Health Consultation #2

Examination of Contamination
in the
Water Column of the

NEW RIVER

IMPERIAL COUNTY, CALIFORNIA

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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 water column 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, 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) (3). 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 (2).

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 (3).

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 (3). 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 with this program include the U.S. Geological Survey, Region 7 of the California 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 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 (3).

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 petitioned health consultation 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 staffer 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 and April 1996, the Binational Study Group collected water 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). Suspended and bottom sediment samples, and several species of fish, were also collected and analyzed. An evaluation of the sediment and fish samples will be presented in forthcoming health consultations. Grab sampling was used to collect river water samples. These samples were filtered, and the filtered water analyzed for Base/Neutral/Acid (BNA) compounds, volatile organic compounds (VOCs), "carbopack" pesticides, "C18" pesticides, and trace metals (Table 1) (1). Samples were analyzed for a total of 227 chemicals. In some cases, the filtered materials were analyzed, and in the second sampling effort, some of the trace elements were also analyzed as the total recovered fraction. Additional samples were

collected and analyzed for other parameters, including (but not limited to) water hardness, pH, temperature, and dissolved and suspended sediments.

A variety of chemicals were identified in the New River. These are categorized by sampling location, whether the chemicals were detected during the first or second sampling effort, and by chemical class (BNA, VOC, etc.) (Tables 2 – 4).

- No BNA compounds (57 target BNA compounds) were detected at any sampling station during either of the two sampling efforts.

- A total of six VOCs (60 target VOCs) were detected at Mexicali and Calexico, and three VOCs were detected at the Salton Sea. Only samples collected during the first sampling effort were analyzed for VOCs.

- A total of five carbopack pesticides (41 target carbopack pesticides) were detected during both sampling efforts, but only at the Salton Sea.

- A total of 19 C18 pesticides (48 target C18 pesticides) were detected at all three sampling stations during both sampling periods.

- A total of 14 trace elements (33 target trace elements) were detected at each sampling station during each sampling effort.

One 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. 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 (9).

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. An 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 potential pathway is a pathway in which one or more elements of the pathway are missing, but might be present later. A pathway 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 determined that there is one completed exposure pathway, that of the receptor population engaging in recreational or play activities such as fishing or swimming, with subsequent exposure to contamination in the New River either through incidental ingestion of river water during play activities, or through direct dermal contact with the water, with the contaminants passing through the skin and into the body (Table 5). Incidental exposure is considered exposure which occurs during other activities (e.g., swallowing small amounts of water (the incidental exposure) while swimming). For adults, play activities refers to activities such as fishing or wading in the New River. For children, this refers to activities such as swimming or fishing.

The receptor population is divided into three sub-groups, adults (greater than 18 years old), children (1 – 11 years old), and infants (less than 1 year old). Two of these sub-groups are relevant to the completed exposure pathway, adults and children. Infants were not considered for the completed pathway, because children of this age would be very unlikely to play in the New River, whereas older children would be more likely to do so. Default assumptions regarding all three sub-groups of the receptor population are listed in Table 6.

Potentially Completed Exposure Pathways

In addition to the completed exposure pathway discussed above, there is one potentially completed exposure pathway. This potentially completed exposure pathway is that of the receptor population using the New River as a primary source of drinking water (Table 7). This pathway also includes dermal exposure because this water would also be used for bathing. This is designated as a potentially completed pathway because it is not known if area residents are using the New River as a source of drinking water.

The relevant sub-groups of the receptor population for this potentially completed exposure pathway are adults and infants. Infants were chosen as a sub-group for this pathway because they are a more sensitive group than children.

Eliminated Exposure Pathways

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

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 were identified as described below.

Calculation of Dose

The total dose is defined as the sum of the oral dose of the chemical and the dermal dose 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 would be unlikely to suffer adverse health effects. These reference doses have uncertainty factors built in to them to account for several issues, including but not limited to the extrapolation of conclusions from animal 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. Acute MRLs are developed for exposures of up to 14 days; intermediate MRLs for exposures of between 15 and 364 days; and chronic MRLs for exposures of greater than 365 days. An RfD, by definition, is a chronic exposure dose. In this document, only chronic MRLs and RfDs are used to calculate hazard quotients and hazard indices. The two exceptions to this are vanadium and 1,4-dichlorobenzene. No chronic MRLs or RfDs were available. Intermediate MRLs were used for these chemicals. Intermediate MRLs are typically higher than chronic MRLs. Thus, the resulting hazard quotient for these chemicals are therefore lower than if chronic MRLs/RfDs were used.

In addition to oral intake, the direct contact of a chemical with the skin (dermal contact, dermal exposure) can also lead to exposure to that chemical. The ability of a chemical to penetrate the skin is measured by the permeability constant, K_p. The ability of a chemical to penetrate the skin is also a function of the concentration of the chemical in the medium of interest, the surface area of the body which is exposed to the chemical, the part of the body exposed, and the length of time that the chemical is in contact with the skin.

Permeability constants could only be located for four organic chemicals: toluene, 1,4-dichlorobenzene, xylene, and chloroform; and for three inorganic chemicals: nickel, zinc, and chromium. In the absence of specific values for specific compounds, default values were used. For inorganic chemicals, a value of 0.001 cm/hr was used. (22). The availability of permeation constant data, as well as other parameters that could be used to estimate the permeability constant, was limited. Thus, for organic species, a default value of 0.1 cm/hr was chosen. This value was chosen based upon an examination of Table 5-7 from reference 22. While the permeability constant was greater than 0.1 cm/hr for a few compounds (e.g., 0.2–0.4 cm/hr for DDT and related compounds, greater than 1 for several polycyclic aromatic hydrocarbons), the majority of the compounds listed have permeability constants that are less than 0.1, including several organochlorine and organophosphorous pesticides of the sort of interest in the New River. This value of 0.1 cm/hr, therefore, represents what is probably an overestimation of the permeability constant, and therefore, an overestimation of dermal exposure. Thus, this overestimation increases the confidence that no adverse health effects will occur if the hazard index/hazard quotient is less than 1 (or less than 0.1 for children).

Non-Cancer Adverse Health Effects

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 total 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, and the chemicals must be further evaluated to determine the 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 cause adverse health effects, and further evaluation is required. A hazard index that is less than or equal to one indicates that adverse health effects are unlikely, and those chemicals are not considered further (7). If only one chemical causing a particular effect is detected, then this chemical is evaluated separately.

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 (8). 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 (OSF) for that chemical. The OSF, 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 OSF. 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 Pathway

CDHS has identified one completed exposure pathway, that of the receptor population exposed to chemical contamination through incidental ingestion of river water and through dermal

absorption of contaminants, while playing in the New River. The toxicological evaluation of this pathway will evaluate the two relevant subgroups, adults and children, separately.

In the discussions below, the conclusions reached are based upon concentrations of contaminants measured in water samples which had been filtered prior to analysis, whereas during play activities, any river water incidentally ingested would be unfiltered and therefore contain contaminated sediment. Thus, because we are using filtered water in the dose calculations, this would lead to an underestimate of exposure. In addition, the use of default values for permeability constants means that dermal exposures can only be estimated. This introduces additional uncertainty into the toxicological evaluation.

In evaluating exposure pathways, CDHS deliberately uses assumptions regarding issues such as body weight and ingestion rate that yield worst-case scenarios (Table 6). 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.

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 weighs 70 kg (approximately 154 pounds), plays in the New River for one hour per day, every day, but only exposes his or her arms or legs only (during activities such as wading into the river from the bank, or reaching into the water from a boat). During such activities, an adult is assumed to accidentally ingest about 50 mL of water (about 1/6 of a can of soda) (7). It is also assumed that dermal absorption of chemical contamination will occur through the exposed arms or legs.

In this pathway, for all three sampling locations and both sampling efforts, all hazard quotients/indices were less than 1 (Tables 8 – 13), indicating that non-cancer adverse health effects are not expected to occur.

In this pathway, for all three sampling locations and both sampling efforts, the only significant contributor to the total increased lifetime cancer risk is arsenic (Tables 14 – 19).

Arsenic

Arsenic is a naturally occurring element that is often found in surface and ground waters of California. Its background level is approximately 3 ppb, with concentrations in the New River in the range of 4 – 5 ppb at all three sampling locations and both sampling efforts. 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). Arsenic in drinking water is implicated in the development of skin cancer and in cancer of the bladder, liver, kidneys, and lungs (11,12).

Under this exposure pathway, for all three sampling locations during the first sampling effort, and for the Mexicali and Calexico sampling stations during the second sampling effort, the total increased lifetime cancer risk was 5×10^{-6}. This is considered a very low increased risk. During the second sampling effort at the Salton Sea sampling station, the total increased lifetime cancer risk was 1×10^{-5}. This is considered a low increase in the total lifetime cancer 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 for one hour per day, every day, and also swims in the river, and is thus fully immersed in the contaminated water. During such activities, a child will be assumed to ingest approximately 100 mL of water (about 1/3 of a can of soda) (7). It is also assumed that dermal absorption of chemical contamination will occur.

For all three sampling locations during the first sampling effort, only arsenic was detected at a level sufficient to potentially cause adverse health effects (Tables 20 – 22). During the second sampling effort, several chemicals and groups of chemicals were detected at levels sufficient to potentially cause adverse health effects (Tables 23 – 25). These include chemicals with an effect on the renal system (vanadium and uranium), dermal effects (arsenic), neurological effects (diazinon and disulfoton), and testicular effects (boron). The toxicological implications of exposure to these chemicals are discussed below.

Renal Effects

Uranium was detected at all three sampling locations during the first sampling effort. Samples collected during the first sampling effort were not analyzed for vanadium. Both vanadium and uranium were detected at all three sampling locations during the second sampling effort. Thus, it is likely that vanadium was also present in samples collected during the first sampling effort, though this cannot be confirmed. Carbaryl was also detected, but the total daily dose was very far below the reference dose in all cases, and will not be considered further.

Uranium. Uranium is an element that occurs naturally in soil, ground water, and surface water. background levels of uranium are approximately 5 ppb, while the levels of uranium detected in the New River are in the range of 6 ppb – 11 ppb. The doses of uranium corresponding to these concentrations of uranium are approximately 30,000 to 40,000 times less than doses of uranium shown to cause adverse health effects in animal studies.

The primary non-cancer adverse health effect of uranium ingestion is damage to the kidneys. The extent of damage depends in part the chemical form of the uranium (11,16).

Vanadium. Vanadium is an element that occurs naturally in soils, and also is used frequently in industry. Background levels of vanadium are approximately 5 ppb, while the levels of vanadium detected in the New River range between 18 ppb – 26 ppb. The doses of vanadium corresponding to these concentrations are approximately 1000 times lower than the doses of vanadium which have been shown to cause adverse health effects in animal studies.

The ingestion of very large amounts of vanadium can cause the death of laboratory animals. However, ingestion of lower amounts of vanadium over long periods of time causes damage to the kidneys, lungs, and spleen (11,17).

Combined Effect. The hazard quotient for uranium is well below 0.1 for all three sampling locations and both sampling efforts (0. 02 – 0. 03). The hazard quotient for vanadium ranges from 0.06 – 0.09, with a resulting total hazard index of 0.1 to 0.11. In addition, because an intermediate MRL was used to calculate the hazard index for vanadium, the calculated hazard index is actually lower than it would be if a chronic MRL had been used (the hazard quotient should be somewhat higher than is listed in the Tables).

When considered by itself during the first sampling effort, uranium is not present at levels sufficient to cause kidney damage. However, the combination of both uranium and vanadium as measured in the second sampling effort is sufficient to potentially cause kidney damage to children who are exposed to contamination in the New River during play activities. However, the probability of this occurring is low.

Dermal Effects

Both arsenic and selenium were detected at all three location during both sampling efforts. However, in all cases, selenium was detected at insignificant levels, and will not be considered further.

Arsenic. Background information on arsenic is provided above. The doses of arsenic corresponding to the measured concentrations of arsenic are approximately 20 times lower than doses of arsenic which have been shown to cause adverse health effects in people.

The hazard quotient for arsenic exceeds 0.1 for all three sampling locations during the first sampling effort, and at Mexicali and Calexico during the second sampling effort. At the Salton Sea during the second sampling effort, the hazard quotient is 0.2. These are levels of arsenic that could produce adverse health effect in children who are exposed to contamination in the New River during play activities.

Ingestion of large amounts of arsenic can cause death. Ingestion of somewhat lower levels of arsenic can produce gastrointestinal distress, nausea, vomiting, nervous system damage, and arterial disease. Ingestion of low amounts of arsenic over long periods of time produces darkening of the skin and skin lesions. These effects by themselves are not considered threatening, but they do indicate that arsenic exposure has occurred or is occurring. However, the skin lesions can potentially develop into skin cancer.

Neurological Effects

Chemicals causing neurological effects, at levels sufficient to raise the hazard index to 0.1, were detected only at the Calexico sampling site during the second sampling effort. Those chemicals include diazinon, disulfoton and manganese. The individual effect of manganese is different from that of the other three chemicals, and with a hazard quotient of 0.01, will not be considered further.

Diazinon. Diazinon acts on the nervous system through the inhibition of chemicals responsible for the transmission of nerve impulses. The symptoms of poisoning by these chemicals at lower levels include headaches, dizziness, weakness, and vision problems. Higher levels of exposure can lead to vomiting and diarrhea. (10, 15, 23).

The concentration of diazinon measured at the Calexico sampling station during the second sampling effort are 0.17 ppb. The dose of diazinon corresponding to the concentration is approximately 1300 times less than the dose of diazinon shown to cause adverse health effects in animal studies.

Disulfoton. Disulfoton acts on the nervous system through the inhibition of chemicals responsible for the transmission of nerve impulses. The symptoms of poisoning by these chemicals at lower levels include headaches, dizziness, weakness, and vision problems. Higher levels of exposure can lead to vomiting and diarrhea. At sufficiently high levels, breathing difficulties or death can occur (24).

The concentration of disulfoton at the Calexico sampling location during the second sampling effort was 0.042 ppb. The dose of disulfoton corresponding to this concentration is approximately 4000 times lower than the dose of disulfoton shown to cause adverse health effects in animal studies.

Combined Effect. The hazard quotient for both diazinon and disulfoton is 0.074 and 0.027, respectively, with a combined hazard index of just over 0.1. Thus, adverse health effects might occur in children who are exposed to contaminants in the New River during play activities. However, this is considered very unlikely. This is especially true considering that diazinon, the primary contributor to the total hazard index, has somewhat less severe symptoms than disulfoton.(23,24).

Boron

Boron is a naturally occurring element that is commonly found in soils and waters. Boron is also widely used in industry, especially in the production of glass. The background levels of boron are approximately 240 ppb. The levels of boron measured in the New River range from 820 – 1300 ppb. The dose of boron corresponding to these concentrations are approximately 900 times less than the dose of boron shown to cause adverse health effects in animals.

Ingestion of high levels of boron can cause gastrointestinal distress, including vomiting and diarrhea. Ingestion of lower amounts of boron can cause testicular atrophy and decreased sperm production (11,18).

Only samples collected during the second sampling effort were analyzed for boron. It was detected at all three locations, but only at the Mexicali and Calexico sites was it detected at a level sufficient to raise the hazard quotient to greater than 0.1 (0.15, 0.11, respectively). At these levels, adverse health effects might occur, but would be unlikely.

Toxicological Evaluation of Potentially Completed Exposure Pathway

CDHS has identified one potentially completed exposure pathway at the New River, that of the receptor population using the New River as a primary source of drinking water. CDHS considers this to be an unlikely exposure pathway, but cannot rule it out. The toxicological evaluation of this pathway will consider the two relevant subsets, adults and infants, separately.

In the discussions below, it is assumed that the water is filtered before use. Thus, the analysis of filtered water samples is appropriate, and the calculated oral dose reflects the actual oral dose. However, the dermal dose can still only be estimated, due to the use of default values for the permeability constants.

In evaluating exposure pathways, CDHS deliberately uses assumptions regarding issues such as body weight and ingestion rate that yield worst-case scenarios (Table 7). 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.

Toxicological Evaluation of Receptor Population Using the New River as a Primary Source of Drinking Water – Adults

In evaluating non-cancer adverse health effects on adults using the New River as a primary source of drinking water, CDHS assumes that the adult weighs 70 kg (approximately 154

pounds), and drinks 2 L (about 2 quarts) of water per day, every day (7). Another assumption that the adult uses this water to bathe once per day, for approximately 15 minutes per day, and that dermal absorption of chemical contamination will occur over the whole body.

Under this potentially completed exposure pathway, for all three locations and both sampling periods, no hazard quotient/hazard index exceeded 1, indicating that non-cancer adverse health effects are not expected to occur (Tables 26 – 31).

The only significant contributor to the total increased lifetime cancer risk is arsenic (Tables 32 – 37). Background information on arsenic may be found above. Under this potentially completed exposure pathway, the total increased lifetime cancer risk, at all three locations and both sampling efforts, is 2×10^{-4}, which is considered a moderately low increased risk.

Toxicological Evaluation of Receptor Population Using the New River as a Primary Source of Drinking Water – Infants

In evaluating non-cancer adverse health effects on infants using the New River as a primary source of drinking water, CDHS assumes that the infant weights 10 kg (approximately 22 pounds), drinks 1 L (about 1 quart) of water per day, every day (7). Another assumption is that the infant is bathed daily in this water; for approximately 15 minutes per day, and that dermal absorption of chemical contamination will occur over the whole body.

During the first sampling effort, several chemicals and groups of chemicals were detected at levels which could potentially cause adverse health effects (Tables 38 – 40). These include chemicals with neurological effects (diazinon, carbofuran, manganese), dermal effects, (selenium, arsenic), renal effects (carbaryl, uranium), cardiovascular effects (barium), effects on uric acid levels (molybdenum), and chromium.

During the second sampling effort, chemicals or groups of chemicals detected at levels of potential health concern include those with neurological effects (diazinon, disulfoton, manganese), dermal effects (selenium, arsenic), renal effects (carbaryl, uranium, vanadium), cardiovascular effects (barium), effects on uric acid levels (molybdenum), testicular effects (boron), and chromium (Tables 41 – 43).

Neurological Effects

Chemicals causing neurological effects, at levels sufficient to raise the hazard index to 0.1, were detected only at Calexico during the first sampling effort (diazinon), and at Mexicali (diazinon and manganese) and Calexico (diazinon, disulfoton, and manganese) during the second sampling effort (Tables 38 – 43). Diazinon and disulfoton have been discussed previously. Manganese has a different toxicological effect, and will be evaluated separately.

Diazinon. The concentration of diazinon at Calexico during the first sampling effort was 0.11 ppb, with a corresponding dose of diazinon that is approximately 750 times lower than the dose shown to cause adverse health effects in animal studies. The hazard quotient for diazinon at Calexico during the first sampling effort was 0.13. Thus, adverse health effects are possible, but not likely.

Combined Effects - Diazinon and Disulfoton. At Calexico during the second sampling effort, both diazinon and disulfoton were detected at concentrations of 0.170 and 0.042 ppb, respectively. The doses corresponding to these concentrations are approximately 500 times and 12,000 times less than the doses shown to cause adverse health effects in animals. The hazard index for the combined effects is 0.3. Thus, adverse health effects are possible, but not likely.

Manganese. Manganese is a naturally occurring element and a common constituent of soils. Its background levels are approximately 20 ppb. The measured concentrations of manganese are in the range of 110 – 120 ppb during the first sampling effort, and 190 to 220 ppb during the second sampling effort. The doses of manganese corresponding to these concentrations are approximately 7 times lower than those shown to cause adverse health effects in human studies.

Manganese is used in some pesticides, but not in any of the target pesticides in this study (10). It is also a commonly used industrial metal. The primary health effect of manganese exposure is a trembling similar to that of Parkinson's disease (11,13,14). With a hazard quotient of 0.13, adverse health effects are possible in infants who use the New River as a primary source of drinking water.

Dermal Effects

Both arsenic and selenium were detected at all three sampling locations during both sampling efforts. Selenium was detected at very low levels (hazard quotient = 0.02 – 0.08), and because it has a different dermal effect than arsenic, it will not be considered further.

Arsenic. Background information on arsenic has been presented previously. For all three sampling stations during the first sampling effort, and the Mexicali and Calexico sampling stations during the second sampling effort, the hazard quotient was 1, and was 2 at the Salton Sea sampling station during the second sampling effort. The total dose of arsenic is only about a factor of 2 lower than doses shown to cause adverse health effects in humans. Thus, adverse health effects may occur in infants who use the New River as a primary source of drinking water.

Renal Effects

Uranium was detected at all three sampling stations and during both sampling efforts. Carbaryl was detected at Mexicali and Calexico sampling stations during the first sampling effort, and

all three stations during the second sampling effort. Samples collected during the first sampling effort were not analyzed for vanadium. Vanadium was detected at all three sampling locations during the second sampling effort. Carbaryl, however, was detected at insignificant levels, and will not be evaluated further.

Uranium. Background information on uranium has been given previously. During the first sampling effort, the hazard quotients at Mexicali and Calexico were 0.2, and at the Salton Sea, was 0.4. These correspond to doses that are approximately 2,000 to 4,000 times lower than doses of uranium that have been shown to cause adverse health effects in animals. Thus, adverse health effects are possible, but unlikely.

Vanadium. Background information on vanadium has been given previously. Vanadium was determined only during the second sampling effort, but was detected at all three sampling locations, along with uranium, with hazard quotients of 0.9, 0.6, and 0.9 at Mexicali, Calexico, and the Salton Sea, respectively. The total dose of vanadium is approximately 100 times lower than the dose shown to cause adverse health effects in animals. As discussed above, the use of an intermediate rather than a chronic MRL for vanadium decreases the calculated hazard quotient for vanadium — the actual hazard quotient should actually be higher.

Combined Effect. The hazard index for uranium/vanadium 1.1, 0.8, and 1.2 at Mexicali, Calexico, and the Salton Sea, respectively. At these levels, adverse health effects may be expected to occur in infants who use the New River as a primary source of drinking water.

Barium

Barium is a naturally occurring element that is found at relatively high levels in the soils of the western United States. Depending upon the chemical form of barium, it may also be present in ground or surface water. Barium is also a frequently used industrial metal. The background levels of barium are approximately 100 ppb. The levels of barium measured in the New River range from 68 – 138 ppb. The doses of barium corresponding to these concentrations are approximately 15 times lower than doses shown to cause adverse health effects in humans. The primary adverse health effect of barium ingestion is increased blood pressure (11,20).

Barium was detected at all three sampling locations and during both sampling efforts. The hazard quotient was 0.2, except for the Salton Sea during the first sampling effort (0.1). At these levels, adverse health effects may be expected to occur in infants who use the New River as a primary source of drinking water.

Molybdenum

Molybdenum is a naturally occurring element, but is a relatively minor component of soils in the western United States. It is also an important industrial metal. Background levels of

molybdenum are approximately 8 ppb. The levels of molybdenum detected in the New River range from 12 – 15 ppb. The dose of molybdenum corresponding to these concentrations is approximately 100 times less than doses shown to cause adverse health effects in humans. The primary adverse health effect of molybdenum is an increase in uric acid levels (11).

The hazard quotient for molybdenum is 0.3 for all sampling locations and both sampling efforts except for Calexico during the first sampling effort (0.2). At these levels, adverse health effects might be expected to occur in infants who use the New River as a primary source of drinking water, but are not likely.

Boron

Background information on boron has been provided previously. The hazard quotient for boron is 1.4, 1.1, and 0.9, at Mexicali, Calexico, and the Salton Sea, respectively. This corresponds to a dose of boron approximately 100 times lower than doses shown to cause adverse health effects in animals. At these levels, adverse health effects are possible in infants who use the New River as a primary source of drinking water.

Chromium

Chromium is a naturally occurring element found in rocks and soils in the environment. It is found in several chemical forms. One form, chromium (III) is an essential element, and another form, chromium (VI), is highly toxic, and is sometimes used in pesticides. It is also a widely used industrial metals. Background levels of chromium are approximately 2 ppb. The measured levels of chromium range from 3 – 6 ppb. The dose of chromium corresponding to these concentrations are approximately 4000 times less than doses shown to <u>not</u> cause adverse health effects in humans (11,21).

No specific adverse health effects has been associated with the chronic reference dose for chromium. However, reports of both accidental and deliberate ingestion of large amounts of chromium (VI) (acute exposure) show that gastrointestinal irritation and renal damage are common effects, and death can also occur at high doses. Chromium (VI), when inhaled, is a Known Human Carcinogen (EPA Weight of Evidence classification = A). However, little is known about the potential carcinogenicity of ingested chromium (VI).

The data do no indicate which chromium species were measured. Thus, CDHS assumed that all of the chromium measured was chromium (VI). The hazard quotient for chromium (VI) during the first sampling effort was 0.12 at Mexicali. During the first sampling effort at Calexico and the Salton Sea, and during the second sampling effort at all three locations, the hazard quotient of chromium (VI) was 0.1 or less. Thus, adverse health effects are possible in infants who use the New River as a primary source of drinking water, but very unlikely at Mexicali, but are not excepted anywhere else.

CONCLUSIONS

A variety of organic chemicals and trace elements were detected in the New River. However, adults do not appear to be at risk for non-cancer adverse health effects due to exposure to contaminants in the New River. This includes adults exposed to contamination in the New River while playing in the New River, and, though it is considered to be highly unlikely, adults who use the New River as a primary source of drinking water. The maximum increased lifetime cancer risk for adults exposed to New River contaminants during play activities is approximately 1×10^{-5}, which is considered to be a very low increase. For adults who might use the New River as a primary source of drinking water, the total increased lifetime cancer risk is approximately 2×10^{-4}, which is considered to be a moderately low increase.

For children exposed to contamination in the New River during play activities, adverse health effects are possible, though in most cases, unlikely. The hazard quotient/hazard index for the contaminants of concern are all in the range of 0.1 to 0.2, with a value of less than 0.1 being considered a safe dose. With the exception of arsenic, the total dose of these chemicals is several hundred to several thousand times lower than doses shown to cause adverse health effects. When one considers this, as well as the fact that this exposure pathway is based upon the very conservative assumption that these children play in the New River for one hour, every day, it is highly unlikely that adverse health effects will occur. Arsenic, however, must be considered more carefully. The total dose of arsenic is only about 20 times lower than doses known to cause adverse health effects in humans. Thus, there is a possibility of adverse health effects in these children due to arsenic exposure.

For the chemical exposures described for infants using the New River as a primary source of drinking water, most have either low hazard quotients and doses that are relatively close to the dose causing adverse health effects, or have higher hazard quotients and doses that are much lower than the dose causing adverse health effects. For these chemicals, adverse health effects are possible, but still considered relatively unlikely. However, for arsenic, the maximum hazard index is 2, and the dose is only a factor of two times lower than that shown to cause adverse health effects. Thus, infants exposed to arsenic in this situation are more likely to suffer adverse health effects.

Even though the risks of non-cancer adverse health effects are, in general, relatively low, area residents should still avoid contact with New River water. The water is known to contain disease-causing organisms. Also, it is possible that there are variations in the concentrations of contamination in the river over time that the monitoring study did not detect. Finally, though CDHS attempted to account for this by using the hazard index concept, it is possible that some of these chemicals interact in ways that are not currently known, and which could cause adverse health effects.

Based upon the data available at the time this health consultation was written, CDHS concludes that ingestion and dermal exposure to New River water poses a threat to public health. CDHS

may re-evaluate this conclusion if new information becomes available. CDHS will review new data as they become available.

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. An educational program, designed to raise the awareness of health care providers to issues regarding the New River, has been completed.

2. Reviews of the bottom and suspended sediment data, and the fish data, are in progress, and health consultations based upon the results of these reviews will be written.

Recommendations for Further Action

1. A health consultation regarding the Salton Sea should be undertaken to determine if there are any public health implications.

2. Continue to cooperate in improving the New River's health, 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 in the New River and the Salton Sea. The frequency of monitoring should be increased to identify variations in the concentration of chemical contamination over time.

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CERTIFICATION

The Examination of Contamination in the Water Column 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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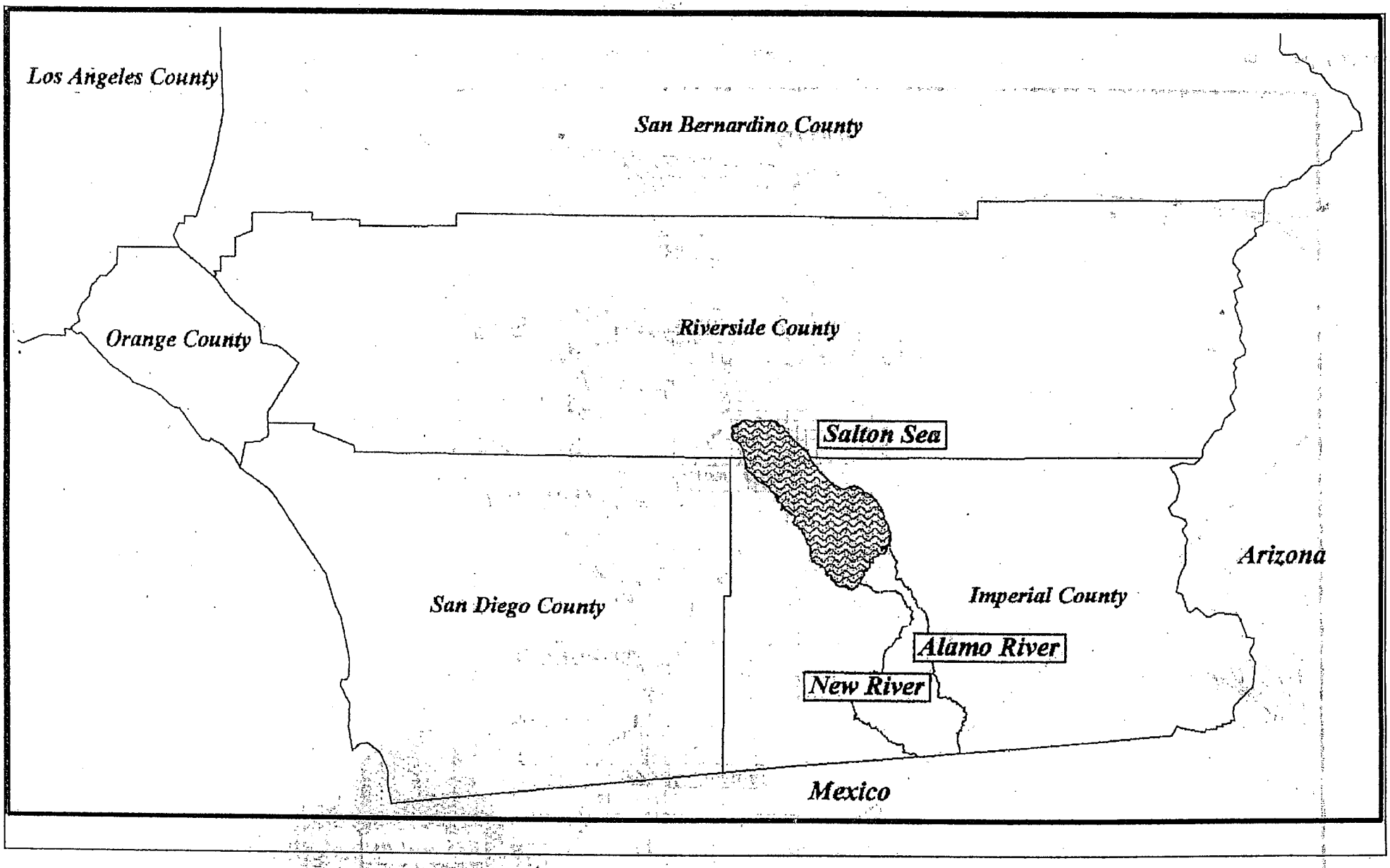

Figure 1. Southern California showing location of Imperial County, the New River, and the Salton Sea.

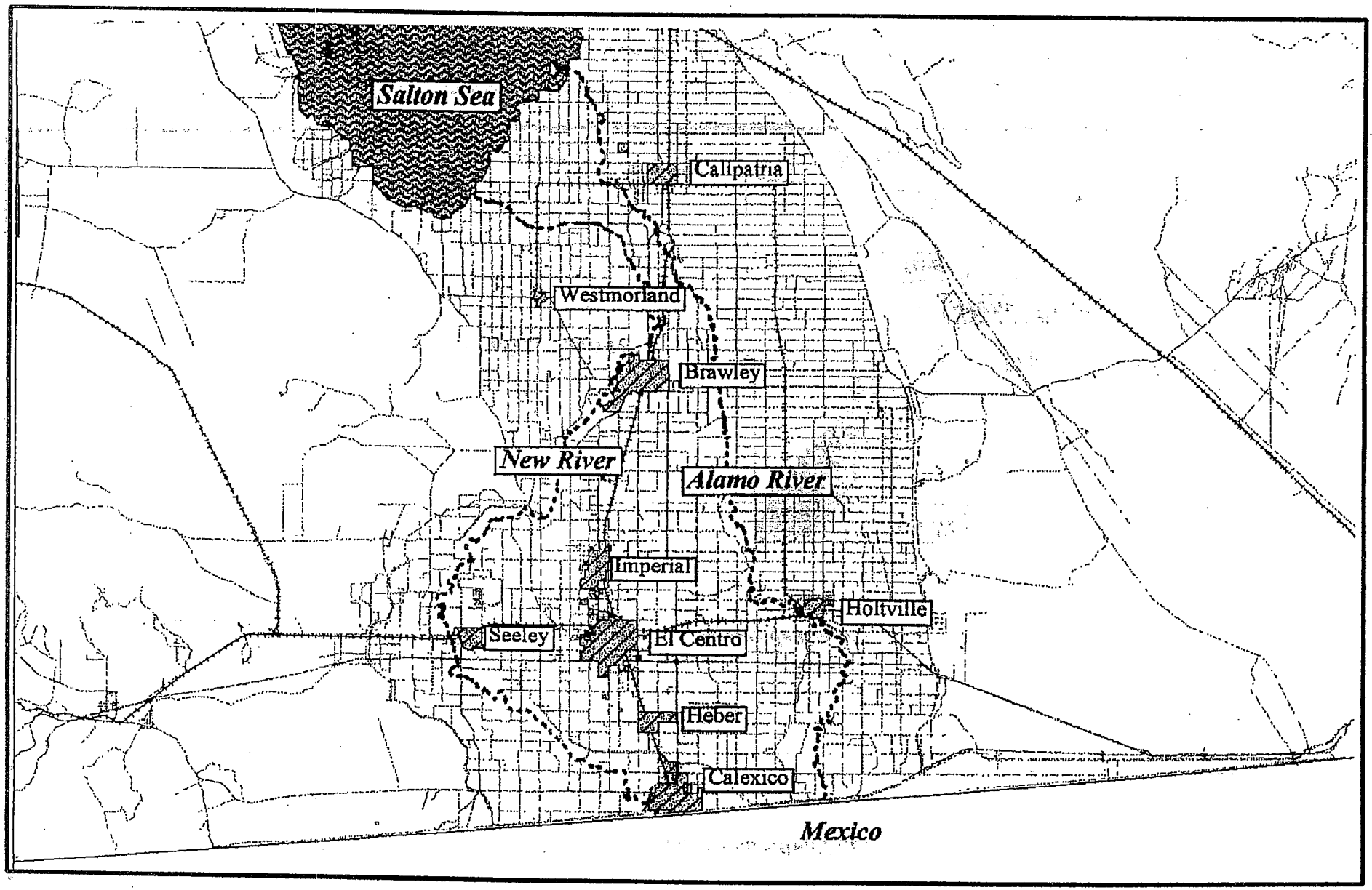

Figure 2. South central Imperial County showing location of the New River, the Salton Sea, and principle towns and Cities

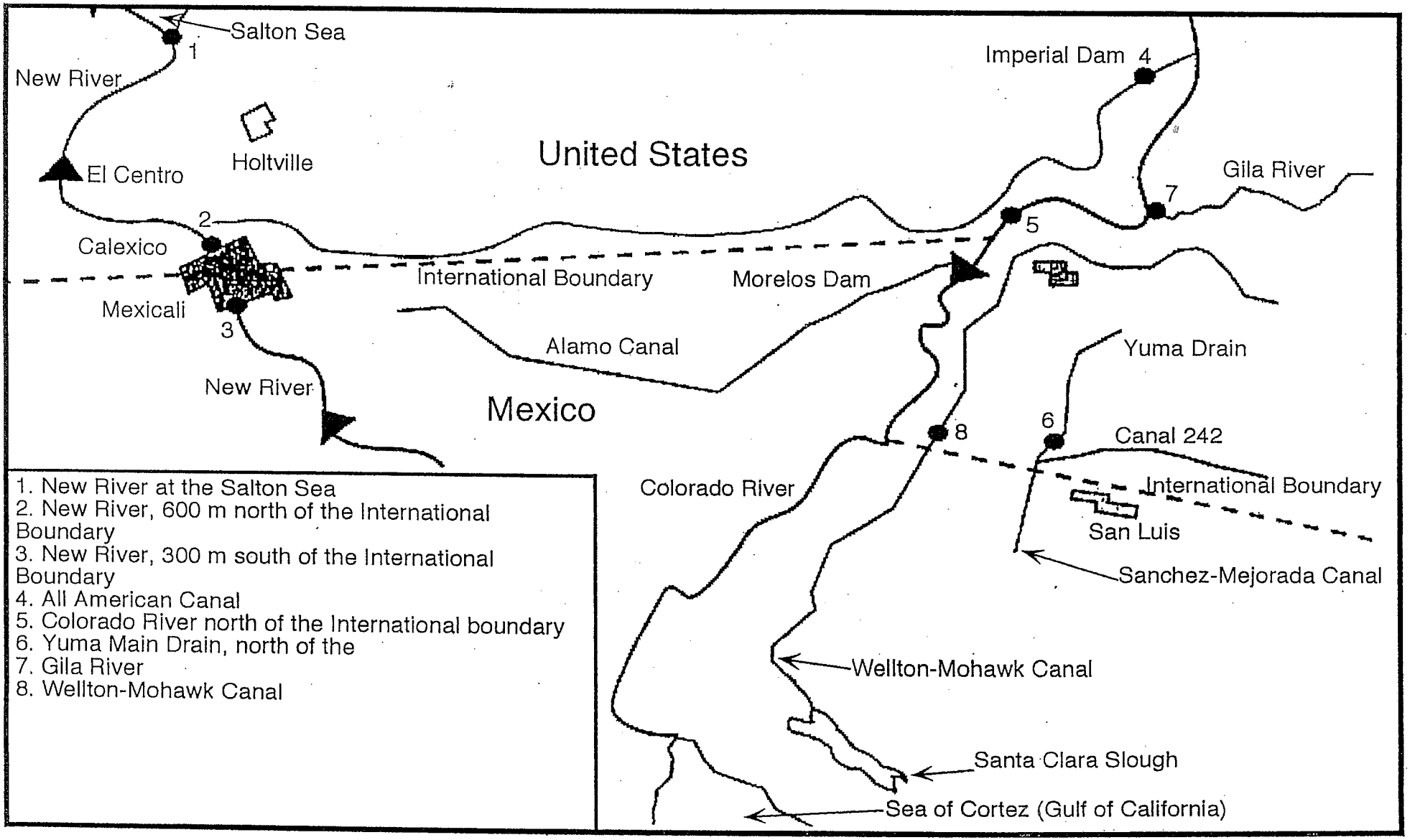

Figure 3. Map of US/Mexico border zone showing sampling locations.

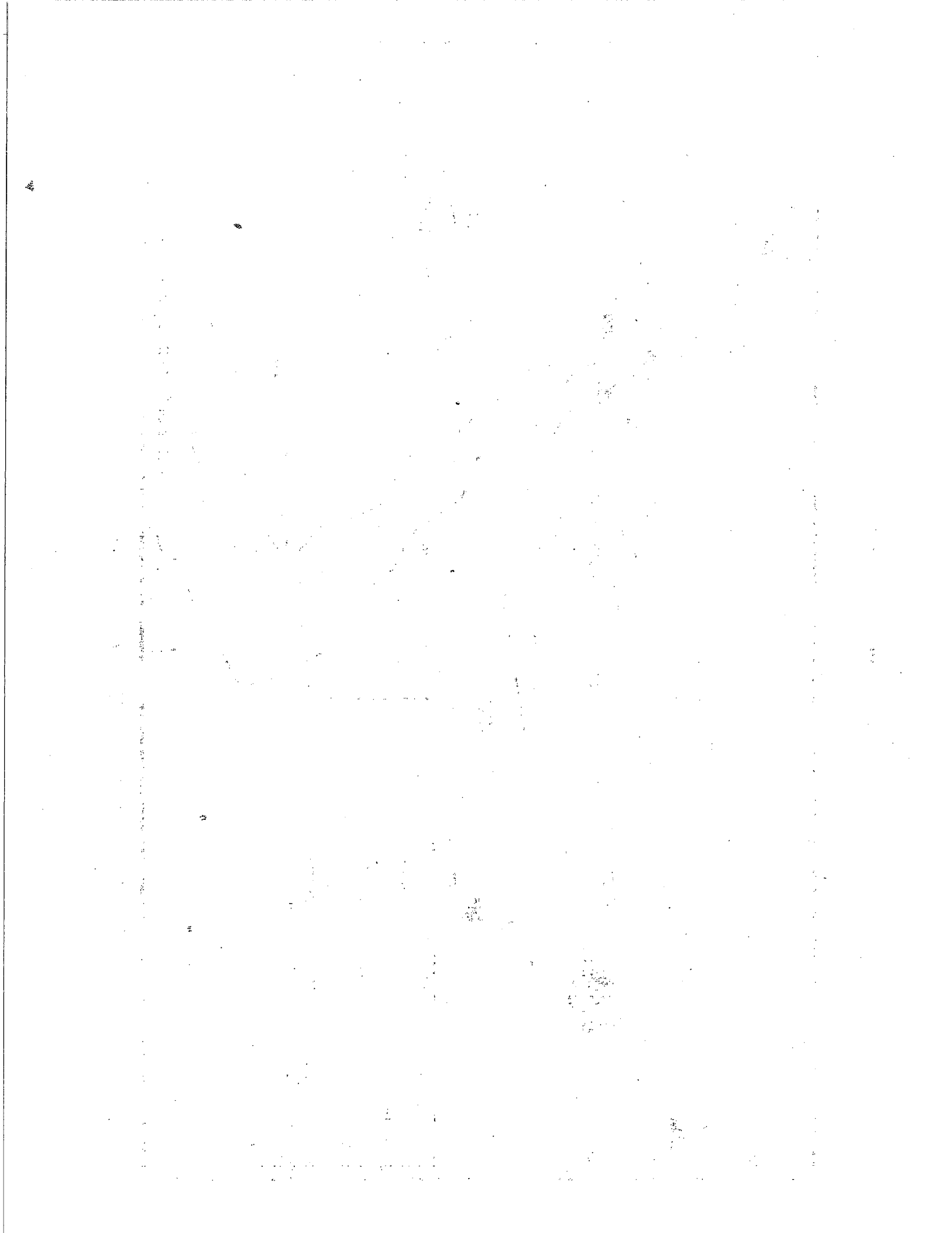

Table 1. List of target compounds in New River water samples.

Base/Neutral/Acid Compounds	Volatile Organic Compounds	Carbopack Pesticides	C18 Pesticides	Trace Elements
Acenaphthylene	Dibromomethane	Bromacil	Propchlor	Arsenic
Acenaphthene	Dichlorobromomethane	Dicamba	Butylate	Barium
Anthracene	Carbon tetrachloride	Linuron	Simazine	Beryllium
Benzo B fluroanthene	1,2-dichloroethane	MCPA	Prometon	Cadmium
Benzo K fluroanthene	Bromoform	MCPB	Diethyl Atrazine	Chromium (as Cr VI)
Benzo A pyrene	Chlorodibromomethane	Methiocarb	Cyanizine	Cobalt
Bis 2-chloroethyleter unfiltered recov.	Chloroform	Propoxur	Fonofos	Copper
Bis(2-chloroethoxy)methane	Toluene	Bentazon	Alpha BHC	Iron
Bis(2-chloroisopropyl)ether	Benzene	2,4-DB	p,p'-DDE	Lead
N-butylbenzylphthalate	Chlorobenzene	Fluometuron	Chlorpyrifos	Manganese
Chrysene	Chloroethane	Oxamyl	Lindane	Molybdenum
Diethylphthalate	Ethylbenzene	2,4-D	Dieldrin	Nickel
Dimethylphthalate	Methylbromide	2,4,5-T	Metolachlor	Silver
Fluoranthene	Methylchloride	Silvex	Malathion	Zinc
Fluorene	Methylenechloride	Trichlopyr	Parathion	Antimony
Hexachlorocyclopentadiene	Tetrachloroethylene	Propham	Diazinon	Aluminum
Hexachloroethane	Trichlorofluoromethane	Picloram	Atrazine wat. dis. rec.	Selenium
Indeno(1,2,3-cd)pyrene	1,1-Dichloroethane	Oryzalin	Alachlor wat. dis. rec.	Uranium
Isophorone	1,1-Dichloroethylene	Norflurazon	Acetochlor wat. filt. rec.	Mercury
N-nitrosodi-n-propylamine	1,1,1-Trichloroethane	Neburon	Metribuzinsenc or	Boron
N-nitrosodiphenylamine	1,1,2-Trichloroethane	1-Naphthol		Cadmium (unfiltered)
N-nitrosodimethylamine	1,1,2,2-Tetrachloroethane	Methomyl	2,6-Diethylaniline	Chromium (tot. recov.)
Nitrobenzene wat. unfil.recov.	o-Dichlorobenzene	Fenuron	Trifluralin	Lead (tot. recov.)
Parachlorometacresol	1,2-Dichloropropane	Esfenvalerate	Ethalfluralin	Manganese (tot. recov.)
Phenanthrene	1,2-Transdichloroethene	DNOC	Phorate	Copper (tot. recov.)
Pyrene	1,2,4-Trichlorobenzene	Diuron	Terbacil	Iron (tot. recov)
Benzo-g,h,l-perylene-1,12-benzoperylene	1,3-Dichlorobenzene	Dinoseb	Linuron	Nickel (tot. recov.)
Benzo-a-anthracene-1,2-benzanthracene	1,4-Dichlorobenzene	Dichlorprop	Methylparathion	Vanadium
Benzene-o-dichloro	Dichlorodifluoromethane	Dichlobenil	EPTC	Zinc (tot. recov.)
Benzene-1,2,4-trichloro	Naphthalene	Dacthal	Pebulate	Mercury (tot. recov.)
1,2,5,6-dibenzylanthracene	trans-1,3-Dichloropropene	Clopyralid	Tebuthiuron	Arsenic (total)
Benzene-1,3--dichloro	cis-1,3-dichloropropene	Chlorothalonil	Molinate	Antimony (total)
Benzene-1,4-dichloro wat. unfil. recov.	Vinyl chloride	Chloramben	Ethoprop	Selenium (total)
2-Chloronaphthalene	Trichloroethylene	3-Hydroxycarbofuran	Benfluralin	
2-Chlorophenol	Hexachlorobutadiene	Carbofuran	Carbofuran	
2-Nitrophenol	cis-1,2-Dichloroethene	Carbaryl	Terbufos	

Di-n-octylphthalate	Styrene	Bromoxynil	Pronamide	
2,4-Dichlorophenol	1,1-Dichloropropene	Aldicarb	Disulfoton	
2,4-Dimethylphenol	2,2-Dichloropropane	Aldicarb sulfone	Triallate	
2,4-Dinitrotoluene	1,3-Dichloropropane	Aldicarb sulfoxide	Propanil	
2,4-Dinitrophenol	1,2,4-Trimethylbenzene	Acifluorfen	Carbaryl	
2,4,6-Trichlorophenol	Isopropylbenzene		Thiobencarb	
2,6-Dinitrotoluene	n-Propylbenzene		DCPA	
3,3'-Dichlorobenzidine	1,3,5-Trimethylbenzene		Pendimethalin	
4-Bromophenylphenylether	o-Chlorotoluene		Napropamide	
4-Chlorophenylphenylether	p-Chlorotoluene		Propargite	
4-Nitrophenol	Bromochloromethane		Methylazinphos	
4,6-Dinitro-o-cresol	n-Butylbenzene		Permethrin, cis	
Phenol (C6H-5OH)	sec-Butylbenzene			
Naphthalene	tert-Butylbenzene			
Pentachlorophenol	p-Isopropyltoluene			
Bis(2-ethylhexyl)phthalate	1,2,3-Trichloropropane			
Di-n-butylphthalate	1,1,1,2-Tetrachloroethane			
Benzidine	1,2,3-Trichlorobenzene			
Hexachlorobenzene	1,2-Dibromoethane			
Hexachlorobutadiene	Freon-113			
1,2-Diphenylhydrazine	Methyl tert-butylether			
	Xylene			
	Bromobenzene			
	Dibromochloropropane			

Table 2. List of Chemicals Detected in New River Water Column at Mexicali

BNAs	VOCs (1 sampling only)	Carbopack Pest.	C18 Pest.	Metals
1st Sampling (3/28/95)				
none	toluene	none	chlorpyrifos	arsenic
	1,4-dichlorobenzene		malathion	barium
	1,2,4-trimethylbenzene		diazinon	chromium
	p-isopropyltoluene		EPTC	copper
	xylene		carbaryl	iron
			DCPA	manganese
				molybdenum
				nickel
				zinc
				aluminum
				selenium
				uranium
2nd Sampling (4/11/96)				
none		none	chlorpyrifos	arsenic
			malathion	barium
			diazinon	chromium
			atrazine	copper
			EPTC	iron
			carbofuran	manganese
			propanil	molybdenum
			carbaryl	nickel
			DCPA	zinc
				aluminum
				selenium
				uranium
				boron
				chromium (total rec.)
				manganese (total rec)
				copper (total rec)
				iron (total rec)
				nickel (total rec)
				vanadium
				zinc (total rec)
				arsenic (total)
				antimony (total)
				selenium (total)

Table 3. List of Chemicals Detected in New River Water Column at Calexico

BNAs	VOCs (1 sampling only)	Carbopack Pest.	C18 Pest.	Metals
1st Sampling (3/25/95)				
none	toluene	none	chlorpyrifos	arsenic
	chloroform		malathion	barium
	1,4-dichlorobenzene		diazinon	chromium
	1,2,4-trimethylbenzene		trifluralin	copper
	p-isopropyltoluene		EPTC	iron
	xylene		carbofuran	manganese
			carbaryl	molybdenum
			DCPA	nickel
				zinc
				aluminum
				selenium
				uranium
2nd Sampling (4/10/96)				
none		none	chlorpyrifos	arsenic
			malathion	barium
			diazinon	chromium
			atrazine	copper
			EPTC	iron
			carbofuran	manganese
			disulfoton	molybdenum
			carbaryl	nickel
			DCPA	zinc
				aluminum
				selenium
				uranium
				boron
				chromium (total rec)
				manganese (total rec)
				copper (total rec)
				iron (total rec)
				nickel (total rec)
				vanadium
				zinc (total rec)
				arsenic (total)
				antimony (total)
				selenium (total)

Table 4. List of Chemicals Detected in New River Water Column at the Salton Sea

BNAs	VOCs (1 sampling only)	Carbopack Pest.	C18 Pest.	Metals
1st Sampling (3/22/95)				
none	chlorobenzene	linuron	simazine	arsenic
	1,2-dichlorobenzene	2,4-D	prometon	barium
	1,3-dichlorobenzene	carbofuran	diethyl atrazine	chromium
		bromoxynil	chlorpyrifos	copper
			malathion	iron
			diazinon	manganese
			atrazine	molybdenum
			metribuzinsencor	nickel
			trifluralin	zinc
			linuron	aluminum
			EPTC	selenium
			DCPA	uranium
			pendimethalin	
2nd Sampling (4/9/96)				
none		diuron	simazine	arsenic
			diethyl atrazine	barium
			fonofos	chromium
			chlorpyrifos	copper
			malathion	iron
			diazinon	manganese
			atrazine	molybdenum
			metribuzinsencor	nickel
			trifluralin	zinc
			linuron	aluminum
			benfluralin	selenium
			carbofuran	uranium
			disulfoton	boron
			carbaryl	chromium (total rec)
			DCPA	lead (total rec)
			pendimethalin	manganese (total rec)
				copper (total rec)
				iron (total rec)
				nickel (total rec)
				vanadium
				zinc (total rec)
				arsenic (total)
				antimony (total)
				selenium (total)

Table 5. Completed Exposure Pathways

Pathway Namne	Elements of Exposure Pathway					Time Frame
	Source	Environmental Medium	Point of Exposure	Route of Exposure	Receptor Population	
Receptor population exposed to New River water during activities in or near the river	Agricultural Runoff Industrial Discharge Domestic Sewage Build up of naturally occuring elements	Surface Water	New River	Incidental Ingestion Dermal Absorption	Adults Children	Past Present Future

Table 6. List of default values

Parameter	Receptor Population		
	Adults	Children	Infants
Body Weight	70 kg	30 kg	10 kg
Body Surface Area	5500 cm^2 (legs only) 19400 cm^2 (whole body)	8750 cm^2	3500
Incidental Ingestion Rate	0.05 L/day	0.1 L/day	NA
Drinking Water Ingestion Rate	2 L/day	1 L/day	1 L/day
Exposure Frequency	365 days/year	365 days/year	365 days/year
Exposure Duration for play activities	1 hour/day	1 hour/day	NA
Exposure Duration for Bath Time	15 min	15 min	15 min
Age Range	greater than 18 years old	1 – 11 years old	1 year old

NA = Not Applicable

Table 7. Potentially Completed Exposure Pathways. Element in *Italics* is missing or potentially missing element.

Pathway Namne	Elements of Exposure Pathway					Time Frame
	Source	Environmental Medium	Point of Exposure	Route of Exposure	Receptor Population	
Receptor population using New River as a primary source of drinking water	Agricultural Runoff Industrial Discharge Domestic Sewage Build up of naturally occuring elements	Surface Water	*Water brought to home from New River*	Ingestion	Adults Infants	Past Present Future

Table 8: 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	Total Dose (mg/kg/day	Ref Dose (mg/kg/day	Hazard Quotien	Critical Effect
Toluene	3.92	4.3E-06	2.0E-01	0.000	Neurological
Chlorpyrifos	0.024	2.1E-07	3.0E-03	0.000	Neurological
Malathion	0.044	3.8E-07	2.0E-02	0.000	Neurological
Diazinon	0.055	4.7E-07	9.0E-05	0.005	Neurological
Manganese	120.0	9.5E-05	1.4E-01	0.001	Neurological
Xylene	1.0	7.0E-06	2.0E+00	0.000	Neurological
				0.0	Total Neurological
Selenium	2.0	1.6E-06	5.0E-03	0.000	Dermal
Arsenic	4.0	3.2E-06	3.0E-04	0.011	Dermal
				0.0	Total Dermal Effects
Carbaryl	0.018	1.5E-07	1.0E-01	0.000	Renal
Uranium	7.0	5.6E-06	3.0E-03	0.002	Renal
				0.0	Total Renal Effects
1,4-	0.6	3.4E-06	1.0E-01	0.000	Hepatic
EPTC	0.014	1.2E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.005	4.3E-08	1.0E-02	0.000	Respiratory
Barium	138.0	1.1E-04	7.0E-02	0.002	Cardivascular
Nickel	15.0	1.1E-05	2.0E-02	0.001	Decr Body Wgt
Zinc	8.0	6.1E-06	3.0E-01	0.000	Hematological
1,2,4-Trimethyl-	0.4	3.4E-06	NA	NA	
p-	0.4	3.4E-06	NA	NA	
Chromium	6.0	5.2E-06	5.0E-03	0.001	None Recorded
Copper	8.0	6.3E-06	NA	NA	
Iron	20.0	1.6E-05	NA	NA	
Molybdenum	14.0	1.1E-05	5.0E-03	0.002	Incr Uric Acid
Aluminum	5.0	4.0E-06	NA	NA	

Table 9. 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	Total Dose (mg/kg/day	Ref.Dose (mg/kg/day	Hazard Quotien	Critical Effect
Toluene	3.92	4.3E-06	2.0E-01	0.000	Neurological
Chlorpyrifos	0.023	2.0E-07	3.0E-03	0.000	Neurological
Malathion	0.060	5.1E-07	2.0E-02	0.000	Neurological
Diazinon	0.110	9.4E-07	9.0E-05	0.010	Neurological
Xylene	1.0	7.0E-06	2.0E-01	0.000	Neurological
Manganese	110.0	8.7E-05	1.4E-01	0.001	Neurological
Carbofuran	2.100	1.8E-05	5.0E-03	0.004	Neurological
				0.0	Total Neurological
Chloroform	0.3	2.6E-06	1.0E-02	0.000	Hepatic
1,4-	0.7	3.9E-06	1.0E-01	0.000	Hepatic
Trifluralin	0.003	2.6E-08	7.5E-03	0.000	Hepatic
				0.0	Total Hepatic
Selenium	1.0	7.9E-07	5.0E-03	0.000	Dermal
Arsenic	4.0	3.2E-06	3.0E-04	0.011	Dermal
				0.0	Total Dermal Effects
Uranium	6.0	4.8E-06	3.0E-03	0.002	Renal
Carbaryl	0.15	1.3E-06	1.0E-01	0.000	Renal
				0.002	Total Renal Effects
EPTC	0.015	1.3E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.008	6.9E-08	1.0E-02	0.000	Respiratory
Barium	126.0	1.0E-04	7.0E-02	0.001	Cardiovascular
Nickel	19.0	1.4E-05	2.0E-02	0.001	Decr Body Wgt
Zinc	7.0	5.3E-06	3.0E-01	0.000	Hematological
1,2,4-Trimethyl-	0.5	4.3E-06	NA	NA	
p-	0.4	3.4E-06	NA	NA	
Chromium	5.0	4.4E-06	2.0E-02	0.000	None Recorded
Copper	65.0	5.2E-05	NA	NA	
Iron	68.0	5.4E-05	NA	NA	
Molybdenum	12.0	9.5E-06	5.0E-03	0.002	Incr Uric Acid
Aluminum	20.0	1.6E-05	NA	NA	

Table 10. 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	Total Dose (mg/kg/day	Ref Dose (mg/kg/day	Hazard Quotien	Critical Effect
Carbofuran	1.40	1.2E-05	5.0E-03	0.002	Neurological
Chlorpyrifos	0.010	8.6E-08	3.0E-03	0.000	Neurological
Malathion	0.100	8.6E-07	2.0E-02	0.000	Neurological
Diazinon	0.076	6.5E-07	9.0E-05	0.007	Neurological
Manganese	120.0	9.5E-05	1.4E-01	0.001	Neurological
				0.010	Total Neurological
Metribuzin	0.007	6.0E-08	2.5E-02	0.000	Hepatic
Trifluralin	0.340	2.9E-06	7.5E-03	0.000	Hepatic
Chlorobenzene	2.74	2.3E-05	4.0E-01	0.000	Hepatic
1,2-	25.26	2.2E-04	9.0E-02	0.002	Hepatic
				0.003	Total Hepatic
Linuron	0.05	4.3E-07	2.0E-03	0.000	Hematological
2,4-D	0.12	1.0E-06	1.0E-02	0.000	Hematological
Linuron	0.087	7.5E-07	2.0E-03	0.000	Hematological
Pendamethalin	0.069	5.9E-07	4.0E-02	0.000	Hematological
Zinc	6.0	4.6E-06	3.0E-01	0.000	Hematological
				0.001	Total Hematological
Atrazine	0.130	1.1E-06	3.5E-02	0.000	Decr. Wgt gain
Nickel	10.0	7.2E-06	2.0E-02	0.000	Decr Body Wgt
Simazine	0.010	8.6E-08	5.0E-03	0.000	Reduced Wgt Gain
				0.000	Total Body Weight
Selenium	3.0	2.4E-06	5.0E-03	0.000	Dermal
Arsenic	4.0	3.2E-06	3.0E-04	0.011	Dermal
				0.011	Total Dermal Effects
Uranium	11.0	8.7E-06	3.0E-03	0.003	Renal
EPTC	0.210	1.8E-06	2.5E-02	0.000	Musculoskeletal
DCPA	0.096	8.2E-07	1.0E-02	0.000	Respiratory
Barium	101.0	8.0E-05	7.0E-02	0.001	Cardiovascular
Bromoxynil	0.06	5.1E-07	2.0E-02	0.000	None listed
Prometon	0.005	4.3E-08	1.5E-02	0.000	None Observed
Diethyl Atrazine	0.006	5.1E-08	NA	NA	
Chromium	4.0	3.5E-06	5.0E-03	0.001	None Recorded
Copper	7.0	5.6E-06	NA	NA	
Iron	15.0	1.2E-05	NA	NA	
Molybdenum	14.0	1.1E-05	5.0E-03	0.002	Incr Uric Acid
Aluminum	3.0	2.4E-06	NA	NA	
1,3-	21.58	1.8E-04	NA	NA	None Observed

Table 11. 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	Total Dose (mg/kg/day	Ref.Dose (mg/kg/day	Hazard Quotien	Critical Effect
Chlorpyrifos	0.026	2.2E-07	3.0E-03	0.000	Neurological
Malathion	0.100	8.6E-07	2.0E-02	0.000	Neurological
Diazinon	0.059	5.1E-07	9.0E-05	0.006	Neurological
Carbofuran	0.031	2.7E-07	5.0E-03	0.000	Neurological
Manganese	215.0	1.7E-04	1.4E-01	0.001	Neurological
				0.0	Total Neurological
Carbaryl	0.035	3.0E-07	1.0E-01	0.000	Renal
Uranium	6.0	4.8E-06	3.0E-03	0.002	Renal
Vanadium	26.0	2.1E-05	3.0E-03	0.007	Renal
				0.0	Total Renal Effects
Atrazine	0.016	1.4E-07	3.5E-02	0.000	Decr. Wgt gain
Nickel	12.0	9.5E-06	2.0E-02	0.000	Decr Body Wgt
				0.0	Total Body Weight
Arsenic	4.0	3.2E-06	3.0E-04	0.011	Dermal
Selenium	2.0	1.6E-06	5.0E-03	0.000	Dermal
				0.0	Total Dermal Effects
EPTC	0.011	9.4E-08	2.5E-02	0.000	Musculoskeletal
Propanil	0.0	1.5E-07	5.0E-03	0.000	Incr. Spleen Wgt
DCPA	0.004	3.4E-08	1.0E-02	0.000	Respiratory
Barium	126.0	1.0E-04	7.0E-02	0.001	Cardivascular
Chromium	4.0	3.5E-06	5.0E-03	0.001	None Recorded
Copper	10.0	7.9E-06	NA	NA	
Iron	41.0	3.3E-05	NA	NA	
Molybdenum	15.0	1.2E-05	5.0E-03	0.002	Incr. Uric Acid
Zinc	6.0	4.6E-06	3.0E-01	0.000	Hematological
Aluminum	7.0	5.6E-06	NA	NA	
Boron	1300.0	1.0E-03	9.0E-02	0.011	Testicular

Table 12. 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	Total Dose (mg/kg/day	Ref.Dose (mg/kg/day	Hazard Quotien	Critical Effect
Chlorpyrifos	0.042	3.6E-07	3.0E-03	0.000	Neurological
Malathion	0.059	5.1E-07	2.0E-02	0.000	Neurological
Diazinon	0.170	1.5E-06	9.0E-05	0.016	Neurological
Carbofuran	0.078	6.7E-07	5.0E-03	0.000	Neurological
Disulfoton	0.042	3.6E-07	6.0E-05	0.006	Neurological
Manganese	187.0	1.5E-04	1.4E-01	0.001	Neurological
				0.0	Total Neurological
Carbaryl	0.056	4.8E-07	1.0E-01	0.000	Renal
Uranium	6.0	4.8E-06	3.0E-03	0.002	Renal
Vanadium	18.0	1.4E-05	3.0E-03	0.005	Renal
				0.0	Total Renal Effects
Atrazine	0.026	2.2E-07	3.5E-02	0.000	Decr. Wgt gain
Nickel	13.0	1.0E-05	2.0E-02	0.001	Decr Body Wgt
				0.0	Total Body Weight
Arsenic	4.0	3.2E-06	3.0E-04	0.011	Dermal
Selenium	1.0	7.9E-07	5.0E-03	0.000	Dermal
				0.0	Total Dermal Effects
EPTC	0.015	1.3E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.006	5.1E-08	1.0E-01	0.000	Respiratory
Barium	116.0	9.2E-05	7.0E-02	0.001	Cardiovascular
Chromium	3.0	2.6E-06	5.0E-03	0.001	None Recorded
Copper	6.0	4.8E-06	NA		NA
Iron	47.0	3.7E-05	NA		NA
Molybdenum	14.0	1.1E-05	5.0E-03	0.002	Incr. Uric Acid
Zinc	7.0	5.3E-06	3.0E-01	0.000	Hematological
Aluminum	9.0	7.1E-06	NA		NA
Boron	1000.0	7.9E-04	9.0E-02	0.009	Testicular

Table 13. 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	Total Dose (mg/kg/day	Ref.Dose (mg/kg/day	Hazard Quotien	Critical Effect
Fonofos	0.00	3.4E-08	2.0E-03	0.000	Neurological
Chlorpyrifos	0.012	1.0E-07	3.0E-03	0.000	Neurological
Malathion	0.120	1.0E-06	2.0E-02	0.000	Neurological
Diazinon	0.027	2.3E-07	9.0E-05	0.003	Neurological
Carbofuran	0.42	3.6E-06	5.0E-03	0.001	Neurological
Disulfoton	0.014	1.2E-07	6.0E-05	0.002	Neurological
Manganese	104.0	8.2E-05	1.4E-01	0.001	Neurological
				0.0	Total Neurological
Trifluralin	0.110	9.4E-07	7.5E-03	0.000	Hepatic
Benfluralin	0.004	3.4E-08	3.0E-01	0.000	Hepatic
Metribuzin	0.015	1.3E-07	2.5E-02	0.000	Hepatic
				0.0	Total Hepatic
Carbaryl	0.017	1.5E-07	1.0E-01	0.000	Renal
Uranium	10.0	7.9E-06	3.0E-03	0.003	Renal
Vanadium	26	2.1E-05	3.0E-03	0.007	Renal
				0.0	Total Renal Effects
Pendamethalin	0.059	5.1E-07	4.0E-02	0.000	Hematological
Linuron	0.032	2.7E-07	2.0E-03	0.000	Hematological
Zinc	5.0	3.8E-06	3.0E-01	0.000	Hematological
				0.0	Total Hematological
Simazine	0.013	1.1E-07	5.0E-03	0.000	Reduced Wgt Gain
Nickel	5.0	3.6E-06	2.0E-02	0.000	Decr Body Wgt
Atrazine	2.600	2.2E-05	3.5E-02	0.001	Decr. Wgt gain
				0.0	Total Body Weight
Arsenic	5.0	4.0E-06	3.0E-04	0.013	Dermal
Selenium	4.0	3.2E-06	5.0E-03	0.001	Dermal
				0.0	Total Dermal Effects
Diethyl Atrazine	0.050	4.3E-07	NA	NA	
DCPA	0.067	5.7E-07	1.0E-02	0.000	Respiratory
Barium	88.0	7.0E-05	7.0E-02	0.001	Cardiovascular
Chromium	5.0	4.4E-06	5.0E-03	0.001	None Recorded
Copper	7.0	5.6E-06	NA	NA	
Iron	15.0	1.2E-05	NA	NA	
Molybdenum	14.0	1.1E-05	5.0E-03	0.002	Incr. Uric Acid
Aluminum	4.0	3.2E-06	NA	NA	
Boron	820	6.5E-04	9.0E-02	0.007	Testicular

Table 14. Total increased lifetime cancer risk for adults playing in the New River at Mexicali (sampling date 3/28/95).

Chemical	Conc	Total Daily (mg/kg/day)	Oral Slope 1/(mg/kg/day)	Weight of (EPA/NTP/IARC)	Individu Chem
1,4-	0.6	3.4E-06	4.0E-02	-/2/2B	1.3E-07
Carbaryl	0.018	1.5E-07	2.3E-02	C/-/-	3.5E-09
DCPA	0.005	4.3E-08	1.4E-03	C/-/-	6.2E-11
Arsenic	4.0	3.2E-06	1.5E+00	A/1/-	4.8E-06
				Total Risk =	4.9E-06

Table 15. Total increased lifetime cancer risk for adults playing in the New River at Calexico (sampling date 3/25/95).

Chemical	Conc	Total Daily	Oral Slope 1/(mg/kg/day)	Weight of (EPA/NTP/IARC)	Individu Chem
Chloroform	0.3	2.6E-06	6.1E-03	B2/2/2B	1.6E-08
1,4-	0.7	3.9E-06	4.0E-02		1.6E-07
Trifluralin	0.003	2.6E-08	7.7E-03	C/-/-	2.0E-10
Carbaryl	0.150	1.3E-06	2.3E-02	C/-/-	2.9E-08
DCPA	0.008	6.9E-08	1.4E-03	C/3/-	9.9E-11
Arsenic	4.0	3.2E-06	1.5E+00	A/1/-	4.8E-06
				Total Risk =	5.0E-06

Table 16. Total increased lifetime cancer risk for adults playing in the New River at the Salton Sea (sampling date 3/22/95).

Chemical	Conc	Total Daily	Oral Slope 1/(mg/kg/day)	Weight of (EPA/NTP/IARC)	Individu Chem
Bromoxynil	0.06	5.1E-07	1.0E-01	C/-/-	5.3E-08
SImazine	0.01	8.6E-08	1.2E-01	C/-/-	1.0E-08
Atrazine	0.13	1.1E-06	2.2E-01	C/3/2B	2.5E-07
Trifluralin	0.34	2.9E-06	7.7E-03	C/-/-	2.2E-08
DCPA	0.10	8.2E-07	1.4E-03	C/3/-	1.2E-09
Arsenic	4.0	3.2E-06	1.5E+00	A/1/-	4.8E-06
				Total Risk =	5.1E-06

Table 17. Increased lifetime cancer risk for adults playing in the New River at Mexicali (sampling date 4/11/96).

Chemical	Conc	Total Daily (mg/kg/day)	Oral Slope 1/(mg/kg/day)	Weight of (EPA/NTP/IARC)	Individu Chem
Carbaryl	0.035	3.0E-07	2.3E-02	C/-/-	6.8E-09
DCPA	0.004	3.4E-08	1.4E-03	C/-/-	4.9E-11
Arsenic	4.0	3.2E-06	1.5E+00	A/1/-	4.8E-06
				Total Risk =	4.8E-06

Table 18. Increased lifetime cancer risk for adults playing in the New River at Calexico (sampling date 4/10/96).

Chemical	Conc	Total Daily	Oral Slope 1/(mg/kg/day)	Weight of (EPA/NTP/IARC)	Individu Chem
Carbaryl	0.056	4.8E-07	2.3E-02	C/-/-	1.1E-08
DCPA	0.006	5.1E-08	1.4E-03	C/-/-	7.4E-11
Arsenic	4.0	3.2E-06	1.5E+00	A/1/-	4.8E-06
				Total Risk =	4.8E-06

Table 19. Increased lifetime cancer risk for adults playing in the New River at the Salton Sea (sampling date 4/9/96).

Chemical	Conc	Total Daily	Oral Slope 1/(mg/kg/day)	Weight of (EPA/NTP/IARC)	Individu Chem
Simazine	0.013	1.1E-07	1.2E-01	C/3/-	1.3E-08
Atrazine	2.600	2.2E-05	2.2E-01	C/3/2B	4.9E-06
Trifluralin	0.110	9.4E-07	7.7E-03	C/-/-	7.3E-09
Carbaryl	0.017	1.5E-07	2.3E-02	C/-/-	3.3E-09
DCPA	0.067	5.7E-07	1.4E-03	C/-/-	8.3E-10
Arsenic	5.0	4.0E-06	1.5E+00	A/1/-	5.9E-06
				Total Risk =	1.1E-05

[1] Weight of Evidence Classifications

EPA Cancer Classifications		NTP Cancer Classifications		IARC Cancer Classifications	
A	Known Human Carcinogen	1	Known Human Carcinogen	1	Human Carcinogen
B 1	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)
B 2	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 20. Toxicological information to evaluate non-cancer adverse health effects for a child playing in the New River at Mexicali (sampling date 3/28/95).

Chemical	Conc	Total Dose (mg/kg/day	Ref.Dose (mg/kg/d	Hazard Quotient	Critical Effect
Toluene	3.92	9.1E-05	2.0E-01	0.000	Neurological
Chlorpyrifos	0.024	9.4E-07	3.0E-03	0.000	Neurological
Malathion	0.044	1.7E-06	2.0E-02	0.000	Neurological
Diazinon	0.055	2.2E-06	9.0E-05	0.024	Neurological
Manganese	120.0	1.2E-03	1.4E-01	0.009	Neurological
Xylene	1.0	3.3E-05	2.0E+00	0.000	Neurological
				0.033	Total Neurological
Selenium	2.0	2.1E-05	5.0E-03	0.004	Dermal
Arsenic	4.0	4.1E-05	3.0E-04	0.137	Dermal
				0.141	Total Dermal Effects
Carbaryl	0.018	7.1E-07	1.0E-01	0.000	Renal
Uranium	7.0	7.2E-05	3.0E-03	0.024	Renal
				0.024	Total Renal Effects
1,4-	0.6	1.7E-05	1.0E-01	0.000	Hepatic
EPTC	0.014	5.5E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.005	2.0E-07	1.0E-02	0.000	Respiratory
Barium	138.0	1.4E-03	7.0E-02	0.020	Cardivascular
Nickel	15.0	1.5E-04	2.0E-02	0.008	Decr Body Wgt
Zinc	8.0	8.1E-05	3.0E-01	0.000	Hematological
1,2,4-	0.4	1.6E-05	NA		NA
p-	0.4	1.6E-05	NA		NA
Chromium	6.0	6.4E-05	5.0E-03	0.013	None Recorded
Copper	8.0	8.2E-05	NA		NA
Iron	20.0	2.1E-04	NA		NA
Molybdenum	14.0	1.4E-04	5.0E-03	0.029	Incr Uric Acid Levels
Aluminum	5.0	5.1E-05	NA		NA

Table 21. Toxicological information to evaluate non-cancer adverse health effects for a child playing in the New River at Calexico (sampling date 3/25/95).

Chemical	Conc	Total Dose (mg/kg/day	Ref.Dose (mg/kg/d	Hazard Quotient	Critical Effect
Toluene	3.92	9.1E-05	2.0E-01	0.000	Neurological
Chlorpyrifos	0.023	9.0E-07	3.0E-03	0.000	Neurological
Malathion	0.060	2.4E-06	2.0E-02	0.000	Neurological
Diazinon	0.110	4.3E-06	9.0E-05	0.048	Neurological
Xylene	1.0	3.3E-05	2.0E-01	0.000	Neurological
Manganese	110.0	1.1E-03	1.4E-01	0.008	Neurological
Carbofuran	2.100	8.2E-05	5.0E-03	0.016	Neurological
				0.072	Total Neurological
Chloroform	0.3	1.2E-05	1.0E-02	0.001	Hepatic
1,4-	0.7	2.0E-05	1.0E-01	0.000	Hepatic
Trifluralin	0.003	1.2E-07	7.5E-03	0.000	Hepatic
				0.001	Total Hepatic Effects
Selenium	1.0	1.0E-05	5.0E-03	0.002	Dermal
Arsenic	4.0	4.1E-05	3.0E-04	0.137	Dermal
				0.139	Total Dermal Effects
Uranium	6.0	6.2E-05	3.0E-03	0.021	Renal
Carbaryl	0.15	5.9E-06	1.0E-01	0.000	Renal
				0.021	Total Renal Effects
EPTC	0.015	5.9E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.008	3.1E-07	1.0E-02	0.000	Respiratory
Barium	126.0	1.3E-03	7.0E-02	0.019	Cardiovascular
Nickel	19.0	1.9E-04	2.0E-02	0.010	Decr Body Wgt
Zinc	7.0	7.1E-05	3.0E-01	0.000	Hematological
1,2,4-	0.5	2.0E-05	NA	NA	
p-	0.4	1.6E-05	NA	NA	
Chromium	5.0	5.3E-05	2.0E-02	0.003	None Recorded
Copper	65.0	6.7E-04	NA	NA	
Iron	68.0	7.0E-04	NA	NA	
Molybdenum	12.0	1.2E-04	5.0E-03	0.025	Incr Uric Acid Levels
Aluminum	20.0	2.1E-04	NA	NA	

Table 22. 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).

Chemical	Conc	Total Dose (mg/kg/day	Ref.Dose (mg/kg/d	Hazard Quotient	Critical Effect
Carbofuran	1.40	5.5E-05	5.0E-03	0.011	Neurological
Chlorpyrifos	0.010	3.9E-07	3.0E-03	0.000	Neurological
Malathion	0.100	3.9E-06	2.0E-02	0.000	Neurological
Diazinon	0.076	3.0E-06	9.0E-05	0.033	Neurological
Manganese	120.0	1.2E-03	1.4E-01	0.009	Neurological
				0.053	Total Neurological
Metribuzin	0.007	2.7E-07	2.5E-02	0.000	Hepatic
Trifluralin	0.340	1.3E-05	7.5E-03	0.002	Hepatic
Chlorobenzene	2.74	1.1E-04	4.0E-01	0.000	Hepatic
1,2-	25.26	9.9E-04	9.0E-02	0.011	Hepatic
				0.013	Total Hepatic Effects
Linuron	0.05	2.0E-06	2.0E-03	0.001	Hematological
2,4-D	0.12	4.7E-06	1.0E-02	0.000	Hematological
Linuron	0.087	3.4E-06	2.0E-03	0.002	Hematological
Pendamethalin	0.069	2.7E-06	4.0E-02	0.000	Hematological
Zinc	6.0	6.1E-05	3.0E-01	0.000	Hematological
				0.003	Total Hematological
Atrazine	0.130	5.1E-06	3.5E-02	0.000	Decr. Wgt gain
Nickel	10.0	1.0E-04	2.0E-02	0.005	Decr Body Wgt
Simazine	0.010	3.9E-07	5.0E-03	0.000	Reduced Wgt Gain
				0.005	Total Body Weight
Selenium	3.0	3.1E-05	5.0E-03	0.006	Dermal
Arsenic	4.0	4.1E-05	3.0E-04	0.137	Dermal
				0.143	Total Dermal Effects
Uranium	11.0	1.1E-04	3.0E-03	0.038	Renal
EPTC	0.210	8.2E-06	2.5E-02	0.000	Musculoskeletal
DCPA	0.096	3.8E-06	1.0E-02	0.000	Respiratory
Barium	101.0	1.0E-03	7.0E-02	0.015	Cardiovascular
Bromoxynil	0.06	2.4E-06	2.0E-02	0.000	None listed
Prometon	0.005	2.0E-07	1.5E-02	0.000	None Observed
Diethyl Atrazine	0.006	2.4E-07	NA	NA	
Chromium	4.0	4.2E-05	5.0E-03	0.008	None Recorded
Copper	7.0	7.2E-05	NA	NA	
Iron	15.0	1.5E-04	NA	NA	
Molybdenum	14.0	1.4E-04	5.0E-03	0.029	Incr Uric Acid Levels
Aluminum	3.0	3.1E-05	NA	NA	
1,3-	21.58	8.5E-04	NA	NA	None Observed

Table 23. Toxicological information to evaluate non-cancer adverse health effects for a child playing in the New River at Mexicali (sampling date 4/11/96).

Chemical	Conc	Total Dose (mg/kg/day	Ref.Dose (mg/kg/d	Hazard Quotient	Critical Effect
Chlorpyrifos	0.026	1.0E-06	3.0E-03	0.000	Neurological
Malathion	0.100	3.9E-06	2.0E-02	0.000	Neurological
Diazinon	0.059	2.3E-06	9.0E-05	0.026	Neurological
Carbofuran	0.031	1.2E-06	5.0E-03	0.000	Neurological
Manganese	215.0	2.2E-03	1.4E-01	0.016	Neurological
				0.0	Total Neurological
Carbaryl	0.035	1.4E-06	1.0E-01	0.000	Renal
Uranium	6.0	6.2E-05	3.0E-03	0.021	Renal
Vanadium	26.0	2.7E-04	3.0E-03	0.089	Renal
				0.1	Total Renal Effects
Atrazine	0.016	6.3E-07	3.5E-02	0.000	Decr. Wgt gain
Nickel	12.0	1.2E-04	2.0E-02	0.006	Decr Body Wgt
				0.0	Total Body Weight
Arsenic	4.0	4.1E-05	3.0E-04	0.137	Dermal
Selenium	2.0	2.1E-05	5.0E-03	0.004	Dermal
				0.1	Total Dermal Effects
EPTC	0.011	4.3E-07	2.5E-02	0.000	Musculoskeletal
Propanil	0.0	7.1E-07	5.0E-03	0.000	Incr. Spleen Wgt
DCPA	0.004	1.6E-07	1.0E-02	0.000	Respiratory
Barium	126.0	1.3E-03	7.0E-02	0.019	Cardivascular
Chromium	4.0	4.2E-05	5.0E-03	0.008	None Recorded
Copper	10.0	1.0E-04	NA	NA	
Iron	41.0	4.2E-04	NA	NA	
Molybdenum	15.0	1.5E-04	5.0E-03	0.031	Incr. Uric Acid Levels
Zinc	6.0	6.1E-05	3.0E-01	0.000	Hematological
Aluminum	7.0	7.2E-05	NA	NA	
Boron	1300.0	1.3E-02	9.0E-02	0.149	Testicular

Table 24. Toxicological information to evaluate non-cancer adverse health effects for a child playing in the New River at Calexico (sampling date 4/10/96).

Chemical	Conc	Total Dose (mg/kg/day	Ref.Dose (mg/kg/d	Hazard Quotient	Critical Effect
Chlorpyrifos	0.042	1.6E-06	3.0E-03	0.001	Neurological
Malathion	0.059	2.3E-06	2.0E-02	0.000	Neurological
Diazinon	0.170	6.7E-06	9.0E-05	0.074	Neurological
Carbofuran	0.078	3.1E-06	5.0E-03	0.001	Neurological
Disulfoton	0.042	1.6E-06	6.0E-05	0.027	Neurological
Manganese	187.0	1.9E-03	1.4E-01	0.014	Neurological
				0.1	Total Neurological
Carbaryl	0.056	2.2E-06	1.0E-01	0.000	Renal
Uranium	6.0	6.2E-05	3.0E-03	0.021	Renal
Vanadium	18.0	1.9E-04	3.0E-03	0.062	Renal
				0.1	Total Renal Effects
Atrazine	0.026	1.0E-06	3.5E-02	0.000	Decr. Wgt gain
Nickel	13.0	1.3E-04	2.0E-02	0.007	Decr Body Wgt
				0.0	Total Body Weight
Arsenic	4.0	4.1E-05	3.0E-04	0.137	Dermal
Selenium	1.0	1.0E-05	5.0E-03	0.002	Dermal
				0.1	Total Dermal Effects
EPTC	0.015	5.9E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.006	2.4E-07	1.0E-01	0.000	Respiratory
Barium	116.0	1.2E-03	7.0E-02	0.017	Cardiovascular
Chromium	3.0	3.2E-05	5.0E-03	0.006	None Recorded
Copper	6.0	6.2E-05	NA	NA	
Iron	47.0	4.8E-04	NA	NA	
Molybdenum	14.0	1.4E-04	5.0E-03	0.029	Incr. Uric Acid Levels
Zinc	7.0	7.1E-05	3.0E-01	0.000	Hematological
Aluminum	9.0	9.3E-05	NA	NA	
Boron	1000.0	1.0E-02	9.0E-02	0.114	Testicular

Table 25. Toxicological information to evaluate non-cancer adverse health effects for a child playing in the New River at the Salton Sea (sampling date 4/10/96).

Chemical	Conc	Total Dose (mg/kg/day	Ref.Dose (mg/kg/d	Hazard Quotient	Critical Effect
Fonofos	0.00	1.6E-07	2.0E-03	0.000	Neurological
Chlorpyrifos	0.012	4.7E-07	3.0E-03	0.000	Neurological
Malathion	0.120	4.7E-06	2.0E-02	0.000	Neurological
Diazinon	0.027	1.1E-06	9.0E-05	0.012	Neurological
Carbofuran	0.42	1.6E-05	5.0E-03	0.003	Neurological
Disulfoton	0.014	5.5E-07	6.0E-05	0.009	Neurological
Manganese	104.0	1.1E-03	1.4E-01	0.008	Neurological
				0.0	Total Neurological
Trifluralin	0.110	4.3E-06	7.5E-03	0.001	Hepatic
Benfluralin	0.004	1.6E-07	3.0E-01	0.000	Hepatic
Metribuzin	0.015	5.9E-07	2.5E-02	0.000	Hepatic
				0.0	Total Hepatic Effects
Carbaryl	0.017	6.7E-07	1.0E-01	0.000	Renal
Uranium	10.0	1.0E-04	3.0E-03	0.034	Renal
Vanadium	26	2.7E-04	3.0E-03	0.089	Renal
				0.1	Total Renal Effects
Pendamethalin	0.059	2.3E-06	4.0E-02	0.000	Hematological
Linuron	0.032	1.3E-06	2.0E-03	0.001	Hematological
Zinc	5.0	5.1E-05	3.0E-01	0.000	Hematological
				0.0	Total Hematological
Simazine	0.013	5.1E-07	5.0E-03	0.000	Reduced Wgt Gain
Nickel	5.0	5.0E-05	2.0E-02	0.003	Decr Body Wgt
Atrazine	2.600	1.0E-04	3.5E-02	0.003	Decr. Wgt gain
				0.0	Total Body Weight
Arsenic	5.0	5.1E-05	3.0E-04	0.172	Dermal
Selenium	4.0	4.1E-05	5.0E-03	0.008	Dermal
				0.2	Total Dermal Effects
Diethyl Atrazine	0.050	2.0E-06	NA	NA	
DCPA	0.067	2.6E-06	1.0E-02	0.000	Respiratory
Barium	88.0	9.1E-04	7.0E-02	0.013	Cardiovascular
Chromium	5.0	5.3E-05	5.0E-03	0.011	None Recorded
Copper	7.0	7.2E-05	NA	NA	
Iron	15.0	1.5E-04	NA	NA	
Molybdenum	14.0	1.4E-04	5.0E-03	0.029	Incr. Uric Acid Levels
Aluminum	4.0	4.1E-05	NA	NA	
Boron	820	8.4E-03	9.0E-02	0.094	Testicular

Table 26. Toxicological information to evaluate non-cancer adverse health effects for adults using the New River at Mexicali as a primary source of drinking water (sampling date 3/28/95)

Chemical	Conc	Total (mg/kg/da	Ref.Dose (mg/kg/da	Hazard Quotie	Critical Effect
Toluene	3.92	3.2E-05	2.0E-01	0.001	Neurological
Chlorpyrifos	0.024	8.5E-07	3.0E-03	0.000	Neurological
Malathion	0.044	1.6E-06	2.0E-02	0.000	Neurological
Diazinon	0.055	2.0E-06	9.0E-05	0.022	Neurological
Manganese	120.0	3.4E-03	1.4E-01	0.025	Neurological
Xylene	1.0	3.4E-05	2.0E+00	0.000	Neurological
				0.048	Total Neurological
Selenium	2.0	5.7E-05	5.0E-03	0.011	Dermal
Arsenic	4.0	1.1E-04	3.0E-04	0.382	Dermal
				0.393	Total Dermal Effects
Carbaryl	0.018	6.4E-07	1.0E-01	0.000	Renal
Uranium	7.0	2.0E-04	3.0E-03	0.067	Renal
				0.067	Total Renal Effects
1,4-	0.6	2.0E-05	1.0E-01	0.000	Hepatic
EPTC	0.014	5.0E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.005	1.8E-07	1.0E-02	0.000	Respiratory
Barium	138.0	4.0E-03	7.0E-02	0.056	Cardivascular
Nickel	15.0	4.3E-04	2.0E-02	0.021	Decr Body Wgt
Zinc	8.0	2.3E-04	3.0E-01	0.001	Hematological
1,2,4-	0.4	1.4E-05	NA	NA	
p-	0.4	1.4E-05	NA	NA	
Chromium	6.0	1.7E-04	5.0E-03	0.034	None Recorded
Copper	8.0	2.3E-04	NA	NA	
Iron	20.0	5.7E-04	NA	NA	
Molybdenum	14.0	4.0E-04	5.0E-03	0.080	Incr Uric Acid Levels
Aluminum	5.0	1.4E-04	NA	NA	

Table 27. Toxicological information to evaluate non-cancer adverse health effects for adults using the New River at Calexico as a primary source of drinking water (sampling date 3/25/95).

Chemical	Conc	Total (mg/kg/da	Ref.Dose (mg/kg/da	Hazard Quotie	Critical Effect(s)
Toluene	3.92	3.2E-05	2.0E-01	0.001	Neurological
Chlorpyrifos	0.023	8.2E-07	3.0E-03	0.000	Neurological
Malathion	0.060	2.1E-06	2.0E-02	0.000	Neurological
Diazinon	0.110	3.9E-06	9.0E-05	0.043	Neurological
Xylene	1.0	3.4E-05	2.0E-01	0.000	Neurological
Manganese	110.0	3.2E-03	1.4E-01	0.023	Neurological
Carbofuran	2.100	7.5E-05	5.0E-03	0.015	Neurological
				0.082	Total Neurological
Chloroform	0.3	1.1E-05	1.0E-02	0.001	Hepatic
1,4-	0.7	2.3E-05	1.0E-01	0.000	Hepatic
Trifluralin	0.003	1.1E-07	7.5E-03	0.000	Hepatic
				0.001	Total Hepatic Effects
Selenium	1.0	2.9E-05	5.0E-03	0.006	Dermal
Arsenic	4.0	1.1E-04	3.0E-04	0.382	Dermal
				0.388	Total Dermal Effects
Uranium	6.0	1.7E-04	3.0E-03	0.057	Renal
Carbaryl	0.15	5.3E-06	1.0E-01	0.000	Renal
				0.057	Tital Renal Effects
EPTC	0.015	5.3E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.008	2.8E-07	1.0E-02	0.000	Respiratory
Barium	126.0	3.6E-03	7.0E-02	0.051	Cardiovascular
Nickel	19.0	5.4E-04	2.0E-02	0.027	Decr Body Wgt
Zinc	7.0	2.0E-04	3.0E-01	0.001	Hematological
1,2,4-	0.5	1.8E-05	NA		NA
p-	0.4	1.4E-05	NA		NA
Chromium	5.0	1.4E-04	2.0E-02	0.007	None Recorded
Copper	65.0	1.9E-03	NA		NA
Iron	68.0	1.9E-03	NA		NA
Molybdenum	12.0	3.4E-04	5.0E-03	0.069	Incr Uric Acid Levels
Aluminum	20.0	5.7E-04	NA		NA

Table 28. Toxicological information to evaluate non-cancer adverse health effects for adults using the New River at the Salton Sea as a primary source of drinking water (sampling date 3/22/95).

Chemical	Conc	Total (mg/kg/da	Ref.Dose (mg/kg/da	Hazard Quotie	Critical Effect(s)
Carbofuran	1.40	5.0E-05	5.0E-03	0.010	Neurological
Chlorpyrifos	0.010	3.6E-07	3.0E-03	0.000	Neurological
Malathion	0.100	3.6E-06	2.0E-02	0.000	Neurological
Diazinon	0.076	2.7E-06	9.0E-05	0.030	Neurological
Manganese	120.0	3.4E-03	1.4E-01	0.025	Neurological
				0.065	Total Neurological
Metribuzin	0.007	2.5E-07	2.5E-02	0.000	Hepatic
Trifluralin	0.340	1.2E-05	7.5E-03	0.002	Hepatic
Chlorobenzene	2.74	9.7E-05	4.0E-01	0.000	Hepatic
1,2-	25.26	9.0E-04	9.0E-02	0.010	Hepatic
				0.012	Total Hepatic Effects
Linuron	0.05	1.8E-06	2.0E-03	0.001	Hematological
2,4-D	0.12	4.3E-06	1.0E-02	0.000	Hematological
Linuron	0.087	3.1E-06	2.0E-03	0.002	Hematological
Pendamethalin	0.069	2.4E-06	4.0E-02	0.000	Hematological
Zinc	6.0	1.7E-04	3.0E-01	0.001	Hematological
				0.003	Total Hematological
Atrazine	0.130	4.6E-06	3.5E-02	0.000	Decr. Wgt gain
Nickel	10.0	2.9E-04	2.0E-02	0.014	Decr Body Wgt
Simazine	0.010	3.6E-07	5.0E-03	0.000	Reduced Wgt Gain
				0.014	Total Body Weight
Selenium	3.0	8.6E-05	5.0E-03	0.017	Dermal
Arsenic	4.0	1.1E-04	3.0E-04	0.382	Dermal
				0.399	Total Dermal Effects
Uranium	11.0	3.2E-04	3.0E-03	0.105	Renal
EPTC	0.210	7.5E-06	2.5E-02	0.000	Musculoskeletal
DCPA	0.096	3.4E-06	1.0E-02	0.000	Respiratory
Barium	101.0	2.9E-03	7.0E-02	0.041	Cardiovascular
Bromoxynil	0.06	2.1E-06	2.0E-02	0.000	None listed
Prometon	0.005	1.8E-07	1.5E-02	0.000	None Observed
Diethyl Atrazine	0.006	2.1E-07	NA	NA	
Chromium	4.0	1.1E-04	5.0E-03	0.023	None Recorded
Copper	7.0	2.0E-04	NA	NA	
Iron	15.0	4.3E-04	NA	NA	
Molybdenum	14.0	4.0E-04	5.0E-03	0.080	Incr Uric Acid Levels
Aluminum	3.0	8.6E-05	NA	NA	
1,3-	21.58	7.7E-04	NA	NA	None Observed

Table 29. Toxicological information to evaluate non-cancer adverse health effects for adults using the New River at Mexicali as a primary source of drinking water (sampling date 4/11/96).

Chemical	Conc	Total (mg/kg/da	Ref.Dose (mg/kg/da	Hazard Quotie	Critical Effect
Chlorpyrifos	0.026	9.2E-07	3.0E-03	0.000	Neurological
Malathion	0.100	3.6E-06	2.0E-02	0.000	Neurological
Diazinon	0.059	2.1E-06	9.0E-05	0.023	Neurological
Carbofuran	0.031	1.1E-06	5.0E-03	0.000	Neurological
Manganese	215.0	6.2E-03	1.4E-01	0.044	Neurological
				0.067	Total Neurological
Carbaryl	0.035	1.2E-06	1.0E-01	0.000	Renal
Uranium	6.0	1.7E-04	3.0E-03	0.057	Renal
Vanadium	26.0	7.4E-04	3.0E-03	0.248	Renal
				0.305	Total Renal Effects
Atrazine	0.016	5.7E-07	3.5E-02	0.000	Decr. Wgt gain
Nickel	12.0	3.4E-04	2.0E-02	0.017	Decr Body Wgt
				0.017	Total Body Weight
Arsenic	4.0	1.1E-04	3.0E-04	0.382	Dermal
Selenium	2.0	5.7E-05	5.0E-03	0.011	Dermal
				0.393	Total Dermal Effects
EPTC	0.011	3.9E-07	2.5E-02	0.000	Musculoskeletal
Propanil	0.0	6.4E-07	5.0E-03	0.000	Incr. Spleen Wgt
DCPA	0.004	1.4E-07	1.0E-02	0.000	Respiratory
Barium	126.0	3.6E-03	7.0E-02	0.052	Cardivascular
Chromium	4.0	1.1E-04	5.0E-03	0.023	None Recorded
Copper	10.0	2.9E-04	NA	NA	
Iron	41.0	1.2E-03	NA	NA	
Molybdenum	15.0	4.3E-04	5.0E-03	0.086	Incr. Uric Acid Levels
Zinc	6.0	1.7E-04	3.0E-01	0.001	Hematological
Aluminum	7.0	2.0E-04	NA	NA	
Boron	1300.0	3.7E-02	9.0E-02	0.414	Testicular

Table 30. Toxicological information to evaluate non-cancer adverse health effects for adults using the New River at Calexico as a primary source of drinking water (sampling date 4/10/96).

Chemical	Conc	Total (mg/kg/da	Ref.Dose (mg/kg/da	Hazard Quotie	Critical Effect
Chlorpyrifos	0.042	1.5E-06	3.0E-03	0.000	Neurological
Malathion	0.059	2.1E-06	2.0E-02	0.000	Neurological
Diazinon	0.170	6.0E-06	9.0E-05	0.067	Neurological
Carbofuran	0.078	2.8E-06	5.0E-03	0.001	Neurological
Disulfoton	0.042	1.5E-06	6.0E-05	0.025	Neurological
Manganese	187.0	5.4E-03	1.4E-01	0.038	Neurological
				0.131	Total Neurological
Carbaryl	0.056	2.0E-06	1.0E-01	0.000	Renal
Uranium	6.0	1.7E-04	3.0E-03	0.057	Renal
Vanadium	18.0	5.2E-04	3.0E-03	0.172	Renal
				0..229	Total Renal Effects
Atrazine	0.026	9.2E-07	3.5E-02	0.000	Decr. Wgt gain
Nickel	13.0	3.7E-04	2.0E-02	0.019	Decr Body Wgt
				0.019	Total Body Weight
Arsenic	4.0	1.1E-04	3.0E-04	0.382	Dermal
Selenium	1.0	2.9E-05	5.0E-03	0.006	Dermal
				0.388	Total Dermal Effects
EPTC	0.015	5.3E-07	2.5E-02	0.000	Musculoskeletal
DCPA	0.006	2.1E-07	1.0E-01	0.000	Respiratory
Barium	116.0	3.3E-03	7.0E-02	0.047	Cardiovascular
Chromium	3.0	8.6E-05	5.0E-03	0.017	None Recorded
Copper	6.0	1.7E-04	NA	NA	
Iron	47.0	1.3E-03	NA	NA	
Molybdenum	14.0	4.0E-04	5.0E-03	0.080	Incr. Uric Acid Levels
Zinc	7.0	2.0E-04	3.0E-01	0.001	Hematological
Aluminum	9.0	2.6E-04	NA	NA	
Boron	1000.0	2.9E-02	9.0E-02	0.318	Testicular

Table 31. Toxicological information to evaluate non-cancer adverse health effects for adults using the New River at the Salton Sea as a primary source of drinking water (sampling date 4/19/96).

Chemical	Conc	Total (mg/kg/da	Ref.Dose (mg/kg/da	Hazard Quotie	Critical Effect
Fonofos	0.00	1.4E-07	2.0E-03	0.000	Neurological
Chlorpyrifos	0.012	4.3E-07	3.0E-03	0.000	Neurological
Malathion	0.120	4.3E-06	2.0E-02	0.000	Neurological
Diazinon	0.027	9.6E-07	9.0E-05	0.011	Neurological
Carbofuran	0.42	1.5E-05	5.0E-03	0.003	Neurological
Disulfoton	0.014	5.0E-07	6.0E-05	0.008	Neurological
Manganese	104.0	3.0E-03	1.4E-01	0.021	Neurological
				0.043	Total Neurological
Trifluralin	0.110	3.9E-06	7.5E-03	0.001	Hepatic
Benfluralin	0.004	1.4E-07	3.0E-01	0.000	Hepatic
Metribuzin	0.015	5.3E-07	2.5E-02	0.000	Hepatic
				0.001	Total Hepatic Effects
Carbaryl	0.017	6.0E-07	1.0E-01	0.000	Renal
Uranium	10.0	2.9E-04	3.0E-03	0.095	Renal
Vanadium	26	7.4E-04	3.0E-03	0.248	Renal
				0.343	Total Renal Effects
Pendamethalin	0.059	2.1E-06	4.0E-02	0.000	Hematological
Linuron	0.032	1.1E-06	2.0E-03	0.001	Hematological
Zinc	5.0	1.4E-04	3.0E-01	0.000	Hematological
				0.001	Total Hematological
Simazine	0.013	4.6E-07	5.0E-03	0.000	Reduced Wgt Gain
Nickel	5.0	1.4E-04	2.0E-02	0.007	Decr Body Wgt
Atrazine	2.600	9.2E-05	3.5E-02	0.003	Decr. Wgt gain
				0.010	Total Body Weight
Arsenic	5.0	1.4E-04	3.0E-04	0.477	Dermal
Selenium	4.0	1.1E-04	5.0E-03	0.023	Dermal
				0.500	Total Dermal Effects
Diethyl Atrazine	0.050	1.8E-06	NA	NA	
DCPA	0.067	2.4E-06	1.0E-02	0.000	Respiratory
Barium	88.0	2.5E-03	7.0E-02	0.036	Cardiovascular
Chromium	5.0	1.4E-04	5.0E-03	0.029	None Recorded
Copper	7.0	2.0E-04	NA	NA	
Iron	15.0	4.3E-04	NA	NA	
Molybdenum	14.0	4.0E-04	5.0E-03	0.080	Incr. Uric Acid Levels
Aluminum	4.0	1.1E-04	NA	NA	
Boron	820	2.3E-02	9.0E-02	0.261	Testicular

Table 32. Total increased lifetime cancer risk for adults using the New River at Mexicali as a primary source of drinking water (sampling date 3/28/95).

Chemical	Conc	Total (mg/kg/day	Oral Slope 1/ (mg/kg/da	Weight of (EPA/NTP/IARC	Individual Risk
1,4-	0.6	2.0E-05	4.0E-02	-/2/2B	7.9E-07
Carbaryl	0.018	6.4E-07	2.3E-02	C/-/-	1.5E-08
DCPA	0.005	1.8E-07	1.4E-03	C/-/-	2.6E-10
Arsenic	4.0	1.1E-04	1.5E+00	A/1/-	1.7E-04
				Total Risk =	1.7E-04

Table 33. Total increased lifetime cancer risk for adults using the New River at Calexico as a primary source of drinking water (sampling date 3/25/95).

Chemical	Conc	Total	Oral Slope 1/ (mg/kg/da	Weight of (EPA/NTP/IARC	Individual Risk
Chloroform	0.3	1.1E-05	6.1E-03	B2/2/2B	6.5E-08
1,4-	0.7	2.3E-05	4.0E-02		9.2E-07
Trifluralin	0.003	1.1E-07	7.7E-03	C/-/-	8.2E-10
Carbaryl	0.150	5.3E-06	2.3E-02	C/-/-	1.2E-07
DCPA	0.008	2.8E-07	1.4E-03	C/3/-	4.1E-10
Arsenic	4.0	1.1E-04	1.5E+00	A/1/-	1.7E-04
				Total Risk =	1.7E-04

Table 34. Total increased lifetime cancer risk for adults using the New River at the Salton Sea as a primary source of drinking water (sampling date 3/22/95).

Chemical	Conc	Total	Oral Slope 1/ (mg/kg/da	Weight of (EPA/NTP/IARC	Individual Risk
Bromoxynil	0.06	2.1E-06	1.0E-01	C/-/-	2.2E-07
SImazine	0.01	3.6E-07	1.2E-01	C/-/-	4.3E-08
Atrazine	0.13	4.6E-06	2.2E-01	C/3/2B	1.0E-06
Trifluralin	0.34	1.2E-05	7.7E-03	C/-/-	9.3E-08
DCPA	0.10	3.4E-06	1.4E-03	C/3/-	4.9E-09
Arsenic	4.0	1.1E-04	1.5E+00	A/1/-	1.7E-04
				Total Risk =	1.7E-04

Table 35. Total increased lifetime cancer risk for adults using the New River at Mexicali as a primary source of drinking water (sampling date 4/11/96).

Chemical	Conc	Total (mg/kg/day	Oral Slope 1/ (mg/kg/da	Weight of (EPA/NTP/IARC	Individu Chem
Carbaryl	0.035	1.2E-06	2.3E-02	C/-/-	2.8E-08
DCPA	0.004	1.4E-07	1.4E-03	C/-/-	2.0E-10
Arsenic	4.0	1.1E-04	1.5E+00	A/1/-	1.7E-04
				Total Risk =	1.7E-04

Table 36. Total increased lifetime cancer risk for adults using the New River at Calexico as a primary source of drinking water (sampling date 4/10/96).

Chemical	Conc	Total	Oral Slope 1/ (mg/kg/da	Weight of (EPA/NTP/IARC	Individual Chem Risk
Carbaryl	0.056	2.0E-06	2.3E-02	C/-/-	4.5E-08
DCPA	0.006	2.1E-07	1.4E-03	C/-/-	3.1E-10
Arsenic	4.0	1.1E-04	1.5E+00	A/1/-	1.7E-04
				Total Risk =	1.7E-04

Table 37. Total increased lifetime cancer risk for adults using the New River at the Salton Sea as a primary source of drinking water (sampling date 4/9/96).

Chemical	Conc	Total	Oral Slope 1/ (mg/kg/da	Weight of (EPA/NTP/IARC	Individua Chem
Simazine	0.013	4.6E-07	1.2E-01	C/3/-	5.5E-08
Atrazine	2.600	9.2E-05	2.2E-01	C/3/2B	2.0E-05
Trifluralin	0.110	3.9E-06	7.7E-03	C/-/-	3.0E-08
Carbaryl	0.017	6.0E-07	2.3E-02	C/-/-	1.4E-08
DCPA	0.067	2.4E-06	1.4E-03	C/-/-	3.4E-09
Arsenic	5.0	1.4E-04	1.5E+00	A/1/-	2.1E-04
				Total Risk =	2.4E-04

[1] Weight of Evidence Classifications

EPA Cancer Classifications		NTP Cancer Classifications		IARC Cancer Classifications	
A	Known Human Carcinogen	1	Known Human Carcinogen	1	Human Carcinogen
B 1	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)
B 2	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 38. Toxicological information to evaluate non-cancer adverse health effects for children using the New River at Mexicali as a primary source of drinking water (sampling date 3/28/95).

Chemical	Conc	Total Dose (mg/kg/day	Ref. Dose (mg/kg/day	Hazard Quotie	Critical Effect
Toluene	3.92	4.1E-04	2.0E-01	0.002	Neurological
Chlorpyrifos	0.024	2.6E-06	3.0E-03	0.001	Neurological
Malathion	0.044	4.8E-06	2.0E-02	0.000	Neurological
Diazinon	0.055	6.0E-06	9.0E-05	0.066	Neurological
Manganese	120.0	1.2E-02	1.4E-01	0.086	Neurological
Xylene	1.0	1.1E-04	2.0E+00	0.000	Neurological
				0.157	Total Neurological
Selenium	2.0	2.0E-04	5.0E-03	0.040	Dermal
Arsenic	4.0	4.0E-04	3.0E-04	1.335	Dermal
				1.375	Total Dermal Effects
Carbaryl	0.018	2.0E-06	1.0E-01	0.000	Renal
Uranium	7.0	7.0E-04	3.0E-03	0.234	Renal
				0.234	Total Renal Effects
1,4-	0.6	6.3E-05	1.0E-01	0.001	Hepatic
EPTC	0.014	1.5E-06	2.5E-02	0.000	Musculoskeletal
DCPA	0.005	5.4E-07	1.0E-02	0.000	Respiratory
Barium	138.0	1.4E-02	7.0E-02	0.197	Cardivascular
Nickel	15.0	1.5E-03	2.0E-02	0.075	Decr Body Wgt
Zinc	8.0	8.0E-04	3.0E-01	0.003	Hematological
1,2,4-	0.4	4.4E-05	NA	NA	
p-	0.4	4.4E-05	NA	NA	
Chromium	6.0	6.0E-04	5.0E-03	0.120	None Recorded
Copper	8.0	8.0E-04	NA	NA	
Iron	20.0	2.0E-03	NA	NA	
Molybdenum	14.0	1.4E-03	5.0E-03	0.280	Incr Uric Acid Levels
Aluminum	5.0	5.0E-04	NA	NA	

Table 39. Toxicological information to evaluate non-cancer adverse health effects for children using the New River at Calexico as a primary source of drinking water (sampling date 3/25/95).

Chemical	Conc	Total Dose (mg/kg/day	Ref.Dose (mg/kg/day	Hazard Quotien	Critical Effect
Toluene	3.92	4.1E-04	2.0E-01	0.002	Neurological
Chlorpyrifos	0.023	2.5E-06	3.0E-03	0.001	Neurological
Malathion	0.060	6.5E-06	2.0E-02	0.000	Neurological
Diazinon	0.110	1.2E-05	9.0E-05	0.133	Neurological
Xylene	1.0	1.1E-04	2.0E-01	0.001	Neurological
Manganese	110.0	1.1E-02	1.4E-01	0.079	Neurological
Carbofuran	2.100	2.3E-04	5.0E-03	0.046	Neurological
				0.262	Total Neurological
Chloroform	0.3	3.3E-05	1.0E-02	0.003	Hepatic
1,4-	0.7	7.4E-05	1.0E-01	0.001	Hepatic
Trifluralin	0.003	3.3E-07	7.5E-03	0.000	Hepatic
				0.0	Total Hepatic Effects
Selenium	1.0	1.0E-04	5.0E-03	0.020	Dermal
Arsenic	4.0	4.0E-04	3.0E-04	1.335	Dermal
				1.4	Total Dermal Effects
Uranium	6.0	6.0E-04	3.0E-03	0.200	Renal
Carbaryl	0.15	1.6E-05	1.0E-01	0.000	Renal
				0.200	Total Renal Effects
EPTC	0.015	1.6E-06	2.5E-02	0.000	Musculoskeletal
DCPA	0.008	8.7E-07	1.0E-02	0.000	Respiratory
Barium	126.0	1.3E-02	7.0E-02	0.180	Cardiovascular
Nickel	19.0	1.9E-03	2.0E-02	0.095	Decr Body Wgt
Zinc	7.0	7.0E-04	3.0E-01	0.002	Hematological
1,2,4-	0.5	5.4E-05	NA		NA
p-	0.4	4.4E-05	NA		NA
Chromium	5.0	5.0E-04	2.0E-02	0.025	None Recorded
Copper	65.0	6.5E-03	NA		NA
Iron	68.0	6.8E-03	NA		NA
Molybdenum	12.0	1.2E-03	5.0E-03	0.240	Incr Uric Acid Levels
Aluminum	20.0	2.0E-03	NA		NA

Table 40. Toxicological information to evaluate non-cancer adverse health effects for children using the New River at the Salton Sea as a primary source of drinking water (sampling date 3/22/95).

Chemical	Conc	Total (mg/kg/da	Ref.Dose (mg/kg/day	Hazard Quotien	Critical Effect
Carbofuran	1.40	1.5E-04	5.0E-03	0.030	Neurological
Chlorpyrifos	0.010	1.1E-06	3.0E-03	0.000	Neurological
Malathion	0.100	1.1E-05	2.0E-02	0.001	Neurological
Diazinon	0.076	8.3E-06	9.0E-05	0.092	Neurological
Manganese	120.0	1.2E-02	1.4E-01	0.086	Neurological
				0.209	Total Neurological
Metribuzin	0.007	7.6E-07	2.5E-02	0.000	Hepatic
Trifluralin	0.340	3.7E-05	7.5E-03	0.005	Hepatic
Chlorobenzene	2.74	3.0E-04	4.0E-01	0.001	Hepatic
1,2-	25.26	2.7E-03	9.0E-02	0.031	Hepatic
				0.037	Total Hepatic Effects
Linuron	0.05	5.4E-06	2.0E-03	0.003	Hematological
2,4-D	0.12	1.3E-05	1.0E-02	0.001	Hematological
Linuron	0.087	9.5E-06	2.0E-03	0.005	Hematological
Pendamethalin	0.069	7.5E-06	4.0E-02	0.000	Hematological
Zinc	6.0	6.0E-04	3.0E-01	0.002	Hematological
				0.011	Total Hematological
Atrazine	0.130	1.4E-05	3.5E-02	0.000	Decr. Wgt gain
Nickel	10.0	1.0E-03	2.0E-02	0.050	Decr Body Wgt
Simazine	0.010	1.1E-06	5.0E-03	0.000	Reduced Wgt Gain
				0.051	Total Body Weight
Selenium	3.0	3.0E-04	5.0E-03	0.060	Dermal
Arsenic	4.0	4.0E-04	3.0E-04	1.335	Dermal
				1.395	Total Dermal Effects
Uranium	11.0	1.1E-03	3.0E-03	0.367	Renal
EPTC	0.210	2.3E-05	2.5E-02	0.001	Musculoskeletal
DCPA	0.096	1.0E-05	1.0E-02	0.001	Respiratory
Barium	101.0	1.0E-02	7.0E-02	0.144	Cardiovascular
Bromoxynil	0.06	6.5E-06	2.0E-02	0.000	None listed
Prometon	0.005	5.4E-07	1.5E-02	0.000	None Observed
Diethyl Atrazine	0.006	6.5E-07	NA	NA	
Chromium	4.0	4.0E-04	5.0E-03	0.080	None Recorded
Copper	7.0	7.0E-04	NA	NA	
Iron	15.0	1.5E-03	NA	NA	
Molybdenum	14.0	1.4E-03	5.0E-03	0.280	Incr Uric Acid Levels
Aluminum	3.0	3.0E-04	NA	NA	
1,3-	21.58	2.3E-03	NA	NA	None Observed

Table 41. Toxicological information to evaluate non-cancer adverse health effects for children using the New River at Mexicali as a primary source of drinking water (sampling date 4/11/96).

Chemical	Conc	Total Dose (mg/kg/day	Ref.Dose (mg/kg/day	Hazard Quotien	Critical Effect
Chlorpyrifos	0.026	2.8E-06	3.0E-03	0.001	Neurological
Malathion	0.100	1.1E-05	2.0E-02	0.001	Neurological
Diazinon	0.059	6.4E-06	9.0E-05	0.071	Neurological
Carbofuran	0.031	3.4E-06	5.0E-03	0.001	Neurological
Manganese	215.0	2.2E-02	1.4E-01	0.154	Neurological
				0.2	Total Neurological
Carbaryl	0.035	3.8E-06	1.0E-01	0.000	Renal
Uranium	6.0	6.0E-04	3.0E-03	0.200	Renal
Vanadium	26.0	2.6E-03	3.0E-03	0.867	Renal
				1.1	Total Renal Effects
Atrazine	0.016	1.7E-06	3.5E-02	0.000	Decr. Wgt gain
Nickel	12.0	1.2E-03	2.0E-02	0.060	Decr Body Wgt
				0.1	Total Body Weight
Arsenic	4.0	4.0E-04	3.0E-04	1.335	Dermal
Selenium	2.0	2.0E-04	5.0E-03	0.040	Dermal
				1.4	Total Dermal Effects
EPTC	0.011	1.2E-06	2.5E-02	0.000	Musculoskeletal
Propanil	0.0	2.0E-06	5.0E-03	0.000	Incr. Spleen Wgt
DCPA	0.004	4.4E-07	1.0E-02	0.000	Respiratory
Barium	126.0	1.3E-02	7.0E-02	0.180	Cardivascular
Chromium	4.0	4.0E-04	5.0E-03	0.080	None Recorded
Copper	10.0	1.0E-03	NA	NA	
Iron	41.0	4.1E-03	NA	NA	
Molybdenum	15.0	1.5E-03	5.0E-03	0.300	Incr. Uric Acid
Zinc	6.0	6.0E-04	3.0E-01	0.002	Hematological
Aluminum	7.0	7.0E-04	NA	NA	
Boron	1300.0	1.3E-01	9.0E-02	1.446	Testicular

Table 42. Toxicological information to evaluate non-cancer adverse health effects for children using the New River at Calexico as a primary source of drinking water (sampling date 4/10/96)

Chemical	Conc	Total Dose (mg/kg/day	Ref Dose (mg/kg/day	Hazard Quotien	Critical Effect
Chlorpyrifos	0.042	4.6E-06	3.0E-03	0.002	Neurological
Malathion	0.059	6.4E-06	2.0E-02	0.000	Neurological
Diazinon	0.170	1.8E-05	9.0E-05	0.205	Neurological
Carbofuran	0.078	8.5E-06	5.0E-03	0.002	Neurological
Disulfoton	0.042	4.6E-06	6.0E-05	0.076	Neurological
Manganese	187.0	1.9E-02	1.4E-01	0.134	Neurological
				0.4	Total Neurological
Carbaryl	0.056	6.1E-06	1.0E-01	0.000	Renal
Uranium	6.0	6.0E-04	3.0E-03	0.200	Renal
Vanadium	18.0	1.8E-03	3.0E-03	0.601	Renal
				0.8	Total Renal Effects
Atrazine	0.026	2.8E-06	3.5E-02	0.000	Decr. Wgt gain
Nickel	13.0	1.3E-03	2.0E-02	0.065	Decr Body Wgt
				0.1	Total Body Weight
Arsenic	4.0	4.0E-04	3.0E-04	1.335	Dermal
Selenium	1.0	1.0E-04	5.0E-03	0.020	Dermal
				1.4	Total Dermal Effects
EPTC	0.015	1.6E-06	2.5E-02	0.000	Musculoskeletal
DCPA	0.006	6.5E-07	1.0E-01	0.000	Respiratory
Barium	116.0	1.2E-02	7.0E-02	0.166	Cardiovascular
Chromium	3.0	3.0E-04	5.0E-03	0.060	None Recorded
Copper	6.0	6.0E-04	NA	NA	
Iron	47.0	4.7E-03	NA	NA	
Molybdenum	14.0	1.4E-03	5.0E-03	0.280	Incr. Uric Acid
Zinc	7.0	7.0E-04	3.0E-01	0.002	Hematological
Aluminum	9.0	9.0E-04	NA	NA	
Boron	1000.0	1.0E-01	9.0E-02	1.112	Testicular

Table 43. Toxicological information to evaluate non-cancer adverse health effects for children using the New River at the Salton Sea as a primary source of drinking water (sampling date 4/9/96).

Chemical	Conc	Total Dose (mg/kg/day	Ref. Dose (mg/kg/day	Hazard Quotien	Critical Effect
Fonofos	0.00	4.4E-07	2.0E-03	0.000	Neurological
Chlorpyrifos	0.012	1.3E-06	3.0E-03	0.000	Neurological
Malathion	0.120	1.3E-05	2.0E-02	0.001	Neurological
Diazinon	0.027	2.9E-06	9.0E-05	0.033	Neurological
Carbofuran	0.42	4.6E-05	5.0E-03	0.009	Neurological
Disulfoton	0.014	1.5E-06	6.0E-05	0.025	Neurological
Manganese	104.0	1.0E-02	1.4E-01	0.074	Neurological
				0.1	Total Neurological
Trifluralin	0.110	1.2E-05	7.5E-03	0.002	Hepatic
Benfluralin	0.004	4.4E-07	3.0E-01	0.000	Hepatic
Metribuzin	0.015	1.6E-06	2.5E-02	0.000	Hepatic
				0.0	Total Hepatic Effects
Carbaryl	0.017	1.8E-06	1.0E-01	0.000	Renal
Uranium	10.0	1.0E-03	3.0E-03	0.334	Renal
Vanadium	26	2.6E-03	3.0E-03	0.867	Renal
				1.2	Total Renal Effects
Pendamethalin	0.059	6.4E-06	4.0E-02	0.000	Hematological
Linuron	0.032	3.5E-06	2.0E-03	0.002	Hematological
Zinc	5.0	5.0E-04	3.0E-01	0.002	Hematological
				0.0	Total Hematological
Simazine	0.013	1.4E-06	5.0E-03	0.000	Reduced Wgt Gain
Nickel	5.0	5.0E-04	2.0E-02	0.025	Decr Body Wgt
Atrazine	2.600	2.8E-04	3.5E-02	0.008	Decr. Wgt gain
				0.0	Total Body Weight
Arsenic	5.0	5.0E-04	3.0E-04	1.668	Dermal
Selenium	4.0	4.0E-04	5.0E-03	0.080	Dermal
				1.7	Total Dermal Effects
Diethyl Atrazine	0.050	5.4E-06	NA	NA	
DCPA	0.067	7.3E-06	1.0E-02	0.001	Respiratory
Barium	88.0	8.8E-03	7.0E-02	0.126	Cardiovascular
Chromium	5.0	5.0E-04	5.0E-03	0.100	None Recorded
Copper	7.0	7.0E-04	NA	NA	
Iron	15.0	1.5E-03	NA	NA	
Molybdenum	14.0	1.4E-03	5.0E-03	0.280	Incr. Uric Acid
Aluminum	4.0	4.0E-04	NA	NA	
Boron	820	8.2E-02	9.0E-02	0.912	Testicular