

Health Consultation

Address Health-Related Concerns

WACO LANDFILL
(a/k/a WASHINGTON COUNTY LANDFILL)

RICHWOODS, WASHINGTON COUNTY, MISSOURI

MAY 19, 2003

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

Health Consultation: A Note of Explanation

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

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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(a/k/a WASHINGTON COUNTY LANDFILL)

RICHWOODS, WASHINGTON COUNTY, MISSOURI

Prepared by:

Missouri Department of Health & Senior Services
Section for Environmental Public Health
Under a cooperative agreement with the
Agency for Toxic Substances and Disease Registry

Statement of Issues and Background

Statement of Issues

The Missouri Department of Health and Senior Services (DHSS), under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), has prepared this Health Consultation to address health-related concerns in regards to the construction permit application of the Washington County Landfill (henceforth referred to as Waco). A coalition of concerned citizens who have named themselves Safe Handling of Waste – Managed Environmentally (SHOW-ME) have provided a written petition to ATSDR requesting a Public Health Assessment.

Since this landfill has not yet begun operation and no release of contamination has occurred, a Public Health Assessment of this site was not conducted. However, a limited review of the potential public health concerns regarding the site is addressed in this Health Consultation. In this light, this limited consultation will not include a traditional conclusion statement predicting a health hazard. While the focus of this health consultation is on the health implications of the future landfill, DHSS and ATSDR are aware that there are other concerns about the landfill permitting process. A discussion of these concerns/questions has been included in an appendix to this document.

DHSS received the request for this Health Consultation in late August 2002. In order to prepare a response to the request, DHSS has performed five site visits to Waco, reviewed records and interviewed numerous persons.

Background

The Waco Development Group initially consisted of several business partners having an interest in developing property for the construction of a permitted landfill. The Group submitted the landfill application to the Missouri Department of Natural Resources (MDNR) in 1991. MDNR denied the application in 1994 because the geology was not properly characterized, and because MDNR wanted additional groundwater characterization wells installed at the landfill (telephone conversations with Russell Seedyk, Permit Unit Chief for the MDNR Solid Waste Management Program, September 25, 2002). In an agreement made between MDNR and the Waco Development Group, the company contracted geological consultants to perform additional geological work and resubmitted the application in May 2001. Thirty groundwater characterization wells were added to gain a better understanding of the groundwater underlying the entire site. After extensive review and following the citizen comment periods required by law, MDNR issued a construction permit and a stormwater discharge permit (State Operating Permit) in September 2002. Since the beginning of the DHSS investigation, the company has changed ownership. It is now owned by a company from Texas called IESI. This company specializes in solid waste management. The company is presently preparing the site for development.

The proposed landfill is to be located between the towns of Richwoods in Washington County and Fletcher in Jefferson County, Missouri. The landfill will be immediately north of Highway H, 0.5 mile from the Jefferson County line and 1.5 mile south of the Franklin County line (refer to Figure 1, Site Map). The site is bisected by a permanent stream known as Turkey Creek. Joined by several smaller tributaries, Turkey Creek flows into Ditch Creek 3,800 feet north of the site, and eventually all tributaries flow into the Big River four miles from the site.

The surrounding area is very rural and consists of typical Ozark forest cropland with rounded ridge crests and convex slopes. There are only two residences within a 1000-foot radius of the site. Except for an old, abandoned school building, there are no structures on site. In the past, there has been barite mining throughout the surrounding area, but these mines have been closed.

The site encompasses 273 acres, of which 171 acres are proposed for the disposal area. Each side of Turkey Creek will have an independent disposal area connected by a permanent stream crossing of double box culverts. Each disposal area will have a settling pond with a permitted outfall. The landfill will not accept hazardous waste. Acceptable wastes will include municipal, demolition and construction waste, wood waste, soil, rock and concrete, wastewater treatment sludges, industrial process wastes and sludges, incinerator and air pollution control residuals and soil contaminated with petroleum products. The landfill has estimated their waste collection rate at 1,500 tons per day, which gives an estimated life expectancy for the landfill of 28 years (1).

Detailed within the permit application are many protective measures involving both permitting actions as well as construction designs. These measures will aid in preventing potential sources of contamination to the area. The major construction design measures that deserve mention are:

- The leachate material generated by the landfill will not be treated on site. There will be a network of collection pipes and structures to gather the leachate for transport off-site for treatment at a separate wastewater treatment facility.
- The cells will be built predominately over solid bedrock using a minimum of 2 ft. thick compacted soil liner and state of the art 60-mil textured high density polyethylene geomembrane liner. This will provide a barrier against leachate and gas migration.
- A total of 46 gas extraction wells are projected for the life of the project. These wells help to control gas migration by collecting gases and transferring them to destruction flares. This will be protective of gas migration into the soil and of air quality.
- To monitor groundwater, there will be a total of two upgradient wells and 10 downgradient wells. These wells are to be installed at a minimum of one year prior to initiating refuse placement. Sampling is to take place during that time on a quarterly basis for eight quarters as the baseline is established. Thereafter, sampling will take place on a semi-annual (twice per year) basis. These analyses will include groundwater elevations that will indicate if there are changes in

groundwater flow. As an additional protective measure, the state of Missouri has in place a very extensive set of criteria relating to groundwater. These criteria are programmed into their computer system, which will flag any violations immediately.

The MDNR has met with citizens at several public meetings to address questions and concerns about the site and about the permitting process. As stated previously, this health consultation focuses only on the potential health implications of the future landfill. ATSDR and DHSS are aware that many other concerns revolve around geology issues and the previous denial of the permit as well as safety related issues. DHSS has worked closely with MDNR to provide answers to the community's "most frequently asked questions" concerning the permitting process and events that occurred during that process. Responses to these concerns have been carefully evaluated with the help of the MDNR and by a thorough review of the Waco application. Those questions and responses are included as an appendix to this document.

The citizens have expressed concerns about the landfill adding to the health effects of five waste sites located in Washington County. A preliminary review of these five sites revealed that they did not pose any significant health effects. However, these sites will be evaluated separately in the future.

Discussion

Geologic Concerns and History

There is concern by the community that geological faults in the vicinity of the landfill site and "karst topography" may increase the chances that contamination would be released from the landfill and impact area groundwater.

Because DHSS does not have a professional registered geologist on staff to address geological issues, Mr. Peter Price was contacted on December 12, 2002. Mr. Price, a Registered Geologist, was one of the leading reviewers of the Waco application. He is employed by the Geological Survey and Resource Assessment Division (GSRAD) which is a division of the MDNR in charge of overseeing geological issues and dam safety.

Additional geological information was obtained by reviewing the findings of the EPA Region 7 senior geologist who was involved in the EPA Environmental Justice investigation requested by the SHOW-ME group. This type of investigation is conducted to address whether or not proposed operations would cause disproportionately high and adverse environmental and health effects in a community (2).

As previously stated, the application was denied in 1994 because the hydrology and geology were not properly characterized. MDNR wanted additional characterization wells and more borings and field investigations. The original application contained a report authored by Dr. C.W. Clendenin that broadly characterized the area geologically.

This report was referred to as the Clendenin Report. The original application also contained a report prepared in 1983 by Rolla Geotechnical Consultants, Inc. for the De Soto Mining Company characterizing the barite tailings ponds in nearby areas. This report corroborated the age of the rock in the area with the Clendenin Report.

These reports continue to be included in Appendix C of the current application. In addition, a narrative in Chapter 2 refers the reviewer to a new report titled “Detailed Geologic and Hydrogeologic Investigation Report (3).” This report, dated May 1999, was submitted independently of the rest of the application in accordance with state regulations, which changed January 1, 1996. Prior to 1996, many landfill applications were being denied based on geological issues rather than engineering issues. In many cases, the engineering aspect of the applications was adequate, but the geology was not adequate for a landfill operation. Therefore, to streamline the process, MDNR separated the process so the geological review could take place before the engineering review. The MDNR began to call this phase of the application process the Detailed Site Investigation (telephone conversation with Peter Price, December 12, 2002).

In order to comply with the change in regulations, Waco submitted the report “Detailed Geologic and Hydrogeologic Investigation Report.” This report is approximately 1000 pages in length and contains additional field data such as boring logs and piezometer and well data. The situation with the Waco application was unique because it covered a long time span during which changes in regulations took place.

Faults in the vicinity of the landfill

In chapter 2 of the permit application, it states that Missouri law bans new landfills from construction in locations within 200 feet of faults that have experienced displacement during the Holocene Era, which began approximately 10,000 years ago and extends to the present (4).

The Clendenin Report identifies major faulting beginning 3,800 feet north of the site. This is known as the Ditch Creek fault segment. These are considered to be principal fault strands. Three minor slip planes on site were reported by Clendenin, but only two cross Turkey Creek (See Figure 2). These faults are filled with mineral deposits. In addition, Clendenin noted that the last active faulting on the site occurred over 2 million years ago. Therefore, the condition of the law is satisfied because the faulting era is much older than the Holocene era.

However, the GSRAD geologists used additional rationale in approving the application. Those involve seismic activity and water flow. The Clendenin Report states that there are no seismic epicenters on the Ditch Creek Fault segment. The closest epicenter is approximately 14 miles south-southeast of the site. The history of seismic activity in the area indicates that earthquake intensity may only be in the II or III category range. Earthquake activity of this magnitude may rattle windows or break dishes. In addition, as stated, Turkey Creek does display minor faulting evidence. However, because it is a permanent stream flowing year-round and because it is considered to be a gaining stream, the geologists concluded that there are no open fault planes, joints or sink holes in the stream course (4) that would cause downward contaminant migration into groundwater.

Because of the citizens' concerns about the risk to groundwater posed by surface water entering Turkey Creek, DHSS explored the area approximately 250 to 500 feet downstream from Highway H during the first site visit. Figure 3 shows photographs of Turkey Creek approximately 250 and 500 feet from Highway H. It was noted that Turkey Creek was flowing continuously. The stream was approximately 8 to 10 feet wide and 6 to 10 inches deep in the areas explored. The stream bed channel consisted of smooth, flat-surfaced rocks that formed small ledges thus creating riffles in the stream flow. Our observations were consistent with the geological reports and GSRAD's interpretations of those reports, which indicated that Turkey Creek is a gaining stream.

Karst Topography

The SHOW-ME group and various individuals expressed concern about the area's karst topography, which may have an effect on the area's groundwater due to the high permeability of bedrock in karst areas. The concern revolves around a cave existing on private property within a five-mile radius from the proposed landfill.

This matter was addressed in both the Clendenin Report and the "Detailed Geologic and Hydrogeologic Investigation Report." Karst topography refers to areas that have caves, sinkholes, disappearing creeks, etc. The two predominant rock types in this region of the country lend themselves well to karst formations are limestone and dolomite (5). The cave and sinkhole formations occur from the action of acidic water on the carbonate bedrock.

Issues related to karsting are specifically addressed in the EPA's Environmental Justice Complaint investigation. In this report, the geologist explains that the karst features found on the private property occur within the Gasconade formation. This formation is much younger than the Potosi and Derby Doe-Run formations on which the proposed landfill would be built. This younger formation, which has different weathering characteristics, is eroded and absent from the area of the proposed landfill. Figure 2 shows these different formations which occur at different depths and which were formed in different time periods.

The geologists from MDNR and EPA observed no karst features at the site and have concluded that the closest karst features to the site have no bearing on the landfill operations or the potential for groundwater to be affected at the site. The integrity of the landfill is not expected to be compromised. Furthermore, groundwater sampling will ensure that groundwater is not impacted.

Private Drinking Water Wells

The SHOW-ME group and several others have expressed concerns that the private wells of nearby schools may become contaminated by the landfill.

The closest school to the site is Richwoods Elementary, approximately four miles west of the site. The second closest school system is Grandview, approximately 8 miles north of the site. Both are on private well water. The De Soto school district is approximately 13 miles east of the site. The De Soto school system is on public water (telephone conversations with the three school systems, either maintenance personnel or school superintendents, December 2, 2002). There are several schools south of the landfill between Old Mines and Potosi, but these schools fall within a 12 to 18 mile radius from the site.

A protective measure for schools using well water is that these schools are considered a non-community public water supply and are therefore required to submit routine water samples to the MDNR. This monitoring requirement would quickly detect problems or irregularities in the schools' water supply.

Further protection of groundwater is addressed in the application in Chapter 3, sections 3.2 and 3.3, in discussions regarding the soils and landfill subbase. These sections point out that the soils that will be used in construction meet the requirements of Missouri law. These soils are very high in clay content and in limiting liquid movement. This means that these soils will help to protect the sublayers of soil from contaminant migration. In addition, approximately 50% of the landfill construction will be on solid bedrock. This will also be protective of groundwater infiltration. One additional factor to consider is that groundwater flow on both sides of Turkey Creek tends to flow in the direction of the stream and away from the direction of Richwoods Elementary and the De Soto schools.

Due to the geological and construction factors, including a composite liner system, as well as the distance from these schools, it is unlikely that water supplies for the schools would be affected.

Flooding Concerns

Various individuals are concerned about barite mine tailings ponds located upstream of the site at the headwaters of Turkey Creek. The concern is that these ponds may breach during a heavy rain event and wash over the landfill area causing contaminants to migrate into the ground and surface water.

This situation is specifically addressed in the application in Appendix J, Attachment No.8. This entire section of the application is dedicated to calculating the depth of Turkey Creek in the event that a 100-year storm would take place. The method used by the design engineers to do this involved taking measurements of Turkey Creek at nine different stations throughout the length of the site. After running numbers through a

computer model, a theoretical depth was calculated that takes into account numerous factors and realistically predicts the maximum depth that Turkey Creek could experience in a catastrophic rain event (the 100-Years flood). The following table summarizes the elevations of these stations. All figures are in feet.

	<u>Creek Bed El.</u>	<u>Calculated Depth El.</u>	<u>Rise of Creek</u>
Upstream	695	700	5
Downstream	657	662	5
Average	675	681	6

Figure 4 shows a cross section of the landfill. A cross section is a side view of the cells and the creek as if the fill were being viewed from across the hillside. The figure shows the elevation at which the fill will be constructed. The lowest point of the fill will be at the approximate elevation of 745 feet. If the maximum rise of the creek elevation is 700 feet, there is a safety margin of 45 feet before the creek would inundate the landfill.

Viewing the landfill from above (a bird's eye view), the maximum width of the 100-year floodplain is calculated to be 237.5 feet. The closest location of a cell to this floodplain is 175 feet. However, the toe of the sediment pond closest to this floodplain is 62.5 feet from the floodplain. Figure 5 depicts this.

In addition, the application describes the barite tailings ponds at the headwaters of Turkey Creek upstream of the landfill. The application states that the dams of these ponds do not currently retain surface water. This has been corroborated by several citizens during the group meetings with the MDNR (telephone conversation with Russell Seedyk, October 10, 2002). The application points out that historically, water was pumped into the ponds from nearby wells to maintain an adequate water level for the tailings to settle. This was necessary because the natural drainage basin did not provide enough moisture. These ponds are presently dry and support actively growing vegetation (6). Consequently, neither the applicant nor the MDNR considered structural failure of the dams to be a threat and the 100-year floodplain calculations did not take this into account.

In attempting to investigate this concern, DHSS visited the adjacent property in the two areas around the tailings ponds shown in Figure 1, Site Map. The ponds directly south of the landfill (designated as Area 1 on the Site Map) appeared to have been constructed by forming berms from mining spoil piles. DHSS thoroughly explored these ponds and found no signs of dams. From standing in the middle of these old ponds, evidence was found that water has flowed in the area at an indeterminate time, but there was no standing water anywhere. These ponds were completely vegetated.

Exploring Area 2 at the headwaters of Turkey Creek southwest of the landfill as shown on Figure 1, the Site Map, DHSS found remnants of many small ponds and one large mound of gravel and mine waste which DHSS later learned was part of the dam to the tailings pond for the De Soto Mining Company, Inc. mine. (telephone conversation with Jack Agers, November 21, 2002). Figure 6 shows photographs of Area 2.

As DHSS explored Area 2, a large waterbody that could be seen through the tree cover was discovered. DHSS learned later that a private property owner had dammed Turkey Creek downstream of the De Soto Mining Company, Inc. tailings ponds. Figure 7 depicts the size of this waterbody. Dams greater than 35 feet in height fall under the Dam Control Guidelines of the MDNR. Because none of the officials in charge of dam safety, such as the GSRAD or the county engineer, had any knowledge of this dam, GSRAD was asked to investigate the dam for safety purposes.

The dam was found to be 45 feet in height. The 22-acre lake was created in 1999 after the original Waco application had been submitted. Because it falls under dam control, the engineers asked the owner to have the dam certified by having stability analyses done on the dam. This is to be accomplished within six months. The dam is approximately 3,000 feet from Highway H and would probably pose a short term, severe safety hazard to motorists in the event of a large breach. The MDNR Solid Waste Management Program was notified of these findings. No modifications to the Waco permit application will be necessary, as the 100-year floodplain calculations will remain the same. In fact, providing that the dam is properly engineered and constructed, the dam will serve the purpose of retaining water thus keeping the downstream water level of Turkey Creek lower. It will actually help to safeguard against adverse effects of flooding near the landfill.

Figure 8 shows an aerial view of the entire area near the 22-acre lake and includes the mine tailings ponds. As can be seen, the tailings ponds do not have large quantities of water in them. Their light blue color indicates that they are shallow ponds. During the site visit with the dam safety personnel, it was learned that the GSRAD engineers have been actively inspecting the mine tailings ponds on a regular basis.

Stormwater and Sediment Control

There is some concern that the plan for storm water and sediment control is not adequate to prevent contamination from being released from the site. One individual wrote a letter to a federal dignitary expressing concern that the way the MDNR would have Waco protect groundwater is “to dig a ditch around the dump.” DHSS believes this statement expresses a concern about stormwater management and sediment control issues.

This concern relates more to surface water than to groundwater. Pages 20 through 25 of Chapter 3 in the application detail the calculations and methods employed to control surface water runoff. Basically, the area is subdivided into smaller sections for individual runoff control practices. Calculations and designs are tailored according to the type of land use that will take place in those areas and according to the size of the area. Sizing is for peak discharge from a 25-year rain event.

Precipitation that falls within the site boundaries but does not contact waste will be controlled by the surface water management system which includes diversion ditches, culverts and sedimentation basins sized appropriately for the area and for 25-year rain events. Areas of this type may have roads or include the office and scale area. If

precipitation falls in disturbed areas, it will be directed to one of two sedimentation basins or to temporary sediment control structures prior to discharging to Turkey Creek. Areas of this type may include topsoil borrow areas used for landfill cover. Any precipitation or surface water runoff that contacts waste is to be directed to the leachate management system to be transported off-site for wastewater treatment. Attachments in the application show the detailed calculations, and Plan Sheets 26, 32 and 33 show drawings of the water management structures.

The engineering and geological techniques used by MDNR to calculate and justify the landfill design safety are standard and acceptable methods. DHSS believes that the methods employed by MDNR in conducting the Waco permit review are protective of health and the environment.

Surface water monitoring/sampling

A citizen expressed a concern about the landfill property owners being the only monitors of the water runoff. The citizen states that the water sampling will be done only once per year and seems to feel this may not be often enough. The citizen also seems to feel that other citizens should be allowed to sample surface water from the site.

These questions all relate to surface water monitoring and the National Pollution Discharge Elimination System (NPDES). Information on this subject can be found in Chapter 3, page 25 and Chapter 6, page 16 of the permit application. The actual NPDES application is in Appendix E.

To gain information about the NPDES system, DHSS conferred with Mr. Philip Schroeder, MDNR Water Pollution Control Program, Permit Section Chief, on December 3, 2002.

As stated, a stormwater (State Operating Permit) permit has been issued. The landfill must also have a Storm Water Pollution Prevention Plan (SWPPP) on hand at the site. DHSS has reviewed this plan, which contains a copy of the actual State Operating Permit. This permit shows the parameters for which Waco will have to sample. There are several parameters (mostly metals) that will only need yearly sampling. However, there are other parameters such as pH, iron, total dissolved and suspended solids, settleable solids, chemical and biochemical oxygen demand and conductivity that will have reports submitted quarterly. The permit sets limits on many of these parameters and specifies times and conditions under which sampling is to take place.

It is true that Waco as well as other facilities throughout the state of Missouri do their own sampling and submit the laboratory results to the MDNR. The samples must be analyzed by a State certified laboratory. The sample data are compiled and monitored by the MDNR computer system and kept on file. This computerized system maintains the integrity of the water pollution control program because irregularities will cause the computer program to flag the data. MDNR can then follow up on the irregularities by obtaining its own water sample. All water data kept by the MDNR is public information and may be reviewed by citizens by scheduling a review time with the regional MDNR

office. In addition, the MDNR will also collect samples in response to citizen complaints. Periodically, the MDNR will obtain its own water samples for quality control purposes when deemed necessary.

Citizens may obtain their own samples. It is very important, however, that citizens obtain access permission from private property owners. It would also be the citizens' responsibility to pay the laboratory fees for analyses. There may be additional regulatory sampling requirements and protocols that citizens would need to learn about from the regional office or from the Solid Waste Management Program (SWMP) prior to sampling. Samples taken without following proper protocol or analysis by uncertified labs may not be admissible. Citizens may contact the SWMP in Jefferson City at (573) 751-5401 for more information about sampling. Citizen samples can be used by the MDNR for follow-up purposes to give the MDNR clues to do their own sampling. In addition, citizens may wish to evaluate Turkey Creek and surrounding streams by participating in the MDNR's Stream Team program. Contact information for this program is on the MDNR web site (7).

Protective Permitting Measures at the Site:

The MDNR has done a thorough review of all the aspects required to permit a landfill. The site ownership has changed hands since the construction permit was issued. The original company was primarily interested in obtaining a landfill permit to sell the property later. The new company, IESI, specializes in waste disposal services. If this company wants to continue to expand, it must be able to acquire new operating permits. In order to do this, the company must be in good operating standing including a minimal violation history. These types of events are factored into decisions involving future permitting actions. An extensive history of violations would negatively impact the company's ability to obtain future permits.

It is a state requirement to monitor the violation history of a company. If a company has a sufficient number of significant environmental violations at any site it owns anywhere within the United States, it cannot obtain further permits in Missouri (telephone conversation with Russell Seedyk, December 10, 2002). A review of the company's violation history during the ownership transfer process revealed that IESI has only had violations that were administrative in nature. The review did not find any countable environmental violations (8). Therefore, again, if the company wants to remain in business, it is in their best interest to perform well.

In addition, the application includes a section of bond calculations. Bonds are used as insurance for site closure and maintenance. The company must pay the State money prior to constructing new parts of a facility. The State holds this money until the facility has completed operations and has properly closed the site. The State returns part of the money if the site is properly closed. Otherwise, the company forfeits that money which is then applied by the State for proper closure efforts. Bond amounts include inflation and future costs. Therefore, bonds can represent very large sums of money and can

provide additional incentive for a company to perform well. Additional monies are held throughout the post closure period.

The MDNR will have field inspectors from Jefferson City, Rolla and the Southeastern Regional office inspecting the site. They will take measurements of constructed structures to ensure that their dimensions adhere to the plans set forth in the application. The inspectors will make routine and spot visits to the site. They will review water monitoring data regularly. If a problem becomes a violation and the violation is severe enough, inspectors can cause operations to cease temporarily. Inspectors can even have the site shut down completely. Post closure monitoring will extend to thirty years and beyond if necessary.

Conclusion

Based on review of all the preceding information, DHSS believes that as long as the facility is constructed, operated and maintained as described, this facility will not pose a threat to public health.

Public Health Action Plan

MDNR plans to monitor the construction and operation of the landfill to ensure compliance with the State regulations and with the conditions set forth in the permit application.

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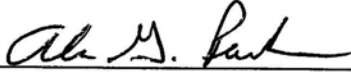
Attachments: Figure 1 - Site Map
Figure 2 - Area Geology Map
Figure 3 – DHSS Site Pictures of Turkey Creek
Figure 4 – Landfill Cross Section
Figure 5 – Top View of Landfill
Figure 6 – DHSS Site Pictures of the Scenery at the Head of Turkey Creek
Figure 7 – DHSS Site Pictures of the 22-acre Lake
Figure 8 – DHSS Site Pictures of the 22-acre Lake
Appendix – Additional Community Concerns Regarding the Site

References

1. Hurst-Rosche Engineers, Inc. Waco landfill application. Volume I of III, chapter 1, p. 1-3.
2. U.S Environmental Protection Agency, Region 7. Environmental justice report regarding proposed Washington County landfill. P.1.
3. Hurst-Rosche Engineers, Inc. Waco landfill application. Volume I of III, chapter 2, p. 2-3.
4. Hurst-Rosche Engineers, Inc. Waco landfill application. Volume I of III, the Clendenin report, Appendix C, p.5 and p.8.
5. U.S. Global Change Research Information Office. Geoindicators: karst activity. Available from: URL: www.gcrio.org/geo/karst.html.
6. Hurst-Rosche Engineers, Inc. Waco landfill application. Volume III of III, Appendix J, Attachment 8.
7. Missouri Department of Natural Resources. Stream team homepage. Available from: URL: www.mostreamteam.org.
8. Missouri Department of Natural Resources. Memorandum letter, Review of Annual Disclosure Statement, February 4, 2003. Finding 4, p. 2.

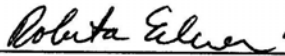
Certification

This health consultation for the WACO Landfill was prepared by the Missouri Department of Health and Senior Services under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved methodology and procedures at the time the health consultation was initiated.



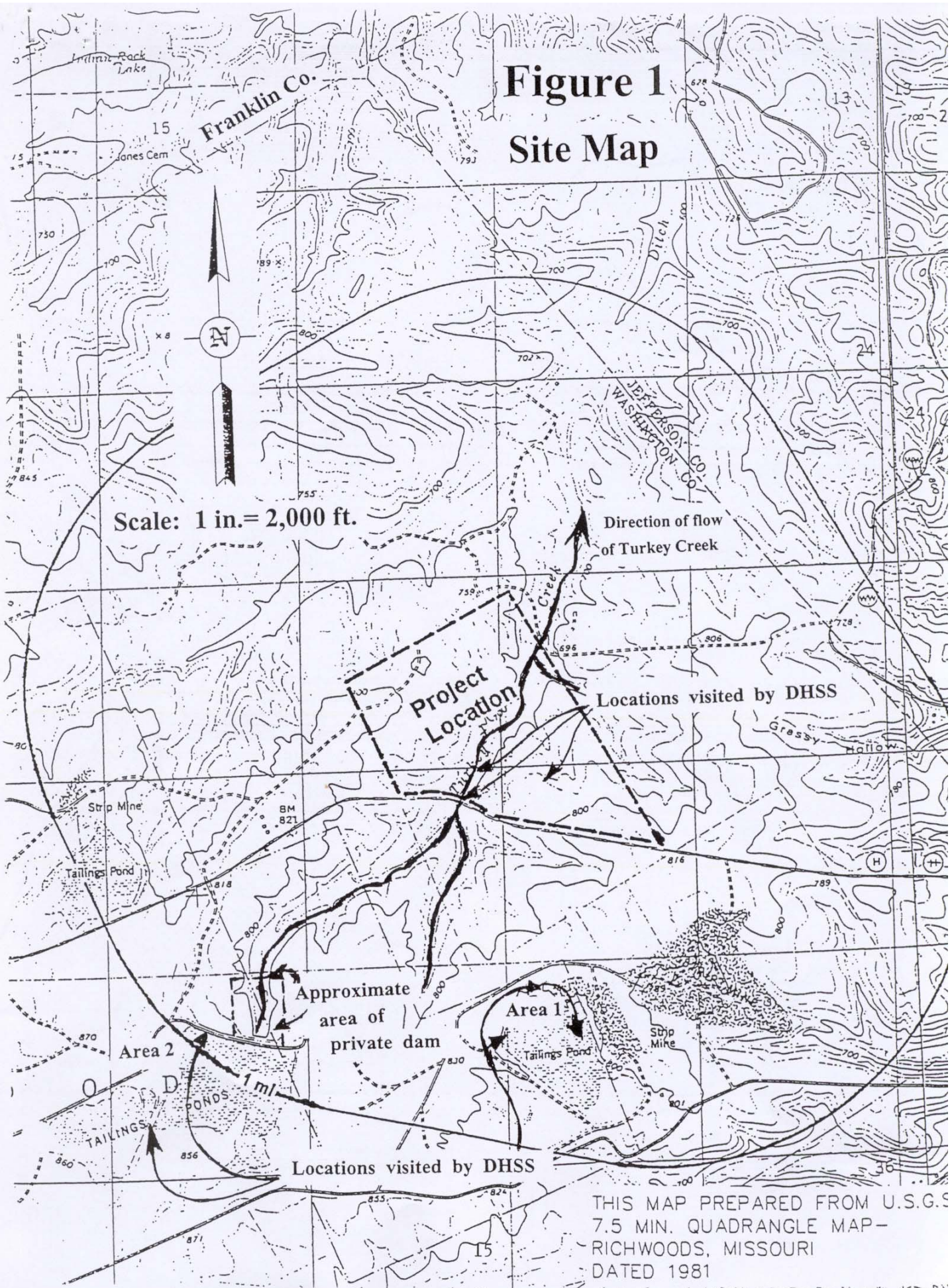
Technical Project Officer, SPS, SSAB, DAC

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



Section Chief, SPS, , ATSDR

Figure 1 Site Map



Scale: 1 in. = 2,000 ft.

Direction of flow of Turkey Creek

Project Location

Locations visited by DHSS

Approximate area of private dam

Area 1

Area 2

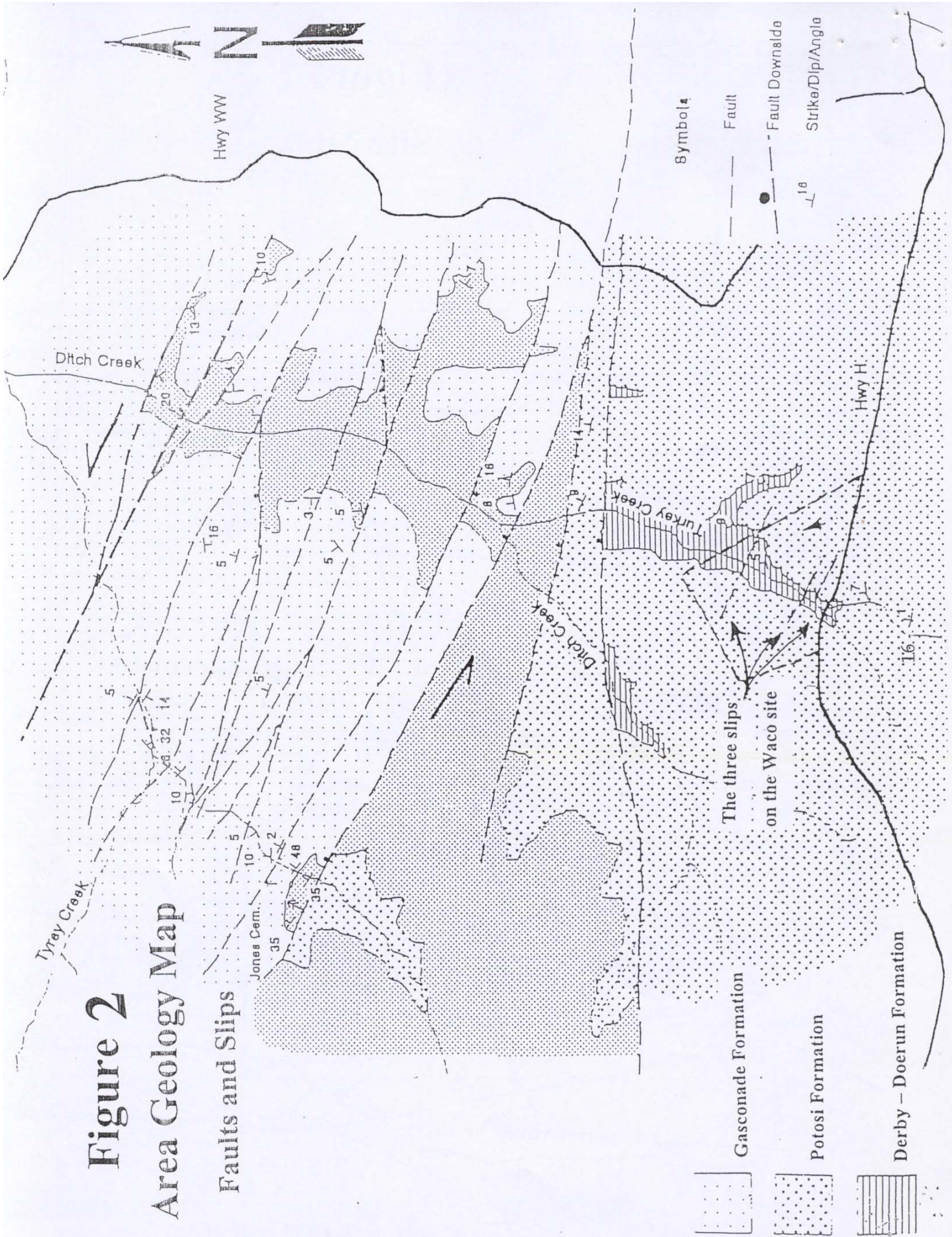
Locations visited by DHSS

THIS MAP PREPARED FROM U.S.G.S
7.5 MIN. QUADRANGLE MAP-
RICHWOODS, MISSOURI
DATED 1981

Figure 2

Area Geology Map

Faults and Slips



The three slips
on the Waco site

Figure 3
DHSS site Pictures of Turkey Creek



Turkey Creek approximately 250 ft. from Highway H

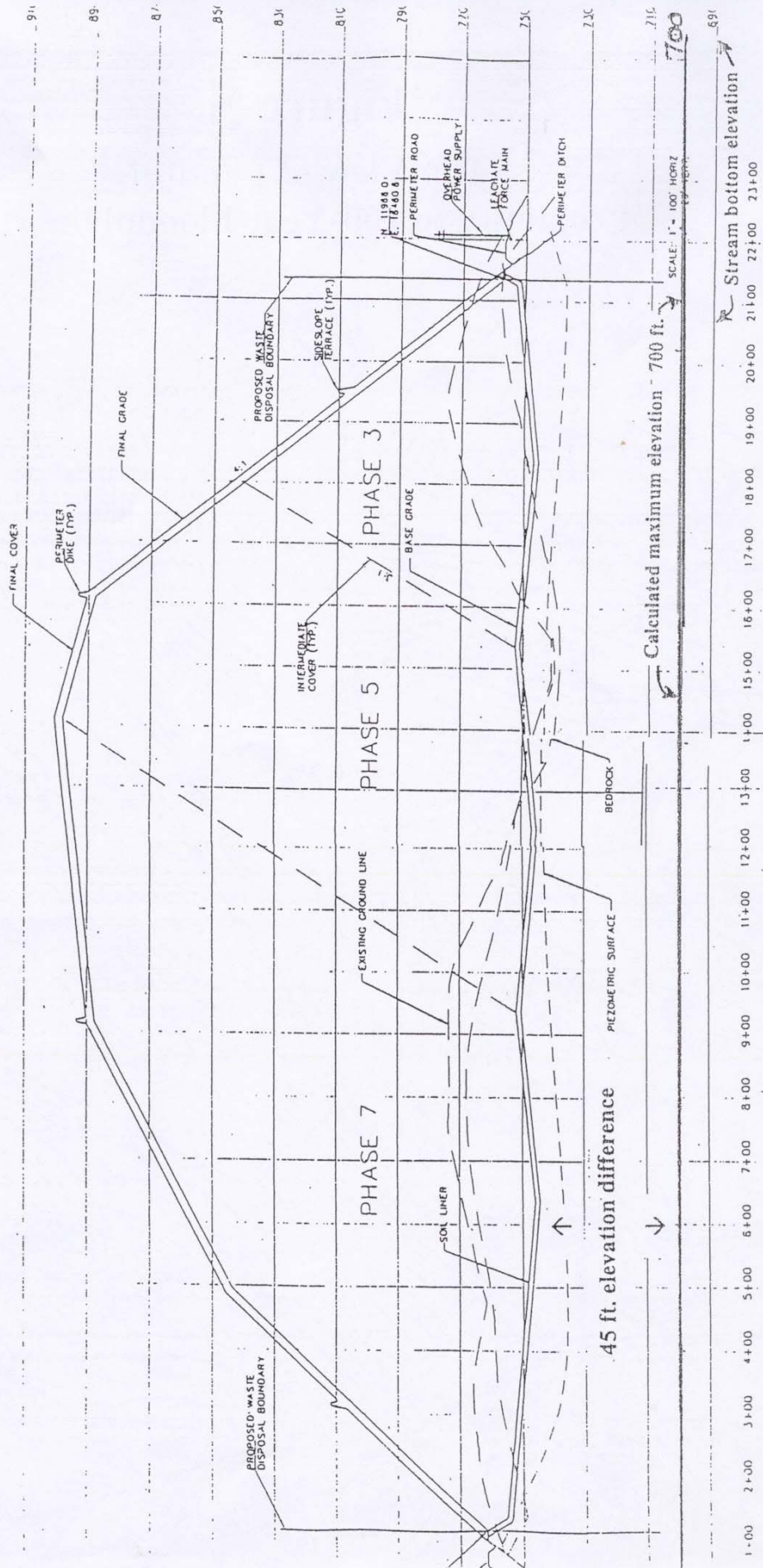


Turkey Creek approximately 500 ft. from Highway H

Figure 4

Landfill Cross Section

Rise of Creek Elevation During the 100-Years Flood



NOT TO SCALE: Each quadrant represents: 100 ft. horizontal run
20 ft. vertical rise

Figure 5
Top View of Landfill
Proximity to 100-Year Floodplain

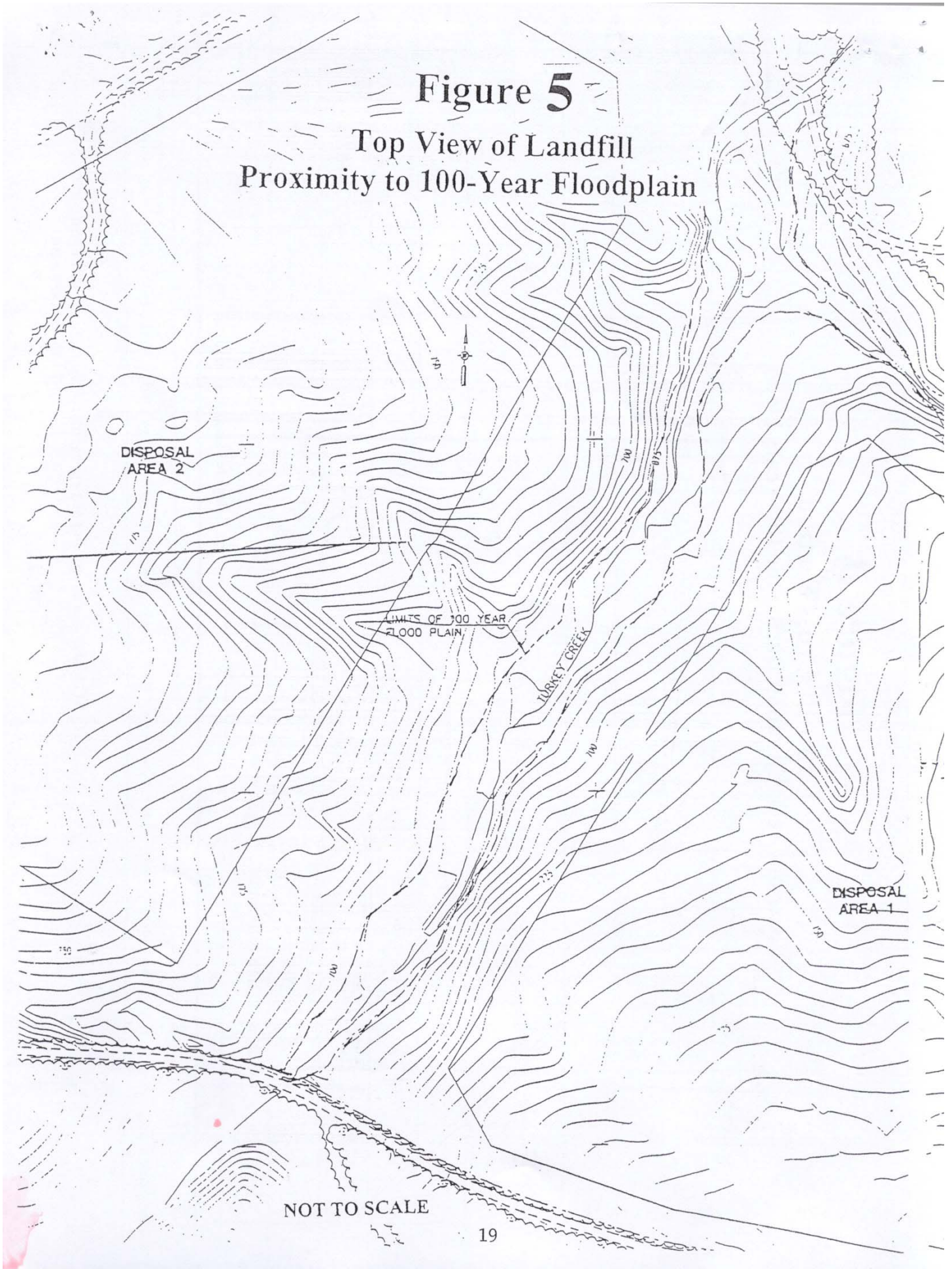


Figure 6
Scenery at the Head of Turkey Creek



Side of tailings pond dam for De Soto Mining Company, Inc.



Remnant of pond that collects dam seepage immediately below the dam shown above.

Figure 7
The 22-acre Lake



View of lake through tree cover, facing northeast toward landfill from the bottom of the tailings pond dam



View of private lake, facing north toward its dam

Figure 8
The 22-acre Lake



View of private lake, facing south from the private lake dam toward the tailings pond dam



Aerial view showing private lake (dark blue in foreground) and surrounding tailings ponds

Appendix

While many of the community's questions and concerns have been previously addressed during public meetings hosted by the MDNR, questions continue to exist around geology issues and the previous denial of the permit. Other concerns centered on safety issues. Although these concerns are not all health related, the information presented in this appendix is an attempt to address the most frequently asked questions and concerns. Responses to these concerns have been carefully evaluated with the help of the MDNR and by a thorough review of the Waco application. Below, each question of concern is shown in italics, and the response follows immediately.

There has been a general concern by SHOW-ME and various individuals regarding the circumstances of the previous permit application denial. Apparently, the citizens believe that the fault information has been removed from the application. In addition, the citizens are questioning why the faults are not explicitly referenced in the construction permit granted in September 2002. These are two separate issues and will be discussed individually.

Geological Issue 1 - The previous denial of the application and a continued belief that the geological faulting information was removed from the application in order to obtain permit approval:

As previously stated, the application was denied in 1994 because the hydrology and geology were not properly characterized. MDNR wanted additional characterization wells and more borings and field investigations. The original application contained a report authored by Dr. C.W. Clendenin that broadly characterized the area geologically. This report was referred to as the Clendenin Report. It also contained a report prepared in 1983 by Rolla Geotechnical Consultants, Inc. for the De Soto Mining Company characterizing the tailings ponds in nearby areas. This report corroborated the age of the rock in the area with the Clendenin Report.

These reports continue to be included in the current application in Appendix C. In addition, a narrative in Chapter 2 refers the reviewer to a new report titled "Detailed Geologic and Hydrogeologic Investigation Report (3)." This report, dated May 1999, was submitted independently of the rest of the application in accordance with state regulations, which changed January 1, 1996. Prior to 1996, many landfill applications were being denied based on geological issues rather than engineering issues. In many cases, the engineering aspect of the applications was adequate, but the geology was not adequate for a landfill operation. Therefore, to streamline the process, MDNR separated the process so the geological review could take place before the engineering review. The MDNR began to call this phase of the application process the Detailed Site Investigation (telephone conversation with Peter Price, December 12, 2002).

In order to comply with the change in regulations, Waco submitted the report "Detailed Geologic and Hydrogeologic Investigation Report." This report is approximately 1000 pages in length and contains additional field data such as boring logs and piezometer and well data. It did not contain faulting information because that data was already included

in the Clendenin Report. No information was removed from the application. The situation with the Waco application was unique because it covered a long time span during which changes in regulations took place.

It may also be useful to add that the author of the “Detailed Geologic and Hydrogeologic Investigation Report” was the geologist in the field while all drilling was occurring. Concurrently, the MDNR geologists were present observing characterization activities including activities related to the construction of piezometers and wells. Piezometers are usually temporary characterization wells drilled into different aquifers to get a clearer picture of groundwater movement and to help determine the locations and depths of permanent monitoring wells. In total, 42 piezometers were installed on the Waco site (telephone conversation with Peter Price, December 12, 2002).

The SHOW-ME group hired an independent consulting firm known as Chatman and Associates, Inc. (CAI) to review the “Detailed Geologic and Hydrogeologic Investigation Report.” In conferring with Mr. Price about using some of the geologic investigation techniques mentioned by CAI, we found that Missouri law does not require the use of some of these techniques, and they were not considered scientifically necessary to characterize the site. He explained that, based on what is required by Missouri law, the application process was complete. Because the applicant followed the steps set forth by the law, the application was technically correct, and the MDNR was able to approve the geological aspect of the application.

The geological approval was made official in August 1999, and the SHOW-ME group was given a copy of the approval letter (telephone conversation with Russell Seedyk, October 10, 2002).

Geological Issue 2 – Concerns that the geological faults were not specifically addressed in the wording of the construction permit:

The facts about the area’s geology are clearly spelled out in the Clendenin Report and in the “Detailed Geologic and Hydrogeologic Investigation Report” that were previously discussed. The MDNR and EPA geologists have concurred with the data from both reports. This type of information is not explicitly written into a permit. The permit is simply a tool for tracking purposes and for keeping records straight. The application itself provides the conditions of the permit and becomes the enforceable criteria. For example, if the application states that only one waste cell will be built at a time and the applicant tries to build two cells, the applicant is in violation of the permit even though the permit itself never addresses this condition in its wording. Enforcement actions can then be taken if an operator attempts to violate the conditions set forth in the application (telephone conversation with Russell Seedyk, October 2, 2002).

Several citizens expressed concerns in regards to traffic safety. They feel that there will be increased traffic on the narrow, curving roads with small shoulders and no guardrails.

Chapter 5 in the application covers much of this topic. The landfill will have set operating hours following set schedules. This schedule will be 4:00 a.m. to 6:00 p.m. on Monday through Friday and 6:00 a.m. to 2:00 p.m. on Saturday. Truck traffic will not be accepted outside of these scheduled times. Trucks leaving the site will have excess mud removed from their tires prior to entering Highway H. In addition, the landfill operators will use their equipment to clean the main highway as needed.

As stated, the landfill can accept up to 1,500 tons per day. Most of the trucks that will visit the facility will be smaller trucks weighing about 10 to 15 tons. The larger trucks that will be used to transport waste from transfer stations weigh about 18 to 20 tons. On average, it is estimated that there will be about 100 trucks visiting the facility daily (telephone conversation with Catherine Arnold, IESI District Manager, December 2, 2002). Based on DHSS observations, large trucks are already utilizing Highway H for transport purposes.