Health Consultation #1

Examination of Contamination
in
Suspended and Bottom Sediments
of the

NEW RIVER

IMPERIAL COUNTY, CALIFORNIA

JUNE 11, 1999

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BACKGROUND AND STATEMENT OF ISSUES

The California Department of Health Services-Environmental Health Investigations Branch (CDHS), under cooperative agreement with the US Agency for Toxic Substances and Disease Registry (ATSDR), is conducting health assessment activities for the communities that lie along the New River in Imperial County, California. As a part of these activities, CDHS will be preparing a series of health consultations that evaluate the public health implications of chemical contamination in the water column, sediments, and fish in New River and the Colorado River. These health consultations will be based upon data obtained from a Binational Study Group, commissioned by the US and Mexican governments, for the purpose of studying water quality issues at the US/Mexican border (1).

The purpose of this health consultation is to evaluate the levels of chemical contamination in the suspended and bottom sediments of the New River, as measured in a recent binational environmental monitoring program, and to estimate the potential public health effects, if any, of that contamination.

Site Description

The New River flows northward, from the Colorado River in Baja California Norte, Mexico, for about 20 miles, to the International Border, and on to the Salton Sea in the US. On the Mexican side of the border, the New River passes through the city of Mexicali. On the US side of the border, it passes through the city of Calexico. The New River flows for approximately 60 miles more through Imperial County, passing near or through several other cities, including Seely, El Centro, Brawley, and Westmoreland, where it terminates at the Salton Sea (Figures 1,2) (2). At the Salton Sea, approximately one third of the total flow is of Mexican origin, and includes agricultural runoff, untreated and partially treated sewage, and industrial waste water. The remaining flow comes mainly from agricultural runoff and irrigation return flow on the US side of the border (2,3)

The city of Mexicali has a population of approximately 600,000, and is growing at an annual growth rate of 1.7 percent. The New River flows through the urban part of Mexicali. Approximately 200 industrial facilities are located in Mexicali. Among these are facilities called *maquiladoras*, which are foreign-owned manufacturing facilities that are operated in Mexico (3).

Imperial County is predominantly agricultural, with the population spread among numerous smaller towns and cities. After passing through the US city of Calexico, the New River passes through predominately agricultural land as it flows to the Salton Sea (2).

In addition to the New River, the Alamo River and the Whitewater River flow into the Salton Sea from the south and north, respectively. There is, however, no outlet from the Salton Sea. Thus, there is the potential for the buildup of contamination in the Salton Sea.

Site History and ATSDR Involvement

For over 50 years, the New River has been a problem for both the US and Mexican governments. As far back as 1944, both governments have been promising to clean up the river, but aside from upgrades to the Mexicali sewage system, little has been accomplished.

In November, 1993, the Board of Supervisors of Imperial County, California, petitioned ATSDR to evaluate the public health impact of the New River. In response, ATSDR prepared a petitioned health consultation (2). The petitioned health consultation evaluated environmental data for the New River, collected from 1969 to 1994, from sampling stations at the International Boundary and along the New River, up to the Salton Sea. These samples were collected as a part of an on-going water quality monitoring program. Agencies involved in this program include the U.S. Geological Service, Region 7 of the Regional Water Quality Control Board, the California Department of Fish and Game, and the State Water Resources Control Board.

The petitioned health consultation concluded that the primary threat to public health was fecal streptococci and other pathogens found in the surface water and the foam, which is often seen floating on the river surface. While some chemical contaminants were present in the water and sediment at concentrations higher than ATSDR comparison values, the authors concluded that adverse health effects (cancer and non-cancer) were unlikely to occur. In addition, New River fish did contain some chemical contamination. The levels of contamination were such that people could probably consume small amounts of fish without adverse health effects. However, based upon the risks posed by biological contamination, the authors recommended against eating any fish from the New River

Based on these conclusions, the petitioned health consultation recommended that: access to the New River be restricted where possible and that warning signs should be posted or improved; coordination and cooperation between the US and Mexican governments be promoted; awareness of contamination issues in the New River be raised for residents and government officials on both sides of the border; and area residents be advised of the potential dangers of eating aquatic animals from the New River and avoid contact with the foam (2).

As mentioned above, the data examined for the petitioned health consultation covered the period of 1969 to 1994. When evaluating these data for potential health effects, the worst case data were used, which in some cases were15 or 20 years old. Thus, when the PHC was presented to the public, concern was expressed concerning the relevance of some of the data. Because of this concern, CDHS decided to evaluate more recent environmental data in this and other health consultations. In addition to these health consultations, CDHS also conducted an educational program for health care providers from both sides of the border in April 1997.

Site Visits

Site Visit — Calexico

Members of the CDHS staff met with local community leaders on April 23, 1996. After this meeting, the community leaders took the CDHS staff members on a tour of the area, including three stops along the New River. The first stop was at the International Boundary, where the New River crosses from Mexico to the US. Patches of foam were seen floating on the river. There is a shopping center located near this location. Though not observed on this day, the wind is known to blow foam into the parking lot of this center. Samples of foam have been analyzed in the past, and shown to contain fecal bacteria.

The second stop was near the Calexico sewage treatment plant. Foul smelling water was seen running down the surface of the hill from the plant to grass near the river. Raw sewage was seen floating in the river, and the river exuded a foul odor.

The third stop was the home of a Calexico resident. Her home is in a neighborhood in which the backyards of many homes face the river, and is only a few yards from the river. The resident reported that often times during the summer, flies and mosquitoes, as well as odors from the river, keep residents from using their back yards. She also reported that she has lived in the neighborhood for nine years, that this was the fourth group of government officials to whom she has told her story, and that in that time, nothing has been done.

In the locations that the staff visited, it was noted that while access to the river is difficult due to the steep banks, there were no fences or other means of restricting access. No one was observed in the New River during this visit.

Site Visit — Mexicali

Following the site visit to the US side of the New River in April 1996, a CDHS staff member visited the Mexican city of Mexicali. He observed that as the New River passes through Mexicali, it runs past several "colonias", poor, unincorporated areas of Mexicali which are often without running water. He observed large piles of garbage near some of these colonias, and in one instance, the garbage forms a solid layer on top of the river, with the water flowing beneath it. While he did not observe children in the water during this visit, it has been reported in the past that children do play in the river. Also, it is not clear whether people use the river as a source of drinking water (5).

Demographics

Based upon 1990 Census data, the majority of the population of Imperial County lies in a corridor along the New River, extending approximately five miles to the west of the New River, and approximately 10 miles east of the New River, and running from the US-Mexico Border to the Salton Sea (Figure 2). The total population in this corridor is

approximately 102,000 people. The population is 48.9% male and 51.1% female. The racial composition of the population is: 26.6% white-non-Hispanic; 2.3% black-non-Hispanic; 0.3% Native American-non-Hispanic; 0.1% other-non-Hispanic; and 69.1% Hispanic. The ages of the population breaks down as follows: 0 – 18 years old, 37.3%; 19 – 29 years old, 16.1%; 30 – 39 years old, 15.5%; 40 – 49 years old, 11.0%; 50 – 59 years old, 7.8%; 60 – 69 years old, 7.0%; and greater than 70 years old, 5.4%.

Community Concerns

As discussed above in **Site History**, the New River has been a source of problems for area residents for many years. Residents complain about odors, as well as insects such as flies and mosquitos, that come from the river. County public health officials have expressed great concern about workers, especially emergency response workers, coming into contact with the water of the New River. In addition, area physicians have expressed concerns about the findings in the 1996 PHC which documents the finding of biological contamination, including fecal streptococci and coliforms, and pathogens capable of causing diseases such as polio, typhoid, cholera, tuberculosis, and encephalitis.

People are also concerned about chemical contamination in the New River. The PHC, however, cited data that was in some cases was almost 20 years old. Thus, people were somewhat skeptical about the relevance of these data, and were very interested in some agency collecting and evaluating more current data.

Environmental Contamination

In March 1995, the Binational Study Group collected sediment samples from three locations on the New River — in Mexicali approximately 300 meters south of the International Boundary, in Calexico approximately 600 meters north of the Boundary, and at the Salton Sea (Figure 3). Water samples and several species of fish were also collected and analyzed. An evaluation of the water samples has been presented in a previous health consultation (7). An evaluation of the fish samples will be presented in a forthcoming health consultation. Grab sampling was used to collect bottom sediment samples. Water samples, collected by grab sampling, were filtered, with the filtered material analyzed as suspended sediments. Both the suspended and bottom sediments were analyzed for "Extracted Compounds," "Organochlorine Pesticides,", and "Trace Elements" (left column, Tables 1 – 3). Additional samples were collected and analyzed for other parameters, including (but not limited to) water hardness, pH, temperature, and amounts of dissolved and suspended sediments (1).

A variety of chemicals were detected in both the suspended and bottom sediments in the New River. For each class of chemical measured (extracted compounds, organochlorine pesticides, trace elements), the concentrations of the chemical in both the suspended sediment and the bottom sediment at each sampling location are compared (Tables 1 – 3). Briefly, these results are:

- Nine extracted chemicals were detected in suspended sediments, and 36 were detected in bottom sediments out of a total of 64 target compounds.

- Eight organochlorine pesticides were detected in suspended sediments, and nine were detected in bottom sediments out of a total of 32 target compounds

- Thirty trace metals were detected out of 32 total target trace metals in suspended sediments

- Thirty nine trace metals were detected out of 47 total target trace metals in bottom sediments

Another factor to consider in evaluating environmental contamination is whether the chemical in question occurs naturally, and at what levels. The organic chemicals detected in the New River are virtually all man-made, and therefore, there would be no naturally occurring background level. Many of the trace elements, however, do occur naturally in soils and in ground and surface water. If a trace element is found at a site at a concentration comparable to that of background concentrations of that element, then it becomes difficult to determine whether that element occurs as a result of contamination, or as a result of naturally occurring processes, or both. Only if the concentration greatly exceeds background levels does it become more likely that the element is present as a result of contamination. Because the source of the New River is the Colorado River, the background levels of trace elements in the New River are estimated from the concentration of that element in the Colorado River at the International Boundary (8).

DISCUSSION

Pathways Analysis

For a target population to be exposed to environmental contamination, there must be a mechanism by which that contamination comes into direct contact with the target population. An exposure pathway is the description of this mechanism. A completed exposure pathway consists of five parts: a source of contamination; an environmental medium and transport mechanism; a point of exposure; a route of exposure; and a receptor population.

Exposure pathways are classified as completed, potential, or eliminated. A completed exposure pathway is one in which all five elements of the pathway are present. A pathway is a potential pathway if one or more elements of the pathway are missing, but might be present later. It may also be described as a potential pathway if information on one of the elements of the pathway is missing. An eliminated pathway is one in which one or more of the elements is missing and will not be complete in the future. For a population to be exposed to an environmental contaminant, a completed exposure pathway (all five elements) must be present. If any one or more of these elements is missing, then there is no

exposure, though the presence of contamination may still be significant and require remediation. This is especially true if there is a possibility of an incomplete exposure pathway becoming complete in the future.

Completed Exposure Pathways

CDHS evaluated one complete exposure pathway (Table 6), that of the receptor population exposed to suspended and bottom sediments during play activities such as swimming, wading, or fishing. In the site visits discussed above, no one was observed actually in the water. However, this has been reported in the past. Thus, CDHS considers this as a completed pathway. In such a scenario, exposure to contamination in the sediment occurs through incidental ingestion of small amounts of river water (along with suspended sediment). Incidental ingestion is that which occurs during other activities (e.g., swallowing small amount of water (the incidental exposure) while swimming). People could also be exposed to contamination through dermal absorption of contamination in both suspended and bottom sediments.

The receptor population is divided into three sub-groups, adults (greater than 18 years old), children (1 – 11 years old), and infants (up to 1 year old). However, only two of these sub-groups are relevant here, adults and children. It is highly unlikely that infants would engage in play activities in the New River. Default assumptions regarding these sub-groups are listed in Table 7.

Eliminated Exposure Pathways

CDHS also considered the possibility of other routes of exposure to suspended sediments in the New River, such as the use of the New River as a primary source of drinking water. It was felt that anyone using the river for drinking water purposes would filter the water, or at least let the water sit to allow any suspended sediments to settle, before drinking the water. Thus, CDHS did not consider the use of the New River as a source of drinking water as a pathway of exposure to contaminants in suspended or bottom sediments.

Samples of foam which blow from the New River to surrounding areas were not analyzed in this study. However, the foam has been analyzed in past studies. Those analyses did not detect any chemical contamination in the foam. Therefore, though the foam was not analyzed in this study, CDHS eliminated this as an exposure pathway. The foam has been shown to contain bacterial contamination, and therefore, contact with the foam is still to be avoided.

Public Health Implications

Non-Cancer Adverse Health Effects

In order to assess the potential health effects of environmental contamination on a nearby population, one must first identify those contaminants which are present at high enough

concentration to possibly cause adverse health effects. Those contaminants so identified are called contaminants of concern. In this document, contaminants of concern are identified as described below.

Chemicals with similar non-cancer toxicological effects were evaluated as a group according to the following procedure: The hazard quotient was calculated for each chemical. The hazard quotient is the ratio of the actual dose of the chemical to the Minimum Risk Level (MRL) or Reference Dose (RfD) for that chemical. If the hazard quotient is greater than one, then there is a potential for adverse health effects. If the hazard quotient is less than or equal to one, then adverse health effects are considered unlikely. Once the hazard quotient is calculated for each detected chemical, then the hazard quotient for each chemical with a similar toxicological end point (neurological effects, kidney or liver toxicity, etc.) is added together to create a hazard index. If the hazard index is greater than one, even if the hazard quotients of the individual chemicals are less than one, then the combined effect of all of the chemicals may be likely to cause adverse health effects. If the hazard index is less than or equal to one, then adverse health effects are considered unlikely, and these chemicals are not considered further. If only one chemical causing a particular effect is detected, then that chemical is evaluated individually (9).

The total dose is defined as the sum of the oral dose of the chemical and the dermal dose (described below) of the chemical. The MRL or RfD is the dose of a chemical, calculated by ATSDR and the US EPA, respectively, below which a person exposed at these levels would be unlikely to suffer adverse health effects. These reference doses have uncertainty factors built into them to account for several factors, including, but not limited to the extrapolation of conclusions from animals studies to humans, and for the variability in the human population.

MRLs and RfDs may be calculated for oral or inhalation exposures. Inhalation exposures will not be considered here. MRLs are classified as either acute, intermediate, or chronic. An acute MRL is the dose of a chemical to which a person could be exposed for a up to 14 days; intermediate MRLs for exposures of between 15 and 364 days; and chronic MRL for exposures of greater than 365 days. An RfD, by definition, is a chronic exposure dose. In this document, chronic MRLs or RfDs are used to calculate hazard quotients and hazard indices. Exceptions to this include dioctyl phthalate, napthalene, *p*-cresol, *p*-dichlorobenzene, and vanadium. These are chemicals for which chronic MRLs or RfDs were not available. Therefore, acute or intermediate MRLs were used.

The oral dose of a chemical which is found in the sediment is calculated from the concentration of the chemical in the sediment (mg chemical / kg sediment) and the amount of sediment per liter of river water (mg sediment / liter water). This provides an equivalent concentration of chemical per liter of river water (mg/L), from which an oral dose, based upon incidental ingestion of suspended sediment in river water, may be calculated.

The direct contact of a chemical with the skin (dermal contact) can also lead to exposure to that chemical (dermal exposure). Whether dermal contact leads to dermal exposure depends upon many factors. These include the medium in which the chemical is found (soil, water), the concentration of the chemical in the medium, the surface area of the body which is exposed to the chemical, the part of the body exposed, the length of time the chemical is in contact with the skin, and the ability of the chemical to penetrate the skin. In the case of contaminated soil or sediment in contact with the skin, one must also consider the physical process of the chemical moving from the soil or sediment particle to the skin, and remaining in contact with the skin long enough to penetrate the skin.

In this document, dermal exposures to chemicals in soils or sediments are estimated by assuming that approximately 30% of the skin surface area is exposed (Table 5), that 1 mg/cm^2 of sediment sticks to the exposed skin, and that the sediment remains in contact with the skin long enough for a fraction of the chemical (Table 8) in the sediment to transfer to the skin, where it is absorbed by the body (10,11).

Child Health Initiative

An additional consideration in evaluating adverse health effects is the effect of a chemical on children. Because children are not little adults, their bodies are not fully developed, and may not respond to a specific chemical in the same manner as an adult. Depending upon their age and the chemical, they may be more sensitive to a chemical's effects than an adult. However, very few chemicals have been evaluated for toxicity in children.

To accommodate this lack of information regarding toxicity in children when evaluating non-cancer adverse health effects, an additional uncertainty factor will be applied to the reference. Language in the "Food Quality Protection Act of 1996" and the National Academy of Sciences "Pesticides in the Diet of Infants and Children," indicates that an "... additional safety factor of up to ten-fold, if necessary, to account for uncertainty in data relative to children" may be used (12). CDHS opted to be very conservative, and used 10 as the additional uncertainty factor. Therefore, when evaluating children exposed to chemical contamination, those chemicals or groups of chemicals with hazard quotients or indices greater than 0.1 will be evaluated for non-cancer adverse health effects. It should be noted, however, that the decision to use 10 rather than a lesser value is a somewhat arbitrary decision, and that one could have chosen a value of 3 or 5 instead of 10. This will be taken into account when evaluating the non-cancer adverse health effects of those chemicals or groups of chemicals with a hazard quotient/index of between 0.1 and 1.

Carcinogenic Adverse Health Effects

To evaluate the cancer risk posed by some chemicals, the increased lifetime cancer risk was calculated. This risk is called an increased risk because the value that is calculated represents an increase in the number of expected cases of cancer over and above the normal background cancer rate in the general population of 1 in 4 (25%, or 250,000 cancers per

1,000,000 people). Thus, an increased lifetime cancer risk of 1 in one million (or 1×10^{-6}) means that in 1,000,000 people, 250,001 cases of cancer would be expected, with only 1 case being caused by the chemical exposure.

The increased lifetime cancer risk is calculated from the oral slope factor for that chemical. The oral slope factor, in turn, is calculated from the slope of the dose-response curve for the chemical in question. The increased lifetime cancer risk from exposure to a given chemical is calculated by multiplying the daily dose of the chemical by the oral slope factor. The total increased lifetime cancer risk is calculated by adding together the cancer risk for the individual chemicals. If the total increased lifetime cancer risk is less than 1×10^{-6}, then it is considered to be an insignificant increased risk, and will not be considered further.

Limitations of Toxicological Evaluation

One problem frequently encountered during the evaluation process is that of incomplete data. Only a relatively few chemicals of the many thousands of commonly used industrial chemicals have been thoroughly evaluated for toxicity. For most chemicals, there are data gaps. For example, there may be information available on the non-cancer health effects of a particular chemical, but no information available on its potential for carcinogenicity. Or, there may be information regarding the toxicity of a chemical at high levels of exposure for short periods of time, but little information on the effects of long term exposure at low levels. In such situations, the health implications of exposure to these chemicals cannot be fully addressed.

Toxicological Evaluation of Completed Exposure Pathways

CDHS has identified one completed exposure pathway, that of the receptor population exposed to chemical contamination in New River sediments through incidental ingestion of suspended sediment during play activities in the New River, and through dermal exposure to contaminants in the bottom sediments. The toxicological evaluation of this pathway will evaluate the two relevant sub-groups, adults and children, separately.

In evaluating exposure pathways, CDHS deliberately uses assumptions regarding issues such as body weight and ingestion rate that yield worst-case scenarios (Table 5). By doing so, one can be more certain that if a chemical is present at less than a comparison value (either a concentration of a chemical in a medium, or a reference dosage), then the risk of adverse health effects will be unlikely. Should a chemical be present at a level which exceeds its comparison value, then it must be evaluated more thoroughly to determine the potential for adverse health effects.

The discussion below concerning potential adverse health effects of contamination measured in the first sampling effort are based upon both incidental ingestion of suspended sediments and dermal absorption of contamination in bottom sediments, for all three

classes of contamination (extracted compounds, organo-chlorine pesticides, and trace elements). However, during the second sampling effort, only bottom sediments were analyzed, and only for extracted compounds and organo-chlorine pesticides: bottom sediments were not analyzed for trace elements, and suspended sediments were not analyzed at all. Thus, an evaluation of potential adverse health effects, based upon data from the second sampling effort, will underestimate the potential.

Toxicological Evaluation of Receptor Population Playing in the New River – Adults

In evaluating non-cancer adverse health effects on adults playing in the New River, CDHS assumes that the adult weights 70 kg (approximately 154 pounds), is exposed to New River every day, and when that exposure occurs, incidentally ingests about 50 mL of water with suspended sediment, that approximately 5500 cm^2 of his or her skin surface area is exposed to bottom sediments, and that approximately 1 mg/cm^2 of sediment sticks to the exposed skin.

Under this exposure pathway, for all three sampling locations during both sampling periods, no hazard index/hazard quotient exceeded 1. Thus, no non-cancer adverse health effects would be expected to occur in adults exposed during play activities to chemical contamination in the suspended and bottom sediments of the New River.

Under this exposure pathway for the first sampling effort, the total increased lifetime cancer risk due to exposure to chemical contamination in suspended and bottom sediments at all three sampling locations is approximately 1×10^{-5}, which is considered a very low increased risk. At Mexicali and Calexico, the primary contributors to this total are arsenic and total chlordane. At the Salton Sea, the primary contributors to this total are arsenic and beryllium..

Under this exposure pathway for the second sampling effort, the total increased lifetime cancer risk due to exposure to chemical contamination in suspended and bottom sediments is approximately 1×10^{-5} at Mexicali and Calexico, which is considered a very low increased risk. The primary contributors to that total are bis-2-ethylhexylphthalate, PCBs, and benzo-[a]-pyrene, benzo-[k]-fluoranthene, and benzo-[b]-fluoranthene, which fall under the general classification of polycyclic aromatic hydrocarbons (PAHs). At the Salton Sea, the total increased lifetime cancer risk is less than 1×10^{-6}, which is considered an insignificant increased risk.

However, as discussed above, these conclusions are based upon samples which were not analyzed for trace elements. Considering that in the first sampling effort, arsenic and beryllium were major contributors to the total increased lifetime cancer risk and are probably present in the sediments collected during the second sampling effort, CDHS feels that the increased lifetime cancer risks calculated for the second sampling effort underestimates the actual increased risk.

Arsenic

Arsenic is a naturally occurring element that is often found in surface and ground waters of California. Arsenic is used in some pesticides (10), but not as an active ingredient in any of the target pesticides determined in this water study. Arsenic is a Known Human Carcinogen (EPA Weight of Evidence Classification = A). Ingested arsenic is implicated in the development of skin cancer and in cancer of the bladder, liver, kidneys, and lungs (13–15).

During the first sampling effort, the background level of arsenic in bottom sediment was 5 mg/kg. Its background level in suspended sediment was also 5 mg/kg, which is equivalent to 2.8×10^{-3} mg/L. In the New River, the concentration of arsenic in bottom sediment is in the range of 2 – 6 mg/kg, which is comparable to background concentration. The concentration of arsenic in suspended sediment is in the range of 10 – 15 mg/kg, which is equivalent to approximately 1.3×10^{-4} mg/L – 2.4×10^{-4} µg/L, which are levels below background concentrations of arsenic in suspended sediments.

During the first sampling effort for adults exposed to arsenic in New River sediments through both incidental ingestion of suspended sediments and through dermal absorption from bottom sediments, the increased lifetime cancer risk is 7.1×10^{-6} at Mexicali, 5.0×10^{-6} at Calexico, and 5.3×10^{-6} at the Salton Sea. Trace elements were not measured in bottom sediment samples collected during the second sampling effort, and suspended sediment samples were not collected at all during the second sampling effort.

Beryllium

Beryllium-containing compounds occur as minor components of soils in the western United States. It is also an industrial metal. No specific organs have been identified as targets for ingested beryllium. However, beryllium is listed by the US Environmental Protection Agency as a Probable Human Carcinogen (Weight of Evidence Classification = B2). Beryllium compounds are known to cause lung cancer when inhaled. However, there is inadequate data to say for certain that ingested beryllium causes cancer in humans (14,16).

During the first sampling effort, the background level of beryllium in bottom sediment was 1 mg/kg. The background level of beryllium in suspended sediment was 1 mg/kg, which is equivalent to 5.6×10^{-4} mg/L of beryllium in river water. In the New River, no beryllium was detected in bottom sediments. In the New River, the concentration of beryllium in suspended sediments was in the range of 1 – 2 mg/kg, which is equivalent to 1.6×10^{-5} – 9.0×10^{-4} mg/kg . Trace elements were not measured in bottom sediment samples collected during the second sampling effort, and suspended sediments were not collected at all during the second sampling effort.

The increased lifetime cancer risk to adults, exposed to beryllium through both incidental ingestion of suspended sediments and dermal absorption from bottom sediments during the

first sampling effort, at Mexicali is 5×10^{-8}, which is an insignificant risk. At the Salton Sea, the increased lifetime cancer risk due to beryllium exposure is 3×10^{-4}, which is a very low increased risk.

Total Chlordane

Chlordane is a man-made pesticide used in the past to control of termites in the home, and other pests in agricultural fields, lawns, and gardens. However, its use has been banned in the United States since 1988. Chlordane is actually a mixture of chemicals, the primary constituents of which include *cis*-chlordane, *trans*-chlordane, *cis*-nonachlor, *trans*-nonachlor, and oxychlordane. In this document, the term total chlordane refers to the sum of the concentrations of these five chemicals. Chlordane is listed as a Probable Human Carcinogen (EPA Weight of Evidence category = B2). There is evidence that ingestion of chlordane causes liver tumors in animals. There is insufficient data to determine whether ingestion of chlordane causes cancer in humans (14,17).

Chlordane was detected during both sampling efforts, but only at the Mexicali and Calexico sampling stations. During the first sampling effort at Mexicali, the concentration of total chlordane in bottom sediment was 0.47 mg/kg, and the concentration in suspended sediment was 0.23 mg/kg, which is equivalent to a concentration in water of 3.6×10^{-6} mg/L.

For adults exposed to chlordane in New River sediments through both ingestion of suspended sediments and through dermal absorption of chlordane in bottom sediments, the total increased lifetime cancer risk due to exposure to total chlordane in the sediments of the New River is 2.4×10^{-6}. The total increased lifetime cancer risk due to exposure to total chlordane at the other locations was less than 1×10^{-6}, which is considered an insignificant increased risk.

Di (2-ethylhexyl) phthalate

Di (2-ethylhexyl) phthalate is a man-made chemical used to make plastic and vinyl products more flexible. This chemical is listed as a Probable Human Carcinogen (EPA Weight of Evidence category = B2). Animal studies show that bis-2-ethylhexylphthalate causes liver tumors. However, there is inadequate data to state that ingestion of di (2-ethylhexyl) phthalate causes cancer in humans (14,18)

Di (2-ethylhexyl) phthalate was detected in the first sampling effort only at the Salton Sea, but not at levels sufficient to cause a significant increase in the lifetime cancer risk. During the second sampling effort, it was detected in the bottom sediments at the Mexicali and Calexico sampling stations at concentrations of 13 mg/kg and 14 mg/kg, respectively. Suspended sediments were not sampled during the second sampling effort.

For adults exposed to di (2-ethylhexyl) phthalate in New River sediments through both ingestion of suspended sediments and through dermal absorption of di (2-ethylhexyl) phthalate in bottom sediments, the increased lifetime cancer risks for at Mexicali and Calexico are 1.4×10^{-6} and 1.5×10^{-6}, respectively. These are considered very low increased risks.

Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are man-made chemicals that were once widely used in a variety of products especially electrical components. They were produced in mixtures called Araclors. The manufacture of PCBs was halted in 1977 because of evidence of the harmful effects of these chemicals. PCBs are listed as a Probable Human Carcinogen (EPA Weight of Evidence category = B2). Animal studies show that PCBs cause liver cancer. There is inadequate data to state that ingestion of PCBs causes cancer in humans (14,19).

No PCBs were detected in samples collected during the first sampling effort. PCBs were detected during the second sampling effort in bottom sediments at Mexicali and Calexico at levels of 0.2 mg/kg and 0.15 mg/kg, respectively.

For adults exposed to PCBs in New River sediments through both ingestion of suspended sediments and dermal absorption from bottom sediments, the increased lifetime cancer risk at Mexicali and Calexico is 54.7×10^{-6} and 3.5×10^{-6}, respectively.

Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs) are a class of chemical produced through the incomplete burning of fossil fuels. They are also found in crude oil, coal, coal tar pitch, creosote, and roofing tars. PAHs typically occur as mixtures rather than individual compounds. The carcinogenicity of different PAHs range from Probable Human Carcinogen (EPA Weight of Evidence category = B2) to Not Classifiable as a Human Carcinogen (EPA Weight of Evidence category = D) (14,20).

No PAHs were detected during the first sampling effort. During the second sampling effort, PAHs were detected at significant levels only at Mexicali and Calexico. Benz[a]pyrene was detected in the bottom sediment at Mexicali at a concentration of 0.062 mg/kg. At Calexico, benzo[a]pyrene, benzo[k]fluoranthene, and benzo[b]fluoranthene were detected in bottom sediment at levels of 0.16, 0.15, and 0.19 mg/kg, respectively.

For adults exposed to PAHs in New River sediments through both incidental ingestion of suspended sediments and dermal absorption from bottom sediments at Mexicali, the total increased lifetime cancer risk due to exposure to benzo[a]pyrene is 5.3×10^{-6}, which is a very low increased risk. For these same adults at Calexico, the total increased lifetime cancer risk due to exposure to benzo[a]pyrene, benzo[k]fluoranthene, and benzo[b]fluoranthene is 1.4×10^{-5}, 1.3×10^{-6}, and 1.6×10^{-6}, respectively. The increased lifetime cancer risk for benzo[a]pyrene is considered a low increased risk, whereas the

increased lifetime cancer risk for the other two compounds is considered a very low increased risk.

Toxicological Evaluation of Receptor Population Playing in the New River –Children

In evaluating non-cancer adverse health effects on children playing in the New River, CDHS assumes that the child weighs 30 kg (approximately 66 pounds), plays in the New River every day, and that during such play activities, incidentally ingests approximately 100 mL of water with suspended sediments, that approximately 2625 cm^2 of skin is exposed to bottom sediments, and that approximately 1 mg/cm^2 of sediment sticks to the exposed skin.

For samples collected during the first sampling effort, at all three sampling locations, no hazard index/hazard quotient exceeded 0.1. Thus, non-cancer adverse health effects would not be expected to occur in children due to exposure to chemical contamination in the suspended and bottom sediments of the New River.

For samples collected during the second sampling effort at Calexico and the Salton Sea, no hazard index/hazard quotient exceeded 0.1. Thus, non-cancer adverse health effects would not be expected to occur in children due to exposure to chemical contamination in the bottom sediments at Calexico and the Salton Sea. However, suspended sediments were not sampled during this second sampling effort. At Mexicali, only polychlorinated biphenyls exceeded a hazard index of 0.1.

Polychlorinated Biphenyls

Background information on PCBs has been given above. In addition to their potential for carcinogenicity, ingestion of PCBs over a long period of time has been shown to have adverse effects on the immune system (14,20)

PCBs were detected in the bottom sediment at Mexicali at a level of 0.2 mg/kg which leads to a total dose of 2.6×10^{-6} mg/kg/day. The hazard quotient for PCBs based on this concentration in the bottom sediment is 0.13.

The total dose of PCBs is approximately 2000 times lower than the lowest dose shown to cause adverse health effects in studies on monkeys. Therefore, adverse health effects would be unlikely to occur in children exposed to PCBs through dermal absorption from bottom sediments.

CONCLUSIONS

The suspended and bottom sediments of the New River contain a variety of organic and trace element contaminants. However, adults who may be exposed to these contaminants through incidental ingestion of suspended sediments or through dermal absorption of contaminants in bottom sediments do not appear to be at risk for non-cancer adverse health effects. For these adults, there is a low increase in the lifetime cancer risk.

For children who may be exposed in the same manner, only PCBs in bottom sediment exceeds the hazard index of 0.1, but the total dose is far below that dose which was demonstrated to cause adverse health effects in animals. Thus, this exposure is unlikely to cause adverse health effects in children.

There are three caveats to these conclusions, however. The first is that during the second sampling effort, suspended sediments were not sampled at all, and bottom sediment samples were not analyzed for trace elements. Thus, an evaluation of health effects based upon data from the second sampling effort will underestimate the potential for adverse effects due to the lack of data. The second is that there are fluctuations over time in the concentration of some pollutants (e.g., PAHs, PCBs). Thus, the potential for adverse health effects may be underestimated if samples were collected during a period when the concentrations of these pollutants are low. The third is that several chemicals were detected in New River sediments for which no toxicological information is available. Thus, once again, the potential for adverse health effects may be underestimated.

Based upon the data available at the time this health consultation was written, CDHS concludes that exposure to contamination in the New River resulting from ingestion of suspended sediments and through dermal absorption of contaminants from bottom sediments does pose a Public Health Hazard (ATSDR Hazard Category B). This threat is primarily that of an increased risk for cancer in adults. CDHS will review any new data as they become available, and may re-evaluate these conclusions if indicated by such a review.

PUBLIC HEALTH RECOMMENDATIONS AND ACTIONS

The Public Health Recommendations and Action Plan (PHRAP) for this site contains a description of actions taken, to be taken, or under consideration by ATSDR and CDHS at and near the site. The purpose of the PHRAP is to ensure that this health consultation not only identifies public health hazards, but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. CDHS and ATSDR will follow-up on this plan to ensure that actions are carried out

Actions Completed

1. In April 1997, CDHS conducted an educational program designed to raise awareness of regional health care providers to issues regarding the New River.

2. CDHS has reviewed New River water column contamination data in another health consultation.

Work in Progress

1. Review of the fish data is in progress, and a health consultation based upon the results of this review will be written.

Recommendations for Further Action

1. A health consultation focusing on the Salton Sea should be undertaken to determine if there are any public health implications of chemical contamination in the water column, sediments, and fish.

2. Continue to cooperate in improving the health of residents of the New River area, including an examination of issues related to agricultural runoff, the *maquiladoras*, and water and sewage treatment facilities.

3. Continue to educate area residents on their respective sides of the border concerning the dangers of any contact with the New River, or biota from the river.

4. Ensure that fences, signs, or other means of discouraging or preventing access to the New River are put into place and maintained.

5. Continue to monitor water quality and chemical contamination issues in the New River and the Salton Sea.

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CERTIFICATION

The Examination of Contamination in the Suspended Sediments of the New River Health Consultation was prepared by the California Department of Health Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.

Chief, SPS, SSAB, DHAC, ATSDR

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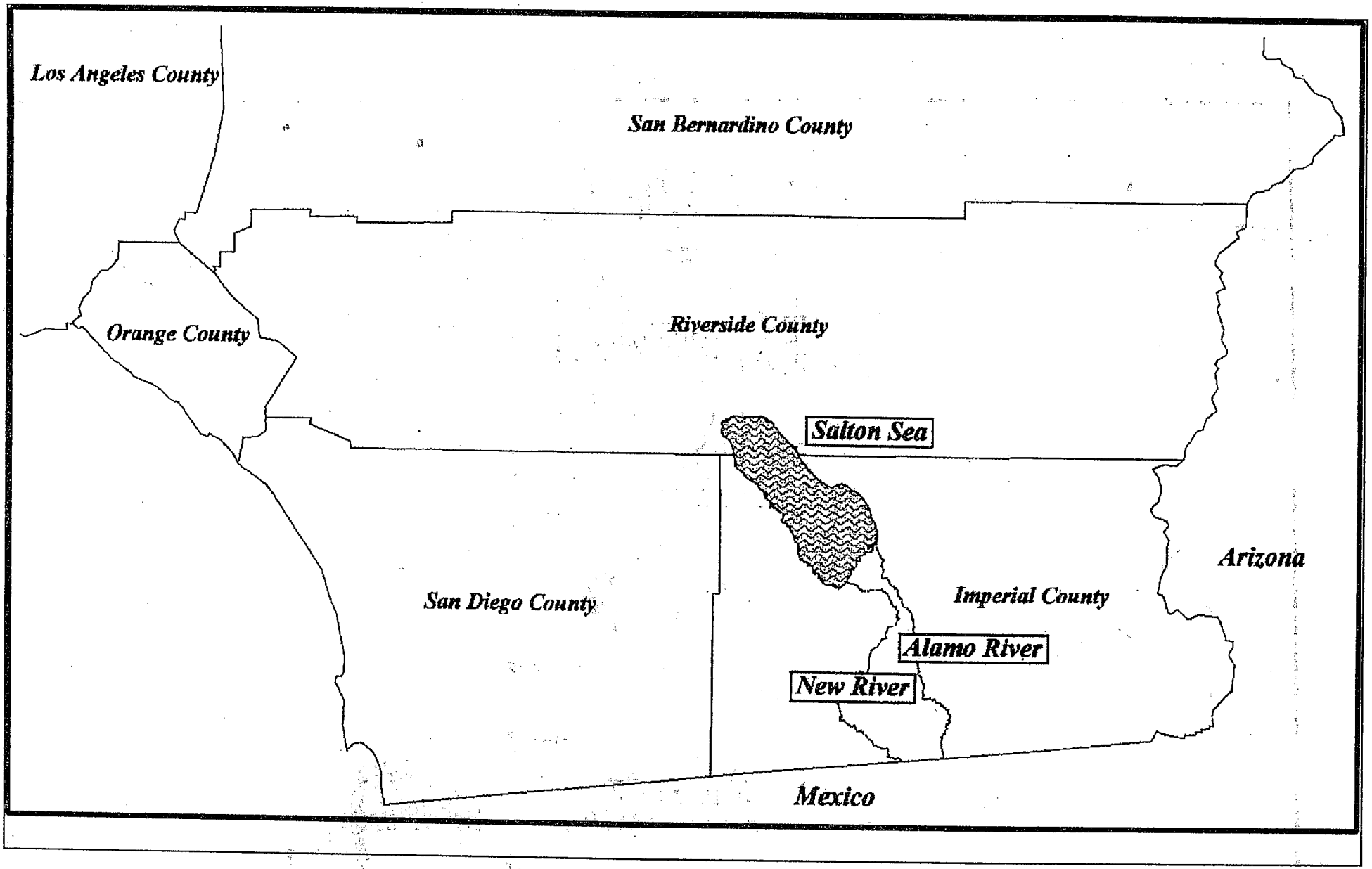

Figure 1. Southern California showing location of Imperial County, the New River, and the Salton Sea.

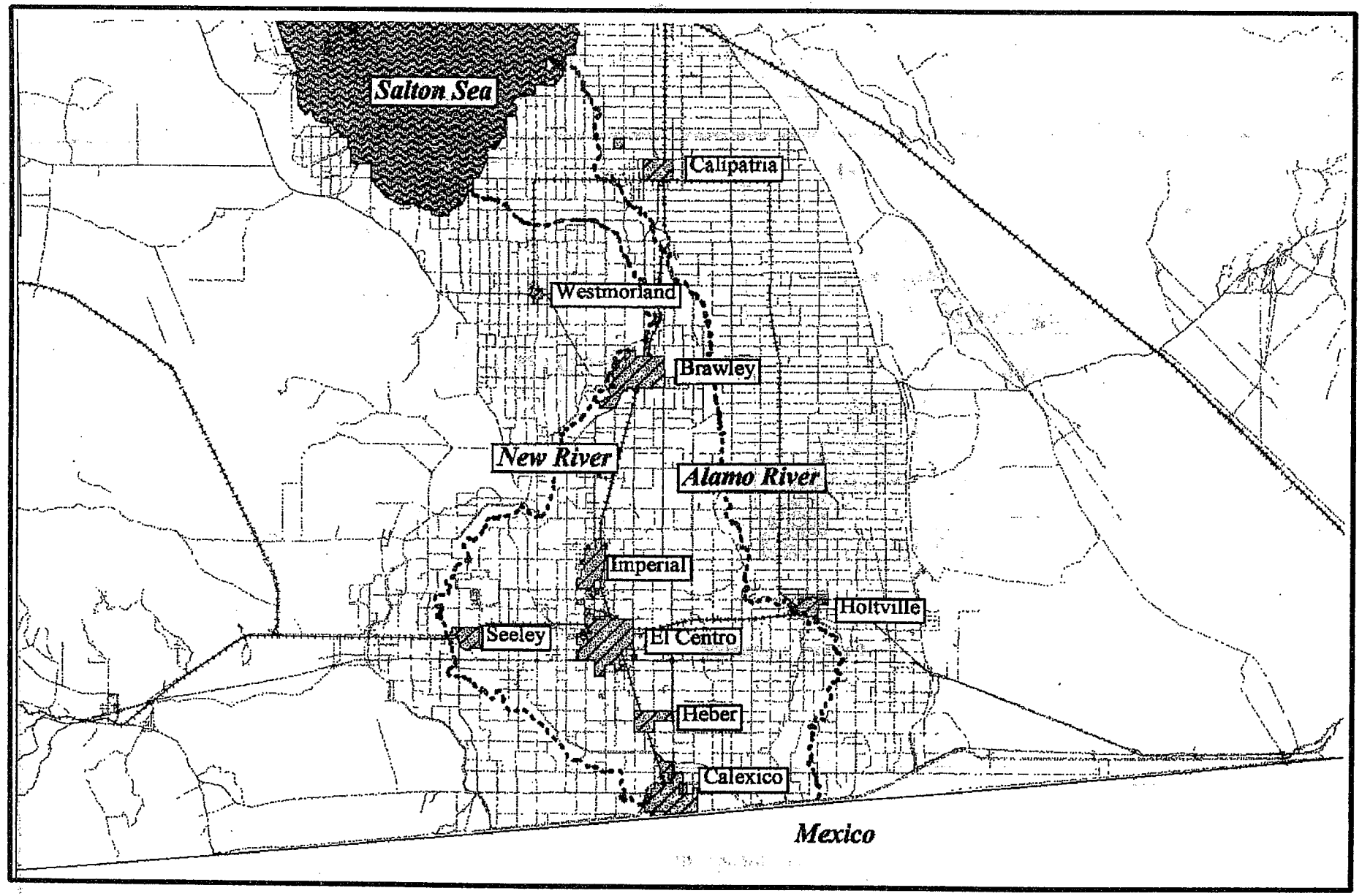

Figure 2. South central Imperial County showing location of the New River, the Salton Sea, and principle towns and Cities.

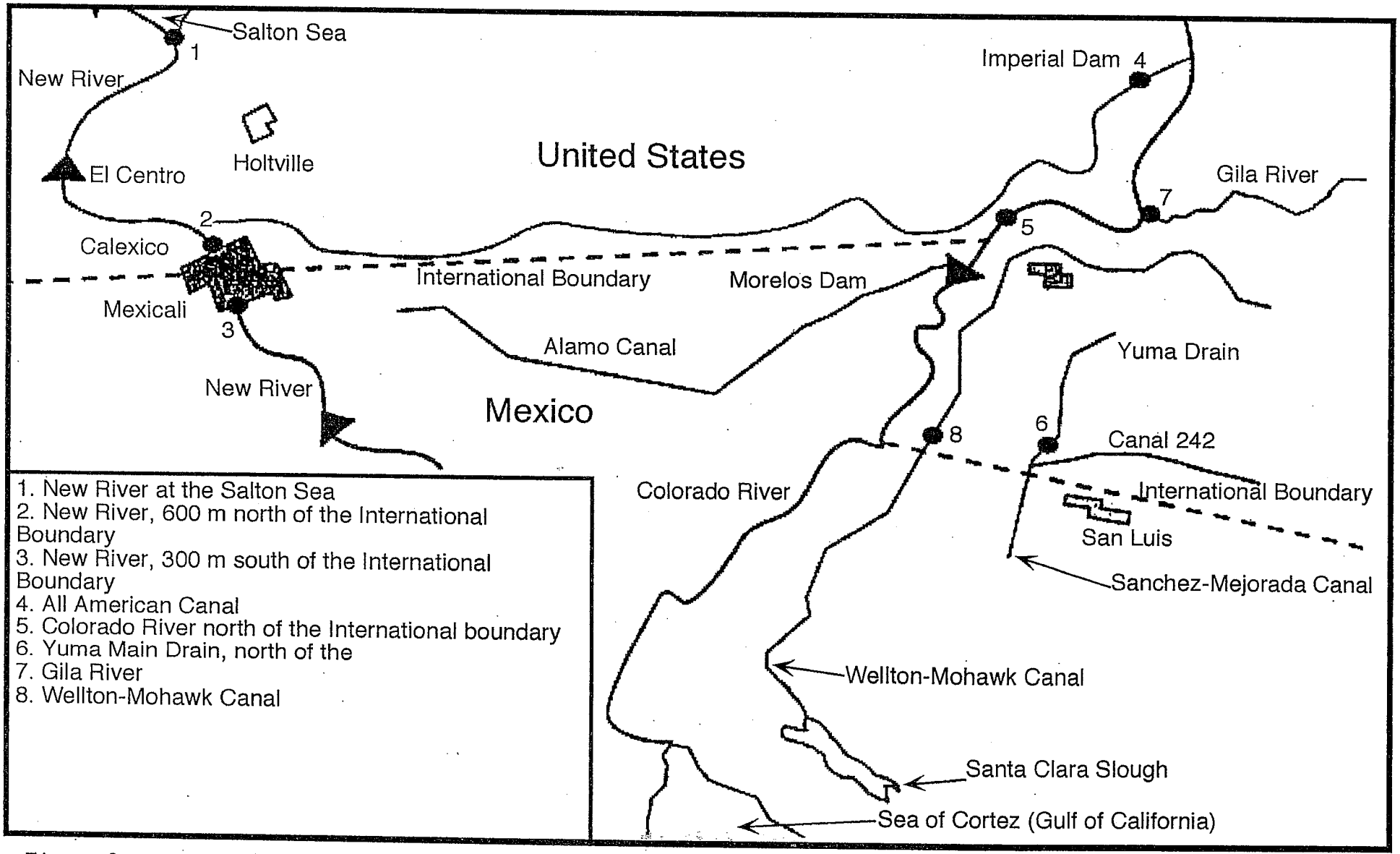

Figure 3. Map of US/Mexico border zone showing sampling locations.

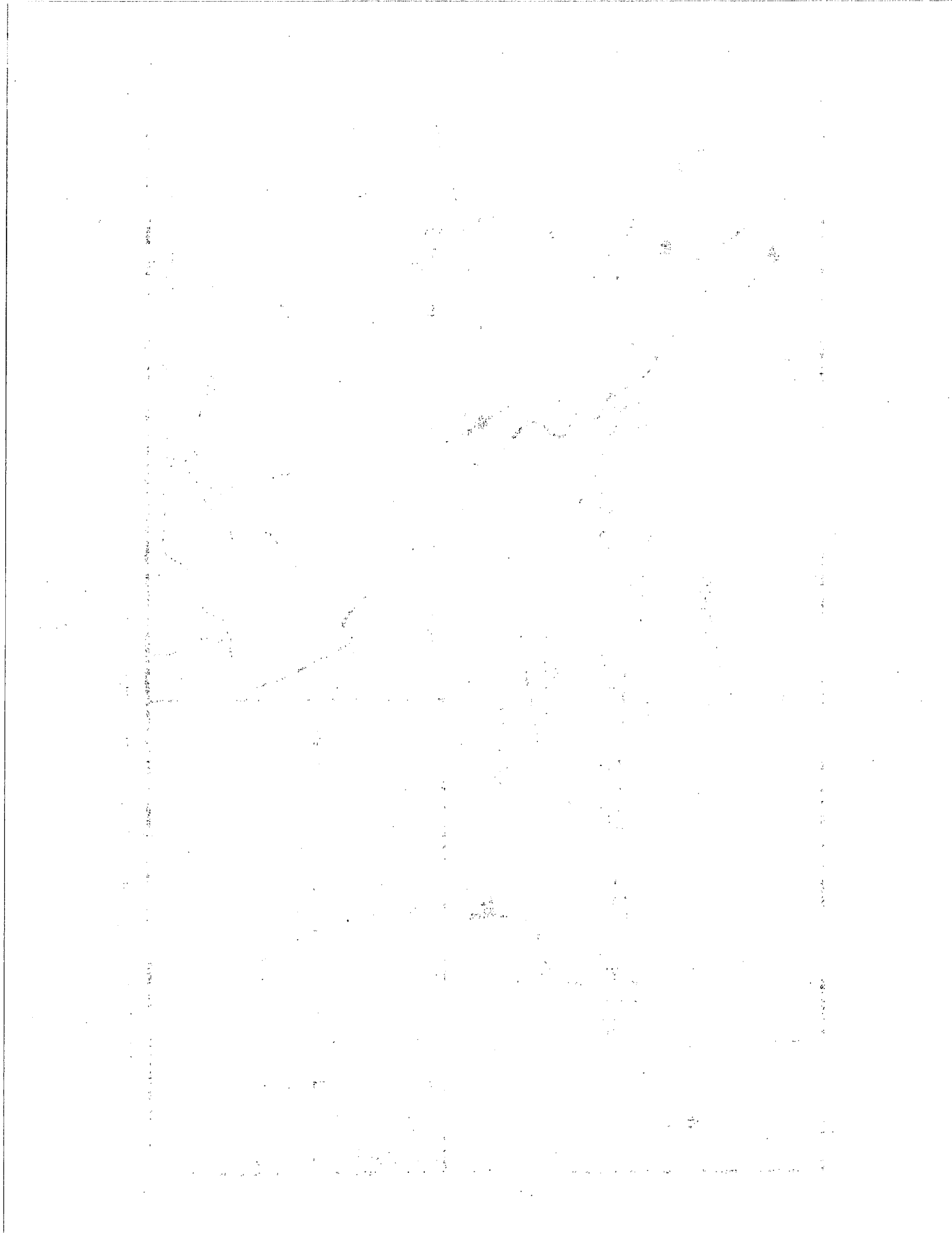

Table 1. List of Extracted Compounds (Left column) and that Chemical's Concentration in Suspended and Bottom Sediments at Each Sampling Location.

Compound	New River Mexicali SUSPEND SEDIMENT	New River Mexicali BOTTOM SEDIMENT	New River Calexico SUSPEND SEDIMENT	New River Calexico BOTTOM SEDIMENT	New River Salton SUSPEND SEDIMENT	New River Salton Sea BOTTOM SEDIMENT
Date	03/28/95	03/28/95	03/25/95	03/25/95	03/22/95	03/22/95
Hexachlorobenzene (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Dibutylphthalate (ug/Kg)	n.d.	95	n.d.	87	210	E38.0
Dioctylphthalate (ug/Kg)	7300	450	5600	150	n.d.	n.d.
Diethylphthalate (ug/Kg)	n.d.	E15.0	n.d.	E13.0	n.d.	n.d.
Dimethylphthalate (ug/Kg)	n.d.	E18.0	n.d.	n.d.	n.d.	n.d.
Pyrene (ug/Kg)	n.d.	170	n.d.	220	n.d.	n.d.
Pyrene,1-methyl (ug/Kg)	n.d.	52	n.d.	E49.0	n.d.	n.d.
Benzo-a-pyrene (ug/Kg)	n.d.	n.d.	n.d.	89	n.d.	n.d.
Indeno-1,2,3-cd-pyrene (ug/Kg)	n.d.	n.d.	n.d.	110	n.d.	n.d.
2,2'-biquinoline (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Quinoline (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Phenanthridine (ug/Kg)	n.d.	n.d.	n.d.	E18.0	n.d.	n.d.
Isoquinoline (ug/Kg)	n.d.	n.d.	n.d.	E21.0	n.d.	n.d.
Toluene,2,4-dinitro (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Toluene,2,6-dinitro (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzo-k-fluoranthene (ug/Kg)	n.d.	87	n.d.	92	n.d.	n.d.
9H-fluorene,1-methyl (ug/Kg)	n.d.	60	n.d.	E19.0	n.d.	n.d.
9H-fluorene (ug/Kg)	n.d.	E17.0	n.d.	E11.0	n.d.	n.d.
Isophorone (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Methane, 2-chloroethoxy (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Naphthalene (ug/Kg)	n.d.	E18.0	n.d.	E25.0	n.d.	n.d.
Naphthalene, 1,2-dimethyl (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Naphthalene, 1,6-dimethyl (ug/Kg)	n.d.	99	n.d.	E27.0	n.d.	n.d.
Naphthalene, 2,3,6-trimethyl	n.d.	74	n.d.	E18.0	n.d.	n.d.
Naphthalene, 2,6-dimethyl (ug/Kg)	830	210	1800	76	120	n.d.
Naphthalene, 2-chloro (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzo(g,h,I)perylene (ug/Kg)	n.d.	n.d.	n.d.	61	n.d.	n.d.
Phenanthrene (ug/Kg)	n.d.	87	n.d.	110	n.d.	n.d.
Phenanthrene, 1-methyl (ug/Kg)	n.d.	150	n.d.	61	n.d.	n.d.
4-Hcypenphenanthrene (ug/Kg)	n.d.	n.d.	n.d.	E44.0	n.d.	n.d.
Phenol (ug/Kg)	1100	E27.0	1300	E16.0	E30.0	E6.0
3,5-Xylenol (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
m-Cresol, 4-chloro (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Phenol, C8-alkyl (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Phthalate, bis-2-ethylhexyl (ug/Kg)	n.d.	1800	n.d.	1700	3600	130
Phthalate, butylbenzyl (ug/Kg)	n.d.	120	n.d.	97	100	E37.0
Acenaphthylene (ug/Kg)	n.d.	n.d.	n.d.	E8.0	n.d.	n.d.
Acenaphthene (ug/Kg)	n.d.	n.d.	n.d.	E7.0	n.d.	n.d.
Acridine (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Dipropylamine, n-nitroso (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Diphenylamine, n-nitroso (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Anthracene (ug/Kg)	n.d.	E34.0	n.d.	E24.0	n.d.	n.d.
Anthracene,2-methyl (ug/Kg)	n.d.	120	n.d.	E35.0	n.d.	n.d.
Benz-a-anthracene (ug/Kg)	n.d.	84	n.d.	110	n.d.	n.d.
9,10-Anthraquinone (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzene, 1,2,4-trichloro (ug/Kg)	n.d.	n.d.	n.d.	E28.0	n.d.	n.d.
Benzene, o-dichloro (ug/Kg)	n.d.	E6.0	n.d.	E21.0	n.d.	n.d.
Benzene, m-dichloro (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzene, p-dichloro (ug/Kg)	n.d.	160	n.d.	86	n.d.	n.d.
Azobenzene (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

Nitrobenzene (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzene, pentachloronitro (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Carbazole (ug/Kg)	n.d.	n.d.	n.d.	E18.0	n.d.	n.d.
Chrysene (ug/Kg)	n.d.	110	n.d.	120	E49.0	n.d.
p-Cresol (ug/Kg)	n.d.	n.d.	430	300	81	n.d.
Thiophene, dibenzo (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
4-Bromophenylphenylether (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
4-Chlorophenylphenylether (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzo-b-fluoranthene (ug/Kg)	n.d.	90	n.d.	89	n.d.	n.d.
Pentachloroanisole (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Dibenz-(a,h)-anthracene (ug/Kg)	n.d.	n.d.	320	n.d.	n.d.	n.d.
Fluoranthene (ug/Kg)	n.d.	150	n.d.	220	n.d.	n.d.
Phenol, 2-chloro (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzocinnoline (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

n.d. = Not Detected

Table 2. List of Organo-Chlorine Pesticides (Left column) and that Chemical's Concentration in Suspended and Bottom Sediments at Each Sampling Location.

Compound	New River Mexicali SUSPENDED SEDIMENT	New River Mexicali BOTTOM SEDIMENT	New River Calexico SUSPENDED SEDIMENT	New River Calexico BOTTOM SEDIMENT	New River Salton Sea SUSPENDED SEDIMENT	New River Salton BOTTOM SEDIMENT
Date	03/28/95	03/28/95	03/25/95	03/25/95	03/22/95	03/22/95
cis-Nonachlor (ug/Kg)	E21.0	E1.2	n.d.	n.d.	n.d.	n.d.
trans-Nonachlor (ug/Kg)	62	4.1	n.d.	1.6	n.d.	n.d.
Oxychlordane (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Aldrin (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
cis-Chlordane (ug/Kg)	69	5.1	E20	1.9	n.d.	n.d.
trans-Chlordane (ug/Kg)	75	5.4	n.d.	2	n.d.	n.d.
Chloroneb (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
DCPA (ug/Kg)	n.d.	n.d.	n.d.	n.d.	32	n.d.
o,p'-DDD (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
p,p'-DDD (ug/Kg)	E120.0	E16.0	E25.0	n.d.	n.d.	n.d.
o,p'-DDE (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
p,p'-DDE (ug/Kg)	81	12	49	9.6	43	1.8
o,p'-DDT (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
p,p'-DDT (ug/Kg)	130	E25.0	n.d.	n.d.	4.8	n.d.
Dieldrin (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Endosulfan I (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Endrin (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Alpha BHC (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Beta BHC (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Heptachlor (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Heptachlor epoxide	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzene, hexachloro	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Isodrin (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Lindane (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
p,p'-Methoxychlor (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
o,p'-Methoxychlor (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Mirex (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
cis-Permethrin (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
trans-Permethrin (ug/Kg)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Toxaphene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
PCB	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Pentachloroanisole	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

n.d. = Not Detected

Table 3. List of Trace Elements (Left column) and that Chemical's Concentration in Suspended and Bottom Sediments at Each Sampling Location.

Compound	New River Mexicali SUSPENDED SEDIMENT	New River Mexicali BOTTOM SEDIMENT	New River Calexico SUSPENDED SEDIMENT	New River Calexico BOTTOM SEDIMENT	New River Salton Sea SUSPENDED SEDIMENT	New River Salton BOTTOM SEDIMENT
Date	03/28/95	03/28/95	03/25/95	03/25/95	03/22/95	03/22/95
Aluminum (Percent)	6	4.3	1.8	3.7	7.9	4.2
Antimony (ug/g)	1.1	1	0.7	2	0.8	1
Arsenic (ug/g)	15	5.8	10	4.1	11	2.3
Barium (ug/g)	420	560	180	570	500	840
Beryllium (ug/g)	1	n.d.	n.d.	n.d.	2	n.d.
Bismuth (ug/g)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Cadmium (ug/g)	1.3	0.4	1.7	0.3	0.56	0.1
Calcium (ug/g)	4.1	3.2	1.8	2.5	7.9	2.2
Cerium (ug/g)	NA	30	NA	22	NA	21
Chromium (ug/g)	97	36	67	20	100	9
Cobalt (ug/g)	NA	13	NA	5	NA	2
Copper (ug/g)	120	560	89	570	38	840
Europium (ug/g)	NA	n.d.	NA	n.d.	NA	n.d.
Gallium (ug/g)	NA	9	NA	7	NA	8
Gold (ug/g)	NA	n.d.	NA	n.d.	NA	n.d.
Holmium (ug/g)	NA	n.d.	NA	n.d.	NA	n.d.
Iron (Percent)	3.2	1.6	1.1	0.93	3.4	0.55
Lanthanum (ug/g)	NA	18	NA	14	NA	12
Lead (ug/g)	52	45	70	43	27	9
Lithium (ug/g)	NA	20	NA	20	NA	8
Magnesium (ug/g)	1.5	0.77	2	0.47	1.9	0.23
Manganese (ug/g)	940	340	620	210	780	270
Mercury (ug/g)	NA	0.35	NA	n.d.	NA	n.d.
Molybdenum (ug/g)	7.5	2	5.7	n.d.	4.6	n.d.
Neodymium (ug/g)	21	13	6	9	28	9
Nickel (ug/g)	200	51	150	14	53	5
Niobium (ug/g)	6	4	n.d.	n.d.	10	n.d.
Phosporus (Percent)	0.92	0.09	6.5	0.09	0.2	0.05
Potassium (Percent)	1.7	1.7	2.4	1.7	2.1	1.5
Scandium (ug/g)	9	4	2	2	11	n.d.
Selenium (ug/g)	NA	1.2	NA	1.2	NA	0.2
Silver (ug/g)	0.6	0.9	3.3	0.5	0.42	n.d.
Sodium (Percent)	0.55	0.92	0.41	0.94	0.55	1.4
Strontium (ug/g)	360	230	240	210	320	290
Sulfur (ug/g)	NA	0.32	NA	0.22	NA	n.d.
Tantalum (ug/g)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Thorium (ug/g)	8.4	4.9	2.2	3.6	12	2.4
Tin (ug/g)	NA	n.d.	NA	n.d.	NA	n.d.
Uranium (ug/g)	3.1	1.9	1.4	1.6	3.5	0.77
Vanadium (ug/g)	79	38	22	21	100	11
Yttrium (ug/g)	15	10	4	7	21	5
Ytterbium (ug/g)	2	1	n.d.	n.d.	2	n.d.
Zinc (ug/g)	350	120	250	81	120	26
Carbon-Organic (Percent)	NA	1.13	NA	0.68	NA	0.12
Carbon-Org+Inorg (Percent)	NA	n.d.	NA	n.d.	NA	n.d.
Carbon-Inorganic (Percent)	NA	0.71	NA	0.63	NA	0.33
Titanium (Percent)	0.24	0.18	0.06	0.11	0.32	0.07

NA = Not Analyzed
n.d. = Not Detected

Table 4. List of Organochlorine Pesticides (Left column) and that Chemical's Concentration in Bottom Sediments at Each Sampling Location for Samples Collected During the Second Sampling Effort.

Compound	New River Mexicali	New River Calexico	New River Salton Sea
	BOTTOM SEDIMENT	BOTTOM SEDIMENT	BOTTOM SEDIMENT
Date	04/11/96	04/10/96	04/09/96
Hexachlorobenzene (ug/Kg)			
Dibutylphthalate (ug/Kg)	110.0	110.0	87.0
Dioctylphthalate (ug/Kg)	E 600.0	E 750.0	E 41.0
Diethylphthalate (ug/Kg)	E 39.0	E 44.0	E 34.0
Dimethylphthalate (ug/Kg)	n.d.	n.d.	n.d.
Pyrene (ug/Kg)	100.0	290.0	E 35.0
Pyrene,1-methyl (ug/Kg)	E 46.0	67.0	E 20.0
Benzo-a-pyrene (ug/Kg)	62.0	160.0	n.d.
Indeno-1,2,3-cd-pyrene (ug/Kg)	n.d.	n.d.	n.d.
2,2'-biquinoline (ug/Kg)	n.d.	n.d.	E 41.0
Quinoline (ug/Kg)	n.d.	n.d.	n.d.
Phenanthridine (ug/Kg)	n.d.	n.d.	n.d.
Isoquinoline (ug/Kg)	E 23.0	n.d.	n.d.
Toluene,2,4-dinitro (ug/Kg)	n.d.	n.d.	n.d.
Toluene,2,6-dinitro (ug/Kg)	n.d.	n.d.	n.d.
Benzo-k-fluoranthene (ug/Kg)	53.0	150.0	n.d.
9H-fluorene,1-methyl (ug/Kg)	n.d.	E 44.0	n.d.
9H-fluorene (ug/Kg)	E 29.0	E 33.0	E 19.0
Isophorone (ug/Kg)	n.d.	n.d.	n.d.
Methane, 2-chloroethoxy (ug/Kg)	n.d.	n.d.	n.d.
Naphthalene (ug/Kg)	E 11.0	53.0	n.d.
Naphthalene, 1,2-dimethyl (ug/Kg)	E 31.0	E 29.0	n.d.
Naphthalene, 1,6-dimethyl (ug/Kg)	79.0	110.0	n.d.
Naphthalene, 2,3,6-trimethyl (ug/Kg)	58.0	62.0	n.d.
Naphthalene, 2,6-dimethyl (ug/Kg)	480.0	690.0	E 26.0
Naphthalene, 2-chloro (ug/Kg)	n.d.	n.d.	n.d.
Benzo(g,h,I)perylene (ug/Kg)	n.d.	n.d.	n.d.
Phenanthrene (ug/Kg)	58.0	278.0	E 15.0
Phenanthrene, 1-methyl (ug/Kg)	60.0	90.0	n.d.
4-Hcypenphenanthrene (ug/Kg)	n.d.	n.d.	n.d.
Phenol (ug/Kg)	E 25.0	E 24.0	E 10.0
3,5-Xylenol (ug/Kg)	n.d.	n.d.	n.d.
m-Cresol, 4-chloro (ug/Kg)	n.d.	n.d.	n.d.
Phenol, C8-alkyl (ug/Kg)	n.d.	n.d.	n.d.
Phthalate, bis-2-ethylhexyl (ug/Kg)	E 13000.0	E 14000.0	E 670.0
Phthalate, butylbenzyl (ug/Kg)	n.d.	100.0	51.0
Acenaphthylene (ug/Kg)	n.d.	E 49.0	n.d.
Acenaphthene (ug/Kg)	n.d.	E 21.0	n.d.
Acridine (ug/Kg)	n.d.	n.d.	n.d.
Dipropylamine, n-nitroso (ug/Kg)	n.d.	n.d.	n.d.
Diphenylamine, n-nitroso (ug/Kg)	n.d.	n.d.	n.d.
Anthracene (ug/Kg)	E 36.0	E 48.0	E 24.0
Anthracene,2-methyl (ug/Kg)	E 45.0	56.0	E 35.0
Benz-a-anthracene (ug/Kg)	E 37.0	110.0	E 17.0
9,10-Anthraquinone (ug/Kg)	n.d.	120.0	n.d.
Benzene, 1,2,4-trichloro (ug/Kg)	n.d.	n.d.	n.d.
Benzene, o-dichloro (ug/Kg)	n.d.	n.d.	n.d.
Benzene, m-dichloro (ug/Kg)	n.d.	n.d.	n.d.
Benzene, p-dichloro (ug/Kg)	n.d.	94.0	n.d.

Azobenzene (ug/Kg)	n.d.	n.d.	n.d.
Nitrobenzene (ug/Kg)	n.d.	n.d.	n.d.
Benzene, pentachloronitro (ug/Kg)	n.d.	n.d.	n.d.
Carbazole (ug/Kg)	n.d.	n.d.	n.d.
Chrysene (ug/Kg)	150.0	200.0	E 25.0
p-Cresol (ug/Kg)	110.0	610.0	E 27.0
Thiophene, dibenzo (ug/Kg)	n.d.	n.d.	n.d.
4-Bromophenylphenylether (ug/Kg)	n.d.	n.d.	n.d.
4-Chlorophenylphenylether (ug/Kg)	n.d.	n.d.	n.d.
Benzo-b-fluoranthene (ug/Kg)	50.0	190.0	n.d.
Pentachloroanisole (ug/Kg)	n.d.	n.d.	n.d.
Dibenz-(a,h)-anthracene (ug/Kg)	n.d.	n.d.	n.d.
Fluoranthene (ug/Kg)	86.0	300.0	E 33.0
Phenol, 2-chloro (ug/Kg)	n.d.	n.d.	n.d.
Benzocinnoline (ug/Kg)	n.d.	n.d.	n.d.
n.d. = Not Detected	n.r.	E 23.0	n.r.

Table 5. List of Organochlorine Pesticides (Left column) and that Chemical's Concentration in Bottom Sediments at Each Sampling Location for Samples Collected During the Second Sampling Effort.

Compound	New River Mexicali	New River Mexicali	New River Salton Sea
	BOTTOM SEDIMENTS	BOTTOM SEDIMENTS	BOTTOM SEDIMENTS
Date	04/11/96	04/10/96	04/09/96
cis-Nonachlor (ug/Kg)	n.d.	n.d.	n.d.
trans-Nonachlor (ug/Kg)	4.60	3.60	n.d.
Oxychlordane (ug/Kg)	n.d.	n.d.	n.d.
Aldrin (ug/Kg)	n.d.	n.d.	n.d.
cis-Chlordane (ug/Kg)	8.40	6.10	n.d.
trans-Chlordane (ug/Kg)	9.70	6.80	n.d.
Chloroneb (ug/Kg)	n.d.	n.d.	n.d.
DCPA (ug/Kg)	n.d.	n.d.	n.d.
o,p'-DDD (ug/Kg)	n.d.	n.d.	n.d.
p,p'-DDD (ug/Kg)	E 24.0	E 18.0	E 1.60
o,p'-DDE (ug/Kg)	n.d.	n.d.	n.d.
p,p'-DDE (ug/Kg)	19.00	18.00	20.00
o,p'-DDT (ug/Kg)	n.d.	n.d.	n.d.
p,p'-DDT (ug/Kg)	n.d.	7.80	n.d.
Dieldrin (ug/Kg)	n.d.	n.d.	n.d.
Endosulfan I (ug/Kg)	n.d.	n.d.	n.d.
Endrin (ug/Kg)	n.d.	n.d.	n.d.
Alpha BHC (ug/Kg)	n.d.	n.d.	n.d.
Beta BHC (ug/Kg)	n.d.	n.d.	n.d.
Heptachlor (ug/Kg)	n.d.	n.d.	n.d.
Heptachlor epoxide (ug/Kg)	n.d.	n.d.	n.d.
Benzene, hexachloro (ug/Kg)	n.d.	n.d.	n.d.
Isodrin (ug/Kg)	n.d.	n.d.	n.d.
Lindane (ug/Kg)	n.d.	n.d.	n.d.
p,p'-Methoxychlor (ug/Kg)	n.d.	n.d.	n.d.
o,p'-Methoxychlor (ug/Kg)	n.d.	n.d.	n.d.
Mirex (ug/Kg)	n.d.	n.d.	n.d.
cis-Permethrin (ug/Kg)	n.d.	n.d.	6.70
trans-Permethrin (ug/Kg)	n.d.	n.d.	n.d.
Toxaphene	n.d.	n.d.	n.d.
PCB	200.00	150.00	n.d.
Pentachloroanisole	n.d.	n.d.	n.d.

n.d. = Not Detected

Table 6. Completed Exposure Pathways

	Elements of Exposure Pathway					
Pathway Namne	Source	Environmental Medium	Point of Exposure	Route of Exposure	Receptor Population	Time Frame
Receptor Population Playing in the New River	Agricultural Runoff Industrial Discharge Domestic Sewage Buildup of Naturally Ocuring Elements in Sediments	Suspended Sediments in Surface Water Bottom Sediments in Surface Water	New River	Incidental Ingestion of Suspended Sediments Dermal Absorption	Adults Children Infants	Past Present Future

Table 7. List of Default Values for Subgroups of Receptor Population

Parameter	Receptor Population	
	Adult	Children
Body Weight	70 kg	30 kg
Age Range	greater than 18 years old	1 – 11 years old
Surface Area	19400 cm^2 (Whole Body) 5500 cm^2 (Exposed Area)	8750 cm^2 (Whole Body) 2625 cm^2 (Exposed Area)
Soil Adherance Factor	1 mg/cm^2	1 mg/cm^2
Incidnetal WaterIngestion Rate	0.05 L/hour	0.1 L/hour
Drinking Water Ingestion Rate	2 L/day	1 L/day
Exposure Duration	365 days/year	365 days/year

Table 8. Dermal Absorbance Factors for Chemicals from Soil

Compound Class	Absorption Fraction
Chlorinated Insecticides	0.05
Polycyclic Aromatic Hydrocarbons	0.15
Organophohphates	0.25
Pentachlorophenol	0.25
Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans	0.03
Polychlorinated Biphenyls	0.15
Other Organic Chemicals	0.10
Cadmium	0.001
Arsenic	0.03
Hexavalent Chromium	0.0
Other Metals and Complexed Cyanides	0.01
Free Cyanide	0.10

Table 9. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for an Adult Playing in the New River at Mexicali (Sampling Date 3/28/95)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref.Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Dioctylphthalate	7.300	1.2E-04	4.5E-01	0.10	3.6E-06	2.0E+00	0.000	Hepatic
Cis-Chlordane	0.069	1.1E-06	5.1E-03	0.05	2.1E-08	6.0E-04		Hepatic
Trans-Chlordane	0.075	1.2E-06	5.4E-03	0.05	2.2E-08	6.0E-04		Hepatic
Cis-Nonachlor	0.021	3.4E-07	1.2E-03	0.05	5.0E-09	NA		
Trans-Nonachlor	0.062	9.9E-07	4.1E-03	0.05	1.7E-08	NA		
Oxychlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
Total Chlordane	0.227	3.6E-06	4.7E-01	0.05	1.8E-06	6.0E-04	0.003	Hepatic
o,p'-DDD	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'- DDD	0.120	1.9E-06	1.6E-02	0.05	6.4E-08	NA		
o,p'-DDE	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'- DDE	0.081	1.3E-06	1.2E-02	0.05	4.8E-08	NA		
o,p'-DDT	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'- DDT	0.130	2.1E-06	2.5E-02	0.05	1.0E-07	5.0E-04		Hepatic
Total DDT	0.331	5.3E-06	5.3E-02	0.05	2.1E-07	5.0E-04	0.000	Hepatic
							0.003	Total Hepatic
Cadmium	1.300	2.1E-05	4.0E-01	0.01	3.3E-07	7.0E-04	0.000	Renal
Uranium	3.100	5.0E-05	1.9E+00	0.01	1.5E-06	3.0E-03	0.001	Renal
Vanadium	79.000	1.3E-03	3.8E+01	0.01	3.1E-05	3.0E-03	0.010	Renal
							0.011	Total Renal
Phenol	1.100	1.8E-05	2.7E-02	0.10	2.2E-07	6.0E-01	0.000	Developmental
Antimony	1.100	1.8E-05	1.0E+00	0.01	8.0E-07	4.0E-04	0.002	Longevity
Arsenic	15.000	2.4E-04	5.8E+00	0.01	4.7E-06	3.0E-04	0.016	Dermal
Barium	420.000	6.7E-03	5.6E+02	0.01	4.4E-04	7.0E-02	0.006	Cardiovascular
Beryllium	1.000	1.6E-05	0.0E+00	0.01	1.1E-08	5.0E-03	0.000	None Listed
Manganese	940.000	1.5E-02	3.4E+02	0.01	2.8E-04	1.4E-01	0.002	Neurological
Molybdenum	7.500	1.2E-04	2.0E+00	0.01	1.7E-06	5.0E-03	0.000	Incr. uric acid levels
Chromium	97.000	1.6E-03	3.6E+01	0.01	2.9E-05	2.0E-02	0.001	None Listed
Nickel	200.000	3.2E-03	5.1E+01	0.01	4.2E-05	2.0E-02	0.002	Decr. Body Weight
Zinc	350.000	5.6E-03	1.2E+02	0.01	9.8E-05	3.0E-01	0.000	Hematological
Silver	0.600	9.6E-06	9.0E-01	0.01	7.1E-07	5.0E-03	0.000	Dermal

Table 10. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for an Adult Playing in the New River at Calexico (Sampling Date 3/25/95)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref.Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Dioctylphthalate	5.600	7.3E-05	1.5E-01	0.10	1.2E-06	2.0E+00	0.000	Hepatic
cis-Chlordane	0.020	2.6E-07	1.9E-03	0.05	7.7E-09	6.0E-04		Hepatic
Trans-Chlordane	0.000	0.0E+00	0.002	0.05	7.9E-09	6.0E-04		Hepaic
Cis-Nonachlor	0.000	0.0E+00	0	0.05	0.0E+00	NA		
Trans-Nonachlor	0.000	0.0E+00	0.0016	0.05	6.3E-09	NA		
Oxychlordane	0.000	0.0E+00	0	0.05	0.0E+00	NA		
Total Chlordane	5.620	7.3E-05	1.6E-01	0.05	6.6E-07	6.0E-04	0.001	Hepatic
o,p'-DDD	0.000	0.0E+00	0	0.05	0.0E+00	NA		
p,p'-DDD	0.025	3.3E-07	0	0.05	2.3E-10	NA		
o,p'-DDE	0.000	0.0E+00	0	0.05	0.0E+00	NA		
p,p'-DDE	0.049	6.4E-07	0.0096	0.05	3.8E-08	NA		
o,p'-DDT	0.000	0.0E+00	0	0.05	0.0E+00	NA		
p,p'-DDT	0.000	0.0E+00	0	0.05	0.0E+00	5.0E-04		Hepacit
Total DDT	0.074	9.6E-07	0.0096	0.05	3.8E-08	5.0E-04	0.000	Hepatic
							0.001	Total Hepatic
Cadmium	1.700	2.2E-05	3.0E-01	0.01	2.5E-07	7.0E-04	0.000	Renal
Uranium	1.400	1.8E-05	1.6E+00	0.01	1.3E-06	3.0E-03	0.000	Renal
Vanadium	22.000	2.9E-04	2.1E+01	0.01	1.7E-05	3.0E-03	0.006	Renal
							0.006	Total Renal
Phenol	1.300	1.7E-05	1.6E-02	0.10	1.4E-07	6.0E-01	0.000	Developmental
Antimony	0.700	9.1E-06	2.0E+00	0.01	1.6E-06	4.0E-04	0.004	Longevity
Arsenic	10.000	1.3E-04	4.1E+00	0.01	3.3E-06	3.0E-04	0.011	Dermal
Barium	180.000	2.3E-03	5.7E+02	0.01	4.5E-04	7.0E-02	0.006	Cardiovascular
Manganese	620.000	8.1E-03	2.1E+02	0.01	1.7E-04	1.4E-01	0.001	Neurological
Molybdenum	5.700	7.4E-05	0.0E+00	0.01	5.3E-08	5.0E-03	0.000	Incr. uric acid levels
Chromium	67.000	8.7E-04	2.0E+01	0.01	1.6E-05	2.0E-02	0.001	None Listed
Nickel	150.000	2.0E-03	1.4E+01	0.01	1.2E-05	2.0E-02	0.001	Decr. Body Weight
Zinc	250.000	3.3E-03	8.1E+01	0.01	6.6E-05	3.0E-01	0.000	Hematological
Silver	3.300	4.3E-05	5.0E-01	0.01	4.2E-07	5.0E-03	0.000	Dermal

Table 11. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for an Adult Playing in the New River at the Salton Sea (Sampling Date 3/22/95)

Chemical	Conc. Sed (mg/kg)	Conc. Water (mg/L)	Conc. Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref. Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Bis-2-	3.600	1.6E-03	1.3E-01	0.10	1.2E-06	2.0E-02	0.000	Hepatic
Butylbenzylphthalate	0.100	4.5E-05	3.7E-02	0.10	3.2E-08	2.0E-01	0.000	Hepatic
Cis-Chlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	6.0E-04		Hepatic
Trans-Chlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	6.0E-04		Hepatic
Cis-Nonachlor	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
Trans-Nonachlor	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
Oxychlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
Total Chlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	6.0E-04	0.000	Hepatic
o,p'-DDD	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'-DDD	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
o,p'-DDE	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'-DDE	0.043	1.9E-05	1.8E-03	0.05	1.4E-08	NA		
o,p'-DDT	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'-DDT	0.005	2.2E-06	0.0E+00	0.05	1.5E-09	5.0E-04		Hepatic
Total DDT	0.048	2.2E-05	1.8E-03	0.05	1.5E-08	5.0E-04	0.000	Hepatic
							0.000	Total Hepatic
Cadmium	0.560	2.5E-04	1.0E-01	0.01	1.8E-07	7.0E-04	0.000	Renal
Uranium	3.500	1.6E-03	7.7E-01	0.01	1.1E-06	3.0E-03	0.000	Renal
Vanadium	100.000	4.5E-02	1.1E+01	0.01	3.2E-05	3.0E-03	0.011	Renal
							0.011	Total Renal
Phenol	0.030	1.4E-05	6.0E-03	0.10	9.7E-09	6.0E-01	0.000	Developmental
p-Cresol	0.081	3.7E-05	0.0E+00	0.10	2.6E-08	5.0E-02	0.000	Neurological
DCPA	0.032	1.4E-05	0.0E+00	0.05	1.0E-08	1.0E-02	0.000	Respiratory
Dibutylphthalate	0.210	9.5E-05	3.8E-02	0.10	6.8E-08	1.0E-01	0.000	Incr. Mortality
Antimony	0.800	3.6E-04	1.0E+00	0.01	2.6E-07	4.0E-04	0.001	Longevity
Arsenic	11.000	5.0E-03	2.3E+00	0.01	3.5E-06	3.0E-04	0.012	Dermal
Barium	500.000	2.3E-01	8.4E+01	0.01	1.6E-04	7.0E-02	0.002	Cardiovascular
Beryllium	2.000	9.0E-04	0.0E+00	0.01	6.4E-07	5.0E-03	0.000	None Listed
Manganese	780.000	3.5E-01	2.7E+02	0.01	2.5E-04	1.4E-01	0.002	Neurological
Molybdenum	4.600	2.1E-03	0.0E+00	0.01	1.5E-06	5.0E-03	0.000	Incr. uric acid levels
Chromium	100.000	4.5E-02	9.0E+00	0.01	3.2E-05	2.0E-02	0.002	None Listed
Nickel	53.000	2.4E-02	5.0E+00	0.01	1.7E-05	2.0E-02	0.001	Decr. Body Weight
Zinc	120.000	5.4E-02	2.6E+01	0.01	3.9E-05	3.0E-01	0.000	Hematological
Silver	0.420	1.9E-04	0.0E+00	0.01	1.4E-07	5.0E-03	0.000	Dermal

Table 12. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for an Adult Playing in the New River at Mexicali (Sampling Date 4/11/96)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref.Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Dioctylphthalate			6.0E-01	0.10	4.7E-06	2.0E+00	0.000	Hepatic
Phthalate, bis-2-ethylhexyl			1.3E+01	0.10	1.0E-04	2.0E-02	0.005	Hepatic
Naphthalene			1.1E-02	0.15	1.3E-07	2.0E-02	0.000	Hepatic
cic-Nonachlor				0.05	0.0E+00	NA		
trans-Nonachlor			4.6E-03	0.05	1.8E-08	NA		
Oxychlordane				0.05	0.0E+00	NA		
cis-Chlordane			8.4E-03	0.05	3.3E-08	6.0E-04		Hepatic
trans-Chlordane			9.7E-03	0.05	3.8E-08	6.0E-04		Hepatic
Total Chlordane			2.3E-02	0.05	8.9E-08	6.0E-04	0.000	Hepatic
o,p'-DDD				0.05	0.0E+00	NA		
p,p'-DDD			2.4E-02	0.05	9.4E-08	NA		
o,p'-DDE				0.05	0.0E+00	NA		
p,p'-DDE			1.9E-02	0.05	7.5E-08	NA		
o,p'-DDT				0.05	0.0E+00	NA		
p,p'-DDT				0.05	0.0E+00	5.0E-04		Hepatic
Total DDT			4.3E-02	0.05	1.7E-07	5.0E-04	0.000	Hepatic
							0.006	Total Hepatic
Pyrene			1.0E-01	0.15	1.2E-06	3.0E-02	0.000	Renal
Fluoranthene			8.6E-02	0.15	1.0E-06	4.0E-02	0.000	Renal
							0.000	Total Renal
Dibutylphthalate			1.1E-01	0.10	8.6E-07	1.0E-01	0.000	Incr. mortality
Diethylphthalate			3.9E-02	0.10	3.1E-07	8.0E-01	0.000	Decr growth rate
9H-fluorene			2.9E-02	0.15	3.4E-07	4.0E-02	0.000	Hematological
Phenol			2.5E-02	0.10	2.0E-07	6.0E-01	0.000	Developmental
Anthracene			3.6E-02	0.15	4.2E-07	3.0E-01	0.000	None Observed
p-Cresol			1.1E-01	0.10	8.6E-07	5.0E-02	0.000	Neurological
PCB			2.0E-01	0.15	2.4E-06	2.0E-05	0.118	Immunological

Table 13. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for an Adult Playing in the New River at Calexico (Sampling Date 4/10/96)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref.Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Dioctylphthalate			7.5E-01	0.10	5.9E-06	2.0E+00	0.000	Hepatic
Phthalate, bis-2-ethylhexyl			1.4E+01	0.10	1.1E-04	2.0E-02	0.006	Hepatic
Phthalate, butylbenzyl			1.0E-01	0.10	7.9E-07	2.0E-01	0.000	Hepatic
Benzene, p-dichloro			9.4E-02	0.05	3.7E-07	1.0E-01	0.000	Hepatic
Naphthalene			5.3E-02	0.15	6.2E-07	0.02	0.000	Hepatic
Acenaphthene			2.1E-02	0.15	2.5E-07	6.0E-02	0.000	Hepatic
cis-Nonachlor				0.05	0.0E+00	NA		
trans-Nonachlor			3.6E-03	0.05	1.4E-08	NA		
Oxychlordane				0.05	0.0E+00	NA		
cis-Chlordane			6.1E-03	0.05	2.4E-08	6.0E-04		Hepatic
trans-Chlordane			6.8E-03	0.05	2.7E-08	6.0E-04		Hepatic
Total Chlordane			1.7E-02	0.05	6.5E-08	6.0E-04	0.000	Hepatic
o,p'-DDD				0.05	0.0E+00	NA		
p,p'-DDD			1.8E-02	0.05	7.1E-08	NA		
o,p'-DDE				0.05	0.0E+00	NA		
p,p'-DDE			1.8E-02	0.05	7.1E-08	NA		
o,p'-DDT				0.05	0.0E+00	NA		
p,p'-DDT			7.8E-03	0.05	3.1E-08	5.0E-04		Hepatic
Total DDT			4.4E-02	0.05	1.7E-07	5.0E-04	0.000	Hepatic
							0.006	Total Hepatic
Fluoranthene			3.0E-01	0.15	3.5E-06	4.0E-02		Renal
Pyrene			2.9E-01	0.15	3.4E-06	0.03		Renal
							0.000	Total Renal
Dibutylphthalate			1.1E-01	0.01	8.6E-08	1.0E-01	0.000	Incr. Mortality
Diethylphthalate			4.4E-02	0.10	3.5E-07	8.0E-01	0.000	Decr. growth rate
9H-fluorene			3.3E-02	0.15	3.9E-07	0.05	0.000	Hematological
Phenol			2.4E-02	0.10	1.9E-07	0.6	0.000	Developmental
Anthracene			4.8E-02	0.15	5.7E-07	3.0E-01	0.000	None observed
p-Cresol			6.1E-01	0.10	4.8E-06	5.0E-02	0.000	Neurological
PCB			1.5E-01	0.15	1.8E-06	2.0E-05	0.088	Immunological

Table 14. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for an Adult Playing in the New River at the Salton Sea (Sampling Date 4/9/96)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref.Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Dioctylphthalate			4.1E-02	0.10	3.2E-07	2.0E+00	0.000	Hepatic
Phthalate, bis-2-ethylhexyl			6.7E-01	0.10	5.3E-06	2.0E-02	0.000	Hepatic
Phthalate, butylbenzyl			5.1E-02	0.10	4.0E-07	2.0E-01	0.000	Hepatic
9H-fluorene			1.9E-02	0.15	2.2E-07	4.0E-02	0.000	Hepatic
cis-Permethrin			6.7E-03	0.05	2.6E-08	5.0E-02	0.000	Hepatic
cis-Nonachlor				0.05	0.0E+00	NA		
trans-Nonachlor				0.05	0.0E+00	NA		
Oxychlordane				0.05	0.0E+00	NA		
cis-Chlordane				0.05	0.0E+00	6.0E-04		Hepatic
trans-Chlordane				0.05	0.0E+00	6.0E-04		Hepatic
Total Chlordane			0.0E+00	0.05	0.0E+00	6.0E-04	0.000	Hepatic
o,p'-DDD				0.05	0.0E+00	NA		
p,p'-DDD			1.6E-03	0.05	6.3E-09	NA		
o,p'-DDE				0.05	0.0E+00	NA		
p,p'-DDE			2.0E-02	0.05	7.9E-08	NA		
o,p'-DDT				0.05	0.0E+00	NA		
p,p'-DDT				0.05	0.0E+00	5.0E-04		Hepatic
Total DDT			2.2E-02	0.05	8.5E-08	5.0E-04	0.000	Hepatic
							0.000	Total Hepatic
Fluoranthene			3.3E-02	0.15	3.9E-07	4.0E-02	0.000	Renal
Pyrene			3.5E-02	0.15	4.1E-07	3.0E-02	0.000	Renal
							0.000	Total Renal
Dibutylphthalate			8.7E-02	0.10	6.8E-07	1.0E-01	0.000	Incr. Mortality
Diethylphthalate			3.4E-02	0.10	2.7E-07	8.0E-01	0.000	Decr growth rate
Phenol			1.0E-02	0.10	7.9E-08	6.0E-01	0.000	Developmental
Anthracene			2.4E-02	0.15	2.8E-07	3.0E-01	0.000	None observed
p-Cresol			2.7E-02	0.10	2.1E-07	5.0E-02	0.000	Neurological

Table 15. Total Increased Lifetime Cancer Risk for Adults Playing in the New River at Mexicali (Sampling Date 3/28/95)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Total Daily (mg/kg/day)	OSF 1/(mg/kg/day)	Weight of Evidence* (EPA/NTP/IARC)	Individual Chem. Cancer Risk
Total Chlordane	2.3E-01	3.6E-06	4.7E-01	1.8E-06	1.300	B2/3/-	2.4E-06
p,p'- DDD	1.2E-01	1.9E-06	1.6E-02	6.4E-08	0.240	B2/2/2B	1.5E-08
p,p'- DDE	8.1E-02	1.3E-06	1.2E-02	4.8E-08	0.340	B2/2/2B	1.6E-08
p,p'- DDT	1.3E-01	2.1E-06	2.5E-02	1.0E-07	0.340	B2/2/2B	3.4E-08
Arsenic	1.5E+01	2.4E-04	5.8E+00	4.7E-06	1.500	A/1/-	7.1E-06
Beryllium	1.0E+00	1.6E-05	0.0E+00	1.1E-08	4.300	B2/2/-	4.9E-08
Chromium	9.7E+01	1.6E-03	3.6E+01	2.9E-05	NA	A/1/-	
Cadmium	1.3E+00	2.1E-05	4.0E-01	3.3E-07	NA	B1/2/-	
Nickel	2.0E+02	3.2E-03	5.1E+01	4.2E-05	NA	-/2/-	
Lead	5.2E+01	8.3E-04	4.5E+01	3.6E-05	NA	B2/3/-	
						Total Cancer Risk =	9.6E-06

Table 16. Total Increased Lifetime Cancer Risk for Adults Playing in the New River at Calexico (Sampling Date 3/25/95)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Total Daily (mg/kg/day)	OSF 1/(mg/kg/day)	Weight of Evidence* (EPA/NTP/IARC)	Individual Chem. Cancer Risk
Total Chlordane	5.6E+00	7.3E-05	1.6E-01	6.6E-07	1.300	B2/3/-	8.6E-07
p,p'- DDD	2.5E-02	3.3E-07	0.0E+00	2.3E-10	0.240	B2/2/2B	5.6E-11
p,p'- DDE	4.9E-02	6.4E-07	9.6E-03	3.8E-08	0.340	B2/2/2B	1.3E-08
Dibenz(a,h)anthracene	3.2E-01	4.2E-06	0.0E+00	3.0E-09	4.100		1.2E-08
Arsenic	1.0E+01	1.3E-04	4.1E+00	3.3E-06	1.500	A/1/-	5.0E-06
Chromium	6.7E+01	8.7E-04	2.0E+01	1.6E-05		A/1/-	
Cadmium	1.7E+00	2.2E-05	3.0E-01	2.5E-07		B1/2/-	
Nickel	1.5E+02	2.0E-03	1.4E+01	1.2E-05		-/2/-	
Lead	7.0E+01	9.1E-04	4.3E+01	3.4E-05		B2/3/-	
						Total Cancer Risk =	5.9E-06

Table 17. Total Increased Lifetime Cancer Risk for Adults Playing in the New River at the Salton Sea (Sampling Date 3/22/95)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Total Daily (mg/kg/day)	OSF 1/(mg/kg/day)	Weight of Evidence* (EPA/NTP/IARC)	Individual Chem. Cancer Risk
p,p'- DDE	4.3E-02	1.9E-05	1.8E-03	1.4E-08	0.340	B2/2/2B	4.7E-09
p,p'- DDT	4.8E-03	2.2E-06	0.0E+00	1.5E-09	0.340	B2/2/2B	5.3E-10
Bis-2-ethylhexylphthalate	3.6E+00	1.6E-03	1.3E-01	1.2E-06	0.014	B2/-/-	1.6E-08
Chrysene	4.9E-02	2.2E-05	0.0E+00	1.6E-08	**0.073**	B2/2/-	1.2E-09
Arsenic	1.1E+01	5.0E-03	2.3E+00	3.5E-06	1.500	A/1/-	5.3E-06
Beryllium	2.0E+00	9.0E-04	0.0E+00	6.4E-07	4.300	B2/2/-	2.8E-06
Chromium	1.0E+02	4.5E-02	9.0E+00	3.2E-05		A/1/-	
Cadmium	5.6E-01	2.5E-04	1.0E-01	1.8E-07		B1/2/-	
Lead	2.7E+01	1.2E-02	2.8E+01	8.7E-06		B2/3/-	
Nickel	5.3E+01	2.4E-02	5.0E+00	1.7E-05		-/2/-	
Butylbenzylphthalate	1.0E-01	4.5E-05	3.7E-02	3.2E-08		C/3/-	
						Total Cancer Risk =	8.1E-06

Table 18. Total Increased Lifetime Cancer Risk for Adults Playing in the New River at Mexicali (Sampling Date 4/11/96)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Total Daily Dose (mg/kg/day)	OSF 1/(mg/kg/day)	Weight of Evidence* (EPA/NTP/IARC)	Individual Cancer Risk
Phthalate, bis-2-			1.3E+01	1.0E-04	0.0140	B2/2/-	1.4E-06
Total Chlordane			2.3E-02	8.9E-08	1.3000	B2/3/-	1.2E-07
p,p'-DDD			2.4E-02	9.4E-08	0.2400	B2/2/2B	2.3E-08
p,p'-DDE			1.9E-02	7.5E-08	0.3400	B2/2/2B	2.5E-08
Pyrene			1.0E-01	1.2E-06	0.0073	D/3/-	8.6E-09
Fluoranthene			8.6E-02	1.0E-06	0.0073	D/3/-	7.4E-09
9H-fluorene			2.9E-02	3.4E-07	0.0073	D/3/-	2.5E-09
Anthracene			3.6E-02	4.2E-07	0.0730	D/3/-	3.1E-08
p-Cresol			1.1E-01	8.6E-07		C/3/-	0.0E+00
PCB			2.0E-01	2.4E-06	2.0000	B2/2/-	4.7E-06
Benzo-a-pyrene			6.2E-02	7.3E-07	7.3000	B2/2/2A	5.3E-06
Benzo-k-fluoranthene			5.3E-02	6.2E-07	0.7300	B2/2/2B	4.6E-07
Phenanthrene			5.8E-02	6.8E-07	0.0073	D/-/-	5.0E-09
Benz-a-anthracene			3.7E-02	4.4E-07	0.7300	B2/2/2A	3.2E-07
Chrysene			1.5E-01	1.8E-06	0.0730	B2/2/-	1.3E-07
Benzo-b-fluoranthene			5.0E-02	5.9E-07	0.7300	B2/2/2B	4.3E-07
						Sum	1.3E-05

Table 19. Total Increased Lifetime Cancer Risk for Adults Playing in the New River at Calexico (Sampling Date 4/10/96

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Total Daily Dose (mg/kg/day)	OSF 1/(mg/kg/day)	Weight of Evidence* (EPA/NTP/IARC)	Individual Cancer Risk
Phthalate, bis-2-			1.4E+01	1.1E-04	0.0140	B2/2/-	1.5E-06
Phthalate, butylbenzyl			1.0E-01	7.9E-07		C/3/-	0.0E+00
Benzene, p-dichloro			9.4E-02	3.7E-07	0.0400	-/2/2B	1.5E-08
Acenaphthene			2.1E-02	2.5E-07	0.0073	-/3/-	1.8E-09
Total Chlordane			1.7E-02	6.5E-08	1.3000	B2/3/-	8.4E-08
p,p'-DDD			1.8E-02	7.1E-08	0.2400	B2/2/2B	1.7E-08
p,p'-DDE			1.8E-02	7.1E-08	0.3400	B2/2/2B	2.4E-08
p,p'-DDT			7.8E-03	3.1E-08	0.3400	B2/2/2B	1.0E-08
Fluoranthene			3.0E-01	3.5E-06	0.0073	D/3/-	2.6E-08
Pyrene			2.9E-01	3.4E-06	0.0073	D/3/-	2.5E-08
9H-fluorene			3.3E-02	3.9E-07	0.0000	D/3/-	0.0E+00
Anthracene			4.8E-02	5.7E-07	0.0073	D/3/-	4.1E-09
p-Cresol			6.1E-01	4.8E-06		C/3/-	0.0E+00
PCB			1.5E-01	1.8E-06	2.0000	B2/2/-	3.5E-06
Benzo-a-pyrene			1.6E-01	1.9E-06	7.3000	B2/2/2A	1.4E-05
Benzo-k-fluoranthene			1.5E-01	1.8E-06	0.7300	B2/2/2B	1.3E-06
Phenanthrene			2.8E-01	3.3E-06	0.0073	D/-/-	2.4E-08
Acenaphthylene			4.9E-02	5.8E-07	0.0073	D/3/-	4.2E-09
Benz-a-anthracene			1.1E-01	1.3E-06	0.7300	B2/2/2B	9.5E-07
Chrysene			2.0E-01	2.4E-06	0.0730	B2/2/2B	1.7E-07
Benzo-b-fluoranthene			1.9E-01	2.2E-06	0.7300	B2/2/2B	1.6E-06
Mesitol			2.3E-02	1.8E-07			
						Sum	2.3E-05

Table 20. Total Increased Lifetime Cancer Risk for Adults Playing in the New River at the Salton Sea (Sampling Date 4/9/96)

Chemical	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Total Daily Dose (mg/kg/day)	OSF 1/(mg/kg/day)	Weight of Evidence* (EPA/NTP/IARC)	Individual Cancer Risk
Phthalate, bis-2-			6.7E-01	5.3E-06	0.0140	B2/2/-	7.4E-08
Phthalate, butylbenzyl			5.1E-02	4.0E-07		C/3/-	0.0E+00
9H-fluorene			1.9E-02	2.2E-07	0.0073	D/3/-	1.6E-09
p,p'-DDD			1.6E-03	6.3E-09	0.2400	B2/2/2B	1.5E-09
p,p'-DDE			2.0E-02	7.9E-08	0.3400	B2/2/2B	2.7E-08
Fluoranthene			3.3E-02	3.9E-07	0.0073	D/3/-	2.8E-09
Pyrene			3.5E-02	4.1E-07	0.0073	D/3/-	3.0E-09
Anthracene			2.4E-02	2.8E-07	0.0730	D/3/-	2.1E-08
p-Cresol			2.7E-02	2.1E-07		C/3/-	0.0E+00
Phenanthrene			1.5E-02	1.8E-07	0.0073	D/-/-	1.3E-09
Benz-a-anthracene			1.7E-02	2.0E-07	0.7300	B2/2/2B	1.5E-07
Chrysene			2.5E-02	2.9E-07	0.0730	B2/2/2B	2.2E-08
						Sum	3.0E-07

* Weight of Evidence Classifications

EPA Cancer Classifications		NTP Cancer Classifications		IARC Cancer Classifications	
A	Known Human Carcinogen	1	Known Human Carcinogen	1	Human Carcinogen
B1	Probable Human Carcinogen (limited human, sufficient animals studies)	2	Reasonably anticipated to be a carcinogen	2A	Reasobably Anticipated to be a Carcinogen (Limited Human Studies)
B2	Probable Human Carcinogen (inadequate human, sufficient animal studies)	3	Not Classified	2B	Reasobably Anticipated to be a Carcinogen (Sufficient animal studies)
C	Possible Human Carcinogen			3	Not Classifiable
D	Not Classifiable			4	Probably Not a Human Carcinogen
E	Evidence of Non-carcinogenicyty				

Table 21. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for a Child Playing in the New River at Mexicali (Sampling Date 3/28/95)

	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref.Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Dioctylphthalate	7.3	0.0001168	0.45	0.10	4.3E-06	2.0E+00	0.000	Hepatic
Cis-Chlordane	0.069	1.104E-06	0.0051	0.05	2.6E-08	6.0E-04	0.000	Hepatic
Trans-Chlordane	0.075	0.0000012	0.0054	0.05	2.8E-08	6.0E-04	0.000	Hepatic
Cis-Nonachlor	0.021	3.36E-07	0.0012	0.05	6.4E-09	NA		
Trans-Nonachlor	0.062	9.92E-07	0.0041	0.05	2.1E-08	NA		
Oxychlordane	0	0	0	0.05	0.0E+00	NA		
Total Chlordane	0.227	3.632E-06	0.4658	0.05	2.0E-06	6.0E-04	0.003	Hepatic
o,p'-DDD	0	0	0	0.05	0.0E+00	NA		
p,p'- DDD	0.12	1.92E-06	0.016	0.05	7.6E-08	NA		
o,p'-DDE	0	0	0	0.05	0.0E+00	NA		
p,p'- DDE	0.081	1.296E-06	0.012	0.05	5.7E-08	NA		
o,p'-DDT	0	0	0	0.05	0.0E+00	NA		
p,p'- DDT	0.13	2.08E-06	0.025	0.05	1.2E-07	5.0E-04	0.000	Hepatic
Total DDT	0.331	5.296E-06	0.053	0.05	2.5E-07	5.0E-04	0.000	Hepatic
							0.004	Total Hepatic
Cadmium	1.300	2.1E-05	4.0E-01	0.01	4.2E-07	7.0E-04	0.001	Renal
Uranium	3.100	5.0E-05	1.9E+00	0.01	1.8E-06	3.0E-03	0.001	Renal
Vanadium	79.000	1.3E-03	3.8E+01	0.01	3.7E-05	3.0E-03	0.012	Renal
							0.014	Total Renal
Phenol	1.100	1.8E-05	2.7E-02	0.10	2.9E-07	6.0E-01	0.000	Developmental
Antimony	1.100	1.8E-05	1.0E+00	0.01	9.3E-07	4.0E-04	0.002	Longevity
Arsenic	15.000	2.4E-04	5.8E+00	0.01	5.9E-06	3.0E-04	0.020	Dermal
Barium	420.000	6.7E-03	5.6E+02	0.01	5.1E-04	7.0E-02	0.007	Cardiovascular
Beryllium	1.000	1.6E-05	0.0E+00	0.01	5.3E-08	5.0E-03	0.000	None Listed
Manganese	940.000	1.5E-02	3.4E+02	0.01	3.5E-04	1.4E-01	0.002	Neurological
Molybdenum	7.500	1.2E-04	2.0E+00	0.01	2.2E-06	5.0E-03	0.000	Incr. uric acid levels
Chromium	97.000	1.6E-03	3.6E+01	0.01	3.7E-05	2.0E-02	0.002	None Listed
Nickel	200.000	3.2E-03	5.1E+01	0.01	5.5E-05	2.0E-02	0.003	Decr. Body Weight
Zinc	350.000	5.6E-03	1.2E+02	0.01	1.2E-04	3.0E-01	0.000	Hematological
Silver	0.600	9.6E-06	9.0E-01	0.01	8.2E-07	5.0E-03	0.000	Dermal

Table 22. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for a Child Playing in the New River at Calexico (Sampling Date 3/25/95)

	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Dioctylphthalate	5.600	7.3E-05	1.5E-01	0.10	1.6E-06	2.0E+00	0.000	Hepatic
cis-Chlordane	0.020	2.6E-07	1.9E-03	0.05	9.2E-09	6.0E-04	0.000	Hepatic
Trans-Chlordane	0.000	0.0E+00	0.002	0.05	8.8E-09	6.0E-04	0.000	Hepaic
Cis-Nonachlor	0.000	0.0E+00	0	0.05	0.0E+00	NA		
Trans-Nonachlor	0.000	0.0E+00	0.0016	0.05	7.0E-09	NA		
Oxychlordane	0.000	0.0E+00	0	0.05	0.0E+00	NA		
Total Chlordane	5.620	7.3E-05	1.6E-01	0.05	9.2E-07	6.0E-04	0.002	Hepatic
o,p'-DDD	0.000	0.0E+00	0	0.05	0.0E+00	NA		
p,p'-DDD	0.025	3.3E-07	0	0.05	1.1E-09	NA		
o,p'-DDE	0.000	0.0E+00	0	0.05	0.0E+00	NA		
p,p'-DDE	0.049	6.4E-07	0.0096	0.05	4.4E-08	NA		
o,p'-DDT	0.000	0.0E+00	0	0.05	0.0E+00	NA		
p,p'-DDT	0.000	0.0E+00	0	0.05	0.0E+00	5.0E-04	0.000	Hepacit
Total DDT	0.074	9.6E-07	0.0096	0.05	4.5E-08	5.0E-04	0.000	Hepatic
							0.002	Total Hepatic
Cadmium	1.700	2.2E-05	3.0E-01	0.01	3.4E-07	7.0E-04	0.000	Renal
Uranium	1.400	1.8E-05	1.6E+00	0.01	1.5E-06	3.0E-03	0.000	Renal
Vanadium	22.000	2.9E-04	2.1E+01	0.01	1.9E-05	3.0E-03	0.006	Renal
							0.007	Total Renal
Phenol	1.300	1.7E-05	1.6E-02	0.10	2.0E-07	6.0E-01	0.000	Developmental
Antimony	0.700	9.1E-06	2.0E+00	0.01	1.8E-06	4.0E-04	0.004	Longevity
Arsenic	10.000	1.3E-04	4.1E+00	0.01	4.0E-06	3.0E-04	0.013	Dermal
Barium	180.000	2.3E-03	5.7E+02	0.01	5.1E-04	7.0E-02	0.007	Cardiovascular
Manganese	620.000	8.1E-03	2.1E+02	0.01	2.1E-04	1.4E-01	0.002	Neurological
Molybdenum	5.700	7.4E-05	0.0E+00	0.01	2.5E-07	5.0E-03	0.000	Incr. uric acid levels
Chromium	67.000	8.7E-04	2.0E+01	0.01	2.0E-05	2.0E-02	0.001	None Listed
Nickel	150.000	2.0E-03	1.4E+01	0.01	1.9E-05	2.0E-02	0.001	Decr. Body Weight
Zinc	250.000	3.3E-03	8.1E+01	0.01	8.2E-05	3.0E-01	0.000	Hematological
Silver	3.300	4.3E-05	5.0E-01	0.01	5.8E-07	5.0E-03	0.000	Dermal

Table 23. Toxicological Information to Evaluate Non-Cancer Adverse Health Effects for a Child Playing in the New River at the Salton Sea (Sampling Date 3/22/95)

	Conc- Sed (mg/kg)	Conc-Water (mg/L)	Conc-Btm (mg/kg)	Absorption Fraction	Total Dose (mg/kg/day)	Ref.Dose (mg/kg/day)	Hazard Quotient	Critical Effect
Bis-2-	3.600	1.6E-03	1.3E-01	0.10	6.5E-06	2.0E-02	0.000	Hepatic
Butylbenzylphthalate	0.100	4.5E-05	3.7E-02	0.10	4.7E-07	2.0E-01	0.000	Hepatic
Cis-Chlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	6.0E-04	0.000	Hepatic
Trans-Chlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	6.0E-04	0.000	Hepatic
Cis-Nonachlor	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
Trans-Nonachlor	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
Oxychlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
Total Chlordane	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	6.0E-04	0.000	Hepatic
o,p'-DDD	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'-DDD	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
o,p'-DDE	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'-DDE	0.043	1.9E-05	1.8E-03	0.05	7.3E-08	NA		
o,p'-DDT	0.000	0.0E+00	0.0E+00	0.05	0.0E+00	NA		
p,p'-DDT	0.005	2.2E-06	0.0E+00	0.05	7.2E-09	5.0E-04	0.000	Hepatic
Total DDT	0.048	2.2E-05	1.8E-03	0.05	8.0E-08	5.0E-04	0.000	Hepatic
							0.001	Total Hepatic
Cadmium	0.560	2.5E-04	1.0E-01	0.01	9.3E-07	7.0E-04	0.001	Renal
Uranium	3.500	1.6E-03	7.7E-01	0.01	5.9E-06	3.0E-03	0.002	Renal
Vanadium	100.000	4.5E-02	1.1E+01	0.01	1.6E-04	3.0E-03	0.053	Renal
							0.057	Total Renal
Phenol	0.030	1.4E-05	6.0E-03	0.10	9.8E-08	6.0E-01	0.000	Developmental
p-Cresol	0.081	3.7E-05	0.0E+00	0.10	1.2E-07	5.0E-02	0.000	Neurological
DCPA	0.032	1.4E-05	0.0E+00	0.05	4.8E-08	1.0E-02	0.000	Respiratory
Dibutylphthalate	0.210	9.5E-05	3.8E-02	0.10	6.5E-07	1.0E-01	0.000	Incr. Mortality
Antimony	0.800	3.6E-04	1.0E+00	0.01	2.1E-06	4.0E-04	0.005	Longevity
Arsenic	11.000	5.0E-03	2.3E+00	0.01	1.9E-05	3.0E-04	0.062	Dermal
Barium	500.000	2.3E-01	8.4E+01	0.01	8.3E-04	7.0E-02	0.012	Cardiovascular
Beryllium	2.000	9.0E-04	0.0E+00	0.01	3.0E-06	5.0E-03	0.001	None Listed
Manganese	780.000	3.5E-01	2.7E+02	0.01	1.4E-03	1.4E-01	0.010	Neurological
Molybdenum	4.600	2.1E-03	0.0E+00	0.01	6.9E-06	5.0E-03	0.001	Incr. uric acid levels
Chromium	100.000	4.5E-02	9.0E+00	0.01	1.6E-04	2.0E-02	0.008	None Listed
Nickel	53.000	2.4E-02	5.0E+00	0.01	8.4E-05	2.0E-02	0.004	Decr. Body Weight
Zinc	120.000	5.4E-02	2.6E+01	0.01	2.0E-04	3.0E-01	0.001	Hematological
Silver	0.420	1.9E-04	0.0E+00	0.01	6.3E-07	5.0E-03	0.000	Dermal
Phosporus	2000.000	9.0E-01	5.0E+02	0.00	3.0E-03	2.0E-05		0