PUBLIC HEALTH ASSESSMENT

LHR Farms, Inc.
Cleveland, White County, Georgia

Application of treated wastewater on agricultural field, LHR Farms, Inc., with poultry house in background.

GEORGIA DEPARTMENT OF COMMUNITY HEALTH
Division of Public Health

Prepared Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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STATEMENT OF ISSUES

In early 2008, a local resident submitted a petition to the Agency for Toxic Substances and Disease Registry (ATSDR) asking that they investigate potential adverse health effects from exposure to contaminants generated by LHR Farms, a wastewater treatment facility. The petitioner noted that in the last two years, the odor, flies, and amount of hauler traffic to LHR Farms have increased and is concerned that residents are being exposed to potentially harmful contaminants through private drinking water wells and ambient (outdoor) air. The petitioner also reported that odors cause nausea, and that residents have experienced urinary tract infections, bladder tumors or kidney disease/tumors, skin rashes, headaches, eye and respiratory symptoms. In April 2008, the Georgia Department of Human Resources, Division of Public Health (GDPH), Georgia Environmental Protection Division (GEPD), and ATSDR met to discuss the petition. Under a cooperative agreement with ATSDR, GDPH agreed to conduct a public health assessment on LHR Farms in response to the petition.

The purpose of this public health assessment is to determine the nature and extent of exposure to hazardous chemicals in the environment, whether exposure might result in adverse health effects, and assess the concerns and health education needs of the public. The information in this public health assessment is specifically designed to provide information about public health issues related to exposure to chemicals in the environment, and to identify populations for which further health-related actions may be needed. It is not intended to address liability or other non-health issues.

BACKGROUND

Site Description and History

LHR Farms, Inc. is located at 425 Joe Turner Road in Cleveland, White County, Georgia (Figure 1). The 400 acre farm is bounded by Joe Turner Road to the south, County Line Church Road to the east, Industrial Avenue to the north, and Highway 129 to the west. Residential properties are located south, east, and west of LHR Farms. An industrial park is located to the north, which includes a solid waste transfer station.

LHR Farms began operations in 1996. The farm processes septic tank pump out wastewater and other biodegradable organic wastewater from restaurants, homeowners, and industrial facilities across northeast Georgia. Processed wastewater is used as fertilizer on restricted areas of the farm. Materials not suitable for fertilizer are sent to local landfills or other permitted treatment facilities. The site consists of several building structures and approximately 400 acres of land used for forest, agriculture, pasture, stables, a horse riding pavilion, cattle, chicken houses, and a facility available to the public for community gatherings.

There are no physical hazards associated with the site. The facility has restricted access and is surrounded by fencing. There is no indication that trespass occurs and current restriction measures are considered adequate.

Satellite image shows the LHR Farms approximate property boundary outlined in red. The yellow circle is an approximate half-mile radius.

Regulatory History

LHR Farms applies treated domestic wastewater to land (including septage, the partially treated wastewater from a septic tank) by subsurface injection and surface application, initially under the regulatory supervision of the White County Health Department. This supervision was governed by a Memorandum of Understanding with the GEPD.

Note: Septic tank waste and commercial waste are not the same as sewage sludge and are not regulated the same way. Sewage sludge is a concentrated solid byproduct of large-scale waste water treatment that is removed as part of other waste water treatment operations. Sewage sludge is not delivered to or treated at LHR Farms.

Legislation was passed in 2002 amending the Official Code of Georgia Annotated (O.C.G.A.) to divide regulatory responsibilities for the land application of septage between GDPH and GEPD. The O.C.G.A. Title 31-2-7 granted authority to GDPH to regulate land application sites receiving septage from a single hauler and the O.C.G.A. Title 12-8-7 granted authority to GEPD to regulate land application sites that receive septage from multiple haulers. Since LHR Farms was accepting septage from multiple haulers, regulation of LHR Farms moved from the White County Health Department to GEPD in 2002.

The O.C.G.A. was amended in 2005 to grant sole responsibility for regulation of existing and new land application sites to GEPD. The O.C.G.A. also allows existing facilities, like LHR Farms, which had been in operation prior to July 1, 2005, to continue operation until GEPD permits could be issued.

Another statutory change affecting LHR Farms occurred in 2005 when the "Commercial Waste Act" was adopted to address poor grease trap disposal practices in Georgia. The O.C.G.A. Title 12-15 was amended to regulate the removal, transport and disposal of waste from grease interceptors, sand traps, oil-water separators and grit chambers. Regulations were adopted by GEPD in 2006. GEPD granted approval to LHR Farms on April 7, 2006, or continued acceptance

of grease trap waste, now known as commercial waste, using its existing subsurface injection system [1]. On October 29, 2007, GEPD issued LHR Farms a Consent Order designed to be used as an interim Land Application System (LAS) permit and to address the company land applying without a permit. LHR Farms is moving away from a subsurface injection system to a more rigorous method of removing solids and treating wastewater to a greater extent than in the past [2]. Such a system allows the site to discontinue subsurface injection of septage and to provide a higher level of wastewater treatment consistent with other LAS facilities throughout the state.

While waiting for GEPD to issue a treatment permit for these combined wastewater streams (septage and commercial wastewater), LHR Farms has researched and developed a wastewater treatment system that provides treatment and disinfection. This system uses a belt press to remove solids for off-site disposal, and then treated wastewater is used to spray irrigate and fertilize crops on site. Land application of wastewater without a permit from GEPD is a violation of the Groundwater Quality Control Act and GEPD's rules and regulations for water quality control. As a result, on October 12, 2007, the Consent Order issued by GEPD specifies the conditions for using treated wastewater for spray irrigation of crop lands.

LHR Farms has been inspected by GEPD on numerous occasions. GEPD inspectors visited LHR on Jan. 17, 2008, and again on April 8, 2008. Violations were found in operation and maintenance, failure to conduct monthly sampling, accepting sludge from a municipal wastewater facility and accepting wastewater from a dry cleaning operation. The latter two actions are not allowed under LHR's permit. GEPD also noted excess fecal bacteria in three samples of LHR's effluent, and five violations of the nitrate standard in the farm's groundwater.

To determine whether heavy metal contamination is occurring from operations at LHR Farms, GEPD evaluated soil, sediment, surface water, and groundwater samples in March 2008. Samples were analyzed for nitrates, arsenic, cadmium, copper, lead, nickel, selenium, zinc, and mercury, and with the exception of a slightly elevated nitrate level found in one on-site monitoring well, no contaminants exceeded health guidelines or regulatory limits [3].

Additionally, in April 2008, GEPD analyzed off-site groundwater samples from three residences near LHR Farms. No contaminants exceeded health based screening values guidelines or federal drinking water standards [4].

GDPH Site Visit and Process Description

Representatives from GDPH conducted a site visit of LHR Farms on July 15, 2008. The purpose of the visit was to gather information about the current wastewater treatment operation and to make observations of the farm and surrounding area. GDPH does not regulate LHR Farms and this site visit was scheduled with LHR Farms.

Upon arriving at LHR Farms, the farm appeared well maintained. We did not smell any odors as we entered the property, nor were many flies present on any part of LHR Farms. However, noticeable odors were present as we approached the wastewater treatment operations facility, but the odor was not present beyond the immediate area (within 50 to 100 feet) surrounding the wastewater treatment operations. The wastewater treatment facility within the LHR Farm complex was not visible from any road surrounding the farm. Several hundred feet of forest buffer the wastewater treatment facility to the north and east.

The entire wastewater treatment process was observed from the point of acceptance of wastewater to spraying the crop fields. As we approached the wastewater treatment facility, a tanker truck was unloading septic tank wastewater. The wastewater first passed through a tumbler screen that separated solids from the wastewater. The solids were placed in a roll-off container to be sent to a landfill for disposal. Wastewater was then diverted to a concrete equalization basin, where large aspirators and aerators keep the wastewater constantly mixed. Coagulants were added to the equalization basin and pH was constantly monitored and controlled to maximize the binding and settling of organic solids.

Wastewater from the equalization basin was pumped indoors into a Dissolved Air Flotation[1] (DAF) unit where coagulated solids were skimmed off and sent to a belt press for drying. The pressed solids are then raised to pH 12 or greater, which helps give the greasy sludge a binding agent to accelerate the drying process. Additionally, the high pH serves as a pathogen and vector control system that kills pathogens and prevents flies from hovering around the solids after being placed in roll-off dumpsters outside the treatment building (while flies were present inside the wastewater treatment facility, flies were noted to be generally absent around the dumpsters). The solids were collected to be sent to a landfill for final disposal. Water coming off the belt press was then piped back into the equalization tank and to undergo the treatment process again. Treated water coming off the DAF unit was injected with hydrogen peroxide for pathogen control and sent outside to an aeration basin where it undergoes constant aeration to further reduce the Biological Oxygen Demand[2] of the treated water.

Treated wastewater prior to being spray applied to crop fields. Because of constant aeration, the original odors have been greatly reduced.

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Treated wastewater in the aeration basin was injected with hydrogen peroxide for the second time to aid in bacteria (coliform) control. Hydrogen peroxide is injected into the spray field sprinkler system a third time, before the treated wastewater is applied to crop fields, LHR Farms

[1] Dissolved Air Flotation (DAF): a water treatment process that clarifies wastewaters by the removal of suspended matter such as oil or solids. The removal is achieved by dissolving air in the wastewater under pressure and then releasing the air at atmospheric pressure in a flotation tank or basin. The released air forms tiny bubbles which adhere to the suspended matter causing the suspended matter to float to the surface where it may then be removed by a skimming device.

[2] Biological Oxygen Demand: a chemical procedure for determining how fast biological organisms use up oxygen in a body of water.

samples the spray effluent weekly for fecal coliform to ensure that their treatment method is adequate. Since October 2007, these sample results are sent to GEPD on a monthly basis. GEPD requires spray effluent to contain less than 400 colony forming units (CFU) per milliliter (ml) of coliform bacteria. GDPH reviewed sample results from May through August 2009 and these samples have shown less than 1 CFU/ml (GEPD Industrial Wastewater Branch provided GDPH with this data).

Upon issuance of the LAS permit to LHR Farms, GEPD will require the monitoring of fecal coliform bacteria not only in the effluent spray, but also in the surface water adjacent to or traversing the site [GEPD, *Draft LAS Permit No. GA01-576*, 11/4/09]. Additional on-site groundwater monitoring wells will be installed and groundwater will be sampled quarterly. The permit specifies maximum hydraulic load requirements onto the spray-field soils, and measures to ensure that effluent will not migrate off the boundaries of the spray fields.

No odors were present when the crop fields were being spray irrigated. The sprinklers sprayed in a circular pattern and the hay and other grasses were much taller in areas sprayed with treated wastewater than in areas where treated wastewater was not applied. Hay and other feed grasses grown on the farm are harvested seasonally and fed to horses and cattle raised on the farm. Excess hay harvested is sold as livestock feed.

Spray application of treated wastewater to crop fields for irrigation and fertilization.

During our site visit, we also drove on public roads surrounding the farm, stopping at times to assess for any noticeable foul odors. Strong odors were present on Industrial Avenue directly in front of the White County Waste Transfer Station. The wind was blowing northwest that day and the odors coming from the transfer station were very strong. When standing at the farm's boundary fence directly south and east of the transfer station, the odors were not noticeable. We determined that the offensive odors were coming directly from the White County Waste Transfer Station that day; not LHR Farms. Other potential sources of odors in the vicinity of LHR Farms include several poultry houses, a poultry hatchery and a food processing plant.

The White County Waste Transfer Station entrance is located in the Industrial Park adjacent to LHR Farms.

COMMUNITY INVOLVEMENT

To gather community concerns about LHR Farms, GDPH conducted an Environmental Health Education Needs Assessment [5]. Staff from the GDPH Epidemiology Branch and the North District Health Department met with a community representative in March, 2008 to gather health concerns and other documentation about LHR Farms. GDPH also reviewed television and print media coverage, town hall meeting minutes, and material on a local advocacy group's website to gather community concerns. Appendix A describes the Environmental Health Education Needs Assessment process in more detail.

A survey was developed by the North District Health Department to help further assess community concerns and health education needs (Appendix A). The survey was distributed and collected by the community representative. The survey requested basic demographic information, date of home construction, length of residency, drinking water source, and occupation. Respondents were asked questions about odors from LHR Farms and other sources, if they had heard of land application of biosolids and if they had any symptoms or illnesses. A list of symptoms were included in the survey; some of which (e.g. headaches, nausea, and cough) could possibly be caused and/or exacerbated by odors. Respondents were also asked about their preferred methods for receiving health information.

Results of this survey analysis are included in this public health assessment. This information is based upon a self-administered survey which reflects the concerns only of the participating community members. It is important to consider that the survey responses are entirely self-reported, meaning there has been no diagnostic confirmation to verify that reported symptoms and illnesses occurred.

No additional health concerns have been reported to GDPH by residents since this document was closed for Public Comment in February, 2009.

Sign posted by some residents illustrates concerns about LHR Farms operations. Contrary to the sign, unprocessed human waste is not being applied to land at LHR Farms. Public education can increase understanding about the difference between land application of human waste (sludge) and spray irrigation of processed waste water.

Community Survey Results

During April 2008, the survey was distributed to local residents and adjacent private industry employees. Upon completion, the community representative provided GDPH with 117 completed surveys. Of the 117 surveys, there were multiple surveys completed for individual addresses; most were residences, some were workplaces. In all, these surveys represent persons from 46 individual addresses. Completed surveys were primarily from households within approximately one-half mile of LHR Farms. Figure 2 illustrates the locations of survey responses.

Survey responses were analyzed using analytic techniques appropriate for community survey design. Univariate analyses generated descriptive statistics to characterize survey responses.

Demographics

Using 2000 U.S. Census data, the ATSDR calculated population information for individuals living within a 1-mile radius of the LHR Farms site. The population within one mile of LHR is approximately 532 people (Figure 1). Survey respondents were primarily white (98%), high school or college educated, and in their forties and fifties. Thirteen surveys were completed for minors, ages 17 and under.

Mossy Creek Elementary school, located approximately one mile north of LHR Farms, opened in late August 2008. The elementary school currently has 546 students enrolled. There are no other schools near LHR Farms.

Environmental Information

Approximately one-third of respondents reported unusual taste or odor in their drinking water. Among the respondents who said that they had unusual taste or odor in their household water, 30 reported using well water and 9 reported using municipal water.

Over 90% of respondents reported smelling odors and being concerned about the health effects of odors.

Health Information

Respondents were provided a list of health symptoms and were asked to indicate which symptoms they had experienced within the last month. Symptoms included respiratory problems, watery eyes, headaches, coughing, and rash. Most respondents indicated two or more symptoms. Seventy percent of survey respondents reported experiencing symptoms in the month prior to filling out the survey (Table 1).

Table 1. Self-reported Symptoms Among Respondents in the Last Month

			FEMALE*		MALE*	
	n=117		n=65		n=52	
Reported Symptom	n	% of total	n	% of female	n	% of male
Respiratory problems	50	42.7	27	41.5	23	44.2
Watery eyes	46	39.3	29	44.6	17	32.7
Headaches	52	44.4	31	47.7	21	40.4
Coughing	45	38.5	24	36.9	21	40.4
Rash	14	12.0	6	9.2	8	15.4
Refused to Answer/Don't Know	4	3.4	2	3.1	2	3.8
Other	29	24.8	18	27.7	11	21.2

Respondents were asked whether they had any health complaints they were concerned about in the past two years. Seventy-seven percent of survey respondents stated that they had health complaints. Most of these respondents selected two or more health complaints. Of the 20 possible symptoms and illnesses to choose from in the survey, 25 of the 117 respondents indicated that they had no health complaints that they were concerned about in the past two years and two respondents chose as many as 12 health complaints.

Responses regarding health complaints within the last two years were divided into two groups, symptoms and illnesses. Of reported symptoms, headaches were the most commonly reported (51%) followed by eye irritation (50%) and coughing (42%). Of reported illnesses, depression was the most commonly reported (14%), followed by kidney disease (12%) and infections (11%) (Table 2).

Table 2. Self-reported Symptoms among Survey Respondents in the Past Two Years

			FEMALE		MALE	
	n=117		n=65		n=52	
Reported Symptoms	n	% of total	n	% of female	n	% of male
Headaches	60	51.3	36	55.4	24	46.2
Eye irritation	58	49.6	34	52.3	24	46.2
Coughing	49	41.9	26	40.0	23	44.2
Respiratory problems	48	41.0	29	44.6	19	36.5
Sore throats	43	36.8	23	35.4	20	38.5
Lightheadedness	41	35.0	26	40.0	15	28.8
Nausea	41	35.0	26	40.0	15	28.8
Sleep changes	40	34.2	24	36.9	16	30.8
Skin rashes	24	20.5	12	18.5	12	23.1
Irritability	19	16.2	13	20.0	6	11.5
Nosebleeds	11	9.4	7	10.8	4	7.7

Table 3. Self-reported Illnesses among Survey Respondents in the Past Two Years

			FEMALE		MALE	
	n=117		n=65		n=52	
Reported Illnesses	n	% of total	n	% of female	n	% of male
Depression	16	13.7	14	21.5	2	3.8
Kidney Disease	14	12.0	12	18.5	2	3.8
Infections	13	11.1	8	12.3	5	9.6
Cancer	12	10.3	6	9.2	6	11.5
Diabetes	7	6.0	4	6.2	3	5.8
Stroke	6	5.1	4	6.2	2	3.8
Emphysema	5	4.3	1	1.5	4	7.7
Seizures	2	1.7	2	3.1	0	0.0
Liver Disease	1	0.9	1	1.5	0	0.0

Conclusions

The self-reported symptoms and illnesses considered in this survey are used to determine the health concerns and education needs of the community--not to establish an association or causal link between adverse health effects and environmental exposures.

For many residents, odors may have a negative impact on their health and quality of life. However, there is no indication that permanent health effects (i.e. physiological damage to organs) will occur from exposure to odors in the vicinity of LHR Farms. Symptoms may result from exposure to odors, but are expected to cease when the odor is eliminated.

Public Comments

GDPH published this public health assessment for review and public comment from December 15, 2008 to January 30, 2009. GDPH received a total of 43 comments from several sources including individual community members, local business, and an environmental advocacy group. Public comments and responses are provided in Appendix H.

ENVIRONMENTAL SAMPLING DATA

Under GEPD oversight, soil, groundwater, surface water, and sediment were sampled at LHR Farms in March 2008 [3]. All samples were analyzed for metals (both dissolved and total metals): arsenic, cadmium, copper, lead, nickel, selenium, zinc, and mercury. Seventeen soil samples were taken from various locations within the 90-acre spay field where land application of treated wastewater occurs. One sample was taken from each of the three on-site monitoring wells. Two upstream and two downstream surface water and sediment samples were collected from a surface water drainage ditch located on the eastern boundary of LHR Farms.

No metals were detected in soil above regulatory levels or health based screening values, and the levels found are consistent with normal background levels found in Georgia soil. No metals were detected in the upstream and downstream surface water or sediment samples exceeding regulatory levels or health based screening values.

No metals were detected in groundwater samples above regulatory levels. Two metals, arsenic and cadmium, were not detected, but the detection limits used for the analyses are slightly above the lowest health based screening levels for these metals. However, because these metals were not detected at detection levels far below the lowest health based screening values for on-site soil and sediment (averaging approximately 4 times below for arsenic, and two times below for cadmium), it was determined that arsenic and cadmium are not likely present in on-site groundwater monitoring wells at levels above health based screening values. Tables 4–7 in Appendix B contain the sample analyses results for the March 2008 sampling event.

Note: detection limits used for these analytical methods meet federal drinking water requirements

Both the monitoring wells and the on-site drinking water well are sampled monthly at LHR Farms to assess water quality. Because the public is not exposed to the on-site drinking well or monitoring well water supplies, these water well sample results are not included in this document but are referenced from GDPH files. On-site drinking water sample results continue to meet federal drinking water standards [6]. All but one monitoring well continue to meet federal drinking water standards. One monitoring well has repeatedly had a nitrate level slightly above the federal drinking water standard and lowest health based screening level. The highest nitrate concentration detected is 11.1 parts per million (ppm) and the regulatory standard (maximum contaminant level) and lowest health based screening level are both 20 ppm. It is important to note that no exposure to on-site groundwater at LHR Farms is occurring.

Because of community concerns that operations at LHR Farms might be contaminating local drinking water supplies, in April 2009, GEPD sampled drinking water wells at three residences near LHR Farms. The samples were analyzed for the metals listed above and for additional metals, ammonia, nitrate/nitrite, Kjeldahl nitrogen, phosphorous and fecal bacteria (coliform). No contaminants were detected at levels above federal drinking water standards [4]. Nitrate was

found below 10 ppm in all three wells. Cadmium and arsenic were not detected; however, the detection limits used for the analyses are slightly above the lowest health based screening levels for these metals. Because arsenic and cadmium have not been detected in any other groundwater samples (including from on-site monitoring wells closest to a potential source of contamination), soil, surface water or sediment, it was determined that arsenic and cadmium are not likely present in off-site residential drinking water wells at levels above health based screening values.

Outdoor air near LHR Farms was sampled, and volatile organic compounds (VOCs) were detected and related to fungal species that produce these VOCs. VOCs detected include ethanol, isopropyl alcohol, acetone, 2-butanone, ethyl acetate, iso-octane, heptane, toluene and others. In all cases, the air concentrations were between 5 to 500 times below health based screening values.

Since this document was first published for public comments, GDPH obtained a full report from the White County Board of Commissioners of environmental sampling conducted near LHR Farms [Appalachian Water and Soil Analyses, Inc., *laboratory report minerals, metals, anions, heavy metals and bacterial analyses*; 7/29/08].GDPH requested an external review by an environmental consulting company with expertise in land application, to provide an expert and independent assessment of the air and water sampling and analyses. Bruce Pruitt, Ph.D., P.H., P.W.S., of Nutter & Associates Environmental Consultants has over thirty-two cumulative years of professional level working experience in both the private and public sector. After review of the report, Dr. Pruitt concluded:

1. According to the report by Appalachian Water and Soil Analysis (AWSA) dated July 29, 2008, analyses of water samples collected from several locations showed no samples contained fecal coliforms at levels above the state standard.
2. Air quality samples were collected March 10, 2008 for a suite of fungi including molds. Presently, standards for judging what is an acceptable, tolerable, or normal quantity of mold have not been established by either GEPD, the United States Environmental Protection Agency (EPA) or the Centers for Disease Control and Prevention There are no EPA regulations or standards for airborne mold contaminants. AWSA did not identify which species are of concern or the minimum concentrations of concern. Consequently, the criteria for interpreting the test results were not established.
3. The bacteria and fungi cultured and reported by AWSA are commonly found in soil, plant material, decaying vegetation and wood. No cases of infection or diseases have been documented from many of the species observed by AWSA such as *Epicoccum, Arthrinium,* and *Sporotrichum*. One colony forming unit (CFU) of *Trichoderma* was reported at Station Wpt19A. As with the other fungi, Trichoderma is widely distributed in soil and decaying vegetation. Very few cases of infection have been identified and are mostly manifested in immunocompromised patients.
4. The spores and bacteria collected from the air quality filters could have been from multiple sources. For example, AWSA reported a wind direction from the northwest (336 degrees) for Stations Fence01 through Fence04 which are located on the north side of the LHR Farms site. Thus, the air quality filters received aerosols from ambient air that probably did not originate from the LHR Farms site.
5. Overall, the AWSA report did not specify what methods and protocols were used to collect, preserve, transport (chain-of-custody), and analyze the environmental samples. Establishing background air quality conditions is critical to conduct air quality studies

and maintaining quality control. It is not clear whether a background or reference station was established. In addition, it is not clear whether a certified laboratory was used to analyze the samples.

The full review submitted to GDPH by Nutter & Associates can be found in Appendix C.

In January 2009, the White County School System hired an environmental consultant to collect and analyze air samples from Mossy Creek Elementary School for numerous species of fungi and bacteria. Air samples were collected both indoors and outdoors. The analysis results show that all samples were normal for fungi and bacteria levels commonly found inside building environments. Indoor and outdoor air sampling was conducted again in September 2009 for Mossy Creek Elementary, Yonah Elementary and White Middle Schools. The results also show no elevated levels of fungi or bacteria at any of the schools [Pioneer Regional Educational Service Agency, Letters to White County Schools, 1/5/09 and 9/30/09].

Pathway Analysis

GDPH identifies pathways of human exposure by identifying environmental and human components that might lead to contact with contaminants in environmental media (e.g., air, soil, groundwater). A pathways analysis considers five principle elements: a source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure, and a receptor population. Completed exposure pathways are those in which all five elements are present, and indicate that exposure to a contaminant has occurred in the past, is presently occurring, or will occur in the future. GDPH regards people who come into contact with contamination as exposed. For example, people who reside in an area with contaminants in air, or who drink water known to be contaminated, or who work or play in contaminated soil are considered to be exposed to contamination. Potential exposure pathways are those for which exposure seems possible, but one or more of the elements is not clearly defined. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring now, or could occur in the future. However, key information regarding a potential pathway may not be available. It should be noted that the identification of an exposure pathway does not imply that health effects will occur. Exposures may, or may not be substantive. Thus, even if exposure has occurred, human health effects may not necessarily result [7].

GDPH reviewed the site's history, community health concerns, and available environmental sampling data. Based on this review, GDPH did not identify an exposure pathway that warranted further evaluation because neither a point of exposure, nor a route of exposure, exists for any hazardous chemicals sampled for.

Evaluation Process

For each environmental medium, GDPH examines the types and concentrations of contaminants of concern. Comparison Values (CVs) are concentrations of a contaminant that can reasonably (and conservatively) be regarded as harmless to human health, assuming default conditions of exposure. The CVs generally include ample safety factors to ensure protection of sensitive populations. Because CVs do not represent thresholds of toxicity, exposure to contaminant concentrations above CVs will not necessarily lead to adverse health effects [7]. GDPH then considers how people may come into contact with the contaminants. Because the level of exposure depends on the route and frequency of exposure and the concentration of the contaminants, this exposure information is essential to determine if a public health hazard exists.

CVs and the evaluation process used in this document are described in more detail in Appendix D.

GDPH determined that a source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure, and a receptor population do not exist for hazardous chemicals sampled from soil, groundwater, surface water, sediment, and air at LHR Farms.

CANCER INCIDENCE DATA

The petitioner reported that several residents in the area surrounding LHR Farms have experienced bladder tumors or kidney disease/tumors. In October 2009, the Georgia Comprehensive Cancer Registry (GCCR), analyzed the most current (2002 - 2006) cancer incidence data available for White County and the 30528 zip code. Zip code areas are the smallest geographic units for which cancer data are available. In general, incidence rates for four types of cancer are elevated for White County and/or for zip code 30528, compared to rates for the State of Georgia. Specifically, analysis of the distribution of cancer cases in White County and the 30528 zip code (Appendix E) show that:

- prostate cancer rates are significantly higher in White County and the 30528 zip code
- melanoma (skin) cancer rates are significantly higher for men and women in White County and the 30528 zip code
- bladder cancer rates for males are significantly higher in the 30528 zip code
- breast cancer rates are significantly higher for women in the 30528 zip code

NOTE: A statistically significant difference means there is statistical evidence that there is a difference; it does not mean the difference is necessarily large or important. For example, given a sufficiently large sample, small differences can be found to be statistically significant, and statistical significance says nothing about the practical significance of a difference.

For example, within the general population, the major risk factor known for increasing the risk of bladder tumors is repeated, long-term exposure to several chemicals in tobacco smoke. In addition, based on data from worker studies, the U.S. Department of Health and Human Services has determined that exposure to several industrial chemicals over many years results in an increased risk of bladder cancer. For those instances in which cancer is due to a contact with a cancer causing agent, the disease does not develop immediately. Instead, there is a 10 to 30 years latency period between exposure to a carcinogen (a cancer causing agent) and medical diagnosis of cancer. LHR Farms began operations in 1996, and our cancer data review was conducted for 2002-2006, five to ten years after operations started. In summary:

1. Based on the analyses of environmental sampling data, no exposure to any carcinogenic chemicals is expected to have occurred, or to be occurring, as a result of operations at LHR Farms.
2. None of the chemicals known to contribute to prostrate, breast, skin, or bladder cancer are suspected to be present at LHR Farms.
3. Given the short period of time for any potential exposures to biological contamination and that no exposure to chemicals has occurred, reported cancer cases are not related to LHR Farms operations.

GDPH concludes that LHR Farms is not contributing to elevated rates of bladder cancer, or other types of cancer, in White County and in zip code 30528.

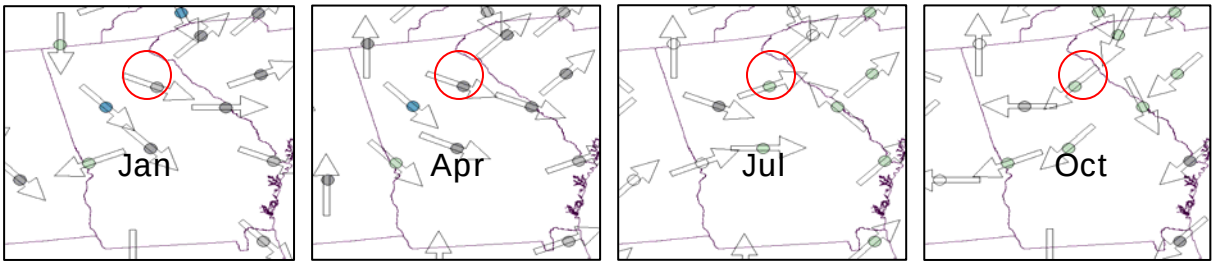
The GCCR is a part of Georgia Division of Public Health. GCCR is a population-based registry that collects, maintains, and analyzes cancer incidence data in Georgia. Additionally, GCCR also responds to citizen's concerns about cancer case excess and other cancer-related inquiries. A team of epidemiologists, environmental specialists, statisticians and other cancer experts conduct cancer cluster investigations at the GCCR. The GCCR will continue to:

- monitor bladder and other cancer rates in White County
- collect information on all newly diagnosed cancer cases
- calculate cancer incidence rates for the state of Georgia
- make data available to the public and health care professionals
- identify and evaluate cancer morbidity and mortality trends on an ongoing basis

GCCR staff is available to residents living near LHR Farms to answer questions about cancer. For more information, please contact GCCR at 404-657-6611 or visit *www.health.state.ga.us/programs/gccr*.

ODOR COMPLAINTS

Odors reported as originating from LHR Farms are apparently one of the main concerns of area residents. Wind direction plays an important role on where odors will be noticeable. Annual wind direction data does not exist for Cleveland, Georgia; however, regional data from Athens, Georgia and Asheville, North Carolina was evaluated. The Ashville area mountain topography is somewhat similar to the topography of Cleveland's foothill setting. As shown in the seasonal prevailing wind charts below, prevailing winter and spring winds in the Athens area blow in a southeast direction. Prevailing summer winds blow slightly northeast, and prevailing autumn winds blow in a southwest direction. The prevailing winds in the Ashville, North Carolina area blow year round in a slightly southeast direction [8, 9].



Seasonal prevailing winds for Athens, Georgia are represented in the dots circled in red [8].

Combining prevailing wind data from both areas allows us to conclude that the annual prevailing wind directions in the Cleveland area tend to be south and southeast. Therefore, residents living south and east of LHR Farms would likely be affected most often by odors generated at or near LHR Farms.

From our site visit, we determined that there were several potential sources capable of generating foul odors. These include poultry houses, a poultry hatchery, a food processing facility, and the White County Waste Transfer Station adjacent to LHR Farms.

The influence of odors on the health and comfort of individuals is difficult to evaluate. Unpleasant odors can result in social and behavioral changes, such as diminishing one's sense of well being, enjoyment of daily activities, and ability to perform various tasks. However, odor perception is subjective, and different individuals may react differently to the same type and intensity of odor [10].

A recent publication [Khuder, et al, 2007] examines the self-reported health effects of residents living near fields where wastewater is land applied for agricultural purposes, similar to operations at LHR Farms [11]. The survey of the community surrounding the land application sites is similar to the survey used for this Needs Assessment. However, the study focuses specifically on land application of septage. The surface land application techniques may have implications for nutrient run-off as well as exposure pathways for pathogens. This method of application is not comparable to the spraying of recycled wastewater occurring at LHR Farms.

It is important to consider that like the Needs Assessment survey results, the health affects considered in Khuder, et al, are entirely self-reported, meaning there has been no diagnostic confirmation to verify that reported symptoms occurred. The controversy surrounding biosolids application can easily influence the residents, biasing self-reporting of health effects. With no diagnostic confirmation, plausible associations to environmental factors are difficult to establish.

Based on facility operations, professional knowledge about similar facilities and the data available from inspection reports conducted regularly at the facility, LHR Farms is not suspected of releasing emissions that could cause or contribute to chronic health problems.

CHILD HEALTH CONSIDERATIONS

To protect the health of the nation's children, ATSDR has implemented an initiative to protect children from exposure to hazardous substances. In communities faced with contamination of the water, soil, air, or food, ATSDR and GDPH recognize that the unique vulnerabilities of infants and children demand special emphasis. Due to their immature and developing organs, infants and children are usually more susceptible to toxic substances than are adults. Children are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are also more likely to encounter dust, soil, and contaminated vapors close to the ground. Children are generally smaller than adults, which results in higher doses of chemical exposure because of their lower body weights relative to adults. In addition, the developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages.

Based on the 2000 U.S. Census, less than 50 children (age 6 and younger) live within one mile of LHR Farms. Mossy Creek Elementary School opened in August 2008. The school is located approximately one mile from LHR Farms. Because of the distance of the homes and school from the spray fields, which are centrally located on 90 acres of the more than 400 acres of the farm, it is unlikely that children will come into contact with spray field soil or the irrigation spray.

CONCLUSIONS

The purpose of this public health assessment is to determine the nature and extent of exposure to hazardous chemicals in the environment, whether exposure might result in adverse health effects, and assess the concerns and health education needs of the public. Based on the results of the environmental sampling, Needs Assessment survey, cancer data analyses, and review of

community concerns, GDPH has categorized LHR Farms as **no public health hazard** to residents living near the site, and adjacent private industry employees. A description of public health hazard categories is provided in Appendix F. Specifically:

1. Exposure to soil, groundwater, surface water, and sediment located on or underneath the property of LHR Farms poses **no public health hazard**, because no one consumes groundwater from the property and public contact with the property is limited.
2. Off-site groundwater is not suspected of being contaminated by heavy metals from operations conducted at LHR Farms.
3. For many residents, odors may have a negative impact on their health and quality of life. However, there is no indication that permanent health effects (i.e., physiological damage to organs) will occur from exposure to odors in the vicinity of LHR Farms. Symptoms may result from exposure to the odors, but are expected to cease when the odor is eliminated.
4. Several other possible sources of odors have been identified within close proximity to LHR Farms.
5. Based on facility operations, professional knowledge about similar facilities and the data available from inspection reports conducted regularly at the facility, LHR Farms is not suspected of releasing chemical or biological emissions to air that could cause or contribute to chronic health problems.

RECOMMENDATIONS

1. Under GEPD oversight, LHR Farms should continue to test on-site drinking water and groundwater monitoring wells to ensure the protection of groundwater resources in the vicinity of LHR Farms.
2. GEPD should be contacted if residents have any concerns regarding the monitoring of fecal coliform bacteria and other microbes during LHR Farms operations.
3. White County should work to reduce odors generated at the White County Waste Transfer Station.
4. The Georgia Comprehensive Cancer Registry should continue to monitor bladder and other cancer rates in White County.

PUBLIC HEALTH ACTION PLAN

Actions Completed

- In February 2008, GEPD oversaw the sampling of soil, groundwater, surface water, and sediment at LHR Farms.
- LHR Farms continues to monitor groundwater quality underneath the farm by periodic sampling of their groundwater monitoring wells and drinking water well.
- GDPH developed, collected, and analyzed community surveys to assess health complaints and published the results in October 2008.
- In October 2008, GDPH distributed a Needs Assessment summary and the brochures, *Health Effects of Odors* and *Cancer and the Environment,* to the public health information repository and to the community leader who assisted with the Needs Assessment.
- GDPH provided additional information to the public about wastewater treatment, biosolids, and land application in Appendix G of this document.

Actions Planned

- The GCCR will continue to monitor bladder and other cancer rates in White County. GCCR staff is available to residents living near LHR Farms to answer questions about cancer.
- GDPH staff will continue to respond to questions about health and environmental concerns regarding operations at LHR Farms.

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11. Khuder S, Milz S A, Bisesi M, et al. *Health Survey of Residents Living Near Farm Fields Permitted to Receive Biosolids.* Archives of Environmental & Occupational Health. Vol. 62. No. 1; 2007.

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CERTIFICATION

This LHR Farms, Inc. public health assessment was prepared by the Georgia Division of Public Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodologies and procedures existing at the time the public health assessment was initiated. Editorial Review was completed by the Georgia Division of Public Health.

_____

Technical Project Officer, CAT, CAPEB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this public health assessment and concurs with its findings.

_____

Team Lead, CAT, CAPEB, DHAC, ATSDR

FIGURES

Figure 1: Site Demographics

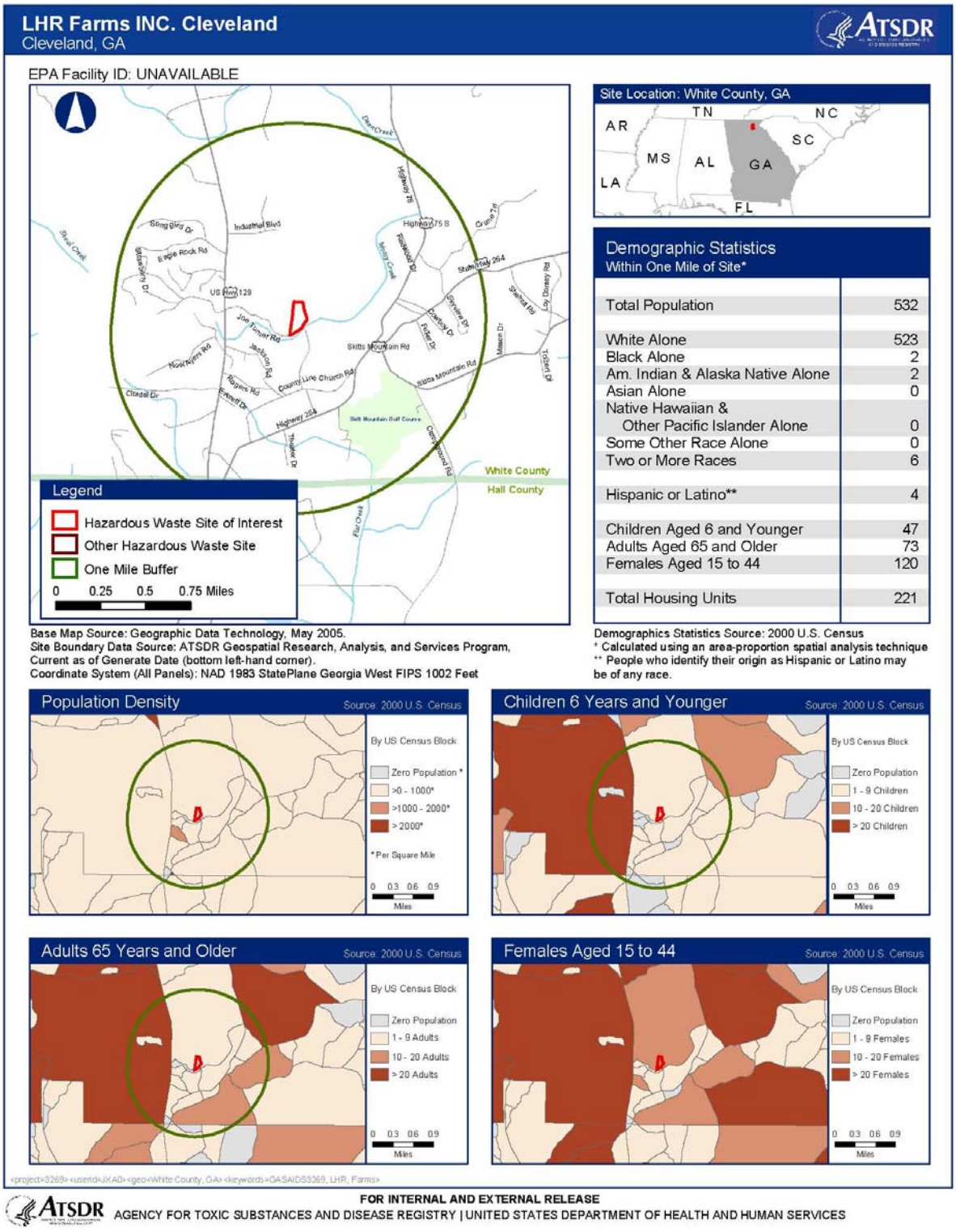
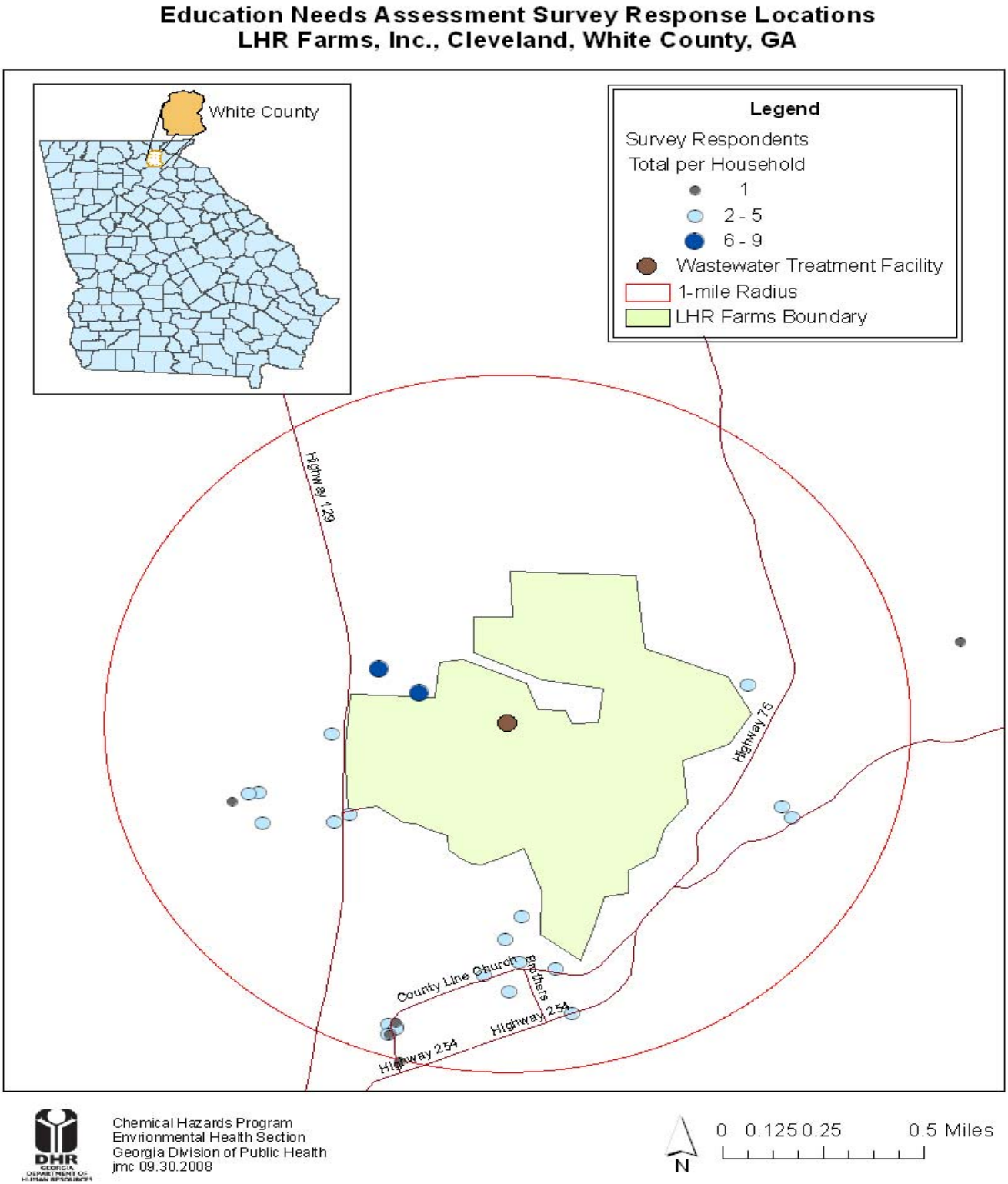


Figure 2: Survey Response Locations Grouped By Household



APPENDICES

Appendix A: Environmental Health Education Needs Assessment

Introduction and Purpose

An Environmental Health Education Needs Assessment is designed to assist local health departments in working collaboratively with communities to identify environmental health education needs and to develop education programs to meet those needs. This needs assessment report compiles information collected from community members concerned about whether hazardous substances are in their environment, and whether environmental exposures are resulting in increased incidences of symptoms and/or illnesses associated with releases from LHR Farms, Inc, a wastewater treatment facility in Cleveland, White County, Georgia.

This needs assessment report includes the following:

- Site description and history
- Demographic information
- Community health concerns
- Self-reported symptoms and illnesses
- Area maps and photographs
- Best methods of exchanging information with a community
- Results of needs assessment findings
- Conclusions summarizing community education needs
- Recommendations to resolve community concerns
- Action plan to propose to guide health education activities

The information contained in this report is not a health study. It reflects the concerns of the participating community members and not the Georgia Division of Public Health or any other public health or environmental agency.

Methodology

In April 2008, staff from the Georgia Division of Public Health (GDPH) and the Georgia Environmental Protection Division (GEPD) met to discuss a petition submitted to the Centers for Disease Control, Agency for Toxic Substances and Disease Registry (ATSDR), to investigate public health concerns about LHR Farms. A local resident petitioned ATSDR, concerned about potential exposure to substances released by the site. The petitioner stated that in the last two years the odor, flies, and amount of wastewater hauled to LHR Farms have increased. The petitioner is concerned that local residents are being exposed to potentially harmful contaminants through private drinking water wells and in ambient (outdoor) air. The petitioner also noted that several businesses and homes border the farm, and a new school is being built one half mile from the farm. The petitioner reports that the rancid odor causes nausea and vomiting, and that several local residents have experienced urinary tract infections, bladder tumors or kidney disease/tumors, skin rashes, headaches, and eye and respiratory irritations/infections [1].

Under a cooperative agreement with ATSDR, the GDPH reviewed community concerns, media reports, and available environmental sampling data, conducted a public health assessment, and helped develop an Environmental Health Education Needs Assessment survey to gather more information to address the concerns of residents near LHR Farms. On March 27, 2008 the survey was finalized after input and review by the petitioner and District Health Department staff. At a public meeting, staff from the District Health Department discussed the purpose, format, and goals of the survey with the community.

The survey was distributed and collected by the petitioner, who provided the completed surveys to GDPH. Beginning in July 2008, GDPH staff created a database in Microsoft Access and entered the survey responses to compile and analyze the results. This report summarizes those results.

Development

GDPH developed the survey to formally collect and document the health concerns of residents and people employed near LHR Farms Inc. Participation in this survey was entirely voluntary and was offered at no cost to residents. The survey requested basic demographic information including age, gender, race and ethnicity, and education level, date of home construction, length of residence in the area, drinking water source, and occupation/title. Respondents were asked to provide descriptions of odors from LHR Farms Inc. and other sources of odors, as well as to indicate if they had heard of land application of biosolids. Self reported symptoms and diseases were gathered as well. Some symptoms listed in the survey were included as indicators for chronic illnesses that may be exacerbated by odors. In addition, respondents were asked about their preferred methods for receiving health education.

Distribution and Data Collection

Surveys were distributed and collected by return mail and fax to Sandy Alexander. Several completed surveys were deposited into drop boxes. A second drop box was delivered to the local high school, but the school administration chose not to participate. Neither the drop box nor any surveys were returned by the local high school.

Data Management and Entry

Upon receipt of the completed surveys, GDPH staff entered, and analyzed of the survey responses. Upon receipt at GDPH, surveys were immediately coded and then separated from the cover page, which contained personal identifiers (name and address). Cover pages were stored in a locked cabinet and personal information was not shared with any other agency or individuals. Survey data were entered into a Microsoft Access database designed by GDPH staff. Some answers required interpretation and coding. Questions with answers left blank were marked as “refused to answer/ don’t know” if the logical precedent yes/no question was not a “no” response. Survey data were entered by GDPH staff and cross checked for accuracy by random verification by comparing database entries with the actual surveys.

Data Analysis

Microsoft Access 2000 database software was used for data entry, and both Microsoft Access and Microsoft Excel 2004 served for the analysis of the compiled data. Survey questions were analyzed and compared using analytic techniques appropriate for community survey design. Univariate analyses generated classical descriptive statistics to characterize survey responses. Missing data were not included in the analyses and therefore not reported in the tables.

For Office Use Only

SURVEY ID: _____

ENVIRONMENTAL HEALTH EDUCATION NEEDS ASSESSMENT SURVEY

Name _____ Phone _____

Address _____

The Georgia Division of Public Health is working with residents living near the LHR Farm to address their environmental health education needs. This survey is designed to help the Georgia Division of Public Health to identify those needs, and to develop educational programs to meet those needs.

GOAL: The goal of this needs assessment survey is to find out about residents' health concerns and general knowledge about exposure to odors.

OBJECTIVES: There are three objectives of this needs assessment survey. They are:

1. To gather information from residents through this community survey during April 2008.
2. To analyze all survey results by June 30, 2008.
3. To develop and carry out a health education program based on survey results during Summer 2008.

SUMMARY: Local residents will be invited to participate in this survey. Participation is voluntary and is offered at no cost to residents. The Georgia Division of Public Health will analyze the results of the survey and decide which health education activities will best serve these communities. The results of this survey are expected to be available to residents in Summer 2008. Summary results of the survey may be shared with other governmental agencies.

CONFIDENTIALITY STATEMENT: THE GEORGIA DIVISION OF PUBLIC HEALTH WILL USE THE SURVEY RESULTS TO ESTABLISH SITE-SPECIFIC ENVIRONMENTAL HEALTH EDUCATION PROGRAMS. ALL REPORTS CREATED FROM THE SURVEY RESULTS WILL NOT CONTAIN ANY PERSONAL IDENTIFIERS SUCH AS NAME OR ADDRESS. THESE REPORTS WILL CONTAIN GROUPED INFORMATION ONLY.

INSTRUCTIONS - A survey is to be completed for each individual resident. Surveys for minors aged 17 and under are to be completed by a parent or guardian. **You can refuse to answer any question, but please answer all questions you choose to answer as truthfully and completely as possible.**

When you are finished filling out the survey, please return the completed survey to:
Sandy Alexander, 254 Joe Turner Road, Cleveland, GA 30528

To begin, some questions about you.

1.1 What is your date of birth? _____

1.2 Are you: ☐ Male ☐ Female

1.3 Which one of the following best describes your race?

a. African-American b. White c. Asian

d. Native American e. Pacific Islander

f. Multiracial g. Refused to Answer/ Don't Know

h. Other: _____

1.4 Are you of Hispanic origin?

a. Yes
b. No
c. Refused to Answer/ Don't Know

1.5 What is the highest level of education you have completed:

a. Less than high school graduate b. Graduate/advanced degree

c. High school graduate/GED d. Technical school/Military/Associates degree

e. Some college f. Refused to Answer/ Don't Know

g. Four-year college degree

1.6 In what year range was your home built?

a. Before 1960
b. 1960-1990
c. 1991-2000
d. 2000-present
e. Refused to Answer/ Don't Know

1.7 How long have you lived at your current residence?

a. More than two years
b. More than a year, but less than two
c. Less than one year
d. Refused to Answer/ Don't Know

1.8 Do you use an individual well or municipal water?

a. Well water
b. Municipal water
c. Refused to Answer/ Don't Know

1.9 Does/has your household water have/had an unusual taste or odor?

a. Yes
b. No
c. Refused to Answer/ Don't Know
d. If yes, describe

_____

_____

1.10 What is your occupation? _____

1.11 What is your job title? _____

1.12 Do you smoke?

a. Yes
b. I have quit smoking
c. No
d. Refused to Answer/ Don't Know

1.13 Do you live with someone who smokes?

a. Yes
b. No
c. Refused to Answer/ Don't Know

The next few questions are about symptoms.

2.1 Have you experienced any symptoms in the last month?

a. Yes
b. No
b. Refused to Answer/Don't Know

2.2 If Yes, which of the following symptoms have you experienced?

a. Respiratory problems (asthma, allergens)
b. Watery eyes
c. Headaches
d. Coughing
e. Rash
f. Refused to Answer/ Don't Know
g. Other: _____

The next few questions are about odors.

2.3 Have you smelled odors? (If No, please skip to question 3.1)

a. Yes
b. No
c. Refused to Answer/ Don't Know

If Yes, please describe. Include approximately how often, time of day, day of week, and weather conditions:_____

_____

2.4 Have you smelled odors from the LHR Farms facility?

a. Yes
b. No
c. Refused to Answer/ Don't Know

2.5 Have you smelled odors from something other than LHR Farms?

a. Yes
b. No
c. Refused to Answer/ Don't Know

If Yes, please describe. Include approximately how often, time of day, day of week, and weather conditions:_____

_____

2.6 How long have you smelled these odors?

a. Months b. Over a year c. A few years d. Over five years

d. Refused to Answer/ Don't Know

2.7 Where do you smell odors?

a. In my house
b. When I am in my neighborhood
c. When I step out of my house
d. Refused to Answer/ Don't Know

2.8 Do you change your outdoor activities because of odors from the LHR Farms?

a. Yes
b. No
c. Refused to Answer/ Don't Know

2.9 Do the odors make you feel sick in any way?

a. Yes
b. No
c. Refused to Answer/ Don't Know

2.10 Do you have any concerns regarding the odors?

a. Yes
c. No
c. Refused to Answer/Don't Know

2.11 If Yes, what are they? Please circle all that apply.

a. Personal health
f, Legal issues

b. Health of the workers
c. Health of the residents
d. Health of the children
e. Health of the environment
g, Property values
h. Quality of life
i. Refused to Answer/ Don't Know

This section asks questions about your current knowledge and need for more information about odors.

3.1 Have you heard of biosolids? Yes No Refused to Answer/ Don't Know

3.2 Have you heard of land application of biosolids? Yes No Refused to Answer/ Don't Know

3.3 Would you like to learn more about them? Yes No Refused to Answer/ Don't Know

3.4 In your opinion, what are the best ways to get information to the public regarding pollution in our environment?

a. Fact sheets delivered to your home
b. Newspaper ads/articles
c. Your doctor or preferred health care professional
d. Church
e. Internet
f. Local community events
g. Refused to Answer/ Don't Know
h. Other: _____

This section asks general questions regarding your health.

4.1 In the past 2 years have you had any health complaints that you are concerned about?

a. Yes
b. No
c. Refused to Answer/ Don't Know

4.2 If Yes, what are they? Please circle all that apply.

a. Cancer	Yes	No	Refused to Answer/ Don't Know
b. Seizures	Yes	No	Refused to Answer/ Don't Know
c. Kidney Disease	Yes	No	Refused to Answer/ Don't Know
d. Emphysema	Yes	No	Refused to Answer/ Don't Know
e. Diabetes	Yes	No	Refused to Answer/ Don't Know
f. Stroke	Yes	No	Refused to Answer/ Don't Know
g. Liver Disease	Yes	No	Refused to Answer/ Don't Know

h.	Depression	Yes	No	Refused to Answer/ Don't Know
i.	Respiratory problems (asthma, allergens)	Yes	No	Refused to Answer/ Don't Know
j.	Skin Rashes	Yes	No	Refused to Answer/ Don't Know
k.	Lightheadedness/Dizzy	Yes	No	Refused to Answer/ Don't Know
l.	Coughing	Yes	No	Refused to Answer/ Don't Know
m.	Eye Irritation	Yes	No	Refused to Answer/ Don't Know
n.	Nosebleeds	Yes	No	Refused to Answer/ Don't Know
o.	Infections	Yes	No	Refused to Answer/ Don't Know
p.	Sore Throats	Yes	No	Refused to Answer/ Don't Know
q.	Irritability	Yes	No	Refused to Answer/ Don't Know
r.	Nausea	Yes	No	Refused to Answer/ Don't Know
s.	Sleep Changes	Yes	No	Refused to Answer/ Don't Know
t.	Headaches	Yes	No	Refused to Answer/ Don't Know
u.	Other: _____			

******** Thank you for your participation *********

Please return completed survey to:

Sandy Alexander
254 Joe Turner Road
Cleveland, GA 30528
Phone: 706-865-1632

For more information:

GEORGIA DEPARTMENT OF HUMAN RESOURCES
Division of Public Health
2 Peachtree Street, 14th Floor
Atlanta, Georgia 30303
(404) 463-3454

Appendix B: Soil, Groundwater, Surface Water, and Sediment Sampling Results for LHR Farms
(Samples Collected March 2008)

Table 4: Summary of Soil Sampling Results

Contaminant	Number of Samples	Number of Detections	Range of Concentrations ppm	Lowest Health-Based Comparison Value (CV)* ppm	Type of CV (Soil)
Arsenic	17	0	BRL (4.86 - 6.02)	20/200	$EMEG_{c/a}$
Cadmium	17	0	BRL (2.43 - 3.01)	5/70	$EMEG_{c/a}$
Copper	17	17	8.73 – 56.2	500/7,000	$EMEG_{c/a}$
Lead	17	17	9.74 – 29.1	400	PRG
Nickel	17	13	5.39 – 13.9	1,000/10,000	$RMEG_{c/a}$
Selenium	17	0	BRL (4.86 - 6.02)	300/4,000	$EMEG_{c/a}$
Zinc	17	17	11.6 - 128	20,000/200,000	$EMEG_{c/a}$
Mercury	17	11	0.157 - 0.389	20/200[1]	$RMEG_{c/a}$

ppm: parts per million
BRL: Below Reporting Limit (Reporting Limit Range)
EMEG: Environmental Media Evaluation Guide for Children/Adults
PRG: EPA Region 9 Preliminary Remedial Goals
RMEG: Reference Dose Media Evaluation Guide for Children/Adults
[1]: For methyl mercury (most protective)
*Source: ATSDR, Soil comparison values (June 2009)

Table 5: Summary of Groundwater Sampling Results

Contaminant	Number of Samples	Number of Detections	Range of Concentrations ppb	Lowest Health-Based Comparison Value (CV)* ppb	Type of CV (Drinking water)
Arsenic	3	0	BRL (5)	3/10	$EMEG_{c/a}$
Cadmium	3	0	BRL (5)	1/4	$EMEG_{c/a}$
Copper	3	0	BRL (10)	100/400	$EMEG_{c}$
Lead	3	0	BRL (10)	15	PRG
Nickel	3	0	BRL (20)	200/700	$RMEG_{c/a}$
Selenium	3	0	BRL (20)	50/200	$EMEG_{c/a}$
Zinc	3	1	20	3,000/10,000	$EMEG_{c/a}$
Mercury	3	0	BRL (0.2)	2	MCL

ppb: parts per billion
BRL: Below Reporting Limit (Reporting Limit)
EMEG: Environmental Media Evaluation Guide for Children/Adults
PRG: EPA Region 9 Preliminary Remedial Goals
RMEG: Reference Dose Media Evaluation Guide for Children/Adults
MCL: Maximum Contaminant Level
* Source: ATSDR, Drinking water comparison values (June 2009)

Table 6: Summary of Sediment Sampling Results Upstream and Downstream of LHR Farms

Contaminant	Number of Samples	Number of Detections	Range of Concentrations ppm	Health-Based Comparison Value (CV)* ppm	Type of CV (Soil)
Arsenic	2	0	BRL (5.68 – 6.01)	20/200	$EMEG_{c/a}$
Cadmium	2	0	BRL (2.84 – 3)	5/70	$EMEG_{c/a}$
Copper	2	1	BRL – 3.45	500/7000	$EMEG_{c/a}$
Lead	2	0	BRL (5.68 – 6.01)	400	PRG
Nickel	2	0	BRL (5.68 – 6.01)	1,000/10,000	$RMEG_{c/a}$
Selenium	2	0	BRL (5.68 – 6.01)	300/4,000	$EMEG_{c/a}$
Zinc	2	2	8.02 – 12.6	20,000/200,000	$EMEG_{c/a}$
Mercury	2	0	BRL (0.121)	20/200[1]	$RMEG_{c/a}$

ppm: parts per million
BRL: Below Reporting Limit (Reporting Limit Range)
EMEG: Environmental Media Evaluation Guide for Children/Adults
PRG: EPA Region 9 Preliminary Remedial Goals
RMEG: Reference Dose Media Evaluation Guide for Children/Adults
[1]: For methyl mercury (most protective)
* Source: ATSDR, Soil comparison values (June 2009)

Table 7: Summary of Surface Water Sampling Results Upstream and Downstream of LHR Farms

Contaminant	Number of Samples	Number of Detections	Range of Concentrations ppb	Health-Based Comparison Value (CV)* ppb	Type of CV (Drinking water)
Arsenic	2	0	BRL (5)	3/10	$EMEG_{c/a}$
Cadmium	2	0	BRL (5)	1/4	$EMEG_{c/a}$
Copper	2	0	BRL (10)	100/400	$EMEG_{c/a}$
Lead	2	0	BRL (10)	15	MCL
Nickel	2	0	BRL (20)	200/700	$RMEG_{c/a}$
Selenium	2	0	BRL (20)	50/200	$EMEG_{c/a}$
Zinc	2	0	BRL (20)	3,000/10,000	$EMEG_{c/a}$
Mercury	2	0	BRL (0.2)	2	MCL

ppb: parts per billion
BRL: Below Reporting Limit (Reporting Limit)
EMEG: Environmental Media Evaluation Guide for Children/Adults
MCL: Maximum Contaminant Level
RMEG: Reference Dose Media Evaluation Guide for Children/Adults
MCL: Maximum Contaminant Level
* Source: ATSDR, Groundwater comparison values (June 2009)

Appendix C: Review and Statement of Opinion

Nutter & Associates
environmental consultants

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TECHNICAL MEMORANDUM NO. 08-025.01

PREPARED FOR:	Georgia Division of Public Health Jane M. Perry, Director Chemical Hazards Program
PREPARED BY:	Bruce A. Pruitt, PhD, PH, PWS
DATE:	October 8, 2009
SUBJECT:	Review and Provide Statement of Opinion on LHR Farms, Cleveland, White County, Georgia

At the request of the Georgia Division of Public Health, Chemical Hazards Program, Nutter & Associates is pleased to provide the following review and opinion on the Air and Water Quality Data regarding the LHR Farms site located in White County near Cleveland, Georgia. The review included air and water quality data previously provided to us by the Georgia Division of Public Health.

According to the report by Appalachian Water and Soil Analysis (AWSA) dated July 29, 2008, several water and air quality parameters were "tested" in the vicinity of LHR Farms over a period of seven months. Samples collected from surface water, specifically Dean Creek (Mossy creek), included fecal coliforms, turbidity, nitrates, phosphates, total dissolved solids, electrical conductivity, pH, temperature, dissolved oxygen levels, biological oxygen demand, ammonia, and total kjeldahl nitrogen. Several genera of Bacteria were also tested including *Pseudomonas*, *Salmonella*, *Bacillus*, *Staphylococcus*, *Citrobacter*, *Proteus*, *Edwardsiella*, and *Klebsiella*. In addition, water samples were collected for a suite of synthetic organic compounds. Also, a suite of fungi and bacteria were tested on air quality samples collected in the vicinity of LHR Farms.

E. coli are found in the lower intestine of warm blooded animals including humans and animals that occur in the natural environment. Consequently, the presence of *E. coli* indicates the potential for human or animal contamination. However, it's presence does not confirm that human pathogens are present. The Georgia Environmental Protection Division (EPD) requires that surface water samples for fecal coliforms be collected during the months of May through October and the geometric mean of at least four (4) independent samples collected not less than 24 hours apart during a 30-day period (EPD 391-3-6-.03 Water Use Classification and Water Quality Standards. Amended. Section 6(c)(iii)). According to the table provided by AWSA, samples were collected in January 2008. In addition, it is not clear whether four independent samples were collected, from which, a geometric mean was

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calculated. Since the samples were collected outside of the period specified by EPD (May through October), the EPD standard states (EPD 391-3-6-.03, Section 6(c)(iii)):

> Fecal coliforms not to exceed a geometric mean of 1,000 per 100 ml based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours and not to exceed a maximum of 4,000 per 100 ml for any sample.

Assuming that AWSA sampled one time in January 2008, the maximum not to exceed for fecal coliforms is 4,000 per 100 ml. AWSA reported fecal coliforms at seven stations, none of which, exceeded the state standard.

EPD's standard for turbidity is (EPD 391-3-6-.03, Section 5(d)):

> All waters shall be free from turbidity which results in a substantial visual contrast in a water body due to a man-made activity. The upstream appearance of a body of water shall be as observed at a point immediately upstream of a turbidity-causing man-made activity. That upstream appearance shall be compared to a point which is located sufficiently downstream from the activity so as to provide an appropriate mixing zone.

Turbidity was measured on several different dates from January 4 to February 21, 2008. The maximum turbidity observed during the sample period was 14.5 NTU at Alex (Wpt35) which is a relatively low turbidity and the water would appear to be clear of suspended solids. Considering the samples were not collected synoptically during the same day, it is impossible to determine whether the streams were in compliance with the aforementioned state standard.

AWSA identified several metals observed in surface water samples collected from January 4 to February 21, 2008. The metal concentrations reported by AWSA did not exceed state standards (EPD 391-3-6-.03, Section 5(e)(ii)).

Air quality samples were collected March 10, 2008 for a suite of fungi including molds. Presently, standards for judging what is an acceptable, tolerable, or normal quantity of mold have not been established by either EPD, the United States Environmental Protection Agency (EPA) or the Center for Disease Control (CDC). There are no EPA regulations or standards for airborne mold contaminants. AWSA did not identify which species are of concern or the minimum concentrations of concern. Consequently, the criteria for interpreting the test results was not established.

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Apparently, AWSA used malt extract agar (MEA) to culture samples collected from Stations Fence01, Wpt18A, and Wpt19A (spreadsheet columns C, D, N, Q, R, U, AE and AF). Trypticase soy agar (TSAII) was used to culture samples collected from Station Wpt19B (spreadsheet column V). Bacteria blood agar was used to culture samples collected from Wpt18B (spreadsheet column O). Apparently, air quality samples at the other stations were collected and analyzed using Air-O-Cell™ cassettes which collect both viable and non-viable airborne aerosols such as mold. Most air-born mold spores are non-viable (i.e., not alive and capable of causing human health problems). Non-viable air-born spores can account for over ten times the number of viable spores. Air-O-Cell™ does not discriminate between air-born spores that may cause human health problems (viable) and those that do no cause human health problems (non-viable). Consequently, it is unknown whether the spore counts using the Air-O-Cell™ cassettes reported by AWSA would cause a health concern or not.

During the period of air quality sampling, wind direction was recorded (spreadsheet row 9). However, it is not clear whether the predominant wind direction was from the LHR Farms site or elsewhere. Consequently, the spores and bacteria collected from the air quality filters could have been from multiple sources. For example, AWSA reported a wind direction from the northwest (336 degrees) for Stations Fence01 through Fence04 which are located on the north side of the LHR Farms site. Thus, the air quality filters received aerosols from ambient air that probably did not originate from the LHR Farms site.

The bacteria and fungi cultured and reported by AWSA are commonly found in soil, plant material, decaying vegetation and wood. No cases of infection or diseases have been documented from many of the species observed by AWSA such as *Epicoccum*, *Arthrinium*, and *Sporotrictum*. One colony forming unit (CFU) of *Trichoderma* was reported from Station Wpt19A. As with the other fungi, *Trichoderma* is widely distributed in soil and decaying vegetation. Very few human cases of infection have been identified and are mostly manifested in immunocompromised patients.

Overall, the AWSA report did not specify what methods and protocols were used to collect, preserve, transport (chain-of-custody), and analyze the environmental samples. Establishing background air quality conditions is critical to conduct air quality studies and maintaining quality control. It is not clear whether a background or reference station was established. In addition, it is not clear whether an EPD or EPA certified laboratory was used to analyze the samples.

Appendix D: Explanation of Evaluation Process

Step 1--The Screening Process

In order to evaluate the available data, GDPH used comparison values (CVs) to determine which chemicals to examine more closely. CVs are contaminant concentrations found in a specific environmental media (for example; air, soil, water) and are used to select contaminants for further evaluation. CVs incorporate assumptions of daily exposure to the chemical and a standard amount of air, soil, or water that someone may inhale or ingest each day. CVs are generated to be conservative and non-site specific. The CV is used as a screening level during the public health assessment process where substances found in amounts greater than their CVs might be selected for further evaluation. CVs are not intended to be 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 CVs are calculated from the U.S. Environmental Protection Agency's (EPA) oral cancer slope factors for ingestion exposure, or inhalation risk units for inhalation exposure. Non-cancer CVs are calculated from the Agency for Toxic Substances and Disease Registry's (ATSDR) minimal risk levels, EPA's reference doses, or EPA's reference concentrations for ingestion and inhalation exposure. When a cancer and non-cancer CV exist for the same chemical, the lower of these values is used as a conservative measure. The chemical and media-specific CVs used in the preparation of this public health assessment are listed below:

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. Separate child and adult exposure doses (or the amount of a contaminant that gets into a person's body) are calculated for site-specific scenarios, using assumptions regarding an individual's likelihood of accessing the site and contacting contamination.

Non-cancer Health Risks

The doses calculated for exposure to individual chemicals are then compared to an established health guideline, such as an ATSDR minimal risk level (MRL) or an EPA reference dose (RfD), in order to assess whether adverse health impacts from exposure are expected. Health guidelines are chemical-specific values that are based on available scientific literature and are considered protective of human health. 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 to derive health guidelines is to identify, usually from animal toxicology experiments, a no observed adverse effect level (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 known toxicological values are doses derived from human and animal studies that are summarized in ATSDR's *Toxicological Profiles (www.atsdr.cdc.gov/toxpro2.html).* The NOAEL is modified with an uncertainty (or safety) factor, which reflects the degree of uncertainty that exists when experimental animal data are extrapolated to the human population. The magnitude of the uncertainty factor considers various factors such as sensitive subpopulations (e.g., children, pregnant women, the elderly), extrapolation from animals to humans, and the completeness of the available data. Thus, exposure doses at or below the established health guideline are not expected to cause adverse health effects because these values are much lower (and more human health protective) than doses, which do not cause adverse health effects in laboratory animal studies.

Minimal Risk Levels (MRLs) are developed by ATSDR for contaminants commonly found at hazardous waste sites. The MRL is developed for ingestion and inhalation exposure, and for lengths of exposures:

acute (less than 14 days); intermediate (between 15-364 days), and chronic (365 days or greater). ATSDR has not developed MRLs for dermal exposure (absorption through skin).

Reference Doses (RfDs) EPA developed chronic RfDs for ingestion and RfCs for inhalation as estimates of daily exposures to a substance that are likely to be without a discernable risk of deleterious effects to the general human population (including sensitive subgroups) during a lifetime of exposure.

If the estimated exposure dose to an individual is less than the health guideline value, the exposure is unlikely to result in non-cancer health effects. If the calculated exposure dose is greater than the health guideline, the exposure dose is compared to known toxicological values for the particular chemical and is discussed in more detail in the text of the public health assessment. A direct comparison of site-specific exposures and 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.

It is important to consider that the methodology used to develop health guidelines does not provide any information on the presence, absence, or level of cancer risk. Therefore, a separate cancer risk evaluation is necessary for potentially cancer-causing contaminants detected at this site.

Cancer Risks

Exposure to a cancer-causing chemical, even at low concentrations, is assumed to be associated with some increased risk for evaluation purposes. The estimated risk for developing cancer from exposure to contaminants associated with the site was calculated by multiplying the site-specific doses by EPA's chemical-specific cancer slope factors (CSFs) available at *www.epa.gov/iris*. This calculation estimates a theoretical excess cancer risk expressed as a proportion of the population that may be affected by a carcinogen during a lifetime of exposure. For example, an estimated risk of 1×10^{-6} predicts the probability of one additional cancer over background in a population of 1 million. An increased lifetime cancer risk is not a specified estimate of expected cancers. Rather, it is an estimate of the increase in the probability that a person may develop cancer sometime in his or her lifetime following exposure to a particular contaminant under specific exposure scenarios. For children, the theoretical excess cancer risk is not calculated for a lifetime of exposure, but from a fraction of lifetime; based on known or suspected length of exposure, or years of childhood.

Because of conservative models used to derive CSFs, using this approach provides a theoretical estimate of risk; the true or actual risk is unknown and could be as low as zero. Numerical risk estimates are generated using mathematical models applied to epidemiologic or experimental data for carcinogenic effects. The mathematical models extrapolate from higher experimental doses to lower experimental doses. Often, the experimental data represent exposures to chemicals at concentrations orders of magnitude higher than concentrations found in the environment. In addition, these models often assume that there are no thresholds to carcinogenic effects--a single molecule of a carcinogen is assumed to be able to cause cancer. The doses associated with these estimated hypothetical risks might be orders of magnitude lower that doses reported in toxicology literature to cause carcinogenic effects. As such, a low cancer risk estimate of 1×10^{-6} and below may indicate that the toxicology literature supports a finding that no excess cancer risk is likely. A cancer risk estimate greater than 1×10^{-6}, however, indicates that a careful review of toxicology literature before making conclusions about cancer risks is in order.

Appendix E: Cancer Incidence, 2002-2006

Source: Georgia Comprehensive Cancer Registry,
Georgia Department of Community Health, Division of Public Health, 2009

Age-Adjusted Cancer Incidence Rates for the State of Georgia, 2002-2006

Site	Cases	Rate	Cases	Rate	Cases	Rate
All Sites	181771	462.1	95333	566.3	86433	392.4
Oral Cavity	4579	11.2	3201	17.3	1378	6.3
Esophagus	1908	4.9	1443	8.4	465	2.1
Stomach	2468	6.4	1453	8.8	1015	4.6
Colon and Rectum	18910	49.2	9714	58.7	9196	42.3
Liver	1762	4.4	1296	7.2	466	2.1
Pancreas	4089	10.9	2012	12.6	2077	9.6
Larynx	1927	4.8	1549	8.7	378	1.7
Lung and Bronchus	27811	73.3	16385	101.7	11426	53.3
Bone and Joints	370	0.9	205	1.0	165	0.7
Melanoma	8300	20.2	4742	26.8	3558	15.8
Breast	--	--	--	--	26457	118.5
Uterine Cervix	--	--	--	--	1946	8.6
Uterine Corpus	--	--	--	--	3850	17.3
Ovary	--	--	--	--	2778	12.6
Prostate	--	--	27372	162.3	--	--
Testis	--	--	900	3.9	--	--
Kidney and Renal Pelvis	5380	13.5	3274	18.6	2106	9.6
Bladder (Incl in situ)	6701	18.1	4986	32.7	1715	8.0
Brain and Other Nervous System	2607	6.3	1379	7.2	1228	5.5
Thyroid	3468	7.9	783	3.9	2685	11.8
Hodgkin Lymphoma	1071	2.4	574	2.6	497	2.2
Non-Hodgkin Lymphoma	6694	17.0	3605	20.8	3089	14.1
Multiple Myeloma	2199	5.8	1176	7.2	1023	4.7
Leukemias	4505	11.5	2527	15.0	1978	9.0

Average annual rate per 100,000, age-adjusted to the 2000 US standard population.

Age-Adjusted Cancer Incidence Rates for Zip Code 30528, Georgia, 2002-2006

	Total		Males		Females	
Site	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
All Sites	570	624.1	307	760.3	263	539.1
Oral Cavity	13	~	***	~	<5	~
Esophagus	<5	~	<5	~	<5	~
Stomach	<5	~	<5	~	<5	~
Colon and Rectum	56	61.6	30	78.5	26	52.2
Liver	<5	~	<5	~	<5	~
Pancreas	13	~	5	~	8	~
Larynx	<5	~	<5	~	<5	~
Lung and Bronchus	84	89.5	50	122.8	34	65.9
Bone and Joints	<5	~	<5	~	<5	~
Melanoma	45	51.1	24	56.1	21	46.4
Breast	--	--	--	--	80	163.2
Uterine Cervix	--	--	--	--	<5	~
Uterine Corpus	--	--	--	--	11	~
Ovary	--	--	--	--	7	~
Prostate	--	--	101	244.7	--	--
Testis	--	--	<5	~	--	--
Kidney and Renal Pelvis	21	23.7	12	~	9	~
Bladder (Incl in situ)	30	31.9	23	58.4	7	~
Brain and Other Nervous System	<5	~	<5	~	<5	~
Thyroid	12	~	<5	~	***	~
Hodgkin Lymphoma	<5	~	<5	~	<5	~
Non-Hodgkin Lymphoma	27	30.0	12	~	15	~
Multiple Myeloma	6	~	<5	~	<5	~
Leukemias	14	~	<5	~	***	~

Average annual rate per 100,000, age-adjusted to the 2000 US standard population.
Rates highlighted in yellow are significantly lower than the state rate (p<.05).
Rates highlighted in orange are significantly higher than the state rate (p<.05).

Zip Code 30528 Cancer Incidence, 2002-2006
Data Summary

All Cancer Sites

- 570 new cancer cases were diagnosed in Zip Code 30528 from 2002 to 2006, an average of 114 new cases per year.
- It is expected that about 61 males and 53 females will be diagnosed with cancer every year in Zip Code 30528.
- The overall age-adjusted cancer incidence rate in Zip Code 30528 is 624.1 per 100,000 population. This is significantly higher than the rate for Georgia (462.1 per 100,000).
- Males are 41% more likely than females to be diagnosed with cancer in Zip Code 30528.

Males

- The overall age-adjusted cancer incidence rate for males in Zip Code 30528 is 760.3 per 100,000 population. This is significantly higher than the rate for Georgia males (566.3 per 100,000).
- Prostate, lung, and colorectal are the top cancer sites among males in both Zip Code 30528 and the State of Georgia.
- The age-adjusted prostate cancer incidence rate is significantly higher for males in Zip Code 30528 (244.7 per 100,000) than for Georgia males (162.3 per 100,000).
- The age-adjusted lung cancer incidence rate is higher for males in Zip Code 30528 (122.8 per 100,000) than for Georgia males (101.7 per 100,000), but this difference is not statistically significant.
- The age-adjusted colorectal cancer incidence rate is higher for males in Zip Code 30528 (78.5 per 100,000) than for Georgia males (58.7 per 100,000), but this difference is not statistically significant.
- The age-adjusted melanoma incidence rate is significantly higher for males in Zip Code 30528 (56.1 per 100,000) than for Georgia males (26.8 per 100,000).
- The age-adjusted bladder cancer incidence rate is significantly higher for males in Zip Code 30528 (58.4 per 100,000) than for Georgia males (32.7 per 100,000).

Females

- The overall age-adjusted cancer incidence rate for females in Zip Code 30528 is 539.1 per 100,000 population. This is significantly higher than the rate for Georgia females (392.4 per 100,000).
- Breast, lung and colorectal are the top cancer sites among females in both Zip Code 30528 and the State of Georgia.
- The age-adjusted breast cancer incidence rate is significantly higher for females in Zip Code 30528 (163.2 per 100,000) than for Georgia females (118.5 per 100,000).
- The age-adjusted lung cancer incidence rate is higher for females in Zip Code 30528 (65.9 per 100,000) is similar to that for Georgia females (53.3 per 100,000), but this difference is not statistically significant.
- The age-adjusted colorectal cancer incidence rate is higher for females in Zip Code 30528 (52.2 per 100,000) than for Georgia females (42.3 per 100,000), but this difference is not statistically significant.
- The age-adjusted melanoma incidence rate is significantly higher for females in Zip Code 30528 (46.4 per 100,000) than for Georgia females (15.8 per 100,000).

Age-Adjusted Cancer Incidence Rates for White County, Georgia, 2002-2006

	Total		Males		Females	
Site	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
All Sites	717	538.8	401	661.0	316	452.2
Oral Cavity	16	~	***	~	<5	~
Esophagus	6	~	***	~	<5	~
Stomach	5	~	<5	~	<5	~
Colon and Rectum	70	53.1	41	72.9	29	39.9
Liver	<5	~	<5	~	<5	~
Pancreas	14	~	<5	~	***	~
Larynx	<5	~	<5	~	<5	~
Lung and Bronchus	99	71.8	58	96.5	41	54.1
Bone and Joints	<5	~	<5	~	<5	~
Melanoma	57	46.1	33	55.2	24	38.1
Breast	--	--	--	--	98	140.0
Uterine Cervix	--	--	--	--	5	~
Uterine Corpus	--	--	--	--	13	~
Ovary	--	--	--	--	10	~
Prostate	--	--	135	212.7	--	--
Testis	--	--	<5	~	--	--
Kidney and Renal Pelvis	25	19.3	15	~	10	~
Bladder (Incl in situ)	39	28.1	30	48.5	9	~
Brain and Other Nervous System	6	~	<5	~	<5	~
Thyroid	14	~	<5	~	***	~
Hodgkin Lymphoma	<5	~	<5	~	<5	~
Non-Hodgkin Lymphoma	31	23.3	14	~	17	~
Multiple Myeloma	7	~	***	~	<5	~
Leukemias	15	~	<5	~	***	~

Average annual rate per 100,000, age-adjusted to the 2000 US standard population.
Rates highlighted in yellow are significantly lower than the state rate (p<.05).
Rates highlighted in orange are significantly higher than the state rate (p<.05).

White County Cancer Incidence, 2002-2006
Data Summary

All Cancer Sites

- 717 new cancer cases were diagnosed in White County from 2002 to 2006, an average of 143 new cases per year.
- It is expected that about 80 males and 63 females will be diagnosed with cancer every year in White County.
- The overall age-adjusted cancer incidence rate in White County is 538.8 per 100,000 population. This is significantly higher than the rate for Georgia (462.1 per 100,000).
- Males are 46% more likely than females to be diagnosed with cancer in White County.

Males

- The overall age-adjusted cancer incidence rate for males in White County is 661.0 per 100,000 population. This is significantly higher than the rate for Georgia males (566.3 per 100,000).
- Prostate, lung, and colorectal are the top cancer sites among males in both White County and the State of Georgia.
- The age-adjusted prostate cancer incidence rate is significantly higher for males in White County (212.7 per 100,000) than for Georgia males (162.3 per 100,000).
- The age-adjusted lung cancer incidence rate is lower for males in White County (96.5 per 100,000) than for Georgia males (101.7 per 100,000), but this difference is not statistically significant.
- The age-adjusted colorectal cancer incidence rate is higher for males in White County (72.9 per 100,000) than for Georgia males (58.7 per 100,000), but this difference is not statistically significant.
- The age-adjusted melanoma incidence rate is significantly higher for males in White County (55.2 per 100,000) than for Georgia males (26.8 per 100,000).

Females

- The overall age-adjusted cancer incidence rate for females in White County is 452.2 per 100,000 population. This is significantly higher than the rate for Georgia females (392.4 per 100,000).
- Breast, lung and colorectal are the top cancer sites among females in both White County and the State of Georgia.
- The age-adjusted breast cancer incidence rate is higher for females in White County (140.0 per 100,000) than for Georgia females (118.5 per 100,000), but this difference is not statistically significant.
- The age-adjusted lung cancer incidence rate for females in White County (54.1 per 100,000) is similar to that for Georgia females (53.3 per 100,000).
- The age-adjusted colorectal cancer incidence rate is lower for females in White County (39.9 per 100,000) than for Georgia females (42.3 per 100,000), but this difference is not statistically significant.
  The age-adjusted melanoma incidence rate is significantly higher for females in White County (38.1 per 100,000) than for Georgia females (15.8 per 100,000).

Appendix F: Public Health Hazard Categories

Public Health Hazard Categories
Depending on the specific properties of the contaminant, the exposure situations, and the health status of individuals, a public health hazard may exist. Using data from public health assessments, sites are classified using one of the following public health hazard categories:

Category 1: Urgent Public Health Hazard
Sites that pose a serious risk to public health as a result of short-term exposures to hazardous substances.

Category 2: Public Health Hazard
Sites that pose a public health hazard as a result of long-term exposures to hazardous substances.

Category 3: Potential/Indeterminate Public Health Hazard
Sites for which no conclusions about public health hazard can be made because data are lacking.

Category 4: No Apparent Public Health Hazard
Sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.

Category 5: No Public Health Hazard
Sites for which data indicate no current or past exposure or no potential for exposure and, therefore, no health hazard.

Source: Agency for Toxic Substances and Disease Registry

Appendix G: Wastewater Treatment and Biosolids Land Application

Wastewater Treatment

Source: United States Geological Survey

We consider wastewater treatment as a water use because it is so interconnected with the other uses of water. Much of the water used by homes, industries, and businesses must be treated before it is released back to the environment.

If the term "wastewater treatment" is confusing to you, you might think of it as "sewage treatment." Nature has an amazing ability to cope with small amounts of water wastes and pollution, but it would be overwhelmed if we didn't treat the billions of gallons of wastewater and sewage produced every day before releasing it back to the environment. Treatment plants reduce pollutants in wastewater to a level nature can handle.

Wastewater is used water. It includes substances such as human waste, food scraps, oils, soaps and chemicals. In homes, this includes water from sinks, showers, bathtubs, toilets, washing machines and dishwashers. Businesses and industries also contribute their share of used water that must be cleaned.

The major aim of wastewater treatment is to remove as much of the suspended solids as possible before the remaining water, called effluent, is discharged back to the environment. "Primary treatment" removes about 60 percent of suspended solids from wastewater. This treatment also involves aerating (stirring up) the wastewater, to put oxygen back in. Secondary treatment removes more than 90 percent of suspended solids.

Biosolids and Land Application

Source: U.S. Environmental Protection Agency

1) What are Biosolids?

They are nutrient-rich organic materials resulting from the treatment of domestic sewage in a treatment facility. When treated and processed, these residuals can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth.

2) What is the difference between biosolids and sludge?

Biosolids are treated sewage sludge. Biosolids are carefully treated and monitored and must be used in accordance with regulatory requirements.

3) Why do we have biosolids?

We have biosolids as a result of the wastewater treatment process. Water treatment technology has made our water safer for recreation and seafood harvesting. Thirty years ago, thousands of American cities dumped their raw sewage directly into the nation's rivers, lakes, and bays. Through regulation of this dumping, local government now required to treat wastewater and to make the decision whether to recycle biosolids as fertilizer, incinerate it, or bury it in a landfill.

4) How are biosolids generated and processed?
Biosolids are created through the treatment of domestic wastewater generated from sewage treatment facilities. Once the wastewater reaches the plant, the sewage goes through physical, chemical and biological processes which clean the wastewater and remove the solids. If necessary, the solids are then treated with lime to raise the pH level to eliminate objectionable odors. The wastewater treatment processes sanitize wastewater solids to control pathogens (disease-causing organisms, such as certain bacteria, viruses and parasites) and other organisms capable of transporting disease.

5) How are biosolids used?
After treatment and processing, biosolids can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth. The controlled land application of biosolids completes a natural cycle in the environment. By treating sewage sludge, it becomes biosolids which can be used as valuable fertilizer, instead of taking up space in a landfill or other disposal facility.

6) Where are biosolids used?
Farmers and gardeners have been recycling biosolids for ages. Biosolids recycling is the process of beneficially using treated the treated residuals from wastewater treatment to promote the growth of agricultural crops, fertilize gardens and parks and reclaim mining sites. Land application of biosolids takes place in all 50 states.

7) Why are biosolids used on farms?
The application of biosolids reduces the need for chemical fertilizers. As more wastewater plants become capable of producing high quality biosolids, there is an even greater opportunity to make use of this valuable resource.

8) What percentage of biosolids are recycled and how many farms use biosolids?
About 50% of all biosolids are being recycled to land. These biosolids are used on less than one percent of the nation's agricultural land.

9) Are biosolids safe?
The National Academy of Sciences has reviewed current practices, public health concerns and regulator standards, and has concluded that "the use of these materials in the production of crops for human consumption when practiced in accordance with existing federal guidelines and regulations, presents negligible risk to the consumer, to crop production and to the environment."

10) Do biosolids smell?
Biosolids may have their own distinctive odor depending on the type of treatment it has been through. Some biosolids may have only a slight musty, ammonia odor. Others have a stronger odor that may be offensive to some people. Much of the odor is caused by compounds containing sulfur and ammonia, both of which are plant nutrients.

11) Are there regulations for the land application of biosolids?
The federal biosolids rule is contained in 40 CFR Part 503. Biosolids that are to be land applied must meet these strict regulations and quality standards. The Part 503 rule governing the use and disposal of biosolids contain numerical limits, for metals in biosolids, pathogen reduction standards, site restriction, crop harvesting restrictions and monitoring, record keeping and reporting requirements for land applied biosolids as well as similar requirements for biosolids that are surface disposed or incinerated. Most recently, standards have been proposed to include requirements in the Part 503 Rule that limit the concentration of dioxin and dioxin like compounds in biosolids to ensure safe land application.

12) Where can I find out more about the regulations?
The biosolids rule is described in the EPA publication, *A Plan English Guide to the EPA Part 503 Biosolids Rule* . This guide states and interprets the Part 503 rule for the general reader. This guide is also available in hard copy. In addition to the Plain English Guide, EPA has prepared *A Guide to the Biosolids Risk Assessments for the EPA Part 503 Rule* which shows the many steps followed to develop the scientifically defensible, safe set of rules (also available from EPA in hard copy.)

13) How are biosolids used for agriculture?
Biosolids are used to fertilize fields for raising crops. Agricultural use of biosolids, that meet strict quality criteria and application rates, have been shown to produce significant improvements in crop growth and yield. Nutrients found in biosolids, such as nitrogen, phosphorus and potassium and trace elements such as calcium, copper, iron, magnesium, manganese, sulfur and zinc, are necessary for crop production and growth. The use of biosolids reduces the farmer's production costs and replenishes the organic matter that has been depleted over time. The organic matter improves soil structure by increasing the soil's ability to absorb and store moisture.

The organic nitrogen and phosphorous found in biosolids are used very efficiently by crops because these plant nutrients are released slowly throughout the growing season. This enables the crop to absorb these nutrients as the crop grows. This efficiency lessens the likelihood of groundwater pollution of nitrogen and phosphorous.

14) Can biosolids be used for mine reclamation?
Biosolids have been used successfully at mine sites to establish sustainable vegetation. Not only does the organic matter, inorganic matrix and nutrients present in the biosolids reduce the bioavailability of toxic substances often found in highly disturbed mine soils, but also regenerate the soil layer. This regeneration is very important for reclaiming abandoned mine sites with little or no topsoil. The biosolids application rate for mine reclamation is generally higher than the agronomic rate which cannot be exceeded for use of agricultural soils.

15) How are biosolids used for forestry?
Biosolids have been found to promote rapid timber growth, allowing quicker and more efficient harvest of an important natural resource.

16) Can biosolids be used for composting?
Yes, biosolids may be composted and sold or distributed for use on lawns and home gardens. Most biosolids composts, are highly desirable products that are easy to store, transport and use.

17) Are there rules about where biosolids can be applied?
To determine whether biosolids can be applied to a particular farm site, an evaluation of the site's suitability is generally performed by the land applier. The evaluation examines water supplies, soil characteristics, slopes, vegetation, crop needs and the distances to surface and groundwater. There are different rules for different classes of biosolids. Class A biosolids contain no detectible levels of pathogens. Class A biosolids that meet strict vector attraction reduction requirements and low levels metals contents, only have to apply for permits to ensure that these very tough standards have been met. Class B biosolids are treated but still contain detectible levels of pathogens. There are buffer requirements, public access, and crop harvesting restrictions for virtually all forms of Class B biosolids.

Nutrient management planning ensures that the appropriate quantity and quality of biosolids are land applied to the farmland. The biosolids application is specifically calculated to match the nutrient uptake requirements of the particular crop. Nutrient management technicians work with the farm community to assure proper land application and nutrient control.

18) Are there buffer requirements or restrictions on public access to sites with biosolids?
In general, exceptional quality (Class A) biosolids used in small quantities by general public have no buffer requirements, crop type, crop harvesting or site access restrictions. Exceptional Quality biosolids is the name given to treated residuals that contain low levels of metals and do not attract vectors. When used in bulk, Class A biosolids are subject to buffer requirements, but not to crop harvesting restrictions. In general, there are buffer requirements, public access, and crop harvesting restrictions for virtually all forms of Class B biosolids (treated but still containing detectible levels of pathogens).

19) Can anyone apply biosolids to land?
Anyone who wants to use biosolids for land application must comply with all relevant federal and state regulations. In some cases a permit may be required.

Appendix H: Public Comments

The public comment process gives the public--particularly the community near the site--an opportunity to review the results of the public health assessment, GDPH's conclusions and recommendations, and to provide additional information and comments. In reviewing the document, community members may provide input on such issues as: Is the document understandable? Has GDPH taken into account all relevant site information? Has GDPH identified and responded to community concerns?

The public comment period was open from December 15, 2008 to January 30, 2009. GDPH received a total of 43 comments from a number of parties including individual community members, a local business owner, and an environmental advocacy group. Comments are presented in the order that they were received.

From most of the comments received, there seems to be some misunderstanding of what the wastewater treatment process actually is, what land application of biosolids is, and what spray irrigation of treated wastewater is. We added Appendix F to briefly address what wastewater treatment is and questions regarding the land application of biosolids. Land application of biosolids is no longer occurring at LHR Farms. Treated wastewater is now being sprayed on crop fields at LHR Farms.

1. Comment: *LHR Farms poses no public health hazard.* How can GDPH make this determination without air testing to confirm that no pathogens or VOCs are being spread?

Response: GDPH does not conduct sampling of environmental media but evaluates validated sampling data gathered from regulatory agencies. According to GEPD, there are no air monitoring requirements for sewage wastewater treatment facilities in Georgia, or throughout the United States.

GDPH did receive limited air sampling data sent to us from a business located in the Industrial Park adjacent to LHR Farms. Those data results did not detect any bacterial species (fecal coliform other otherwise). The data did show several genera of fungi reported from sampling locations around the perimeter of LHR Farms. Volatile organic compounds (VOCs) were measured and related to the fungal species that produce these VOCs. Some of the VOCs measured include ethanol, isopropyl alcohol, acetone, 2-butanone, ethyl acetate, iso-octane, heptane, toluene and others. In all cases, the air concentrations, as measured in ug/m3, were anywhere from 5 to 500 times below air comparison values (CVs). For information about CVs, please see Appendix B.

Since this document was first published, we obtained the full report of microbial air sampling conducted near LHR Farms. The report also found seven viable bacterial genera captured in the air sampling device. However, none of the bacterial genera detected were enteric bacteria, that is, gram negative bacteria normally found in the human intestine. Furthermore, endotoxin sampled for was not detected in any of the air samples collected. This is further evidence that bioaersolization of E. coli and other coliform bacteria, if it is occurring, is not escaping the boundaries of LHR Farms.

2. Comment: *LHR Farms is not suspected of releasing emissions to air that could cause or contribute to chronic health problems.* Aerosolization of contaminated wastewater can be carried for miles. EPD confirmed that the effluent being sprayed contained excess amounts of fecal coliform. Do feces contain Hepatitis, HIV, viruses, etc.? Yes it does and hydrogen peroxide does not kill disease to my knowledge. What about the caustic effect of hydrogen peroxide and the relationship to the numerous complaints of eye irritation?

Response: We were unable to locate any literature or documented evidence that aerosolization of contaminated wastewater or fecal coliform from the land application of biosolids is carried for miles. We did, however, find documentation of measured aerosolization at a landfill where biosolids are spread and at wastewater treatment plants where quantification of bioaerosols in sewage was conducted. Bioaersolization in both these studies was localized. That is, it occurred only in the actual area of land application or wastewater treatment. The findings are summarized below:

[National Institute for Occupational Safety and Health. *Health hazard evaluation report* 2003-0078-2918; Waste Management Inc., *Outer Loop Landfill, Louisville, Kentucky*, 8/03]

The National Institute for Occupational Safety and Health (NIOSH) responded to a request concerning landfill dozer and compactor operators' exposures during the dumping and spreading of biosolids and sewage sludge at the working face of the landfill. NIOSH conducted air sampling which included the collection of area and personal breathing zone samples for culturable bacteria, endotoxin (a component in cell membranes of Gram-negative bacteria), and VOCs. Samples were collected at the active site of the landfill where waste is disposed and at a capped site no longer receiving waste for comparison. Employees working at the landfill did not report any health problems.

Total bacteria concentrations for the comparison samples and active site samples ranged from 96 colony forming units per cubic meter of air (CFU/m3) to 144 CFU/m3 and from 108 CFU/m3 to > 62,304 CFU/m3 respectively. The following enteric bacteria (bacteria present in the intestinal tracts of humans and animals) were identified: *Klebsiella oxytoca*, *Leclercia adecarboxylata*, *Enterobacter cloacae*, and *Citrobacter freundii*.

Area endotoxin samples collected at the active site of the landfill ranged from 2.9 enzyme units[3] per cubic meter (EU/m3) to 170 EU/m3. The PBZ time-weighted average (TWA) exposure of the dozer operator was 27.9 EU/m3. Occupational exposure criteria for endotoxin, based on observed health effects at measured endotoxin levels, have been suggested at 200 EU/m3 for airway inflammation with increased airway activity, 2000 EU/m3 for over-shift decline in forced expiratory volume in one second, 3000 EU/m3 for chest tightness, and 10,000-20,000 EU/m3 for toxic pneumonitis. NIOSH has not established any recommended exposure limits for culturable bacteria or endotoxin exposure.

3 1 EU (Enzyme Unit) = 12 nanograms of endotoxin per cubic meter.

Some epidemiological studies of wastewater and sewage workers have shown an increased risk of gastrointestinal symptoms. Lundholm and Rylander found that skin disorders and diarrhea and other gastrointestinal symptoms were more prevalent among employees at six Swedish wastewater treatment plants than among workers at three water treatment plants [Lundholm M, Rylander R, 1983*; Work related symptoms among sewage workers.* Br J Ind Med 40:325].

Major VOCs detected were ethanol, various aliphatic hydrocarbons, toluene, ethyl benzene, xylenes, trimethyl benzenes, styrene, limonene, and siloxanes.

[Scarlett-Kranz JM, Babish JG, Strickland D, Lisk DJ, 1987; *Health among sewage sludge application on Ohio farms: health effects*. Environmental Research 38:332-359]

In a three-year, prospective epidemiologic study in Ohio, the health status of farming families using sludge on land was compared to families not using sludge. The families using sludge were randomly selected. Each family participated in a monthly family and animal health questionnaire, annual tuberculin skin testing, and quarterly blood sampling for serological testing for 23 viruses. There was no significant difference in the frequency of respiratory illnesses, digestive illnesses, or general symptoms between the two family groups. There were also no observed differences in health status among the farm animals. Viral serological test results were similar, and there were no tuberculin skin test conversions. According to the authors, farmers in the study had a sewage sludge application rate comparable to the practices allowed under the U.S. Environmental Protection Agency's (EPA) regulations, and the sewage sludge had undergone accepted digestion procedures.

[Opplinger A, Hilfiker S, Vu Duc T, 2005; *Influence of seasons and sampling strategy on assessment of bioaerosols in sewage treatment plants in Switzerland.* Ann. Occup. Hyg., Vol 49, No. 5, pp. 393-400]

The purpose of this study was to collect a comprehensive dataset for bioaerosols concentration (endotoxins, bacteria, and fungi) in different seasons for different worksites (indoors/outdoors) and during special tasks. The composition of the community of Gram-negative bacteria was also investigated.

An assessment of sewage workers' exposure to airborne cultivable bacteria, fungi, and inhaled endotoxins was performed at 11 sewage treatment plants. Enclosed and unenclosed treatment areas were sampled in each plant and the influence of seasons was evaluated (summer and winter) for bioaerosols levels. Personal exposure to endotoxins was also measured of workers during special operations where a higher risk of bioaerosols exposure was assumed because of short-term tasks (spray removal from basins, tank walls, grids or rakes) which do not reflect the mean personal daily exposure of workers.

Results show that only fungi are present in significantly higher concentrations in summer than in winter (2331±858 versus 329±95 colony forming units per cubic meter of air (CFU/m3). Also, there are significantly more bacteria in the enclosed area, near the particle grids for incoming

water, than in the unenclosed area near the aeration basins (9455±2661 versus 2435±985 CFU/m3 in summer and 11,081±2299 versus 2002±839 CFU/m3 in winter). Workers carrying out special tasks were exposed to very high levels of endotoxins (up to 500 enzyme units per cubic meter of air (EU/m3). The percentage of viable bacteria observed to be Gram-negative ranged from 8.4±2.1% in summer and 4.4±2.1% in winter for viable counts. The small concentration of airborne cultivable Gram-negative bacteria is primarily due to the short survival periods in the airborne state. The species composition and concentration of airborne Gram-negative bacteria were also studied. A broad spectrum of different species within the Pseudomonadaceae (ubiquitous bacteria) and the Enterobacteriaceae families were predominant in nearly all plants investigated. Within the family of Enterobacteriaceae, the genera *Klebsiella* and *Enterobacter* dominated. These bacteria are found in the soil and in water. Bacteria from human feces, such as *E. coli* (potentially pathogenic), were generally present in very low numbers.

What do the findings of these three studies mean in relation to LHR Farms?

To summarize, two of the above studies documents exposure of landfill workers and wastewater treatment plant workers to bioaerosols localized in the area of operation. However, there is no correlation with illness associated with this exposure. Some epidemiological studies have found an occupational correlation from exposure to bioaerosols to gastrointestinal symptoms. The other three–year epidemiological study where medical monitoring that included annual tuberculin skin testing, and quarterly blood sampling for serological testing for 23 viruses found no significant difference in the frequency of respiratory illnesses, digestive illnesses, or general symptoms between the two family groups. There were also no observed differences in health status among the farm animals.

One of these studies pointed out that bacteria from human feces, such as *E. coli*, were found in very low numbers, and other Gram-negative enteric bacteria (like *E. coli*) do not survive very long when they are airborne.

None one of the Needs Assessment survey respondents reported have any gastrointestinal disorders, such as diarrhea. Furthermore, aside from low airborne enteric bacteria viability, any bioaersolization (as measured directly at the source) would be diluted by an enormous atmospheric volume air surrounding the 400 acre farm acting as a buffer before the moving offsite.

To address the use of hydrogen peroxide as a disinfectant: bloodborne pathogens such as hepatitis and HIV are generally not a problem in wastewater. Hydrogen peroxide primarily kills bacteria and deactivates viruses through oxidative damage.

Oxygen is very reactive; it tends to suck electrons away from other molecules, a process called "oxidation". When life scientists speak about "oxidative damage", they are generally referring to oxygen atoms pulling electrons away from other molecules, thus destabilizing those molecules, to the point that they may change their shape (and thus their function) or even break apart.

Hydrogen peroxide cannot be excluded from cells; it can pass through cell membranes easily. Once inside a cell, it usually breaks down into a hydroxyl radical and a hydroxide ion. The hydroxyl radical (HO+) is extraordinarily reactive, and will steal an electron from almost any organic substrate it comes in contact with. However, this usually turns the oxidized substrate into a radical itself, which will steal an electron from another nearby molecule, initiating a chain reaction of electron-stealing which can destabilize an entire area of a cell. Also, DNA is very susceptible to oxidative damage, and since bacteria have a single chromosome controlling all their life functions, that kind of damage can be disastrous to them. Bacteria often lack repair mechanisms which can limit this kind of damage, too, which is why it often ends with the bacterial cell dying. However, any kind of cell can and will suffer oxidative damage in the presence of free radicals.

However, according to a comment from a retired microbiology professor living in your community, "The potential for air pollution and potential health problems from hydrogen peroxide injected aerosol wastewater is probably less than health problems with non-peroxide treated wastewater; however, the jury is still out and I am not aware of pending research that addresses this issue." GDPH is also unaware of available research.

3. Comment: *ATSDR does not have the authority or expertise to evaluate bacterial exposures.* If ATSDR does not have the authority to evaluate bacterial and fungal concentrations, then the statement that LHR poses no risk is extremely premature and the state should retain experts who are qualified and have expertise and can make accurate statements regarding the risks.

Response: ATSDR was created by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), more commonly known as the Superfund law. The Superfund program is responsible for finding and cleaning up the most dangerous hazardous waste sites in the country.

ATSDR is the lead federal public health agency responsible for determining human health effects associated with toxic chemical exposures, preventing continued exposures, and mitigating associated human health risks at these NPL sites and others throughout the country. However, the GDPH does have some expertise in the etiology and pathogenesis of biological disease and we have addressed community concerns in this section to the best of our ability.

In addition, GDPH requested an external review by an environmental consulting company with expertise in land application, to provide an expert and independent assessment of the air and water sampling and analyses. The full review submitted to GDPH by Nutter & Associates can be found in Appendix C.

4. Comment: GDPH does not have the authority or expertise to evaluate the potential pathology of bacterial or fungal concentrations that may exist on crop field soil and in irrigation water. If GDPH does not have the authority to evaluate bacterial and fungal concentrations, then the statement that LHR poses no risk is extremely premature and the state should retain experts who are qualified and have expertise and can make accurate statements regarding the risks.

Response: Please see response to Comment 3.

5. Comment: *Materials not suitable for fertilizer are sent to landfills.* Is this a proven fact? The trucks that haul the solids have only began doing that in the past 1 ½ years. What was being done with the material prior to that?

Response: During our site visit, we observed solids screening as the first step in wastewater treatment provided at LHR Farms. Screened solids were placed in dumpsters and hauled off to a permitted solid waste landfill. Prior to the spray application of treated wastewater, septage was sub-surface injected into crop field soils. Fore more information about the history of disposal of solids at LHR Farms, please contact GEPD.

6. Comment: *LHR is moving away from subsurface injection.* LHR was doing the land-subsurface application up until December 2007. This should have been factored in for the evaluation.

Response: GDPH could only base its evaluation on available scientific data. Groundwater, soil, surface water, and sediment sampling results show that heavy metals were not present in concentrations above any health-based guidelines at the LHR Farms site. Detection of these contaminants at high levels, and above health-based guidelines, would be an indication that prior subsurface injection practices at LHR Farms could have led to such contamination. This was not the case.

7. Comment: *LHR has been inspected on numerous occasions.* LHR was only inspected in Jan, March, and July. That is not numerous. A suggestion would be to include specific dates and findings. The results of those inspections were not reported in your findings. The violations were not mentioned. The tampons, condoms, syringes lying in the sludge fields were not mentioned in your report. If solids are being removed, then these items shouldn't be accumulating in the fields. Is this environmentally appropriate?

Response: According to GEPD, inspections of wastewater treatment facilities typically only occur once per year. Given that this facility was inspected three times during a 12 month period, this is considered numerous.

Solid waste debris on the fields could be from a number of sources. It is not suspected to be a source for chemical contamination, and the available environmental sampling data show no chemical contamination of soil, sediment, surface water, or groundwater. It does indicate maintenance and/or operation problems and these concerns should be directed toward GEPD for investigation.

8. Comment: *No contaminants exceeded regulatory limits.* The Zinc was elevated and the Nitrate was elevated. It is false to state in your conclusion that no contaminants exceeded the limits and then to put in small print at the end of the report that there were two which were elevated. They either are elevated or they are not elevated.

Response: We have corrected that statement on Page 4 and it now reads: "Samples were analyzed for nitrates, arsenic, cadmium, copper, lead, nickel, selenium, zinc, and mercury, and with the exception of a slightly elevated nitrate level found in one on-site monitoring well, no contaminants exceeded health guidelines or regulatory limits."

The sample results show that zinc was found in the groundwater, but not at elevated levels. EPA's maximum contaminant level (MCL) for zinc in drinking water and Food and Drug Administration permissible levels in bottled water are 5 ppm. The zinc concentration found in one monitoring well at LHR Farms ranged from 0.020 to 0.026 ppm.

9. Comment: *GPHD July 15, 2008 onsite visit.* Was this an announced visit? The report should clarify if this was an expected visit or scheduled visit. It makes a huge difference in what your experience will be.

Response: This visit was scheduled and noted in the text.

10. Comment: *The facility is not visible from any road.* This is false. It is visible from Joe Turner Rd., 129, and Hwy 254. The Industrial Park also can see the facility.

Response: This statement may be correct. However, during our site visit, we did not see the actual wastewater treatment facility from any of the public roads we drove on.

11. Comment: *Hay is sold for feed.* The records should be checked on this because the hay was too high in Nitrate to be sold for horse feed. This is documented. GDPH's statement is false and misleading.

Response: According to LHR Farms, if there is a high nitrate concentration in the hay, it is used as mulch for landscaping purposes.

12. Comment: *Odor from transfer station vs. needs assessment results.* A description of the odor that was observed at that point in time would be better for documentation. The residents can tell the difference between chicken, hen, and trash odors when compared to feces. The smell is equivalent to removing the top of a septic tank which has been closed for 10 years. It occurs 5 out of 7 days per week. The odor can be controlled, which is most likely why you did not experience it. Your report minimizes the odor which is experienced by the residents. You should include the results/breakdown of odors from the survey. Why would you omit that?

Response: As we stated in this document, noticeable odors were present as we approached the wastewater treatment operations facility, but the odor was not present beyond the immediate area (within 50 to 100 feet) surrounding the wastewater treatment operations. The odor around the facility was that of skatole, which is present at most wastewater treatment operations. The presence of hydrogen sulfide and other malodors such as mercaptan from anaerobic degradation of organic waste was not present. This is because the waste stream is constantly agitated and aerated in both the equalization basin and the aeration basin.

During our site visit, we also drove on public roads surrounding the farm, stopping at times to assess for any noticeable foul odors. Strong odors were present on Industrial Avenue directly in front of the White County Waste Transfer Station. The wind was blowing northwest that day and the odors coming from the transfer station were very strong. When standing at the farm's boundary fence directly south and east of the transfer station, the odors were not noticeable. We determined that the offensive odors were coming directly from the White County Waste Transfer Station that day; not LHR Farms. The overwhelming offensive odor likely came from the rancidity of fats and the putrefaction of proteins present in municipal solid waste.

We do not dispute the reports of specific odors from LHR Farms and, in fact, conducted the survey to help document those reports. We report our site visit experience, which is necessary to determine other industries and potential sources of odor, to assess whether residents are being exposed to odors from chemical exposures at levels that may be harmful. As stated in the public health assessment, over 90% of respondents reported smelling odors and being concerned about the health effects of odors. Evaluating symptoms and illnesses reported in the surveys showed no trends that might indicate exposure to chemicals that can cause long term health effects.

13. Comment: *Over 90% of respondents reported smelling odors.* The breakdown of where the residents felt the odors were coming from should have been included in the results. The survey allowed for comments on where they believed the odors were coming from and 90% said LHR. This is not clear with how you have worded the results.

Response: The public health assessment was not intended to evaluate odors from biological sources, but to assess whether exposure to hazardous chemicals originating from LHR Farms is occurring. A summary of survey results is provided in the public health assessment.

Although there was a line provided in the survey for comments about odors, 52 (44.4%) respondents filled in a description of odors. However, because of the qualitative nature of odor descriptions, it is not possible to quantify this information for this public health assessment.

14. Comment: *The purpose of the survey was not to establish an association or causal link between adverse health effects and environmental exposures.* What was the purpose then? Was this not the specific purpose?

Response: The Environmental Health Education Needs Assessment is a tool used to identify the health education needs of the local population and to develop education programs to meet those needs. The information gathered in the survey is not verifiable; symptoms and illnesses are self-reported, and these are not considered to be confirmed diagnoses. If trends in self reported symptoms and illnesses are identified by the survey, and environmental and health outcome data determine that toxic exposures may be occurring, recommendations may be made for epidemiologic actions, including a health study. A health study is a method to establish an association between health and environment. Odors from LHR Farms or other sources in the area are not caused by toxic, regulated chemical emissions.

Health education needs assessed in the survey include information about chemical sources and exposure pathways, the differences in health outcomes between chemical and biological

exposures, and the health effects of odors from biological sources. Because no exposure to chemicals is occurring, the matter is referred to LHR Farms and its regulators to control odors as required by law.

15. Comment: *Zinc was found in one groundwater sample*. The report says that no contamination was present.

Response: Zinc is a naturally occurring metal found in soil, groundwater, and surface water. The concentration reported is within normal background levels for this element. Please refer to the response to Comment 8.

16. Comment: *Monitoring wells are sampled monthly at LHR.* This is not accurate. LHR is supposed to monitor monthly, but have not been consistent and the proof is in the EPD records. Your statement is false.

Response: Monthly monitoring has been conducted by LHR Farms since the Consent Order was issued by GEPD. The Consent Order is designed to be used as an interim Land Application System (LAS) permit and to address land application without a permit. GEPD has documentation of monitoring well sampling results since the issuance of the Consent Order.

17. Comment: *Monitoring well had increased nitrate numerous times.* The report says that no contamination was present. Your report is misleading. EPD has documented increased Nitrate in the monitoring wells several times since the operation began.

Response: On page 10 of the PHA it states, "One monitoring well has repeatedly had a nitrate level slightly above the federal drinking water standard and lowest health based screening level. The highest nitrate concentration detected is 11.1 parts per million (ppm) and the regulatory standard (maximum contaminant level) and lowest health based screening level are both 10 ppm." It is important to note that it is only this one monitoring well that has repeatedly had nitrate levels about the MCL. The other monitoring wells and the on-site drinking water well have always met federal drinking water standards.

18. Comment: *Khuder, et al 2007 focuses on land application of septage and is not comparable to LHR operations.* LHR was land applying when the complaints started. Why would this research be not applicable when we were exposed to this method of application for more than ten years and as recent as December 2007? The sludge on the fields has ran into neighboring yards many times, is documented in the health department records and in EPD records, yet GDPH feels that it is not applicable. Why would it not be applicable? There research does not deliver favorable results, is this why it is not used? Why reference it in the first place if it's not applicable. IT IS APPLICABLE and the findings should be posted in your report. There is also research on spraying the effluent. Why would you not reference it? It is not favorable either, is that why?

Response: GDPH reviewed and referenced the Khuder, et. al. publication because this article was mentioned in a Letter to the Editor of White County News (August 2008) from a citizen of White County. The methods of biosolids application mentioned in the Khuder, et. al. study were

splash and cake application methods. Splash application involves the use of a vehicle where untreated septage is spread onto the surface of the land from the rear of a container with a fan or splash plate. Cake application involves the use of dewatered biosolids that have had polymers or lime added prior to a belt filter press or centrifuge processing to achieve a 15-30% solids content. This generally has the consistency of gelatinous mud, which is applied directly onto the surface of the land. None of these methods have ever been used at LHR Farms.

Prior to LHR Farms' current method of spray application, subsurface injection was used. Subsurface injection is generally used for agricultural fields that are under a no-till system.

As we stated on page 14, the Khuder, et. al. study examines the self-reported health effects of residents living near fields where wastewater is land applied for agricultural purposes. No environmental sampling data of any kind was used in this study. The study also compared their findings with those in the literature concerning wastewater workers: "Exposure characteristics of wastewater workers would presumably differ from those in residents living near farm fields where biosolids were applied. For example, potential exposure to airborne contaminants from wet sewage, more likely to occur among wastewater workers, is different from the potential exposure to airborne contaminants from dry biosolids, more likely to occur among residents living near farm fields where biosolids were applied, resulting in differing routes of exposure."

The authors of this study also cited another research paper where investigators evaluating livestock waste reported less than 0.01% of aerosolized microbes are viable, possibly indicating that exposure to aerosolized biosolids are unlikely to cause infections in humans.

19. Comment: *Less than 50 kids live within 1 mile of LHR.* Did you forget to mention the school which is within one mile. There are 600 kids there that spend eight hours per day breathing the air which may contain droplets of the effluent which is in excess of fecal coliform. I believe the report says the wind was blowing north that day…straight toward the school playground. Again, why was air testing not applicable?

Response: Census data only represents people living in an area. Mossy Creek Elementary school is located approximately one mile north of LHR Farms. The elementary school currently has 546 students enrolled. Because of the distance of the homes and school from the spray fields, which are centrally located on 90 acres of the more than 400 acres of the farm, it is unlikely that children will come into contact with spray field soil or the irrigation spray.

In addition, please see response to Comment 2.

20. Comment: *The small number of groundwater samples, and the detection limits used in groundwater analysis are higher than what would make for absolute certainty that the metal analyzed for are below all applicable CVs.* Well this is a confusing statement. I believe what you are saying is that the results are skewed. GDPH is not really sure that the metals are below the CVs…right? You seem pretty darn sure that there is NO PUBLIC HEALTH RISK, yet, in small, unbolded letters, you make this claim. Is this for liability? I would suggest removing one or the other.

Response: The statement was made because the lowest CV is for a child consuming water that may have arsenic or cadmium and is lower than the detection limit of the analytical method used in the laboratory analysis for these elements. We used a child's CV as the most conservative measure, which includes ample safety factors. Because CVs do not represent thresholds of toxicity, exposure to contaminant concentrations above CVs will not necessarily lead to adverse health effects. Detection limits on the analytical methods used meet federal drinking water requirements. It is important to note that no exposure to on-site groundwater at LHR Farms is occurring. The statement referred to in the comment has been omitted for clarity.

21. Comment: *I've had the opportunity to read the published document (ATSDR) regarding LHR Farms.* My husband and I want to "thank-you" for the in-depth study, the time put into the study, the resources used and overall, the study covered all points of concern that many of the neighbors (including us) may have had. Our property borders LHR Farms property and while we have been to the LHR site to see the operation first hand, we are pleased to have things confirmed.

Response: Thank you.

22. Comment: *The largest flaw in the report is evident on pages 14 and 15, "Child Health Considerations", where ATSDR assures the commitment to protect children from exposure to hazardous substances.* Your report is negligent, as it utilizes a Census Report from 2000 to determine the risk for children. Furthermore, it fails to even consider the new Mossy Creek Elementary School located less than one mile from this nuisance operation. As of today, there are currently 580 students, along with 80 teachers and administrative staff at this school! This is by far a totally different scenario created by the white washed report prepared by the Georgia Department of Human Resources….

Response: When environmental sampling was conducted at LHR Farms, and at the time of the GDPH site visit, Mossy Creek Elementary School was still under construction. Please see responses to Comments 1, 2, 3, 6, 18, and 19.

Since this original publication, the White County School System hired an environmental consultant to collect and analyze air samples from Mossy Creek Elementary School for numerous species of fungi and bacteria. In January 2009, Air samples were collected both indoors and outdoors. The analysis results show that all samples were normal for fungi and bacteria levels commonly found inside building environments. Indoor and outdoor air sampling was conducted again in September 2009 for Mossy Creek Elementary, Yonah Elementary and White Middle Schools. The results also show no elevated levels of fungi or bacteria at any of the schools [Pioneer Regional Educational Service Agency, Letters to White County Schools, 1/5/09 and 9/30/09].

23. Comment: *As part of our company's own investigation, we have hired and consulted with microbiologists concerning toxics found in outside air samples from our property and the property of others around LHR Farms.* We found evidence of fungi and mold spores, along with carcinogenic chemical compounds in the air. Both PhD microbiologists we consulted expressed

concerns about toxic spores or carcinogenic compounds reaching the school. How can you issue a report, basically giving an operation such as LHR Farms a clean bill of health, when you did not even address this new school and the number of children attending the school?

Response: GDPH reviewed the results of the air sampling data. As part of the analysis, volatile organic compounds (VOCs) were measured and related to the fungal species that produce these VOCs. Some of the VOCs measured include ethanol, isopropyl alcohol, acetone, 2-butanone, ethyl acetate, iso-octane, heptane, toluene and others. In all cases, the air concentrations, as measured in ug/m3 were anywhere from 5 to 500 times below air CVs. For more information about review of the air sampling data, please refer to Appendix C.

For discussion about the school, please see responses to Comments 1, 2, 3, 6, 18, and 19, and 22.

24. Comment: *While there are no standards for outside air, both of our consultants have stated that it could take years to see the long term health effects of these biological agents and compounds in children.* I challenge you to re-evaluate this report for no other reason than this new school, which was constructed without regard to the presence of biological and chemical agents found in the air. Over 434 schools in 34 states have found health risks for children attending schools near industry as a result of exposure to airborne toxics (USA Today, December 8, 2008). Do you think Mossy Creek Elementary is immune from airborne contaminants coming off LHR Farms' operation?

Response: Please see responses to Comments 1, 2, 3, 6, 18, 19, 22 and 23.

25. Comment: *Since this report does not address the children at Mossy Creek Elementary School, it is therefore inadequate and deficient in its purpose.*

Response: Please see responses to Comments1, 2, 3, 6, 18, 19, 22 and 23.

26. Comment: *Additionally, the report states that "LHR Farms is not suspected of releasing emissions into the air that could cause or contribute to chronic health problems"*. How can such a ridiculous statement be made with no supporting emissions/air testing such as those done by our company with a third party.

Response: Please see responses to Comments 1, 2, 3, and 23.

27. Comment: *No mention of dry cleaning compounds?* No mention of GEPD lawsuit with LHR Farms? No mention of stream contamination found by others?

Response: This public health assessment evaluates all applicable environmental sampling data available at the time this document was prepared. To answer questions about a lawsuit involving another state agency, you need to contact that agency.

28. Comment: *I am one of 532 people living in the affected area and have silently watched and waited for this odor and health problem to be corrected.* Are you ignoring your own data

concerning the higher cancer rate and the 50/51% who have other problems such as headaches and eye irritations?

Response: In the Environmental Health Education Needs Assessment survey, the question is posed, "Have you experienced any symptoms in the last month?" Given multiple choices, 39% of respondents reported having experienced watery eyes, and 44% reported headaches in the last month. These percentages are not considered elevated for common health complaints such as headaches and eye irritation.

Analysis of the distribution of cancer cases in the 30528 zip code show elevated rates of some types of cancers; However,

- No exposure to any carcinogenic chemicals is expected to have occurred, or to be occurring, as a result of LHR Farms operations.
- None of the chemicals known to contribute to prostrate, colorectal; breast, skin, or bladder cancer are suspected to be present at LHR Farms.
- Given the short period of time for any potential exposures to biological contamination and that no exposure to chemicals has occurred, reported cancer cases are not related to LHR Farms operations.

GDPH concludes that LHR Farms is not contributing to elevated rates of bladder cancer, or other types of cancer, in zip code 30528. The GCCR will continue to monitor bladder and other cancer rates in White County.

29. Comment: *Are you not concerned that 33% of the wells would not pass the safe drinking water test?*

Response: Although there is no single "safe drinking water test," there are several standards for water quality, such as the presence/absence of coliform bacteria as well as MCLs listed by EPA as National Primary Drinking Water Standards. These standards are enforceable for public water systems under the Safe Drinking Water Act; not in private wells. Another important distinction is between monitoring wells and drinking water wells. Monitoring wells are not used for human consumption, but provide sampling opportunities to assess groundwater quality. The public health assessment states "…both monitoring wells and the drinking well water are sampled monthly at LHR Farms to assess the water quality. Drinking water sample results continue to meet federal drinking water standards… Monitoring well number one has consistently had a nitrate level slightly above the MCL, and is the only component that does not meet federal drinking water standards for nitrate, which is 10 parts per million." The monitoring well is not used for human consumption and no other wells show elevated nitrates.

For further information regarding MCLs and groundwater quality visit *www.epa.gov/safewater*. In Georgia, the Water Well Standards Act (1985) requires wells to be constructed by a licensed well driller. It is recommended that private wells be tested annually for coliform, and have a chemical screening.

30. Comment: *How can it be that the Georgia Department of Health believes the odor is from anything but septic waste?*

Response: Please see response to Comment 12.

31. Comment: *How can it be that our county officials do not have the authority to control this?*

Response: Georgia does not have any nuisance odor regulations.

32. Comment: *Between the request to look at LHR Farms and the time GDPH got involved, several months had passed.* Why wasn't it looked at in a timelier manner?

Response: A petition request to conduct a public health assessment for LHR Farms was received by ATSDR in January 2008. In early June 2008, ATSDR made a recommendation not to accept this petition because of the lack of environmental data supporting the claims of the petitioner. However, environmental sampling results from March and April sampling events at LHR Farms were available in late June 2008. GDPH then made the decision to conduct a public health assessment based on this sampling data. A site inspection of LHR Farms was conducted in July 2008 and a public health assessment was published in December 2008.

33. Comment: *ATSDR/GDPH does not have the ability to collect samples.* They rely on data from outside agencies and based their conclusions on data furnished to them that only contained chemical data, but no biological data.

Response: ATSDR's mission is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and disease related exposures to toxic substances. Formally organized in 1985, ATSDR was created by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), more commonly known as the Superfund law. Superfund is responsible for finding and cleaning up the most dangerous hazardous waste sites in the country.

ATSDR is directed by congressional mandate to perform specific functions concerning the effect on public health of hazardous chemicals in the environment. These functions include assessing exposures to hazardous substances at hazardous waste sites and releases, and taking actions to protect public health, conducting health studies, information development and dissemination, and education and training. Environmental sampling is designed and conducted by qualified individuals (e.g., environmental engineers) with specific training in sampling protocol and approved methodology.

34. Comment: *Fifty percent of the survey respondents reported experiencing 'health problems' yet there is no medical documentation of these problems.*

Response: A majority of the respondents (76%) reported two or more common health complaints in the past two years. Because the adverse health conditions in the Needs Assessment survey are self-reported, they are not considered to be confirmed diagnoses. The information collected in the survey is useful to determine the health education needs of the public and to

guide health education programs and recommendations for further public health actions, if appropriate.

35. Comment: *Why hasn't the White County Health Department looked into and corrected the odor problems at the White County Transfer Station or is it the responsibility of the North District Health Department?* Don't these two agencies and others interact to insure our health?

Response: Solid Waste Transfer Stations are under the purview of the Solid Waste Management Program of the Georgia Environmental Protection Division. Georgia does not have any nuisance odor regulations. In some cities and counties, local authorities have imposed zoning ordinances to reduce odors. Contact your local elected officials for more information.

36. Comment: *The potential for air pollution and potential health problems from hydrogen peroxide injected aerosol wastewater is probably less than health problems with non-peroxide treated wastewater; however, the jury is still out and I am not aware of pending research that addresses this issue.*

Response: We are also unaware of such research.

37. Comment: *On page 4, it is reported that LHR Farms accepts septic tank wastewater.* On page 7, however, the assessment states that LHR Farms does not accept human waste. These two statements are in conflict with each other, which raises significant questions about the credibility of the assessment.

Response: The caption on page 7 states that human waste is not being spread at LHR Farms. It does not state that LHR Farms does not accept human waste.

38. Comment: *It does not appear that any air quality testing was performed and reported, which is a major flaw in the assessment, because, as reported on page 13, odors originating from LHR Farms is one of the main concerns of area residents.* Furthermore, the conclusion that any odor problems are sourced at the White County Transfer Station and not LHR Farms is unfounded because GDPH did not conduct any sampling or testing at either location.

Response: Please see responses to Comments 1, 2, 3, 12, 22 and 23.

39. Comment: *Page 10 reveals that two samples taken from wells showed elevated levels of zinc and nitrates, however, the assessment does not recommend further testing or additional monitoring or analysis to uncover the source of these exceeding levels of metals and nutrients.* Furthermore, the conclusion statement states that, "the small number of groundwater samples, and the detection limits used in groundwater analysis are higher than what would make for absolute certainty that the metals analyzed for are below all applicable CVs."

Response: Please see responses to Comments 8, 15, 17, and 20.

40. Comment: *Page 13 reveals an alarming rate of cancer incidences among men and women living in close proximity to LHR Farms, however, the assessment offers little analysis on the*

issue. Instead, the assessment abandons the issue by claiming that it is too difficult to pinpoint a cause. Curiously, the assessment then makes a baseless claim that any cancers in the area of question are a result of habits and exposures to carcinogens from "many years ago, long before LHR Farms began operation." Meanwhile, we know from the assessment that LHR Farms has been in operation for over a decade.

Response: The incidence rates you are referring to are not necessarily for residents living in close proximity to LHR Farms, but for zip code area, which is the smallest geographic unit for which cancer data are available. Prostate and colorectal cancers are the most common types of cancers afflicting men throughout the United States. Breast cancer is the most common type of cancer afflicting women throughout the United States. Melanoma can be triggered from over exposure to ultraviolet radiation from the sun.

For those instances in which cancer is due to a contact with a cancer-causing agent, the disease does not develop immediately. Instead, there is a 10 to 30 years latency period between exposure to a carcinogen (a cancer causing agent) and medical diagnosis of cancer. LHR Farms began operations in 1996, and our cancer data review was conducted for 2001-2005, five to ten years after operations started. Given the short period of time for any potential exposures to biological contamination and that no exposure to chemicals has occurred, reported cancer cases are not related to LHR Farms operations.

41. Comment: *The assessment fails to report LHR Farms' record of regulatory violations, including those related to illegal discharges into nearby waterways.*

Response: GDPH is not a regulatory agency. Please contact GEPD with your concerns about regulatory violations.

42. Comment: *The assessment is largely based on information collected at a site visit to LHR Farms on July 15, 2008.* Based on numerous complaints filed against LHR Farms and the complexity of the possible sources of irritants and pollutants, additional unannounced site inspections are warranted.

Response: A site visit is one of the ways we gather information for the public health assessment process, but the majority of the information comes from the scientific analysis of environmental sampling data. GPPH does not have the authority to conduct unannounced inspections because we are not a regulatory agency. However, according to the Georgia Environmental Protection Division, unannounced inspections of wastewater treatment facilities typically occur once per year. Given that this facility was inspected three times during a 12 month period, this was more numerous than usual.

43. Comment: *The use of groundwater for potable purposes would not be advised.*

Response: This comment is directed toward monitoring well number one, which has consistently had a nitrate level above the MCL, and is the only component that does not meet the federal drinking water standard if 10 parts per million. It is important to note that it is only one monitoring well with nitrate levels about the MCL. The level is approximately 11 ppm. The

other monitoring wells and the on-site drinking water well have always met federal drinking water standards.

The distinction between monitoring wells and drinking water wells is that monitoring wells are not used for human consumption, but provide sampling opportunities to ensure groundwater quality