



Public Health Assessment for

Evaluation of Surface Soil, Dry Sediment, and Surface Water Data

**BLUE RIDGE PLATING COMPANY SITE
ARDEN, BUNCOMBE COUNTY, NORTH CAROLINA
EPA FACILITY ID: NCD044447589
MAY 18, 2007**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE**

Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

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PUBLIC HEALTH ASSESSMENT

Evaluation of Surface Soil, Dry Sediment, and Surface Water Data

BLUE RIDGE PLATING COMPANY SITE
ARDEN, BUNCOMBE COUNTY, NORTH CAROLINA
EPA FACILITY ID: NCD044447589

Prepared by:

Agency for Toxic Substances and Disease Registry
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STATEMENT OF ISSUES AND BACKGROUND

Statement of Issues

The Agency for Toxic Substances and Disease Registry (ATSDR) prepared this public health assessment to evaluate, based on the information currently available, any known or potential adverse human health hazards related to exposures to contaminants in surface soil, dry sediment, and surface water associated with the Blue Ridge Plating Company Site. EPA has listed the Blue Ridge Plating Company Site on its National Priorities List of hazardous waste sites. ATSDR is mandated by Congress to conduct public health activities at sites that EPA lists on its National Priorities List.

Background

The Blue Ridge Plating Company Site (Blue Ridge Plating Site) is located at 171 Glenn Bridge Road in Arden, Buncombe County, North Carolina. The site comprises approximately 3 acres and includes one main manufacturing building. Blue Ridge Plating Site is an active electroplating and metal finishing facility. Activities at the site involve the use of zinc, cadmium, chromium, tin, copper, cyanide, and black oxide.

Reports indicate in the 1970s and 1980s, electroplating wastes were collected in drums in the basement of the facility. The sludge waste was filtered and waste water directed to a 70,000-gallon open top concrete lagoon located at the south of the facility. The plating sludge was taken off-site for disposal and wastewater was either reused or sprayed on the ground on-site. From the mid 1980s to 1990, the waste water began being discharged to the local municipal sewer. In 1990, Blue Ridge Plating Site was no longer permitted to discharge waste water into the public sewer due to failure to meet pretreatment requirements. Currently, the facilities system is “closed loop” and reportedly does not involve any discharges. The current system filters and neutralizes plating waste and evaporates the waste water (1).

The North Carolina Department of Environment and Natural Resources (NCDENR) reports that the lagoon was backfilled in November 2002 (2). Old plating vats and other debris can be found on the eastern portion of the facility (1).

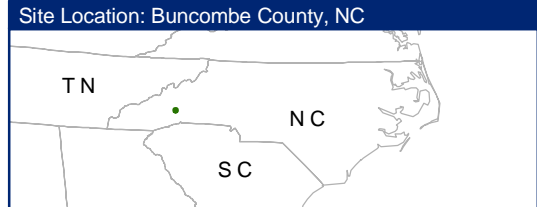
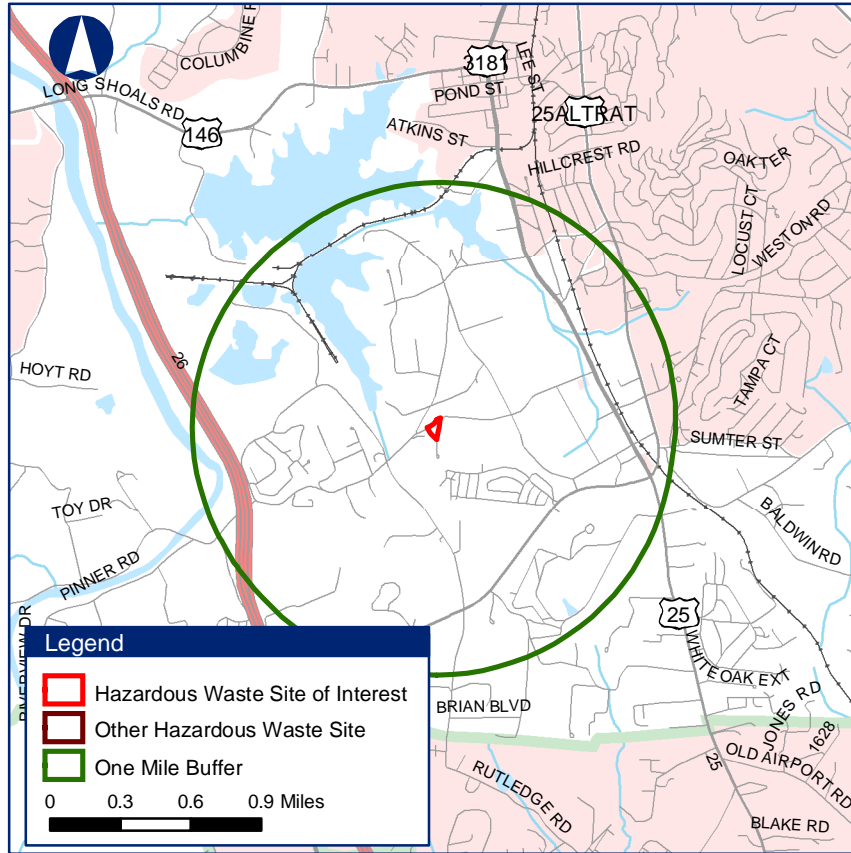
Land Use and Demographics

The north boundary of the Blue Ridge Plating Site is Glenn Bridge Road. It is bounded to the east by an unnamed dead end road, and to the south and west by wooded wetland areas. The site is located in the watershed of an unnamed tributary that feeds Lake Julian, a lake used for cooling by Carolina Power and Light Company. Lake Julian is fished recreationally and protected by the State of North Carolina as a water supply suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture (2).

Land use around the site is primarily rural to light industrial. There are no schools or daycare centers in close proximity to the site. The nearest school is located approximately 1.5 miles north. The nearest residences, a small townhome community, is located approximately 500 feet west of the site (1).

According to U.S. 2000 Census data, 1,476 people live within a one-mile radius of the site. Approximately 73% of this population, or 1,076, are white. Also, 173 are children age 6 and under, and 103 are adults over age 65. A total of 716 housing units are within one mile of the site area. Additional demographic information for the community in the vicinity of the site is presented in the following figure.

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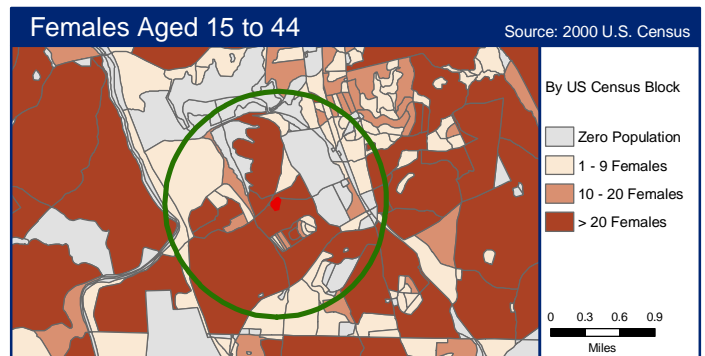
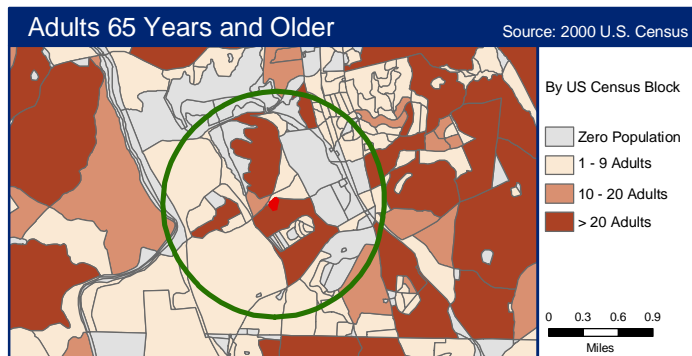
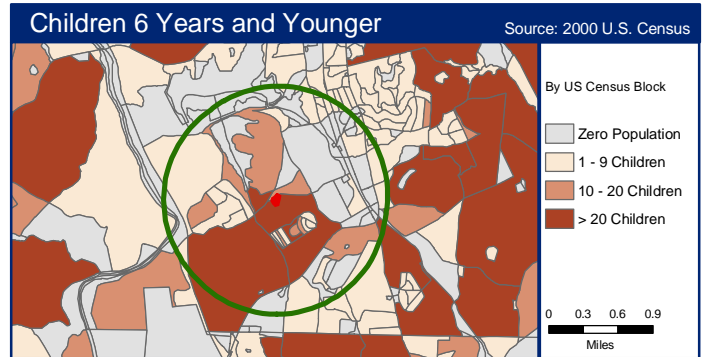
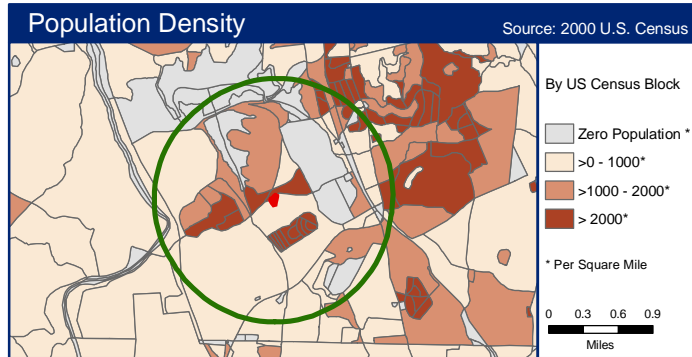


Demographic Statistics
Within One Mile of Site*

Total Population	2,984
White Alone	2,297
Black Alone	545
Am. Indian & Alaska Native Alone	9
Asian Alone	32
Native Hawaiian & Other Pacific Islander Alone	1
Some Other Race Alone	43
Two or More Races	58
Hispanic or Latino**	103
Children Aged 6 and Younger	299
Adults Aged 65 and Older	316
Females Aged 15 to 44	728
Total Housing Units	1,452

Base Map Source: Geographic Data Technology, May 2005.
Site Boundary Data Source: ATSDR Geospatial Research, Analysis, and Services Program, Current as of Generate Date (bottom left-hand corner).
Coordinate System (All Panels): NAD 1983 StatePlane North Carolina FIPS 3200 Feet

Demographics Statistics Source: 2000 U.S. Census
* Calculated using an area-proportion spatial analysis technique
** People who identify their origin as Hispanic or Latino may be of any race.



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ENVIRONMENTAL DATA

As part of this public health assessment, ATSDR evaluated some of the environmental samples collected by EPA during 2000, 2003, and 2004 field investigations. Each of the sampling events is detailed in the following paragraphs and is based on information presented in the Remedial Investigation Report prepared by EPA (1).

During the 2000 sampling event, 5 soil (0 to 2 feet below ground surface), 10 surface water, 10 sediment, and 5 groundwater samples were collected. The samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, inorganic compounds, and cyanide.

Field activities in 2003 resulted in the collection of 19 surface soil samples (0 to 1 foot below ground surface), 21 subsurface soil (1-12 feet below ground surface), 12 surface water, 16 sediment, and 10 groundwater samples. Samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, polychlorinated biphenyls, and metals.

During the 2004 remedial investigation sampling event, 1 surface soil (6-12 inches below ground surface), 4 subsurface soil (1 to 2 feet), and 10 groundwater samples were collected. These samples were analyzed for volatile organic compounds and metals.

PATHWAY ANALYSIS

ATSDR's pathway analysis determines whether people have come into contact with chemicals from a site and whether those contacts were substantial enough to cause harm. To make this determination, ATSDR identifies exposure pathways or ways in which a chemical could enter a person's body.

As outlined in ATSDR's Public Health Assessment Guidance Manual, an exposure pathway contains five major elements:

1. a source of contamination,
2. transport through an environmental medium,
3. a point of exposure,
4. a route of exposure, and
5. an exposed population.

If an exposure pathway contains all five elements and exists now or did exist in the past, the pathway is considered complete. Completed exposure pathways are evaluated further by ATSDR to determine whether health effects could occur. An exposure pathway is

considered incomplete and is eliminated from further evaluation when exposure is highly unlikely to occur (3).

Completed Exposure Pathways for the Blue Ridge Plating Site

ATSDR has identified the following completed exposure pathways for the Blue Ridge Plating Site: surface soil, dry sediment, surface water (from creeks, ponds, ditches, and wetlands), and surface water from Lake Julian.

Surface soil and dry sediment exposure pathway

Surface soil is defined in this assessment as soil from a depth of 0 to 1 foot below ground surface. In general, there is a greater potential for exposure to on-site surface soil by individuals rather than deeper soils because typical activities outdoors do not involve digging and coming in contact with soil more than a few inches below the ground surface.

There may be periods of the year when rainfall is limited and sediment from shallow creeks, ponds, ditches and wetlands areas may not be covered by surface water. Samples from these locations are termed dry sediment samples and conservatively evaluated in this public health assessment as surface soil even though exposure to dry sediment is likely to be less than that of surface soil.

At the Blue Ridge Plating Site, individuals may come in contact with on-site soils and dry sediment from creeks, ponds, ditches, and wetlands areas while trespassing on the site which is located on private property. These individuals are likely to be adolescents who access the site periodically for recreational purposes.

Surface water from creeks, ponds, ditches, and wetlands

The Blue Ridge Plating Site is bounded to the south and west by wooded wetlands. The site is located in the watershed of an unnamed tributary that feeds Lake Julian. Drainage from the site enters an unnamed tributary south of the former concrete lagoon, located directly south of the facility, and flows through a forested wetland area to another unnamed drainage tributary and eventually to Lake Julian.

At the Blue Ridge Plating Site, adolescents may periodically come in contact with surface water from creeks, ponds, ditches, and wetlands while trespassing on the site for recreational purposes.

Surface water from Lake Julian

Drainage from the site flows through unnamed tributaries and wetland areas to Lake Julian which is located approximately 1,800 feet downstream of the site. Lake Julian is a lake used for cooling by the Carolina Power and Light Company. Lake Julian is fished recreationally and protected by the State of North Carolina as a water supply suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture (1).

At the Blue Ridge Plating Site, adults and children may come in contact with surface water from Lake Julian during recreational activities including swimming, wading, and boating.

Incomplete Exposure Pathways for the Blue Ridge Plating Site

ATSDR has identified the following incomplete exposure pathways for the Blue Ridge Plating Site: drinking water, subsurface soil, and wet sediment.

Drinking water in the vicinity of the site is provided by the Asheville-Buncombe Water Authority. The water authority provides residents and businesses near the site with drinking water from two reservoir sources which are located more than 4 miles from the site. The water from this source is routinely tested and has not been impacted by activities at the Blue Ridge Plating Site. No private drinking water wells have been found to exist in the vicinity of the site. Therefore, the drinking water exposure pathway is considered incomplete and was not evaluated further in this public health assessment.

For the purposes of this evaluation, surface soil samples are defined as soil collected from 0 to 1 foot below ground surface. Soil samples collected from greater depths are defined as subsurface soil. It is unlikely for individuals to come in contact with subsurface soil while trespassing or visiting the Blue Ridge Plating Site. Therefore, the subsurface soil pathway is considered incomplete and was not evaluated further.

Two types of sediment samples were collected during the investigation at the Blue Ridge Plating Site. Previously discussed, dry sediment samples were collected from areas of creeks, ponds, ditches, and wetlands that are not covered by water throughout the entire year. There is the potential for people to come in contact with dry sediment. However, exposure to wet sediment which is covered by water throughout the year is considered to be minimal. Therefore, ATSDR concludes that exposure to wet sediment is an incomplete exposure pathway.

DISCUSSION

The first step in ATSDR's evaluation process is to select the chemicals of concern, also described as the chemicals that require further evaluation. ATSDR selects chemicals of concern on the basis of whether the maximum detected concentrations of the chemical are found to exceed applicable, health-based comparison values. A chemical found to exceed a comparison value indicates that a more detailed analysis is necessary for that chemical. Levels of chemicals greater than comparison values do not necessarily mean that adverse health effects will occur. The amount of the chemical, the duration of exposure, the route of exposure (i.e., ingestion, inhalation, and direct skin contact), and the health status of exposed individuals are also important factors in determining the potential for adverse health effects. Instead, when concentrations of a chemical exceed comparison values, a more detailed assessment of the site-specific exposure factors is necessary.

Because specific comparison values are unavailable for sediment, soil comparison values were used to evaluate surface soil and dry sediment data. ATSDR has not developed comparison values specifically for surface water. Therefore, drinking water comparison values were used for the evaluation of surface water data. This is a very protective approach because no one uses the surface water bodies evaluated in this public health assessment for drinking water purposes, which account for much greater exposure than surface water. A complete discussion of ATSDR's evaluation process is presented in Appendix A of this public health assessment.

Chemicals that exceed health-based comparison values are presented in Tables 1 and 2. It should be noted that concentrations of calcium, iron, magnesium, potassium, and sodium were detected in the surface soil, dry sediment, and surface water samples collected during the site investigations. These elements occur naturally in the environment and are unlikely to be related to the site. They are also essential nutrients and are not expected to cause any health-related problems at the levels at which they were detected. Therefore, calcium, iron, magnesium, potassium, and sodium have not been considered further in this public health assessment.

Table 1. Surface soil and dry sediment – Detected chemicals that exceed comparison values

CONTAMINANT	Milligrams per kilogram (mg/kg)			SOURCE	FREQUENCY DETECTED
	Minimum	Maximum	Comparison Value		
Arsenic	1.9	6.3	0.5	CREG	7/33
Benzo(a)anthracene*	0.052	1.0	0.22	EPA RBC	18/43
Benzo(a)pyrene*	0.046	1.2	0.1	CREG	18/43
Benzo(b)fluoranthene*	0.063	1.8	0.22	EPA RBC	20/43
Benzo(g,h,i)perylene*	0.067	0.89	NA	NA	19/43
Cadmium	0.56	580	10	Chronic EMEG (child)	27/44
Chromium	4.8	1,000	200	RMEG (child)	44/44
Copper	6	2,000	500	Intermediate EMEG (child)	36/44
Dibenzo(a,h)anthracene*	0.057	0.18	0.022	EPA RBC	3/43
Indeno(1,2,3-cd)pyrene*	0.064	0.98	0.22	EPA RBC	15/43
Lead	3	630	400	EPA Residential AL	44/44

Notes:

CREG=Cancer Risk Evaluation Guide

RBC = Risk-Based Concentration

EMEG = Environmental Media Evaluation Guide

RMEG = Reference Media Evaluation Guide

AL = Action level

Frequency of Detection = Number of samples in which chemical was detected / Total number of samples collected

*All of these chemicals belong to a class of compounds referred to as polychlorinated aromatic hydrocarbons.

Table 2. Surface water from creeks, ponds, ditches, and wetland areas*: Detected chemicals that exceed comparison values

CONTAMINANT	Milligrams per liter (mg/L)			SOURCE	FREQUENCY DETECTED
	Minimum	Maximum	Comparison Value		
Cadmium	0.013	0.021	0.0020	Chronic Child EMEG	2/17
Chromium	0.015	0.035	0.030	Child RMEG	3/17
Trichloroethene	0.003	0.003	0.026	EPA RBC	1/16

Notes:

*Data presented on Table 2 for creeks, ponds, ditches, and wetland areas does not include samples collected from Lake Julian. Lake Julian samples have been analyzed separately and are discussed below.

EMEG = Environmental Media Evaluation Guide

RMEG = Reference Media Evaluation Guide

RBC = Risk-Based Concentration

Frequency of Detection = Number of samples in which chemical was detected / Total number of samples collected

The chemical concentrations detected in Lake Julian were compared with drinking water comparison values. This is considered a very protective approach since exposures to chemicals in a lake used for recreational purposes are expected to be significantly lower than exposures associated with a drinking water source. None of the chemicals detected in samples collected from Lake Julian were present at concentrations that exceed health-based comparison values. Therefore, the Lake Julian surface water pathway poses no public health hazard and will not be considered further in this public health assessment.

PUBLIC HEALTH IMPLICATIONS

For chemical concentrations found to exceed comparison values, ATSDR performed calculations referred to as exposure doses and cancer risk estimates. These calculations estimate the amount of the chemicals of concern that individuals may be exposed to and the likelihood of cancer and non-cancer health impacts. They are based on the types of site-specific activities that individuals may be involved with that result in contact with chemicals in the surface water. In the event that calculated exposure doses exceed established health guidelines (e.g., ATSDR Minimal Risk Levels or EPA Reference Doses), an in-depth toxicological evaluation is the next step necessary to determine the likelihood of health effects.

Surface soil at the site has been impacted by past waste disposal activities. Access to the facility is not restricted, except for a chain-link fence surrounding the back of the facility and the loading dock area. Adult and children residents in the vicinity of the site are not expected to come in contact with chemicals on-site as there is no point of interest for these individuals on this industrial property. However, adolescent trespassers may come in contact with chemicals present in surface soil. Exposure may occur via incidental ingestion, inhalation of fugitive dust, and direct skin contact. Dry sediment samples collected from the creeks, ponds, ditches, and wetlands were included in the surface soil evaluation because the areas where sediment samples were collected are dry much of time. Therefore, adolescents may also come in contact with chemicals in dry sediment similarly to surface soil during trespassing activities.

As previously discussed, surface water samples collected from Lake Julian did not contain concentrations of chemicals above comparison values. Therefore, wading and swimming in Lake Julian poses no public health risk and will not be addressed further in this public health assessment. However, ATSDR has evaluated adolescent trespassers who may wade in the surface water from the creeks, ponds, ditches, and wetland areas on and surrounding the site. Direct skin contact with surface water during wading has been considered. Some of the surface water sampling locations were observed during ATSDR's site visit. Based on these observations, the surface water is very shallow and it is very unlikely that these areas would be accessed frequently for wading due to the presence of heavy brush making surface water difficult to access. Therefore, ATSDR's evaluation of this pathway is considered to be health-protective.

Adolescent trespassers are assumed to weigh approximately 110 pounds and access the site about 2 days per week, or 104 days per year. In the winter, it is assumed that their face, hands, and arms are available for contact with contaminated surface soil and sediment. In the summer, they are assumed to have potential contact with chemicals in surface soil and dry sediment on their face, hands, arms, legs, and feet. Surface water exposure is likely to occur via wading as opposed to swimming due to the depth of the surface water surrounding the site. Therefore, face, hands, arms, legs, and feet are likely to come in contact with chemicals in surface water.

Additional information on the exposure scenarios, assumptions and calculations used to estimate exposures to adolescent trespassers are discussed in Appendix A of this public health assessment.

Surface Soil and Dry Sediment - Public Health Implications

The following chemicals were detected in surface soil and dry sediment on-site and in the vicinity of the Blue Ridge Plating Site at levels that exceed health-based comparison values: arsenic, polychlorinated aromatic hydrocarbons (PAHs), cadmium, chromium, copper, and lead. The polychlorinated aromatic hydrocarbons detected above comparison values include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. Lead was also detected at concentrations that exceed EPA's Action Level. Comparison values were unavailable for benzo(g,h,i)perylene, also a PAH compound.

With the exception of benzo(g,h,i)perylene, for which there is no specific toxicological data, PAH compounds have been grouped together for evaluation purposes and referred to as benzo(a)pyrene equivalents. For health protectiveness, exposures to this group of chemicals are compared with benzo(a)pyrene. The available toxicological data indicates that benzo(a)pyrene has the greater cancer potency compared with the other PAH compounds so evaluating all PAHs in this manner is considered to be cautionary and health-protective.

ATSDR calculated exposure doses for non-cancer exposure to the chemicals detected in surface soil and dry sediment to determine the potential for non-cancer health effects. The calculated exposure doses were compared with health-based guidelines, when available. These guidelines are described in more detail in Appendix A of this public health assessment. Calculated exposure doses below these guidelines indicate that health effects are not expected. When calculated exposure doses for a particular chemical exceed the health-based guidelines, it is necessary to evaluate this chemical further and does not necessarily indicate that health effects will occur. Instead, a closer look at the toxicological data available for the chemical is needed to fully evaluate this exposure.

ATSDR's evaluation of chemicals in the surface soil and dry sediment indicates that calculated exposure doses for each chemical were below the health-based guidelines, with the exception of cadmium. The dose for cadmium exposure of 0.00033 mg/kg/day slightly exceeds ATSDR's chronic oral Minimal Risk Level of 0.00020 mg/kg/day. A closer look at cadmium indicates that it was only detected in 2 of the 17 surface soil and dry sediment samples collected. Further review of the available toxicological information indicates that harmful effects may occur at concentrations that are tens to hundreds of times greater than those associated with the Blue Ridge Plating Site.

No available health guideline exists for exposure to lead. Exposure to lead is of greatest concern to pregnant women and children, neither of which are likely to access this site routinely and be in contact with surface soil and dry sediment. Trespassers who periodically access the site for recreational purposes are not at risk for harmful effects occurring from occasional contact with surface soil and dry sediment containing the levels of lead detected at the Blue Ridge Plating Site.

ATSDR concludes that adverse non-cancer health effects are not expected to occur among trespassers who may come in contact with chemicals detected in surface soil and dry sediment on and surrounding the Blue Ridge Plating Site.

The scientific literature indicates some of the chemicals detected in surface soil and dry sediment at the Blue Ridge Plating Site may be associated with cancerous effects. Therefore, ATSDR evaluated the cancer risk associated with these exposures. It should be noted that an increased cancer risk is not a specific estimate of expected cancers. Rather, it is an estimate of the increase in the probability that a person may develop cancer sometime during his or her lifetime following exposure to a particular chemical. The recommendations of many scientists, including ATSDR and EPA, has been that an increased lifetime cancer risk of one in one million (1×10^{-6}) or less is generally considered an insignificant increase in cancer risk. Cancer risk less than 1 in 10,000 (or 1×10^{-4}) is not typically considered a health concern. Cancer risk greater than 1 in 10,000 may pose a significant concern regarding cancerous effects.

ATSDR's evaluation of cancer risk indicates that exposure to the chemicals at the Blue Ridge Plating Site poses an insignificant increased risk for cancer. Numerically, the calculated cancer risk was estimated to be 2 extra cancer cases per million people exposed (or 2×10^{-6}), a very low, insignificant increased cancer risk. Therefore, ATSDR concludes that trespassers, exposed to chemicals in the surface soil and dry sediment, are not at a significant increased risk for cancer.

The calculated exposure doses and cancer risk estimates for each of the chemicals are presented in Tables B-1 and B-2, respectively, in Appendix B of this public health assessment.

Surface Water (creeks, ponds, ditches, wetland areas) - Public Health Implications

The following chemicals were detected in surface water samples collected from creeks, ponds, ditches, and wetland areas on and around the Blue Ridge Plating Site at levels that exceed health-based comparison values: cadmium, chromium, trichloroethylene.

ATSDR calculated exposure doses for exposure to the chemicals detected in surface water from ponds, ditches, and wetland areas to determine the potential for non-cancer health effects. The calculated exposure doses were compared with health-based guidelines, described in more detail in Appendix A of this public health assessment.

ATSDR's evaluation indicates that calculated exposure doses for each chemical were below the health-based guidelines. Therefore, ATSDR concludes that adverse non-cancer health effects are not expected to occur among trespassers who may come in contact with any of the chemicals detected in surface water from creeks, ponds, ditches, and wetland areas surrounding the Blue Ridge Plating Site.

The scientific literature indicates trichloroethylene has been associated with cancerous effects in animal studies. Therefore, ATSDR evaluated the cancer risk associated with this exposure. It should be noted that an increased cancer risk is not a specific estimate of expected cancers. Rather, it is an estimate of the increase in the probability that a person may develop cancer sometime during his or her lifetime following exposure to a particular chemical.

ATSDR's evaluation of cancer risk indicates that exposure to trichloroethylene at the Blue Ridge Plating Site poses an insignificant increased risk for cancer. Numerically, the calculated cancer risk for trichloroethylene was estimated to be 1 extra cancer cases per 10 million people exposed (or 1×10^{-7}), a very low, insignificant increased cancer risk. Therefore, ATSDR concludes that trespassers, exposed to chemicals in the surface water, are not at a significant increased risk for cancer.

The calculated exposure doses and cancer risk estimates for each of the chemicals are presented in Tables B-1 and B-2, respectively, in Appendix B of this public health assessment.

Community Health Concerns

ATSDR visited this community in the summer of 2006 to tour the site and engage with community members in the area. ATSDR held a public availability session on August 24, 2006 in an effort to gather health concerns from the community surrounding the Blue Ridge Plating Site. The public availability session was held at the Skyland Fire Station from 6:00 PM to 8:00 PM. Representatives from ATSDR and EPA attended the sessions. Flyers were sent out to residences in the vicinity of the Blue Ridge Plating Site to announce the meeting. Five community members attended the session. These individuals had observed EPA's activities at the site and were interested in the status of the investigation and cleanup. They were also interested in the types of chemicals found at the site and whether any of these chemicals were found near their homes. ATSDR provided some background on the chemicals of interest and indicated that these chemicals were found on-site and not on any residential properties.

ATSDR released this public health assessment for public comment on March 9, 2007. A 60-day public comment period was given on the document. During this time, government agencies as well as community members were given the opportunity to share their comments on the document in writing. A press release was submitted to local media outlets to announce the release of the public comment version of the document and to indicate its availability at the Buncombe/Skyland Library located at 260 Overlook Road Asheville, North Carolina. The comments received and ATSDR's responses to these comments are presented in Appendix C. The names of those who submitted comments have not been included to protect their privacy.

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposures to hazardous substances. Children play outdoors and typically engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than adults; this means they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

On the basis of the evaluation conducted in this public health assessment, ATSDR has determined that children are not at risk for health-related problems due to exposures associated with the Blue Ridge Plating Site. Based on site-specific information, including environmental data and land use, it is unlikely for children to come in contact with chemicals associated with the site. The site is located in a light industrial area that children would not easily access. In addition, there is no point of interest for young

children on the site. It is possible for an older child to access the site for recreational purposes. Therefore, ATSDR has evaluated adolescent trespassers exposures and determined that they are not at risk for adverse health effects.

CONCLUSIONS

The Blue Ridge Plating Site is located in an area used for light industry. Adult and children residing in the vicinity of the site are not expected to come in contact with chemicals associated with this site and not at risk for health effects. Based on site-specific information, ATSDR has evaluated exposures to adolescent trespassers who may access the site for recreational purposes and come in contact with chemicals in surface soils, dry sediment, or surface water.

Additional site specific information, including environmental data or land use changes, may become available in the future. In the event new information becomes available, ATSDR may evaluate this information in supplemental public health assessment or health consultation documents, if this information changes the conclusions for the site.

ATSDR's evaluation concludes the following for the Blue Ridge Plating Site:

1. Exposure to chemicals in surface soil and dry sediment poses no apparent public health hazard to trespassers who access the site.
2. Exposure to chemicals in surface water from creeks, ponds, ditches, and wetland areas poses no apparent public health hazard to trespassers.
3. No chemicals were found in surface water collected from Lake Julian at concentrations that exceed health-based comparison values. Therefore, contact with surface water from Lake Julian poses no apparent public health hazard.

RECOMMENDATION

ATSDR's makes the following recommendation for the Blue Ridge Plating Site:

The findings of this public health assessment are not intended to encourage trespassing on the Blue Ridge Plating Site. It is recommended that individuals avoid accessing the property, for any reason, without the owner's consent. The site is located on private property and is currently under investigation by EPA.

REFERENCES

1. U.S. Environmental Protection Agency. Remedial Investigation Report for Blue Ridge Plating Company Site. Arden, Buncombe County, North Carolina. August 2004.
2. North Carolina Department of Environment and Natural Resources, Classification of Water Quality Standards Applicable to the Surface Waters of North Carolina. Chapter 15A of the North Carolina Administrative Code Section 2B 0.0200. January 10, 2002.
3. Agency for Toxic Substances and Disease Registry. Public health assessment guidance manual. Atlanta: US Department of Health and Human Services; 2005.

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APPENDIX A - ATSDR's EVALUATION PROCESS

Step 1 – Comparison Values and the Screening Process

To evaluate the available data, ATSDR used comparison values (CVs) to determine which chemicals to examine more closely. CVs are the chemical concentrations found in a specific media (for example: air, soil, or water) and are used to select chemicals for further evaluation. CVs incorporate assumptions of daily exposure to the chemical and a standard amount of air, soil, or water that someone may take into their body each day. CVs are generated to be conservative and non-site specific. These values are used only to screen out chemicals that do not need further evaluation; CVs are not intended as environmental clean-up levels or to indicate that health effects occur at concentrations that exceed these values.

CVs can be based on either carcinogenic (cancer-causing) or non-carcinogenic effects. Cancer-based comparison values are calculated from the U.S. Environmental Protection Agency's (EPA) oral cancer slope factor (CSF) or inhalation risk unit. CVs based on cancerous effects account for a lifetime exposure (70 years) with a theoretical excess lifetime cancer risk of 1 extra case per 1 million exposed people. Non-cancer values are calculated from ATSDR's Minimal Risk Levels (MRLs), EPA's Reference Doses (RfDs), or EPA's Reference Concentrations (RfCs). When a cancer and non-cancer CV exists for the same chemical, the lower of these values is used in the comparison for conservatism. The chemical and media-specific CVs utilized during the preparation of this public health assessment are listed below:

An **Environmental Media Evaluation Guide (EMEG)** is an estimated comparison concentration for which exposure is unlikely to cause adverse health effects, as determined by ATSDR from its toxicological profiles for a specific chemical.

A **Reference Dose Media Evaluation Guide (RMEG)** is an estimated comparison concentration that represents concentrations of chemicals (in water, soil, and air) to which humans may be exposed without experiencing adverse health effects.

A **Cancer Risk Evaluation Guide (CREG)** is a comparison concentration that is based on an excess cancer rate of one in a million persons and is calculated using EPA's cancer slope factor (CSF).

A **Risk-Based Concentration (RBC)** is a comparison concentration derived by EPA by combining standard exposure scenarios and toxicological information corresponding to fixed levels of risk.

Step 2 – Evaluation of Public Health Implications

The next step in the evaluation process is to take those contaminants that are above their respective CVs and further identify which chemicals and exposure situations are likely to be a health hazard. Therefore, calculations are performed to estimate the possibility of cancer and non-cancer health problems. The calculations consider the activities of people living in the community.

In this public health assessment, ATSDR has estimated exposure by adolescent trespassers to site chemicals from different environmental media by calculating exposure doses and cancer risk estimates. The same equations have been used for the non-cancer and cancer calculations with the indicated modifications. The equations and the assumptions are based on the EPA Risk Assessment Guidance for Superfund, Part A¹, EPA Risk Assessment Guidance for Superfund, Part E² and the EPA Exposure Factors Handbook³, unless otherwise specified. The assumptions and details on the non-cancer and cancer evaluations of exposure are presented in the following equations and text.

Incidental Ingestion of Chemicals Present in Surface Soil and Dry Sediment

Individuals may unintentionally ingest surface soil and dry sediment while trespassing on the site.

$$Dose (mg/kg/day) = \frac{C \times IR \times EF \times ED \times CF}{BW \times AT}$$

where

C = maximum detected concentration of a chemical; See Table 1; milligrams per kilogram (mg/kg)

IR = ingestion rate; 100 milligrams per day (mg/day)

EF = exposure frequency; 104 days per year (days/year) equal to exposure 2 days per week

ED = exposure duration; 5 years

CF = conversion factor; 0.000001 kilograms per milligrams (kg/mg)

BW = body weight; 50 kilograms (kg) equal to approximately 110 pounds

AT = averaging time; 1,825 days for non-cancer and 25,550 days for cancer evaluation

¹ U.S. Environmental Protection Agency. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part A. December 1989.

² U.S. Environmental Protection Agency. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part E, Supplemental Guidance for Dermal Exposure. July 2004.

³ U.S. Environmental Protection Agency. Exposure Factors Handbook. August 1997.

Inhalation of Chemicals Present in Fugitive Dust from Surface Soil and Dry Sediment

Individuals may generate dust that can be inhaled from surface soil and dry sediment while trespassing on the site.

$$Dose (mg/kg/day) = \frac{C \times IR \times ET \times EF \times ED}{PEF \times BW \times AT}$$

where

C = chemical concentration; See Table 1; mg/kg

IR = inhalation rate; 0.42 cubic meter per hour (m³/hour)

ET = exposure time; 4 hours/day

EF = exposure frequency; 104 days/year equal to exposure 2 days per week

ED = exposure duration; 5 years

PEF = particulate emissions factor; default value of 1.32e+09 cubic meter per hour (m³/kg)

BW = body weight; 50 kg equal to approximately 110 pounds

AT = averaging time; 1,825 days for non-cancer and 25,550 days for cancer evaluation

Direct Skin (Dermal) Contact with Chemicals Present in Surface Soil and Dry Sediment

Dermal absorption depends on numerous factors, including the area of exposed skin, anatomical location of the exposed skin, length of contact, concentration of the chemical in contact with the skin, and other factors.

$$Dose (mg/kg/day) = \frac{C \times SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT}$$

where

C = chemical concentration; See Table 1; mg/kg

SA = surface area exposed; 8,790 square centimeters/day (cm²/day) during summer months to account for exposure to the face, hands, arms, legs, and feet and 2,950 cm²/day during winter months to account for exposure to hands, face, and arms.

AF = adherence factor; 0.20 milligrams per square centimeters (mg/cm²)

ABS = absorption factor; chemical-specific; 0.03 for arsenic, 0.13 for carcinogenic PAHs, 0.001 for cadmium, 0.01 for chromium and copper

EF = exposure frequency; 78 days/year in the summer; 26 days/year in the winter

ED = exposure duration; 5 years

CF = conversion factor; 1 x 10⁻⁶ kg/mg

BW = body weight; 50 kg equal to approximately 110 pounds

AT = averaging time; 1,825 days for non-cancer and 25,550 days for cancer evaluation

Direct Skin (Dermal) Contact with Chemicals Present in Surface Water

Individuals may come in contact with chemical in surface water during wading.

$$Dose (mg/kg/day) = \frac{C \times SA \times PC \times ET \times EF \times ED \times CF}{BW \times AT}$$

where

C = maximum detected concentration of a chemical; See Table 1; milligrams per liter (mg/L)

SA = surface area exposed; 8,790 cm²/day to account for exposure to face, hands, arms, legs, and feet.

PC = permeability constant; chemical-specific; 0.0011 cm/hour for cadmium, 0.0027 cm/hour for chromium, 0.012 cm/hour for trichloroethylene

ET = exposure time; 2 hours per event

EF = exposure frequency; 104 days/year equal to exposure 2 days per week

ED = exposure duration; 5 years

CF = conversion factor; 0.0010 liter per cubic centimeters (L/cm³)

BW = body weight; 50 kg equal to approximately 110 pounds

AT = averaging time; 1,825 days for non-cancer and 25,550 days for cancer evaluation

Non-Cancer Health Effects

The doses calculated for exposure to each individual chemical are then compared to established health guidelines, such as ATSDR's Minimal Risk Levels (MRLs) or EPA's Reference Doses (RfDs), in order to assess whether adverse non-cancer health impacts from exposure are expected. These health guidelines, described in more detail in the following text, are chemical-specific values that are based on the available scientific literature and are considered protective of human health.

Minimal Risk Levels (MRLs)

ATSDR has developed MRLs for contaminants commonly found at hazardous waste sites. The MRL is an estimate of daily exposure to a contaminant below which non-cancer, adverse health effects are unlikely to occur. MRLs are developed for different routes of exposure, such as inhalation and ingestion, and for lengths of exposure, such as acute (less than 14 days), intermediate (15-364 days), and chronic (365 days or greater). At this time, ATSDR has not

developed MRLs for dermal exposure. A complete list of the available MRLs can be found at <http://www.atsdr.cdc.gov/mrls.html>.

References Doses (RfDs)

An estimate of the daily, lifetime exposure of human populations to a possible hazard that is not likely to cause non-cancerous health effects. RfDs consider exposures to sensitive sub-populations, such as the elderly, children, and the developing fetus. EPA's RfDs have been developed using information from the available scientific literature and have been calculated for oral and inhalation exposures. A complete list of the available RfDs can be found at <http://www.epa.gov/iris>.

Non-carcinogenic effects, unlike carcinogenic effects, are believed to have a threshold, that is, a dose below which adverse health effects will not occur. As a result, the current practice for deriving health guidelines is to identify, usually from animal toxicology experiments, a No Observed Adverse Effect Level (or NOAEL), which indicates that no effects are observed at a particular exposure level. This is the experimental exposure level in animals (and sometimes humans) at which no adverse toxic effect is observed. The NOAEL is then modified with an uncertainty (or safety) factor, which reflects the degree of uncertainty that exists when experimental animal data are extrapolated to the general human population. The magnitude of the uncertainty factor considers various factors such as sensitive subpopulations (for example; children, pregnant women, and the elderly), extrapolation from animals to humans, and the completeness of available data. Thus, exposure doses at or below the established health guideline are not expected to result in adverse non-cancer health effects.

When site-specific exposure doses exceed health guidelines, it does not necessarily indicate that health effects will occur. Rather, it indicates that a more thorough look at the known toxicological values for this chemical and the site-related exposures are needed. The known toxicological values are doses derived from human and animal studies that are presented in the ATSDR Toxicological Profiles and EPA's Integrated Information System (IRIS). A direct comparison of site-specific exposure doses to study-derived exposures and doses found to cause adverse health effects is the basis for deciding whether health effects are likely to occur. This in-depth evaluation is performed by comparing calculated exposure doses with known toxicological values, such as the no-observed adverse-effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL) from studies used to derive the MRL or RfD for a chemical.

Health guidelines are available for ingestion and inhalation exposures to chemicals. However, specific health guidelines do not exist for exposures occurring as a result of dermal contact. As part of this public health assessment, non-cancer health effects from dermal exposure were evaluated using oral health guidelines. This approach

conservatively assumed 100% absorption to adjust from administered dose (oral) to absorbed dose (dermal). This approach is likely to overestimate exposure.

It is important to consider that the methodology used to develop these health guidelines does not provide any information on the presence, absence, or level of cancer risk. Therefore, a separate cancer evaluation is necessary for potentially cancer-causing chemicals detected in samples at this site. A more detailed discussion of the evaluation of cancer risks is presented in the following section.

Cancer Risks

Exposure to a cancer-causing compound, even at low concentrations, is assumed to be associated with some increased risk for evaluation purposes. The estimated excess risk of developing cancer from exposure to chemicals associated with the site was calculated by multiplying the site-specific adult exposure doses, with a slight modification, by EPA's chemical-specific Cancer Slope Factors (CSFs or cancer potency estimates), which are available at <http://www.epa.gov/iris>.

CSFs are only available for ingestion and inhalation exposures and no specific CSFs exist for exposures occurring as a result of dermal contact. As part of this public health assessment, cancer health effects from dermal exposure were evaluated using oral CSFs. This approach conservatively assumed 100% absorption to adjust from administered dose (oral) to absorbed dose (dermal). This approach is likely to overestimate exposure.

An increased excess lifetime cancer risk is not a specific estimate of expected cancers. Rather, it is an estimate of the increase in the probability that a person may develop cancer sometime during his or her lifetime following exposure to a particular chemical. Therefore, the cancer risk calculation incorporates the equations and parameters (including the exposure duration and frequency) used to calculate the dose estimates, but the estimated value is divided by 25,550 days (or the averaging time), which is equal to a lifetime of exposure (70 years) for 365 days/year.

There are varying suggestions among the scientific community regarding an acceptable excess lifetime cancer risk, due to the uncertainties regarding the mechanism of cancer. The recommendations of many scientists and EPA have been in the risk range of 1 in 1 million to 1 in 10,000 (as referred to as 1×10^{-6} to 1×10^{-4}) excess cancer cases. An increased lifetime cancer risk of one in one million or less is generally considered an insignificant increase in cancer risk. Cancer risk less than 1 in 10,000 (or 1×10^{-4}) is not typically considered a health concern. An important consideration when determining cancer risk estimates is that the risk calculations incorporate several very conservative assumptions that are expected to overestimate actual exposure scenarios. For example, the method used to calculate EPA's CSFs assumes that high-dose animal data can be used

to estimate the risk for low dose exposures in humans. As previously stated, the method also assumes that there is no safe level for exposure. Lastly, the method computes the 95% upper bound for the risk, rather than the average risk, suggesting that the cancer risk is actually lower, perhaps by several orders of magnitude.

Because of the uncertainties involved with estimating carcinogenic risk, ATSDR also employs a qualitative approach in evaluating all relevant data. The numerical risk estimate must be considered in the context of the variables and assumptions involved in their derivation and in the broader context of biomedical opinion, host factors, and actual exposure conditions. The actual parameters of environmental exposures have been given careful and thorough consideration in evaluating the assumptions and variables relating to both toxicity and exposure. A complete review of the toxicological data regarding the doses associated with the production of cancer and the site-specific doses is an important element in determining the likelihood of exposed individuals being at a greater risk for cancer.

**Appendix B, Table B-1 - Summary of Calculated Exposure Doses
Blue Ridge Plating Site**

	Ingestion & Direct Contact Dose (mg/kg/day)	Oral Health Guideline (mg/kg/day)	Exceeds Health Guideline?	Health Guideline Source	Inhalation Dose (mg/kg/day)	Inhalation Health Guideline (mg/kg/day)^(a)	Exceeds Health Guideline?
<u>Trespasser - Surface Soil and Dry Sediment Pathway</u>							
Arsenic	5.17E-06	3.00E-04	No	Chronic MRL	NA	NA	NA
cPAHs	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA
Cadmium	3.36E-04	2.00E-04	Yes	Chronic MRL	4.21E-09	5.70E-05	No
Chromium	6.53E-04	3.00E-03	No	RfD	7.25E-09	3.00E-05	No
Copper	1.31E-03	1.00E-02	No	Intermediate MRL	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA
<u>Trespasser - Surface Water Pathway (Creeks, Ponds, Ditches, and Wetlands)^(b)</u>							
Cadmium	2.30E-05	2.00E-04	NA	Chronic MRL	NA	NA	NA
Chromium	9.50E-05	3.00E-03	NA	RfD	NA	NA	NA
Trichloroethylene	4.00E-06	3.00E-04	NA	RfD	NA	NA	NA

NOTES:

Doses were only calculated for contaminants with available health guidelines.

(a) Values are EPA provisional health guidelines.

(b) Oral and inhalation exposures were not evaluated for surface water because site-specific conditions indicate that swimming is unlikely. Direct skin contact by trespassers has been evaluated.

MRL = Minimal Risk Level

cPAHs = carcinogenic polyaromatic hydrocarbons

RfD = Reference Dose

NA = Not available

**Appendix B, Table B-2 - Summary of Theoretical Cancer Risk
Blue Ridge Plating Site**

Calculated Theoretical Lifetime Cancer Risk					Cancer Risk Conclusion
	Ingestion	Direct Contact	Inhalation of Dust	Total Cancer Risk	
<u>Trespasser - Surface Soil and Dry Sediment Pathway</u>					
Arsenic	3.85E-07	1.69E-07	4.93E-11	5.54E-07	No Increased Cancer Risk
cPAHs	5.35E-07	1.02E-06	2.89E-12	1.56E-06	
Benzo(g,h,i)perylene	NA	NA	NA	NA	
Cadmium	NA	NA	1.89E-09	1.89E-09	
Chromium	NA	NA	2.12E-08	2.12E-08	
Copper	NA	NA	NA	NA	
Lead	NA	NA	NA	NA	
Phenanthrene	NA	NA	NA	NA	
Total Risk for Contaminants				2.13E-06	
<u>Trespasser - Surface Water Pathway (Creeks, Ponds, Ditches, and Wetlands)^(a)</u>					
Cadmium	NA	1.03E-07	NA	1.03E-07	No Increased Cancer Risk
Chromium	NA	NA	NA	NA	
Trichloroethylene	NA	NA	NA	NA	
Total Risk for Contaminants				1.03E-07	

NOTES:

Cancer risks were only calculated for contaminants with available cancer slope factors.

(a) Oral and inhalation exposures were not evaluated for surface water because site-specific conditions indicate that swimming is unlikely. Direct skin contact by trespassers has been evaluated.

NA = Not available

APPENDIX C - ATSDR RESPONSES TO PUBLIC COMMENTS RECEIVED

The following comments have been received by ATSDR during the 60-day public comment period for the Blue Ridge Plating public health assessment which began on March 9, 2007 and ended on May 9, 2007. ATSDR's responses to the comments are presented below and indicated changes to the document have been made.

Comment: Page 9. It is claimed that none of the chemicals detected exceeded health-based comparison values. According to Table 2, cadmium and chromium exceeded comparison values.

Response: The text on Page 9 (under Table 2) refers to samples collected from Lake Julian for which none of the detected chemicals were found to exceed health-based comparison values. The data on Table 2 was collected from creeks, ponds, ditches, and wetland areas and does not include samples collected from Lake Julian. To clarify, an endnote has been included on Table 2 that states, "Data presented on Table 2 for creeks, ponds, ditches, and wetland areas does not include samples collected from Lake Julian. Lake Julian samples have been analyzed separately and are discussed below."

Comment: Table 2. The units should be ug/L, not mg/kg.

Response: The units on Table 2 are incorrectly presented as mg/kg. However, the data is actually presented in milligrams per liter (or mg/L). The units have been corrected on the table to reflect chemical concentrations in mg/L.