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EXECUTIVE SUMMARY

I. Introduction:

In 1984, a cluster of childhood cancers was identified in McFarland, California. By the end of 1989, a total of 13 cases were diagnosed, indicated a cancer rate 3-4 times higher than expected for a town the size of McFarland. No new cases have been diagnosed between 1989 and the release of this document.

DHS, in collaborating with other agencies, investigated the McFarland environment to determine if unusual levels of contamination were present in McFarland or might indicate that the environment is unsafe. Tests have included pesticides, heavy metals, other chemicals, ionizing radiation, radio frequency radiation, and electromagnetic radiation.

DHS evaluated the McFarland environment during the time frame of the cancer cluster. When chemical carcinogens and other potential risk factors identified in childhood epidemiologic case-control studies were identified in the McFarland environment, DHS used several criteria to evaluate possible contamination including:

1) Is there a plausible human exposure scenario?

2) Do levels of a given risk factor suggest an elevated cancer risk?

3) Are levels in McFarland higher than other areas?

II. Potential Sources of Chemical Contamination

Agriculture is the primary land use activity in the McFarland area. Several crop and nursery packing facilities currently operate in the town. Other processing

facilities and pesticide application services have operated in the past. There is not public record that waste facilities ever operated in McFarland.

In 1988, the U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control (DTSC) evaluated aerial historical photographs of McFarland. EPA found no visible evidence of waste facilities operating between 1937 and 1984, nor any evidence of soil contamination. DTSC geologists found that drainage patterns could not have concentrated pesticides in areas later developed into residential housing.

Prior to 1990, there was significant under-reporting of the amount of restricted pesticide use, which may include compounds that cause cancer. For restricted pesticides, disparities also existed between amounts reported sold and used, and local and state data bases. Pesticides potentially used near McFarland were evaluated and some with potential cancer effects had been used in the McFarland area. Toxicological and environmental data were not available to evaluate potential hazards for all of these pesticides. 1990 pesticide-use data indicates that more than 50 pesticides are in use around McFarland, about 25% of which are classified as potential or probably human carcinogens.

III. Air:

During 1987-1991 monitoring for pesticides in many agricultural areas, including McFarland, was conducted by the California Air Resources Board (ARB) and researchers from U.C. Davis. No unusual risks were identified for the pesticides detected in McFarland air. However, the monitoring data is limited and is inadequate to state whether McFarland air is different from other agricultural areas. ARB data from other agricultural areas, where additional pesticide monitoring data is available, suggest cancer risk of potential regulatory concern for inorganic arsenic and telone. The data in other agriculture areas also suggest non-cancer risks of potential concern for chloropicrin, DEF, ethyl parathion, methyl bromide and telone.

IV. Water

The McFarland water supply has been tested for contaminants on many occasions for several reasons including routine monitoring requirements, the cancer cluster investigation, and state groundwater surveys conducted by the DHS Office of Drinking Water (ODW). Tests have included pesticides, heavy metals, ionizing

radiation, nitrates, nitrosamine, volatile organic compound, total organic carbon and halides, radon, and coliform bacteria. DHS also conducted an extensive review of the scientific literature examining the potential of nitrates to cause cancer and other adverse health effects.

These tests revealed that prior to 1985, nitrate standards were commonly exceeded. DHS believes that nitrates are not the cause of the cancer cluster because no unusual patterns of nitrate contamination coincide with the cluster, groundwater contamination by nitrate was common on other agricultural areas in the state with lower cancer rates, and the scientific literature indicates that nitrates are not carcinogens. Several sporadic positive tests for other compounds have not been confirmed by follow-up testing.

V. Soil:

1985 Investigation of Pesticides at Cancer Case and Control Homes: Trace levels of chlorinated pesticides were found in soil samples from ten out of 20 homes tested. Levels above background were found at one case home where chlordane (a pesticide) was used to control termites. The contaminated soil at this home was not accessible to children.

1987 Study of Pesticides and Metals in Public-Use Areas: Thirty-eight soil samples were collected from public use areas, including Browning Road School, Browning Road Park, Sherwood Avenue Park, and from the water collection sump near Glenwood Avenue. All metal concentrations were within normal background levels. No organophosphorous or carbamate pesticides were detected. Trace levels of chlorinated pesticides were detected in 7 samples.

1989 EPA Community-Wide Soil Screening Study: Over 300 locations in McFarland were screened by X-ray fluorescence for arsenic, chromium, and lead. Additional measurements were made at specific areas of concern, including cancer case homes, agricultural processing facilities, and the railroad tracks. Seventeen individual soil samples were also analuzed by laboratory methods.

Metal Results: The cast majority (99%) of XRF measurements for arsenic, lead, and chromium were below the instrument detection limits. Higher arsenic levels along some areas of the railroad tracks were confirmed by laboratory analysis, which reported elevated arsenic at 254 parts per million (ppm) for one sample (background soil arsenic levels averages 5-

15 ppm.) This information has been referred to the DTSC. Other laboratory measurements for arsenic, lead, and chromium were consistently low.

Pesticide Analysis of Individual Soil Samples: One sample collected at an agricultural processing facility contained 1.057 parts per million DDE, which is slightly above the regulatory definition of hazardous waste at 1 part per million. This information was forwarded to the DTSC. No other sites contained quantifiable levels of pesticides.

Organic Compounds: Low levels of polycyclic aromatic hydrocarbons (PAH's) were found in one sample collected near the railroad tracks.

Tests of McFarland soil for chemical contamination have not revealed widespread hazardous environmental contamination in the soil of McFarland, particularly in residential or public use areas. The low levels of environmentally persistent chlorinated pesticides found in many of the samples are typical of levels throughout the United States and California and do not suggest unusual contamination in McFarland soils.

VI. 60 Hertz Electromagnetic Fields

Sixty hertz electromagnetic fields were lower in McFarland than urban areas. In addition, there were no differences in electromagnetic field levels in the homes of ten children with cancer and ten children without cancer.

VII. Radio Frequency Radiation

Several studies of radio frequency radiation in the McFarland area, including Voice of America transmissions, UHF and VHF television broadcasts. AM and FM radio, and microwave transmissions, have found very low levels that are similar to or lower than other residential areas in the United States and well below all health-based standards.

VIII. Ionizing Radiation

Background ionizing radiation levels in the homes of children with cancer and at the public schools are similar to levels throughout the United States.

IX. McFarland-Dillon Municipal Landfill

The McFarland-Dillon Municipal Landfill is a sanitary landfill located 1.5 miles southwest of Dillon, and about 4 miles northwest of McFarland. Groundwater testing at the site has revealed contamination by several organic compounds and metals. The limited extent of groundwater contamination around the site indicates that it is unlikely to have contaminated drinking water supplies in McFarland. The Kern County Public Works Department is currently evaluating the site and developing plans to mitigate any potential pollution hazards.

X. Northeast McFarland

McFarland residents have raised concerns that there is unusual contamination of the residential area east of Highway 99 and north of Perkins Avenue. However:

- No detectable levels of pesticides were found at the homes of children with cancer in the northeast neighborhood.
- Of the 38 soil samples collected in 1987, 32 samples were collected from the Browning Road School and Park and the water collection sump in the northeast neighborhood. Five of these samples contained very low levels of several chlorinated pesticides. Metal concentrations were with background.
- Virtually all 1989 tests conducted by the EPA in northeast McFarland were below detection limits, except the presence of DDE in a pit east of Highway 99. The potential risks associated with the DDE concentration in the pit are very low, and the distance of the pit to residential areas suggest that it is unlikely to be a significant source of exposure.
- The evaluation of historical aerial photographs did not indicate the presence of visible hazardous wast contamination in the northeast area. Drainage patterns would not have selectively concentrated pesticides in areas later developed into residential housing.

XI. Conclusions

The McFarland environment has been extensively investigated for chemical carcinogens and other risk factors identified in epidemiological case-control studies of childhood cancer. The factors investigated included metals and pesticides, ionizing radiation, radio frequency radiation, and electromagnetic fields. DHS concludes:

- Environmental contamination that is 1) plausibly related to human exposures, 2) suggests an elevated cancer risk, or 3) is higher in McFarland than in other areas in California has not been found in McFarland. Because none of these criteria have been met, environmental contamination in McFarland has not been found to be associated with the cancer cluster.

- The McFarland investigations have been extensive and used the most up-to-date techniques to reconstruct a view of the past environment. These investigations have exhausted the available tools to look at past exposures in McFarland.

These investigations, however, have indicated the following concerns regarding pesticide use in California:

- Pesticides used in the San Joaquin Valley include many with potential cancer and non-cancer effects. The toxicity of several of these pesticides is not well characterized.

- A preliminary risk assessment suggests that cancer and non-cancer risks for some pesticides may be of potential public health concern in agricultural communities throughout the San Joaquin valley.

- A review of the Pesticide use Reporting (PUR) system indicates that, although the PUR data does indicate which pesticides have been sued, pesticide-use data during the 1970's and 1980's are inadequate to estimate the amount of pesticide use.

XII. Recommendations

1. Pesticide Exposure Study: DHS recommends that the merits of a multi-pathway pesticide exposure study for the San Joaquin Valley Area be considered to aid public health evaluation of pesticide use.

2. Review of Pesticide use reporting System: Pesticide reporting system requirements changed in 1990. An assessment of the Pesticide use Reporting System is recommended to determine the quality of current pesticide-use data for human exposure assessment.