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LETTER REGARDING COMMENTS ON BIOAUGMENTATION CORRECTIVE ACTION
SUBMITTAL PACKAGE NS MAYPORT FL
3/30/1995
ABB ENVIRONMENTAL SERVICES



8534

March 30, 1995

Commanding Officer
Southern Division
Naval Facilities Engineering Command
ATTN: Mr. Harold McGill, CODE: 1823
2155 Eagle Drive
North Charleston SC 29418

SUBJECT: Comments on FIFCO International Inc.
Bioaugmentation Corrective Action Submittal Package
NAVSTA Mayport
Navy CLEAN District I CTO #0028
Contract No. N62467-89-D-03170

Dear Harold:

Enclosed please find a compilation of comments on the January 1995 FIFCO International Bioaugmentation Corrective Action Submittal Package. At the end of each comment in parentheses the originator of the comment is identified. The commentors are as follows:

Mayport	Cheryl Mitchell
SOUTHDIV	Paul Campbell
FDEP	Greg Brown P.E.
ABB-ES	Mark Lieberman

In addition, I am enclosing preliminary figures showing the concentration and distribution of chlordane, DDT, and DDE in surface soils, and boring logs for the three monitoring wells closest to the area of contamination. These figures will provide FIFCO with additional site characterization information.

Please contact me at 904-656-1293 with any questions or comments.

Very truly yours,
ABB Environmental Services



Peggy Layne, P.E.
Project Manager

enclosures

cc: Cheryl Mitchell, NAVSTA Mayport
David Driggers, Southern Division
ABB Environmental Services, Inc.

Comments on Bioaugmentation Corrective Action
Submittal Package
by
FIFCO International Inc.

General Comments

- It must be clearly established that Bac-terra contains microbes versus being purely a "microbial conditioner". (SOUTHDIV)
- How will the contractor ensure the effects of all pertinent biodegradation and non-biological degradation (i.e. aeration, inherent microbes, water availability, microbial competition, pH, and such) are evaluated versus the effectiveness of the bioaugmentation process? (SOUTHDIV)
- In the discussion of adjacent properties, there is no mention of the town of Mayport. There are residents within 500 yards of SWMU 15. If they use groundwater as drinking water will microbial migration effect these people? (ABB-ES)
- All references to "Naval Air Station" or NAS should be changed to "Naval Station" or "NAVSTA". After reviewing record drawings it was discovered that the building number is actually 48A, not 484. Please correct these references. (Mayport)
- The decontamination of drilling equipment between application well installation was not discussed. If the bioaugmentation technology does not work, the installation of these wells without decontamination may help to spread the contamination. (ABB-ES)
- The overall scope and presentation of the project is vague and uses general terminology to describe processes and concepts. Additionally, significant aspects of the project are not adequately addressed: this includes the duration of the project, how ground water and aquifer characteristics will be utilized in the project design, the total volume of media to be injected, the media characteristics with respect to any breakdown products, the media slug migration rate, direction of migration, composition and geometry of the media slug. More importantly, what will be the effect, if any, on wells located in the city of Mayport? (FDEP)
- What are the site-specific wastes this technology is being applied to, how are existing conditions going to be measured, how is treatment performance going to be monitored, and how will the efficacy of the treatment be determined? (FDEP)
- Please address comments on claims made in the July 94 submittal. 1) Claims to co-metabolize and/or "stabilize metal salts". (Page 1) 2) Also claims "metal salts will be at acceptable levels in 30 days". (Page 2) 3) Claims BAC-TERRA can work in environments up to 240 degrees F. At atmospheric pressure, this is above the boiling

point of water. Since most life forms are made up principally of water, how does BAC-TERRA work at these extreme conditions. (Page 2) (FDEP)

- None of the case studies presented in the "Project Results" section of the July 94 submittal explicitly addressed pesticide contamination. (FDEP)
- In a recent EPA publication "Contaminants and Remedial Options at Pesticide Sites" the biodegradation of DDT (a significant contaminant at this site) is stated as having a degradation rate constant of 0.00013 day^{-1} . This means that it would take 5,300 day to degrade 50 % of the DDT in soil. How long does FIFCO plan to run the demonstration and what is the anticipated removal rate? (ABB-ES)
- What removal efficiency is expected for the DDT and chlordane contamination and does the removal efficiency include the degradation of the breakdown products DDE and DDD? If the pesticides are fully degraded what happens to the chlorine molecules in the pesticide? Won't the chlorine combine with water to create HCl and if so, how will the increasingly acidic environment effect biodegradation? (ABB-ES)

RAP Comments

- Pg 8: How will head space analysis using a FID provide useful information on pesticide contamination? (FDEP)
- Pg 8: The decontamination procedures are not as stringent as the procedures stated in Appendix B "Standard Cleaning Procedures" of the Environmental Compliance Branch's SOP's for EPA Region IV. (ABB-ES)
- Pg 9: Please explain how IDW decontamination fluids will be used "for the subsequent bioremediation". (FDEP)
- Pg 9: Pesticides not identified as COCs in confirmatory sampling discussion. (FDEP)
- Pg 9, Section 5.0 discusses the control and confirmation sampling, however, the vertical interval of this sampling is not discussed. Will there be more than one sampling interval per location? Are they only proposing surface sampling? (ABB-ES)
- Pg 10: Preliminary RFI data indicates that pesticide contamination is in soil near the surface. Proposed injection scheme would place BAC-TERRA solution below known contamination. (FDEP)

- Pg 10: The infiltration capacities of soils at Mayport are high. The proposed application method does not appear effective. How will the BAC-TERRA solution permeate the horizontal soil matrix between injection points? Possible impacts to groundwater are not discussed. (FDEP)
- Pg 10: What is (are) the bacteria types (genus at least) that will be utilized in this project? What is the composition of the "100% symbiotic organic matter"? What will happen to this material as its residence time in the aquifer increases? If this material is a fulvic acid or humic acid material, will it act as a chelator to metal species that are present and increase their aquifer mobility? Why or why not? (FDEP)
- Pg 10, Section 6.1 states that the microbes "will digest the target contaminants and nitrates when added to contaminated soil..." Will the microbes be specialized enough to distinguish between pesticides and naturally occurring methane, etc? The base is built on a marshy area and methane was detected in many of the monitoring wells. Will these micro-organisms feed only on the long chain hydrocarbons or will they live on methane? If they live on methane how will the spread of the micro-organisms be stopped? (ABB-ES)
- Pg 10: How can this process "degrade...stabilized heavy metal salts?" (See Section 6.1). What happens to the metal atom or ion? I can understand degrading organic compounds to their components such as CHON, but am unsure of the application of this principle regarding metals. (FDEP)
- Pg 10: Please explain the meaning of the statement "Bac-Terra™, BR-650 is comprised of only beneficial micro-organisms and is capable of rapid reproduction, thus allowing the nitrogen stressed environment to release and utilize its nitrogen. As a result of this process, molecularly bound oxygen is released as free oxygen, which aids the reproduction of the aerobic micro-organisms" (See Section 6.2.1). (FDEP). Please provide a detailed description or material balance of the mechanism referred to in Section 6.2.1. (ABB-ES)
- Pg 10: The proposed application well spacing of 15 feet seems too far considering the hydraulic conductivity of the soils at the base. The soils at the site are sandy and drain very well - I don't think that the nutrients or the microbes will migrate laterally more than two or three feet from the application wells. (ABB-ES)
- The well diagram (Figure 7) shows the well surrounded by Monterey sand # 30 but the text states (Pg10 section 6.2.2) that the well installation will not include a filter material since the wells will not be used for sampling. (ABB-ES)

- Pg 11, Section 6.2.3 speaks of nutrient application volumes (1.5 gallons per cubic yard) which will be disbursed by "transpiration under gravity flow". Please explain the term "transpiration". It appears that the assumption is made that the media will disburse laterally (at 90° to the gravitational force which is vertical in the down direction); in fact, the upper portion of the fluid media within the individual well screen is subject to less hydraulic head which would assist in the lateral migration of the media. How will this be compensated for, remembering that the site contaminant data indicates that the majority of the contamination is within the upper foot or so of the site? (FDEP)
- Pg 11, paragraph 2 states that the application wells will be refilled until the required gallons per cubic yard volume has been attained. This will be based on a 15-foot lateral movement through the soil. How will this lateral movement be measured? (ABB-ES)
- Pg 12: In Section 6.2.4, several references are made to "the plume." In fact, no discrete plume has been delineated; therefore, how will the nutrients be "equilibrated" within such a plume? Is it anticipated that saturation of the upper foot or so of the vadose zone can be achieved and/or be maintained? Please elaborate. (FDEP)
- Pg 12: In regards to the Table 6.2.5 - Materials Required, there is no indication as to what the contractor is providing and what the DON is expected to provide. It is assumed that the contractor is providing the water pump and generator (DON does not purchase equipment in this contract) but on Figure 3 (of the SSHP), "Site Plan" there is a listing for "Electric Supply by DON" - what would this power be used for and what type of power would be required? (Mayport)
- Pg 12: There is a discrepancy between the size of tanks listed in Table 6.2.5 and those shown on Figure 3 of the SSHP. We also believe that the tanks should be provided by the contractor (DON does not purchase equipment in this contract) as they are an inherent part of the purchased technology, not a site requirement. (Mayport)
- Pg 13: In Table 6.2.5 there is a requirement for chlorine free water. We will need to know the acceptable level of chlorine (ppm or ppb) in order to treat the water supply on base or request an outside water supply. Water is not available at Building 48A (as shown on Figure 3 of the SSHP) and will have to be supplied from Building 450 or an outside source depending upon the acceptable level chlorine. (Mayport)
- Pg 13: Section 8.1 must be addressed adequately; how does FIFCO or the Navy intend to monitor and evaluate the residual media remaining in the shallow soil and

water table aquifer after the project. What proposed criteria will be used to assess success or the risk, if any, from this project? (FDEP)

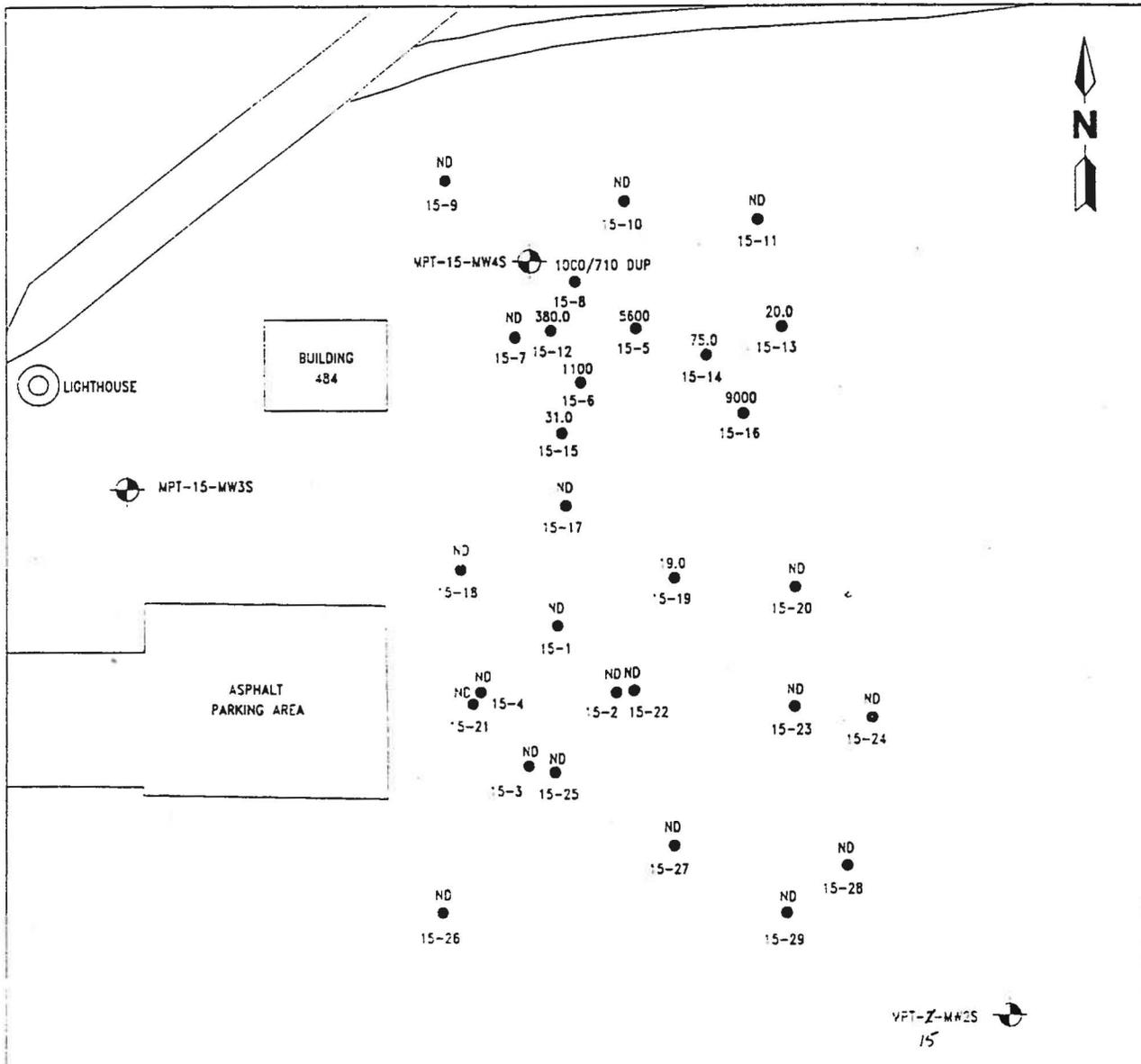
- Pg 13: The method of utilizing wells in this project to place the bacterial culture and/or culture media within the subsurface will likely subject the project to permitting under Department Rule, Chapter 62-528, F.A.C., Underground Injection Control. Project Management and the Navy should recognize this during these early decision stages of the project. (FDEP)
- Pg 13: Bioaugmentation of soil in drums is like a "glorified" version of composting in a drum. Placing materials into drums may artificially bias the results by raising temperatures and thereby thermally increasing the activity of the microbes,(i.e. thermal changes may prove more effective than nutrient addition. Also need to consider inherent microbial degradation without augmentation.) (SOUTHDIV)
- On Figure 5 of the RAP wells are shown in the asphalt parking lot. These are a "special installation" requirement as stated in Contract Amendment 0002, Section C.5(a)2 item (c) and the asphalt will have to be repaired to existing conditions , at contractor cost, after removal of the wells. (Mayport)

SHSP Comments

- On Figure 3 DON can only provide 75' of the parking lot space requested in the parking lot space requested in the parking area . Due to this limitation of available parking lot space , a re-configuration of the equipment may be required in order to use portions of the grassy space north of the parking lot or east of the treatment zone. (Mayport)
- In the HASP Section 3.0 question #2 - the site is a Federally designated Solid Waste Management Unit (SWMU). Southwest Division in not involved in this contract and references to this Division should be deleted from the HASP. (Mayport)
- In the HASP Section 8.0, Activity #2 - lists a 1000 gallon water storage tank. Is this different from the 5k and 10k holding tanks described in Table 6.2.5. (Mayport)
- On Figure 3, we believe that the requirement for a 6' security fence is excessive. We would like to provide a smaller "snow fence" around the wells with perhaps more secure fencing around the tanks and spill equipment storage on the parking lot. We also will not be able to fence in Building 48A since that is used as a storage area and must be accessible. (Mayport)

QAPP Comments

- The QAPP and the SHSP are the only places where the drilling involved in the application well installation are addressed. It should also be addressed in the RAP. (ABB-ES)
- Pg 6, paragraph 2 mentions that the laboratory selected will prepreserve all sampling bottles prior to shipment to the site, but there is no mention of FIFCO verifying that the preservation is properly done prior to shipment. (ABB-ES)
- QAPP calls for daily Health and Safety "tailgate" meetings, but the Health and Safety plan says that the "tailgate" meeting will happen at the discretion of the SHSO. Which is true? (ABB-ES)



NOTE: Concentrations in µg/kg

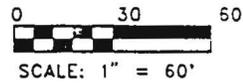
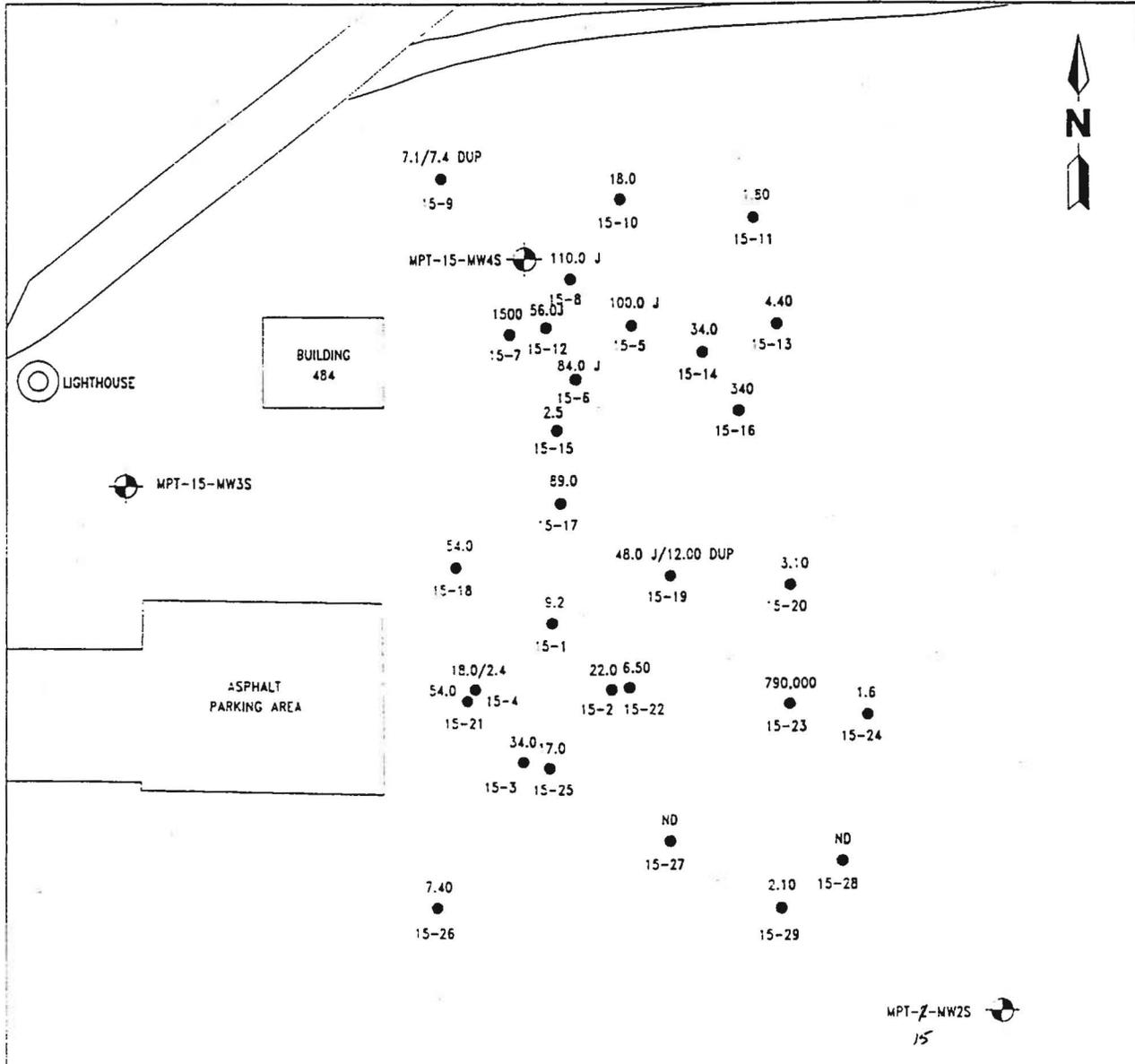


FIGURE 1-2
CHLORDANE IN SURFACE SOIL SAMPLES
AT SWMU 15



RCRA FACILITY ASSESSMENT
GROUP I AND II SWMUs

U.S. NAVAL STATION
MAYPORT, FLORIDA



NOTE: Concentrations in $\mu\text{g}/\text{Kg}$

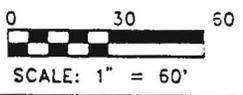


FIGURE 1-1
DDT IN SURFACE SOIL SAMPLES
AT SWMU 15



RCRA FACILITY ASSESSMENT
GROUP I AND II SWMUs

U.S. NAVAL STATION
MAYPORT, FLORIDA

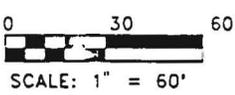
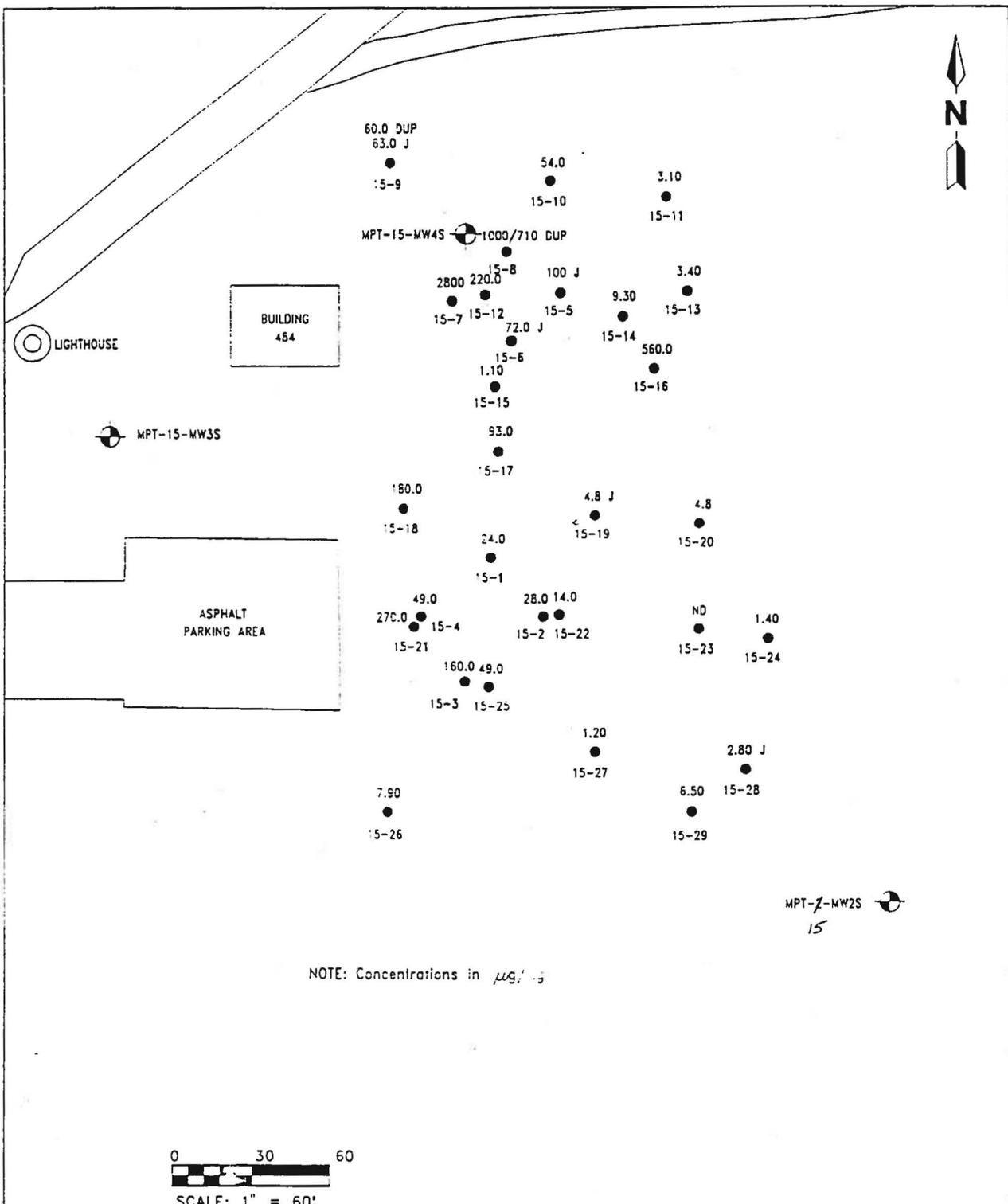


FIGURE 1-2
DDE IN SURFACE SOIL SAMPLES
AT SWMU 15



RCRA FACILITY ASSESSMENT
GROUP I AND II SWMUs

U.S. NAVAL STATION
MAYPORT, FLORIDA

TITLE: Naval Station Mayport, Mayport, FL		LOG of WELL: MPT-15-MW2S	BORING NO. MPT-15-MW2S
AGENCY: SOUTHERN DIVISION, NAVFACENCOM			PROJECT NO: 8533-04
CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES, INC.		DATE STARTED: 07/12/84	COMPLTD: 07/12/84
METHOD: 4.25" HSA	CASE SIZE: 2"	SCREEN INT: 2.5-12.5 FT	PROTECTION LEVEL: D
TOC ELEV.: 11.77 FT.	MONITOR INST: FID	TOT DPTH: 14FT.	DPTH TO ∇ 5.0 FT.
LOGGED BY: P. Craine	WELL DEVELOPMENT DATE: 07/21/84		SITE: 15

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY SAMPLE	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/8-IN	WELL DATA
0				Silty Sand-fine, dark brown with trace clay.		SM		Posthole
5		1.8/2	0	Silty Sand-fine, saturated, light gray.			6,10,11,10	∇
				Silty Sand-fine, light gray with few shells.				Observation
10		1/2	0	Silty Sand-fine, light gray with few shells.			4,3,2,2	
		1/2	70	Silty Sand- (12-12.5') fine, tan, over Sandy Clay (12.5-13.17'), light gray, over Clayey Sand (13.17-14'), light gray to dark gray.		CL SC	4,2,1,1	
15				TOTAL DEPTH OF BORING = 14' BLS				
20								

TITLE: Naval Station Mayport, Mayport, FL		LOG of WELL: MPT-15-MW3S	BORING NO. MPT-15-MW3S
ENT: SOUTHERN DIVISION, NAVFACENCOM			PROJECT NO: 8533-04
CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES, INC.		DATE STARTED: 7/13/94	COMPLTD: 7/13/94
METHOD: 4.25" HSA	CASE SIZE: 2"	SCREEN INT.: 8-18 FT.	PROTECTION LEVEL: D
TOC ELEV.: 11.28 FT.	MONITOR INST.: FID	TOT DPTH: 17FT.	DPTH TO ∇ 8 FT.
LOGGED BY: P. Craine	WELL DEVELOPMENT DATE: 07/21/94	SITE: 15	

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/8-IN	WELL DATA
0				Silty Sand - Dark to light brown, w/ trace coarse shells.		SM		
5		75%	Silty Sand - As above, w/ trace medium to coarse shells.	7,10,14,14				
10		50%	Silty Sand - As above, grey, wet	2,2,5,8				
15		100%	Clay- (15-18.3') - moderately stiff, grayish green, over Clayey sand.	CL SC		2,1,1,1		
				TOTAL DEPTH OF BORING = 17' BLS				

TITLE: Naval Station Mayport, Mayport, FL		LOG of WELL: MPT-15-MW4S	BORING NO. MPT-15-MW4S
AGENCY: SOUTHERN DIVISION, NAVFACENCOM			PROJECT NO: 8533-04
CONTRACTOR: LAYNE ENVIRONMENTAL SERVICES, INC.		DATE STARTED: 7/13/84	COMPLTD: 7/13/84
METHOD: 4.25" HSA	CASE SIZE: 2"	SCREEN INT.: 5-15 FT.	PROTECTION LEVEL: D
TOC ELEV.: 12.18 FT.	MONITOR INST.: FID	TOT DPTH: 15.5FT.	DPTH TO ∇ 7.0 FT.
LOGGED BY: P. Craine	WELL DEVELOPMENT DATE: 07/21/84		SITE: 15

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY SAMPLE	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/8-IN	WELL DATA
0						SM		
				Silty Sand-few shells, dark brown to tan.				Posthole
								Posthole
5		1.3/2	0	Silty Sand - As above			4,8,12,11	
								Observation
10		0.5/2	10	Silty Sand-fine, tan.			2,4,8,8	
						CL		
15		1.5/2	10	Clay-moderately stiff, grayish green.			1,1,1	
				TOTAL DEPTH OF BORING = 15.5' BLS				
20								