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NAS CECIL FIELD, FL
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TECHNICAL MEMORANDUM FOR CONFIRMATION SAMPLING FOR LEAD AT OPERABLE UNIT 5 (OU 5) SITE 15 BLUE 10 ORDNANCE DISPOSAL AREA NAS CECIL FIELD FL

10/14/2005

TETRA TECH NUS INC

TECHNICAL MEMORANDUM
CONFIRMATION SAMPLING FOR LEAD AT SITE 15
NAS CECIL FIELD
JACKSONVILLE, FLORIDA
October 14, 2005

Identifying Areas of Excavation

The reuse plan for NAS Cecil Field stipulates that Site 15 will be maintained as a green space with no planned development for the site. Therefore, it was agreed by the BCT the site would be remediated to be protective of recreational receptors (infrequent use) and ecological receptors (insectivorous birds and mammals). To achieve protection of human receptors, it was concluded that soil with lead concentrations greater than 6,500 mg/kg would need to be excavated. In addition, protection of insectivorous mammals requires that 2-acre exposure units have average soil lead concentrations less than 2,512 mg/kg. To achieve this average lead concentration in 2-acre exposure units, excavation of soil with lead concentrations greater than 4,000 mg/kg would need to be excavated in 2 of these exposure units. The areas identified for excavation of lead-contaminated soil are illustrated in Figure 1.

The excavation lines that were drawn to represent isoconcentration contours of these lead concentrations (6,500 mg/kg and 4,000 mg/kg) were based on geostatistical analysis. The geostatistical analysis included an exploratory data analysis to analyze the spatial and statistical distribution of lead, a structural analysis to determine the spatial correlation of lead samples, and an estimation of soil lead concentrations in locations where no soil samples were collected. This method of estimation is referred to as point kriging. Inherent with the geostatistical analysis is a degree of uncertainty associated with the estimation of soil lead concentrations in locations where there are no samples. Certainly, the high number of samples collected at Site 15 reduces this uncertainty. Additionally, the details in the exploratory data analysis to demonstrate that lead concentrations clearly follow a northwest to southeast trend as a result of rounds fired from the similarly aligned trap and skeet ranges reduce uncertainty.

Because of the inherent uncertainty associated with the prediction of the isoconcentration contours, it was agreed that additional sampling near these contours would be conducted to confirm that the concentrations are less than or equal to the excavation concentrations.

Determining the Location of Confirmation Samples

The objective of the confirmation sampling is to ensure that the isoconcentration contours accurately represent the excavation concentrations. The tools within the software, Spatial Analysis and Decision Assistance (SADA), assist in the visualization, geospatial analysis, and statistical analysis of the data. The components within the software can help quantitatively estimate the degree of uncertainty associated with point estimates of data.

This aspect of the software is referred to as cross validation. When conducting the cross validation, the SADA software estimates the error in the value of existing data. Cross validation is performed on each existing data point by removing that data point from the available set of data points and estimating the value at the location of the removed spot.

The SADA software is also able to interpolate the data, as the geostatistical software did to estimate the excavation lines. It uses various interpolation methods including "nearest neighbor," the simplest approach, as well as kriging, the most sophisticated approach, that was used to define the isoconcentration contours. Because of the large number of sampling points, cross validation that was conducted on approaches more sophisticated than the nearest neighbor approach did not demonstrate much uncertainty, i.e., estimated concentrations are essentially equivalent to actual concentrations. To determine where to sample, areas of greatest uncertainty were used to define the sampling locations. The nearest neighbor approach, because of its simplicity, results in the clearest identification of areas of uncertainty. Therefore, this approach was used as the basis for establishing confirmation sample locations.

In the nearest neighbor approach, each point of estimation becomes equal in value to its nearest neighbor. Clearly, this indicates that each point would have the greatest degree of uncertainty relative to the other approaches. Figure 2 illustrates the degree of uncertainty associated with each point using the cross validation analysis. Points colored blue show the highest degrees of uncertainty. Therefore, those points in blue near the excavation lines are those areas where confirmation sampling would be focused.

Figure 3 focuses on the lead excavation areas in the northern area of Site 15. In Area A, there is a small area where lead greater than 6,500 mg/kg is proposed for excavation and a larger area where lead greater than 4,000 mg/kg is proposed for excavation. The greatest uncertainty (red dots) in this area lies between the two zones in Area A and to the east of the larger zone in Area A. Therefore, based on this uncertainty, one sample at each location is proposed to confirm that levels are less than or approximately equal to the excavation limits.

In Area B (Figure 3), the greatest uncertainty is with those samples located to the east, which are less than 400 mg/kg. Therefore, based on this uncertainty, one sample at each corner is proposed to confirm that levels are less than or approximately equal to 6,500 mg/kg.

In Area C (Figure 3), all samples surrounding this zone have considerable low uncertainty (purple dots). Therefore, based on this low degree of uncertainty, no samples are proposed in this area.

Figure 4 focuses on the lead excavation areas in the southern area of Site 15. In Area D, two adjacent zones are identified. The excavation lines in the two zones are defined by a lead concentration of 6,500 mg/kg. Uncertainty lies in the northern part of the larger zone with lower concentrations to the northeast and concentrations between 400 and 4,000 mg/kg to the north. Therefore, a confirmation sample to the north of this zone is

proposed. Concentrations significantly drop from greater than 6,500 mg/kg to less than 400 mg/kg to the south of these zones. Therefore, a sample is proposed between the adjacent southern corners of these two zones. A significant decrease in the concentration is also noted in the northwest corner of the smaller zone with large uncertainty noted in that direction. Therefore, a sample is proposed in this northwestern corner of the smaller zone.

In Area E (Figure 4), the greatest uncertainty exists on the western side of the excavation zone. Therefore, one sample north of this location and one sample south of this location are proposed to confirm that concentrations are less than or approximately equal to 6,500 mg/kg.

In Area F (Figure 4), the greatest uncertainly exists to the northeast and to the west of the excavation zone. These samples in this direction are less than 400 mg/kg. Therefore, samples are proposed on the northern and western corners of the excavation.

Sampling and Analysis

An illustration of all excavation areas and proposed sampling locations is presented in Figure 5.

The sampling activities, quality assurance/quality control (QA/QC) procedures, and data validation requirements for field activities described in this work plan are in general agreement with the U.S. EPA Region IV Environmental Investigation Standard Operating Procedures (SOPs) and Quality Assurance Manual (EISOPQAM), FDEP SOPs FS3000, Remedial Investigation report for Sites 36 and 37, and current Tetra Tech NUS, Inc. (TtNUS) SOPs. Florida Administrative Code (FAC) 62-160, Quality Assurance Rule (FAC 62-160) was updated in April of 2002 and incorporates new SOPs developed and adopted by the FDEP for the collection and analysis of environmental media. Accordingly, the soil and groundwater activities that will be conducted in this work plan will abide by SOPs FS3000 (for soil) which reference additional applicable SOPs as necessary.

The surface soil samples (0 to 1 foot bgs) will be collected as grab samples using a plastic, disposable trowel. The proposed soil sample locations shall be surveyed by a registered land surveyor or located using GPS prior to sampling and marked with a wooden stake or pin flag labeled with the sample identification.

Personnel protection equipment and other waste trash (e.g. disposable trowels) will not be considered hazardous and will be disposed in a municipal landfill. Such trash will be collected in a plastic bag and disposed in a suitable trash receptacle. Removed soil from the surface soil sampling in excess of sampling volume requirements will be placed back on the ground.

Requirements for sample handling, bottleware, preservation, and holding time for the analyses proposed for this sampling event are as identified in the following table:

Analysis	Analytical Method	Bottleware	Preservation	Holding Time[1]
Lead	SW-846 6010B	8-oz. glass jar	Cool to 4°C	180 days to analysis

[1] Holding times are measured from the date/time of sample collection.

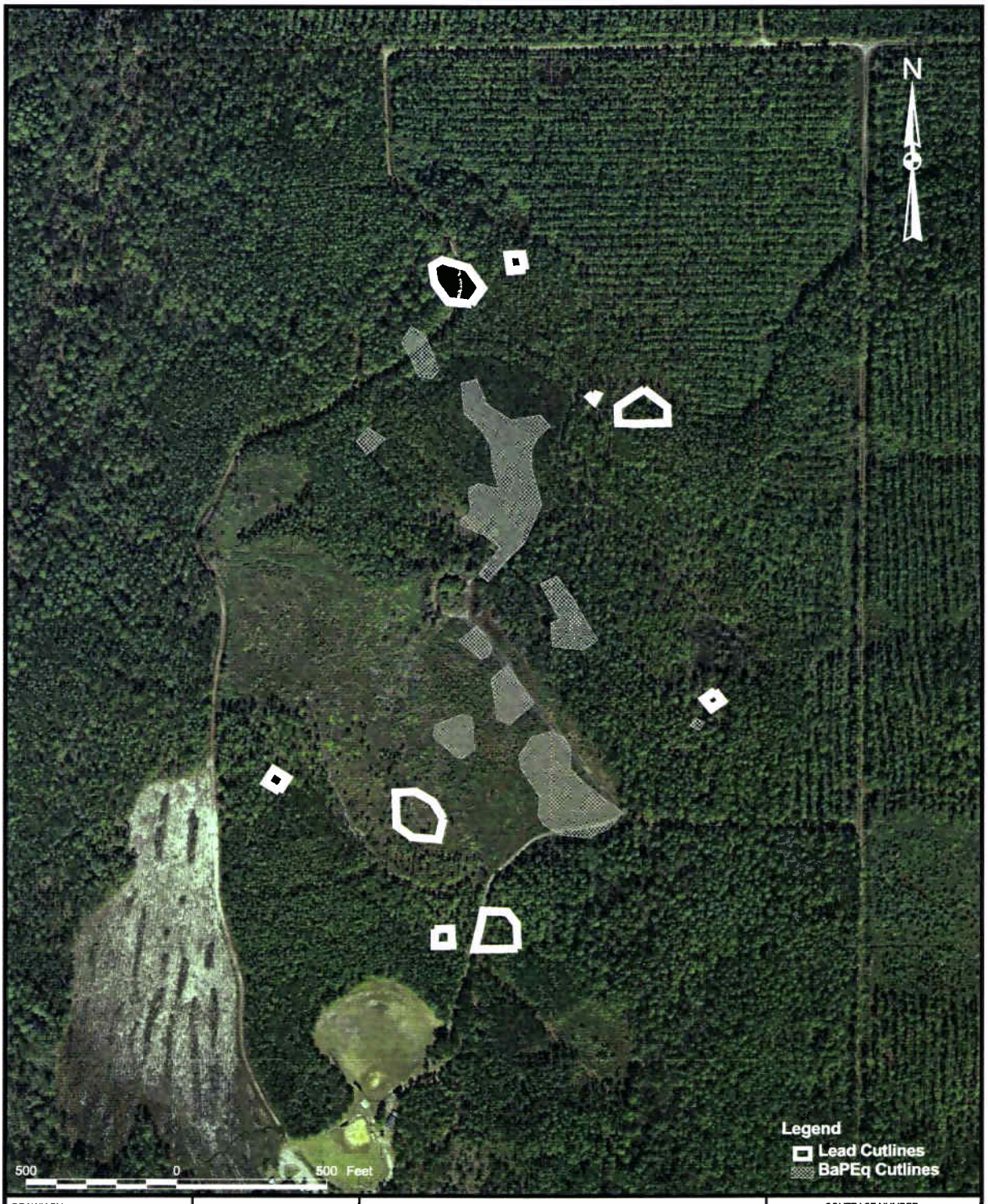
Analytical results will be reported on a 28-day turn around basis.

As agreed upon by the BCT, the collection of rinsate and trip blanks has been eliminated at NAS Cecil Field. In addition, field blanks will not be collected during this sampling program because there will be minimal decontamination of sampling equipment. In accordance with these changes, the following table summarizes the frequency and type of field Quality Assurance/Quality Control (QA/QC) samples to be collected for this sampling program.

Type of Samples	Frequency	Samples to be Collected
Field Duplicate	1/10 sample/matrix	1 soil
Lab MS/MSD	1/20 samples/matrix	1 soil [1]

(1) MS/MSD is a laboratory QA/QC requirement, separate samples not required, only additional volume (2x).

As agreed upon by the BCT, formal data validation has been eliminated from the installation restoration program at NAS Cecil Field. However, the analytical data packages generated by the analytical laboratory will be reviewed by Tetra Tech NUS personnel to eliminate false positives and false negative results.



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CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV 0

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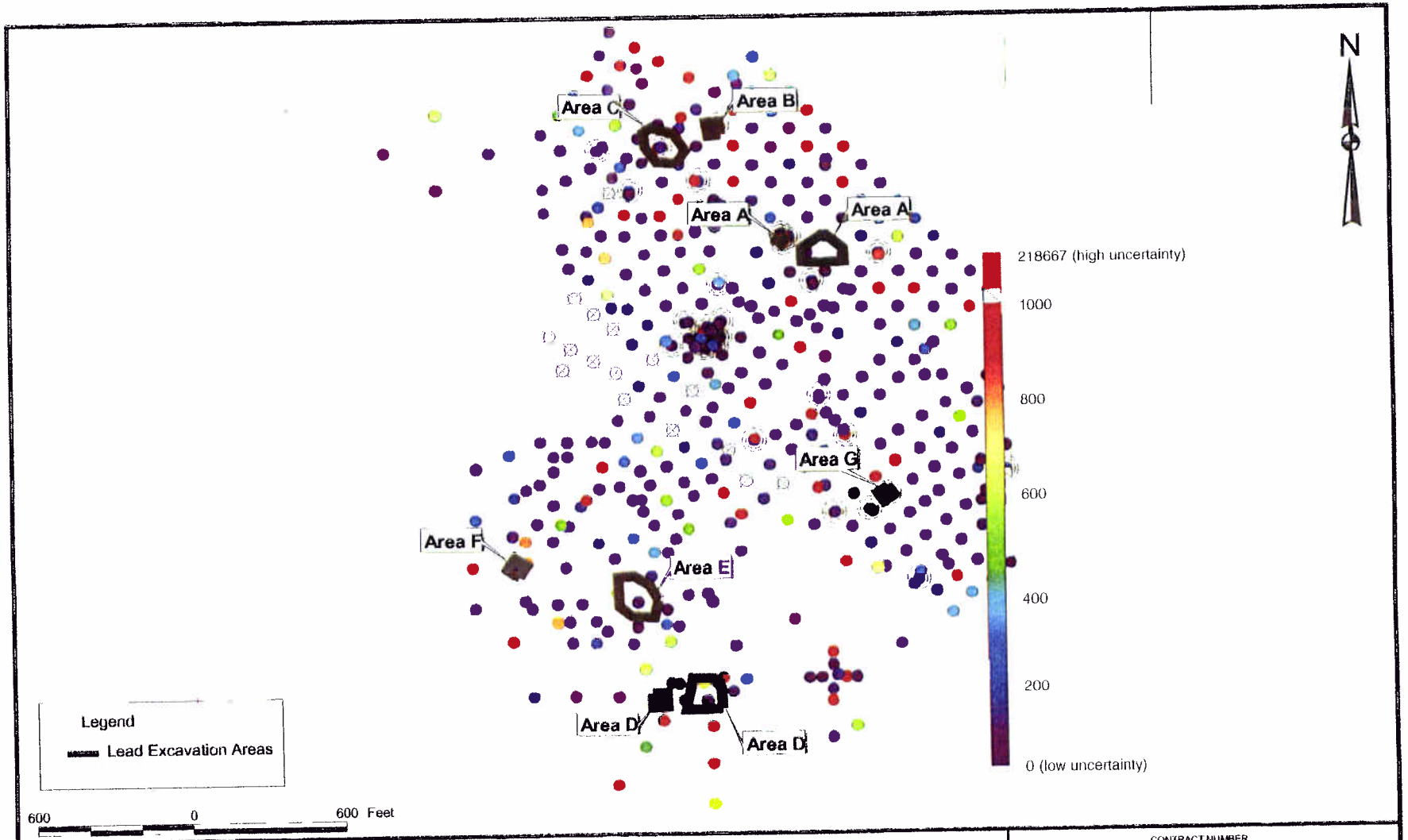

DRAWN BY MJJ	DATE 12Oct05	CROSS VALIDATION ANALYSIS MAP OPERABLE UNIT 5, SITE 15 INTERIM REMEDIAL ACTION REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 2 / REV 0

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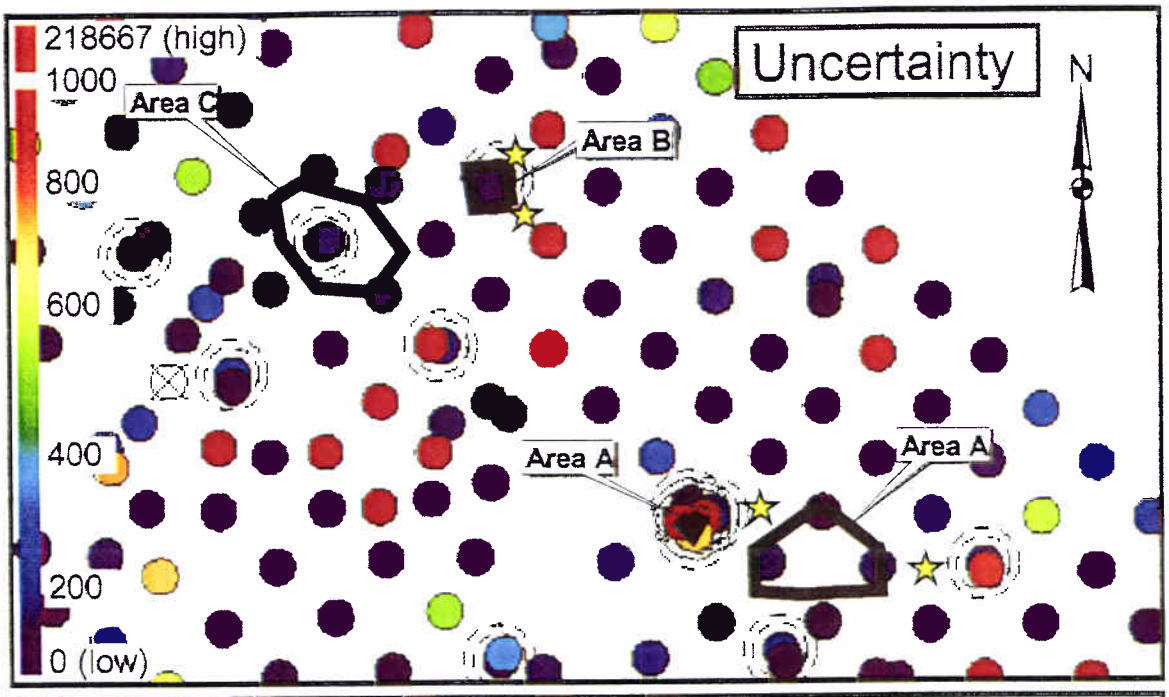

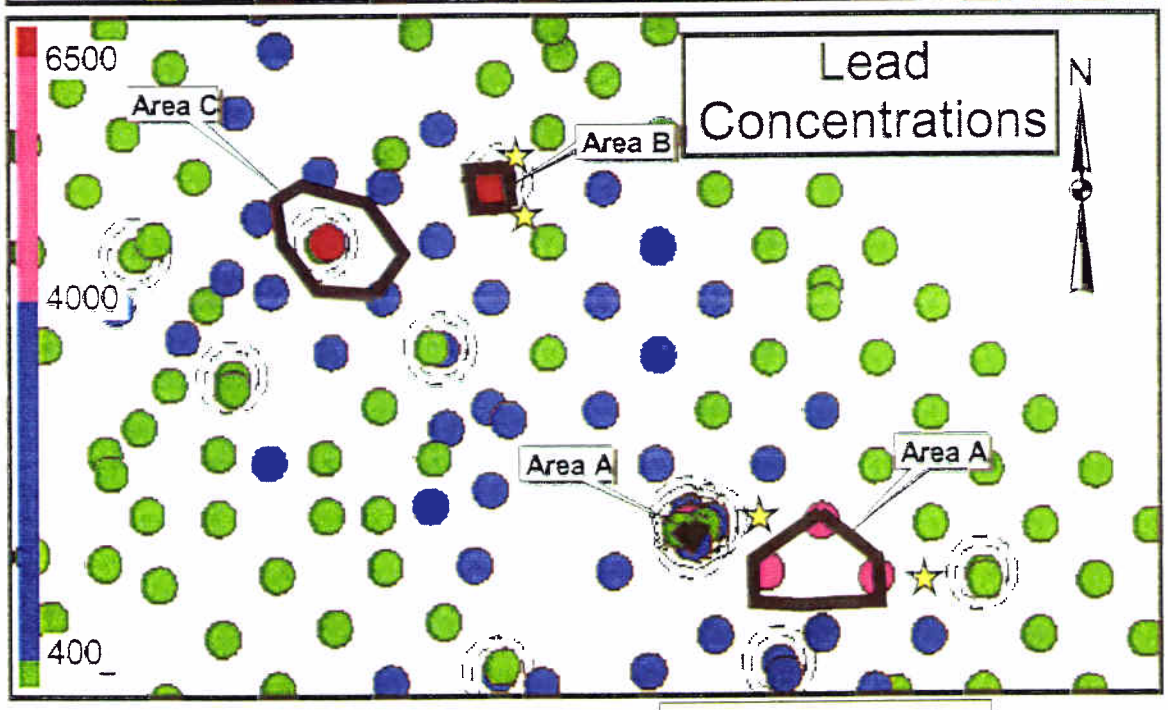

Legend
Proposed Confirmation Sample
Lead Excavation Areas

300 0 300 Feet

DRAWN BY MJJ	DATE 12Oct05	PROPOSED SAMPLING NORTHERN AREA OPERABLE UNIT 5, SITE 15 INTERIM REMEDIAL ACTION REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7553
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3 / REV 0

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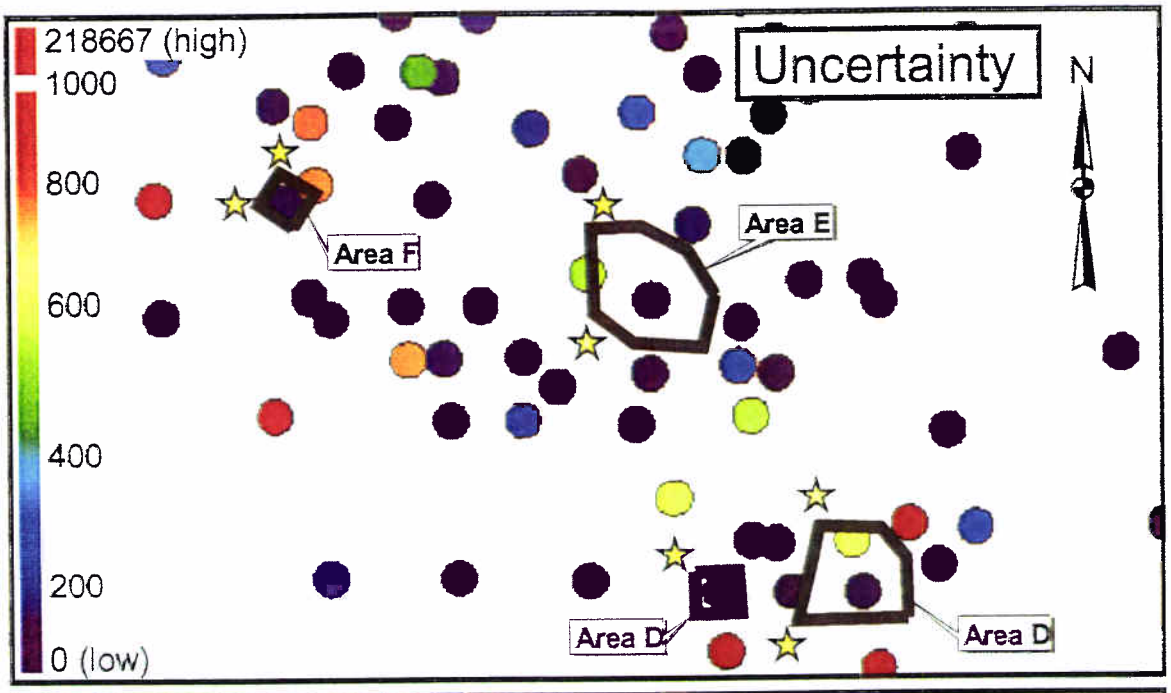

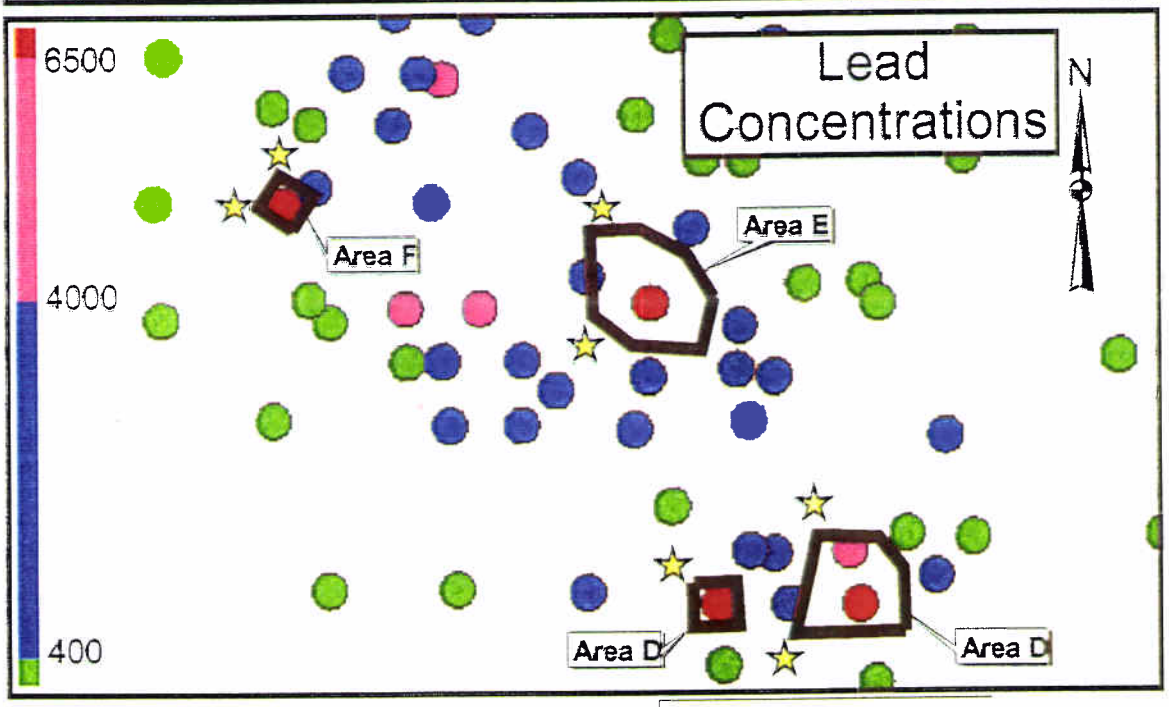

Legend
Proposed Confirmation Sample
Lead Excavation Areas

300 0 300 Feet

DRAWN BY MJJ	DATE 12Oct05	PROPOSED SAMPLING SOUTHERN AREA OPERABLE UNIT 5, SITE 15 INTERIM REMEDIAL ACTION REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4 / REV 0

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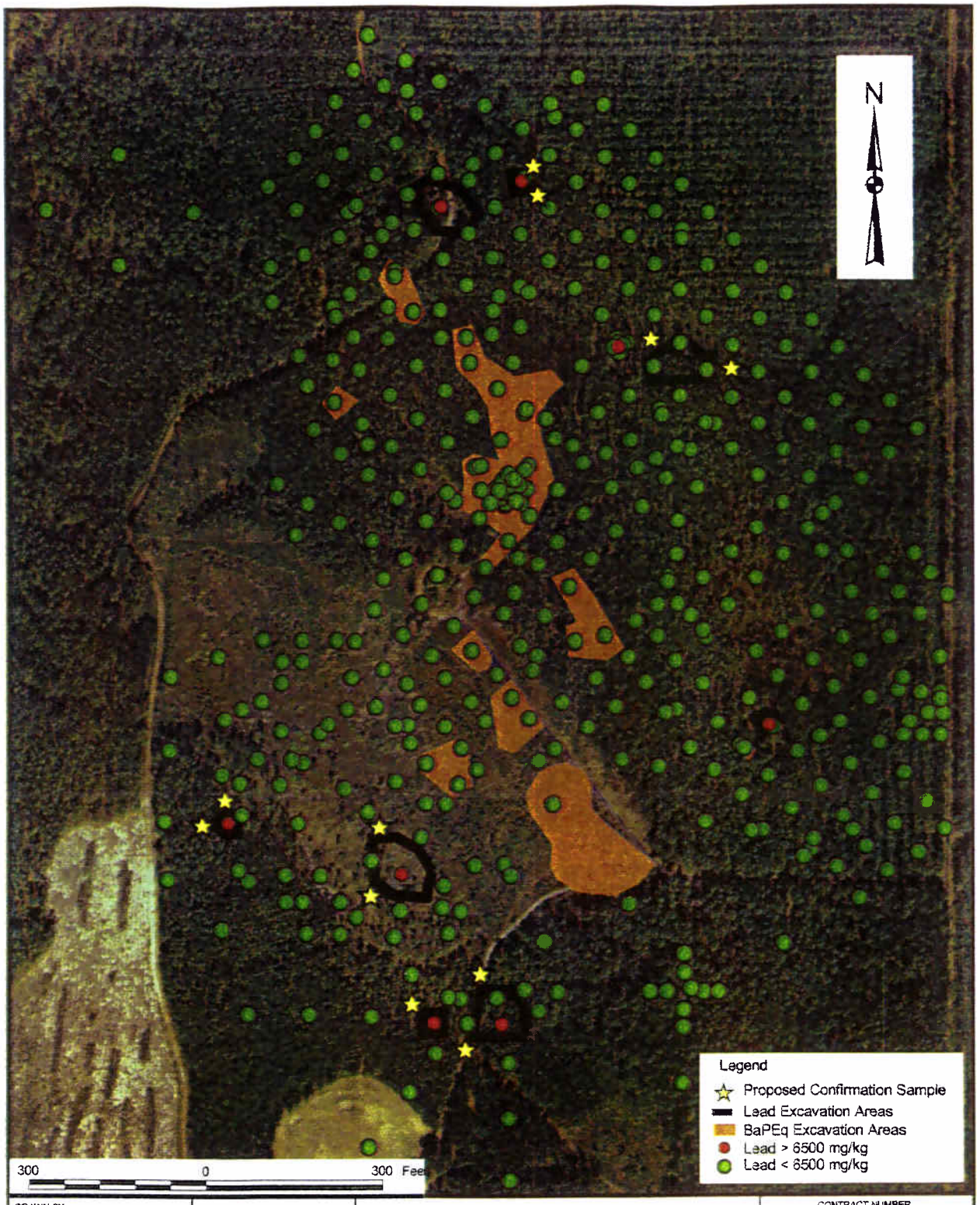

DRAWN BY MJJ	DATE 12Oct05	PROPOSED SAMPLING LOCATIONS OPERABLE UNIT 5, SITE 15 INTERIM REMEDIAL ACTION REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653	
CHECKED BY	DATE		APPROVED BY	DATE
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5	REV 0

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