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DuPont Engineering

October 14, 2003

Mr. Christopher A. Saari
Hydrogeologist
Northern Region Remediation and Redevelopment
State of Wisconsin Department of Natural Resources
Ashland Service Center
2501 Golf Course Road
Ashland, Wisconsin 54806

PRODUCTION AREA INVESTIGATION WORK PLAN
Former DuPont Barksdale Works
Barksdale, Wisconsin

Dear Mr. Saari:

This letter transmits the Production Area Investigation Work Plan for the Former E. I. du Pont de Nemours and Company, Inc. (DuPont) Barksdale Works. DuPont has submitted the applicable fees for your review of this work plan to the Wisconsin Department of Natural Resource's Rhinelander, Wisconsin office (see copy of payment).

As we have discussed previously, DuPont desires to implement the sampling on October 20, 2003, pending your review of the work.

If you have any questions or comments regarding work plan, please contact me at (502) 569-2148.

Sincerely,

Bradley S. Nave

Bradley S. Nave
DuPont Corporate Remediation Group
Project Director

cc: Cary E. Pooler, URS Corporation
Paul Bretting, Bretting Manufacturing, Inc.
Amelia Lindsey, Bayfield County Health Department
Henry Nehls-Lowe, State of Wisconsin Department of Health and Family Services

PRODUCTION AREA INVESTIGATION
FORMER DUPONT BARKSDALE WORKS
BARKSDALE, WISCONSIN

Date: October 14, 2003

Project No.: 7431 URS 18982817

DUPONT

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

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(Enclosed on CD)

1.0 INTRODUCTION

E. I. DuPont de Nemours and Company (DuPont) operated an explosives manufacturing facility for approximately 70 years in Barksdale, Wisconsin known as the Former DuPont Barksdale Works (Figure 1). In the mid 1980s, DuPont sold the site to Bretting Development Corp., which maintains the site for private recreational pursuits.

In 1997, nitroamine and nitroaromatic organic compounds were identified in residential drinking water wells adjacent to the Former DuPont Barksdale Works. As a result of the detections, DuPont has installed and maintained point-of-use carbon filters in affected homes and has voluntarily conducted environmental site investigation activities to determine the nature of site-related compounds that are present at the site surface and in groundwater due to previous manufacturing operations. Sampling conducted during previous phases of the site investigation (DuPont 2001) has indicated that the chemicals of concern at the site are nitramine and nitroaromatic compounds primarily the production materials trinitrotoluene (TNT) and dinitrotoluene (DNT).

Based on the investigation findings and the issues encountered to-date, DuPont has identified the following priorities for investigation of the site:

1. Provide affected residents with drinking water that meets Wisconsin standards.
2. Evaluate and implement long-term drinking water supply alternatives.
3. Identify potential off-site soil or sediment issues and take appropriate action.
4. Identify on-site priority source areas and take appropriate action.

In accordance with the fourth investigation priority, DuPont has reviewed available historical data sources (engineering drawing archives, aerial photo collections, snap shot collections and former employee interviews) and compared the information obtained with existing site conditions. This process identified several former production areas with potential for near surface residuals of production materials. In many of the identified areas, the potential presence of production materials was further indicated by stressed vegetation.

This work plan describes initial subsurface evaluation of several production areas within the grounds of the Former DuPont Barksdale Works where nitramine and nitroaromatic compounds could be expected to be present.

1.1 Goals

The overall goal of the work scope presented in this document is to gain a further understanding of the distribution and quantity of nitramine and nitroaromatic compounds present in identified production areas. Particular emphasis will be applied to those areas where stressed vegetation indicates both surficial erosion and leaching to groundwater may potentially occur.

1.2 Objectives

The following objectives are proposed:

- Evaluate the nature and typical distribution of residual compounds in soils within and below the areas of stressed vegetation observed in the former production areas.
  - Evaluate soil stratigraphy to determine if bare areas are the result of prior excavation and decommissioning activities or of surficial spills.
  - Compare soil nutrient levels and physical structure within and immediately adjacent to stressed areas to determine conditions necessary to revegetate the bare areas.
  - Evaluate bare area soils for parameters necessary to determine if Daramend remediation will be effective.
- Evaluate the extent of prior decommissioning activities
  - Determine if concentrated pockets of nitramine and nitroaromatic compounds were buried in the shallow soils around selected production buildings when large soil barricades were leveled during plant decommissioning.
  - Determine which subsurface features were typically addressed or removed during decommissioning of the former production lines.
  - Determine whether subsurface features not addressed by historical decommissioning activities typically contain concentrated pockets of nitramine and nitroaromatic compounds that would require further investigation of all production lines.
- Determine if former DNT production lines and storage areas represent potential sources of groundwater contamination.
- Determine if areas of bare soil are contributing to groundwater contamination.

Section 2 provides a summary of the conditions identified during the prior work phases. The procedures proposed to meet the objectives stated above are described in Section 3. The expected task duration's and proposed schedule are discussed in Section 4.

2.0 CURRENT UNDERSTANDING OF SITE CONDITIONS

The site consists of approximately 1,800 acres and is located in Bayfield County, south of Washburn, Wisconsin, on Chequamegon Bay, Lake Superior. The town of Washburn (Bayfield County Seat) is located approximately three miles north of site. The town of Ashland (Ashland County Seat) is located approximately four miles to the southeast. State Highway 13 runs northeast across the eastern portion of the former site at about 1,000 feet from the Lake Superior shoreline (Figure 2). The property is bordered by Nolander Road along its north side and Ondossagon Road along the west. The security fence surrounding the former site marks the southern boundary (Figure 2).

The identified production areas and reasons for their selection for further sampling are as follows:

- **TNT line 1**: TNT#1 operated from 1905 to 1913. It was located west of the current water tower between the Lydol and TNT#6 areas. Foundations visible at the area indicate that little subsurface decommissioning work was done at the acid and nitration buildings in the TNT#1 line. However, soil barricades around the neutralizing and graining houses have been removed and one interviewee did report excavating around the TNT#1 line Graining House in the late 1970's. No bare soil areas or surficial TNT deposits have been found at this production line and since the dense growth in the area makes access difficult, sampling is not proposed at this time. Sampling may be conducted here at a future date if conditions at the other lines indicate a need to investigate specific buildings.
- **TNT lines 2 & 4**: These lines operated from 1913 through 1971. The original WW-I era buildings at TNT#2 were demolished in the 1920's and what was called TNT #4 during WW-I was renamed Line No.1. This line was the only active TNT line during most of the 1920s and 1930s. TNT#2 was rebuilt in 1938 using a new process which incorporated sellite wash in the neutralizing stage. This process resulted in higher quality product and eliminated the need for a separate TNT finishing plant. Once this line became operational, TNT#4/No.1 and the associated Trition Finishing buildings were eventually phased out. By 1966, TNT#2 was the only TNT line in production. Both lines were decommissioned in several phases between 1975 and 1983. The reported decommissioning activities included leveling of barricades, excavation along footings and excavation in the vicinity of known piping runs. To evaluate the completeness of these actions, excavations are planned along several foundations at which historic plans indicated piping runs and catch boxes had been present (the bi-tri nitrating house, neutralizing house and graining house). Several bare areas are visible at these production lines today. It is believed that some of the bare spots were caused by surficial spills while others may represent residue of decommissioning activities. Direct-push borings are proposed for the spill locations (waste acid house and 1930's bi-tri house) and trenches are proposed at the other bare spots where piping may or may not have been excavated (down line of the neutralizing/wash house and graining house). The bare spots present a potential for continued migration of residuals through erosion; therefore, the soils

in the bare spots at the TNT#2 nailing building and the TNT#4 neutralizing and graining houses will be analyzed to provide data required for near surface treatment and development of revegetation/erosion control plans. One existing storm drain has been identified and its interior will be grab sampled to look for accumulated surficial residue.

- **TNT lines 3 & 5 and the Reed Fields / Decommissioning Burning Ground**: TNT#3 and #5 operated from 1913 through 1918. They were located in open fields to the west of TNT#2. After 1918 the lines were demolished and the area remained vacant through the 1950s. In the late 1950's to early 1960's a ridge and furrow-settling pond was built to treat the red water from the remaining active TNT lines prior to discharge to Boyd Creek. This system, known as the Reed Fields, was constructed over the foundations of the TNT#3 and #5 neutralization and graining houses. Decommissioning period excavations along the "WW-I Ravine" (as the ditch through the area was known in 1950 and later) were reported in memos from the 1970's and in employee interviews. These activities apparently focused primarily on the banks of the ditches and portions of the lines further inland may not have received as much attention. Grab samples are proposed along the ditch that received the TNT#2 red water stream to evaluate the effectiveness of the reported decommissioning in this area. Trenches are proposed along several identifiable TNT#3 and #5 foundations to determine if subsurface decommissioning took place at these buildings located away from the "ravine" banks. Composite surface samples for revegetation studies will be collected at the bare spot associated with the TNT#5 neutralizing house. During the decommissioning activities of the 1980s, the Reed Field area was used as a burning ground and then capped with clay. Since the capping of this area has left little surficial evidence of the Reed Field, direct-push sampling at random points along a grid system covering the area is proposed.

- **Lydol Area and Trivelene Lines 1, 2 & 3**: The Lydol area operated from 1913 through the 1920s. Only one foundation, the nitrating house, remains in the area. Other buildings in this operation apparently were built on wooden piers. The area has DNT odor and contains bare spots which indicate potential subsurface residuals. Trivelene#1 was constructed in 1913. Trivelene#2 and #3 were added in 1915 to 1916. All three lines were gone by 1938. Drawings indicate that product from Trivelene#1 was stored in skids adjacent to the sweating house. Bare spots in this area indicate drips and overfills had occurred. Trivelene#2 and #3 apparently discharged drums of product to rail sidings. They have bare spots primarily near the waste acid loading areas at their west ends. Catch boxes still present near the former rail car loading platforms on the east ends may also have received spills over time. Trenches will be used at the Lydol nitrating house and the Trivelene#1 sweating house. Direct-push borings are proposed for investigation of two large bare spots in the Lydol area where no foundations remain to orient trenching. At each spot, three direct-push borings will be sampled. Since the DNT produced in this area may have leached downward over time, two of the probes will be advanced to the local groundwater surface. Composite surface samples for revegetation studies will also be collected at each of the bare spots. Grab samples are proposed at the Trivelene#2 waste acid and

catch box locations. Grab samples are also proposed in the ditch draining the Lydol and Trivelene #2 areas.

- **TNT line 6 and additional lines to west**: These lines apparently operated from 1916 to 1919. No documentation regarding operations at the "lines to the west" has been found; but, the rail connections and general design of these lines appears to associate them with the adjacent TNT#6 line possibly as Triton finishing plants. Based on the intact barricades, it appears little decommissioning occurred at these lines. The areas occupied by these lines were covered by woods and brush since before 1938 and may have been little known to the operators during the decommissioning era. Similar to the TNT#2 line, direct-push borings are proposed for the TNT#6 waste acid house and trenches are proposed at the TNT#6 bi-tri house, neutralizing house and graining house. At one of the three western structures, trenching is proposed around the full perimeter to determine whether subsurface lines exist at this location where no plans are available. Since all three buildings appear to have the same foundation design, information from any one should apply to all three. Trenching is also proposed along a pair of ditches at the southern end of the western area where pieces of TNT were found in 2002. It is not clear if this area was previously excavated exposing pieces from within buried pipes or if the pieces spilled from railcars routed adjacent to the ditch; therefore, trenching is proposed to allow viewing of the underlying soil stratigraphy. In addition, direct push borings are proposed up- and down-gradient of the ditch area to determine if leaching from the pieces found has contributed to groundwater contamination. Each probe will extend to 10-ft below the upper groundwater surface.

- **Triton Finishing Plant**: This area operated from 1913 through the 1940's. Operations changed over that period and some buildings, including a washhouse and finishing house, were removed prior to the 1930's. Five areas of bare soil are present in this area which warrant sampling. Most appear to be associated with rail spurs and are therefore likely due to surficial spills. The intact foundations of the slab casting house (identified on early maps as finishing house no. 1) and a warehouse (earlier labeled washhouse no. 2) contain several pits and drains, which may also contain residual material. Direct-push borings are proposed for bare spots along rail spurs near the recovery tank houses and chloride storage building. One direct-push boring will be advanced near the washhouse no. 2 bare spot to determine if these areas are affecting groundwater. Trenches are proposed at the washhouse and finishing house foundations as well as at the bare spots adjacent to these structures. Composite surface samples for revegetation studies will also be collected at these bare spots. A grab sample may be collected at the finishing house interior if the flooded equipment pit in this location is not obstructed by debris; otherwise, the backhoe will be used to obtain the sample from this pit.

- **Waste Acid Store Houses**: These structures were built between 1913 and 1918. Collection buildings are located at the head of each TNT, TNX and Trivelene line and sampling related to those structures is discussed above. There were also two large waste acid storage towers at the Acid Recovery plant. Drawings indicate rail car transfer of the acids from the lines to the recovery plant during the WW-I era. Bare spots are present at the loading areas adjacent to these buildings. Later operations used pressurized overhead pipelines to return waste acid from blow case pits to the recovery plant. Since the bare spots at the waste acid towers were caused by surficial spills, direct-push borings are proposed for sampling at those spots. Composite surface samples for revegetation studies will also be collected at the bare spot associated with the western waste acid storage tower. To determine if these areas are leaching, the most down gradient location will be sampled to the local groundwater surface.

- **Testing Grounds**: This area was used until the mid-1960's to test batches of product. The area is visible on 1966 aerial photos. Apparently barricades located in the area were leveled in the late 1960's. Sandy soil is present at the ground surface which indicates that the actual testing surface may be buried by the regraded barricade fill. Since the grading of this area has left little surficial evidence of the activities, direct-push sampling at random points along a grid system covering the area is proposed.

- **TNT lines 7 through 10**: These lines operated from 1916 through 1919. They were located in open fields in a northeastern portion of the plant that was apparently unused after the 1920s. Decommissioning period excavations were reported in memos from the 1980's. These activities apparently focused primarily on ditches around the neutralizing/pelleting and graining houses of these lines. Structures associated with other portions of the process (bit/tri, waste acid, and finishing houses) do not appear not have received as much attention based on the size of trees and conditions of barricades present in those areas. Since all four lines appear to be in similar condition, TNT#8 was selected for investigation and conditions there will be considered typical of the group. As at TNT#2, direct-push borings are proposed for the TNT#8 waste acid house and trenches are proposed at the bi-tri house, neutralizing house and graining house. A direct-push boring is also proposed to determine if leaching has occurred below a ponded spot on the drainage ditch bordering the boundary of this area northwest of PZ13.

- **TNX lines 1 through 5**: These lines reportedly only operated during pre-production testing phases. They are present on drawings from the 1916 to 1919 period. They appear to have been decommissioned similarly to the adjacent TNT#7 through #10 lines. Since all five lines appear to be in similar condition, TNX#5 was selected for investigation and conditions there will be considered typical of the group. Direct-push borings are proposed for the TNX#5 waste acid house and neutralizing house. Trenches are proposed at the mono-bi nitration house and the tri nitration house. A direct-push boring is also proposed to determine if leaching has occurred below a ponded spot on the drainage ditch bordering the boundary of this area northwest of PZ21.

- **Triton Refinery**: This area appears to have operated contemporaneously with TNT#7 through #10. However, it was not decommissioned in the 1980's like those adjacent lines. It contained a washhouse, two graining houses and a screening house which refined the crude TNT using a sellite wash process. Tall barricades and a drainage ditch system remain including some areas with chemical odors and absent vegetation. Trenches are proposed at the former washhouse catch box and floor drains. A trench is also proposed at the screening house rail car loading area. Since the outfall of floor drains from the graining house buildings have been identified and access to the foundations themselves is obstructed by trees and barricades, trenching will not be conducted at the graining house foundations. Instead, grab samples will be collected at the point where the pipes discharge to ditches. To isolate which portions of the downstream ditch system have retained residuals, grab samples are also proposed upstream and downstream of the juncture of each refinery-building ditch with the area-wide drainage system.
- **Transformer Spill Area**: In 1980, a former employee reported that transformer oil had been dumped by a transport company during removal of outdated equipment stored near the electrical shop in the 1970s. WDNR investigated and sampled the area that the employee indicated in 1980; but, the employee later said that the area had been filled with cinders since the dumping. Since the filling of this area has left little surficial evidence of the dumping, direct-push sampling at random points along a grid system covering the area is proposed.
- **Skid Storage**: This area was located at the input end of the dynamite lines. Little historical information has been found regarding this area. The area contains a bare spot with a strong DNT odor that is visible in photos as far back as 1938. Since this area appears to have been a surficial spill, direct-push borings are proposed for sampling at the spot. To determine if the area is leaching, the most down gradient location will be sampled to the local groundwater surface. Composite surface samples for revegetation studies will also be collected at the bare spot.
- **Dynamite Line Lydol Heater House**: This operation is indicated on the 1940's site map. One interviewee indicated that DNT drums were warmed in a water bath at this building near the dynamite mixing area. Vegetation in this area is not highly stressed; but, the operation was adjacent to several low areas and ditches which may have been affected if spills occurred. Grab samples are proposed within the ditches at the points most likely to have received or accumulated spilled DNT.

Figure 3 shows the locations.

3.0 ACTIVITIES

The following activities are proposed to accomplish the objectives.

- Work site reconnaissance
- Sample collection
- Sample screening and selection
- Sample analysis
- Surveying of sampling locations.
- Report preparation

3.1 Work Site Reconnaissance

The purpose of this activity is to verify conditions at selected work areas and prepare the proposed work sites for excavation. The point of excavation will be selected and prepared at each location as follows.

- Field copies of historic Engineering Drawings for each area proposed for sampling will be prepared.
- Personnel will take the field copies to the work sites where the existing foundations will be reviewed and field drawings will be marked up showing subsurface items (pipe inlets, catch boxes and drain locations) still identifiable in the field.
- Markers (stakes, flags or similar items) will be placed at each identified subsurface item.
- If needed brush and tree clearing will be conducted in this phase.

3.2 Sample Collection

Test pit and trench locations listed in Table 1 and shown on Figures 3a – 3j will be excavated using a backhoe. The trench locations were typically chosen to investigate catch boxes, sumps or drain lines indicated on historic plans and most trenches are expected to extend to a depth of 6-ft which was the approximate burial depth used to avoid frost damage. Test pits are expected to be about 5-ft square and may vary in depth between 2- and 6-ft based on the depth to the item being uncovered. Additional excavation may be conducted at any of the proposed locations if initial results indicate more extensive issues in a given area.

Direct push samplers will be used to evaluate the depth of residuals present at areas of stressed vegetation which do not correlate with known drain lines or building sites and are therefore believed to have been the caused by surface spills. Direct push samplers will also be used in the Reed Field, Transformer Spill and Test Shot areas where subsequent operations have buried prior site features. Direct push samples are designated by the symbol "GP" in Table 1. The number of direct push boreholes planned within an

area precedes the GP symbol. The expected bottom depths of the direct push boreholes at each location are listed after the GP symbol.

Additional locations (listed as "grab" in the table) will be sampled using spades or hand augers. These areas are typically ditches, ponds, or exposed pits in foundations where heavy equipment access will be problematic. In all cases, sampling devices will be advanced until recent overburden; fresh sediment, leaf mold or demolition debris; has been removed and native soils or intact concrete floors are exposed.

The soils removed from each trench, test pit or grab sampling point will be visually inspected and any large pieces of TNT found will be removed. Once sampling is completed the backhoe and grab sample excavations will be backfilled with the soils removed and direct push boreholes will be backfilled with granular bentonite. The work areas will then be graded to match adjacent ground. Each location will be inspected after regrading and any TNT pieces visible at the surface will be removed. TNT removed will be handled as detailed in Section 4.

3.3 Sample Screening and Selection

At backhoe trenches approved personnel wearing PPE described in the project specific HASP Addendum will approach trenches opened by the backhoe from upwind using a PID to screen the breathing zone air. Personnel will photograph the trench walls, then use colorimetric (Expray®) tests to screen the typical soil profile and to screen any unusual deposits encountered within the excavations for the presence of TNT or DNT.

Trench locations are being investigated to provide an initial screening for the presence of pockets with high concentrations of production materials. Additional investigation will be proposed if delineation of specific items identified is needed. Since the current investigation is only a screening level activity, in-depth analytical sampling and screening confirmation is not proposed for the trench locations. Analytical samples will only be collected at trench locations if screening indicates a potential bottom limit to residuals detected around pockets of production materials or if pockets of production materials are discovered within 2-ft of the surface where they may effect revegetation or treatment proposed for bare spots. If a bottom limit of impacts is indicated by screening at a trench location, a discrete sample will be collected from the native soil of the trench wall for confirmation of the screening result. If near surface materials potentially effecting bare spot treatment are encountered, a sample representative of the upper 2-ft of soil will be composited and submitted for analyses.

Personnel will collect samples directly from the trench wall if accessible or from the bucket of the backhoe if access to the wall is unsafe. Samples will be collected using new wooden spoons at each location and placed into laboratory prepared containers at the trench site.

Direct push samples will be collected in plastic liners. These liners will be opened at the collection site by logging personnel, split, logged, and screened using Expray® kits at each 1-ft increment of depth. The split sample from the depth at each location with the highest screening result and the first non-detect screening result will be packaged for analysis. At locations extending to the groundwater surface, the sample from the just

above the water table will also be submitted for analysis. Recovered soil which screen non-detect will be disposed on the ground. Excess recovered material which screens positive for TNT or DNT will be placed in plastic bags labeled with sampling location. These bags will then be stored in a secure central location pending disposal characterization.

If volatile organic analyses are required for a trench or grab sample, an Encore® sampler will be filled directly from the excavation wall. Encore® samplers collected from direct-push sample locations will be filled from the split material as soon as screening is complete.

At bare spots where samples for evaluation of revegetation or treatment studies are required, two representative composite samples will be formed as follows. First, a sample from outside the bare area will be formed by collecting five 100-gram sub samples throughout the upper 8-inches of soil within a 10-ft diameter circle tangent to an edge of the bare spot. The sub samples will be collected from the limit of the circle in the cardinal directions and at the circle center. Next, a representative sample from within the bare area will be formed using a similar pattern adapted to the shape of the bare area (i.e. from representative spots along the north, east, south, and west edges and at the center of the bare spot). Both samples will be homogenized and any stones or other large debris will be removed and noted on the sample documentation.

No samples will be shipped to the laboratory that contain more than 5% TNT. To confirm this, D-tech® immunoassay tests for the 0.5 to 5.0 mg/kg TNT concentration range will be conducted on any sample selected for analysis when the "high screening" result indicates the presence of TNT. Samples, which show only DNT response or are submitted to confirm non-detect screening results will not be evaluated with IA tests. The United States Army Corps of Engineers recommends that TNT can be shipped safely at concentrations up to 10%.

3.4 Sample Analysis

Most samples, including both discrete and composite samples collected, will be analyzed by Severn Trent Laboratories (STL) for nitroaromatic and nitramine and volatile organic constituents (Tables 2 - 4). Samples collected from area K (the Transformer Spill Area) will only be analyzed for PCB content.

Composite samples from each of the stressed vegetation areas and adjacent areas where vegetation is not stressed will also be analyzed by a laboratory accredited in soil nutrient analyses. This is necessary to determine general soil characteristics as related to plant growth (Table 5) at each area.

3.5 Survey

A benchmark located on a durable site feature adjacent to each trenching location will be marked during the sampling event and recorded in field logs. At each sampling location, field sketches will be prepared by the sampling team referencing sample locations and other trench features. These sketches will include "ties", radial measurements from each important item to as many easily reached permanent features (i.e. recognizable trees,

foundation corners, fence posts or other clearly described features within 100-ft), as required to easily re-establish the location in the future. Sampling personnel will use hand levels and tapes to measure the depth and plan location of each item with respect to the benchmark. This data will be recorded on the site sketches for later tabulation. Samplers will mark the center of each grab sampling point or direct-push boring with pin-flags for later identification by surveyors.

After sampling is completed, the benchmarks and tie references will be surveyed by a licensed surveyor and placed on the site map. Northing and easting coordinates plus surface elevations will be recorded for all sampling points. All site coordinates will be tied to the State Plane Coordinate System – Northern Grid. All elevation information will be tied to the National Geodetic Vertical Datum (NGVD-29) elevation above mean sea level.

3.6 Report

Following field activities, a summary report will be prepared providing the following information.

- Description of all field activities.
- Analytical and field data.
- Maps and tables showing data.
- Results and conclusions.

It is anticipated that the final report will be submitted approximately 90-days following the completion of last phase of field activities. The actual delivery date may be extended due to the actual delivery dates of various items, i.e. analytical data, survey data, etc. taking longer than anticipated (Table 6 – Project Schedule).

3.7 Schedule

The direct push and grab sampling portion of the fieldwork will begin in mid October 2003. The trenching operations will be conducted in late April or early May 2004, depending on site conditions. Optimal site conditions would include dry soil and minimal ponded water in these areas. This will prevent the filling of test pits with water and enable close examination of the soils and waste material. It is estimated that each phase of the work will take 15 working days. If necessary, brush and other materials will be cleared ahead of time to permit easy ingress and egress to the proposed testing areas. Following completion of the first phase of field work (receipt and review of direct push and grab sample analyses), a short letter report will be prepared for submittal to WDNR which identifies any unexpected conditions encountered and identifies any measures proposed to respond to them during the subsequent trenching phase. A detailed report of the full project results will be issued following review of the results of the trench sample analyses in summer 2004.

4.0 SITE MANAGEMENT

4.1 House Keeping

Equipment staging, sample processing, and decontamination will be conducted at a secured location on the grounds of the Former DuPont Barksdale Works.

All work areas including the sample processing, decontamination pad and staging areas will be cleaned up at the end of each shift. All pits will either be barricaded with security fencing or backfilled at the end of each workday.

Equipment will be left in place at the end of a work shift only if work at that location has not been completed and will be continued the following day. Otherwise, all equipment will be stored in the vicinity of the decontamination pad when not in use. Barricades will be left in place for overnight storage of equipment at a work location and gates will be closed and secured.

4.1.1 Investigation Derived Waste Management

Wastes expected to be produced by the proposed activities are residual pieces of TNT, direct push soil which screens positive for TNT or DNT, soiled personal protective and decontamination equipment (PPE) and decontamination water. Soils disturbed by backhoe or grab samplers will be replaced in the excavations and are not wastes requiring disposal.

Wastes will be collected at the generation-sites and transported to a central storage area on the grounds of the Former DuPont Barksdale Works.

The project specific waste management plan addendum details the actual procedures that will be followed to handle the wastes in the field. The waste management procedures are summarized as follows.

Pieces of TNT greater than 1-inch in diameter, if found, will be segregated from the trench spoils or cuttings, placed in velostat bags and stored in 55-gallon drums kept in the on-site magazine. The segregated TNT will subsequently be broken down to less than 1-inch diameter, repackaged in antistatic bags, wetted, manifested and shipped to an off-site incinerator. No attempt will be made to recover buried TNT pieces less than 1-inch in size during this phase of the investigation. These smaller buried pieces will be addressed during subsequent remedial actions, if warranted.

Soil from direct push liners which screens positive will be stored in plastic bags labeled with the sampling location. These bags will be accumulated in a DOT approved drum located on a pallet in a secure area adjacent to the site magazine. The soil in this drum will be characterized using laboratory data from the investigation analytical program. Bag samples from locations where the high screening sample is designated as hazardous based on analytical results will be segregated and packaged for appropriate disposal. Bag samples from locations where the high screening sample tests below RCRA hazardous

thresholds but in excess of WDNR soil enforcement standards will be returned to the drum.

The soils retained from direct push borings will be held in a secure, contained, regularly inspected area. Drums designated as hazardous will be disposed off-site at an appropriately licensed facility before the end of the fieldwork phase of the project. Drums designated as non-hazardous but contaminated will be held on site for incorporation with future soil treatment actions.

Water generated by the work will be filtered to remove suspended solids and organic chemicals. The filtered water will then be transferred to storage tanks where it will be held pending characterization. If the characterization results show that the water does not contain regulated concentrations of waste materials it will be transported to the City of Superior waste water treatment plant for disposal. If the results show residual organic constituents, the batch will be reprocessed through the filtration system and retested.

PPE will be stored in drums. The drums will be transferred to an off-site landfill.

4.1.2 Contamination Control

All down-hole equipment will be thoroughly cleaned prior to use at each sampling area. Supporting vehicles and auxiliary equipment will be thoroughly cleaned prior to leaving the site. The procedures required for equipment and personnel decontamination during the course of the project are detailed in the project specific HASP.

4.1.3 Site Restoration

The ground disturbed around each trench location will be regraded and seeded at the end of all fieldwork.

5.0 PROJECT CONTACTS

For more information please contact the project personnel listed below:

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6.0 REFERENCES

DuPont, 2002. *2001 Site Investigation Report for the Former DuPont Barksdale Works. 2001*. Barksdale, Wisconsin, June 20, 2002

DuPont, 2001. *Quality Assurance Project Plan, Former Barksdale Facility.* Barksdale, Wisconsin, September 6, 2001.

TABLES

Table 1

Sampling Locations

Description and Proposed Sampling Methods

Former DuPont Barksdale Site

Barksdale, Wisconsin

Location	Item to Investigate	6-ft deep trenches (length - ft)	Bare Spot Composite Samples	Other Samples
A: TNT #3&#5 and Reed Fields	bare spot @ #5 neut.	20	2	0
	18' E of SE #5 Bi-Tri corner	15	0	0
	approx location #3 neut. catch box	5	0	0
	21' E of SE #3 graining corner	15	0	0
	reed field furrow area	0	0	8 gp 8'
	down gradient wrt GW of furrows	0	0	1 gp 40'
	head of former ditch into fields	0	0	1 grab
	outfall of ditch near #5 neut.	0	0	1 grab
B: TNT #2 & #4	area of former #2 waste acid store	0	0	2 gp 4 '
	storm drain/culvert N of Bi Tri	0	0	1 grab
	bare spot @ #2 bitri.	0	0	1 gp 4'
	bare spot btw #2 wash & nailing	10	2	0
	fnd perimeter @ #4 bi/tri	25	0	0
	fnd perimeter @ #4 neutralizing	80	0	0
	bare spots s of @ #4 neutralizing	10	2	0
	fnd perimeter @ #4 graining	60	0	0
	bare spot sw of @ #4 graining	30	2	0
	bare spot se of @ #4 graining	5	2	0
C: Lydol and Trivelene	Fnd perimeter @ Nitrator	20	0	0
	Bare spot along S edge of area	0	2	2 gp 4'
	Bare spot along S edge of area	0	0	1 gp 40'
	Bare spot @ area center	0	2	2 gp 4'
	Bare spot @ area center	0	0	1 gp 40'
	Ditch along N edge of area	0	0	3 grab 2'
	Fnd perimeter @ #1 sweating	40	0	0
	catch box @ #2 sweating	0	0	1 grab 0'
	bare spot @ #2 waste acid load out	0	0	1 grab 2'
D: TNT # 6 and West Triton Area	fnd perimeter @ #6 bi/tri	10	0	0
	fnd perimeter @ #6 neutralizing	25	0	0
	fnd perimeter @ #6 graining	20	0	0
	bare spot @ #6 waste acid	0	0	2 gp 4 '
	Ditches S of area	15	0	0
	Perimeter of barricade at bldg	200	0	0
E: Triton Finishing	Bare spot S of solvent rec ho	0	0	1 gp 4'
	Bare spot S of solvent tank ho	0	0	1 gp 4'
	Bare spot SW of chloride store	0	0	1 gp 4'
	Bare spot E of N wash ho.	20	2	0
	Fnd perimeter @ N. wash ho	30	0	0
	Fnd perimeter @ finish ho #2	30	0	0
	Bare spot E of finish ho #2	30	2	1 gp 40'
	Fnd interior @ finish ho #2	5	0	0

Table 1

Sampling Locations
Description and Proposed Sampling Methods

Former DuPont Barksdale Site

Barksdale, Wisconsin

Location	Item to Investigate	6-ft deep trenches (length - ft)	Bare Spot Composite Samples	Other Samples
F: Acid Recovery	W acid storage tower spot	0	2	2 gp 4'
	E acid storage tower spot	0	0	1 gp 4'
	E acid storage tower spot	0	0	1 gp 40'
G: Test Shot Grounds	Random through area	0	0	10 gp 4'
H: TNT #7 - #10	fnd perimeter @ #8 bi/tri	10	0	0
	fnd perimeter @ #8 neutralizing	25	0	0
	fnd perimeter @ #8 graining	20	0	0
	bare spot @ #8 waste acid	0	0	2 gp 4 '
	ponded area NW of PZ13	0	0	1 gp 8
I: TNX #1 - #5	fnd perimeter @ #5 mono/bi	25	0	0
	fnd perimeter @ #5 tri	10	0	0
	catch box @ #5 tri	10	0	0
	drain outfall @ #5 neutralizing	0	0	1 gp 4
	ponded area NW of PZ21	0	0	1 gp 8
J: Triton Refinery	Refine wash house	15	0	0
	Screening house	40	0	0
	West graining ditch headwater	0	0	1 grab 2'
	East graining ditch headwater	0	0	1grab 2'
	Ditch TNX to Central Drainage	0	0	3grab 2'
	Ditch Central Darinage	0	0	3grab 2'
K: Transformer Area	Grid of reported area	0	0	8 gp 4'
L: Shell House Skid Area	Bare spot	0	2	4 gp 4'
				1 gp 40'
M: Dynamite Line	Pond E of Lydol Melt Ho.	0	0	2 grab
	Ditch SE of Lydol Melt Ho.	0	0	2 grab
Totals		875	22	55 gp/23 grab

Table 2

Nitroaromatic and Nitramine Organics by SW-846 8321A
Analytes and Reporting Limits
Former DuPont Barksdale Site
Barksdale, Wisconsin

Compound	CAS No.	Soil (ug/Kg)	
		Reporting Limit	MDL
HMX (1)	2691-41-0	250	168
RDX (2)	121-82-4	250	215
1,3,5-Trinitrobenzene	99-35-4	250	125
1,3-Dinitrobenzene	99-65-0	250	73
Tetryl (3)	479-45-8	250	183
2,4,6-Trinitrotoluene	118-96-7	250	111
Nitrobenzene	98-95-3	250	128
Nitroglycerin	55-63-0	5000	1090
2,4-Dinitrotoluene	121-14-2	250	116
2-Amino-4,6-dinitrotoluene	355-72-78-2	250	143
2,6-Dinitrotoluene	606-20-2	250	59
4-Amino-2,6-dinitrotoluene	1946-51-0	250	120
2-Nitrotoluene	88-72-2	250	196
4-Nitrotoluene	99-99-0	250	137
3-Nitrotoluene	99-08-1	250	152
PETN (4)	78-11-5	2500	1010

(1) HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
(2) RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
(3) Tetryl = Methyl-2,4,6-trinitrophenylnitramine.
(4) PETN = Pentaerythritol tetranitrate.

MDL (Method detection limit) is the minimum concentration of the analyte that can be measured with a 99% probability that it is different from the "blank". MDL values are measured in the laboratory with a series of replicate analyses in a standard matrix, and are updated annually.

Reporting Limit refers to the laboratory's limit of quantitation, or the lowest concentration that can be reliably achieved for a particular analyte within routine operating conditions. Values lower than the Reporting Limit, but above the MDL, are considered estimated concentrations.

ug/Kg = micrograms per kilogram or parts per billion.

Table 3

Wisconsin Regulated Volatile Organics by SW-846 8260B

Analytes and Reporting Limits

Former DuPont Barksdale Site

Barksdale, Wisconsin

Compound	Soil (ug/Kg)	
	Reporting Limit	MDL
1, 1, 1,2-Tetrachloroethane	1.0	0.22
1,1,1-Trichloroethane	1.0	0.26
1,1,2,2-Tetrachloroethane	1.0	0.31
1,1,2-Trichloroethane	1.0	0.39
1,1-Dichloroethane	1.0	0.17
1,1-Dichloroethene	1.0	0.20
1,2,3-Trichloropropane	1.0	0.29
1,2,4-Trichlorobenzene	1.0	0.20
1,2,4-Trimethylbenzene	1.0	0.22
1,2-Dibromo-3-chloropropane (DBCP)	2.0	0.25
1,2-Dibromoethane (EDB)	1.0	0.36
1,2-Dichlorobenzene	1.0	0.24
1,2-Dichloroethane	1.0	0.28
1,2-Dichloroethene (total)	1.0	0.53
1,2-Dichloropropane	1.0	0.21
1,3,5-Trimethylbenzene	1.0	0.29
1,3-Dichlorobenzene	1.0	0.26
1,3-Dichloropropane	1.0	0.26
1,4-Dichlorobenzene	1.0	0.24
2-Butanone (MEK)	5.0	0.93
4-Methyl-2-pentanone	5.0	0.79
Acetone	10.0	1.90
Benzene	1.0	0.21
Bromodichloromethane	1.0	0.22
Bromoform	1.0	0.32
Bromomethane	2.0	0.30
Carbon disulfide	1.0	0.19
Carbon tetrachloride	1.0	0.19
Chlorobenzene	1.0	0.30
Chloroethane	2.0	0.25
Chloroform	1.0	0.23
Chloromethane	2.0	0.30
Dibromochloromethane	1.0	0.38
Dichlorodifluoromethane	2.0	0.23
Ethylbenzene	1.0	0.28
Hexane	1.0	0.25
Methyl tert-butyl ether	5.0	0.21
Methylene chloride	1.0	0.89
Naphthalene	1.0	0.15
Styrene	1.0	0.27
Tetrachloroethene	1.0	0.36
Toluene	1.0	0.29
Trichloroethene	1.0	0.22
Trichlorofluoromethane	2.0	0.28
Vinyl chloride	1.0	0.21
Xylenes	2.0	0.95

MDL (Method detection limit) is the minimum concentration of the analyte that can be measured with a 99% probability that it is different from the "blank". MDL values are measured in the laboratory with a series of replicate analyses in a standard matrix, and are updated annually.

Reporting Limit refers to the laboratory's limit of quantitation, or the lowest concentration that can be reliably achieved for a particular analyte within routine operating conditions. Values lower than the Reporting Limit, but above the MDL, are considered estimated concentrations.

ug/Kg = micrograms per kilogram or parts per billion.

Table 4
Appendix IX Metals
Analytes and Reporting Limits
Former DuPont Barksdale Site
Barksdale, Wisconsin

Compound	Soil (ug/Kg)	
	Reporting Limit	MDL
Beryllium, SW-846 6010B	0.5	0.03
Copper, SW-846 6010B	2	0.09
Nickel, SW-846 6010B	4	0.11
Vanadium, SW-846 6010B	1	0.60
Zinc, SW-846 6010B	2	0.1
Antimony, SW-846 6010B	1	0.5
Cadmium, SW-846 6010B	1	0.03
Cobalt, SW-846 6010B	1	0.07
Silver, SW-846 6010B	1	0.07
Tin, SW-846 6010B	10	0.2
Barium, SW-846 6010B	1	0.09
Chromium, SW-846 6010B	1	0.04
Arsenic, SW-846 6020	0.5	0.05
Lead, SW-846 6020	0.1	0.02
Selenium, SW-846 6020	0.5	0.06
Thallium, SW-846 6020	0.1	0.002
Mercury, SW-846 7470/71B	0.0	0.003

MDL (Method detection limit) is the minimum concentration of the analyte that can be measured with a 99% probability that it is different from the "blank". MDL values are measured in the laboratory with a series of replicate analyses in a standard matrix, and are updated annually.

Reporting Limit refers to the laboratory's limit of quantitation, or the lowest concentration that can be reliably achieved for a particular analyte within routine operating conditions. Values lower than the Reporting Limit, but above the MDL, are considered estimated concentrations.

ug/Kg = micrograms per kilogram or parts per billion.

Table 5

Soil Nutrient and Structure Parameters
Analytes and Reporting Limits

Former DuPont Barksdale Site

Barksdale, Wisconsin

Compound	Soil Reporting Limit
Texture (1)	NA (2)
Sand	NA (2)
Silt	NA (2)
Clay	NA (2)
pH (Water)	Std Units
pH (0.01 M CaC12)	Std Units
Organic Matter (Ashing)	0.2%
Organic Matter (Walkley-Black)	0.1%
Total CaCo3	NA
Bulk Density	0.1 g/cm3
Hydrogen (CEC)	0.1%
Potassium (CEC)	0.1%
Magnesium (CEC)	0.1%
Calcium (CEC)	0.1%
Sodium (CEC)	0.1%
Moisture as Received	0.1%
Cation Exchange Capacity	0.1 meq/100g
Nitrogen, Total	5 mg/kg
Phosphorus	1 mg/kg
Potassium	1 mg/kg
Magnesium	1 mg/kg
Calcium	1 mg/kg
Sulfur	1 mg/kg
Sodium	1 mg/kg
Zinc	0.01 mg/kg
Manganese	0.01 mg/kg
Copper	0.01 mg/kg
Iron	0.01 mg/kg
Boron	0.01 mg/kg
Soluble Salts	0.1 mmhos/cm

(1) USDA system (Sand: 2mm-50um, Silt: 50-2um, Clay: <2um)
(2) NA = Not Applicable
(3) % of dry weight

Reporting Limit refers to the laboratory's limit of quantitation, or the lowest concentration that can be reliably achieved for a particular analyte within routine operating conditions. Reporting Limits are sample-specific, and will vary with invidivual samples.

Table 6

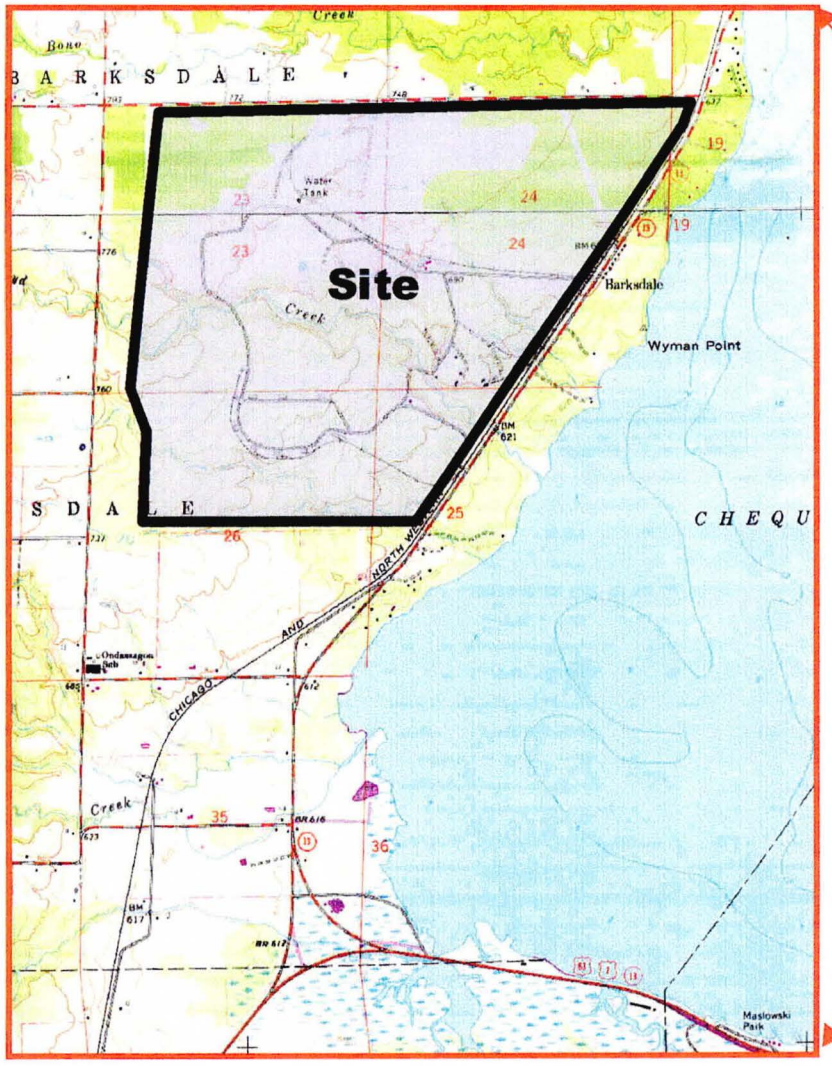
Project Schedule

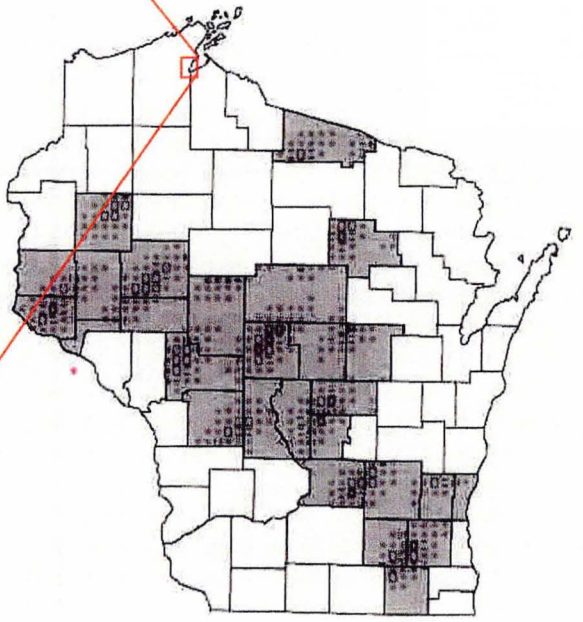
Former DuPont Barksdale Site

Barksdale, Wisconsin

Subtask	Date
Begin Direct Push and Hand Sampling	October 20, 2003
Complete 2003 Field Work	November 25, 2003
Submit Interim Report to WDNR	February 4, 2004
Begin Trench Sampling	April 23, 2004
Complete Trench Sampling	May 12, 2004
Field Survey	May 19, 2004
Submit Report to WDNR	July 20, 2004

FIGURES





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4200 Camp Ground Road
Louisville, Kentucky 40216

TITLE:

Site Location
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

DRAWN:	APPROVED:	PROJECT NO.:
JRH	CEP	7431
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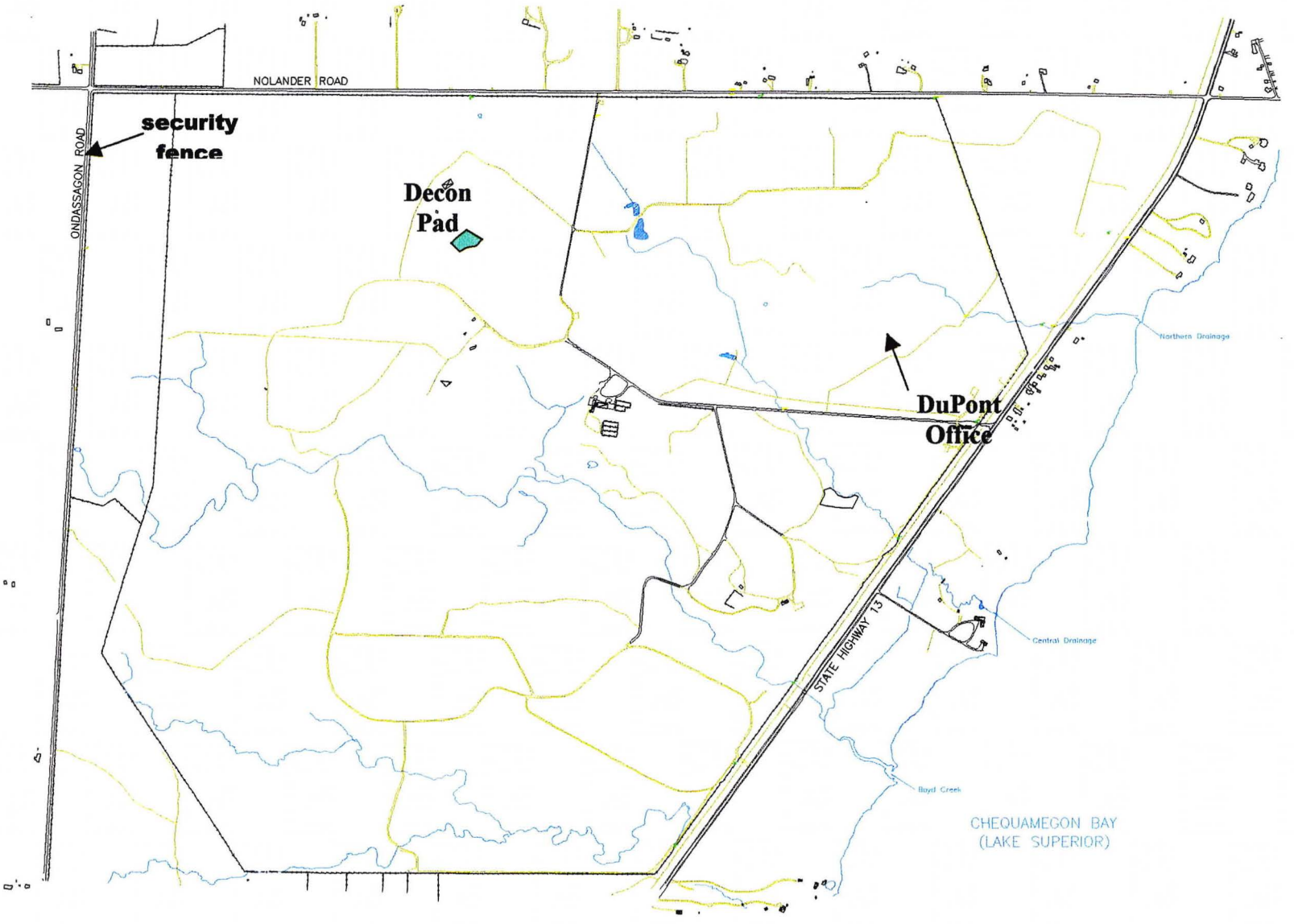

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TITLE:

Site Map
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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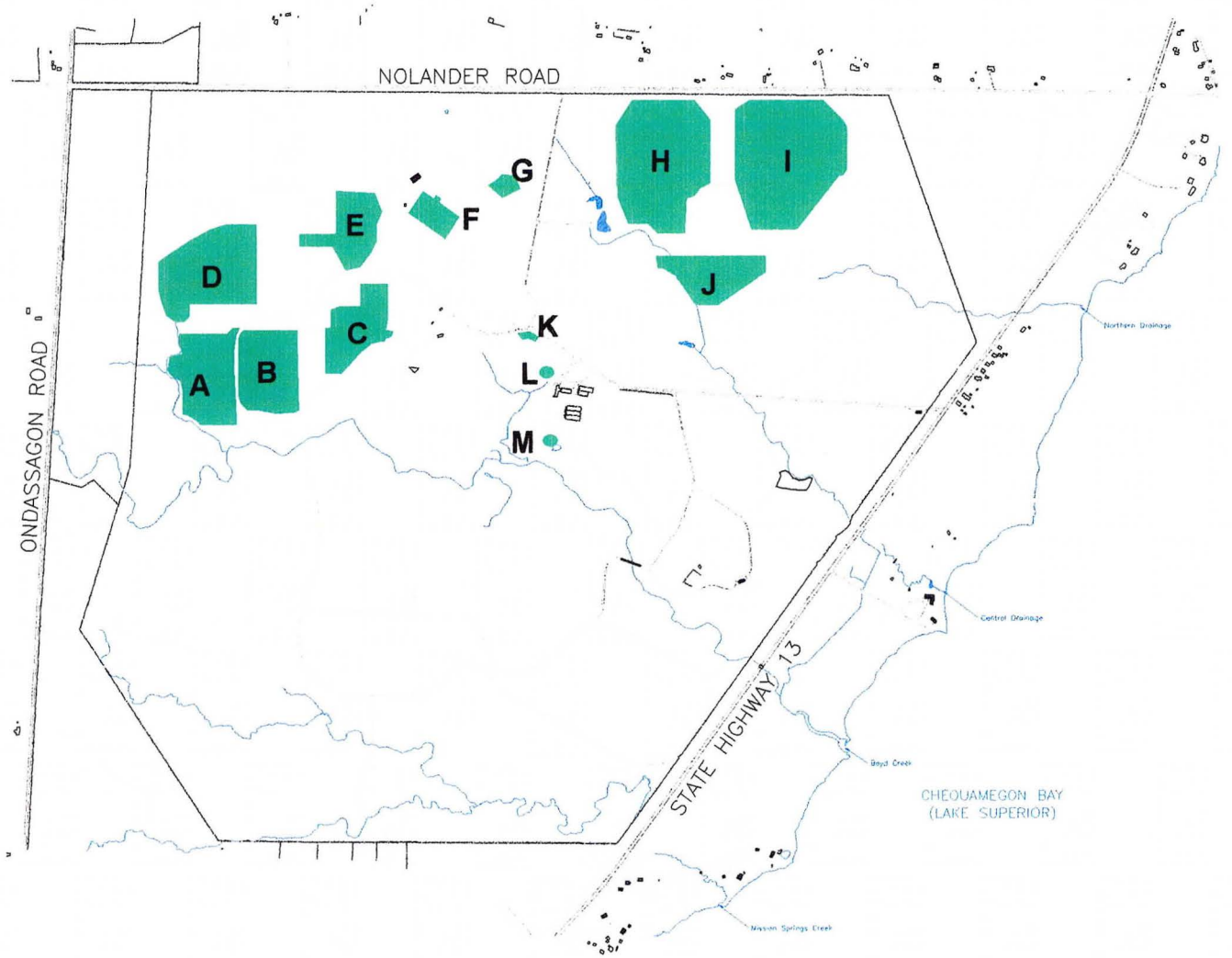

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A = TNT 3 & 5 and Reed Field
B = TNT 2 & 4
C = Lydol / Trivelene
D = TNT 6 & West Lines
E = Triton Finishing
F = Acid Recovery
G = Test Shot Grounds
H = TNT 7 - 10
I = TNX 1 - 5
J = Triton Refinery
K = Transformer Spill
L = Skid Area
M = Dynamite Lydol Melt

0 2000 4000

NORTH

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Louisville, Kentucky 40216

TITLE:

Sampling Areas
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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JRH	CEP	7431
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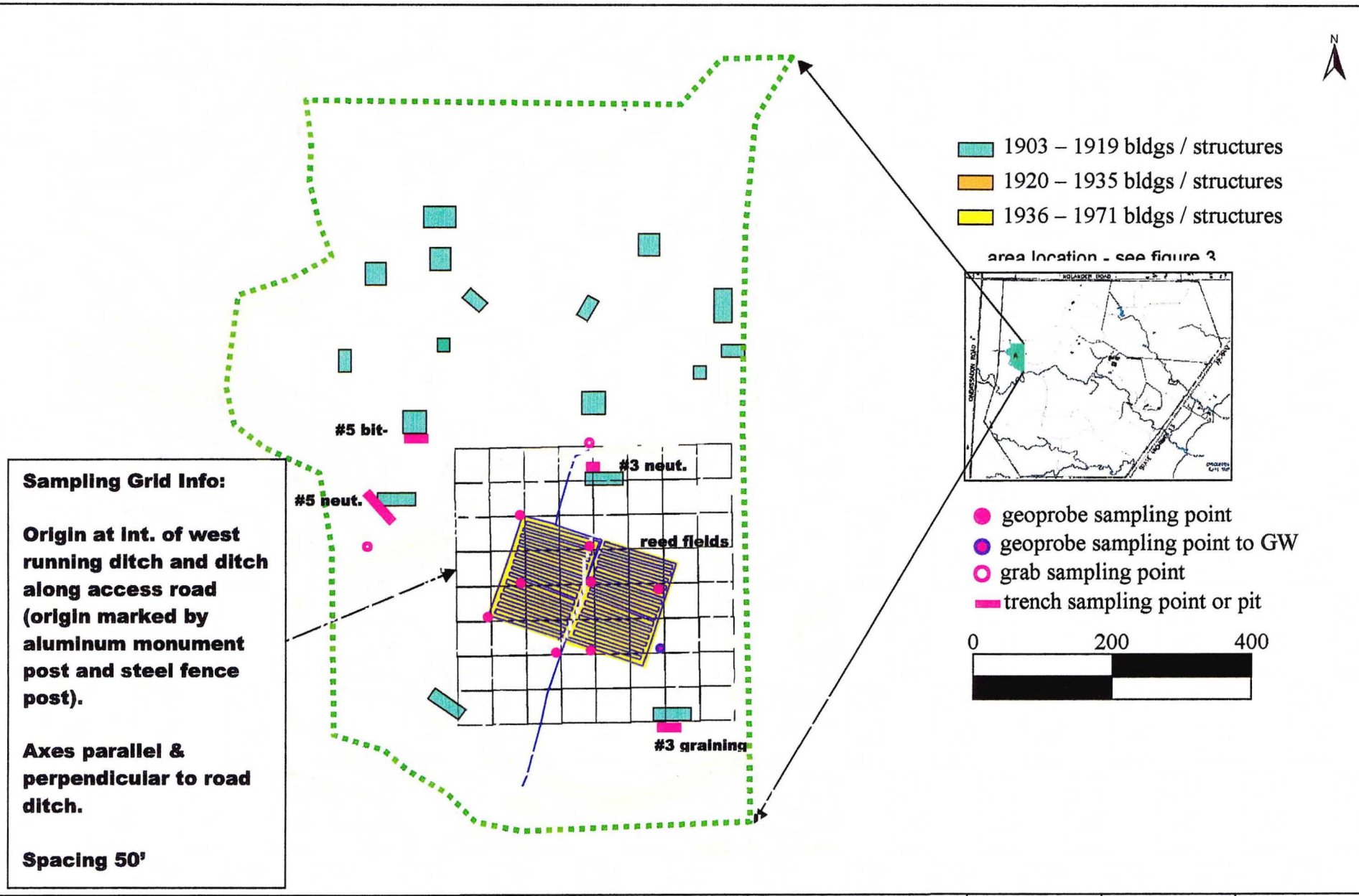

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TITLE:

TNT Numbers 3 & 5 and Reed Fields
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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JRH	CEP	7431
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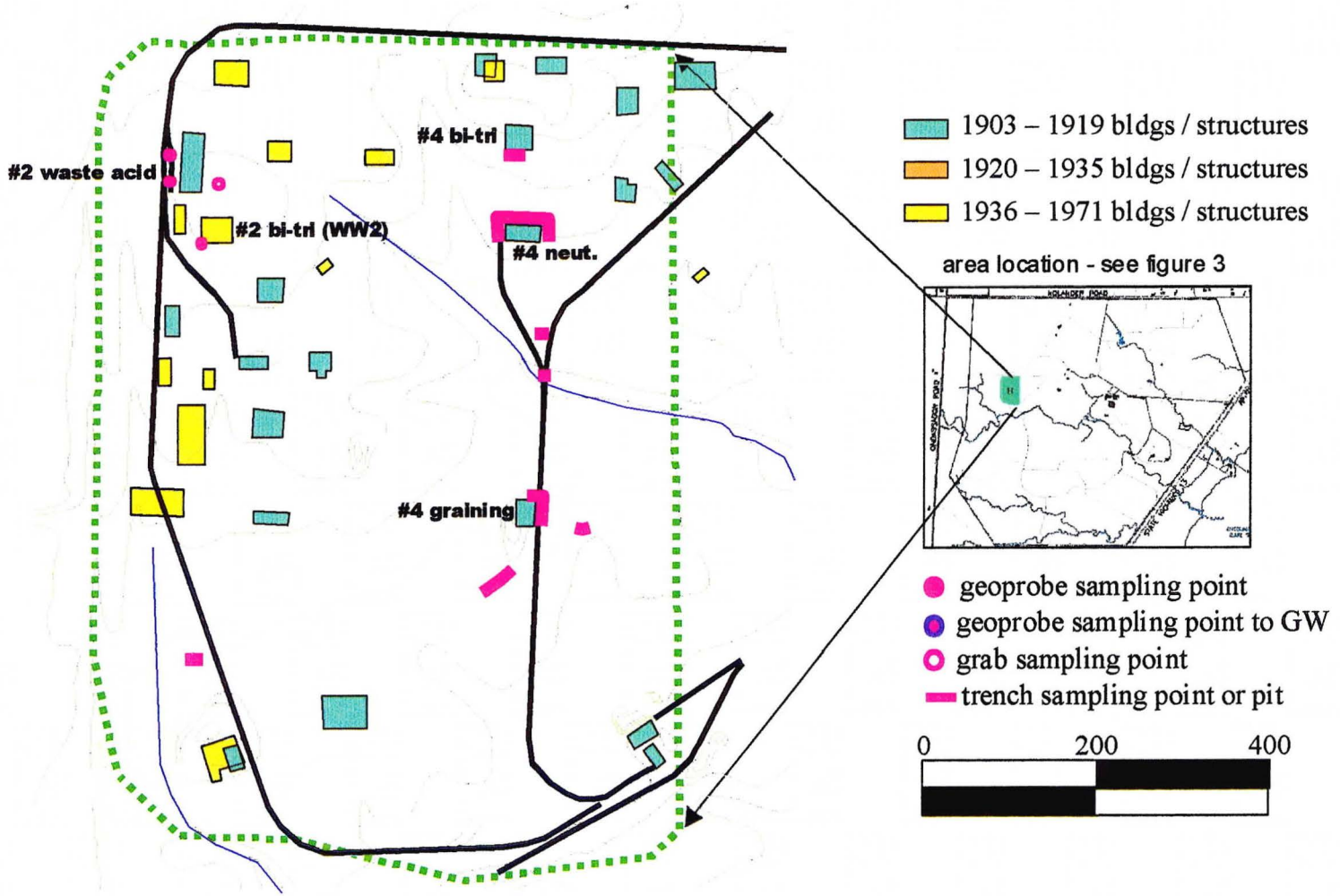

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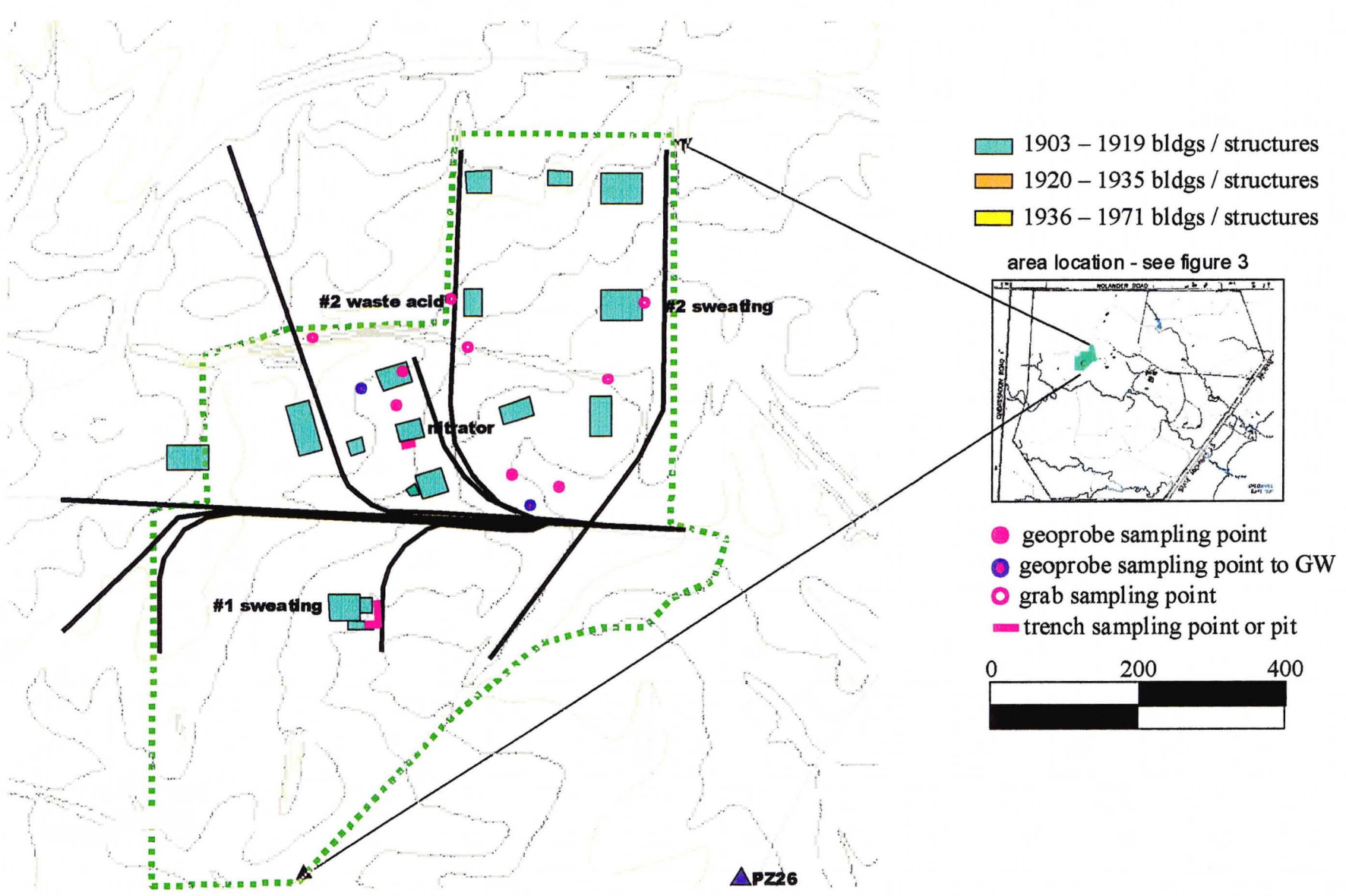

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Lydol/Trivelene
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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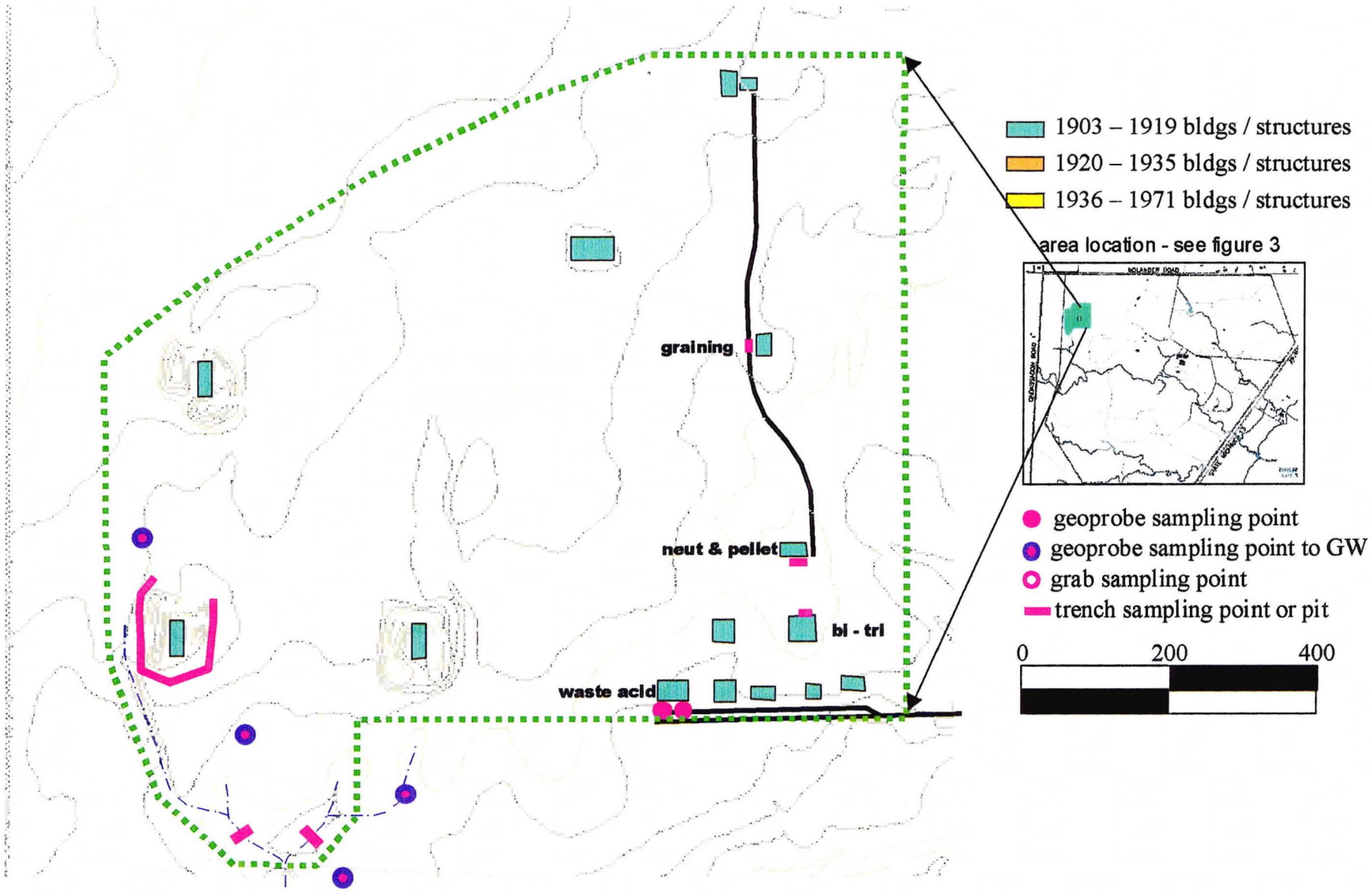

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TITLE:

TNT Number 6 and West Lines
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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CEP	08/22/2003	3D
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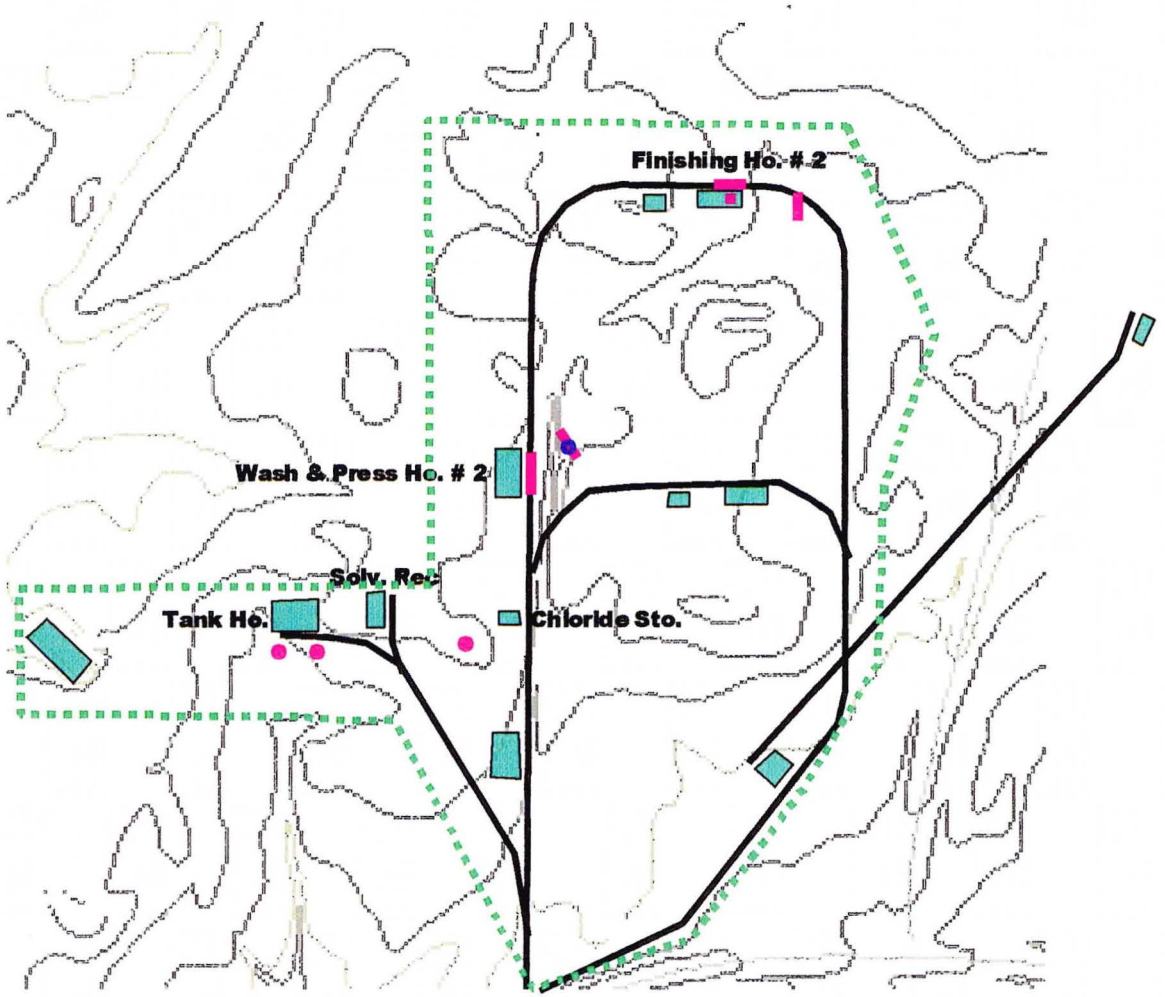
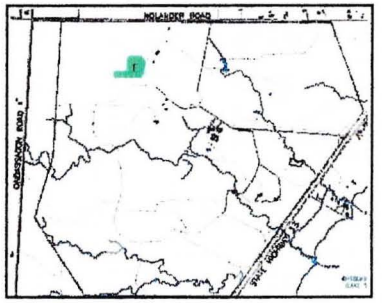


1903 – 1919 bldgs / structures
1920 – 1935 bldgs / structures
1936 – 1971 bldgs / structures

area location - see figure 3



geoprobe sampling point
geoprobe sampling point to GW
grab sampling point
trench sampling point or pit

0 200 400

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Louisville, Kentucky 40216

TITLE:

Triton Finishing
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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CHECKED:	DATE:	FIGURE NO.:
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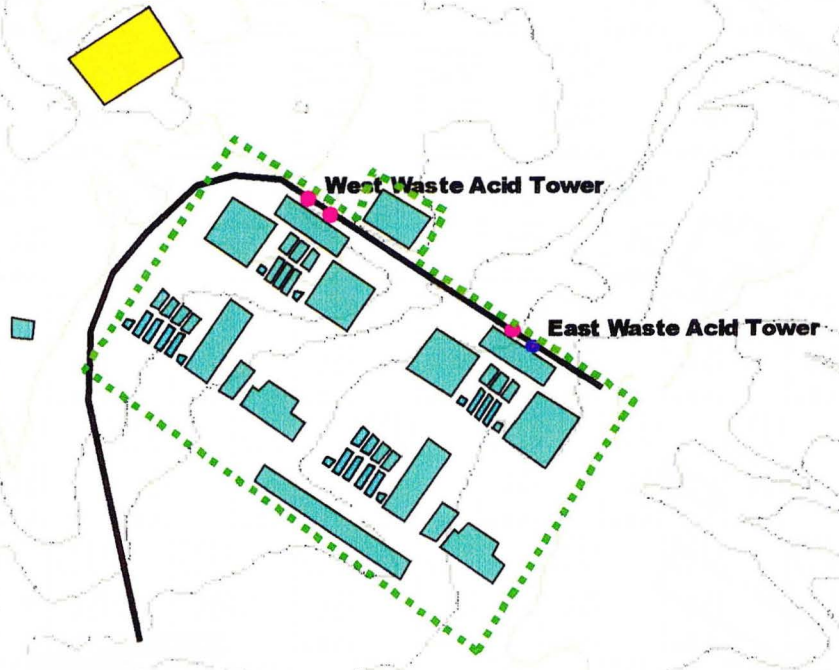

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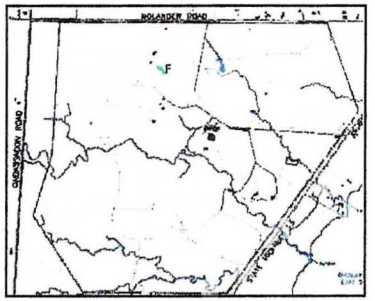
1903 – 1919 bldgs / structures
1920 – 1935 bldgs / structures
1936 – 1971 bldgs / structures

area location - see figure 3



geoprobe sampling point
geoprobe sampling point to GW
grab sampling point
trench sampling point or pit

0 200 400

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TITLE:

Waste Acid Recovery Towers
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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JRH	CEP	7431
CHECKED:	DATE:	FIGURE NO.:
CEP	08/22/2003	3F
FILE NAME:	REVISION:	
PAI Wkp Figs 3e f and g.ppt	0	

Sampling Grid Info:

Origin marked by aluminum monument post and steel fence post at north road edge (outside mow path) 550' from intersection to SE.

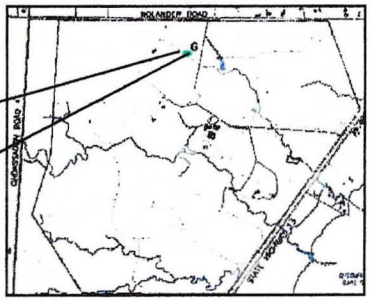
Axes parallel/perpendicular to road.

Spacing 50'

550'

1903 – 1919 bldgs / structures
1920 – 1935 bldgs / structures
1936 – 1971 bldgs / structures

area location - see figure 3



geoprobe sampling point
geoprobe sampling point to GW
grab sampling point
trench sampling point or pit

0 200 400

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TITLE:

Test Shot Areas
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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JRH	CEP	7431
CHECKED:	DATE:	FIGURE NO.:
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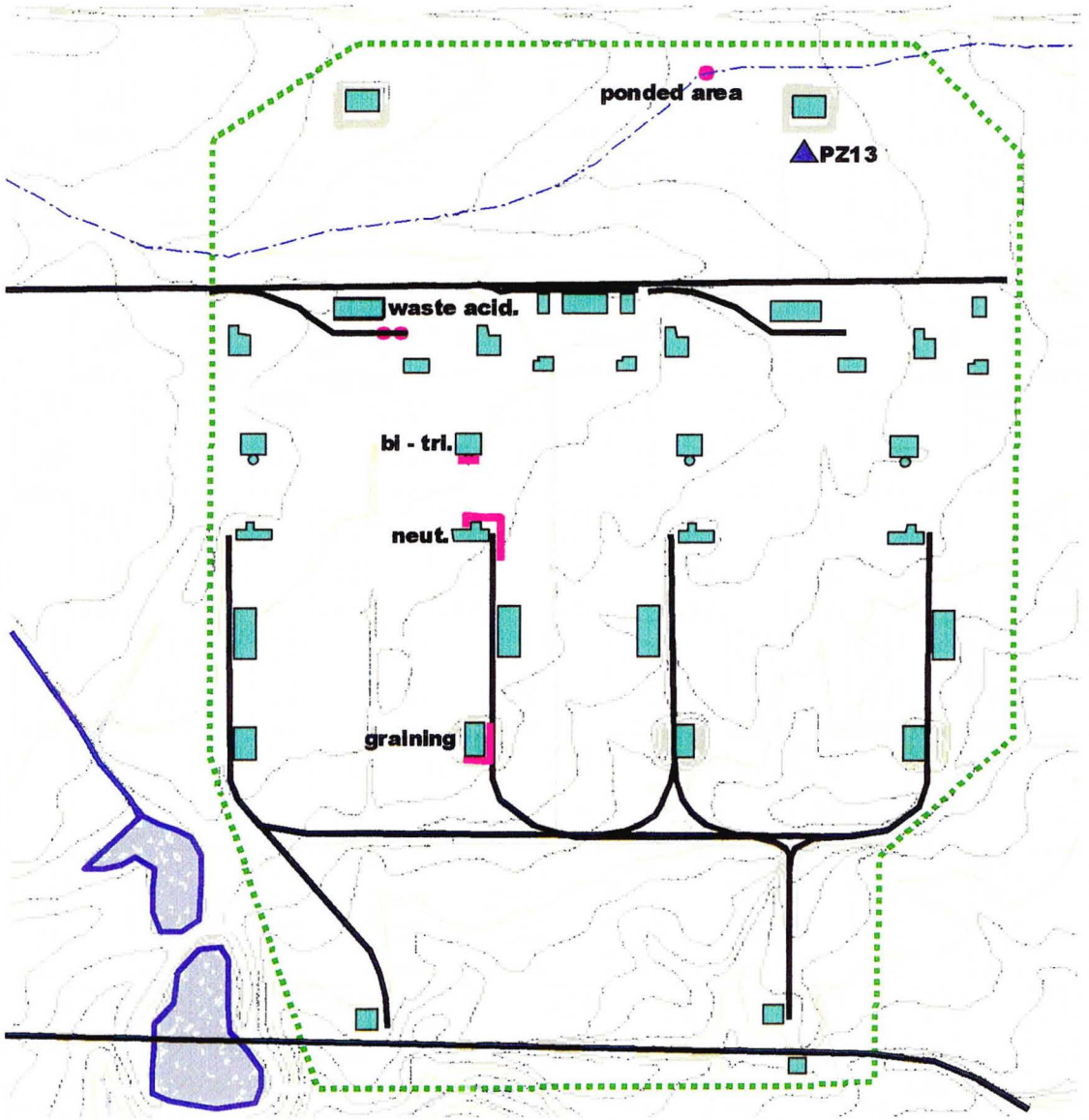

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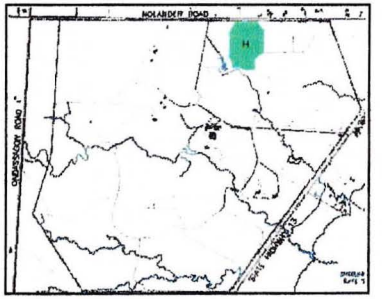
1903 – 1919 bldgs / structures
1920 – 1935 bldgs / structures
1936 – 1971 bldgs / structures

area location - see figure 3



geoprobe sampling point
geoprobe sampling point to GW
grab sampling point
trench sampling point or pit

0 250 500

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TITLE:

TNT Numbers 7 thru 10
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

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JRH	CEP	7431
CHECKED:	DATE:	FIGURE NO.:
CEP	08/22/2003	3H
FILE NAME:	REVISION:	
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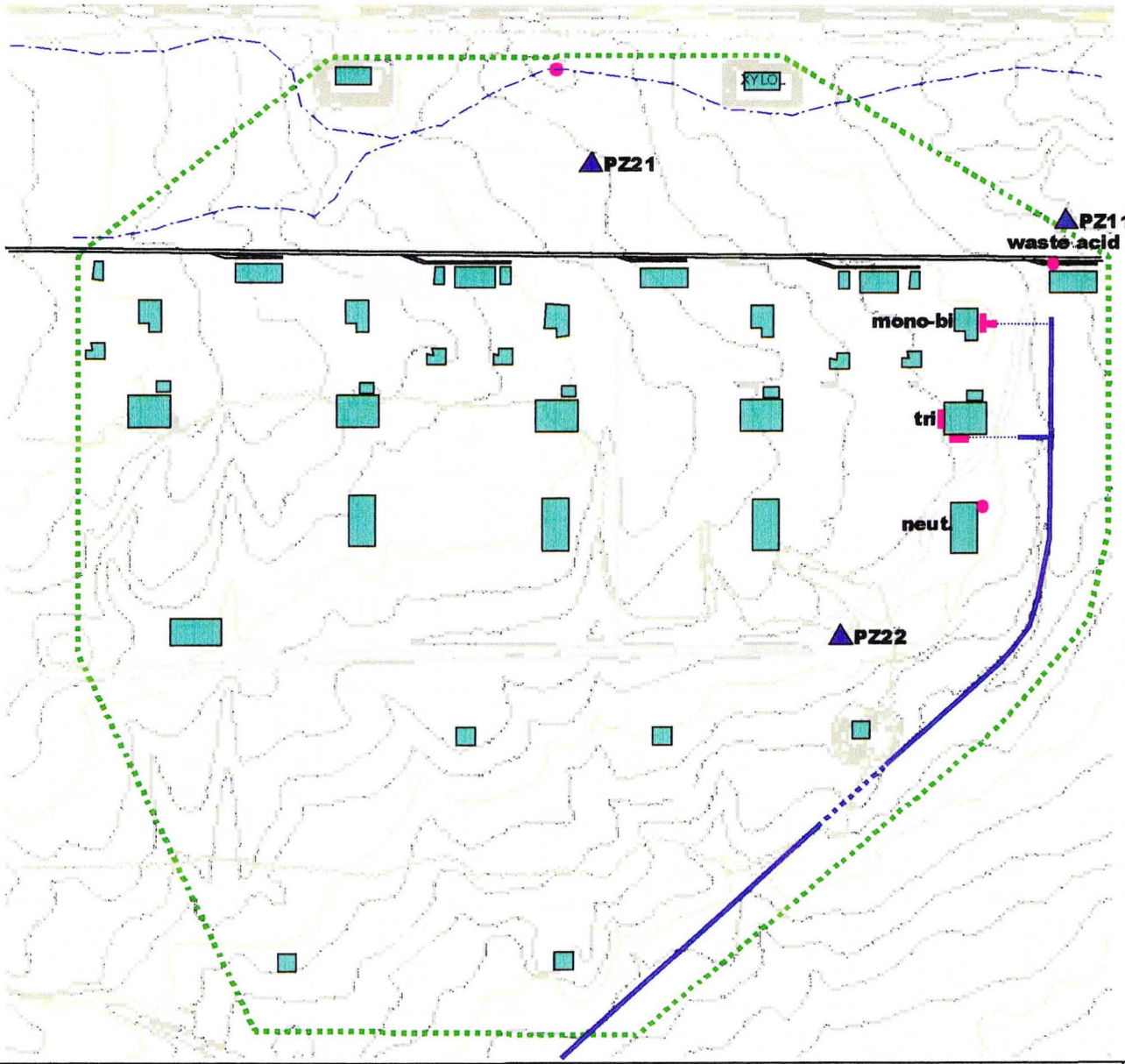
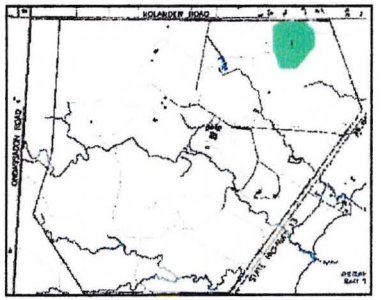


N

1903 – 1919 bldgs / structures
1920 – 1935 bldgs / structures
1936 – 1971 bldgs / structures

area location - see figure 3



geoprobe sampling point
geoprobe sampling point to GW
grab sampling point
trench sampling point or pit

0 250 500

DUPONT
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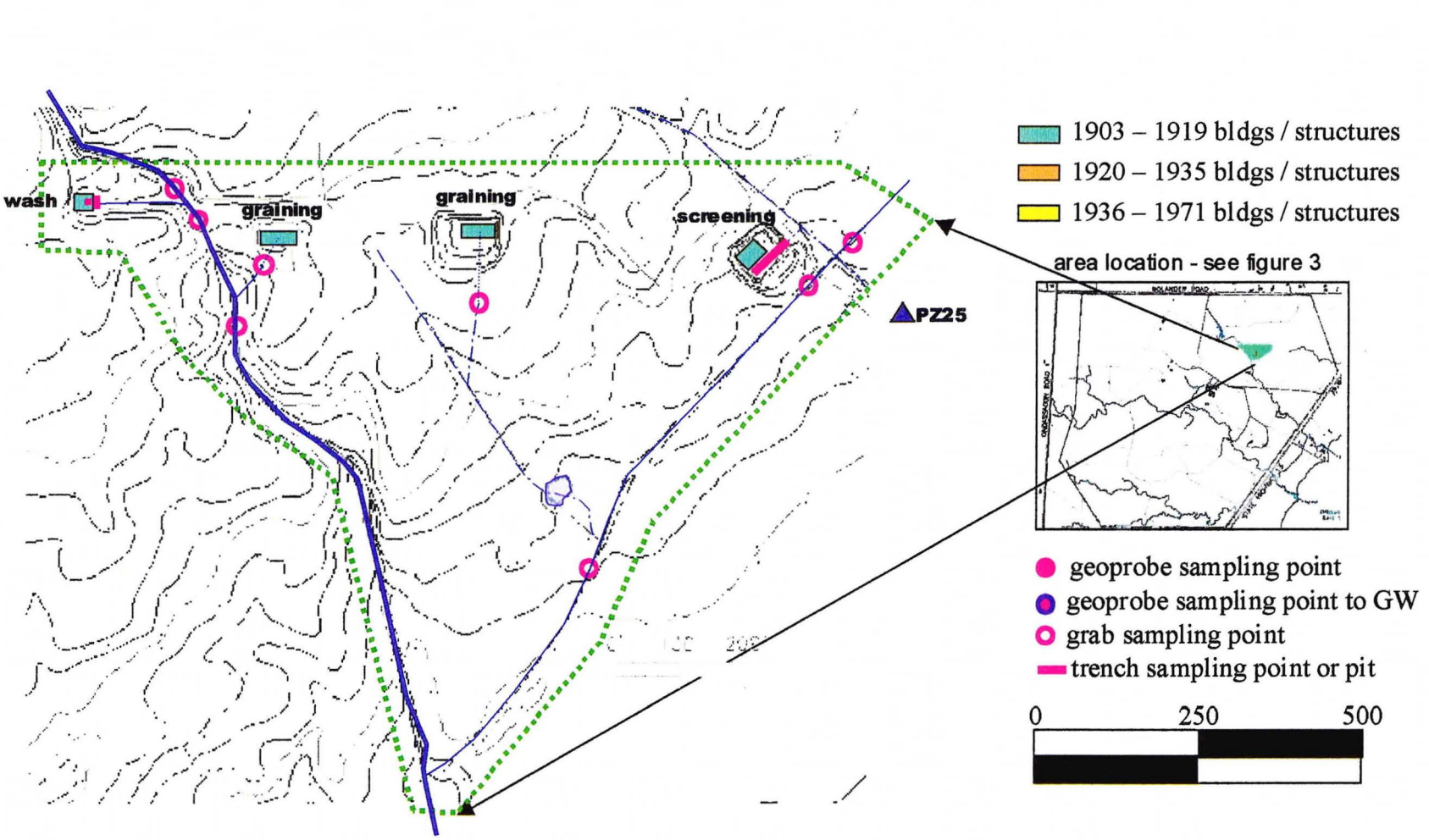
TITLE:

TNX Numbers 1 thru 5
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

DRAWN:	APPROVED:	PROJECT NO.:
JRH	CEP	7431
CHECKED:	DATE:	FIGURE NO.:
CEP	08/22/2003	3I
FILE NAME:	REVISION:	
PAI Wkp Figs 3h i and j.ppt	0	



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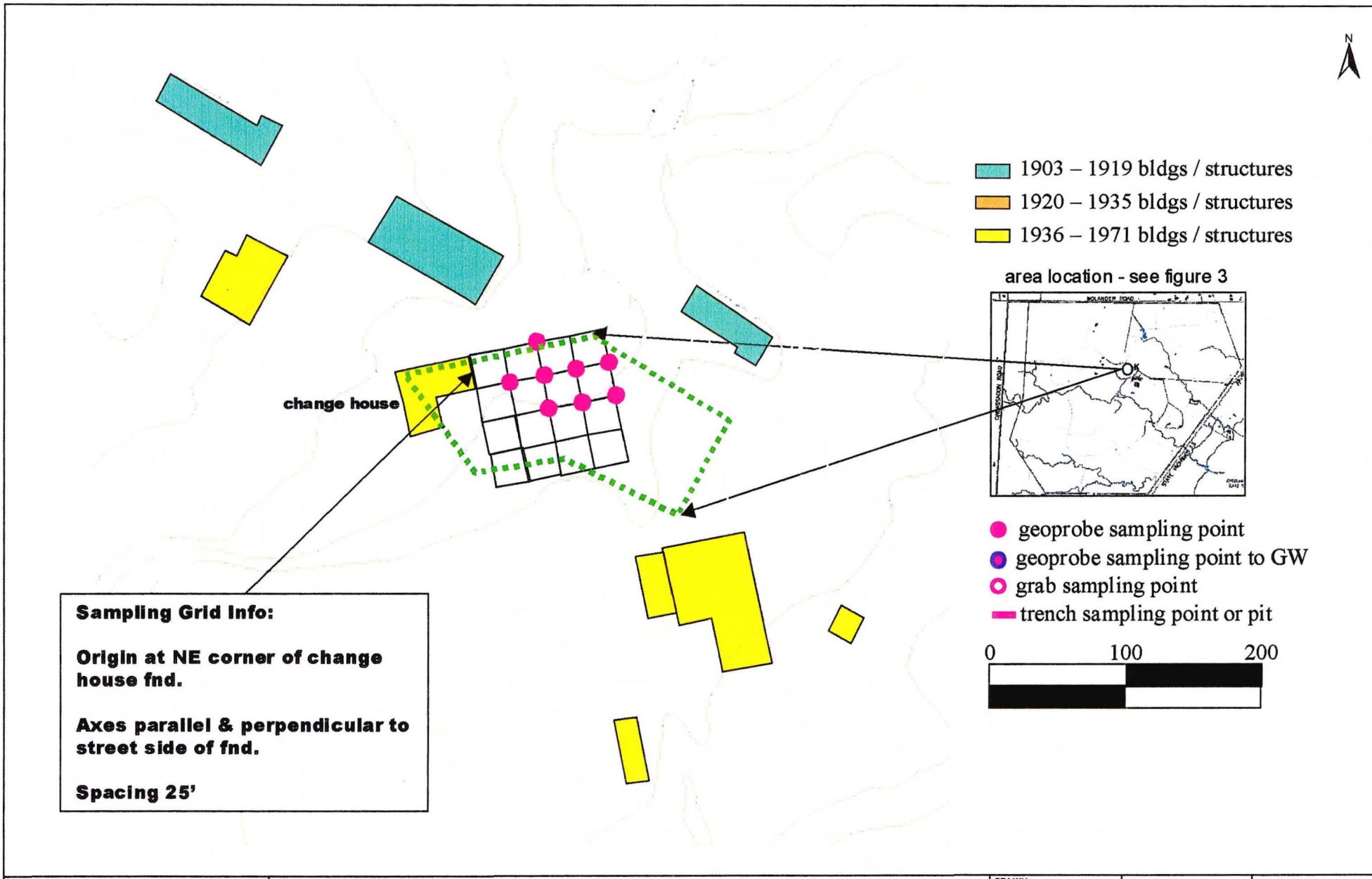
4200 Camp Ground Road
Louisville, Kentucky 40216

TITLE:

Triton Refinery
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

DRAWN:	APPROVED:	PROJECT NO.:
JRH	CEP	7431
CHECKED:	DATE:	FIGURE NO.:
CEP	08/22/2003	3J
FILE NAME:	REVISION:	
PAI Wkp Figs 3h I and J.ppt	0	



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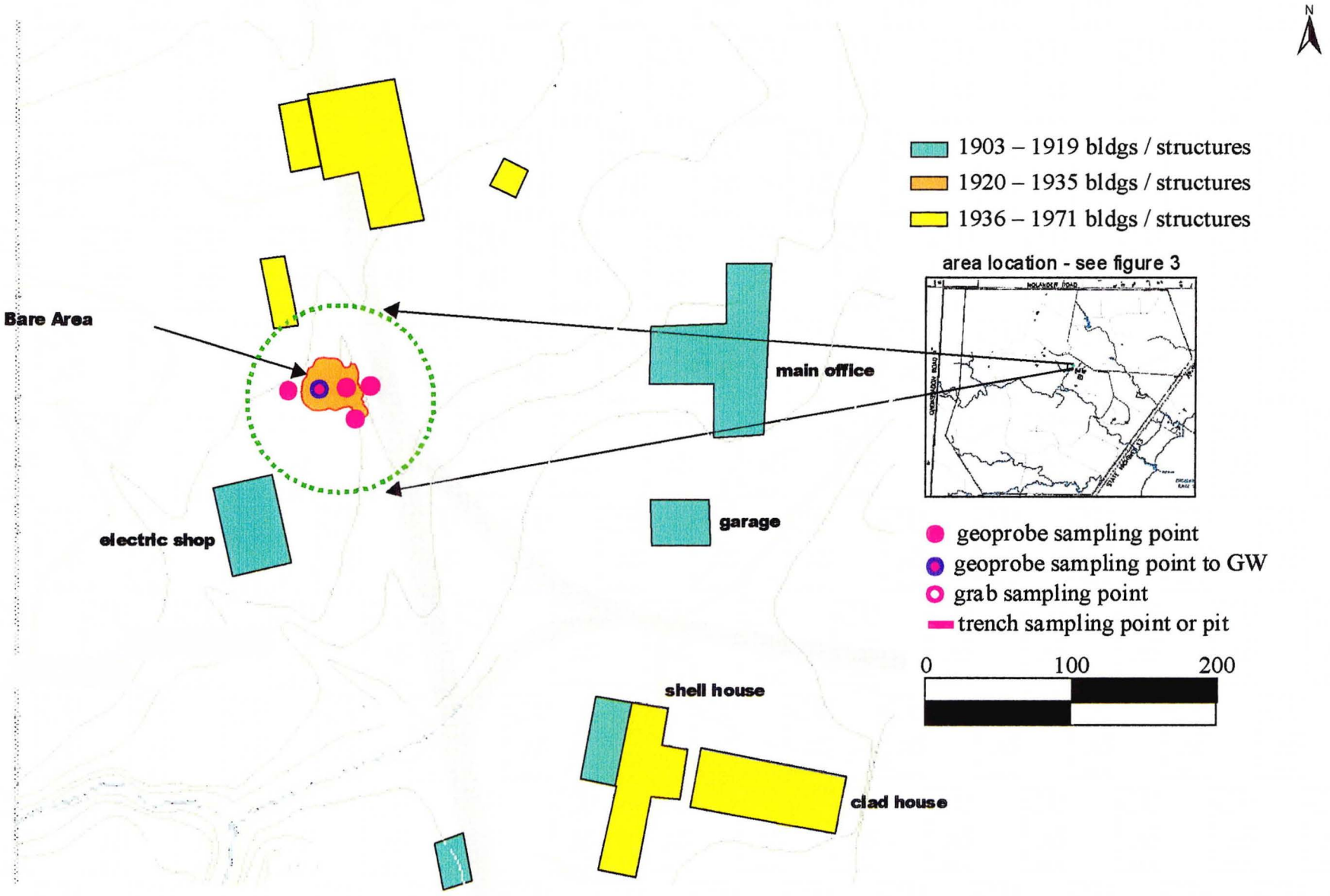
4200 Camp Ground Road
Louisville, Kentucky 40216

TITLE:

Transformer Spill Area
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

DRAWN:	APPROVED:	PROJECT NO.:
JRH	CEP	7431
CHECKED:	DATE:	FIGURE NO.:
CEP	08/22/2003	3K
FILE NAME:	REVISION:	
PAI Wkp Figs 3j k l and m.ppt	0	



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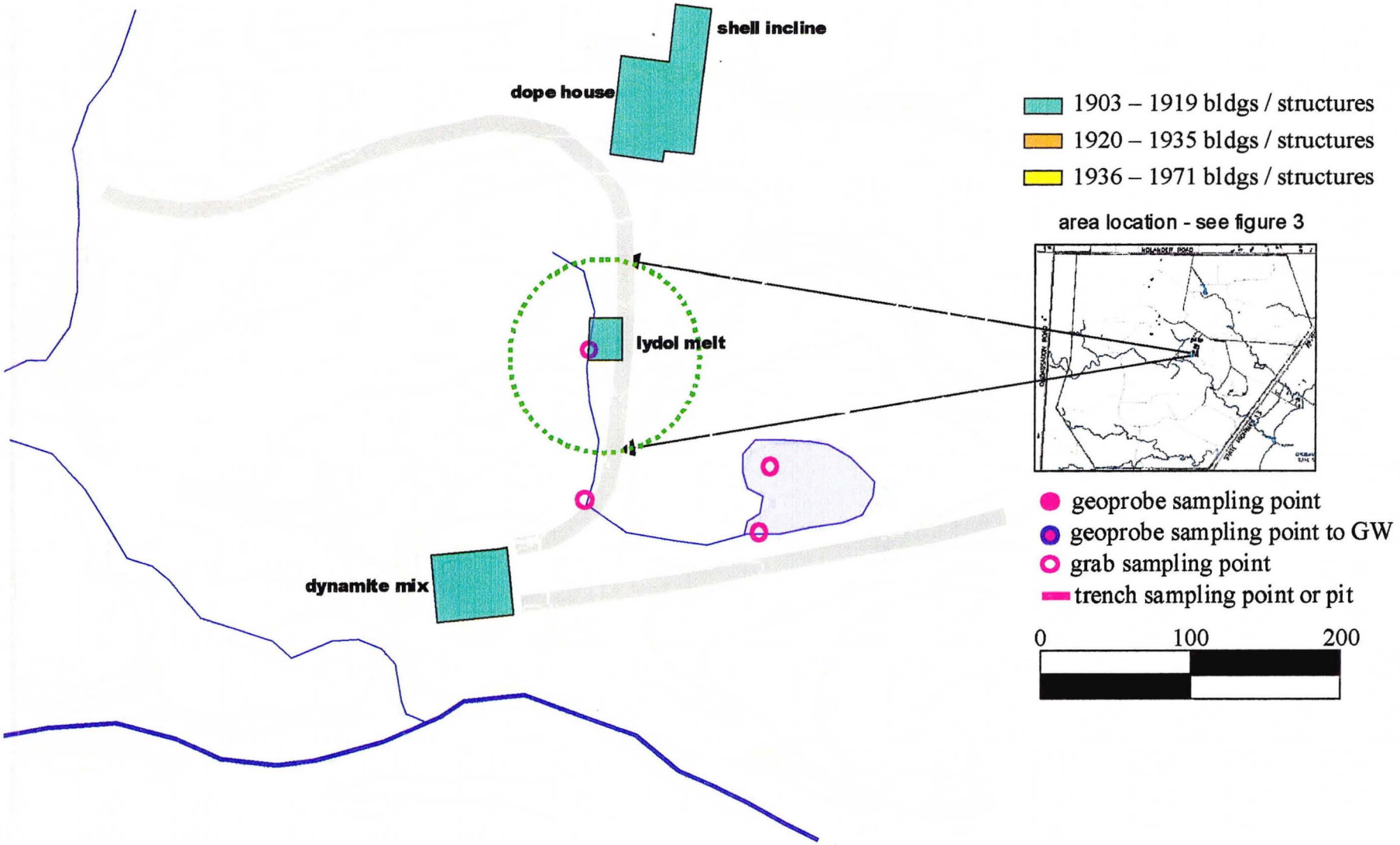
Louisville, Kentucky 40216

TITLE:

Dynamite Skid Area
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

DRAWN:	APPROVED:	PROJECT NO.:
JRH	CEP	7431
CHECKED:	DATE:	FIGURE NO.:
CEP	08/22/2003	3L
FILE NAME:	REVISION:	
PAI Wkp Figs 3j k l and m.ppt	0	



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Louisville, Kentucky 40216

TITLE:

Dynamite Lydol Melt Area
Production Area Investigation Work Plan
Former DuPont Barksdale Works
Barksdale, Wisconsin

DRAWN:	APPROVED:	PROJECT NO.:
JRH	CEP	7431
CHECKED:	DATE:	FIGURE NO.:
CEP	08/22/2003	3M
FILE NAME:	REVISION:	
PAI Wkp Figs 3j k l and m.ppt	0	