kill

CONVERSATION/MEETING RECORDED

☒ NO ☐ YES — TAPE NO. _____

I MET WITH/SPOKE TO: Dan Swecker

OF: Swecker Salmon Farm

TELEPHONE: 273-5890

ADDRESS (if applicable): _____

PARTICIPANTS: _____

SUMMARY OF MEETING/DISCUSSION:

DS has done bioassays in river w/ hatchery fish - Dead within an hour. Experimented w/ acclimation, resulting in definite toxicity of river vs. hatchery water. Gill structure ruined. DO is supersaturated - very high levels indicating high productivity.

Dead clams and fish observed.

* Aug 17, 1989 - DS called. Observed mortality on the ~~Black River~~. Checking plankton species w/ samples sent to UW. DO up to 18 w/ DO meter. pH below 7. Impacts observed above Swecker for 3 miles (downstream).

* Aug 18, 1989 - Suggested to DS that he contact Fisheries for pathology check on Bioassay morts.

NEEDED FOLLOWUP ACTION(S): _____

BY WHOM: _____

8/16/89 - 10 am

Dan Swecker -

Biosassays in Black River - near Swecker's

Fish killed even after temp

Super saturation of O_2

Colors - yellow, etc.

Boat recon up to Canoe Company

10% O_2 total gas sat.

pH below 7

Supersaturation conditions

Gill lamellae shot - mucus & cell sloughing

Dead Clams

→ Sampling needs → call

8/17/89

Dan Swecker:

Continued mortality in Black R.

Jack Kneel - ~~WW~~ - Plankton sampling

* 18 evening - 13 morning

DO Meter - pti - below 7

Phytoplankton species i.d. - toxins?

3 miles above Swecker in Black.

Paul

PIC for Black R fish kill

C32B5

Make sure lab has

for analysis

I have

BM Gale



INSPECTION REPORT

To Global Aqua - Black River
Date of Visit Aug 17, 1989
Name of Entity Global Aqua - USA
City Redmond Gate County Thurston

w/ Jon Neal
Inspector P. Pickett
Permit Number WA 003944-6
Permit Expires 4/86
New Industry _____

Person Contacted Mr. Flotzacker, Tim Mordant, Gary Van~
Type of Facility Aquaculture
Receiving Water Black River via GTW
Type of Treatment System _____

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Visited Global Aqua w/ Jon Neal, toured entire facility. Discussed time frame of activities and use of chemicals (see attached). Questioned each employee separately - all agreed no spill had occurred. They resented attention paid to them w/ pills occurring upstream. Does not appear that Global Aqua spilled any foreign substance or discharged any materials other than shut down of facility w/ reduced flow.

Significant Dates - Global Aqua

7/27 two wells to one well (~3mgd)
8/03 last well shut off
6/26 last existing DO sampled (8-95)
8/03 Shut pumps off - fish removed; tanks draining
~~8/10~~ Tanks drained
8/05 Lake drained completely
8/09 Liming of channels

Morton Blomso - new V.P.

Explained engineering

chloramine T

Formalin 37%

Erythromycin IN FEED

Sodium Thiosulfite

oxolinic acid IN FEED FOR BACTERIAL INFECTION
salt

Hexamine 1622 TREATING BACTERIAL GILL

Diquat

"

"

"

argentyne IODINE DISINFECTANT

MS-222 (TRICAIN METHANE SULFONATE) ANESTHETIC

ROMET IN FEED

HALOWSAN LIKE ARGENTYNE BUT NO PH. BUFFERED

Formalin Usage 1989

8/16/89

GUR

I. June - A. 10l ^{total} @ 1:8000 dilution in various
hotday locations. Treatment of Costia, ext. protozoa, etc.
weekly basis until mid June.

↑ B. Outside location prophylactics @ 1:6000

1. 6/20 33l P-3

2. 6/24 30l P-6

6/25 30l P-10

II. July 7/02 33l P-9

7/10 33l P-4

7/13 30l P-12, 13

III. August None used

Chlorine Usage (Sodium Hypochloride @ 12.5%)

I. July 7/01 30L @ 10ppm dilution P-6
7/01 30L - " P-7

7/20 Both pools neutralized w/ 20Lbs Sodium Thiosulfate

7/26 Added 60L into P-16 as disinfect location. Still in pool.

7/27 shut off well 3 (leaving well 5 as only one operating)

7/31 well 5 down, started up well 4

II. August Remaining well (W-4) shut down 8/03

8/04 15L added to transport tanks to disinfect

Neutralized, left site w/out being drained

20th Century Plastics
1-800-421-4662
STOCK # PPV35



TELEFAX



Date AUGUST 17, 1989
To ~~XXXXXXXXXX~~ FAX 752-8531
From
Subject GLOBAL AQUA, USA INC.
Re
TOTAL PAGES INCLUDING COVER LETTER 6

CORPORATE OFFICE 355 SPRICKSON AVE SUITE 421
BAINBRIDGE ISLAND WA 98110
TEL (206) 842-9881
FAX (206) 842-9883
BLACK RIVER 11408 GATE ROAD SOUTH
OLYMPIA WA 98502
TEL (360) 771-0020
FAX (360) 771-0020

DEAR MR. PICKETT:

ATTACHED PLEASE FIND COPIES OF THE INVOICES FOR THE CHEMICALS THAT HAVE BEEN PURCHASED SINCE MAY 1, 1989.

SHOULD YOU HAVE ANY QUESTIONS, PLEASE DO NOT HESITATE TO CALL.

SINCERELY,

Doug Brickley
DOUG BRICKLEY

DB/DF

Handwritten signature and initials.

5

2/ JSS

ST. ST.
MONITOR
NO.
ST. ST.
MONITOR
ST. ST.
MONITOR
NO.

1000 00
1000 00
1000 00
1000 00

12 52CAT, 20

10	STAVRS	SHIP TO	ELBERT, ALVA	11405 GATE RD. S.	ADDRESS	ROCKSTER, VA	207
15	P.O. BOX 264						
	CHATELAIN, WA						
	18586						

SAVINGS

PLEASE REPLY TO
P.O. BOX 268
TRACY, CA 95376-0268

INVOICE K 32036

8702 152nd AVE NORTHEAST
REDMOND WA 98052

(206) 885-3777

PAGE 1

GLOB35
S Global Aqua
O 355 Erickson Ave
L Suite 421
D Bainbridge Isl, WA 98110
T
O

S Global Aqua
O 11405 Gate Road
L Olympia, WA 98110
P
T
O

DATE 05/31/89		SALESMAN 550		ORDER NO. Tim	ORDER DATE 05/31/89	SHIPPED VIA UPS		TERMS 1.08/ 10	INVOICE NO. 00035225	
ORDERED	QTY SHIPPED	BACK ORDER	ITEM NUMBER	DESCRIPTION			UNIT	UNIT PRICE	AMOUNT	
1 0	1 0	0 0	1a	100lb Chloramine T 80125226 FOB R			ea	550.000 .000	550.00 .00	
Thank you. We appreciate your order.				5043						
NON TAXABLE 00		TAXABLE 550.00		SALES TAX 44.55		FREIGHT 19.39		MISCELLANEOUS .00		INVOICE TOTAL 613.94

ENTERED
2163

8702 152nd AVE NORTHEAST (206) 885-3777
REDMOND, WA 98052

GLOB15
Global Aqua, Inc.
111 Queen Anne Ave N.
403
Seattle, WA 98109

11405 Gate Road
Olympia, WA 98502

PAGE 1

Global Aqua, Inc.
GLOB15

ATTN 05/19/89		SALESMAN 505		ORDER NO. Tim		ORDER DATE 05/16/89		SHIPPED VIA UPS		TERMS 1.0% / 10		INVOICE NO. 00034967	
ORDERED	QTY SHIPPED	BACK ORDER	ITEM NUMBER	DESCRIPTION		UNIT	UNIT PRICE	AMOUNT					
2	2	0	1a	25# Chloramine T		ea	200.000	400.00					
0	0	0		so#24996 FOB R			.000	.00					
Thank you. We appreciate your order! S038													
NON TAXABLE .00		TAXABLE 400.00		SALES TAX 32.40		FREIGHT 9.24		MISCELLANEOUS .00		INVOICE TOTAL		441.64	

ENTERED
2055

INVOICE DATE 05/19/89	INVOICE NO. 00034967
PLEASE DETACH HERE AND RETURN WITH YOUR PAYMENT	
INVOICE TOTAL 441.64	

8702-152nd AVE NORTHEAST (206) 865-3777
REDMOND, WA 98052

8702-152nd AVE NORTHEAST
REDMOND, WA 98052
(206) 865-3777

PAGE 1

PAGE 1

GLOB20
Global Aqua
11405 Gate Road
Olympia, WA 98502

S Same
H
I
P
T
O

Global Aqua
GLOB20

DATE 05/03/89	SALESMAN 550	ORDER NO. Tim	ORDER DATE 02/26/89	SHIPPED VIA UPS	TERMS 1.0% / 10	INVOICE NO. 00034725
QUOTED 2 0	QTY 2 0	BACK ORDER 0 0	ITEM NUMBER 1a	DESCRIPTION 250 Chloramine T so#24703 FOB R	UNIT ea	AMOUNT 200.000 .000 400.00 .00
Thank you. We appreciate your order!				8034		
TAXABLE .00		TAXABLE 400.00		SALES TAX 33.18	FREIGHT 9.70	MISCELLANEOUS .00
INVOICE TOTAL					442.88	

INVOICE DATE	INVOICE NO.
5/03/89	0003472

PLEASE DETACH HERE
AND RETURN WITH
YOUR PAYMENT



AUG 12 '89 15:34 GLOBAL AQUA USA INC.

UBANKS

PHONE (206) 736-3314
P.O. BOX 284
505 WEST MAIN
CENTRALIA, WASH. 98531
FED ID NO. 91-1231867

INVOICE NO. 32730
DATE 05-01-89
GLOBMA

INVOICE NO.	32730
DATE	05-01-89
TO	GLOBMA
FROM	UBANKS
ADDRESS	11400 GATE RD. S. OLYMPIA, WA 98502
TELEPHONE	(206) 736-3314
FAX	(206) 736-3315
CITY	OLYMPIA
STATE	WA
ZIP	98502
COUNTRY	USA
CUSTOMER ORDER NO.	
QUANTITY	
DESCRIPTION	
UNIT PRICE	
TAX	
NET	

52 GALLON DRUMS LIQUID CHLORINE
DRUM DEPOSITS

Comments

NO DRUMS RETURNED
IN THIS ORDER OR 4 DRUMS OF CHLORINE FOR
MINIMUM ORDER OF 4 DRUMS OF CHLORINE FOR
ON SITE DELIVERY

Steven Koffey

DESIGN TEXT

1977

62.48
40.00
15.56

NOTE: ALL CLAIMS AND RETURNED GOODS
MUST BE ACCOMPANIED BY THIS RECEIPT

229.36

All materials guaranteed to be as specified. All work to be completed in a workmanlike manner according to standard practices. Any alteration or deviation from above specifications involving extra costs will be charged only upon written order, and will become an extra charge over and above the estimate. All agreements contingent upon strikes, accidents or delays beyond our control. Owner to carry fire, tornado and other necessary insurance. Our workers are fully covered by Workmen's Compensation Insurance.

All claims and returned goods must be accompanied by this receipt. Terms of payment are net (10) days net from invoice date. All accounts are commercial accounts and not open accounts. All delinquent accounts shall bear interest at the rate of 1 1/2% per month, an annual percentage rate of 18%.



INSPECTION REPORT

To Steelhammer Salmon Farm

Inspector P. Pickett

Date of Visit Aug. 18, 1989

Permit Number WA-003946-2

Name of Entit. same

Permit Expires 4/86

City Rochester County Thurston

New Industry _____

Person Contacted Barbara Steelhammer

Type of Facility Aqua culture

Receiving Water Rochester slough/Black R.

Type of Treatment System _____

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Discussed operations - no chemical use,
no shut down, no cleaning - normal
operations. Took samples from sediment
in the slough. Took water samples
from slough at Schoolland Road. Noted
a large number of small fish in slough.

Talked to Paul Anderson - owner. Normal
operations, no chemical use.



INSPECTION REPORT

To Carlson Salmon Farm

Date of Visit Aug 16, 1989

Name of Entity same

City Richester County Thurston

Person Contacted Leonard Carlson (also Matthew, 12)

Type of Facility Aquaculture

Receiving Water Black River Swamp

Type of Treatment System none (settling)

Inspector P. Pickett

Permit Number none

Permit E _____

New Index _____

Operation: ☐ Satisfactory ☐ Fair ☒ Unsatisfactory

☐ Does not comply with permit conditions

Describe Four 50 foot concrete circular tanks, a
doughboy pool w/ fingerlings, about 10
hatching trays and an earth pond w/
fingerlings. Earth pond discharges to
stand pipe and trough into swamp.
Discharge goes to neighbor's property.
Earth pond not lined, but provided some
settling - only a few months old.
No chemical use, none stored on site.

Issues: 1) Discharge to neighbor

2) no permit

3) Unlined pond

Feed: over 10,000 lbs/mo.

Discharge: ~1000 gpm

Fish on stock ~40,000 lbs

Map over



INSPECTION REPORT

To Swecker Salmon Farm

Date of Visit 8/18/89

Name of Entity same

City Rochester County Thurston

Person Contacted Dan Swecker

Type of Facility Aquaculture

Receiving Water Black River

Type of Treatment System none

Inspector P. Pickett

Permit Number WA-003945-4

Permit Expires 4/86

New Industry _____

Operation: ☐ Satisfactory ☐ Fair ☒ Unsatisfactory

☐ Does not comply with permit conditions

Describe ~~What is the~~ No unusual operations, no chemical use.
Atlantic Salmon in doughboy ponds - '48 - 16'x4',
3-24'x4', 8-15'x3', four 30' concrete w/
Coho, Ten earthen ^{regions} ~~settlement~~ one settling pond.
Surface discharge 2500 ~~to~~ discharge
1000 gpm. About 100,000 ~~to~~ stock about
35000 lbs feed/month. Separate pit pond for
treatment wastewater - not used recently.

Issues: 1) No GW monitoring or sealed ponds
2) No treatment

3) possible permit violation due to
expansion of facility

[Map over]

- Saw signs of burial of mounds in the works

CC [DIR not signed by corporate officer -
Facility expanded w/out reapplying]



INSPECTION REPORT

To Swecker Salmon Farm
Date of Visit Aug 21, 1989
Name of Entity Sam
City Rochester County Thurston

Inspector P. Pickett
Permit Number WA-003945-4
Permit Expires 4/81
New Industry _____

Person Contacted Dan Swecker
Type of Facility Aquaculture
Receiving Water ~~Black River~~ Black River
Type of Treatment System _____

Operation: ☐ Satisfactory ☐ Fair ☐ Unsatisfactory

☐ Does not comply with permit conditions

Describe Went to observe bioassay & pathology work
w/ Pat Chapman of WDF. Went via ATV to
Black River. Bioassay healthy after one hour.
Took samples. (Location - old duck/duck blind)
Observed Chapman's work - no signs of
gill damage or other disease. River of
cooler, less oxygenated.

Swecker reports that UW checked his phyto-
plankton samples, and the species present
appear normal for ~~water~~ a fresh-water
river population.

DISCUSSION AND MEETING RECORD

DATE: 8/22/89

BY: Paul J. Pickett

REFERENCE: Global Aqua

CONVERSATION/MEETING RECORDED

☒ NO ☐ YES ☐ TAPE NO. _____

I MET WITH/SPOKE TO: Judy

OF: Eubanks

TELEPHONE: 736-3314

ADDRESS (if applicable): 505 W. Main, Cuba

PART PANTS: _____

SUMMARY OF MEETING/DISCUSSION:

I requested a list of chemicals sold to Global Aqua. The following were reported:

Date	Amount	Item
<u>4/28/89</u>	<u>2 - 52 gal</u>	<u>12.5% Hypochlorite</u>
<u>6/8/89</u>	<u>2 - 52 gal</u>	<u>12.5% Hypochlorite</u>
<u>6/8/89</u>	<u>2 - 110 lb.</u>	<u>Sodium Thiocyanate</u>
<u>8/1/89</u>	<u>12 - 52 gal.</u>	<u>12.5% Hypochlorite</u>
<u>8/22/89</u>	<u>10 - 64 lb.</u>	<u>Sodium Thiocyanate</u>

These records confirm Global Aqua's records.

NEEDED FOLLOWUP ACTION(S): _____

BY WHOM: _____

TELEFAX



Date August 22, 1989
To Department of Ecology
Attn [REDACTED]
From Global Aqua-USA, Inc. Doug Brickley
Re Black River
FAX: 753-8531

CORPORATE OFFICE 155 BRICKSON AVE. SUITE 101
BAINBRIDGE ISLAND WA 98111
TEL: (206) 847-9881
FAX: (206) 842-4481

BLACK RIVER 11400 GATE ROAD SOUTH
OLYMPIA WA 98512
TEL: (206) 870-1100
FAX: (206) 870-1100

Paul Pickett
Department of Ecology

Dear Mr. Pickett:

Per your request, please find the list of names and phone numbers of the
at the Black River site.

Should you have any questions, please call me.

BLACK RIVER

NAMES

PHONE NUMBERS

Flatraaker, Ole Jan

(206) 273-8180

Monfort, Timothy

(206) 273-8729

Pearson, Karen

(206) 273-~~5976~~ 5976

Pearson, Sarah

(206) 273-5342

Raunholm, Steinar

(206) 273-5342

Rotter, Daniel

(206) 273-5473

Van Ree, Gary

(206) 273-8676

Doug Brickley

Sincerely,

Doug Brickley

DB/df *df*

*Lead off
next to
Brad Suttle - Menke/Cameron Creek
Will Cook - Temp*

Transmission of _____
If not all received, please call 1-800-854-2981

001 854 2981 78808 2011 61 77 808

12068429881

DISCUSSION AND MEETING RECORD

DATE: 8/24/89

BY: Paul Pickett

REFERENCE: Global Agne

CONVERSATION/MEETING RECORDED

☒ NO ☐ YES ——— TAPE NO. _____

I MET WITH/SPOKE TO: Karen Pearson

OF: GA

TELEPHONE: 273-5976

ADDRESS (if applicable): _____

PARTICIPANTS: _____

SUMMARY OF MEETING/DISCUSSION:

Asked her when she has been working at GA. She took 2 weeks vacation. Then worked mostly at Salt Water. After July 21, only worked Aug 15, now on sick leave. Only treatment was RDMET or formaldehyde for frankers. Obvious in May frunc problem was getting worse. Suspended treatment by late July. No spells that she's heard of. Always neutralize Chlorine, use barrels until empty and stored turned over.
She did general work as needed.

NEEDED FOLLOWUP ACTION(S): _____

BY WHOM: _____

M E M O R A N D U M

August 31, 1989

TO: File

FROM: Paul Pickett *PP*

SUBJECT: Black River Fish Kill, August, 1989
Summary of Investigations of Complaints and Rumors

I collected information on several rumors, reports, and theories that arose with regard to the Black River Kill. The information is summarized below.

First-hand Accounts of Swimming Irritation

Name	Date/Time	Place	Description
Sheree Bell	8-7-89/13:00	Turf Farm Pump	Irritated Eyes for 24 Hrs
Dave Walker	"	"	Irritated Eyes for 24 Hrs
(273-7401)	"	"	Upset Stomach for 36 Hrs
	"	"	(ingested river water)
Craig Davis	"	"	No Problem - Kept Eyes
(273-8044)			Shut
Tanya Fagernes	8-7-89/15:00	Big Rock	Irritated Eyes
Mark Fagernes	"	"	Irritated Eyes
	"	"	("Salty" taste to river)
Todd Fagernes	"	"	No Problem - Wore Goggles
(273-9689)			
Josh Wheeler	8-7-89/13:00	Below Moon Rd	Irritated Eyes for 18 Hrs
(273-5519)	"	"	Rash & Sores on Stomach
Pat Wright	"	"	Irritated Eyes
Kevin Duff	8-8-89/12:00	Below Moon Rd	Irritated Eyes for 24 Hrs
April Duff	"	"	No Problem - Brief Swim
(273-6916)			
Brian Douglas	8-8-89/16:00	Above Boat	Irritated Eyes for 18 Hrs
	"	Launch	Photophobia
Jason Albert	"	"	Irritated Eyes for 15 Hrs
	"	"	Photophobia

All swimmers reported that the river was unusually cloudy, and that there was no unusual odor other than a normal rotten smell.

The "Disgruntled Employee" Rumor

Tony Cudinski (273-8576), a Rochester resident, reported a rumor obtained from a fishing buddy that an employee at Global Aqua was unhappy with what was occurring there and had left their employment.

Gene Dechamps (Chehalis Tribal Biologist) reported an anonymous call from a distraught woman who said she had worked for Global Aqua and had information, but could not relay it at that time.

Global Aqua provided a list of employees at the Black River facility. All employees except two (Dan Rotter and Sara Pearson) were interviewed individually, and their descriptions of operations at the facility were consistent.

The "Nuked the Fish" Rumor

Gene Dechamps was told by an anonymous fish farmer that he knew that Global Aqua had "nuked the fish."

Dan Kneeland (352-3415), a businessman with connections to the aquaculture industry reported that a fish farmer he knew told him that Global Aqua had "nuked the fish."

Mark George, a Rochester resident, passed on a rumor that a fish farmer he knew told him that Global Aqua had "nuked the fish." While discussing this with him over the phone, he said that the person who told him that story was also at the restaurant he was calling from.

The fish farmer who apparently began these rumors was Dan Phillips. He told me that he had no first-hand knowledge of Global's activities, and that the information he was spreading was based on Dan Rotter's words ("nuked the fish" - i.e. killed them), and his knowledge of usual fish farm procedures. Thanks, Dan!

The Livestock Feed Tank Truck Complaint

An anonymous caller contacted Thurston county to report that a Stainless Steel Tanker with the words "Livestock Feed" on the side had been seen dumping into a lake or wetland along the Black River in the Mima area. This tanker had reportedly pumped the truck wash at the Restover Truck Stop.

On Friday August 18, Greg Cloud and I investigated a large area of DNR land between the Weyerhaeuser Tree Farm and the Black River Dairy. No signs of use by a heavy truck or of dumping of wastes were found.

The Restover Truck Stop truck wash has been closed for about a year. The previous operator ("Toby", works at Lacey Liquor Store) did not remember the truck we described.

Possibly the truck described was discharging or pumping from a manure lagoon at the Dairy.

Ammonia/Sulphide Theories

Several bits of information support the possibility of Ammonia and/or Sulphide toxicity contributing to the kill:

- 1) Jim Douglas (273-9747), a Rochester resident, reported that on Wednesday August 9 he saw a light blue plume in the river at Sickman-Ford Bridge, on the right-hand side facing downstream.

During a series of fish kills in Budd Inlet in September 1981, a light glacial blue color was observed. It was theorized that hydrogen sulphide released from Capital Lake was precipitating as elemental sulphur and causing that color.

- 2) Conditions in the Global Aqua settling pond may have been appropriate for sulphide and ammonia production because: a) the weather was hot and still, b) the sediments in the pond are high in nutrients and organic material, c) oxygenated influent was no longer entering the pond, and d) water discharged from the pond through the bottom sediments, which were most likely to be anoxic.
- 3) An ammonia level of over 700 mg/l was measured in water puddled over sediments in the influent channel to the settling pond. A sample was collected from the settling pond at the time of the fish kill and analyzed a week later, and a level of 12 mg/l ammonia was found. These values indicate that very high levels of ammonia were possible in the water percolating out of the settling pond.
- 4) Under conditions observed in the Chehalis River, pH 8.3 and a temperature of 20 centigrade, a level of 2.9 mg/l total ammonia as nitrogen would be acutely toxic, based on the one-hour EPA water quality criteria. Discharge from Global Aqua would have needed to be on the order of 200-500 mg/l $\text{NH}_3\text{-N}$ to reach this level in the Chehalis River.
- 5) Low DO conditions were observed in deeper waters of the Black River. Generation of sulphides and ammonia may have already been occurring in anoxic river sediments. Oxidation of additional sulphides and ammonia entering the river would further deplete oxygen. Very slow velocities and thermal stratification may have contributed to the creation of a stable anoxic layer in the river with high ammonia and sulphide levels.
- 6) Several swimmers on the river reported a rotten smell, like dead fish. A hydrogen sulphide or ammonia smell may have been masked by the rotten odors normal to a slow river in the summer.
- 7) Symptoms experienced by the swimmers, burning eyes and photophobia, could have been caused by sulphides.

ATTACHMENT 6

Hallock Aquatic Plant Report

DRAFT

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES

MEMORANDUM

TO: John Bernhardt
FROM: David Hallock
SUBJECT: Black River Field Results: Biological
DATE: August 21, 1989

The following plant species were observed in the Black River between RM 7 and -RM 17 (Littlerock) on Friday, August 18, 1989:

Algae

One clump of attached filamentous algae was collected for analysis. This algae was ubiquitous in the river and was attached to and covering many macrophyte beds. The primary alga was the filamentous diatom, *Melosira*. *Fragillaria* was next in abundance. Various other diatoms and non-filamentous green algae were also present. The only blue-green algae observed was a short strand of *Oscillatoria* (not a toxin-forming species to my knowledge).

Macrophytes

The following macrophytes were observed:

<u><i>Elodea canadensis</i></u> (waterweed)	<u><i>Potamogeton</i> sp.</u> (pondweed)
<u><i>Potamogeton amphidrus</i></u> (pondweed)	<u><i>Sparganium</i> sp.</u> (bur-reed)
<u><i>Myriophyllum</i> sp.</u> (water-milfoil)	<u><i>Nuphar polysepalum</i></u> (water lily)
<u><i>Elatine</i> sp.</u> (waterwort)	<u><i>Polygonum</i> sp.</u> (smartweed)
<u><i>Ceratophyllum</i></u> (coontail)	<u><i>Lemna minor</i></u> (duckweed)

A few other macrophytes were seen but not identified. Both *Sparganium* and *Polygonum* covered the channel in places to the point of interfering with the jet boat's intake. Dense beds of *Elodea* were present in places. The *Myriophyllum* species was probably not eurasian milfoil.

ATTACHMENT 7

Gene Deschamps (Chehalis Fisheries Biologist) Report

Chehalis Indian Tribe Fisheries Program
Notes on Black River/Chehalis River Fish Kill
Between August 10-19, 1989

- Aug. 10 Tribal Fish technicians (A.O. & D.C.) float in rubber raft from informal boat launch in Black River on Schoolhouse Road (River mile 8.6) to highway 12 bridge (RM 4.1) total length 4.5 miles.
Observations: (all dead) (Time: In 10:00a.m. Out 1:00p.m.). Start to Gate Bridge (RM 7.1) 3 dead coho fingerling (est. 3"); 1 squawfish (est. 16"). Gate Bridge to Highway 12 Bridge 4 large Cutthroat Trout (12-16") native coloration; 1 sucker (est 18"); 1 red-sided shiner (est. 4").
Comments: Water not the usual clear brownish tinged, but very murky with apparent suspended plant material. Aquatic plants very thick "hiding" mortalities. (2 coho kept, frozen and later given to pathologist). (Casual observations (G.D.) several weeks earlier at survey start and end revealed good abundance of live coho fingerling).
- Aug. 10 Spot checks (G.D.) on Black River.
Lower Bridge on Howanut Road (RM 1.1) 10:45 a.m.: 5 large live squawfish just above bridge. Schools of live 1"-3" cyprinids near shore-appear OK; 3 live sculpins near shore. Also, 1 8"-10" trout and 2 coho fingerlings swimming rather slow. Water getting murky.
Gate Bridge (RM 7.1). Several lamprey ammocetes left mud and are swimming on the surface. No schools of cyprinids or coho fingerling seen. (These were numerous several weeks ago). Several 3"-4" dead fish on bottom (not identified). One stressed 12" squawfish just below bridge repeatedly surfacing. Water murky.
Highway 12 Boat Ramp (RM 4.1) 2 dead sculpins (3") several red-sided shiners stressed (4") can be caught by hand at the surface. Schools of small 1/2" -1" cyprinids seem ok.
- Aug. 11 (A.O. & D.C.)
Floated Chehalis River in rubber raft from Sickman-Ford Bridge (RM 44.04) to Oakville Boat Launch (RM 42.2). (1.85 miles). 31 dead adult chinook (22 females, 4 males, 5 SND). Also, 16 live stressed, 4 swimming very weakly. Most mortality near bridge, progressively less downstream. Dead piled on gravel bar.
- Aug. 12 & 13 Picked up an additional 30 dead adult chinook washed up at riffle just below Sickman-Ford bridge. (81 total put on bank) (Chehalis Enforcement Officers)

Aug 13

(G.D.)

Spot Checks

Porter Boat Launch (RM 33.3). 7:15 a.m. No dead fish seen. Schools of 1"-3" cyprinids are OK. Larger fish (not I.D.) feeding on insect hatch. Water murky - lots of foam. (Chehalis River).

Below Oakville Boat Launch (RM 42). Two dead 8"-10" fish near far bank (probably whitefish). Several large (12"-18") fish feeding at surface. (Chehalis River.) (7:37 a.m.)

Highway 12 Boat Launch (RM 4.1) Black River. 4 stressed red-sided shiner seen (3"-4"); 3 dead sculpin; water very murky, the schools of small cyprinids seen Aug. 10 are gone. Aquatic plants dying. (8:00 a.m.)

Lower Black River Bridge (RM. 1.1) (8:15 a.m.)

All previous activity absent, except 1 school (25-35 fish) 1 1/2" cyprinids appear stressed. No dead fish seen, however weeds thick.

Chehalis River at Independence Bridge (RM 54.2) Lots of surface feeding cyprinids of all sizes. Water appears clearer than Black River. 1 dead adult chinook (seen previously in mid July) at surface just above bridge on south bank. Heavily fungused - dead 3 weeks or more from presumably natural D.O. sag then.

Aug 14

Spot Checks Black River (G.D.)

Bridge at Little Rock 7:30 a.m., RM 18.4 No dead fish. Coho fingerling seen in eddies, hit "thrown twigs". Gravelly riffles & shallow pools.

Boat launch south of Little Rock (RM 16.2) No dead fish - flow is slow-weedy plants appear ok. Coho fingerlings fairly numerous - hit thrown twigs on surface.

Aug 14

Float Trip - Chehalis River Oakville boat launch to Porter (RM 42.2 to RM 33.3). 8.9 miles. 4 dead female chinook adults and 1 adult summer steelhead. Scattered out from start to 2 miles above Porter. Also 2 barely alive. (Dead fish flagged and put on bank) (65 adult dead chinook accounted for in Chehalis River to date).

Aug 15

(B.S. & J.Y.)

RM ad

Float in raft Black River (RM 1.1 to RMD) Lower bridge to mouth 1:00 p.m. 2 dead suckers, lots of dying lily pads and aquatic plants. 2 tame ducks sitting on log. River appears "dead". No fish activity, water murky. No adult dead chinook (water too low).

3

Continue float in Chehalis River (RM 47 to Sickman Ford Bridge (RM 44.05), (2.95 miles). Terrific kill - 60 adult female chinook; 7 males; 65 (SND) - total 131 dead. Also 15 live chinooks with varying degrees of stress. Also numerous (un counted) dead squawfish, suckers, etc., plus 1 adult shad dying. (196 dead chinook accounted for by Tribe to 8/15). Need to reconcile Ecology helicopter count from Satsop River mouth to Sickman Ford bridge/Garrad Creek to get total dead. Because of overhanging trees, the Tribes float count from the mouth of Black River to Sickman ford bridge is more accurate than the helicopter count. Below here, the chopper count would be best.

(Gene's preliminary chopper count from Oakville Boat launch to Sickman Ford bridge is 44 dead chinook. This added to the previous 196 gives an observed total of 240. We will also have to resolve the number of unseen to calculate a total loss.

P.S. Efforts to secure moribund chinook were unsuccessful on on August 12, 18, 19, 21

Gene Deschamps
Fish Biologist
Chehalis Indian Tribe

Continued Observations

- Aug. 10 Two moribund coho fingerlings collected and frozen.
Given to DOE Aug. 16. (below Gate Bridge)
- Aug. 11 Two recently dead adult chinook picked up in vicinity of
Sickman-Ford bridge and frozen. Given to DOE Aug. 16.
- Aug. 16 One live chinook collected in the Chehalis river by set net
at night about 1 1/2 miles upstream from the mouth of the
Black River in an area not "affected. Kept cool and fresh -
given to DOE August 16. (RM 48.7)

Aug. 22

Highway 12 Boat Launch (1:23 p.m. (RM 4.1)

Small schools of cyprinids (1/2"-1 1/2") seen near weed beds. Seem OK. No coho or larger fish seen. Bottom blanketed with brown organic material, with small chunks breaking off and rising to the surface. Dead plant life present. Water much cleaner than before.

Gate Bridge (1:55 p.m.) (RM 7.1)

A few small cyprinid schools (1/2"-1 1/2" fish) seen near shore or grassy islands. No coho fingerlings or larger fish seen. Bottom and aquatic weeds covered with brown organic matter. Water clearer than before.

Boat Launch below Little Rock (2:19 p.m.) (RM 16.2)

Aquatic plants look OK (some emergent large plants on far bank browning). Water clear. Coho fingerling present, 8 rose to surface to hit twigs thrown in water. Bottom with no blanket of organic matter.

Black River Spot Checks (G.D.)

Lower Bridge (RM 1.1) (1:36 p.m.) A few small cyprinids (1/2"-1 1/2") next to shore. Lots of dead plant material on bottom and on water weeds. No surface feeding fish seen. No large fish seen. Water is clearer.

Aug. 22

(11-11:30 a.m.)

Citizen Tony Cudinski of Rochester stopped by Tribal Center and talked to G.D. He was fishing August 19th, in Black River from the canoe launch to the boat launch at RM 8.6. He said he caught numbers of cutthroat, bass, yellow perch, squawfish and white fish down to 500-600 yards above the "Trestle" near Global Aqua. From there to the boat launch he caught nothing. He thought a "reward" notice should be circulated to attract comment from people who might know something. (His telephone number is 273-8576).

Other

Key to Chehalis Tribe Personnel

G.D. - Gene Deschamps
D.C. - Dennis Cayenne
A.O. - Albert Ortiz
B.S. - Bill Secena
J.Y. - Jerry Youckton

Also

At the invitation of Gary Van Ree of Global Aqua, Gene Deschamps and Sam Secena (Tribal Business Committee) were given a tour of the facilities at 1:00 p.m. August 17. Material was recorded on a "Cam-corder".

6.

Bottom Line Summary - Chehalis Tribal Observations

1. Our first observations revealed a fish kill in progress in Black River between RM 8.6 and RM 4.1 on August 10. Whatever had caused the problem had reached somewhere between RM 4.1 and RM 1.1 at that time. Valuable species lost were coho fingerlings (1988 brood, and resident cutthroat trout. Visual observations probably did not represent the true loss.
2. By Friday August 11 the "Cause" had reached the Chehalis river and began killing adult chinook salmon. Peak losses occurred probably August 12-15, but lasted through the week. About 240 have been seen, with the "unseen" mortality adding to this amount.
3. Observations in the Little Rock area of Black River August 14 (RM 16.2 & 18.4) revealed no dead fish, live coho fingerlings, and apparently healthy aquatic plant life.
4. Below the start of our survey on Black River at RM 8.6, plant life appeared to be severely affected, with decaying matter coloring the water and blanketing the bottom.
5. Small cyprinids seemed to be the most resistant species, perhaps residing in dead-water pockets in weed-beds, etc.
6. By the time it was suggested capturing moribund chinook (or other species) for tissue and other analyses, it was too late.

ATTACHMENT 8

Dave Seiler, WDF, Report on Loss of Coho Salmon
in the Black River Fish Kill.

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
PLANNING, RESEARCH AND HARVEST MANAGEMENT

MEMO

TO: Lew Kittle, Department of Ecology September 27, 1989
FROM: Dave Seiler DS
SUBJECT: Loss of Coho Salmon in the Black River Fish Kill

Per your request, I have estimated the loss of coho salmon in the Black River fish kill of August 1989. I estimate that around 100,000 fry were killed and that these would have resulted in 45,000 smolts in Spring 1990 which in turn would have survived to produce 3,263 adult coho in 1991.

Attached is a detailed explanation of the information and analysis that produced these estimates. If you have any questions or desire additional background information just let me know.

DES:des

cc: Didonato
L. Phinney
D. Phinney
Austin
Cooney
Lincoln
Edie
Gene Deschamps, Chehalis Tribe

Estimation of the Coho Salmon loss in the 1989 Black River Fish Kill

Coho salmon fry rear throughout the Black River system and consequently a significant number were lost in the fish kill that occurred downstream from river mile 9.2 during August of 1989. This paper provides an estimate of the coho loss in this event and estimates the resultant loss to the fisheries and spawning escapement. These estimates are based on studies conducted by the Washington Department of Fisheries' Freshwater Production Evaluation Program, a long term research program designed to quantify natural salmon production, survival and escapement. Various juvenile and adult trapping and tagging techniques are employed to assess wild salmon populations at different lifestages (Seiler et al. 1981 and 1984).

In 1980, this program established a permanent upstream and downstream migrant trapping facility on Bingham Creek (tributary to the Satsop River). In 1982, efforts expanded to include other tributaries of the Grays Harbor Basin (Seiler, 1989). Over the years 1982 through 1985, downstream migrant traps were operated in the Black River system and emigrating coho smolts were trapped and coded wire tagged (CWT). Adult escapement of coho was estimated via adult trapping and tagging in the Black River in 1985. In 1986, adult escapement was also estimated in this system (via CWT ratios). Taken together, these studies provide a means to estimate Black River coho smolt production, survival and contribution to all fisheries and escapement.

Smolt Production

In addition to the Black River, smolts were also trapped in two of its tributaries, Beaver and Waddell Creek. Traps were located near the town of Littlerock (near the mouths of the tributaries and at RM 18.3 on the mainstem (Fig. 1). Consequently, the numbers of smolts trapped relate only to the habitat above these trap sites. Due to the Black River's low gradient and resultant swampy character, the majority of the rearing area critical to coho production is found in the mainstem below Littlerock. Because trapping was possible only on the upper Black River and in certain tributaries, estimation of smolt production for the entire system also requires estimates of basin escapement.

In 1985, we estimated coho escapement to the Black River system at 1,678 adults. Relating the estimated survival to escapement for the 1982 brood of .74% (359/48,278) (Table 2) to this escapement, estimates that 227,000 smolts emigrated from the system in spring 1984. By subtracting the 89,000 smolts we trapped, we estimate that 138,000 were produced downstream of Littlerock. The only tributary of consequence to coho rearing below this point is Mima Creek. Considering its size and habitat, I estimate that it may produce around 10,000 smolts. Subtraction of this production yields an estimate for the 1982 brood of around 128,000 coho smolts from the lower 18.3 miles of Black River mainstem. This level translates into an average production in this reach of around 7,000 smolts per mile.

In the following year, 1986, we estimated Black River coho escapement at

6,200 adults and smolt production for this brood at around 140,000. By subtracting the 81,000 smolts we trapped and the estimated 10,000 from Mima Creek, we estimate 49,000 smolts were produced from the lower 18.3 miles of mainstem, an average production per mile of 2,700 smolts in Spring 1985.

The average 1985-1986 production rate of 4,850 coho smolts per mile can be applied to the lower 9.2 miles affected by the 1989 fish kill. The fish kill loss then, is estimated at 45,000 smolts.

Several questions that should be asked in assessing the veracity of this estimate include the following:

1. How many fry would have been killed to result in this loss?
2. Is the answer to #1 a reasonable estimate of the August standing crop of fry for this quantity of habitat and reach of the river?
3. Was seeding adequate in 1988 to produce this population level of coho fry?

The first question asks what is the survival from August fry to smolt emigration. Literature values range from 30% to 50%. These rates would equate to a population in this reach of 90,000 to 150,000 fry.

Average fry densities in August for a system like the lower Black River, if fully seeded, would likely average over one fry per square meter. As the affected reach of the Black River has over 100,000 square meters of area (9.2 mi. x 1,609 m/mi. x 8 m average width) this fry population could exist at densities even lower than capacity.

Seeding was good in 1988. We estimate escapement to the upper Chehalis River (upstream of Porter) in 1988 at around 30,000 coho, a level of spawning I consider adequate to seed the watershed. While we did not estimate Black River escapement separately in 1988, it would be similar to the 1986 level, around 6,000. In addition to the natural seeding, some 260,000 fed coho fry were outplanted into the mainstem Black River in April, 1988 (Table 1). The combination of good natural spawning and this outplant of fed fry directly into the mainstem probably resulted in full or near full seeding.

Table 1 Releases of fed coho fry into the Black River in 1989.

Release Date	Number Released	Release Site (RM)	Days Reared	Size f/lb
4-14-89	93,288	18.3	45	507
4-18-89	85,800	15.5	43	429
4-19-89	85,800	7.1	43	429
total	264,888			

Marine Survival

Average marine survival of Black River wild coho is estimated at 7.25% over the four broods we tagged (Table 2). This estimate relies on the harvest rate measured each year on the Bingham Creek wild tag group as the upstream trapping facility on this stream provides a complete and precise accounting of tag escapement not available in the Black River system.

Harvest

Over the four broods, an average of 35.4% of the run was harvested in ocean and harbor fisheries. In recent years, the harvest rate by the Chehalis Tribe's net fishery has varied from a high near 20% (1987) to less than 2% (1988). Of the four years we tagged Black River coho, we obtained an adequate sample of the Chehalis Tribe's catch in only one year, 1986. In this year, I estimate the harvest rate by this fishery at 5.5% (117 tags caught of 2,123 tags estimated to escape the harbor fisheries). For estimating purposes in this assessment, a harvest rate for this fishery of 10% would be appropriate.

Harvest in the ocean is shared between commercial troll fishermen and sport fishermen. Treaty and non-treaty gill net fisheries share the harvest in the harbor. Table 3 splits the combined catch of Black River tagged coho by all states and British Columbia into sport, troll and net components within each brood year. These were averaged over the four broods to estimate the harvest components at 8.4% sport, 67.9% troll and 23.7% net.

Estimated Loss of Adult Coho

By applying the average marine survival rate of 7.25% to the estimated loss of 45,000 smolts, we estimate the adult loss at 3,263. Use of the 4 year average harvest rate estimates that 1,156 of these fish would be harvested in ocean and harbor fisheries and the balance, 2,107 would escape up the river. Of these, the Chehalis tribe would catch 211 at the 10% harvest rate, leaving 1,896 to spawn. Based on the four year average catch shares, the estimated total harvest would breakdown as follows: 97 sport, 785 troll and 485 net. The loss of the 1,896 adults that would have escaped to spawn in 1991 also translates into a direct loss to fishermen as harvests will have to be restricted. As this is nearly impossible on a subbasin scale, future production from the Black River will also likely be impacted.

BLACK RIVER

Upper Chehalis Basin

Fig 1.

2 1 1/2 0 1 2 MILES

SCALE 1" = 2 MILES

SYMBOLS

PASSABLE - BARRIERS - IMPASSABLE

	Falls	
	Beaver Dams	
	Dams	
	Salmon Hatchery	
	Fish Passage Facility	
	Stream Gage	
	Stream Mile	
	Reference Point	

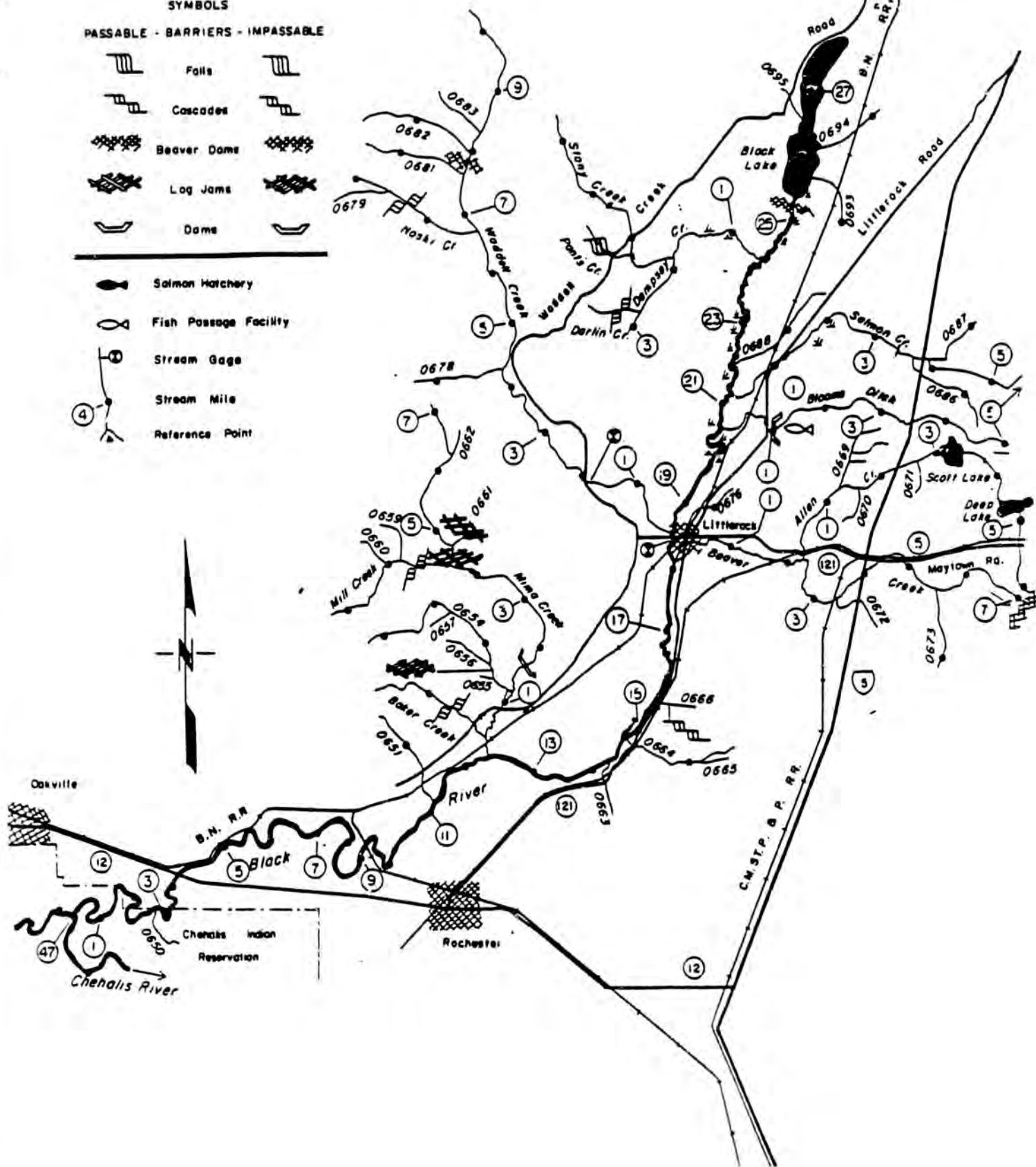


Table 2 Estimated recoveries in fisheries and estimated escapement of tagged Black River and Bingham Creek wild coho, brood years 1980-1983.

Brood Year	Stream	# Tagged 1/	OR	Estimated Catch					Escapement 2/	Total	Marine Surv. (%)
				WA	BC	AK	GH	Total			
1980	Black River	11,474	17	73	275	-	41	406	635	1,041	9.07
1980	Bingham Cr.	21,874	18	22	264	13	63	380	594	974	4.45
1981	Black River	34,772	49	56	479	24	39	647	3,390	4,037	11.61
1981	Bingham Cr.	20,012	9	27	185	4	76	301	1,577	1,878	9.38
1982	Black River	48,278	7	53	230	-	99	389	359	748	1.55
1982	Bingham Cr.	26,546	-	22	96	-	52	170	157	327	1.23
1983	Black River	47,855	18	87	641	4	359	1,109	2,123	3,232	6.75
1983	Bingham Cr.	17,950	12	43	151	-	189	395	756	1,151	6.41
Average	Black River										7.25
Average	Bingham Cr.										5.37

Table 3 Estimated tag recoveries in the ocean and Grays Harbor fisheries of Black River wild coho by catch components of sport, troll and net fisheries, catch years 1983-1986.

Catch Year	Catch Area	Fishery			Total
		Sport	Troll	Net	
1983	ORE	9	8	-	17
	WA	52	21	-	73
	BC	-	275	-	275
	AK	-	-	-	-
	GH	-	-	41	41
	totals	61	304	41	406
	prop. (%)	15.0	74.9	10.1	
1984	OR	30	19	-	49
	WA	16	-	40	56
	BC	10	449	20	479
	AK	-	24	-	24
	GH	-	-	39	39
	totals	56	492	99	647
	prop. (%)	8.7	76.0	15.3	
1985	OR	4	3	-	7
	WA	19	30	4	53
	BC	5	215	10	230
	GH	-	-	99	99
	totals	28	248	113	389
	prop. (%)	7.2	63.8	29.0	
1986	OR	9	9	-	18
	WA	10	19	58	87
	BC	10	600	31	641
	AK	-	4	-	4
	GH	-	-	359	359
	totals	29	632	448	1,109
	prop. (%)	2.6	57.0	40.4	
average prop. (%)		8.4	67.9	23.7	

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