

Health Consultation

Evaluation of Surface Soil Samples

CORONET INDUSTRIES
(a/k/a BORDEN FEED PHOSPHATE COMPLEX)

PLANT CITY, HILLSBOROUGH COUNTY, FLORIDA

EPA FACILITY ID: FL0001704741

JUNE 7, 2004

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation 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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Prepared by:

Florida Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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Foreword

This document summarizes public health concerns related to potential surface soil exposures near a phosphate processing plant in Plant City, Florida. It is based on a site evaluation prepared by the Hillsborough County Environmental Protection Commission (EPC). A number of steps are necessary to do such an evaluation:

Evaluating exposure: Florida DOH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is found, and how people might be exposed to it. Usually, Florida DOH does not collect its own environmental sampling data. Florida DOH relies on information provided by the Florida Department of Environmental Protection (DEP), U.S. Environmental Protection Agency (EPA), and other government agencies, businesses, and the public.

Evaluating health effects: If there is evidence that people are being exposed, or could be exposed, to hazardous substances, Florida DOH scientists will take steps to determine whether that exposure could be harmful to human health. The report focuses on public health (the health impact on the community as a whole), and is based on existing scientific information.

Developing recommendations: In the evaluation report, Florida DOH outlines its conclusions regarding any potential health threat posed by a site, and offers recommendations for reducing or eliminating human exposure to contaminants. The role of Florida DOH in dealing with hazardous waste sites is primarily advisory. For that reason, the evaluation report will typically recommend actions to be taken by other agencies, including the EPA and Florida DEP. However, if there is an immediate health threat, Florida DOH will issue a public health advisory warning people of the danger, and will work to resolve the problem.

Soliciting community input: The evaluation process is interactive. Florida DOH starts by soliciting and evaluating information from various government agencies, the organizations responsible for cleaning up the site, and the community surrounding the site. Any conclusions about the site are shared with the groups and organizations that provided the information. Once an evaluation report has been prepared, Florida DOH seeks feedback from the public.

If you have questions or comments about this report, we encourage you to contact us.

Please write to: Health Education Program Manager
Health Assessment Team
Bureau of Community Environmental Health
Florida Department of Health
4052 Bald Cypress Way, Bin # A-08
Tallahassee, FL 32399-1712

Or call us at: (850) 245-4299, or
toll-free during business hours: 1-877-798-2772

Background and Statement of Issues

In January 2003, a resident of Plant City, Florida petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) to investigate illnesses in the area of a former phosphate mine and the Coronet Industries phosphate processing facility (Coronet). Both the mine and the facility are southeast of Plant City, in Hillsborough County, Florida. The Florida Department of Health (DOH), under its cooperative agreement with ATSDR, prepared a brief scoping report identifying potential exposure sources related to previous and current Coronet operations. This health consultation focuses on the public health concerns of potential exposures to surface soil.

Since 1906, Coronet Industries and its predecessors mined and processed phosphate rock southeast of Plant City. They mined phosphate rock from areas mainly north of the Coronet facility using a shallow excavation technique (less than 25 feet below land surface). After they mined all usable phosphate rock from the site, they shipped phosphate rock to the facility from other areas of Florida. Coronet used the phosphate rock to manufacture alpha tricalcium phosphate, an animal feed supplement. Coronet also produced potassium fluoborate, a boron-containing product. Coronet permanently ended operations at the Plant City facility in March 2004.

The Hillsborough County Environmental Protection Commission (EPC) tested approximately 40 surface soil samples surrounding the Coronet Industries site for metals, including arsenic, boron, lead, mercury and cadmium. In addition to metals in all 40 samples, 18 soil samples were tested for pesticides, herbicides, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs) and gross alpha radiation. These 18 samples included 10 samples from the Gregg Enterprises property and 8 samples in the Lincoln Park community. The Gregg Enterprises property consists of former phosphate mines and two closed landfills that operated in the 1950s and 1960s.

Testing of surface soil (0 – 6 inches below land surface) showed five samples with arsenic above the Florida Department of Environmental Protection's (DEP's) current Soil Cleanup Target Levels (SCTLs) of 0.8 parts per million for direct exposure in residential soil. One sample was at the southwest corner of the intersection of Park Avenue with Martin Luther King, Jr. Drive in the Lincoln Park community. The other four samples were in the area of the former landfills at the Gregg Enterprises property. However, all samples were below the ATSDR's Environmental Media Evaluation Guide (EMEG) value for chronic exposures to arsenic in soil for both adults and children.

For current and future surface soil exposures, the Florida DOH and ATSDR categorize the surface soil in the area around the Coronet plant, including the Gregg Enterprises property and Lincoln Park community as **no apparent public health hazard**. Contaminants found in surface soil (0 – 6 inches below land surface) are not at levels expected to cause illness by repeated, daily exposure over 30 years.

For past exposures, the Florida DOH and ATSDR categorize the surface soil in the area around the Coronet plant, including the Gregg Enterprises property and Lincoln Park community as **an indeterminate public health hazard**. This is because there are no surface soil sampling data from the past and current surface soil contaminant concentrations might not be representative of past concentrations due to time, weather and other conditions.

Community Health Concerns

During meetings with individual residents and at a public meeting held by local and state government environmental and health agencies in August 2003, residents expressed a variety of health concerns they believed Coronet Industries caused, including:

- High rates of cancer,
- Fertility problems, and
- Illnesses from exposures to dust and surface soils around Coronet.

Local citizens also expressed many other health concerns. This health consultation addresses only those concerns related to potential surface soil exposures. Florida DOH will address other health concerns in future health consultation and public health assessment reports.

Discussion

Surface Soil Sampling Results and Standards

Between August and November 2003, the Hillsborough County Environmental Protection Commission (EPC), or their contractor, tested approximately 40 surface soil samples in the area of the Coronet Industries property, around the former landfills on the Gregg Enterprises property, and in the Lincoln Park community. The EPC tested all samples for metals, including those associated with phosphate mining and processing. In addition to metals, the EPC tested the Lincoln Park community surface soil samples for chlorinated pesticides and herbicides, polychlorinated biphenyls (PCBs), semi-volatile compounds and gross alpha radiation. The EPC contractor tested the Gregg Enterprises property surface soil for the above-listed parameters, and also for volatile compounds and radium 226/228.

Of the 40 surface soil sample tests, five had levels of arsenic above the current Florida DEP soil cleanup target level (SCTL) for direct exposure in residential settings of 0.8 parts per million (ppm). Four of the five samples were on the Gregg Enterprises property, and one was in the Lincoln Park community.

Florida DOH used the following standard comparison values (ATSDR 2002 and Florida DEP 2003) in order of priority, to select contaminants of concern:

1. EMEG (Environmental Media Evaluation Guide) – The ATSDR derives EMEGs from Minimal Risk Levels (MRLs) using standard exposure assumptions, such as ingestion of 200 milligrams of soil per day and body weight of 15 kg for children. MRLs are estimates of daily human exposure, generally for a year or longer, to a chemical likely to be without an appreciable risk of non-cancerous illnesses. EMEGs used in this report were either for chronic (≥ 365 days) or intermediate (15–364 days) exposures, where established.
2. Cancer Risk Evaluation Guide (CREG). A CREG is the contaminant concentration estimated to result in no more than 1 excess cancer per 1 million persons exposed during a lifetime (i.e., 70 years). CREGs are calculated from EPA-established cancer slope factors (ATSDR 1992).
3. SCTLs (Soil Cleanup Target Levels) – The Florida Department of Environmental Protection (DEP) derives SCTLs for both residential and commercial/industrial land uses from U.S. Environmental Protection Agency (EPA) standards or from health data compiled from state and federal resources.

Using the criteria listed above, the Florida DOH selected arsenic and radium 226 in the surface soil samples as contaminants of concern. Arsenic was selected because it occurred in surface soil at levels equal to or greater than the guidance concentrations. Radium 226 was selected because there is currently no guidance concentration for radium in soil.

Table 1: Contaminants of Concern in Surface Soil Samples

Contaminants of Concern	Location	Highest Level	FDEP SCTL Residential (current/proposed)	ATSDR CREG / EMEG child / EMEG adult
Arsenic	Lincoln Park	0.94	0.8 / 2.3	0.5 / 20 / 200
Arsenic	Gregg Enterprises	4.7	0.8 / 2.3	0.5 / 20 / 200
Radium 226	Gregg Enterprises	24	na	na

Radium 226 in pCi/g (picocuries per gram); all other units in milligrams per kilogram (mg/kg) = parts per million (ppm);
na = not available (ie. there is no guidance concentration for soil)
SCTL = Soil Cleanup Target Level, CREG = Cancer Risk Evaluation Guide, EMEG = Environmental Media Evaluation Guide

Identification of a contaminant of concern in this section of the report does not necessarily mean that exposure to the contaminant will cause illness. Florida DEP and ATSDR guidance concentrations are usually set 100 to 1,000 times below levels that cause illness. Identification of contaminants of concern helps narrow the focus of the public health assessment to those contaminants that require further evaluation for potential public health risk.

Exposure Pathways

Most chemical contaminants in the environment will only harm people through direct exposure. It is essential to determine or estimate the frequency of contact people could have with hazardous substances in their environment in order to assess the public health significance of the contaminants.

Accidental ingestion of surface soil could occur if adults or children got soil on their hands and then put their hands into their mouths. Adults or children could inhale dust in windy conditions. Construction or agricultural workers could also be exposed through incidental ingestion of surface soil, or through inhalation of dusts. Mowing might increase exposure to contaminants in dust. Exposure can also occur if people eat vegetables grown in contaminated soil.

Public Health Implications

Florida DOH evaluates exposures by estimating daily doses for children and adults. Kamrin (1988) explains the concept of dose in the following manner:

. . .all chemicals, no matter what their characteristics, are toxic in large enough quantities. Thus, the amount of a chemical a person is exposed to is crucial in deciding the extent of toxicity that will occur. In attempting to place an exact number on the amount of a particular compound that is harmful, scientists recognize they must consider the size of

an organism. It is unlikely, for example, that the same amount of a particular chemical that will cause toxic effects in a 1-pound rat will also cause toxicity in a 1-ton elephant.

Thus instead of using the amount that is administered or to which an organism is exposed, it is more realistic to use the amount per weight of the organism. Thus, 1 ounce administered to a 1-pound rat is equivalent to 2,000 ounces to a 2,000-pound (1-ton) elephant. In each case, the amount per weight is the same; i.e., 1 ounce for each pound of animal.

This amount per weight is the *dose*. Dose is used in toxicology to compare the toxicity of different chemicals in different animals. The units of milligrams (mg) of contaminant per kilogram (kg) of body weight per day (mg/kg/day) are used to express doses in this public health assessment. A milligram is 1/1,000 of a gram, a kilogram is approximately 2 pounds.

To calculate the daily dose of each contaminant, Florida DOH uses standard assumptions about body weight, ingestion and inhalation rates, duration of exposure (period of time), and other factors needed for dose calculation (ATSDR 1992, EPA 1997). We assume that people are exposed daily to the maximum concentration measured at the site. ATSDR's toxicological profiles on contaminants separate exposures into three exposure routes - inhalation, ingestion, and dermal (skin) exposure. For each of these exposure routes, ATSDR also groups health effects by duration (time period) of exposure. Acute exposures are those with duration of 14 days or less; intermediate exposures are those with duration of 15 - 364 days; and chronic exposures are those that occur for 365 days or more (or an equivalent period of time for animal exposures). ATSDR Toxicological Profiles also provide information on the environmental transport and regulatory status of contaminants.

To estimate exposure from incidental ingestion of contaminated soil, Florida DOH used the following assumptions (EPA 1997):

- 1) children 1 - 4 years of age ingest an average of 200 mg of soil per day,
- 2) adults ingest an average of 100 mg of soil per day,
- 3) children 1 - 4 years of age weigh an average of 15 kg,
- 4) adults weigh an average of 70 kg,
- 5) children and adults ingest contaminated soil at the maximum concentration measured for each contaminant.

Florida DOH determined that the levels of chemicals measured in surface soil around Coronet, including the Lincoln Park community and Gregg Enterprises property, are not likely to cause non-cancer health effects.

Arsenic

Florida DOH calculated the theoretical increased statistical risk for cancer for children and adults for the highest level of arsenic measured:

- for the incidental soil ingestion exposure route – an increase of 1 theoretical case in 10,000 – or a “low” increased risk, and

- for the dust inhalation exposure route – an increase of less than 1 theoretical case in 1,000,000 – or a “no significant” increased risk.

From lowest to highest dose cancer effect levels, chronic arsenic exposures have been linked to lung, basal and squamous cell skin cancers, liver cancer, urinary tract cancers (bladder, kidney, ureter and all urethral cancers including prostate cancer), and intra-epidermal cancers (ATSDR 2000). For children and adults to have an increased theoretical risk for these cancers, they would have to ingest the maximum amounts of soil at the maximum contaminant levels every day for 30 years.

Radium 226 and Radon

The dose calculations for both inhalation and ingestion exposures to radium 226 in surface soil did not show an increased risk of cancer or non-cancerous adverse health effects for worst-case exposures (15 kg child exposed to the maximum concentration every day for 30 years with a 70 year life span). The most realistic concern from radium 226 in surface soil is tied to the potential presence of radon gas that may enter homes and increase the risk for certain types of lung cancer.

According to the Florida DOH’s Bureau of Radiation Control, this area of Hillsborough County is recommended for active radon controls (Figure 3). Areas southeast of the former mine site are recommended for passive radon controls. Voluntary building specifications for residential dwellings are included in the appendices of the Florida Building Code. These specifications outline construction techniques and materials, which eliminate the risk for radon gas intrusion into homes, built in areas at high risk for radon.

The Florida DOH recommends that existing homeowners in the areas identified on Figure 3 have their homes tested for radon. The Florida DOH also recommends that builders of new homes in these high risk areas consider the voluntary building specifications for preventing radon gas intrusion, as outlined in the appendices of the Florida Building Code.

Information on the building code and radon risk areas can be obtained at the following web address, or by calling the Florida DOH’s Bureau of Community Environmental Health.

<http://www.doh.state.fl.us/environment/facility/radon/dcastdrd.htm>

Other – Volatile Organic Compounds

Surface soil samples around the area of the former landfills on the Gregg Enterprises property showed widespread, low levels of volatile organic compounds such as benzene, acetone, ethylbenzene, toluene, and naphthalene. Although volatile organic compounds (VOCs) on the Gregg Enterprises property were not above state or federal guidance concentrations, the presence of VOCs in all of the surface soil samples suggests that additional characterization of the source and extent of contamination of these VOCs may be warranted.

Child Health Considerations

In communities faced with air, water, soil or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are 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. (ATSDR 1999c).

Conclusions

For current and future exposures, the Florida DOH and ATSDR categorize surface soil in the area surrounding Coronet Industries, including the Lincoln Park community and Gregg Enterprises property, as **no apparent public health hazard**. Contaminants found in surface soil are not at levels expected to cause illness in the community. Realistic exposure scenarios for arsenic and radium 226 in surface soil do not generate an exposure dose large enough to represent an imminent health threat.

The increased theoretical risk of cancer for incidental ingestion of arsenic in surface soil is 1 in 10,000, or a "low" increased risk. The increased theoretical risk of cancer for inhalation of dust containing arsenic is 1 in 1,000,000, or a "no significant" increased risk.

The risk associated with radium 226 on the Gregg Enterprises property is connected to the decay of radium 226, which could lead to increased radon gas concentrations in dwellings. Radon gas is a known carcinogen linked to lung cancer.

Although volatile organic compounds (VOCs) on the Gregg Enterprises property were not above state or federal guidance concentrations, the presence of VOCs in all of the surface soil samples suggests that additional characterization of the source and extent of contamination of these VOCs may be warranted.

For past exposures, the Florida DOH and ATSDR categorize the risk to public health as an **indeterminate public health hazard**. This is because there are no surface soil sampling data from the past. Current surface soil contaminant concentrations might not be representative of past concentrations.

Recommendations

The Florida DOH currently offers no recommendations concerning soils at the Coronet site.

Public Health Action Plan

The Florida DOH will inform and educate the public about these findings.

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CERTIFICATION

The Coronet Industries Public Health Consultation was prepared by the Florida Department of Health, Bureau of Community Environmental Health, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

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

Roberta Erlwein
Team Leader,
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Figures

Figure 1: Coronet Site Map

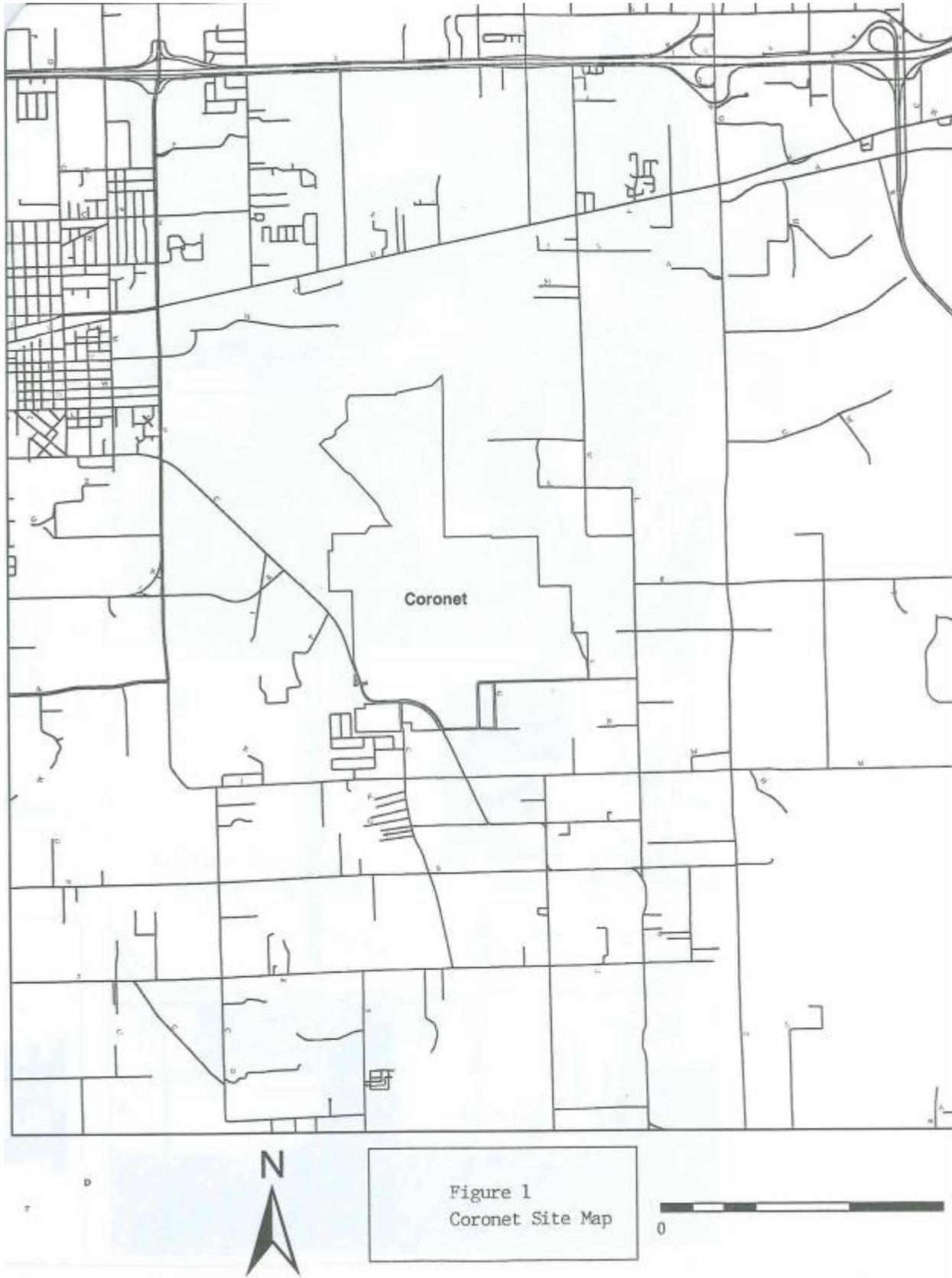
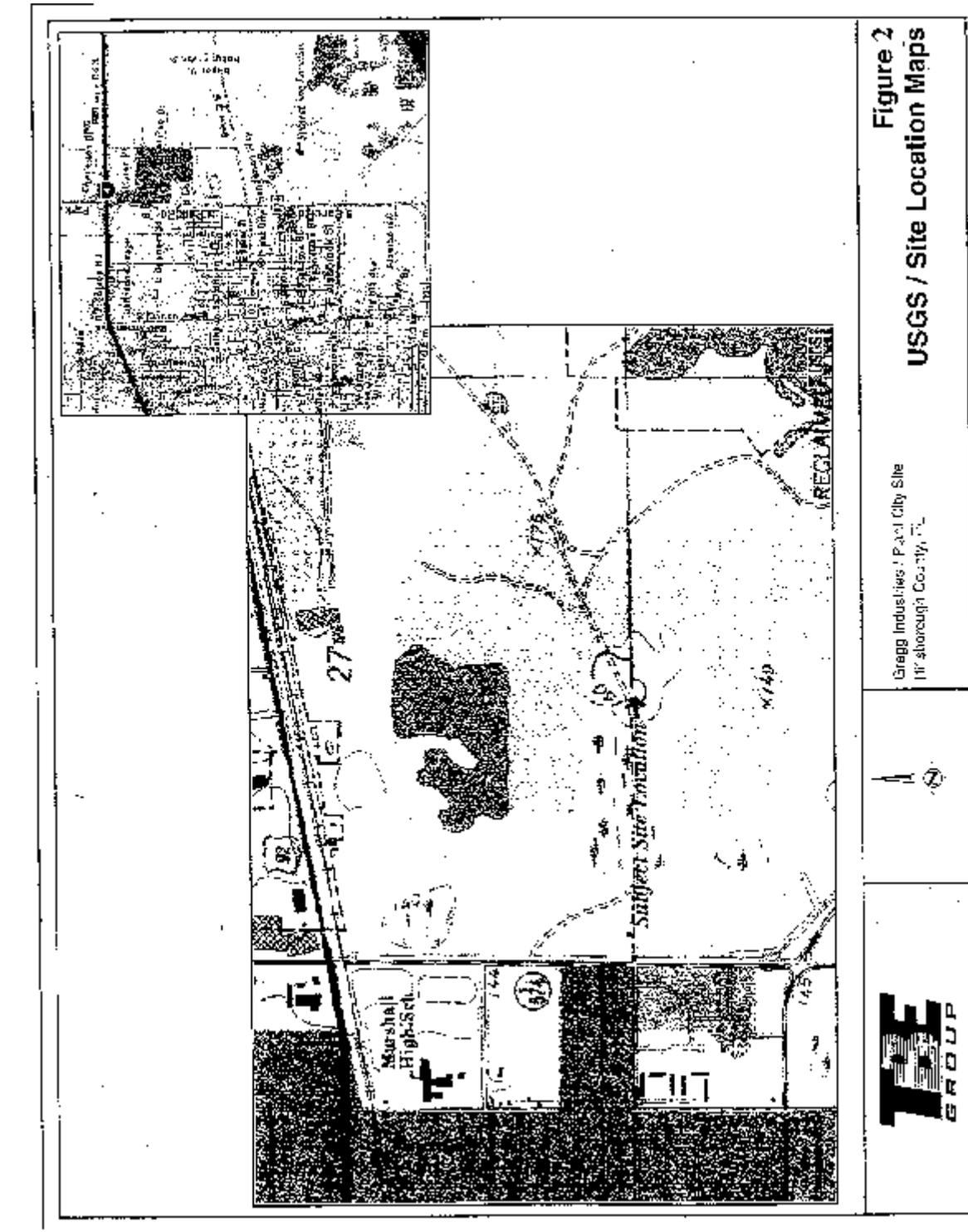
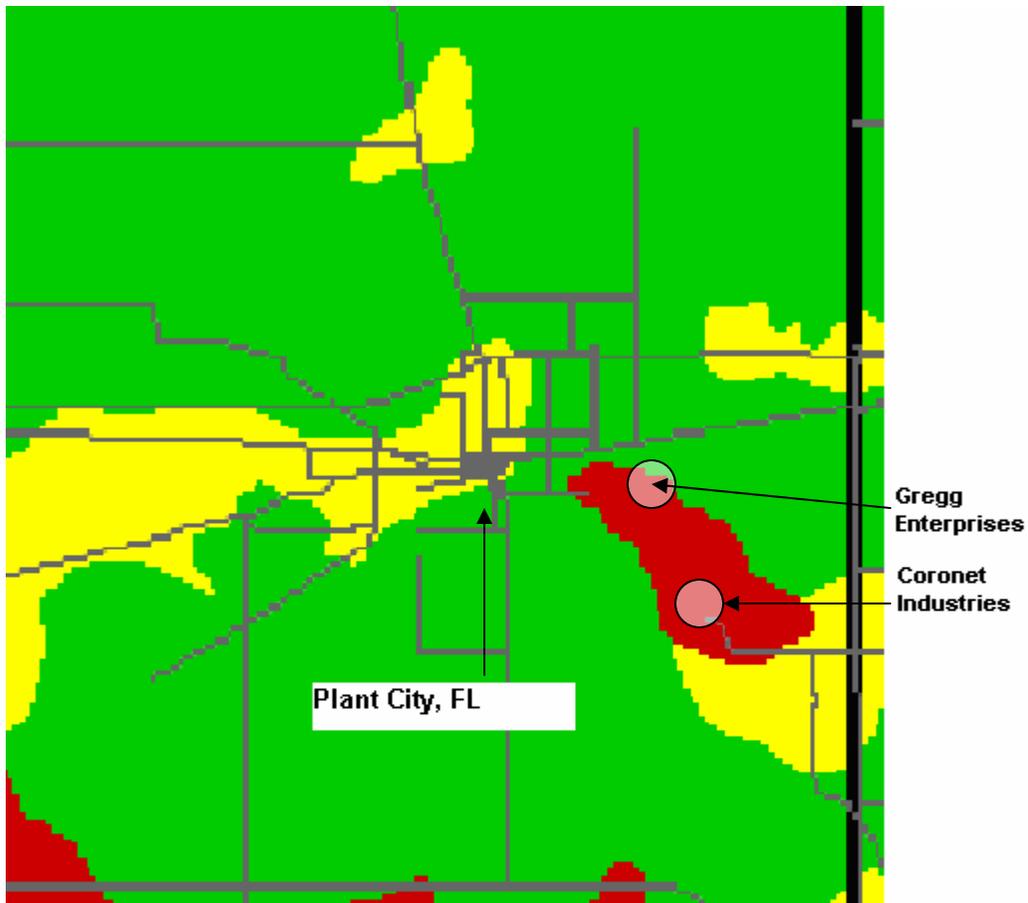


Figure 2: USGS / Site Location Maps (Gregg Enterprises property)





Radon Controls Generally Unnecessary
 Passive Radon Controls Recommended
 Active Radon Controls Recommended



Figure 3: Radon Controls Recommendation Map

Source: Florida Department of Community Affairs, Bureau of Codes and Standards

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<http://www.doh.state.fl.us/environment/facility/radon/>