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GRIT BLAST MATERIAL CLEAN UP PLAN
FEBRUARY 22, 1990

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CLEAN UP PLAN

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GRIT BLAST MATERIAL CLEAN UP PLAN

FEED MATERIALS PRODUCTION CENTER

P.O. Box 398704 Cincinnati, Ohio 45239-8704

February 22, 1990

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1.0 PURPOSE OF PLAN

The purpose of this plan is to provide guidance and information about the estimated twelve pounds of lead released when lead bearing paint was grit blasted during the Main Substation, Water Towers and Plant Wide Painting Projects. This plan identifies areas of grit blast accumulations, and specifies cleanup actions that have been employed to prevent lead contamination at the grit blasted locations and surrounding areas. Specific sampling requirements to verify "clean" levels of lead in soil shall also be described and implemented in accordance to the USEPA Directive "Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites".

Guidance for the classification and disposition of collected grit blast materials shall be found in the complementary document entitled "Storage and Disposition of Material from the Grit Blast Operation".

2.0 OBJECTIVE

The Objective of this plan is to ensure that all areas potentially impacted by the grit blasting operation are inspected and clearly identified, that data is collected to characterize the areas for a Preliminary Assessment (if one is needed), and that the same data is sufficient to evaluate interim cleanup actions prescribed (and already taken) in this plan to reduce the risk of lead contamination in surface soils (0-2").

3.0 SCOPE

This plan provides the following information:

* Identification of the areas affected by the grit blast operation.

* Required safety clothing and equipment to be worn during cleanup activities in compliance with worker protection standards in 29 CFR 1910.120 (Hazardous waste operations and emergency response).

* Description of cleanup operations and specific procedures.

* Schedule of cleanup and sampling effort.

* Specification of "clean" levels for soil, designed to provide quantitative guidance in support of visual evaluations of interim cleanup actions.

* Specific surface soil sampling requirements for verification of cleanup activities.

* Determination of the appropriate number of samples to be collected during surface soil sampling.

* Specific cleaning requirements for sampling equipment.

4.0 IDENTIFIED AREAS OF GRIT BLAST MATERIAL ACCUMULATION

Immediately after analyses of residual grit blast material at the Plant 2/3 pad (Attachment A, 6/89) indicated lead contamination in the grit blast samples that were taken, all areas where grit blasting had occurred were examined (shown on Attachment B). Thirteen areas were identified as having had some visually noticeable accumulations of grit blast material. Due to the lead content of the paint that was grit blasted, there existed the potential for lead contamination of the soil and surface water draining from these areas. Nine of those areas were immediately targeted for interim cleanup because of significant accumulations of grit blast material and the potential for lead contamination of the surface soil. The four other areas (areas below the high lines east of Plant 8 and north of building 12; the area north of the Chemical Warehouse; miscellaneous areas around grit blasted fireplugs) had little to no visually detectable accumulations of grit blast material and shall be sampled to confirm that these areas were not impacted by the grit blast operation. Samples taken from drums of grit blast material that were collected during the initial cleanup (page 1, Attachment A) are compiled with data collected more recently (page 2, Attachment A) from residual grit blast accumulations on the soil surface. Additional data shall be collected for these eight areas and the five areas not represented in Attachment A according to the sampling methodology outlined in section 6.

As of this writing, eight of the nine areas targeted for immediate cleanup have been cleaned of the visual accumulations of grit blast material. Verification sampling to conclude that the areas are "clean" shall be performed according to the schedule listed in Attachment C. The one area left to clean (the Main or South substation) shall be sampled and, if needed, cleaned according to the methodologies described in the next two sections.

Surface water and sediment samples from drainage ditches in or adjacent to the suspect areas (see Attachment B, East & West Water Tower areas) were sampled and analyzed for Total Lead (ppm or mg/kg). The results in Attachment A (as well as four samples taken from locations off-site where storm water drainage is directed from the facility toward Paddy's Run, see DOE 1540-89) indicate that no detectable migration occurred.

The following summary describes the areas and details the status of the cleanup to date:

4.1 East Water Tower and Surrounding Areas

Clean up of the area directly below the East Water Tower began on second shift on June 22, 1989. Other areas affected by the East Water Tower grit blasting operation include the area along the south and west outside wall of Warehouse 79, and the run-off trench just west of the tower. Material was cleaned from the surface of the soil and sifted from the soil in some areas.

STATUS: Accumulations of grit blast material have been removed and the area is awaiting surface soil sampling to verify that the area is "clean".

4.2 West Water Tower and Surrounding Areas

Grit and orange paint particles were observed to be all around the base of the West Water Tower. Most of the material however, appears to be located in the gravel area just west of the tower and weigh scale. Some smaller areas of grit blast accumulation can be seen in the grassy area within 10 yards north, south and east of the tower.

STATUS: Accumulations of grit blast material have been removed and the area is awaiting surface soil sampling to verify that the area is "clean".

4.3 High Lines South of the Rotary Kiln Building and Plant 8 Warehouse

A significant amount of grit was found under the high lines south of Rotary Kiln Building and Plant 8 Warehouse. No grit was visible under the high lines east of this area, however, some large paint flakes were seen at the base of two beams.

Paint speckled grit blast had accumulated in the area of the liquid nitrogen tank, just northwest of the Pilot Plant. Likewise, some material was seen under a skid of abandoned equipment just west of the tank.

STATUS: Accumulations of grit blast material have been removed and the area is awaiting surface soil sampling to verify that the area is "clean".

4.4 High Lines East of Plant 2/3 and Plant 8

Some small accumulations of grit were observed under the surface of and intermingled with gravel under the entire length of the high line east of Plant 2/3 and Plant 8.

STATUS: It appears that little to no accumulation of grit blast material occurred. To confirm that there is no lead contamination, the area shall be sampled in accordance to Section 6.0 of this cleanup plan.

4.5 High Lines North of Maintenance Building

High lines north of the Maintenance Building that extend east to west from the Engine Building to the Water Coolers and north and south from the Propane Storage Tank Area to the center of the east-west line, had been grit blasted. Gravel directly surrounding posts did contain some grit blast material; however, the area south of the east-west high line did not appear to be greatly affected. Orange paint specks could be evidenced in the soil directly below and up to 10 feet away from high lines.

STATUS: It appears that little to no accumulation of grit blast material occurred. To confirm that there is no lead contamination, the area shall be sampled in accordance to Section 6.0 of this cleanup plan.

4.6 Main Substation

This area has significant accumulations of grit blast material. Entry permits will be required for extended cleanup periods, if additional sampling indicates cleanup is necessary.

STATUS: Accumulations of grit blast material are intermingled with the gravel and soil in this area. Statistical sampling of this area shall be performed in accordance to Section 6.0 to determine if concentrations of lead in the surface soil warrant cleanup.

4.7 Plant 2/3 Pad, Runoff Collection Trenches and Sump

A significant amount of grit was removed from the Plant 2/3 concrete pad, around and under skids. Likewise, grit was seen south of the conveyor of the Plant 2/3 pad. Skids on the bottom of the stacks were contaminated with grit material; however, no material appeared to be present on the drums or lids themselves.

Sludge in the drainage ditch surrounding the Plant 2/3 Pad contained a significant amount of grit material.

STATUS: Accumulations of grit blast material have been removed and the area is awaiting surface soil sampling to verify that the area is "clean".

4.8 Incinerator Building

Sludge in the drainage ditch northwest of the incinerator building contains a significant amount of grit. All other areas appear to be clean.

STATUS: Accumulations of grit blast material have been removed and the area is awaiting surface soil sampling to verify that the area is "clean".

4.9 Biodenitrification Towers

Gravel areas to the west of the Bio Towers contained grit material as well as the concrete pad.

STATUS: Accumulations of grit blast material have been removed and the area is awaiting surface soil sampling to verify that the area is "clean".

4.10 Plant One Shelter

Small accumulations of grit blast material were seen around and under skids stored to the east and west of the Plant 1 Shelter.

As specified in the clean-up procedures below, the skids in this area, currently stacked three high, were moved one row at a time within a roped off area. Grit material was swept from the floor of the pad and placed into white 55-gallon steel drums. Likewise, skids on the bottom of the stack were vacuumed prior to being placed into service.

STATUS: Accumulations of grit blast material have been removed and the area is awaiting surface soil sampling to verify that the area is "clean".

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4.11 Chemical Warehouse

All areas around the Chemical Warehouse within a 10 yard distance were checked for grit blast material. Clean up operations of this area appear to have been

adequate for the most part; however, a very small amount of orange paint was observed trapped in the concrete joints of the Plant 1 pad, just north of the Chemical Warehouse.

STATUS: It appears that little to no accumulation of grit blast material occurred. To confirm that there is no lead contamination, the area west and south of the warehouse shall be sampled in accordance to Section 6.0 of this cleanup plan.

4.12 Fire Plugs

Accumulations of grit were observed under the surface of and intermingled with gravel beneath the fire plugs that were grit blasted.

STATUS: It appears that little to no accumulation of grit blast material occurred. To confirm that there is no lead contamination, the specific areas shall be sampled in accordance to Section 6.0 of this cleanup plan.

4.13 NFS Tanks Storage Area

Accumulations of grit material were observed within the diked area of the NFS tanks storage area, north of the Plant 2/3 pad.

STATUS: Accumulations of grit blast material have been removed and the area is awaiting surface soil sampling to verify that the area is "clean".

5.0 PROCEDURES FOR REMOVAL OF GRIT BLAST FROM GRAVEL AND GROUND

Three different methods have been used to remove the grit blast material from the soil, gravel, concrete pads and trenches where the material accumulated:

1) Portable Hoffman vacuum cleaners equipped with High Efficiency Particulate Air (HEPA) filters have been utilized to vacuum gravel and grassy areas as well as the concrete pads where material could not be swept or shoveled. In order to minimize the amount of waste generated, a wire screen has been placed over the vacuum hose to suction filter grit from gravel.

2) A "bobcat" or backhoe has been used to shovel larger areas and the grit is sifted from the soil with a screen.

3) Manual pickup by sweeping or shoveling the grit has been practiced in smaller areas of accumulation where moisture or geometry is a problem.

Though the method used in each area depends on the area conditions, the following guidelines shall be in effect during any clean up:

5.1 Affected area(s) shall be roped off during clean-up activities.

5.2 Visual verification and sign-off by the Waste Operations Manager, or equivalent, is required following cleanup activities for final approval.

5.3 Chemical Operators/High Level Cleaners performing the clean-up are required to wear air purifying respirators with purple cartridges, safety glasses and gloves.

5.4 Standard Operating Procedure 20-C-701 shall be followed during operation of the portable Hoffman Dust Collector.

5.5 Dry grit material shall be collected in white carbon steel 55-gallon knockout drums. Drums shall be filled to within three inches from the top of the drum and shall contain no free liquids, as specified in SOP 20-C-601. Drums packaged in this manner will allow for ease of shipment preparation, following approval of the material as a waste stream.

5.6 Grit material and grit contaminated materials containing free liquids shall be packaged in black 55- gallon steel drums. Processing of this material shall be defined in "Storage and Disposition of Material from the Grit Blast Operation".

5.7 Soil samples shall be taken at designated locations as specified in the sampling section of this plan.

5.8 Grassy areas contaminated or suspected to be contaminated shall be cut low and raked, as necessary, in order to maximize removal efficiency.

5.9 Excavated soils shall be placed in white 55-gallon steel drums that have had diatomaceous earth or absorbent material placed in the bottom. 8
Diatomaceous earth or absorbent material shall also be placed on top of contents, prior to closure.

5.10 Drainage ditches (Plant 2/3 pad, Water Towers) shall be cleaned of any sediment. Likewise, sump basins and filters shall be drained and cleaned, with the sump cake being placed in a clean 55-gallon black drum. Samples of sump water shall be obtained and analyzed for Total Lead (ppm) prior to start of cleanup.

5.11 Skids currently stacked three high (beneath the Plant 1 Shelter and on the Plant 2/3 Pad) shall be moved one row at a time within a roped off area. Grit material shall be swept from the floor of pads and placed into white 55-gallon steel drums. Grit from skids shall be removed by turning the skid on its side and striking it against the pad. Hard to remove or wet grit material may be removed by using an elongated fox tail brush, or equivalent.

6.0 SAMPLING OF SOILS FOR VERIFICATION OF "CLEAN" LEVELS

Based on visual observation, the accumulation of grit blast material has been confined to surface or near-surface soils. Following cleanup and/or excavation of an area, surface soil sampling shall be performed for verification of "clean" levels for soils. Surface soil sampling will provide the most conservative results, due to the fact that the highest concentrations of lead will be found on the surface of the ground.

How to Take the Samples

The "Remedial Investigation Feasibility Study (RI/FS) Quality Assurance Project Plan, Revision 3" contains specific protocols on how to sample the soil, and this methodology has already been accepted by USEPA for air deposition of contaminants on soil. The following procedures, which are consistent with the RI/FS sampling protocols, shall be followed during sampling from the grids (defined for each area by the methodology described in the next section):

-Personnel performing the sampling are required to wear safety glasses and gloves.

-Prior to sampling, leaves, grass and surface debris should be removed from the ~ 1' X 1' area to be sampled. Loose dirt from clumps of grass shall be shaken free as the grass is removed.

-Using a scoop sampler, a 500 ml sample shall be taken from the center of the grid approximately 1/2" (to 1") in depth, but no more than two inches in depth. The center of the grid shall be used as a starting point for sampling. Additional soil shall be collected from points equidistant from the center of the grid, until the specified volume has been collected.

-The sample will be placed in a 1 liter plastic or glass container, sealed, and stored at 4 C until it is submitted to the FMPC laboratory and analyzed for Total lead (ppm or mg/kg). The container and sample (and laboratory paperwork) shall be labeled as Grit Blast residue with the appropriate identification: date of sample, location (area and grid number), name of person sampling and description of sample (dry solid, sludge, noticeable grit). Chain-Of-Custody documentation shall accompany all samples.

-The sample point within the grid area shall be marked with a stake and tagged with the same information as the sample and its container. The sample points shall remain tagged until all the sample analyses have been evaluated.

Number and Location of Sampling Points

The diagram in Attachment B shows all the affected areas with relative location on the FMPC site and related structures. Diagrams like the one in Attachment D for the West Water Tower shall be prepared for each of the areas, specifying the dimensions and sampling points. To identify the sampling points, the affected areas shall be broken down into individual grids with grid intervals being determined by the following equation (OEPA DSHWM Closure Plan Review Guidance):

$$GI = \sqrt{\frac{A\pi}{GL}}$$

Where,
GL = Length of the area to be gridded (units), A = Area to be gridded (square units), GI = The grid interval (units). The equation ensures that the intervals are proportioned to the size of the area for equal weighting.

In the case of soil sampling for areas identified with grit blast material contamination, the length of the area to be gridded shall be recorded in yards. Grids shall be consecutively numbered.

As an example, included in Attachment D is a diagram of the area surrounding the West Water tower that appeared to have visual accumulations of grit blast material. As the diagram illustrates, an approximate 55 yard by 70 yard area was sectioned into a 4 by 5 grid with grid intervals every 40 feet. This closely approximates the calculated GI (GI is actually equal to 13.1 yds. or 39.3′, but because the map is scaled at 1"=20′ and the area neatly fit into a 4 by 5 grid at these intervals, the 40′ interval was chosen). Diagrams like the one in Attachment D shall be prepared for each area to identify specific sampling points.

To estimate the number of appropriate sampling points that would enable a statistical verification of "clean" levels of soil, data that had already been collected before the areas were cleaned shall be used in the equation (from USEPA Test Methods for Evaluating Solid Waste, SW-846):

$$N = (t^2 * s^2) / \Delta^2$$

where N is an estimate of the number of appropriate sampling points, t is the value from the statistical Student t distribution table (based on a 90% confidence level and the appropriate degrees of freedom, df = n-1), s is the sample standard deviation of those data points, and delta is the difference between the Regulatory Threshold* value and the mean ($\bar{x}$) of the data points.

To get preliminary estimates of the values of $\bar{x}$ and s^2, EP Toxicity results (leachable lead) were compared to Total Lead results (Attachment A, see Plant 2/3 pad results from 6/89 and total lead results from that same area dated 1/10/90) and a conservative assumption was made that leachable lead represented 10% of the total lead.

* 500 ppm was the threshold value adopted (from USEPA "Interim Guidance on Establishing Soil Lead Cleanup Levels").

Another assumption that was made (since all the data collected was for "uncleaned" areas) was that 80% of the grit and lead was removed during cleanup. Applying those assumptions to the ten data points collected in 10/88 from the West Water Tower (see the table in Attachment E) enabled preliminary estimates of $\bar{x}$ and s^2 for "clean" areas to be made from leachable lead results for "uncleaned" area . From these preliminary estimates of $\bar{x}$ and s^2, an estimate of the number of appropriate sampling points was made (see Attachment E).

In cases where the variability of preliminary data is so low that less than four samples is estimated, a minimum of four samples shall be taken because the USEPA Test Methods for Evaluating Solid Waste, SW-846 specifies "enough samples (but in no case less than four samples) be collected over a period of time sufficient to represent the variability of the wastes." An example of the calculations performed for this and all other statistical determinations is included in Attachment E for the West Water Tower area. Similar calculations shall be performed for all the affected areas.

To estimate the appropriate number of samples for the five areas (Area north of Maintenance building, Incinerator building, Biodenitrification Towers, Chemical Warehouse, and miscellaneous fire plugs) for which there is no previous data, 20% of the number of identified grid blocks or the highest number of appropriate sampling points calculated from the other six areas (whichever is highest) shall be chosen.

To select the actual sampling locations within the grid, simple random sampling shall be done. Four or more numbers (the actual number depending upon the determination of appropriate sampling points described above) shall be randomly picked from a random number table. Whatever numbers are chosen shall correspond to the grid location, and the point where the sample is actually taken within the grid shall be the area of soil closest to the center of the numbered grid. For instance, in Attachment D, twenty grids were numbered, and as Attachment E details, grids #18, #15, #17 and #5 were randomly selected from the table. As most of this area is soil (versus concrete or tower supports), taking the sample at the exact grid center is not a problem.

Three more samples shall also be randomnly taken (in the case of the West Water Tower, samples corresponding to grid locations #9, #14 and #3), to protect against an underestimate of the appropriate number of samples that can result from poor preliminary estimates of $\bar{x}$ and s^2. These samples shall be archived, and submitted for future analysis if the statistical evaluation described below warrants it.

Evaluation of Analyses

Samples shall be analyzed for total lead by way of atomic absorption at the FMPC Analytical Laboratory (FMPC Analytical Method #1091). The laboratory operates according to the FMPC Analytical Laboratory Quality Assurance Plan dated October 1, 1987 and the protocols will be consistent with SW-846, Revision 3. Results shall be statistically analyzed to determine the true mean and standard deviation of the concentration of total lead in the soil. If the upper limit of an 80% Confidence Interval is less than the threshold of 500 ppm total lead, the soil shall be considered clean. If the upper limit is 12

above the threshold, additional sampling may be required. At the very least, the three archived samples shall be submitted for analysis and the same statistical evaluation performed for all the results. Additional cleaning may or may not be recommended dependent upon the result of the evaluation. That data and final verifications for all the areas (with additional cleanup actions if necessary) shall be issued to the DOE in a final report (see Schedule in Attachment C).

7.0 SAMPLER CLEANING REQUIREMENTS

Residual soil shall be removed from the sampler between samples taken from a given area by brushing and rinsing (50-100 ml deionized water) the soil from the sampler. An absorbent cloth shall be used to wipe the sampler dry before the next sample is taken. After all the samples in a given area have been taken the sampler shall be cleaned as follows:

1) Wash sampler with warm phosphate-free laboratory detergent such as Alquinox or Liquinox. Use a bottle brush to remove particulate matter, films, or other dirt.
2) Rinse the sampler several times with tap water to remove detergent residues.
3) Rinse with deionized water, collecting the last 100 ml of rinse and submitting it for total lead analysis.
4) Drain excess water from sampler.
5) Using a clean dry cloth, dry the sampler, and place the sampler and cloth in a clean polyethylene bag labeled with an "Equipment Cleaning Checkoff Sheet" FMPC-PRO-3129 (1-C-101). Seal the plastic bag with tape, discard the drying cloth, and store the sampler as a "clean" sampler in a protected area when the analytical results indicate the rinse is less than 5 mg/L total lead. If the results indicate the rinse contains equal to or more than 5 mg/L total lead, repeat cleaning steps 1-4 until the sampler is clean, dispose of the rinse as RCRA waste (SOP 20-C-601), and dispose of the cloth and polyethylene bag according to SOP 20-C-605. Chain-Of-Custody documentation shall accompany all samples.

8.0 ESTIMATED SCHEDULE OF COMPLETION

The estimated schedule of completion of the actions specified in this plan is detailed in Attachment C.

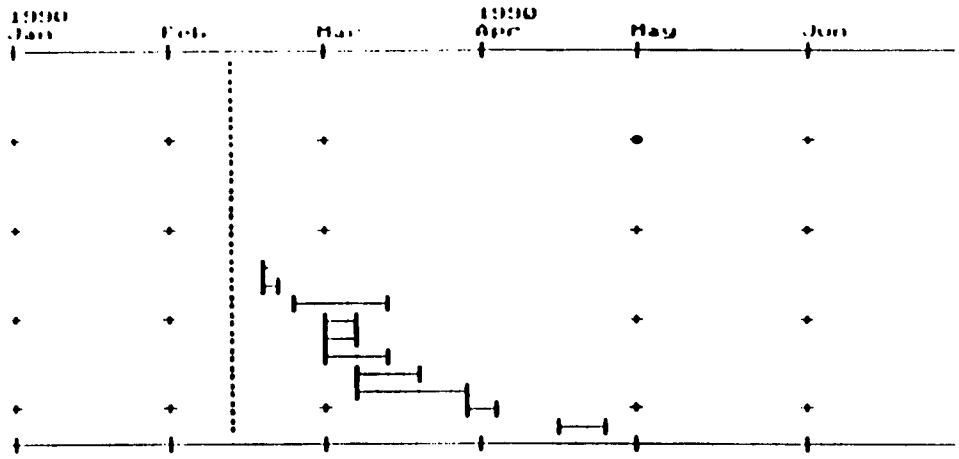
ATTACHMENT A, page 1

ANALYSES OF GRIT BLASTING RESIDUES

LOCATION AND DESCRIPTION OF SAMPLES		Lab No.	(EP TOX) Leachable Lead mg/L	(EP TOX) Leachable Lead ppm*	Total Lead ppm	Total U ppm	U^{235} wt.%	Th^{230} µg/g or ppm
		12-1205	10	200		2		
West Water Tower		12-1206	7.44	148.8		2		
(from Drums)		12-1207	8.96	179.2		1		
	10/88	12-1208	5.70	114		1		
Grit		12-1209	13.6	272		2		
		12-1210	9.97	199.4		1		
SOLID		12-1211	3.92	78.4		1		
		12-1212	12.8	256		1		
		12-1213	13.8	276		1		
		12-1214	12.8	256		1		
East Water Tower		12-1365	52.2	1044		6	0.44	8.5
(from drums)		12-1366	75.0	1500		14	0.46	3.0
SOLID	11/88	12-1367	52.4	1048		12	0.50	<3.0
(from ground)		12-1368	94.0	1880		9	0.65	6.4
		12-1369	76.2	1524		21	0.69	3.4
	11/88	12-1370	100	2000		5	0.77	5.4
SOLID		12-1371	57.7	1154		16	0.68	4.7
Plant 1		12-1354	9.88	197.6				
SOLID	11/88	12-1355	<1.0	<20				
South Substation		12-1356	149	2980		21	0.81	11
		12-1357	2.68	53.6		3	0.66	7.1
SOLID	11/88	12-1358	4.94	98.8		3		5.5
		12-1359	3.00	60.0		3	0.64	6.5
1st Street		12-1360	2.08	41.6		1	0.65	
Between A and B		12-1361	168	336		54	0.82	
SOLID	11/88	12-1362	6.70	134		39	0.65	
2nd Street and B		12-1363	6.45	129		105	0.58	12
SOLID		12-1364	1.90	38				
	11/88							

* Represents ppm leachable lead in original sample.

ATTACHMENT C, page 1 of 2



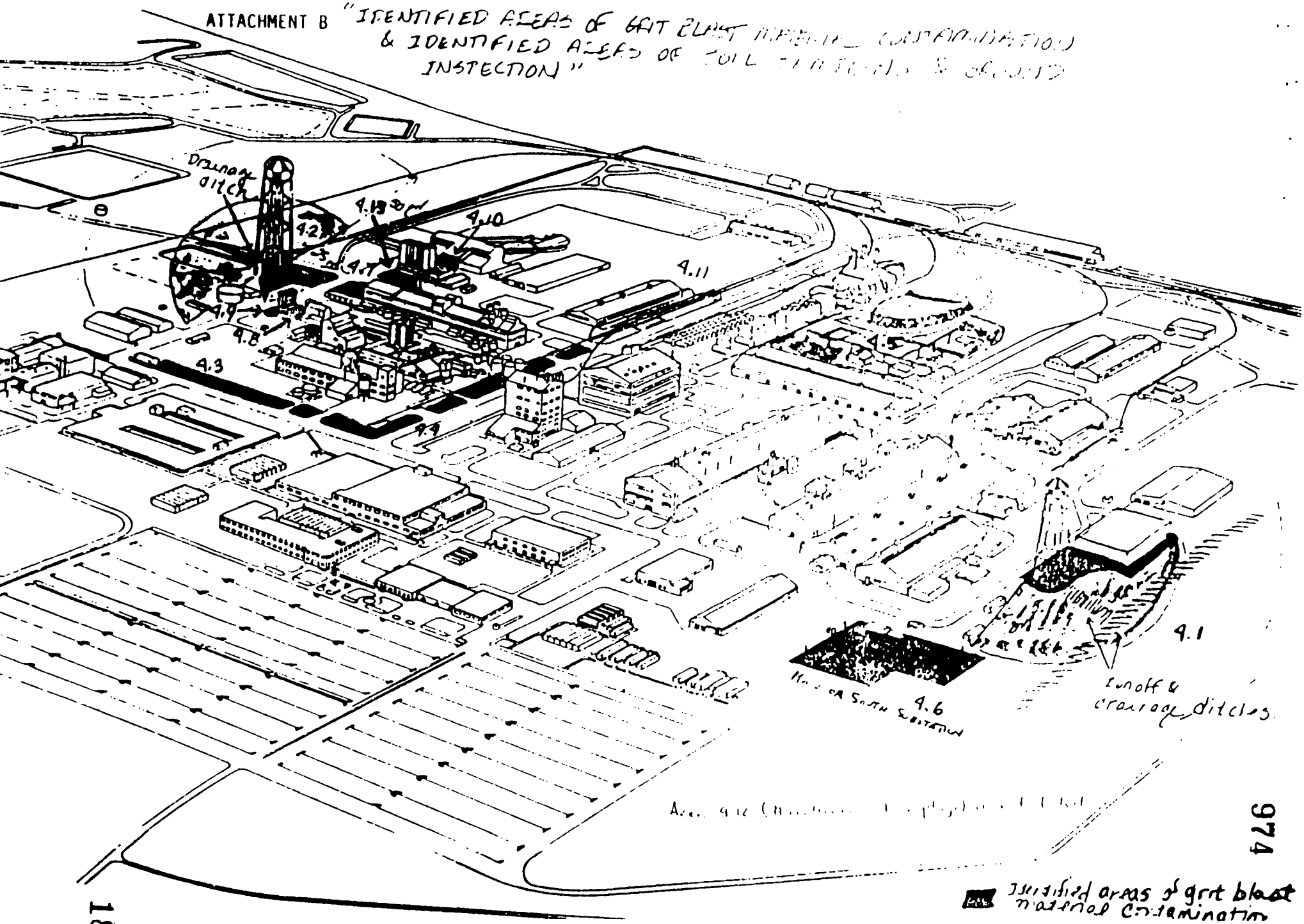
Cleanup of East Water Tower	1
NFS Tank Area Cleanup	2
Develop Grit Blast Cleanup Plan	3
Gather Grit Blast Samples	4
Plant 2/3 Pad Cleanup	5
Cleanup of West Water Tower	6
Environ. Compliance Review Sampling Plan	7
Plant 1 Shelter Cleanup	8
High Lines South of Plt. 8 Cleanup	9
Incinerator Building Cleanup	10
Biodenitrification Tower Cleanup	11
Transmit Cleanup/Sampling Plan to DOE	12
Sampling of South or Main Substation	13
Cleanup of Main Substation	14
Sampling of High Line Area East of Plt.8	15
Sampling of High Line Area North Bldg.12	16
Verification of Cleanup Sampling	17
Analysis and Evaluation of Samples	18
Additional Cleaning	19
Additional Verification	20
Final Cleanup Report	21

ANALYSES OF GRIT BLASTING RESIDUES

LOCATION AND DESCRIPTION OF SAMPLES	Lab No.	(EP TOX) Leachable Lead mg/L	(EP TOX) Leachable Lead ppm	Total Lead ppm	Total U ppm	U^{235} wt. %	TH^{230} µg/g or ppm
West Water Tower (from Drums) Essentially Pure Grit. SOLID 6/89	1-4003	22.0	440		0.6		
				(1/10/90)			
Plant 2/3 Pad Pure Grit 6/89 SOLID	890525-031	17.7	354	3200	204		<45
	890525-032	29.3	586	3620	37		<45
	890525-033	34.5	690	3200	145		<45
NFS Tanks Dike Area SUMP WATER 7/89	2-1291			.023 mg/L			
Plant 2/3 Pad Sump Pit 7/89 & 8/89 SUMP WATER	12-1986			.011			
	12-1987			.028			
	12-1983			.037			
	12-1985			.037			
	12-1979			.020			
	12-1980			.018			
	12-1292			.165			
	12-1977			.013			
	8-9699			.032			
	8-9700			.031			
	8-9706			.021			
	12-1974			.018			
	12-1975			.015			
	12-1976			.004			
East Water Tower Run Off Trench SEDIMENT/SOLID 7/89	890626-052	<1	<20				
	890626-067	<1	<20				
	890626-068	<1	<20				
	890626-069	<1	<20				
West Water Tower Run Off Trench SEDIMENT/SOLID 7/89	890626-070	<1	<20				
	890626-071	<1	<20				
	890626-072	<1	<20				
	890626-073	<1	<20				
	890626-074	<1	<20				
	890626-075	<1	<20				
	890626-076	<1	<20				
	890626-077	<1	<20				
	890626-078	<1	<20				

• Represents ppm leachable lead in original sample.

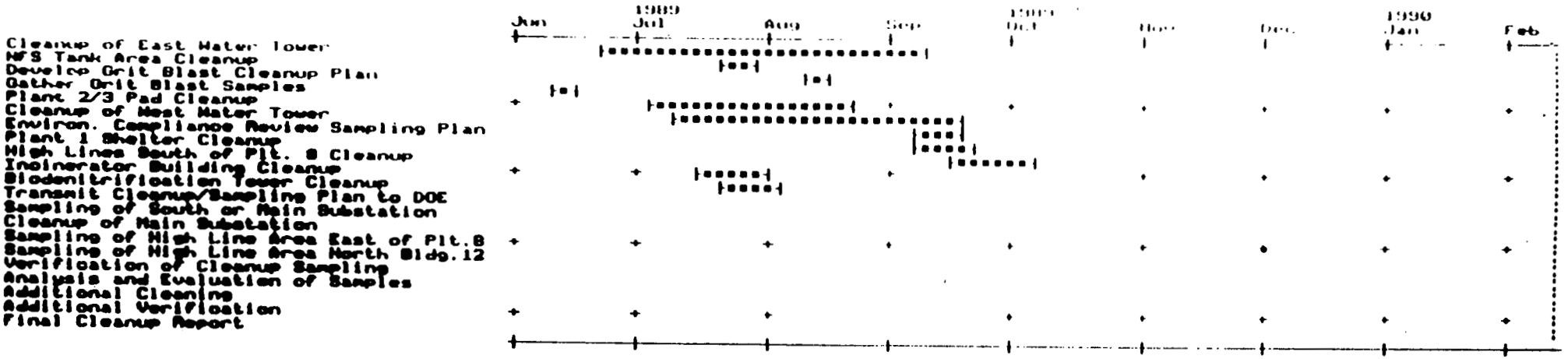
ATTACHMENT B "IDENTIFIED AREAS OF GRIT BLAST MATERIAL CONTAMINATION & IDENTIFIED AREAS OF SOIL SAMPLES & GROUND INSPECTION"

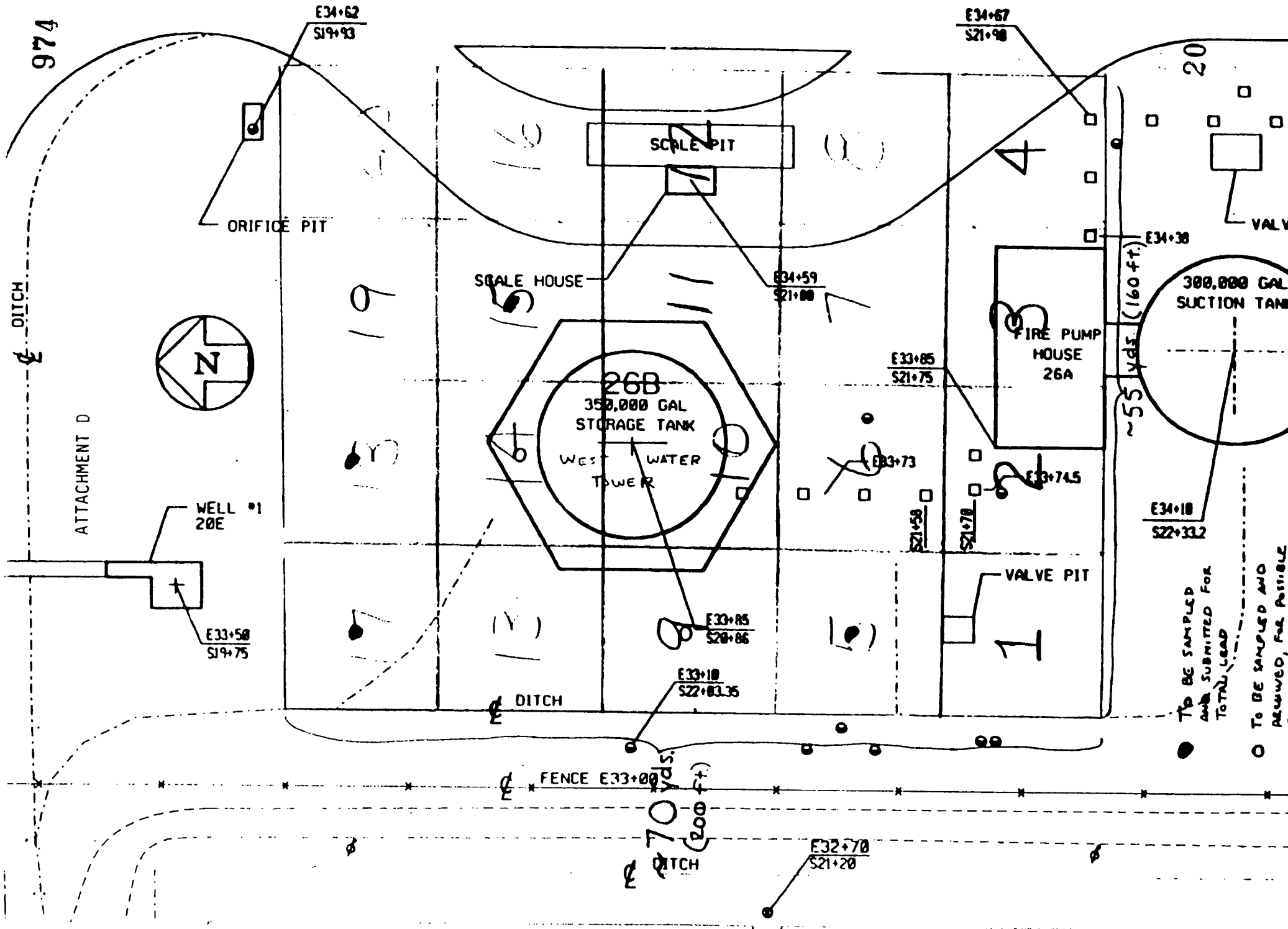


Identified areas of grit blast material contamination

974

GRIT BLAST CLEAN-UP

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SCALE PIT
ORIFICE PIT
SCALE HOUSE
E34+59
S21+88
E34+38
VALV
300,000 GAL
SUCTION TAN
FIRE PUMP
HOUSE
26A
~55 yds. (160 ft.)
E33+85
S21+75
26B
350,000 GAL
STORAGE TANK
WEST WATER
TOWER
E33+73
E33+74.5
S21+58
S21+78
E34+18
S22+33.2
VALVE PIT
DITCH
ATTACHMENT D
WELL #1
20E
E33+50
S19+75
E33+85
S20+86
E33+18
S22+83.35
DITCH
FENCE E33+00
70 yds. (200 ft.)
DITCH
E32+70
S21+20
TO BE SAMPLED AND SUBMITTED FOR TOTAL LEAD
TO BE SAMPLED AND ARCHIVED, FOR POSSIBLE

ATTACHMENT E, page 1 - VERIFICATION OF CLEANUP, WEST WATER TOWER

Determination of Location and Number of Sampling Points

Calculation of Grid Interval

$$GI = \sqrt{\frac{A \cdot \pi}{GL}}$$

Where GI ≡ Grid Interval, yds.
A ≡ Area to be sampled, sq. yds.
GL ≡ Length of area, yds.

For the ~55 x 70 yd. area surrounding the West Water Tower (See Attachment D) that was observed to have visual accumulations of Grit Blast.

$$GI = \sqrt{\frac{3850\ yds^2}{70\ yds.} \cdot \pi}$$

= 13.1 yds. or 39.3 ft.

Appropriate No. of Sampling Points

Assuming that the data already collected (Attachment A) is representative, an estimate of the appropriate number of sampling points can be made with the following equation:

$$N = \frac{t^2 \cdot s^2}{\Delta^2}$$

Where

t ≡ value from Student t distribution table
s ≡ standard deviation

$$s = \sqrt{\frac{\sum_{i=1}^{n} (X_i - \overline{X})^2}{n-1}}$$

$\overline{X}$ ≡ average or mean of the sample
X_i ≡ individual sample values
n ≡ No. of data points

$\Delta = RT - \overline{X}$
RT - Regulatory Threshold (500 ppm)

ATTACHMENT E, page 2 - VERIFICATION OF CLEANUP, WEST WATER TOWER

Assuming also that the variability expressed in these E.P. Toxicity results is indicative of the variability that will be seen in concentrations of total lead in the soil, the equation above is applied to the 10 sample results (Attachment A) from the West Water Tower to estimate the number of samples to take.

Location and Description of Samples	Leachable Lead, ppm	Assuming Total Level Ten Times Higher, ppm	Assuming 80% of it Cleaned up
West Water Tower	200	2000	400
	148.8	1422	297.6
	179.2	1792	358.4
10/88	114	1140	228
	272	2720	544
	199.4	1994	398.8
	78.4	784	156.8
	256	2560	512
	276	2760	552
	256	2560	512

$\bar{X}$ =395.96

Applying these assumptions to the ten data points to calculate the variables:

$\bar{X}$ = 395.96

s^2 = 18,856.976
t = 1.393

$$N = \frac{(1.393)^2 \ (18,856.976)}{(500 - 395.96)^2}$$

N = 3.38

Though the small variability among the data points and about the RT yields an appropriate sampling size of only 3.38, the USEPA "Test Methods For Evaluating Solid Waste, SW 846 specifies "that enough samples (but in no case less than four samples) be collected over a period of time sufficient to represent the variability of the wastes." Thus, a minimum of four random samples shall be taken from the area depicted in Attachment D, and an additional three samples shall be taken from every area to protect against poor estimates of the appropriate number of sampling points caused by inaccurate preliminary estimates of s^2 and $\bar{X}$.

Selection of Sampling Points

From the random number table attached, a point or number on the table was blindly picked...#18 (fifth column approximately halfway down). The next six points...#15, #17, #5, #9, #14, and #3...from that point were taken. The first four grid locations (18, 15, 17,5) shall be sampled in the center or as close to the center as possible, and submitted for analyses. The other three samples (#3, #9, #14) shall be collected and as "protection", submitted later if the first four samples' statistical data indicates that the preliminary estimates of X and s^2 were inaccurate. 22

TABLE 1

Random Numbers, 1-20

11	18	11	4	9	10	1	18
1	4	6	15	14	13	16	1
20	7	2	16	9	13	20	17
8	13	6	3	15	8	10	8
17	7	17	15	5	19	20	8
15	18	18	18	13	5	15	4
15	17	19	4	14	10	4	14
12	6	17	13	1	1	20	13
13	12	14	9	4	2	2	12
7	8	20	14	2	15	15	10
13	3	20	6	4	17	15	16
3	4	17	5	9	6	14	7
8	18	13	7	8	17	10	10
20	9	9	5	1	2	17	6
5	19	4	16	9	3	15	20
11	1	4	5	13	15	8	3
14	13	6	20	20	9	16	8
16	9	18	15	17	11	17	18
16	10	19	15	13	17	4	1
17	8	15	11	12	12	8	9
18	17	18	19	8	8	6	15
14	10	14	11	14	9	20	8
3	5	20	9	13	11	12	5
8	2	10	10	7	16	11	5
11	2	2	3	18	11	4	4
19	20	7	10	15	15	19	14
10	3	8	20	17	14	14	2
15	15	4	6	5	1	9	8
3	13	9	9	9	8	9	12
13	7	10	16	14	17	13	6
2	16	20	20	3	5	14	7
9	18	14	10	18	16	7	18
20	4	18	12	7	14	3	4
7	8	4	15	7	18	14	19
10	12	7	2	16	15	4	7
13	12	2	15	2	2	17	8
19	3	19	6	4	3	20	7
4	1	10	15	8	14	9	7
9	17	1	7	5	4	17	17
10	2	20	3	3	6	5	7
1	15	2	17	18	19	13	6
5	5	12	2	4	3	15	19
15	11	5	16	19	9	15	8
15	5	7	18	14	16	5	13
19	5	15	11	11	1	6	16
11	13	7	9	12	5	10	10
16	10	17	19	7	6	2	3
19	3	11	5	6	9	10	14
12	19	10	3	1	2	9	16
4	7	2	6	7	7	16	2

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