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EPA Superfund Record of Decision:

FCX-Statesville Superfund Site, Operable Unit 2, NC
11/22/1994

FCX-STATESVILLE
SUPERFUND SITE

RECORD OF DECISION
OPERABLE UNIT TWO

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

NOVEMBER 1994

DECLARATION
FOR
THE RECORD OF DECISION

SITE NAME AND LOCATION

FCX-Statesville
Statesville, Iredell County, North Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Operable Unit Two Remedial Action for the FCX-Statesville Superfund Site (the "Site") in Statesville, Iredell County, North Carolina, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Contingency Plan. The main objectives of the Operable Unit Two Remedial Action will be to reduce the risks associated with Site-related contamination in the surface soil, as well as reduce the amount of total pesticides in the surface and subsurface soil as a source of groundwater contamination. This decision is based on the administrative record file for this Site.

The State of North Carolina concurs with the selected remedy for Operable Unit Two. All comments submitted to EPA during the public comment period, as well as EPA's responses to those comments, can be found in Appendix A of this document.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The Operable Unit Two Remedial Action addresses the soil contamination at the Site. The major components of the Operable Unit Two Remedial Action include:

* demolishing the existing buildings and structures, and transporting the demolition rubble to an appropriate disposal facility;

* excavating approximately 6,945 cubic yards of contaminated soil, and stockpiling the soil on-site in preparation for treatment;

* treating the contaminated soil on-site using thermal desorption and base catalyzed decomposition;

* backfilling the excavated areas with the treated soil; and

* regrading and seeding the Site with grass to minimize the potential for erosion and to enhance the appearance of the Site.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the Remedial Action, and is cost-effective.

This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume of Site contaminants as a principal element.

Richard D. Green, Associate Director
Office of Superfund and Emergency Response

22 NOV 94
Date

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OPERABLE UNIT TWO

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I. SITE NAME, LOCATION, AND DESCRIPTION

A. Introduction

The FCX-Statesville property is located at the intersection of Phoenix Street and West Front Street (Highway 90) approximately 1.5 miles west of downtown Statesville. Beginning around 1940, Farmers Cooperative Exchange (FCX) began operations as an agricultural distribution center. These operations included the formulation, repackaging, warehousing, and distribution of farm chemicals, primarily pesticides and fertilizers, along with the milling and sale of feed grains. The repackaging of liquid pesticides was discontinued in 1966 and dust repackaging in 1969.

Testimony from previous employees indicates that 5,000-10,000 pounds of pesticides may have been buried on-site during the late 1960's or early 1970's. Pesticide contamination in the soil, as well as pesticide and volatile organic compound (VOC) contamination in the groundwater, have been identified at the Site since 1986.

B. Site Description

The Site is approximately 5.5 acres in size. The coordinates of the Site are latitude 35° 47' 11" north, longitude 80° 54' 58" west. The Site is bounded to the north by the Norfolk-Southern Railroad and Burlington Industries (formerly Beaunit Mills), the Carnation Milk Company property to the west, residential and small business property along the south side of West Front Street, and a pre-fabricated utility and sales lot on the east side of Phoenix Street. Prior to the late 1960's, the main structures at the Site included a U-shaped building used for pesticide operations, and several buildings on the eastern half of the property used for the milling and bagging of feed grains. A small office building was also present near the southeastern corner of the property. Figure 1 shows the Site as it existed prior to the late 1960's.

During the late 1960's, most of the buildings on the property (with the exception of the small office building) were demolished. Since that time, several buildings and paved areas have been constructed to replace the original structures. A large brick warehouse was constructed around 1969-70, and a smaller, metal warehouse painted blue was constructed in 1982. An asphalt parking lot was paved between the warehouses and West Front Street. The majority of the Site to the east of the two warehouses is a gravelled area, and contains a large reinforced concrete slab and smaller concrete tractor trailor pads. Figure 2 shows the Site as it exists today.

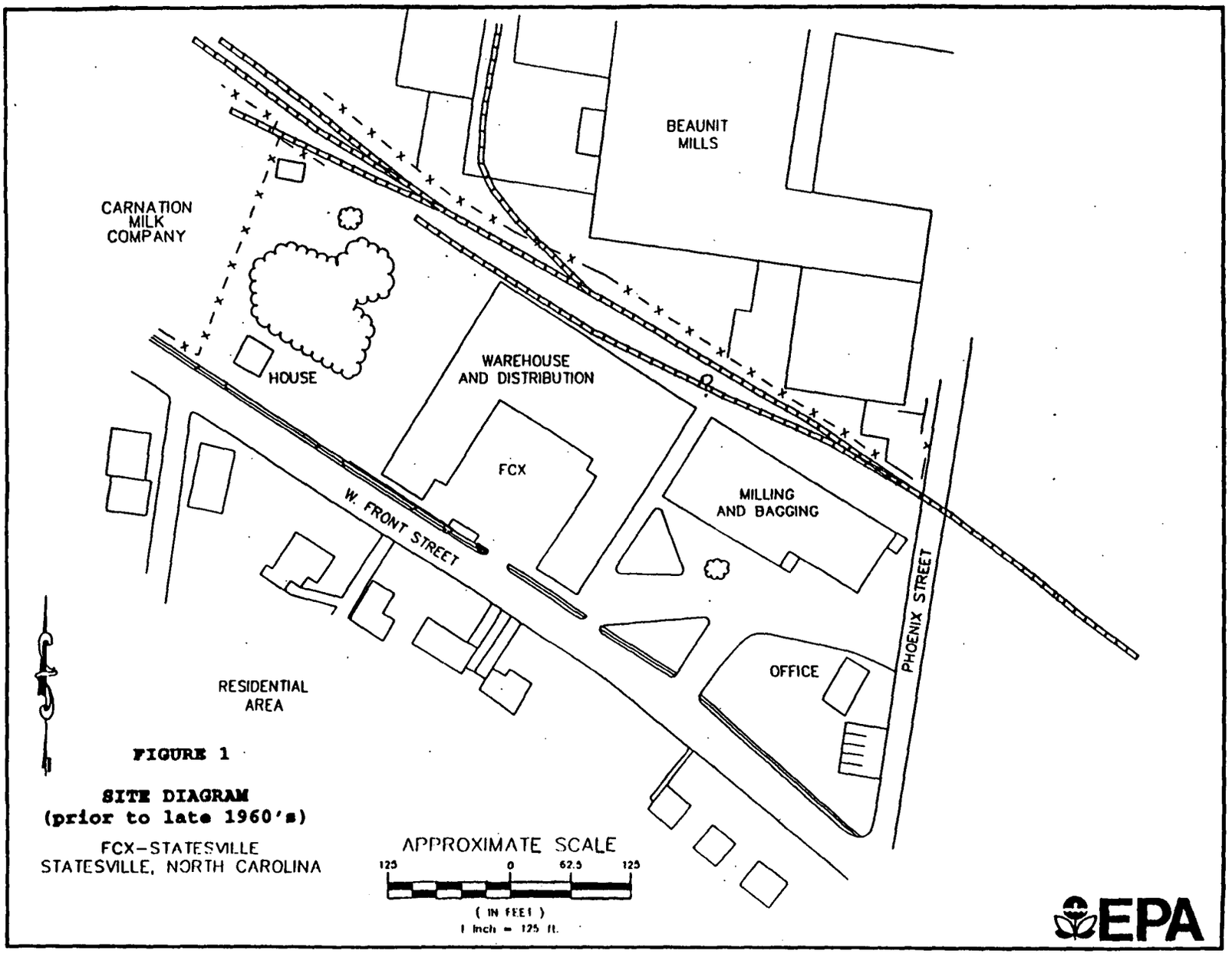

FIGURE 1

SITE DIAGRAM
(prior to late 1960's)

FCX-STATESVILLE
STATESVILLE, NORTH CAROLINA

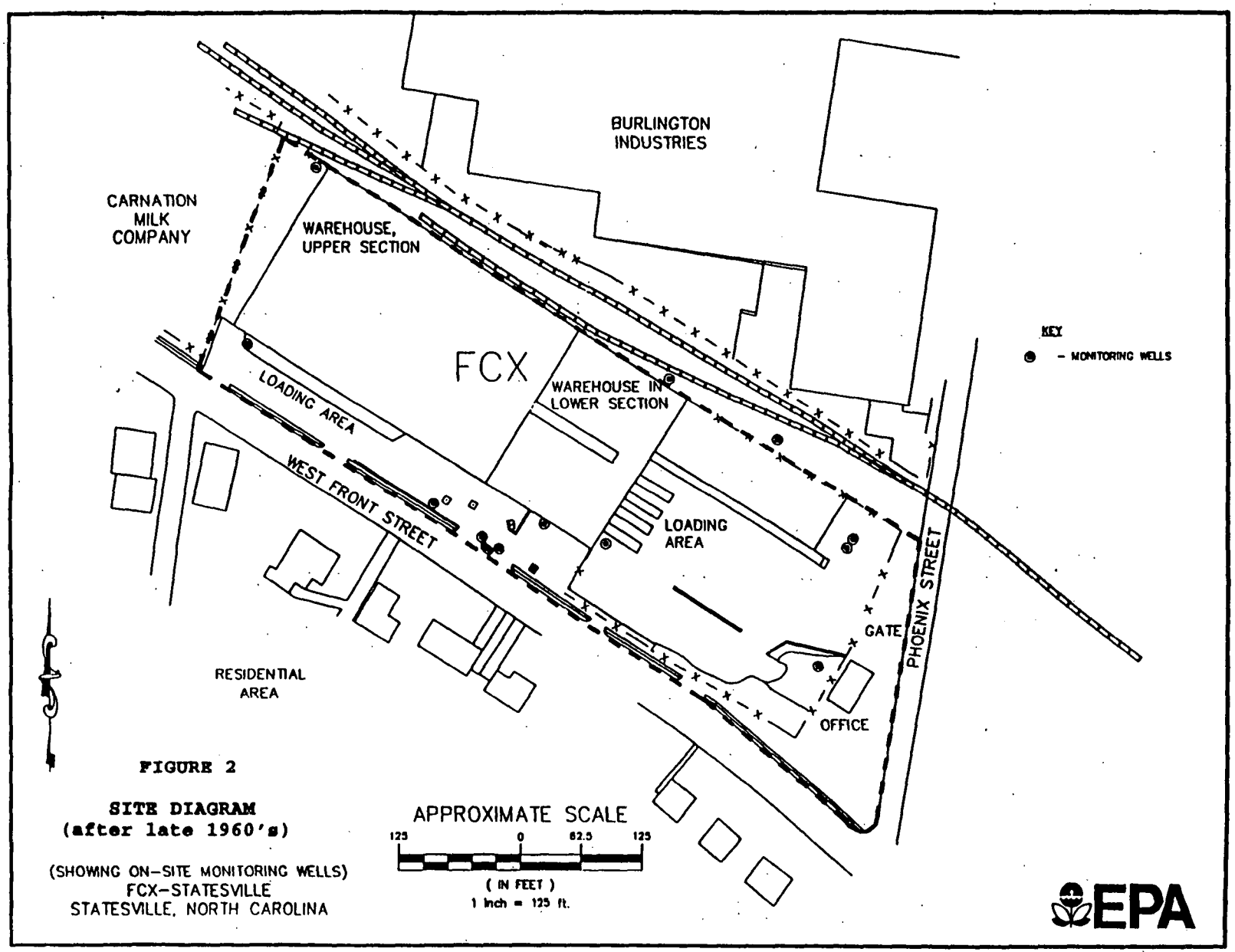

FIGURE 2

SITE DIAGRAM
(after late 1960's)

(SHOWING ON-SITE MONITORING WELLS)
FCX-STATESVILLE
STATESVILLE, NORTH CAROLINA

C. Topography

The Site is situated in the Piedmont physiographic province in western-central North Carolina. The Piedmont physiographic province is characterized as gently rolling and sloping, with slopes on-site ranging up to 1.5 percent. Slopes in the immediate vicinity of the Site range from 2 to 6 percent. Elevations within a four-mile radius of the Site range from 740 to 970 feet above mean sea level.

D. Geology/Hydrogeology

The Site lies within the geologic belt known as the Blue Ridge-Inner Piedmont Belt. The Blue Ridge-Inner Piedmont Belt generally consists of metamorphic rocks including gneisses and schists, as well as gradations of the two types. Most of these rocks near the surface have weathered into a layer of "overburden" overlying the fractured but relatively unweathered bedrock. The overburden ranges in thickness from 15-40 feet at the Site, and consists of saprolite and residual soils interspersed with unweathered gneiss/schist, and to a lesser extent, alluvium. Granitic intrusions are also common in the area of the Site. Soils in the general area of the Site belong to the Lloyd Association. These soils, located along broad ridges with short side slopes, are characterized as deep, well-drained soils with a subsoil of dark red clay.

Groundwater at the Site occurs in an unconfined-to-semiconfined aquifer consisting of the overburden hydraulically interconnected with the underlying fractured bedrock. The saturated overburden serves as a groundwater reservoir which supplies water to the fractures, faults, and other secondary permeability features in the bedrock. Approximate depth to groundwater in the saturated overburden in the vicinity of the Site generally ranges from 27 to 30 feet below land surface. During the wetter periods of the year groundwater may intersect the ground surface and become overland surface water flow.

E. Surface Water

On-site surface water drainage and flow patterns are generally controlled by topography and several man-made drainage structures constructed along West Front Street and Phoenix Street. Surface water flow is generally to the south into Free Nancy Creek, which converges with Third Creek approximately 1.5 miles southeast of the Site (two miles stream distance). Third Creek flows in a easterly direction for approximately 15 miles, where it empties into the South Yadkin River.

F. Meteorology

The climate in Iredell County is classified as fairly mild, and is influenced by the mountain ranges to the northeast, and the Atlantic Ocean to the southeast. Prevailing winds are from the southwest, although northeast winds do frequently occur in the autumn. Relative humidity averages about 70 percent throughout the year. Monthly total precipitation generally ranges from about 3 inches during October and November to about 5 inches during July and August.

G. Demography and Land Use

The Site is located along an industrial corridor which stretches along West Front Street. The area around the Site is characterized by a combination of light/heavy industry, commercial, residential, and institutional. The estimated population within the five-mile radius of the Site includes all of Statesville (18,622 in the 1980 census) and an estimated 9,500 living in Iredell County outside the city limits. The population within the three-mile radius of the Site includes about 90% of the city's population (about 17,000 people) and 2,440 county residents.

H. Utilities

Electricity, telephone, as well as water and sewage connections have been terminated since FCX declared bankruptcy in 1986. Nevertheless, these utilities are available upon request.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Site History

FCX began operating the Site as an agricultural supply distribution center about 1940 and continued to operate the Site until declaring bankruptcy in 1986. The Site served as a formulating, repackaging, warehousing, and distribution center for pesticides, fertilizers, and feed grains. The repackaging of liquid pesticides was discontinued in 1966 and dust repackaging in 1969. As stated in the Introduction, 5,000-10,000 pounds of the pesticides DDT, DDE, and chlordane were allegedly disposed of on-site in two trenches, buried under six feet of soil, and later covered with a reinforced, 8"-thick concrete slab and warehouse.

Previous investigations conducted prior to the Remedial Investigation at the FCX Site have been conducted by Fred C. Hart for Southern States Cooperative, by the North Carolina Department of Human Resources (NCDHR) (now known as the North Carolina Department of Environment, Health, and Natural Resources (NCDEHNR)

Superfund Section), and by EPA-Region IV Emergency Response. The following paragraphs briefly summarize the soil sample results of these investigations.

The Fred C. Hart investigation in February 1986 resulted from a pre-purchase environmental evaluation on behalf of Southern States Cooperative. Five composite soil samples were collected to investigate the soil for reported pesticide contamination. Analytical results of the soil samples indicated the presence of nine pesticides, most notably chlordane and DDT.

The NCDHR conducted a Site Inspection in May 1986. Soil samples were collected both on-site and off-site in the front yard of an adjacent residence. Analytical results of the soil samples indicated the presence of pesticides both on the FCX property as well as on the adjacent property.

EPA-Region IV Emergency Response conducted emergency sampling investigations at the Site in January 1989 and again in January 1990. Extensive exploratory borings were drilled through the main warehouse concrete floor in an attempt to locate the alleged pesticide trenches. Efforts to locate the pesticide trenches were unsuccessful.

B. Enforcement Activities

On September 17, 1986, FCX filed a voluntary petition under the provisions of Chapter 11 of the United States Bankruptcy Code. The EPA, NCDEHNR, and FCX entered into a settlement agreement, whereby FCX established a trust to be used to remediate the Site.

The FCX-Statesville Site was evaluated using the Hazard Ranking System (HRS). The Site was proposed for inclusion on the National Priorities List (NPL) on June 24, 1988, and was finalized on the NPL on February 21, 1990. EPA-Region IV initiated RI/FS field activities at the Site in June 1991 with the aid of EPA's Environmental Services Division, and EPA's Alternative Remedial Contract (ARCs) contractor, Roy F. Weston.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Pursuant to Section 113(K)(2)(B)(i-v) and Section 117 of CERCLA 42 U.S.C. § 9613 (K)(2)(B)(i-j), and 42 U.S.C. § 9617, the Community Relations Plan and the RI/FS Reports were made available to the public in the Administrative Record located both in the Information Repository maintained at the EPA Docket Room in Region IV and at the Iredell County Library in Statesville, North Carolina. Fact sheets notifying local citizens about the availability of these documents, explaining the RI/FS process, and summarizing site-

related activities were sent out in May 1991 and April 1993. A public meeting was held on May 31, 1991 to inform citizens about upcoming RI activities. Notices of the Proposed Plan public meeting were published in the Record and Landmark and the Iredell County News on July 5, 1994. A 30-day public comment period was held from July 5, 1994 to August 4, 1994. The Proposed Plan public meeting was held on July 11, 1994 where representatives from EPA answered questions about the Site and the remedial alternatives under consideration. The public requested an extension of the comment period during the meeting. Based on this request, EPA extended the comment period through September 3, 1994.

Representatives from EPA have met with individual citizens and citizen groups on numerous occasions over the past several years to obtain their input and to keep them informed. The local citizens group "Citizens for a Clean Environment" applied for and were awarded a Technical Assistance Grant (TAG) on March 23, 1992.

IV. SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

As with many Superfund sites, the FCX-Statesville Site is complex. For this reason, EPA currently believes that the remediation of the Site will be accomplished most effectively by implementing three phases of cleanup, referred to as "operable units".

Each operable unit requires a separate RI/FS, Risk Assessment, Proposed Plan, and Record of Decision. The objectives of the three operable units (OUs) at the Site are:

- OU One: Address the groundwater contamination beneath the FCX property and to the south of the FCX property;
- OU Two: Address the pesticide soil contamination on the FCX property; and
- OU Three: Address all other contamination associated with the property which is currently owned and operated by Burlington Industries.

The Record of Decision for OU One was signed by the EPA-Region IV Acting Regional Administrator in September 1993. EPA is currently developing the work plan to design the groundwater pump-and-treat system for OU One. Once the Regional Administrator has signed the Record of Decision for OU Two, EPA will hire a contractor to develop a work plan to design the soil remediation system. On April 25, 1994, EPA held a public meeting in Statesville to initiate the Remedial Investigation field activities for OU Three.

Once this investigation is complete, EPA will write the Record of Decision for OU Three to address the contamination associated with the property currently owned and operated by Burlington Industries.

V. SUMMARY OF SOIL INVESTIGATION

Soil samples were collected and analyzed throughout the Remedial Investigation (RI) in order to fully characterize the nature and extent of the soil contamination at the Site. All of the soil samples collected during the RI were analyzed for Target Analyte List (TAL) metals, cyanide, Target Compound List (TCL) VOCs, Semi-Volatile Organic Compounds (SVOCs), poly-chlorinated biphenyls (PCBs), and pesticides. Numerous exploratory borings were also drilled during the RI in an attempt to locate the alleged pesticide burial trenches.

During the Phase I RI conducted in June 1991, one hundred and eighty-seven (187) surface and subsurface soil samples were collected from three areas on and around the FCX property. Area 1 includes the residential area south of Front Street, the Carnation property, and locations adjacent to and east of Phoenix Street. Area 2 includes those portions of the FCX property not covered by the warehouses, as well as locations adjacent to the railroad tracks. Area 3 includes those locations presently under the warehouses. Figure 3 shows the soil sample locations. During the Phase II RI conducted in June 1992, nine (9) soil samples were collected and analyzed to provide additional information regarding surface and subsurface soil contamination at the Site.

Phase I Results

A number of metals were detected in the soil samples during the Phase I RI, most commonly aluminum, iron, chromium, lead, vanadium, barium, magnesium, potassium, nickel, calcium, zinc, copper, and cobalt. Most of these metals, based on their widespread occurrence and geological/mineralogical associations, are probably present at naturally-occurring concentrations. However, chromium and lead were detected in several samples at concentrations significantly higher than naturally-occurring or background concentrations. The elevated levels of chromium and lead in these samples are not thought to be associated with former FCX operations.

Thirteen pesticides were identified in surface and subsurface soil samples collected and analyzed during the Phase I RI. These pesticides included DDT, DDD, DDE, pentachlorophenol, alpha-chlordane, gamma-chlordane, dieldrin, endrin, heptachlor, heptachlor epoxide, alpha-BHC, gamma-BHC (lindane), and aldrin. The most widespread pesticides detected in the soil were the compounds of the DDT family (4,4'-DDT and its degradation or

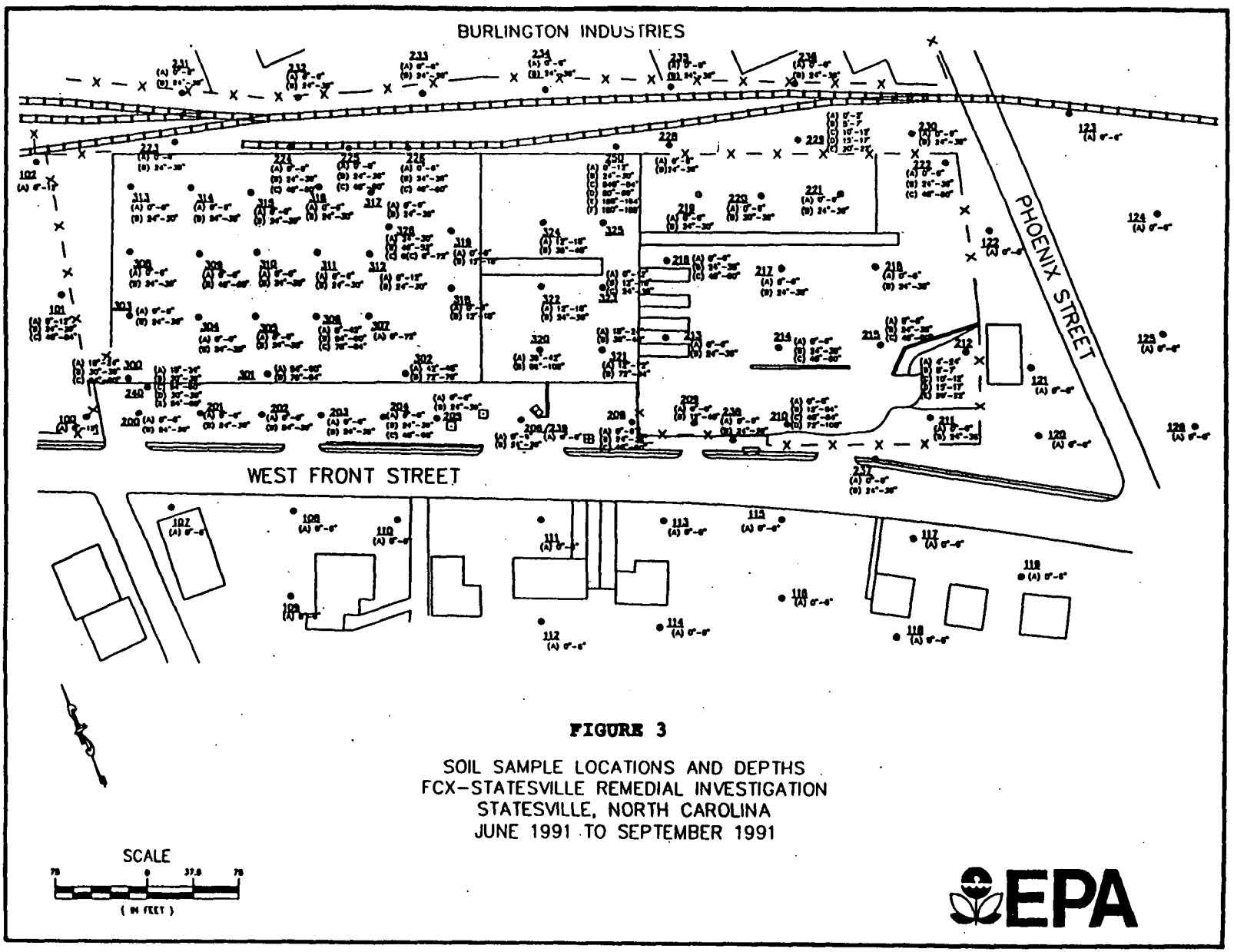

FIGURE 3

SOIL SAMPLE LOCATIONS AND DEPTHS
FCX-STATESVILLE REMEDIAL INVESTIGATION
STATESVILLE, NORTH CAROLINA
JUNE 1991 TO SEPTEMBER 1991

transformation products, 4,4'-DDD and 4,4'-DDE). DDT (4,4'-DDT) was detected in fifty-seven (57) out of one hundred eighty-seven (187) samples collected. Figure 4 shows the distribution of DDT in the soil, including the detection boundary, as well as the 1,000 ug/kg, 10,000 ug/kg, and the 100,000 ug/kg isoconcentration boundaries. The highest concentration of DDT detected in the soil during the Phase I RI, 830,000 ug/kg, was detected from 12-16 inches below the surface at sample location FS-319-SLB.

The soil sample results from the Phase 1 RI indicated presumptive evidence of dioxin and furans. As a result, an additional forty-three (43) soil samples were collected from twenty-two sample locations and analyzed for dioxin and furans. Dioxin was present in the soil beneath the upper warehouse at Toxicity Equivalent Quotient (TEQ) concentrations below one part-per-billion. EPA also collected groundwater samples from a representative number of the on-site monitoring wells to determine if dioxin or furans had leached from the soil into the groundwater. None of the groundwater samples revealed the presence of dioxin or furans.

A number of extractable organic compounds were identified in the soil samples collected and analyzed during the RI. Nineteen (19) of the twenty-one (21) extractable organic compounds were polycyclic aromatic hydrocarbons (PAHs), including pyrene, fluoranthene, anthracene, perylene, phenanthrene, benzo-(b/k)fluoranthene, chrysene, benzo(a)anthracene, benzo(a)pyrene, indeno(1,2,3-CD)pyrene, and dibenzo(A,H)anthracene. The elevated levels of PAHs in the soil are not thought to be associated with former FCX operations, but with the crossties underlying the railroad tracks next to the Site. In addition to the extractable organic compounds mentioned in the previous paragraphs, forty (40) additional extractable compounds (listed as mostly unidentified compounds) were detected during the Phase I RI.

Twelve (12) purgeable organic compounds were also detected in soil samples collected and analyzed during the Phase I RI. Of these twelve compounds, trichloroethene and tetrachloroethene were the most frequently detected in the soil. The distribution of these two compounds in the soil appears to coincide with the plume of trichloroethene and tetrachloroethene in the groundwater. Other purgeable organic compounds identified at small concentrations in the soil during the RI included acetone, 1,2-dichloroethene, tetrahydrofuran, chloroform, total xylene, ethyl benzene, chlorobenzene, pinene, trimethylcyclohexane, and ethylmethyl-cyclohexane.

Phase II Results

Six of the nine soil samples collected during the Phase II RI were analyzed to provide total organic carbon (TOC) values for

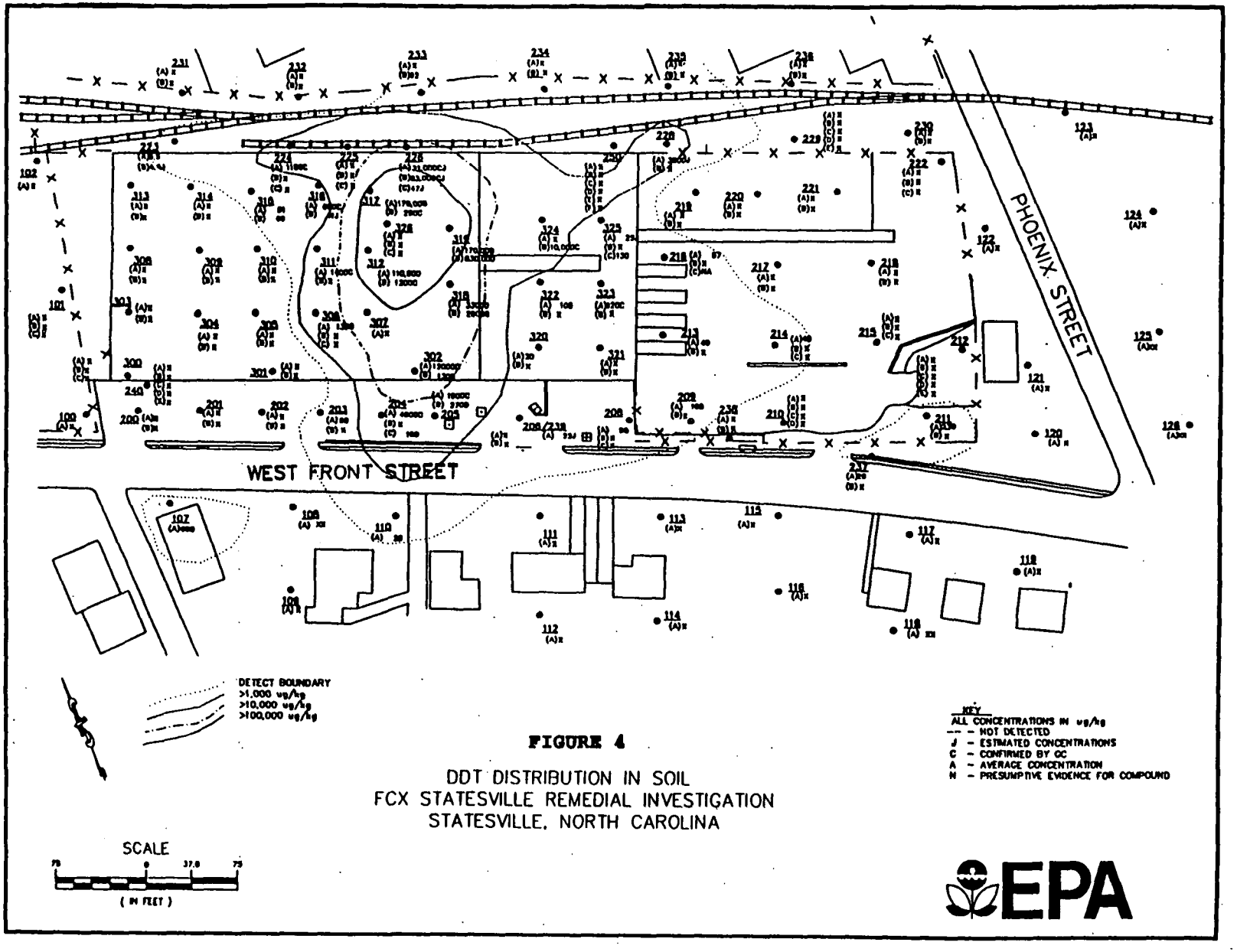

FIGURE 4

DDT DISTRIBUTION IN SOIL
FCX STATESVILLE REMEDIAL INVESTIGATION
STATESVILLE, NORTH CAROLINA

evaluating the fate and transport of the Site contaminants. Two soil samples, FS2-T11-SLA and FS2-T11-SLB, were collected from the 20-25 foot depth interval and the 30-35 foot interval, respectively. Both samples contained DDT, DDD, DDE, and gamma-chlordane at concentrations up to 20 ug/kg, as well as several BHC isomers, endrin, and heptachlor at concentrations below 20 ug/kg.

VI. SUMMARY OF SITE RISKS

The Baseline Risk Assessment (BRA) was developed to identify the potential threats to public health and the environment posed by the Site under current and future conditions, assuming that no remedial actions take place, and that no restrictions are placed on future use of the Site. The results of the BRA indicate that actual or threatened releases from the Site, if not addressed, may present an imminent and substantial endangerment to human health and the environment.

The BRA evaluated the potential risks from exposure to contaminated surface soil, surface water, sediment, and groundwater. Any potential risks associated with contaminated groundwater will be addressed with Operable Units One and Three. However, the specific objective of Operable Unit Two is to address contaminated soil on the FCX property. The following sections summarize the Site-related risks as they relate to the following topics: A) chemicals of concern, B) exposure assessment, C) toxicity assessment, D) risk characterization, and E) environmental (ecological) assessment.

A. Chemicals of Concern

In order to identify potential chemicals of concern for the Site, the chemicals present in Site samples were screened using comparisons with ambient or background concentrations, essential nutrient concentrations, as well as concentration-toxicity criteria. If a chemical of potential concern was determined to contribute significantly to an unacceptable risk, and was not screened out using these comparisons, then it was considered to be a chemical of concern at the Site.

The chemicals of concern identified in the soil at the FCX-Statesville Site included arsenic, beryllium, benzo(a)pyrene, dibenzo(a,h)anthracene, benzo(b,k)fluoranthene, pentachlorophenol, and dioxin. Several of these chemicals of concern, such as the inorganics arsenic and beryllium, are not thought to be associated with former FCX operations. Therefore, these inorganics will not be targeted for remediation during Operable Unit Two. Likewise, the following PAHs, benzo(b,k)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, are not thought to be associated with former FCX operations. These PAHs are "creosote-related" compounds

which are commonly found in the crossties which underly railroad tracks. Therefore, these PAHs will not be targeted for remediation during Operable Unit Two.

Dioxin was identified in the surface soil at levels less than one part-per-billion (or 1.0 ug/kg) TEQ. The draft dioxin reassessment document has recommended a minor relaxation of the Cancer Slope Factor (CSF) for Dichloro-Diphsdyl-Trichloromethane (TCDD) and has not recommended a RfD for use in evaluation of non-cancer endpoints. Using the new CSF and standard default daily exposure assumptions, 1.0 ug/kg of dioxin TEQs in soil equates to an upper bound risk estimate of about 10^{-4}. The 1.0 ug/kg level will likely continue to be considered by EPA as the residential protective level during the reassessment finalization period to be completed in September 1995. For this reason, dioxin will not be targeted for remediation during Operable Unit Two.

B. Exposure Assessment

The exposure assessment uses the description of the Site and the soil contamination characterized during the Remedial Investigation to identify potential exposure pathways for the contaminants of concern.

The exposure pathways that were evaluated under the current land use conditions were: the dermal contact and incidental ingestion of surface soil by children and adults living in Area 1; and the dermal contact and incidental ingestion of surface soil by an adolescent child trespassing into Areas 2 and 3.

The exposure pathways that were evaluated under the future land use conditions were: the dermal contact and incidental ingestion of surface soil by children and adults living on-site (assuming the existing buildings and parking lots were removed); the dermal contact and incidental ingestion of surface soil by the on-site worker (assuming the existing buildings remain); and the dermal contact and incidental ingestion of surface soil by the on-site worker (assuming the existing buildings were removed).

C. Toxicity Assessment

Under current EPA guidelines, the likelihood of adverse effects to occur in humans from carcinogens and noncarcinogens are considered separately. Cancer slope factors have been developed by EPA for estimating excess lifetime cancer risks asscociated with exposure to potentially carcinogenic chemicals. Slope factors, which are expressed in units of (kg-day/mg), are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upperbound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upperbound" reflects

factor. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals that are likely to be without risk of adverse effect. Estimated intakes of chemicals from environmental media can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied. These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

D. Risk Characterization

The risk characterization step of the risk assessment process integrates the toxicity and exposure assessments into quantitative and qualitative expressions of risk. The output of this process is a characterization of the Site-related, potential carcinogenic and noncarcinogenic health effects.

Carcinogenic risk is calculated using the following equation: Risk = CDI X SF, where CDI = chronic daily intake averaged over 70 years (mg/kg/day), and SF = slope factor expressed as $(mg/kg/day)^{-1}$. Carcinogenic risk is expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to one or more cancer-causing substances. These probabilities are generally expressed in scientific notation (e.g., $1X10^{-6}$ or $1E^{-6}$). An excess lifetime cancer risk of $1 X 10^{-6}$ indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

EPA has developed guidelines for carcinogen risk characterization. These guidelines discuss weighing the evidence that a substance is a carcinogen and classifying the suspect chemical into one of the five groups:

* Group A - Human Carcinogen
* Group B - Probable Carcinogen
* Group C - Possible Human Carcinogen
* Group D - Not Classified as a Human Carcinogen
* Group E - Evidence of Noncarcinogeneity for Humans

The potential risk for noncarcinogens, better known as the hazard quotient or HQ, is presented as the ratio of the CDI to the reference dose (RfD) for each chemical. A hazard index or HI is the sum of the HQs for a particular exposure pathway, or the sum of the HQs across multiple exposure pathways for an individual receptor. The HI is useful as a reference point for gauging if the potential exists for adverse health effects to occur from a particular exposure pathway(s). When the calculated HI exceeds 1.0 for multiple contaminants or multiple exposure pathways, there may be concern for potential adverse health effects.

Table 1 shows the model used for calculating doses from the dermal contact of contaminated surface soil, including the exposure assumptions associated with the surface soil at the Site. Table 2 shows the model used for calculating doses from the incidental ingestion of contaminated surface soil, including the exposure assumptions associated with the surface soil at the Site. Table 3 shows the exposure point concentrations for the chemicals of concern for the Site. Table 4 summarizes the carcinogenic and noncarcinogenic toxicity criteria for the Site-related contaminants of concern in the soil.

Current Land Use

For current residents living in close proximity to the Site, no carcinogenic or noncarcinogenic risks were identified at levels greater than 1E-4 (1-in-10,000) or with an HI greater than 1.0. This means that the probability of a current resident (child or adult) having adverse health effects from dermal contact or ingestion of cancer-causing contamination in the soil in areas 1, 2, or 3 is less than one-in-ten-thousand (1E-4).

Future Land Use

For future residents living on-site in areas 1 and 2, carcinogenic risks were identified for both child and adult residents at levels which were equal to or in excess of 1E-4. Hazard Index values for noncarcinogenic contaminants were also identified for the future resident (both child aged 1-6 and adult) in excess of 1.0. These risk values mean that the probability of a future resident having adverse health effects from cancer-causing contamination at the Site is greater than 1-in-ten-thousand. The next two paragraphs summarize the risks to future residents living on the Site.

The total carcinogenic risk for the future child and adult resident from the dermal contact and ingestion of contaminated surface soil was 4E-4 (4-in-10,000). A 4E-4 risk level exceeds the risk range from 1E-4 to 1E-6, which EPA-Region IV considers to be acceptable for most hazardous waste sites. The carcinogenic risk for the child resident aged 1-6 from dermal contact and ingestion of

contaminated surface soil was 2E-4 (2-in-10,000). The carcinogenic risk for the child resident aged 7-12 from dermal contact and ingestion of contaminated surface soil was 1E-4. The carcinogenic risk for the adult resident from dermal contact and ingestion of contaminated surface soil was 1E-4.

The carcinogenic risk for the future on-site worker (assuming the existing buildings remain) from the dermal contact or ingestion of contaminated surface soil at the Site was 1E-5 (1-in-100,000). The carcinogenic risk for the on-site worker (assuming the buildings are removed) from the dermal contact and ingestion of contaminated surface soil at the Site was 4E-5 (4-in-100,000).

In evaluating potential risks to future on-site workers working within the existing warehouses, air monitoring was conducted in three locations within the warehouses during two consecutive 24-hour periods. The results were evaluated against the Occupational Safety and Health Administration (OSHA) established limits. These federal limits are referred to as permissible exposure limits (PELs) determined with the time weighted average (40 hr/week, 8 hr/day scenario), which are referenced criteria for any EPA remedial activity. None of the air sample data collected and analyzed from the Site exceeded the PELs.

The total noncarcinogenic risk for the future child and adult resident living on-site (assuming the existing buildings are removed) was 3.6. The noncarcinogenic risk for the future child resident aged 1-6 from the dermal contact and ingestion of contaminated soil was 1.4. The noncarcinogenic risk for the future child resident aged 7-12 from the dermal contact and ingestion of contaminated surface soil was 5.3. The noncarcinogenic risk for the future resident living on-site from dermal contact and ingestion of contaminated surface soil was 1.4. Table 5 shows the carcinogenic and non-carcinogenic risk levels for the exposure pathways evaluated.

E. Environmental (Ecological) Assessment

Potential risks to environmental receptors at or near the Site were evaluated based on Site sampling data and a review of the toxicity of the chemicals of potential concern to ecological receptors. Use of the Site by terrestrial receptors such as birds and small mammals, particularly the area presently covered by the brick warehouses and paved parking lot, was considered unlikely given the lack of trees or other vegetative cover at the Site.

TABLE 1

Model for Calculating Doses from Dermal Contact with Soil

Soil Dermal Absorption Dose (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Where:

CS	=	Chemical concentration in soil (mg/kg)
CF	=	Conversion factor (10^{-6} kg/mg)
SA	=	Skin surface area available for contact (cm^2/day)
AF	=	Soil to skin adherence factor (mg/cm^2)
ABS	=	Dermal absorption factor (unitless)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)

Assumptions:

CS	=	Upper 95% confidence limit of the mean concentration in soil.
SA	=	2,125 cm^2/day for the child (1-6) resident. It represents the 50th percentile surface area of the arms, hands, lower legs, and feet (50% of the exposure events) and forearms and hands (50% of the exposure events) of a 1-6 year old (Anderson, 1985).
	=	4,453 cm^2/day for the child (7-12). It represents the 50th percentile surface area of the arms, hands, lower legs, and feet (100% of the exposure events) (Anderson, 1985).
	=	4,145 cm^2/day for the adult resident. It represents the 50th percentile surface area of the arms, hands, lower legs, and feet (50% of the exposure events) and forearms and hands (50% of the exposure events) of an adult male (EPA, 1992).
	=	1,980 cm^2/day for the future worker. It represents the 50th percentile surface area of the forearms and hands of an adult male (EPA, 1992).
AF	=	1 mg/cm^2, soil adherence factor (EPA, 1992b).
ABS	=	0.01 - Organic compounds (EPA, 1992a) 0.001 - Inorganic compounds (EPA, 1992a).

TABLE 1 (Continued)

Model for Calculating Doses from Dermal Contact with Soil

Soil Dermal Absorption Dose (mg/kg-day)	=	$\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$
Where:		
CS	=	Chemical concentration in soil (mg/kg)
CF	=	Conversion factor (10^{-6} kg/mg)
SA	=	Skin surface area available for contact (cm^2/day)
AF	=	Soil to skin adherence factor (mg/cm^2)
ABS	=	Dermal absorption factor (unitless)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)
EF	=	45 days/year for trespasser (approximately once a week). 320 days/year for child (7-12) trespasser/resident. 350 days/year for the child and adult residents (EPA, 1991a). 250 days/year for the future worker (EPA, 1991a).
ED	=	6 years for the child (1-6) resident (EPA, 1991a). 6 years for the current child (7-12) trespasser/resident (EPA, 1991a). 25 years for the on-site worker (EPA, 1991a).
	=	18 years for the adult resident (EPA, 1991a).
BW	=	15 kg for the child resident (EPA, 1991a). 27 kg for the current child (7-12) trespassers/resident (EPA, 1991a) 70 kg for the adult resident (EPA, 1991a). 70 kg for the future worker (EPA, 1991a).
AT	=	Exposure duration (years) x 365 days/year for evaluating noncancer risk.
	=	70 years x 365 days/year for evaluating cancer risk.

TABLE 2

Model for Calculating Doses from Incidental Ingestion of Soil

	Soil Ingestion Dose (mg/kg-day) =	$\frac{CS \times IR \times CF \times EF \times ED}{BW \times AT}$
Where:		
CS	=	Chemical concentration in soil (mg/kg)
IR	=	Soil ingestion rate (mg/day)
CF	=	Conversion factor (10^{-6} kg/mg)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days)
Assumptions:		
CS	=	Upper 95% confidence limit of the mean concentration in soil.
IR	=	200 mg/day for the child (1-6) resident (EPA, 1991a) 100 mg/day for the child (7-12) (EPA, 1991a). 100 mg/day for the adult resident (EPA, 1991a). 50 mg/day for the future worker (EPA, 1991a).
EF	=	45 days/year for trespasser (EPA, 1991a) 320 days/year for the child (7-12) offsite resident (EPA, 1991a) 350 days/year for the children and adult residents (EPA, 1991a). 250 days/year for the future worker (EPA, 1991a).
ED	=	6 years for the child (1-6) resident (EPA, 1991a). 6 years for the current child (7-12) (EPA, 1991a). 18 years for the adult resident (EPA, 1991a).
	=	25 years for the future on-site worker (EPA, 1991a).
BW	=	15 kg for the child resident (EPA, 1991a). 27 kg for the current child (7-12) trespassers (EPA, 1995) 70 kg for the adult resident (EPA, 1991a). 70 kg for the future worker (EPA, 1991a).
AT	=	Exposure duration (years) x 365 days/year for evaluating noncancer risk.
	=	70 years x 365 days/year for evaluating cancer risk.

TABLE 3

EXPOSURE POINT CONCENTRATIONS FOR CHEMICALS OF CONCERN (MG/KG)

CHEMICAL OF CONCERN	EXPOSURE POINT CONCENTRATIONS (MG/KG)		
	AREA 1	AREA 2	AREA 3
ARSENIC	2.7	6.6	-----
BERYLLIUM	0.7	0.7	-----
BENZO(A)PYRENE	0.8	1.2	0.5
DIBENZO(A,H)-ANTHRACENE	0.6	0.5	-----
BENZO(B,K)-FLUORANTHENE	1.1	2.4	0.6
PENTACHLORO-PHENOL	-----	-----	34
DIOXIN (TEQ)	.000026	.000045	.00071

(-----) - None Detected

TABLE 4

TOXICITY VALUES FOR CHEMICALS OF CONCERN

	Oral Slope Factor $(mg/kg/day)^{-1}$	Dermal Slope Factor	Ref.	Oral RfD (mg/kg/day)	Dermal RfD	Ref.	Inhalation Slope Factor $(mg/kg/day)^{-1}$	Ref.	Inhalation RfD (mg/kg/day)	Ref.
Arsenic	1.75E+00	8.75	IRIS, 1992	3.00E-04	6E-5	IRIS, 1992	1.50E+01	IRIS, 1992		
Beryllium	4.30E+00	2.15E+01	IRIS, 1992	5.00E-03	1E-3	IRIS, 1992	8.40E+00[1]	IRIS, 1992	NTV	
Benzo(B and/or K)Fluoranthene	7.3E+00	1.46E+1		NTV			NTV		NTV	
Benzo-A-Pyrene	7.3E+00	1.46E+1	IRIS, 1992	NTV			NTV		NTV	
Dibenzo(A,H)Anthracene	7.3E+00	1.46E+1		NTV			NTV		NTV	
Pentachlorophenol	1.20E-01	2.4E-1	IRIS, 1992	3.00E-02	1.5E-2	IRIS, 1992	NTV		NTV	

[1]Converted from a unit risk assuming the ingestion of 2 liters of drinking water per day and a body weight of 70kg (EPA, 1992)
NTV = No Toxicity Value
Dermal RfDs/SFs are derived
Absorption Factors (ABS): 0.2 - Inorganics, 0.8 - Volatile Organics, 0.5 - Semi-volatile Organics/Pesticides/PCBs
Dermal RfD = Oral RfD x ABS
Dermal Slope Factor = Oral SF/ABS

TABLE 5

CARCINOGENIC AND NON-CARCINOGENIC RISK LEVELS FOR CHEMICALS OF CONCERN

LAND USE	EXPOSURE PATHWAY	CARCINOGENIC RISK	NON-CARCINOGENIC RISK (HI)
CURRENT	CHILD AGED 1-6	$3x10^{-5}$	0.5
	CHILD AGED 7-12	$1x10^{-5}$	0.1
	ADULT	$1x10^{-5}$	0.1
FUTURE	CHILD AGED 1-6	$2x10^{-4}$	1.4
	CHILD AGED 7-12	$1x10^{-4}$	0.5
	ADULT	$1x10^{-4}$	1.4

Based on a qualitative analysis, terrestrial wildlife communities in the low-lying and wooded areas near the Site are not likely to be significantly impacted. In order to evaluate the potential risks to aquatic receptors at the Site, the surface water concentrations were compared with North Carolina Surface Water Quality Standards and Ambient Water Quality Criteria used by EPA-Region IV as chronic screening values. Several pesticides were identified in the surface water and sediment at sample location FS-020, located south of Front Street along an unnamed branch of Free Nancy Creek. Pesticide concentrations at this one sample location exceeded both the State Standards and chronic screening values for surface water. Therefore, the potential exists for adverse effects to aquatic biota at sample location FS-020 due to surface water contamination. The National Oceanic and Atmospheric Administration's (NOAA) Effects Range concentrations were also used by EPA-Region IV as sediment screening values. Pesticide concentrations in the sediment at sample location FS-020 exceeded the NOAA Effects Range concentrations; therefore, the potential exists for adverse effects on aquatic biota at sample location FS-020 due to sediment contamination.

Due to the isolated nature of the pesticide contamination at sample location FS-020, EPA does not believe that a response action is warranted for surface water and sediment. However, several volatile organic compounds were identified in surface water and sediment samples collected around the Site during the Phase I

Remedial Investigation. Due to the presence of the volatile organic compounds in the surface water and sediment, additional sampling of the surface water pathways around the Site is currently underway as part of the Operable Unit Three Remedial Investigation to determine if remedial action is warranted.

VII. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(D) of CERCLA, as amended by SARA, requires that remedial actions comply with requirements or standards set forth under Federal and State environmental laws. The applicable or relevant and appropriate requirements (ARARs) that must be complied with are those that are (A) action-specific, (B) location-specific, or (C) chemical-specific at the Site.

ARARs are used to determine the appropriate extent of Site cleanup, to scope and formulate remedial action alternatives, and to govern the implementation and operation of the selected action. "To be considered" materials (TBCs) are non-promulgated, non-enforceable advisories, guidelines, or criteria issued by federal or state governments (e.g., reference doses and carcinogenic potency factors) that may be useful for developing remedial action alternatives or for determining what is protective to human health and the environment. This section examines the cleanup criteria associated with the contaminants identified during the RI/FS and the environmental media contaminated.

A. Action-Specific ARARs

Action-specific requirements set controls or restrictions on the design, performance, and other aspects of implementation of specific remedial activities. A retained alternative must conform with all ARARs unless a statutory waiver is invoked.

B. Location-Specific ARARs

Location-specific ARARs are design requirements or activity restrictions based on the geographical or physical positions of the Site and its surrounding area.

C. Chemical-Specific ARARs

Chemical-specific ARARs include those laws and regulations governing the release of materials possessing certain chemical or physical characteristics, or containing specified chemical compounds. These requirements generally set health or risk-based concentration limits or discharge limitations in various environmental media for specific hazardous substances, contaminants, and pollutants.

VIII. REMEDIAL ACTION OBJECTIVES

The Remedial Investigation and Baseline Risk Assessment indicate that elevated levels of the Site-related contaminants DDT, DDD, gamma-BHC (lindane), endrin, dieldrin, chlordane, and pentachlorophenol are present in the soil at the Site. The Operable Unit Two Remedial Action will address this pesticide contamination by: 1) reducing levels of pentachlorophenol in the surface soil (top one foot) to 3.2 parts per million based on the 10^{-6} risk level for dermal contact and ingestion, and 2) to reduce the amount of total pesticides in the surface and subsurface soil to one parts per million as a source of groundwater contamination.

Elevated levels of arsenic, beryllium, benzo(a)pyrene, dibenzo(a,h)anthracene, and benzo(b,k)fluoranthene were identified in the soil at the Site; however, EPA does not believe that these chemicals are associated with former FCX operations. Dioxin was also identified in the soil at levels below EPA's normal remediation level of one part per billion (ppb). Therefore, EPA does not plan to remediate these chemicals.

EPA has established the remediation level for pentachlorophenol in the surface soil based on the 10^{-6} risk level. EPA has established a cleanup level for total pesticides in the surface and subsurface soil based on the following rationale. Pesticide application has been a widespread activity for a number of years because North Carolina is a heavily agricultural state. Normal agricultural pesticide usage has resulted in observed background pesticide levels in the one part per million (ppm) range.

These field observations are also supported by suggested application rates. For example, the Water Resources and Research Institute (WRRI) Report No. 60, "Contamination of Surface and Ground Water with Pesticides Applied to Cotton" indicates that in 1972 the standard application rate for DDT and methyl parathion was 1 lb/acre and for toxaphene was 2 lbs/acre. These applications were made twelve (12) times per growing season. Assuming an application rate of 2 lbs/acre and a till depth of 6 inches (and uniform mixing) this would result in a concentration of 1 ppm (soil density of 4,000,000 lbs. weight for one acre of soil one ft. deep was also assumed). Considering this and the fact that, for this Site, any direct contact to soil at this level is well within EPA's acceptable risk range, a total pesticides concentration of one ppm is being used as a performance standard for this ROD.

EPA acknowledges that an estimated 1.6 percent of the total pesticides in the surface and subsurface soil at the Site are not targeted for excavation, and may leach into the groundwater at levels above the remediation levels established in the Operable Unit One Record of Decision. For this reason, EPA and the State

believe it is important to install a groundwater pump-and-treat system, as well as continue monitoring the groundwater as part of the Operable Unit One Remedial Action.

IX. DESCRIPTION OF ALTERNATIVES

The six remedial alternatives developed to address soil contamination on the FCX property are shown listed below with a brief summary.

Alternative 1: No Action

Alternative 2: Limited Action - includes property deed restrictions and limited paving of areas around the warehouses.

Alternative 3: Demolition of buildings and paving of all areas with soil contamination. Property deed restrictions would be imposed.

Alternative 4: Demolition of buildings, contaminated soil is excavated, stockpiled, and treated on-site using Thermal Desorption and Base Catalyzed Decomposition. Treated soil is backfilled on-site.

Alternative 5: Demolition of buildings, contaminated soil is excavated, stockpiled, and treated on-site using Thermal Desorption and alternate method of treating offgases. Treated soil is backfilled on-site.

Alternative 6: Demolition of buildings, contaminated soil is excavated, stockpiled, and transported off-site for treatment at an approved RCRA incineration facility. Clean soil would be brought to the site to replace excavated soil.

An analysis of the potential Federal action-, location-, and chemical-specific ARARs is provided in Table 6. An analysis of the potential State action-, location-, and chemical-specific ARARs is provided in Table 7.

TABLE 6

Analysis of Federal ARARs

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Justification Comments
Resource Conservation and Recovery Act			
Chemical-Specific ARARs			
Identification and Listing of Hazardous Waste	40 CFR Part 261	Defines those solid wastes which are subject to regulation as hazardous waste under 40 CFR Parts 262-270.	Applicable to remedial actions involving solid waste (soil) removal in the identification of wastes and application of other action specific ARARs.
Resource Conservation and Recovery Act (continued)			
Action-Specific ARARs			
Requirements for hazardous waste generators	40 CFR Part 262 Subparts A,B,C,D	Establishes standards for generators of hazardous wastes.	Applicable to remedial actions involving removal of hazardous waste.
Requirements for transporters of hazardous waste	40 CFR Part 263 Subparts A,B,C	Establishes standards which apply to transporters of hazardous waste within the United States if the transportation requires a manifest under 40 CFR Part 262.	Applicable to remedial actions involving removal of hazardous waste.

TABLE 6 (Continued)

Analysis of Federal ARARs

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Justification Comments
Requirements for hazardous waste treatment, storage, and disposal (TSD) facilities.	40 CFR Part 264		
	Subpart L.....	Regulates owners and operators of facilities that store or treat hazardous waste in piles.	Applicable to remedial activities requiring the formation of waste piles.
	Subpart M.....	Regulates owners and operators of facilities that treat or dispose of hazardous waste in land treatment units.	Applicable to remedial activities requiring the formation of land treatment units.
	Subpart N.....	Regulates owners and operators of facilities that dispose of hazardous waste in landfills.	Applicable to remedial activities requiring the disposal of hazardous waste in landfills.
	Subpart X.....	Regulates owners and operators of facilities that treat, store, or dispose of hazardous waste in miscellaneous units.	Applicable to remedial activities requiring thermal treatment of hazardous waste in a miscellaneous unit.
Land Disposal Restrictions	40 CFR Part 268	Identifies hazardous wastes that are restricted from land disposal	Applicable to remedial actions involving removal of hazardous wastes (e.g., soil excavation)
Clean Water Act (CWA)			
Chemical-Specific ARARs			
Water quality criteria	CWA Part 303 40 CFR Part 131	Establishes water quality criteria based on the protection of human health and aquatic life.	Applicable to remedial actions involving discharge of water to a surface water body.
Action-Specific ARARs			

TABLE 6 (Continued)

Analysis of Federal ARARs

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Justification Comments
National Pollutant Discharge Elimination System (NPDES) requirements	CWA Part 402 40 CFR Part 125	Requires permit for effluent discharge from any point source into surface waters of the United States.	Applicable to remedial actions involving discharges to surface waters.
National pretreatment standard for indirect discharge to a POTW	CWA Part 307(b) 40 CFR Part 403	Establishes standards to control pollutants which pass through or interfere with treatment processes in public treatment works which may contaminate sewage sludge.	Applicable to discharge of water into local POTW.
Technology-based effluent limitations	CWA Part 301(b)	Establishes guidelines to determine effluent standards based on the best available technology (BAT) economically achievable.	Applicable to aqueous effluent from remedial processes.
Safe Drinking Water Act (SDWA)			
Chemical-Specific ARARs			
National Primary Drinking Water Standards	40 CFR Part 141	Establishes health-based enforceable standards for public water systems (maximum contaminant levels (MCLs)).	Applicable to remedial actions involving in-place treatment of soils.
National Secondary Drinking Water Standards	40 CFR Part 143	Establishes aesthetic-based, non-enforceable guidelines for public water systems (secondary maximum contaminant levels (SMCLs)).	Applicable to remedial actions involving in-place treatment of soils.
Clean Air Act (CAA)			
Chemical-Specific ARARs			

TABLE 6 (Continued)

Analysis of Federal ARARs

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Justification Comments
National Ambient Air Quality Standards (NAAQS)	40 CFR Part 50	Establishes ambient air quality standards for classes of pollutants - carbon monoxide, hydrocarbons, lead, nitrogen dioxide, particulate matter, ozone, and sulfur oxides. Standards do not apply directly to source-specific emissions, but are ambient concentration limitations.	Only "major sources" (emissions exceeding 100-250 tons per year of regulated pollutants) are subject to NAAQS attainment requirements.
National Emission Standards for Hazardous Air Pollutants (NESHAP)	40 CFR Part 61	Establishes emission standards for seven contaminants - benzene, mercury, arsenic, asbestos, beryllium, vinyl chloride, and radionuclides.	Not applicable to the site as benzene and vinyl chloride are not produced as a result of manufacturing operations.
Occupational Safety and Health Act			
Action-Specific ARARs			
Safety of workers	29 USC 651-678 29 CFR 1910	Regulates workers' health and safety.	Applicable to remedial actions at the site.
Hazardous Materials Transportation Act			
Action-Specific ARARs			
Hazardous Materials Transportation Regulations	49 USC 1801-1813 49 CFR 107, 171-177	Regulates transportation of Department to Transportation (DOT)-defined hazardous materials.	Applicable to remedial action involving transportation of DOT-defined hazardous materials off-site.
Protection of Wetlands (Executive Order 11990)			
Location-Specific ARARs			

TABLE 6 (Continued)

Analysis of Federal ARARs

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Justification Comments
Regulations to protect wetlands	Executive Order No. 11990 49 CFR 6.302(a) and Appendix A.	Requires consideration of the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practical alternative exists.	Site is not located in a wetland area.
Floodplain Management (Executive Order 11988)			
Location-Specific ARARs			
Regulations to protect floodplains	Executive Order No. 11988 40 CFR 6, Appendix A	Requires evaluation of the potential effects of actions which may be taken in a floodplain to avoid the adverse impacts associated with direct and indirect development of a floodplain.	Site is not located in the 100-year floodplain.
Regulations Protecting Landmarks, Historical, and Archeological Sites			
Location-Specific ARARs			
National natural landmarks	Historic Sites Act of 1935, 16 USC 461, 40 CFR 6.301(a)	Establishes regulations to protect national natural landmarks during remedial actions.	Site is not located in an area with natural landmarks.
Historic, architectural, archeological, and cultural sites	National Historic Preservation Act of 1966, 16 USC 470, 36 CFR 800, Executive order 11593 40 CFR 6.301(b)	Establishes regulations to protect historic, architectural, archeological, and cultural sites during remedial actions.	Site is not located in an area with historic, architectural, archeological or cultural sites.

TABLE 6 (Continued)

Analysis of Federal ARARs

Standard, Requirement, Criteria, or Limitation	Regulatory Citation	Description	Justification Comments
Historic, prehistoric and archeological data	Archeological Preservation Act of 1974, 16 USC 469 et seq. Executive Order 11593 4O CFR 6.301(c)	Establishes regulations to protect historic, prehistoric, and archeological data during remedial actions.	Site is not located in an area with prehistoric or archeological data.
Endangered Species Act			
Action-Specific ARARs			
Protection of endangered species	16 USC 1531 50 CFR Part 200 50 CFR Part 402	Requires action to conserve endangered species and/or critical habitats upon which endangered species depend.	Potentially applicable as endangered and threatened species have been identified as candidate species in Iredell Onslow County.
Fish and Wildlife Coordination Act			
Action-Specific ARARs			
Protection of fish and wildlife due to any modifications of water bodies.	16 USC 661-666	Requires adequate provision for protection of fish and wildlife resources when any modification of any stream or other water body is proposed.	Potentially applicable if the remedial action involves discharge of treated water to New River.

TABLE 7

Analysis of State of North Carolina ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Justification Comments
North Carolina Waste Management Rules and Solid Waste Management Law			
Chemical-Specific ARARs			
Identification and listing of hazardous waste.	15 A NCAC 13 A (.0006-.0014)	Defines those solid wastes which are subject to state regulation and as a hazardous waste. Consistent with corresponding federal standards (characteristic and listed hazardous waste designations).	Potentially applicable to remedial actions involving solid waste (soil) removal.
North Carolina Water and Air Resources Act			
Action-Specific ARARs			
Laws to achieve and to maintain a total environment with superior quality.	General Statutes, Chapter 143 Article 21B	State equivalent of the Federal CWA and CAA	Potentially applicable for remedial action involving discharge of water and air emissions.
North Carolina Drinking Water Act			
Action-Specific ARARs			
Regulations on drinking water	General Statutes Chapter 130A, Article 10	Establishes criteria for protection of state public water supplies.	Potentially applicable to remedial actions involving in-place treatment of soils.

TABLE 7 (Continued)

Analysis of State of North Carolina ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Justification Comments
North Carolina Solid Waste Disposal Regulations	NCAC Title 15A, Chapter 13B NCAC Title 15A, Chapter 2	Provides design, operation, and closure requirements for solid waste disposal facilities	Potentially applicable to remedial actions involving point source discharges to surface waters.
North Carolina Air Pollution Control Requirements	Subchapter 2D.....	Regulates air pollution, air quality, and emissions standards	
	Subchapter 2H.....	Requires permit for discharge of effluent from point sources into surface waters. State-level version of federal NPDES program.	
North Carolina Sedimentation Control Rules	NCAC Title 15A, Chapter 4.....	Provides requirements for the prevention of sedimentation pollution.	
North Carolina Drinking Water and Groundwater Standards			
Chemical-Specific ARARs			
Groundwater Classifications and Standards	NCAC Title 15A, Chapter 2, Subchapters 2L.0100, 2L.0200, and 0.0201	Establishes groundwater and drinking water standards based on the usage.	Potentially applicable to remedial actions involving in-place treatment of soils.

TABLE 7 (Continued)

Analysis of State of North Carolina ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Justification Comments
North Carolina Surface Water Quality Standards			
Chemical-Specific ARARs			
Classification and water quality standards applicable to surface water	NCAC Title 15A, Chapter 2, Subchapters 2L.0100 and 2L.0200	Establishes a series of classifications and water quality standards for surface waters.	Potentially applicable to discharge of water to a surface water body.
Technology-based effluent limitations	NCAC Title 15A, Subchapter 2B.0400	Establishes guidelines for effluent limitations based on BAT economically achievable.	Potentially applicable to discharge of water.

Each of the six alternatives is briefly described below. Table 8 shows the soil remediation levels for the Site-related chemicals of concern. The estimated total extent of pesticide soil contamination is shown on Figure 5. The vertical extent of the soil contamination ranges from the ground surface to depths of 7 to 10 feet below land surface. Table 9 also shows how the six alternatives either meet or do not meet the nine evaluation criteria.

Alternative 1: No Action

By law, EPA is required to evaluate a No Action Alternative to serve as a basis against which other alternatives can be compared. No remedial action of the contaminated soil would take place under the No Action Alternative. Therefore, the existing structures (i.e., buildings and parking areas) would remain intact. There are no capital costs associated with Alternative 1. However, five-year reviews of the remedy would be conducted for an estimated period of 30 years to determine if the No Action alternative remained protective of human health and the environment. The estimated present worth cost for the five-year reviews is $55,640.

Capital Costs	$ 0
Present Worth O & M Costs	$ 55,640
Total Present Worth Costs	$ 55,640

Alternative 2: Limited Action

As with the No Action Alternative, no remediation of the contaminated soil would take place under the Limited Action Alternative. The Limited Action Alternative would not reduce contaminants in the surface soil to levels that are considered protective of human health and the environment.

TABLE 8

Soil Remediation Levels

	Remedial Goal (mg/kg)
Total Pesticides[a]	1.0
Pentachlorophenol[b]	3.2

[a]Defined as gamma-BHC (Lindane), endrin, dieldrin, chlordane, DDT, and DDD.
[b]Applies only to the top one foot of soil.

The existing structures (i.e., buildings and paved areas) would remain intact. However, the areas of contaminated soil not presently covered by a warehouse or a paved surface would be capped. Additional capping or paving of those contaminated areas would reduce the possibility of future residents or on-site workers

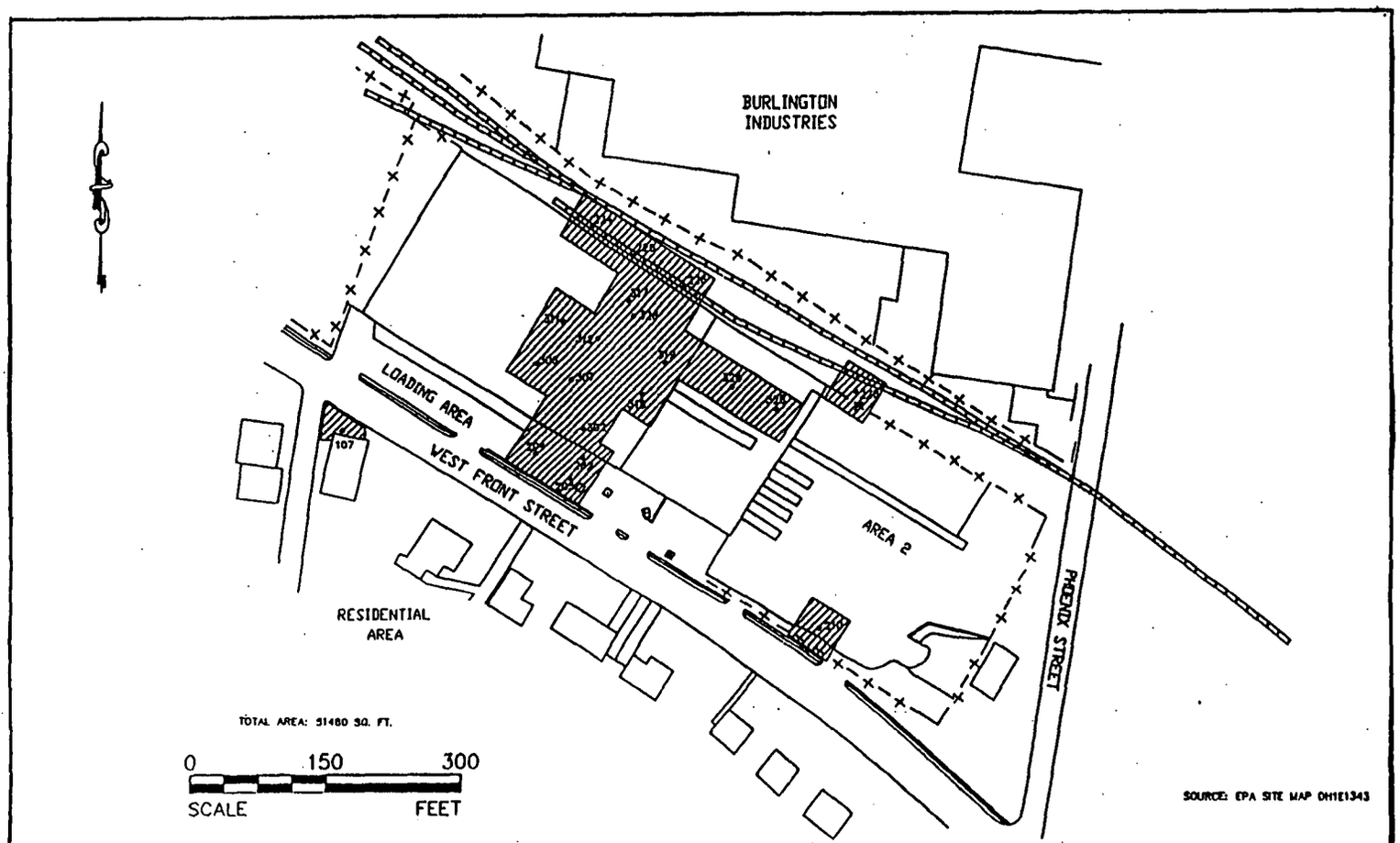

FIGURE 5

Areas of Contaminated Soil to be Remediated

ROY F. WESTON, INC.

WESTON

MANAGERS DESIGNERS/CONSULTANTS

DRAWN	DATE	DES. ENG.	DATE	W. O. NO.
D.O.	4-19-94			04400-01-02
CHECKED	DATE	APPROVED	DATE	DWG. NO.

TABLE 9

Evaluation of Remedial Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Limited Action Capping	Alternative 3 Building Removal/ Capping	Alternative 4 Thermal Desorption with BCD	Alternative 5 Thermal Desorption	Alternative 6 Off-Site Incineration
Overall Protection of Human Health and the Environment	Does not mitigate risks or achieve remediation goals.	Would limit direct exposure and protect human health. Meets criterion.	Higher degree of protection against exposure than Alternative 2. Meets criterion.	Eliminates the risk of exposure to soil contaminants by human receptors. Exceeds criterion.	Same as Alternative 4.	Same as Alternative 4.
Compliance with ARARs						
• Chemical-Specific (Cleanup Goals)	Does not meet.	N/A	N/A	Expected to meet.	Expected to meet.	Expected to meet.
• Action-Specific	N/A	N/A	N/A	Requires special handling, storage, treatment, and disposal of hazardous waste	Same as Alternative 4.	Must meet RCRA land disposal restrictions and DOT manifesting procedures.
• Location-Specific	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 9 (Continued)

Evaluation of Remedial Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Limited Action Capping	Alternative 3 Building Removal/ Capping	Alternative 4 Thermal Desorption with BCD	Alternative 5 Thermal Desorption	Alternative 6 Off-Site Incineration
Short-Term Effectiveness						
• Protection of Community During Implementation	N/A	N/A	Dust control measures would be required during building demolition.	Controls required to protect against dust generation during excavation and building demolition.	Controls required to protect against dust generation during excavation and building demolition.	Controls required to protect against dust generation from excavation, building demolition, and truck traffic.
• Protection of Workers	N/A	No significant risk to workers.	Physical hazards associated with building demolition.	Protection required against dermal contact and inhalation of contaminated dust during excavation, demolition, and treatment.	Protection required against dermal contact and inhalation of contaminated dust during excavation, demolition, and treatment.	Protection required against dermal contact and inhalation of contaminated dust during excavation, demolition, and trucking.
• Environmental Impact	N/A	Minimal	Minimal	Minimal	Minimal	Minimal
Long-Term Effectiveness	Questionable whether soil remediation goals can be met through natural degradation. Five-year review required.	Reduces continued infiltration and leaching of contaminants into groundwater. Eliminates direct contact risks. Five-year review required.	Same as Alternative 2.	Provides permanent and effective means of eliminating source for groundwater contamination.	Same as Alternative 4.	Same as Alternative 4.
Reduction of Toxicity, Mobility, and Volume						
• Treatment Process Used and Materials Treated	None	None	None	Achieves treatment.	Achieves treatment.	Achieves treatment.

TABLE 9 (Continued)

Evaluation of Remedial Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Limited Action Capping	Alternative 3 Building Removal/ Capping	Alternative 4 Thermal Desorption with BCD	Alternative 5 Thermal Desorption	Alternative 6 Off-Site Incineration
• Amount of Hazardous Materials Destroyed or Treated	None	None	None	6,945 cubic yards of contaminated soil treated.	6,945 cubic yards of contaminated soil treated.	6,945 cubic yards of contaminated soil destroyed.
• Degree of expected reduction in toxicity, mobility, and volume.	Does not meet CERCLA preference for treatment remedies.	Does not meet CERCLA preference for treatment remedies.	Does not meet CERCLA preference for treatment remedies.	Reduction of soil contamination below soil remediation goals.	Reduction of soil contamination below soil remediation goals.	Greater than 99.99% destruction of organic contaminants through incineration.
• Degree of Irreversibility	N/A	Cap and buildings could be removed.	Cap could be removed.	Process would be irreversible.	Process would be irreversible.	Process would be irreversible.
• Type and quantity of residuals remaining.	N/A	N/A	N/A	Residual soil contamination below remediation goals would be delisted and backfilled.	Same as Alternative 4.	Ash residual disposed of by incineration facility.
Implementability						
• Ability to Construct and Operate the Technology.	N/A	Road paving equipment easily operated.	Road paving equipment operated easily. Building demolition requires additional planning but easily performed.	Mobile unit commercially available to handle the expected soil volumes. Demolition and excavation implementable.	Mobile units are available to handle the expected soil volumes. Demolition and excavation implementable.	Permitted incinerators are available with the capacity to handle the expected soil volumes. Demolition and excavation implementable.
• Ease of Site Preparation	N/A	Only minor grading required.	Would require decontamination and demolition of buildings.	Would require warehouse demolition and decontamination facilities.	Same as Alternative 4.	Same as Alternative 4.

TABLE 9 (Continued)

Evaluation of Remedial Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Limited Action Capping	Alternative 3 Building Removal/ Capping	Alternative 4 Thermal Desorption with BCD	Alternative 5 Thermal Desorption	Alternative 6 Off-Site Incineration
• Ease of Undertaking Additional Remedial Actions	N/A	Would not interfere with any future actions.	Would not interfere with any future actions.	Would not interfere with any future actions.	Would not interfere with any future actions.	Would not interfere with any future actions.
• Ability to Monitor Effectiveness	N/A	Pavement would be inspected for cracks.	Same as Alternative 2.	Confirmation soil sampling easily performed.	Same as Alternative 4.	Same as Alternative 4.
• Ability to Obtain Approval from Other Agencies	N/A	N/A	N/A	Community may express concern over thermal treatment on-site.	Same as Alternative 3.	State may object to sending materials out of state.
• Availability of Materials	N/A	All materials obtained easily.	All materials obtained easily.	All materials obtained easily.	All materials obtained easily.	All materials obtained easily.
• Availability of Unusual or Special Services	N/A	None needed.	Building demolition equipment obtained easily.	Building demolition equipment obtained easily.	Building demolition equipment obtained easily.	Building demolition equipment obtained easily.
Estimated Cost (1994 $)						
• Capital Cost	0	$139,844	$1,084,881	$4,840,000	$6,150,000	$17,100,000
• Annual O&M Cost (Years 1-30)	$ 20,000 *	$ 4,000 $ 20,000 *	$ 8,000 $ 20,000 *	$ 0	$ 0	$ 0
• Present Worth **	$ 55,640	$255,640	$1,345,640	$4,840,000	$6,150,000	$17,100,000

* Review performed every 5 years.
** Present worth calculated using a discount rate of 5% and 30-year life where O&M costs are included.

from coming into dermal contact or ingesting contaminated soil. Property deed restrictions would also be established to put limitations on the future use(s) of the property, thereby further reducing the possibility of future residents or workers coming into dermal contact or ingesting contaminated soil. The capital costs as well as the operation and maintenance costs associated with Alternative Two are shown below.

Capital Costs	$ 0
Present Worth O & M Costs	$ 255,640
Total Present Worth Costs	$ 255,640

Alternative 3: Demolition of Buildings and Capping

As with Alternatives 1 and 2, Alternative 3 would not involve remediation of contaminated soil. However, the existing structures (i.e., buildings and paved areas) would be demolished and transported off-site to an appropriate disposal facility. The areas known to have surface soil contamination would then be capped or paved to reduce the possibility of future residents or workers coming into dermal contact or ingesting contaminated soil. Capping would also reduce the possibility of contaminants leaching from the soil into the groundwater. Property deed restrictions would be established to place limitations on the future use(s) of the property. The capital costs as well as the operation and maintenance costs associated with Alternative Three are shown below.

Capital Costs	$ 0
Present Worth O & M Costs	$ 1,345,640
Total Present Worth Costs	$ 1,345,640

Alternative 4: Demolition of Buildings, Soil Excavation and On-site Treatment Using Thermal Desorption and Base Catalyzed Decomposition

Alternative 4 would involve demolishing the existing buildings, then excavating and treating approximately 6,945 cubic yards of contaminated soil on-site with Thermal Desorption and Base Catalyzed Decomposition (BCD). Thermal Desorption is a process which uses either direct or indirect heat exchange to heat organic contaminants to a temperature high enough to separate them from a contaminated solid medium such as soil. After being condensed and treated in the BCD process, all organic residuals would be transported off-site for further treatment and disposal. Particulate matter is removed by conventional air pollution control methods.

The treated soil would be backfilled into the excavated areas, after which the Site would be regraded and seeded with grass.

Trenches would also be dug in areas currently beneath the warehouses in an attempt to locate the alleged pesticides burial pit. A treatability study may be needed to evaluate the process viability of the contaminated soil, as well as to establish design and operating parameters for the optimization of the treatment system. A determination will be made during the remedial design phase as to the need of the treatability study. The capital and operation and maintenance costs for Alternative 4 are shown below.

Capital Costs	$ 4,840,000
Present Worth O & M Costs	$ 0
Total Present Worth Costs	$ 4,840,000

Alternative 5: Demolition of Buildings, Soil Excavation, and On-site Treatment Using Thermal Desorption and an alternate method of treating offgases

Alternative 5 would involve demolishing the existing buildings, then excavating and treating approximately 6,945 cubic yards of contaminated soil on-site using Thermal Desorption and an alternate method of treating the offgases. Organics in the offgases may be collected and recovered on-site by condensation and adsorption. Any concentrated and condensed organic contaminants remaining after the process would be stored for shipment to recycling centers or off-site treatment facilities, such as incinerators. Particulate matter would be removed by conventional air pollution control methods.

The treated soil would be backfilled into the excavated areas, after which the Site would be regraded and seeded with grass. Trenches would be dug beneath the existing warehouses in an attempt to locate the alleged pesticide burial pit. As with Alternative Four, a treatability study may be needed as part of Alternative Five to evaluate the process viability of the contaminated soil, as well as to establish design and operating parameters for the optimization of the treatment system. The capital and operation and maintenance costs associated with Alternative 5 are shown below.

Capital Costs	$ 6,150,000
Present Worth O & M Costs	$ 0
Total Present Worth Costs	$ 6,150,000

Alternative 6: Demolition of Buildings, Soil Excavation, and Off-site Treatment Using Incineration

Alternative 6 would involve demolishing the existing buildings, then excavating and transporting approximately 6,945 cubic yards of contaminated soil offsite to an EPA-approved incineration facility for treatment. Clean soil would be transported to the Site and backfilled into the excavated areas. The Site would then be regraded and seeded with grass.

Trenches would be dug beneath the existing warehouses in an attempt to locate the alleged pesticide burial pit. The capital and operation and maintenance costs associated with Alternative 6 are shown below.

Capital Costs	$17,100,000
Present Worth O & M Costs	$ 0
Total Present Worth Costs	$17,100,000

X. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives to address soil contamination were each evaluated using the nine evaluation criteria as set forth in the

NCP, 40 CFR 300.430(e)(9). A brief description of each of the nine evaluation criteria is provided below.

The nine evaluation criteria summarized above relate directly to requirements in Section 121 of CERCLA, 42 U.S.C. § 9621, which determine the feasibility and acceptability of the remedy. Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major tradeoffs between remedies. State and community acceptance are modifying criteria formally taken into account after public comment is received on the Proposed Plan. The following paragraphs provide brief summaries of the nine evaluation criteria, followed by a summary of how each of the six alternatives was evaluated against the nine criteria.

THRESHOLD CRITERIA

Overall Protection of Human Health and the Environment addresses how an alternative as a whole will protect human health and the environment. This includes an assessment of how any unacceptable risk to human health and the environment is properly eliminated, reduced, or controlled through the treatment of hazardous waste, or with engineering controls or property deed restrictions placed on the property to restrict access and (future) development.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) addresses whether or not a remedy complies with all state and federal environmental and public health laws and requirements that apply or are relevant and appropriate to the conditions and cleanup options at a specific site. If an ARAR cannot be met, the analysis of the alternative must provide the grounds for invoking a statutory waiver.

PRIMARY BALANCING CRITERIA

Short-term Effectiveness refers to the likelihood of adverse impacts on human health or the environment that may be posed during the construction and implementation of an alternative until cleanup levels are achieved.

Long-term Effectiveness and Permanence refers to the ability of an alternative to maintain reliable protection of human health and the environment over time once the cleanup levels have been met.

Reduction of Toxicity, Mobility, or Volume are the three principal measures of the overall performance of an alternative. The 1986 amendments to the Superfund emphasize that, whenever possible, EPA should select a remedy that uses a treatment process to permanently reduce the level of toxicity of contaminants at the site; the spread of contaminants away from the source of contaminants; and the volume, or amount, of contamination at the site.

Implementability refers to the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement the alternative.

Cost includes the capital (up-front) cost of implementing an alternative, as well as the cost of operating and maintaining the alternative over the long-term, and the net present worth of both

the capital and operation and maintenance costs.

MODIFYING CRITERIA

State Acceptance addresses whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comments on the alternative EPA is proposing as the remedy for the Site.

Community Acceptance addresses whether the public concurs with EPA's Proposed Plan. Community acceptance of the Proposed Plan is evaluated based on verbal comments received at the public meetings and those written comments received during the public comment period.

Overall Protection of Human Health and the Environment

Each alternative was evaluated to determine whether it would effectively mitigate and minimize the long-term risks to public health and the environment due to dermal contact and ingestion of contaminated soil at the Site. Alternative 1 would not be protective of human health or the environment since soil contamination would not be addressed; therefore, unacceptable risks would not be mitigated and the contaminated soil would continue to exist as a source of groundwater contamination. Furthermore, no deed restrictions would be implemented to restrict the future land use of the Site.

Alternative 2 would be partially protective of human health and the environment because the capping of contaminated soil around the warehouses would help reduce the possibility of dermal contact and ingestion of contaminated surface soil, as well as the potential leaching of contaminants from the soil into the groundwater. However, Alternative 2 would be protective over the long term only if the deed restrictions were effectively implemented on the FCX property. Furthermore, since no active remediation of the soil would take place under Alternative 2, the contaminated soil would continue to exist as a source of groundwater contamination.

Alternatives 4, 5, and 6 would be protective of human health and the environment because the unacceptable risks associated with the contaminated soil would be reduced to acceptable levels. Total pesticides in the surface and subsurface soil would also be reduced by an estimated 98.4 % as an existing source of groundwater contamination.

Compliance with ARARs

There are no chemical-specific ARARs for the soil at the Site. However, the remediation levels established for Site-related contaminants in the surface soil at the FCX-Statesville Site are based on 10^{-6} risk. The pesticide penta-chlorophenol is the only Site-related contaminant identified in the surface soil at the Site at concentrations which exceed 10^{-6} risk. EPA has established a remediation level of 3.2 parts per million for pentachlorophenol in the surface soil. This remediation level reduces the risk associated with dermal contact and ingestion of pentachlorophenol in the surface soil to 10^{-6}.

EPA has established the remediation level for total pesticides in the surface and subsurface soil at the Site at the one part per million. EPA believes that remediating total pesticides in the surface and subsurface soil to the one part per million level will effectively remove approximately 98.4 % of the total pesticides in the soil as a source of groundwater contamination. Combined with the Operable Unit One groundwater pump-and-treat system, EPA believes this 98.4 % reduction of total pesticides in the surface and subsurface soil will be protective of human health and the environment.

Short-term Effectiveness

Alternatives 1 and 2 could be easily implemented because both alternatives involve conducting 5-year reviews, and limited capping for alternative 2. Alternatives 1 and 2 would not reduce the site-related contamination on a short-term basis.

Alternatives 3, 4, 5, or 6 would involve potential physical hazards to workers during warehouse demolition and remedial action activities. For this reason, EPA will require a Health and Safety Plan (following OSHA guidelines) to be developed and followed by all remedial workers throughout the Operable Unit Two Remedial Action. Alternatives 3, 4, 5, and 6 would also involve the generation of dust. However, these alternatives will be designed so that dust would be minimized and controlled with water sprayers.

Long-term Effectiveness and Permanence

Alternatives 1, 2, and 3 would have no effect on the contaminant concentrations contributing to the risks identified in the Baseline Risk Assessment. Capping of portions of the Site under Alternatives 2 and 3 would help mitigate the potential for dermal contact and ingestion of contaminated surface soil, as well as the leaching of contaminants from the soil into the groundwater. However, the long-term effectiveness of these two alternatives would depend on the effectiveness of the property deed restrictions. On the other hand, Alternatives 4, 5, and 6 are permanent remedies, and therefore would be effective over the long-term.

Reduction of Toxicity, Mobility, or Volume

Since Alternatives 1, 2, and 3 provide no active treatment of the contaminated soil, contaminants would degrade only by passive, natural processes. On the other hand, Alternative 4, 5, and 6 would effectively reduce the volume of pesticides in the soil by an estimated 98.4 %, thereby reducing the toxicity, mobility, and volume of the contaminants in the soil.

Implementability

The five-year reviews would be easily implemented as part of Alternatives 1, 2, and 3; however, extensive coordination is needed between the State and local agencies in order to implement the deed restrictions necessary for the effective implementation of Alternatives 2 and 3. Alternatives 4, 5, and 6 are implementable, but would require both detailed design preparation and coordination.

coordination.

Cost

Estimated total present worth costs for the five soil alternatives for Operable Unit Two are presented below; the costs assume a 5% interest rate.

Alternative 1:	$55,640
Alternative 2:	$255,640
Alternative 3:	$1,345,640
Alternative 4:	$4,840,000
Alternative 5:	$6,150,000
Alternative 6:	$17,100,000

State Acceptance

The NCDEHNR has reviewed and provided EPA-Region IV with comments on the Remedial Investigation and Feasibility Study reports. The NCDEHNR also reviewed this Record of Decision and EPA's preferred alternative and concurs with EPA's selection.

Community Acceptance

Each comment has been included in the Responsiveness Summary, and is included as Appendix B of this Record of Decision (ROD).

XI. THE SELECTED REMEDY

Based on consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives, as well as state and public comments, EPA has selected Alternative Four for the Operable Unit Two Remedial Action at the FCX-Statesville Superfund Site. Alternative Four will involve treating approximately 6,945 cubic yards of contaminated soil on-site using Thermal Desorption and Base Catalyzed Decomposition (BCD). Thermal Desorption and BCD have proven effective in the treatment of halogenated volatile organic compounds, halogenated semivolatile organic compounds, pesticides, herbicides, and dioxin/furans in soil. Implementation of the Operable Unit Two Remedial Action must be in compliance with all ARARs listed in Tables 6 and 7.

The total present worth cost of Alternative Four (assuming a 5% interest rate) is approximately $4,840,000. Table 10 shows the capital costs and the operation and maintenance costs associated with Alternative Four.

Alternative Four will involve a number of activities. Following the completion of the Remedial Design, equipment will be transported to

the Site. The existing buildings and asphalt parking lot will be demolished and the demolition rubble transported off-site to an appropriate disposal facility. An estimated 6,945 cubic yards of contaminated soil will then be excavated and stockpiled on-site in a manner which minimizes dust emissions and runoff. Soil samples will be collected beneath the excavated areas and analyzed to ensure that soil remaining on the FCX property contains less than the risk-based remediation level for pentachlorophenol (3.2 parts-per-million in the top one foot of soil), and the remediation level for total pesticides (one part-per-million in surface and subsurface soil). Trenches will also be dug beneath the areas presently covered by the warehouses in an attempt to locate the alleged pesticide burial pit.

EPA believes the contaminated soil is not RCRA Listed Hazardous Waste because the contamination is thought to have resulted from spillage and not from deliberate dumping. However, if EPA obtains evidence during the Remedial Action which indicates that the soil is RCRA Listed Hazardous Waste, then all ARARs listed in this document regarding the storage, treatment, and disposal of RCRA Listed Hazardous Waste will be met.

During the Remedial Design Phase, EPA will determine if the contaminated soil is RCRA Characteristic Hazardous Waste by collecting and analyzing soil samples using the Toxicity Characteristic Leaching Procedure (TCLP). Only if the TCLP indicates that the soil is RCRA Characteristic Hazardous Waste, will the ARARs listed in this document regarding the storage, treatment, and disposal of RCRA Characteristic Hazardous Waste be met.

The contaminated soil will be treated on-site with Thermal Desorption and the Base Catalyzed Decomposition (BCD) process. Once the soil has passed through the treatment system, verification samples will be collected and analyzed to ensure the treated soil contains levels of pentachlorophenol and total pesticides equal to or below 3.2 parts per million and one part per million, respectively. The treated soil will then be backfilled into the excavated areas, and the Site will be regraded and seeded with grass. Regrading and seeding the Site will reduce the possibility of erosion and help to enhance the appearance of the FCX property.

XII. STATUTORY DETERMINATION

Based on available information, the selected remedy satisfies the remedy selection requirements under CERCLA, as amended by SARA, and the NCP. The selected remedy provides protection of human health and the environment, complies with all ARARs, is cost-effective, utilizes permanent solutions to the maximum extent practicable, and satisfies the statutory preference for remedies involving treatment technologies.

TABLE 10

Cost Estimate for Alternative 4

ITEM	UNITS	UNIT COST	COST	COMMENT
CAPITAL COSTS				
PROJECT PLANS	1	40,000	40,000	
EROSION CONTROL(LIN.FT.)	2,000	3	6,000	SITE PERIMETER (5 ACRES)
MOBILIZATION	0	0	0	
WAREHOUSE DEMOLITION	1	650,000	650,000	INCLUDES DECON AND DISPOSAL
TREATABILITY STUDY	1	40,000	40,000	LAB BENCH SCALE STUDY
EXCAVATION AND MTTD WITH BCD				
EXCAVATION (CY)	6,945	0	0	INCLUDED IN TURNKEY PRICE
MTTD WITH BCD (TONS)	9,376	250	2,343,938	100 PCF (TURNKEY PROJECT PRICE)
TRANSPORTATION (TONS)	0	0	0	
VERIFICATION SAMPLES	50	350	17,500	PESTICIDES, PCP, DIOXINS ANALYSIS
BACKFILL (CY)	6,945	0	0	INCLUDED IN TURNKEY PRICE
REGRADE/RESEED(ACRES)	2	1,500	3,000	2 AC
O & M COSTS			0	
SUBTOTAL CAPITAL			3,100,438	
ENGINEERING, ADMINISTRATION (%)		25	775,109	
CONTINGENCY (%)		25	968,887	
TOTAL - CAPITAL			4,844,434	
PRESENT WORTH				$4,840,000

NOTE: Present worth equals capital costs since there are no future O&M costs for this alternative. Value shown has been rounded to the nearest $10,000.

Protection of Human Health and the Environment

The selected remedy will permanently treat the contaminated soil, reduce the risks associated with the dermal contact and incidental ingestion of contaminated surface soil, and reduce the amount of total pesticides in the surface and subsurface soil as a source of groundwater contamination.

Compliance with ARARs

The selected remedy will comply with all Federal and State ARARs. No waivers of Federal or State requirements are anticipated for Operable Unit Two at this Site.

Cost Effectiveness

The selected soil treatment technologies are more cost-effective than the other acceptable alternatives considered. The selected remedy provides greater benefit for the cost because it permanently treats the waste and is acceptable to both the regulatory and local communities.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized for this Remedial Action.

Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA-Region IV and the State have determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness, implementability, and cost; State and community acceptance; and the statutory preference for treatment as a principal element.

Preference for Treatment as a Principal Element

The preference for treatment is satisfied by the use of Thermal Desorption and Base Catalyzed Decomposition on the contaminated soil. The principal risk associated with the contaminated soil will be mitigated by the use of these treatment processes.

APPENDIX A

STATE CONCURRENCE LETTER

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Solid Waste Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
William L. Meyer, Director

DEHNR

November 2, 1994

Mr. Ken Mallary
Remedial Project Manager
US EPA Region IV
345 Courtland Street, NE
Atlanta, GA 30365

RE: State Concurrence with the Record of Decision
FCX Statesville NPL Site Operable Unit 2, Soil
NCD 024 644 494
Statesville, Iredell County, NC

Dear Mr. Mallary:

The State of North Carolina has reviewed the Record of Decision (ROD) for the FCX Statesville NPL Site for operable unit 2 (Soil) and concurs with the selected remedy, subject to the following conditions.

1. State concurrence on this Draft Record of Decision (ROD) and the selected remedy for the site is based solely on the information contained in the Draft Final Record of Decision dated October 1994. Should the State receive new or additional information which significantly affects the conclusions or remedy selection contained in the ROD, it may modify or withdraw this concurrence with written notice to EPA Region IV.

2. State concurrence on this ROD in no way binds the State to concur in future decisions or commits the State to participate, financially or otherwise, in the clean up of the site. The State reserves the right to review, overview, comment, and make independent assessment of all future work relating to this site.

3. The last paragraph on page 15 of the referenced ROD indicates the EPA risk range of 1E-4 to 1E-6 as the standard used for establishing the risk based clean-up goals for the site. The risk level accepted in North Carolina is 1E-6. Therefore, if after remediation is complete, the total residual risk level exceeds 1E-6, the State may require deed recordation/restriction to document the presence of residual contamination and possibly limit future use of the property as specified in NCGS 130A-310.8.

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4. The soil clean-up goals established in this ROD may leave concentrations of pesticides which continue to leach to groundwater at levels which exceed NC Groundwater Standards. Continuous monitoring and tracking of the plume over time will be required under these conditions along with well permit restrictions within the plume.

The State of North Carolina appreciates the opportunity to comment on the Draft Record of Decision for the subject site, and we look forward to working with EPA on the final remedy.

Sincerely,

Jack Butler

Jack Butler, PE
Remediation Branch Head
Superfund Section

cc: Curt Fehn, NC Remedial Section Chief
Michael Kelly, Deputy Division Director
Randy McElveen, NC Superfund Section

APPENDIX B

RESPONSIVENESS SUMMARY

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV

RESPONSIVENESS SUMMARY
FCX-STATESVILLE SUPERFUND SITE
OPERABLE UNIT TWO
STATESVILLE, IREDELL COUNTY, NORTH CAROLINA

NOVEMBER 1994

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4.0 PUBLIC MEETING COMMENTS AND EPA RESPONSES

1.0 PREFACE

The United States Environmental Protection Agency (EPA) held a 60-day public comment period from Jul 5, 1994 to September 3, 1994 to provide an opportunity for interested parties to comment on the Remedial Investigation (RI), Risk Assessment (RA), Feasibility Study (FS), and the EPA Proposed Plan for Operable Unit Two at the FCX-Statesville Superfund Site in Statesville, North Carolina. The FS evaluated various options, or remedial alternatives, to address contaminated soil on the FCX property. In the Proposed Plan issued in June 1994, EPA identified its preferred alternative to address the soil contamination on the FCX property. All of the documents for Operable Unit Two were placed in the Administrative Record for review. The Record is a collection of all the documents considered by EPA when choosing the remedy for a site. The Record was made available at the EPA Records Center located in the EPA-Region IV office building located at 345 Courtland Street, NE., Atlanta, Georgia, and at the Information Repository located in the Richard H. Thornton Public Library located in Statesville, North Carolina.

The purpose of this Responsiveness Summary is to document EPA responses to the questions raised and comments submitted during the public comment period. EPA considered all of these questions and comments before selecting the final remedial alternative for Operable Unit Two to address the soil contamination on the FCX property.

2.0 COMMENTS FROM STATE SUPERFUND SECTION AND EPA RESPONSES

Comment #1

The Feasibility Study (FS) for Operable Unit 2, soils, dated June 1994 includes excavation in area 1 around sample 107. Table 6-1 of the FS also indicates the total pesticide concentration in the soil at area 1/FS-107 is 1.35 ppm which is slightly above the 1 ppm cleanup level and PCP concentrations range up to 3.5 ppm which also exceeds the clean-up goal for PCP in soil. However, Figure 4 of the ROD only includes this area as a detect level below the 1 mg/kg (ppm) clean-up goal. This area should be included in the 1 ppm pesticide boundary on Figure 4 rather than the detect boundary.

EPA Response

The pesticide concentration for sample location FS-107 listed in Table 6-1 and shown on Figure 6-3 of the FS Report represents a total pesticide concentration. In other words, the 1.35 ppm total pesticide concentration equals 180 ug/kg DDD, 480 ug/kg DDE, and 690 ug/kg DDT. On the other hand, Figure 4 (DDT Distribution in Soil) only shows the concentration of DDT at sample location FS-107 (690 ug/kg).

3.0 COMMENTS FROM TECHNICAL ASSISTANCE GRANT CONSULTANT AND EPA RESPONSES

Comment #1
Contaminants of concern are present in groundwater at concentrations greater than would generally be expected. The Feasibility Study assumes the this is due to past spillage and leakage onto soils that were not covered with the asphalt and concrete that currently caps most of the site.

EPA Response
EPA has developed several groundwater models which indicate that pesticide groundwater contamination exists at levels which can not be fully accounted for based on the concentrations of pesticides identified in the soil. However, EPA acknowledges in the Feasibility Study Report that not only spillage and leakage onto soils may contribute to the pesticide groundwater contamination, but also the alleged burial of 5,000 to 10,000 pounds of pesticides.

Comment #2
Although metals contaminate both soils and groundwater at the FCX site, these constituents are not addressed in either the Risk Assessment or the Feasibility Study because no connection can be made to past site operations as the source of these contaminants. Again, because the operational history of this site goes back to the early 1940's, and is necessarily somewhat sketchy, we do not believe that metals present on-site should be discounted. At a minimum some discussion of the safety and efficacy of the proposed treatment in relation to metals contamination should be included in the Feasibility Study.

EPA Response
EPA believes the metals were adequately addressed in the Risk Assessment. The Risk Assessment does evaluate the risks associated with potential direct contact with metals in soil, surface water, sediment, and groundwater.

Comment #3
The Feasibility Study adopts a 1 ppb soil remediation goal for PCDD on the basis of that level resulting in an acceptable 10^{-4} to 10^{-6} risk. We would be interested in seeing some discussion of the validity of that soil remedial goal as risk acceptable if the EPA re-evaluation of PCDD toxicity, now in draft format, is considered.

EPA Response
The Draft dioxin reassessment document has recommended a minor relaxation of the Cancer Slope Factor (CSF) for TCDD and has not recommended a RfD for use in evaluating non-cancer endpoints. Using the new CSF and standard default daily exposure

assumptions, 1.0 ug/kg of dioxin TEQs in soil equates to an upper bound risk estimate of about 1E-4. The 1.0 ug/kg level will likely continue to be considered as the Agency residential soil protective level during the reassessment finalization period to be completed in September, 1995.

Comment #4

We remain concerned that groundwater flow direction has been inadequately characterized. The Feasibility Study admits that the presence at this time of Lindane in an off-site well, not directly down gradient of the site is difficult to explain. Again it appears that contaminants are moving into groundwater at rates considerably greater than predicted, and contaminant plumes are being located in directions not previously thought to be downgradient. Obviously, this anomaly raises questions about the sufficiency of both the planned pump and treat groundwater remediation, and the operable unit 2 soil remediation goals. Additional investigation and discussion is required to ensure that pumping wells are correctly sited and installed, and that soil remediation goals will be adequate to prevent further mobilization and migration of contaminants off-site. Some plan should be included in the Feasibility Study or the Record of Decision describing the additional work that will be undertaken to resolve these issues.

EPA Response

Lindane was detected in off-site temporary monitoring well T-5 at a concentration of 0.61 ppb in a direction which is downgradient from the FCX property. EPA disagrees that pesticides are moving at rates greater than predicted. EPA also disagrees that a contaminant plume was located in a direction not previously thought to be downgradient. EPA agrees that additional investigation is needed during the Remedial Design Phase to ensure that both extraction and monitoring wells are properly sited, and the OU1 ROD requires such investigation. Details of the additional work to be performed will be included in the OU1 Remedial Design Report, not in the ROD or FS for OU2.

Comment #5

The community's acceptance of Alternative 4 is conditional based on the closed loop, on-site BCD treatment of desorption off-gases. Because this is a residential area, even incidental emissions from the desorption unit will be unacceptable, as were the potential emissions from the proposed air stripping unit suggested for groundwater treatment.

EPA Response

EPA agrees with the comment. For this reason, EPA will require stringent air emissions standards for the on-site thermal desorption treatment unit. The unit will be monitored at all times during its operation.

Comment #6
The inclusion of Pentachlorophenol in remedial soil goals, although not directly attributable to on-site operations, seems inconsistent when metal/BNA contamination was excluded from consideration on the same basis.

EPA Response
Pentachlorophenol is classified as a pesticide, and as such can not be discounted as being a site-related contaminant. It is important to note that the sample locations to be remediated based on total pesticide concentrations of DDT, chlordane, etc. exceeding one part-per-million, are the same sample locations which revealed the presence of pentachlorophenol.

On the other hand, there is no indication that metals were ever used by FCX. Unlike the pesticides, the metals were detected at similar concentrations in both on-site and off-site soil samples. These widespread concentrations seem to indicate that the metals may be present as naturally-occurring elements and not as site-related contaminants.

Comment #7
Has there been any contingency made for keeping the treatment unit on-site for use in remediating Operable Unit 3 soils? It would be efficient to utilize a standing unit for required treatment, rather than incur the time and expense of shut down and dismantling of the unit, only to re-mobilize at some future point.

EPA Response
At this point in time, there has been no proposed plan for remediating the contamination associated with the property currently owned and operated by Burlington Industries. In fact, the field work for the Operable Unit Three Remedial Investigation is still on-going. EPA agrees that it would be efficient to use the on-site thermal treatment system for remediating contamination associated with Operable Unit Two and Operable Unit Three. EPA recommends that this alternative be evaluated during the development of the Feasibility Study for Operable Unit Three.

COMMENTS ON RISK ASSESSMENT REPORT, REVISION 3

General Comment #1

This Revision 3 of the Risk Assessment represents, a significant improvement in treatment of human exposure assessment.

EPA Response
EPA agrees with and appreciates the comment.

General Comment #2

The methodology of the Ecological Assessment Section (6), which has been the most rigorous, part of risk calculations in Revision 0, has been completely changed, resulting in a weaker and less useful presentation. There is no exposure assessment to diverse media or explicit calculation of hypothetical risk, only comparison of selected contaminant - levels with Ambient Water Quality standards. Thus, all consideration of dioxin/furan exposure of ecological species is precluded.

EPA Response

EPA evaluated each of the contaminants which were identified in the surface water and sediment. There was no evidence of dioxin/furans in the surface water and sediment; therefore, these contaminants were not evaluated in the Ecological Assessment Section.

General Comment #3

Table 3-6, Contaminants of Concern, for organic analytes, represents mostly a summary of which media were tested for a given substance, rather than substances remaining in the analysis after a screening process. Several compounds at significant concentrations were removed from quantitative evaluation at the stage of the Toxicity Assessment, for lack of compound-specific reference dose or cancer slope factor data, with no comment about the affect on the conservativeness of the resulting cumulative risk calculations. The Remedial Design phase must be used to do comprehensive testing for contaminants in all media.

EPA Response

Table 3-6 not only shows which media were tested for a given substance, but it also shows the concentrations of those substances in each of the media. The Risk Assessment does explain which substances were eliminated from the Toxicity Assessment and why. EPA agrees with the 2nd comment. Those substances eliminated from the Toxicity Assessment due to a lack of compound-specific reference dose or cancer slope factor data could have been carried forward through the risk assessment. EPA could then have mentioned the potential affects that these deletions may have had on the qualitative risk analysis. EPA does not believe the deletion of these particular substances would have made a substantive impact on the quantitative risk analysis.

General Comment #4

Although it is clear that dioxins/furans contribute at least 8 of the calculated cumulative chronic and carcinogenic risk for the surface soil dermal and Ingestion pathways in the Future Site Resident scenario, no testing for dioxins and furans was done in other media. In particular, inclusion of a groundwater ingestion pathway, with concentrations on dioxins/furans several orders of magnitude lower than were found in surface soil, would

cause dramatic increases in the total chronic and lifetime risk calculated, and thus could change the degree of treatment required for groundwater.

EPA Response
EPA disagrees that no dioxin/furans testing was performed in media other than the surface soil. Based on the presence of dioxin/furans in the soil at the Site, groundwater samples were collected from on-site monitoring wells and analyzed for dioxin/furans. The analytical results of these groundwater samples did not indicate the presence of dioxin or furans. None of the surface water and sediment samples collected and analyzed during the Remedial Investigation indicated the presumptive evidence of dioxin or furans. Therefore, no additional samples were collected and analyzed specifically for dioxin and furans.

Section 2: Site History

Section 2.1.3
This hole, filled in with pesticide waste by workers, may be a former well and, thus, a direct route to groundwater, with a potential major increase in contaminated soil and water volume. Despite this possibility, there has not been comprehensive testing of monitoring well samples for pesticides and limited deep sampling of the aquifer, even in the areas of highest DDT concentrations.

EPA Response
EPA has received information from a number of former employees about the day-to-day operations and disposal practices at the FCX facility on West Front Street. Most of the information sources centered around a large pesticide disposal pit. One person claimed that waste from FCX may have been disposed in an old, abandoned well. To this point, EPA has not been able to verify this claim. However, EPA does feel that comprehensive testing of the groundwater across the FCX-Statesville property has been performed. Additional testing of the aquifer during the Remedial Design phase will help to further characterize groundwater conditions at the Site prior to designing and implementing the Operable Unit One pump-and-treat system.

Section 2.2.2
Caprolactum had been reported detected in all on-site monitoring wells, with some fairly high concentrations observed (Rev. 0). This compound appears to have been eliminated from relevant figures in Rev. 3, and was not included in any risk calculations.

EPA Response
EPA agrees with the comment. As a clarification, caprolactum was identified in most of the on-site monitoring wells in the NCDHR 1986 study. The levels of caprolactum reported in the wells were

all below 18,000 ug/l, which is EPA-Region IV's screening value for caprolactum. The 18,000 ug/l level equals a non-carcinogenic risk factor or Hazard Index value of one.

Section 2.2.3
In results given in the text for the Weston-SPER Emergency Response of January 1989, it is stated that "no pesticides were detected in any of the samples collected outside of the warehouse building", but no figure is presented with concentration data for pesticide analysis. This statement appears to conflict with the 1986 NCDHR study results reported.

EPA Response
Eight surface soil samples were collected and analyzed for pesticides during the Weston-SPUR Emergency Response investigation in 1989; the minimum detection limit used by the laboratory was 35 parts per billion. None of the samples indicated the presence of pesticides above the minimum detection limit.

Section 2.2.8.1
No analyses are reported of groundwater samples for DDT, DDE, DDD or dioxins/furans, though there is reason to predict the presence of both in on-site or near off-site wells. No result, are given for analyses of the Nelson Brown well.

EPA Response
EPA did analyze the groundwater for DDT, DDE, DDD, and dioxins/furans; however, none of these contaminants were present at levels which exceeded the detection limit. The Risk Assessment did not report the analytical results of the Nelson Brown water supply system; however, as stated in the RI Report, the Nelson Brown sample did not reveal any site-related contaminants.

Section 2.2.8.3
No samples of sediment or surface water were analyzed for dioxins/furans. PAHs found in Phase I sediment analyses were said to be "not sufficient to demonstrate that the presence of these compounds was predominantly a function of proximity to the treated cross-ties...or possibly related to past site-related contamination". Total PAHs are reported for only two samples in figure 2-6. Where are the results reported for the two Phase II samples collected (FS2-03-SD, FS2-04-SD) and how would two more samples, close to the tracks resolve the question of railroad-contaminated or site-associated contamination, as no other on-site samples were tested? Why were there no analyses for PAH's in water or subsoil?

EPA Response
As stated in EPA's response to General Comment #4, there was no presumptive evidence of dioxins/furans in the surface water and

sediment samples collected and analyzed during the Phase I Remedial Investigation. Therefore, EPA did not believe it was necessary to collect additional surface water and sediment samples and analyze them specifically for dioxins and furans. The analytical results of samples FS2-03 SD and FS2-04-SD are provided in the Phase II RI Report. These results did not prove what the source of the PAHs is. Every soil, sediment, surface water, and groundwater sample collected a the Site was analyzed for PAHs. PAHs were reported for every sample in which they occurred.

Section 2.2.9
Figure 2.2.1 - dioxin/furan sample locations, is not included here.

EPA Response
EPA agrees with the comment. As stated on page 2-31 of the Risk Assessment, Figure 2-21 should be included to show the dioxin/furan sample locations. The figure was mistakenly left out of the report.

Figure 2-11
No results are presented for the EPA-installed wells nearest the highest DDT concentrations on the north side of the site. Was no DDT analysis of groundwater done on this round?

EPA Response
All groundwater samples collected at the Site were analyzed for the full target compound/target analyte list constituents, including DDT. DDT was not identified in any of the groundwater samples.

Section 3.2.1.1 and 3.2.1.2
Toxicity screening methodology is more explicitly described in this revision. However, screening the average contaminant concentration against a single background sample value is of very questionable reliability.

EPA Response
Section 3.2.1.1, titled "Screening Against Background", states that the **maximum** on-site concentration of each constituent had to be at least two times greater than the **arithmetic average** of the of the respective background samples.

Table 3-1, and Section 3.2.2.1
Monitoring well MW-4 is clearly not an appropriate source of background samples for screening of groundwater analytical values. The concentration of trichloroflouromethane reported is 99 mg/l, indicative that this well is within the plume of halogenated organics perhaps originating from Burlington Industries.

EPA Response
EPA agrees with the comment. However, since this Site falls within an industrial corridor, it is not likely to locate a background well close to the Site which will provide "true" background conditions. As an example, the Carnation well was sampled during 1986 to provide a background sample. As it turned out, the Carnation well contained VOCs.

Section 3.2.1.4
For lack of "health criteria", five metals including lead and four pesticides were eliminated from quantitative evaluation of ground water exposures in this report, with no discussion as to the effect on the uncertainty of the cumulative risk. Use of the Lead Model Version 5.0 is a significant improvement over elimination of this contaminant from consideration.

EPA Response
Page 3-26 of the Risk Assessment identifies a total of nine (9) substances which were eliminated from the quantitative evaluation due to a lack of health criteria.

Table 3-6
For organic compounds, this table is functionally a chart of which media were tested for which compounds, rather than an indication of the media in which these compounds present a possible hazard. The most glaring examples of this are the absence of data for most PAH's and other semi-volatile organics from groundwater and subsurface soil analysis, the absence of DDT, DDE, and DDD from groundwater analyses, and, probably most grave of all, no testing of dioxins in any media except for three samples in Area 3.

EPA Response
EPA disagrees with the comment. Table 3-6 shows each site-related contaminant which presents unacceptable risk in the different media. All available data are shown for the PAHs and other semi-volatile organics. DDT, DDE, DDD data is not presented for groundwater analyses because none of these compounds were identified in the groundwater. Thirty-eight (38) dioxin samples were collected from nineteen (19) locations in areas 1, 2, and 3, and evaluated in the risk assessment.

Section 4.3
One of the functions of the Conceptual Site Model is to "aid in identifying data gaps". However, this information was not used to recommend further data collection.

EPA Response
EPA agrees with the comment.

Section 4.4
It is assumed that a residence time of 30 years represents the

90th percentile for this area. However, this is probably a figure derived from national census data and probably does not accurately represent residency patterns in southeastern U.S. rural areas and small cities, use of more local residency data is recommended for determining a conservative estimate of exposure time of future on-site residents.

EPA Response
It is standard practice to use a residence time of 30 years as representing 90 percent of the people living across the country.

Section 4.5
Uncertainties in exposure assessment are discussed here with a much improved justification of conservative assumptions. A semi-quantitative treatment of the sensitivity of the calculated hypothetical risk to major parameters should be included.

EPA Response
EPA does not quantify "% confidence" as it relates to the uncertainty in a exposure assessment.

Section 5.1
"The potential for carcinogenic effects is limited to substances that have been shown to be carcinogenic in animal and/or humans" This statement is misleading and should be clarified; the cumulative risks may only be calculated for known carcinogens, but there is undoubtedly the potential for carcinogenic effects from as yet undemonstrated carcinogens.

EPA Response
EPA does not think this statement is misleading. Although it is true that the potential exists for carcinogenic effects from undemonstrated carcinogens, it is unreasonable to think that the cumulative risks from undemonstrated carcinogens can be quantified until carcinogenic affects for those substances are first qualified with laboratory data.

Section 5.1.1
There remain several imprecise and unclear statements in this section, such as: "the range of risks, defined as the upper limit as determined by the model and the lower limit of zero needs to be understood by the appropriate decision makers." A more useful and interpretable statement would be that assumptions and parameters used in the model, including measured concentrations of contaminants, were chosen to yield a cumulative risk figure with -% confidence that the actual risk is below this number. In order to make such a statement, there must be some information given about the distribution of these parameters and the sensitivity of the calculated risk to each of them.

EPA Response

EPA does not quantify % confidence in risk assessments.

Section 5.4
Acknowledging the uncertainties associated with extrapolating from oral to dermal pathways, the method used for approximating dermal reference doses and dermal cancer slope factors seems a reasonable one. Here is a case, however, where the confidence that a calculated cumulative risk is below a certain level would be increased by using a safety factor in transforming to another pathway.

EPA Response
Safety or "uncertainty" factors are already included in the oral values. EPA agrees the dermal adjustments add to the uncertainty in the risk assessment process, but EPA believes this is a conservative adjustment.

Uncertainty Analysis
This section more clearly enumerates the major contributors to uncertainty in the risk calculations, but should include at least a semiquantitative statement about the magnitude and direction of the contribution made by each (i.e., a sketchy sensitivity analysis). It should be pointed out that exclusion of substances whose specific RfD's and CSFs are not determined is a potentially significant source of error in the direction of underestimation of cumulative risk.

EPA Response
EPA does not quantify uncertainty in the Risk Assessment process. EPA agrees with the second comment that the exclusion of substances whose RfDs and CSFs are not determined is a potential source of error in the direction of underestimation of cumulative risk.

Section 6: Ecological Risk Assessment
This section, the most rigorous of the Rev. 0 Risk Analyses, has been completely transformed, with the elimination of a detailed and rational exposure model for the American Robin. Instead, a limited selection of water contaminants is screened against Ambient Water Quality standards, altogether eliminating assessment of exposure to the most toxic on site contaminants, dioxins and furans.

EPA Response
Each of the substances identified in surface water and sediment samples during the RI were first screened against background and concentration-toxicity data. EPA then evaluated each of substances identified in surface water and sediment against the Ambient Water Quality Standards. The reason why dioxin/furans were not evaluated in the Ecological Risk Assessment was because there was no presumptive evidence of dioxin/furans in the surface water and sediment samples collected and analyzed during the

RI/FS; therefore, no samples were collected and analyzed specifically for dioxin/furans.

Tables 6-6 and 6-7
Contaminants of Concern. As in Section 3, this list is based less on a rational screening process for analyzed substances than on which chemicals were analyzed in a given medium.

EPA Response
EPA would like to point out that, unlike Table 3-7 in Section 3, the titles for Tables 6-6 and 6-7 do not mention "Contaminants of Concern", but "Contaminants in Surface Water" and "Contaminants Detected in Sediment", respectively.

Section 7: Risk Characterization
This Risk Characterization suffers from the non-evaluation of several contaminants, either because toxicity data were not available for the particular compound or because analysis was not performed for toxic compounds which should have been expected in all media. Given the presence of chlorinated solvents, polyaromatics and pesticides, dioxins/furans should have been analyzed extensively in all media. Air monitoring data described qualitatively here should have been included in tabular form in section 2 of this risk analysis.

The uncertainty analysis for this section is completely inadequate (see comments on other uncertainty subsections) and fails to mention the non-conservative effect of removal of all contaminants lacking health criteria from the risk calculations.

EPA Response
EPA evaluated all site-related substances that were identified during the Remedial Investigation, including dioxins/furans. Soil was the only medium in which presumptive evidence of dioxin/furans was identified. As a result, EPA collected soil and groundwater samples and analyzed them specifically for dioxin/furans. Although dioxin and furans were identified in the soil at levels below 1 ppb (TEQ), no dioxin or furans were identified in the groundwater.

EPA agrees with the comment regarding the uncertainty section. EPA should have included a discussion in the Risk Characterization Section regarding the lack of toxicity values for certain contaminants, and the potential affects of excluding these contaminants from the risk evaluation.

Section 8: Remedial Goal Options

Tables 8-1 and 8-2. This explicit presentation of the clean-up goals for individual contaminants in order to achieve various hypothetical risk levels is informative, and, in the case of Table 8-2, provides a helpful comparison with state and federal

regulatory levels for drinking water. As analysis for several compounds, was not carried out comprehensively in all media (most importantly, for dioxins/furans in ground water), this table can only be used for preliminary guidance in estimated soil and water volumes requiring treatment. Only if far more comprehensive testing occurs during the Remedial Design phase, especially for dioxins/furans, will such calculations rationally guide clean-up level decisions.

EPA Response

As stated in previous responses, EPA believes that a comprehensive evaluation of all site-related substances was carried out. EPA does not believe that additional testing for dioxins/furans in groundwater is necessary due to the fact that neither of these constituents was identified in on-site monitoring wells during the Remedial Investigation.