STORM WATER SAMPLING PLAN

FOR

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM

INDUSTRIAL STORM WATER DISCHARGES

Prepared For

UNITED STATES ARMY MISSILE COMMAND

REDSTONE ARSENAL, ALABAMA

By

UNITED STATES GEOLOGICAL SURVEY

TUSCALOOSA, ALABAMA

And

UNITED STATES ARMY CORPS OF ENGINEERS

MOBILE DISTRICT

MOBILE, ALABAMA

REVISED
AUGUST 1993

TABLE OF CONTENTS

Section Title **Page**

1. **INTRODUCTION**.....1-1

2. **DESIGNATED SAMPLING POINTS**

2.1 Summary of Designated Sample Points.....2-1
2.2 Designated Sample Point Locations.....2-5

3. **STORM WATER SAMPLING PROTOCOL**

3.1 Rainfall Data Collection 3-1
3.2 Grab Sample.....3-3
3.3 Determination of Discharge Data.....3-5
3.4 Flow Rate-Weighted Composite Samples.....3-6
3.5 Personnel Sampling and Safety Training...3-9
3.6 Access to Redstone Arsenal.....3-11
3.7 Security Procedures and POC's.....3-12

4. **STORM WATER SAMPLING REQUIREMENTS**

4.1 Parameter Analysis List.....4-1
4.2 Testing Requirements.....4-2
4.3 Analytical Methods.....4-9

APPENDIX

A. REGULATED FACILITY LIST BY DESIGNATED SAMPLE POINT...A1-A5

B. RAIN GAGE LOCATION MAP (Fig. 1) & GENERAL SITE MAPS.B1-B2

TABLES AND FIGURES

Table Number	Description	Page
TABLE 1	DSN SUMMARY TABLE	2-5
TABLE 2	COMPOSITE PROPORTIONS CHART	3-10

Figure Number		
FIGURE 1	RAIN GAGE INSTALLATION MAP & GENERAL SITE MAP	Appendix 'B'
FIGURE 2	RAIN GAGE INSPECTION SHEET	3-2
FIGURE 3	STAINLESS STEEL SAMPLER	3-4
FIGURE 4	LOG OF RAINFALL EVENT	3-5
FIGURE 5	DISCHARGE VOLUME RECORDING FORM	3-7

1. INTRODUCTION

A. Authority. U.S. Army Corps of Engineers, Mobile District, under contract to the U.S. Army Missile Command, Redstone Arsenal has prepared and implemented a two phase storm water sampling and analysis plan. This plan is in accordance with Federal Regulation 40 CFR Part 122 and State of Alabama Department of Environmental Management Regulations.

B. Implementation. Mobile District retained the services of the U.S. Geological Survey (USGS) to perform the field work associated with collecting storm water samples. Analytical testing of the samples was performed by U.S. Army Corps of Engineers, South Atlantic Division Laboratory, Marietta, Georgia.

C. Storm Water Sampling and Testing Plan. This sampling and testing plan was prepared jointly between USGS and COE. This plan documents the sampling point locations, parameters to be tested, and field procedures for collecting, compositing, documenting, and shipping the samples to the lab.

2. DESIGNATED SAMPLE POINTS.

Outfalls which have been chosen to represent the Storm Water Discharge effluent runoff from Redstone Arsenal have been assigned designated sample point numbers; DSN-010 thru DSN-022. These outfalls are further described in this Section. Designated sample points DSN-001 thru DSN-009 were existing monitoring points at Redstone Arsenal.

2.1 Summary of Designated Sampling Points.

A Summary Table of Designated Sample Points is presented on page 2-5. A list of proposed outfalls with facilities to be sampled is attached as Appendix 'A'. Facilities with an asterisk adjacent to the Sample No. are not directly sampled but their discharges will be representatively characterized by the 22 sampled outfalls. A list of the parameters to be analyzed by outfall is presented in Section 4.1. A general site map of redstone Arsenal showing the sample point locations is presented in Appendix 'B'. Detailed site specific locations maps are presented in Section 2.2. A general summary of the proposed grouping at the 22 outfalls is as follows:

DSN-001-009. Existing storm water sampling points at Redstone Arsenal (from prior NPDES permit with Alabama Department of Environmental Management).

DSN-010. DSN-010 will sample effluent runoff from facilities located at the airport. No grouping is proposed. Facilities listed under DSN-010 on Appendix 'A' will be directly sampled.

DSN-011. DSN-011 will sample effluent runoff from facilities associated with the bulk fuel storage area. No grouping is proposed. Facilities listed under DSN-011 on Appendix 'A' will be directly sampled.

DSN-012. DSN-012 will sample the sewage treatment plant No. 4 and the inactive sanitary landfill, Area G. Sewage treatment plant No's 1 & 3 and sewage lift station 10 will be represented by this outfall.

DSN-013. DSN-013 will sample the Inert Landfill and Open Storage Area 56-2. Storage Area ASP-range #3 will be grouped with this outfall.

DSN-014. DSN-014 will sample effluent runoff from Test Area No. 4. No grouping is proposed. Facilities listed under Appendix 'A' will be directly sampled.

DSN-015 DSN-015 will sample various open burn pads, trenches, and open detonation areas, see Appendix 'A' for specific facilities. Similar open burn and disposal trenches (see Appendix 'A') will be grouped with the runoff sampled at this outfall.

DSN-016. DSN-016 will sample Chemical Storage Areas AA, X, and Y, former Demolition Site X1, Toxic Chemical Areas Y1 and Z, and Static test Facility. Various chemical storage and disposal sites (see Appendix 'A') will be grouped with the runoff sampled from this outfall.

DSN-017. DSN-017 will sample scrap yards at the Thiokol Open Storage and the Maintenance Shop. All other open storage areas and scrap yards (see Appendix 'A') will be grouped with the runoff sampled by this outfall.

DSN-018. DSN-018 will sample runoff from various facilities located on Thiokol. These facilities are generally TCE/TCA solvent stills. No grouping is proposed. Facilities listed under Appendix 'A' will be directly sampled by this outfall.

DSN-019. DSN-019 will sample twenty eight facilities generally associated with rocket propellant located on Thiokol. All other facilities associated with this type of rocket propellant processing and production (see Appendix 'A') will be grouped with the runoff sampled at this outfall.

DSN-020. DSN-020 will sample various facilities including Open Storage area 56-1 and the Electrical Storage Yard (see Appendix 'A'). Open Storage Area 54-1 and the Test and Evaluation Facility (open storage) will be grouped with the runoff sampled by this outfall.

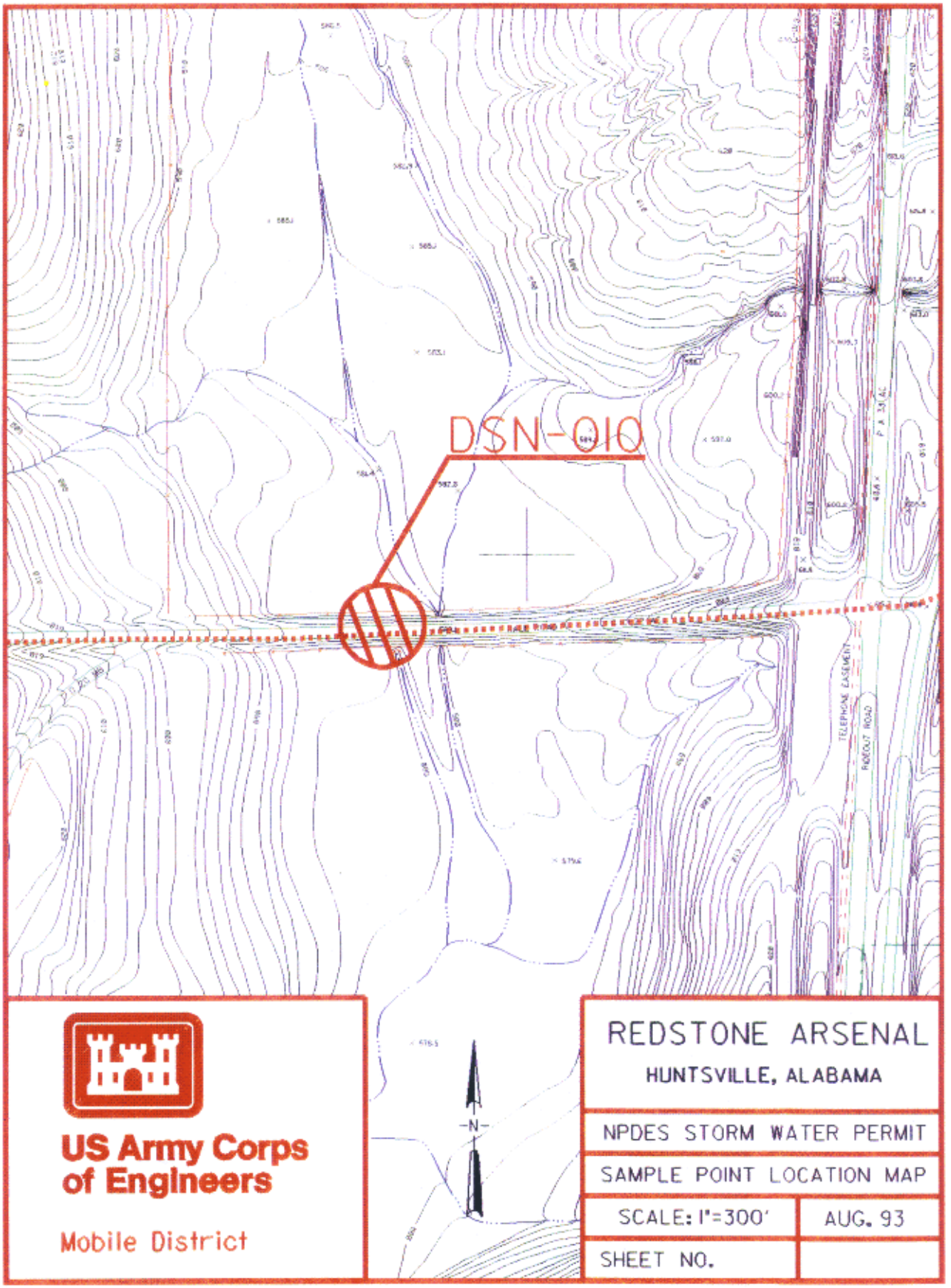
DSN-021. DSN-021 will sample various facilities including the Landfill Area T and the closed Arsenic lagoons (Area U). Various inactive rubble fill areas and former Arsenic Pond F will be grouped with the runoff sampled by this outfall.

DSN-022. DSN-022 will sample the waste accumulation and test Area at Facility 3630, the RSA Motor pool, Maintenance shop at Facility 3631, and the Paint Shop. Paint shops, Test Area 5, and the motor pools (see Appendix 'A') will be grouped with the runoff sampled by this outfall.

TABLE NO. 1

2.2 SUMMARY TABLE DESIGNATED SAMPLING POINTS (DSN) FOR NPDES STORM WATER PERMIT

OUTFALL SAMPLE POINT NUMBER	LOCATION	FACILITIES SAMPLED (GENERAL LISTING-FOR A DETAILED LIST SEE APPENDIX 'A'.
DSN-010	HALE ROAD	AIRPORT
DSN-011	SOUTH OF FACILITY 5656	BULK FUEL STORAGE AREA
DSN-012	SEWAGE TREATMENT PLANT NO. 4	STP NO. 4
DSN-013	SOUTHEAST OF INERT LANDFILL	INERT LANDFILL
DSN-014	SOUTH OF TEST AREA 4	TEST AREA NO. 4
DSN-015	NORTHEAST OF DEMOLITION AREA	OPEN DETONATION AREA & OPEN BURN PADS
DSN-016	EAST OF DEMOLITION AREA	FORMER CHEMICAL STORAGE AREAS
DSN-017	BUXTON ROAD	SCRAP YARDS
DSN-018	THIOKOL	TCE/TCA SOLVENT STILLS
DSN-019	THIOKOL	VARIOUS THIOKOL FACILITIES
DSN-020	INDUSTRIAL ROAD	OPEN STORAGE SITES
DSN-021	VIPER ROAD	CLOSED ARSENIC WASTE LAGOON
DSN-022	PATRIOT DRIVE	VARIOUS MOTOR POOLS & MAINTENANCE SHOPS



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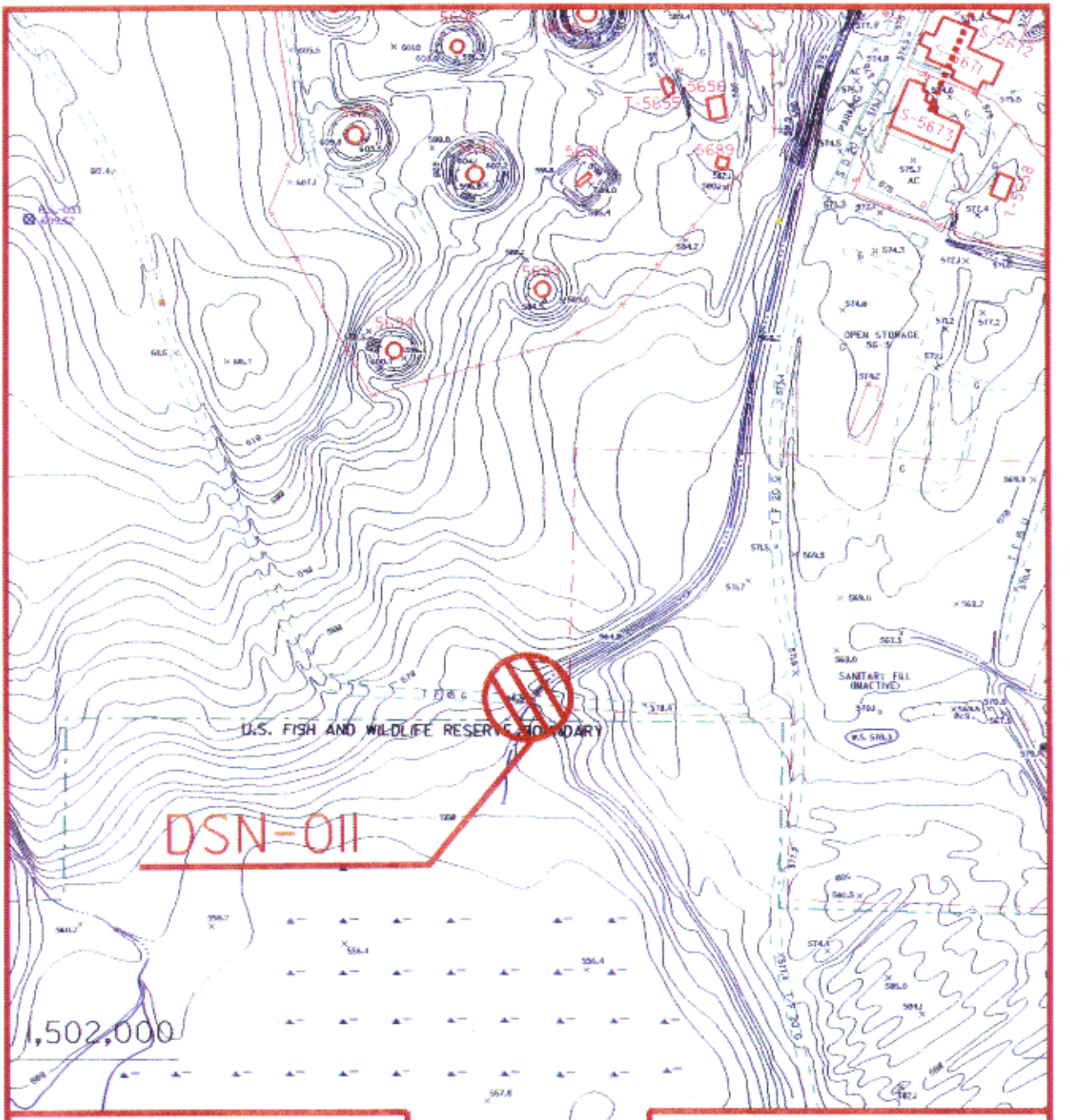
NPDES STORM WATER PERMIT

SAMPLE POINT LOCATION MAP

SCALE: 1"=300'	AUG. 93
SHEET NO.	



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NPDES STORM WATER PERMIT

SAMPLE POINT LOCATION MAP

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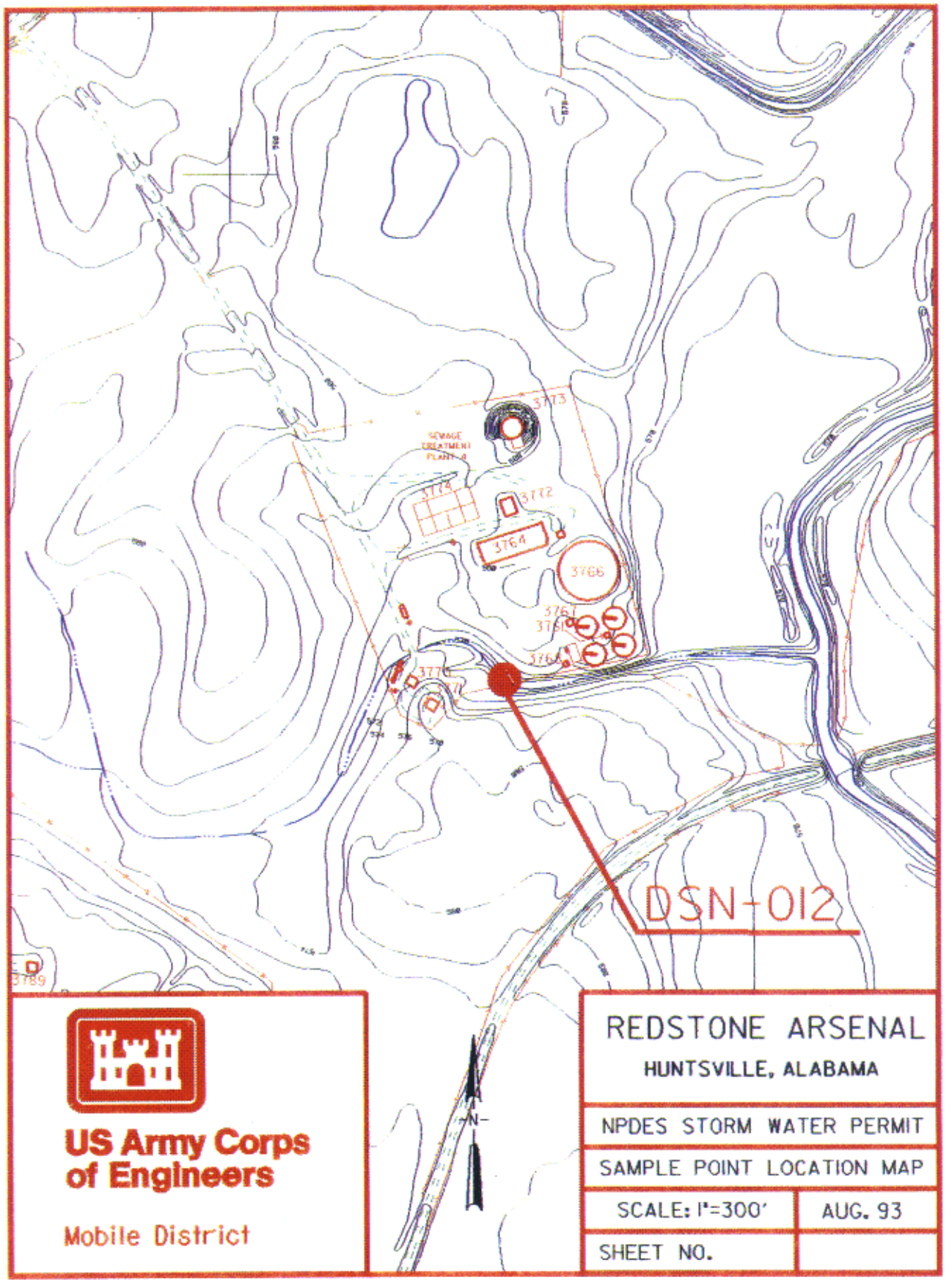

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NPDES STORM WATER PERMIT	
SAMPLE POINT LOCATION MAP	
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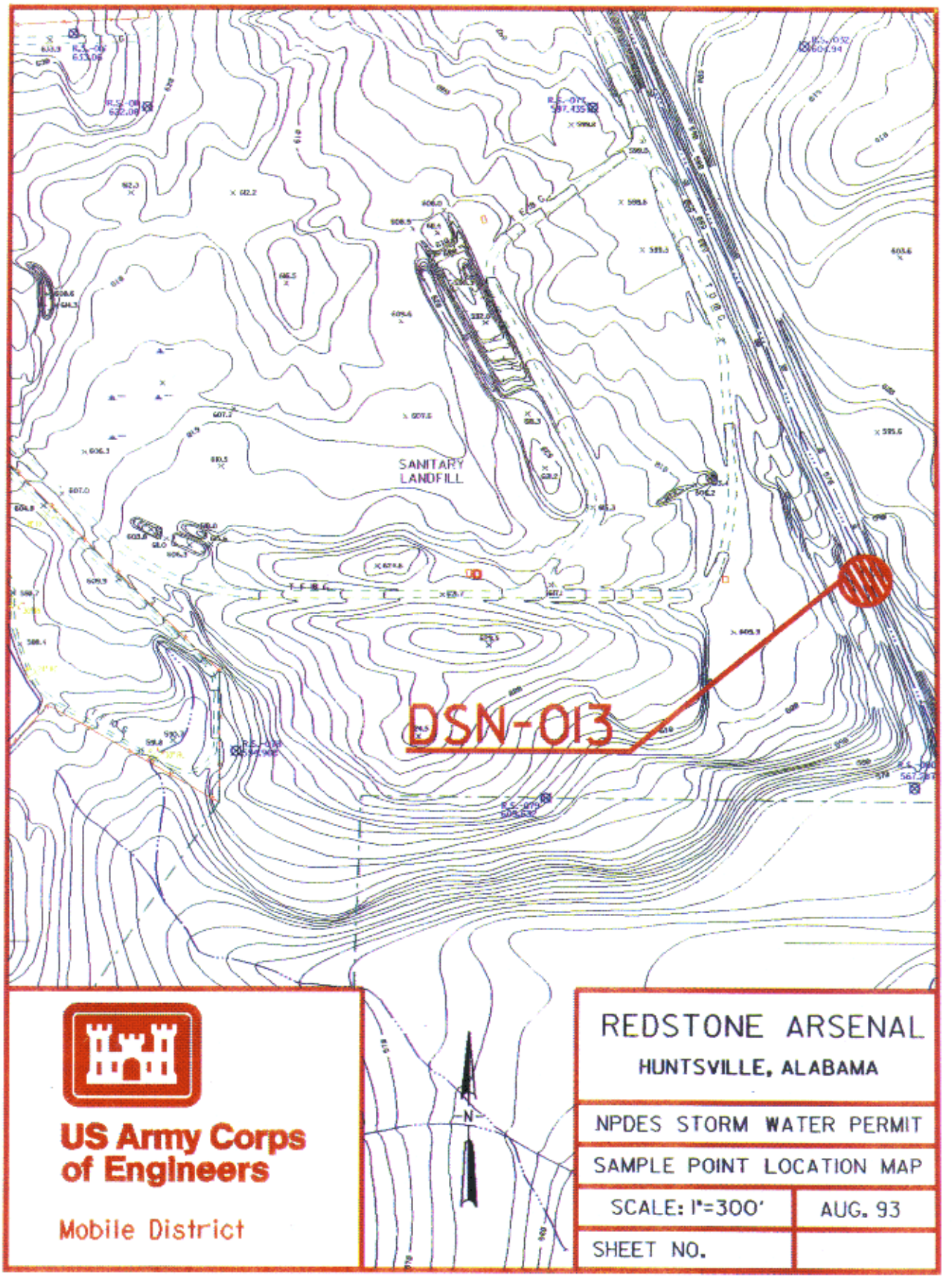
SHEET NO.	



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NPDES STORM WATER PERMIT

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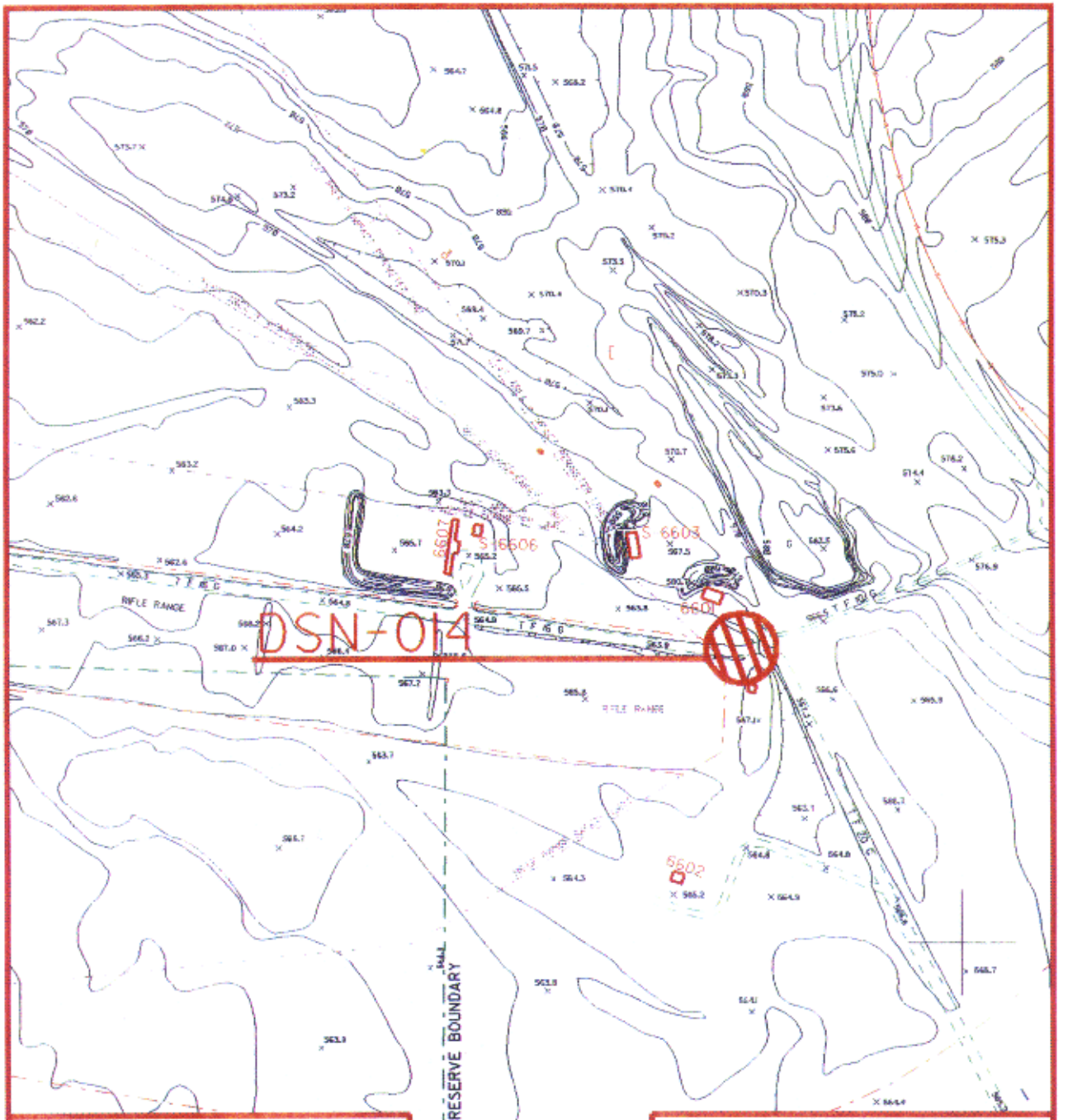

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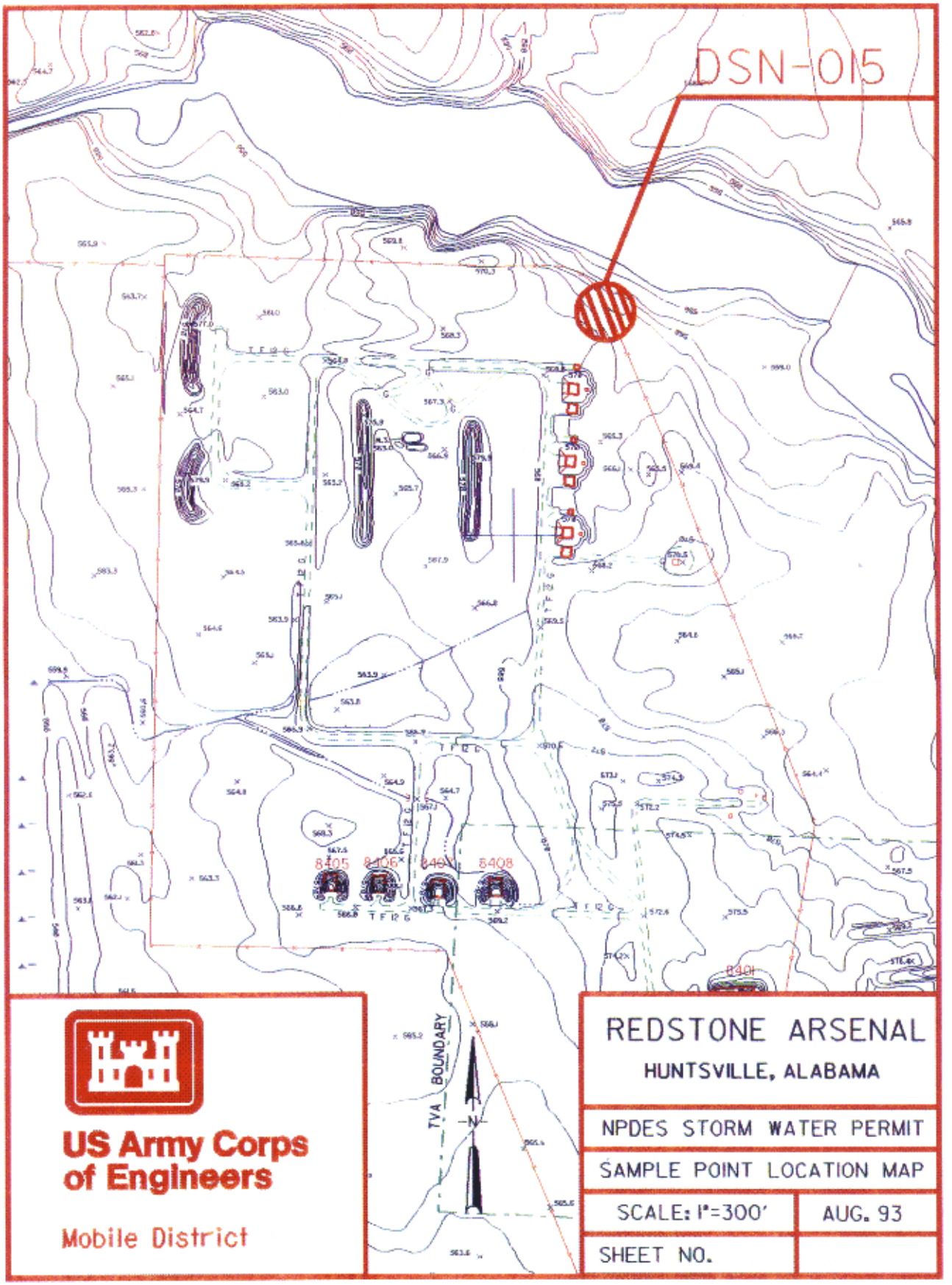

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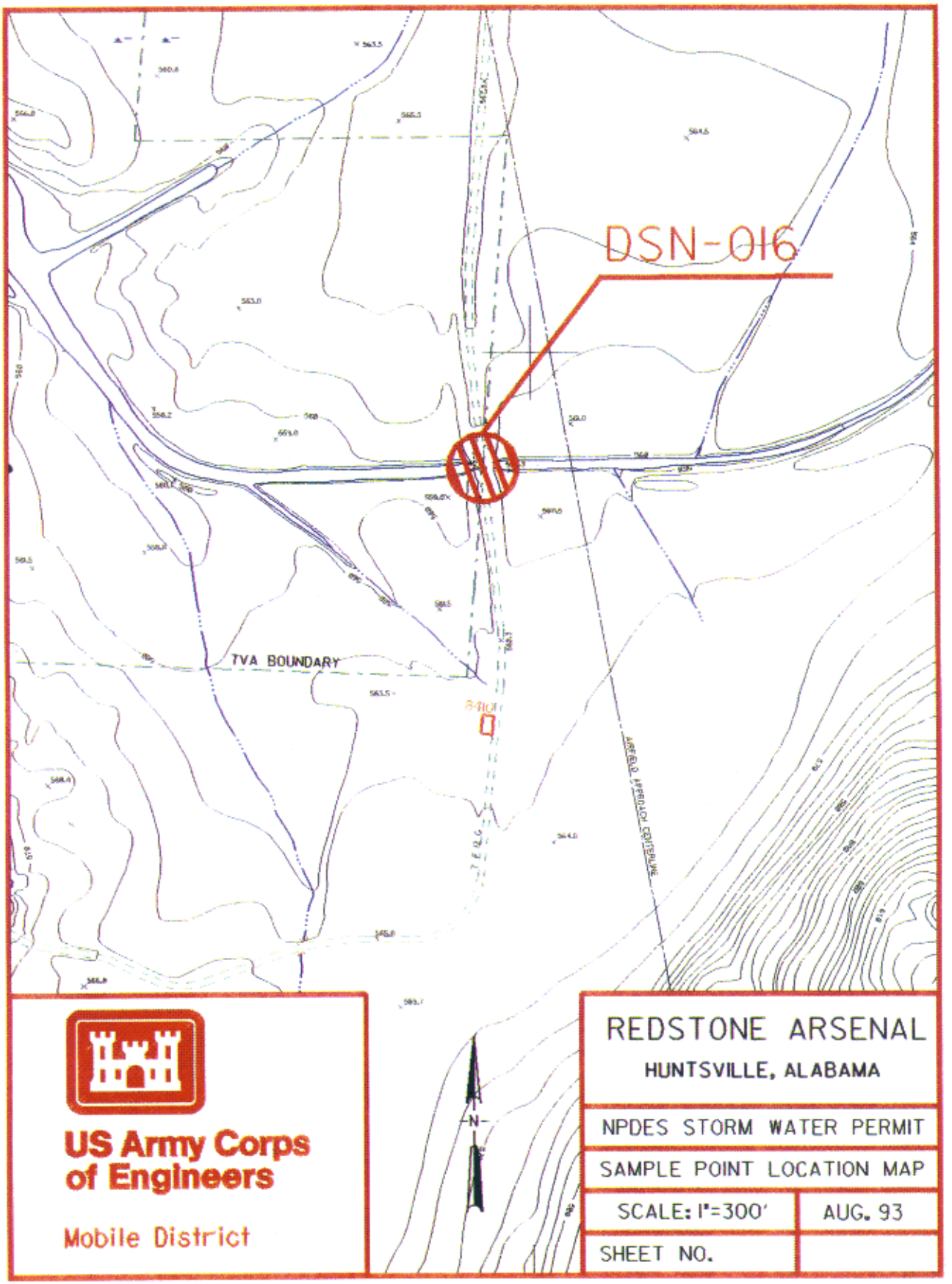

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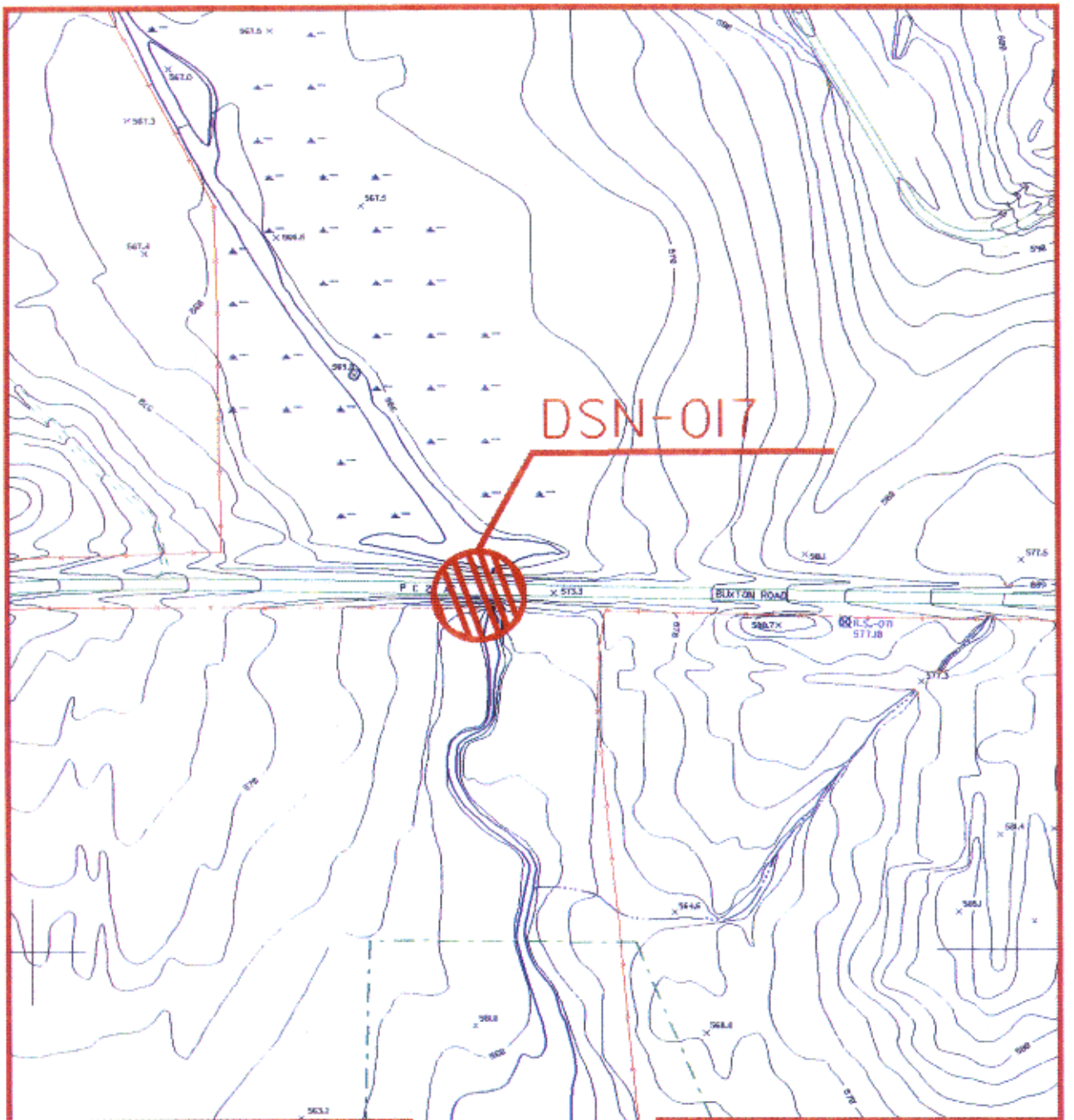

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NPDES STORM WATER PERMIT

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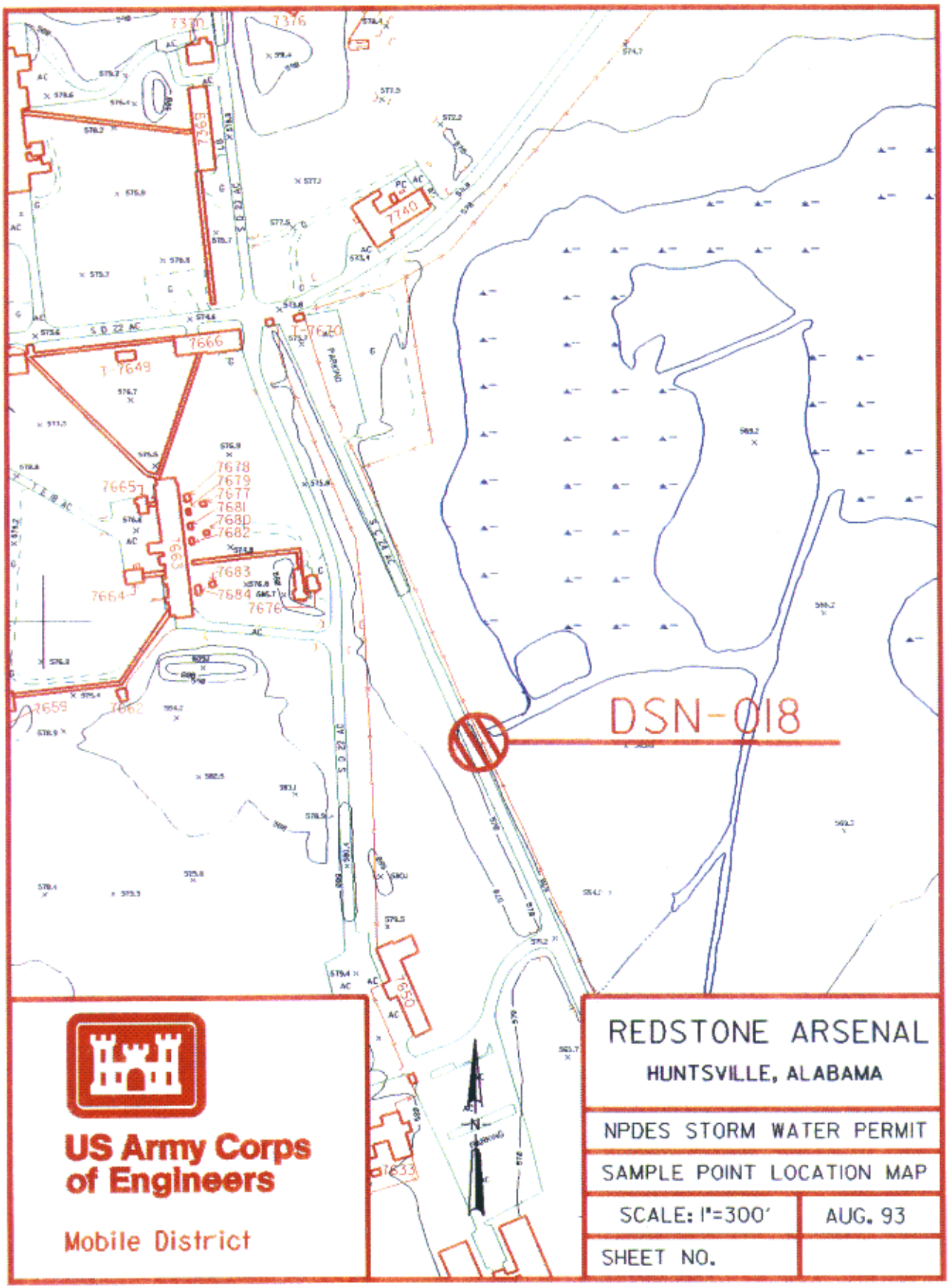

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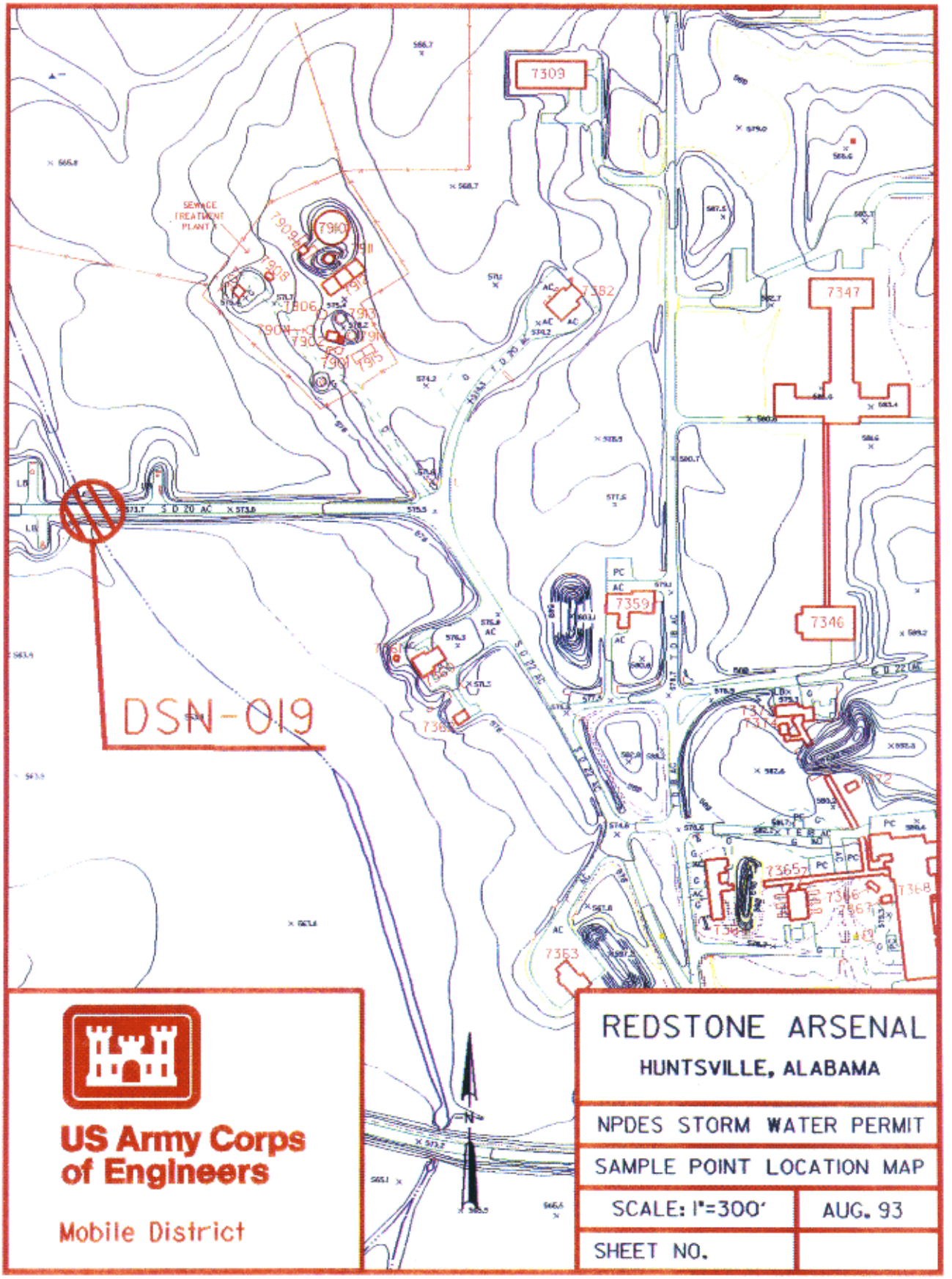

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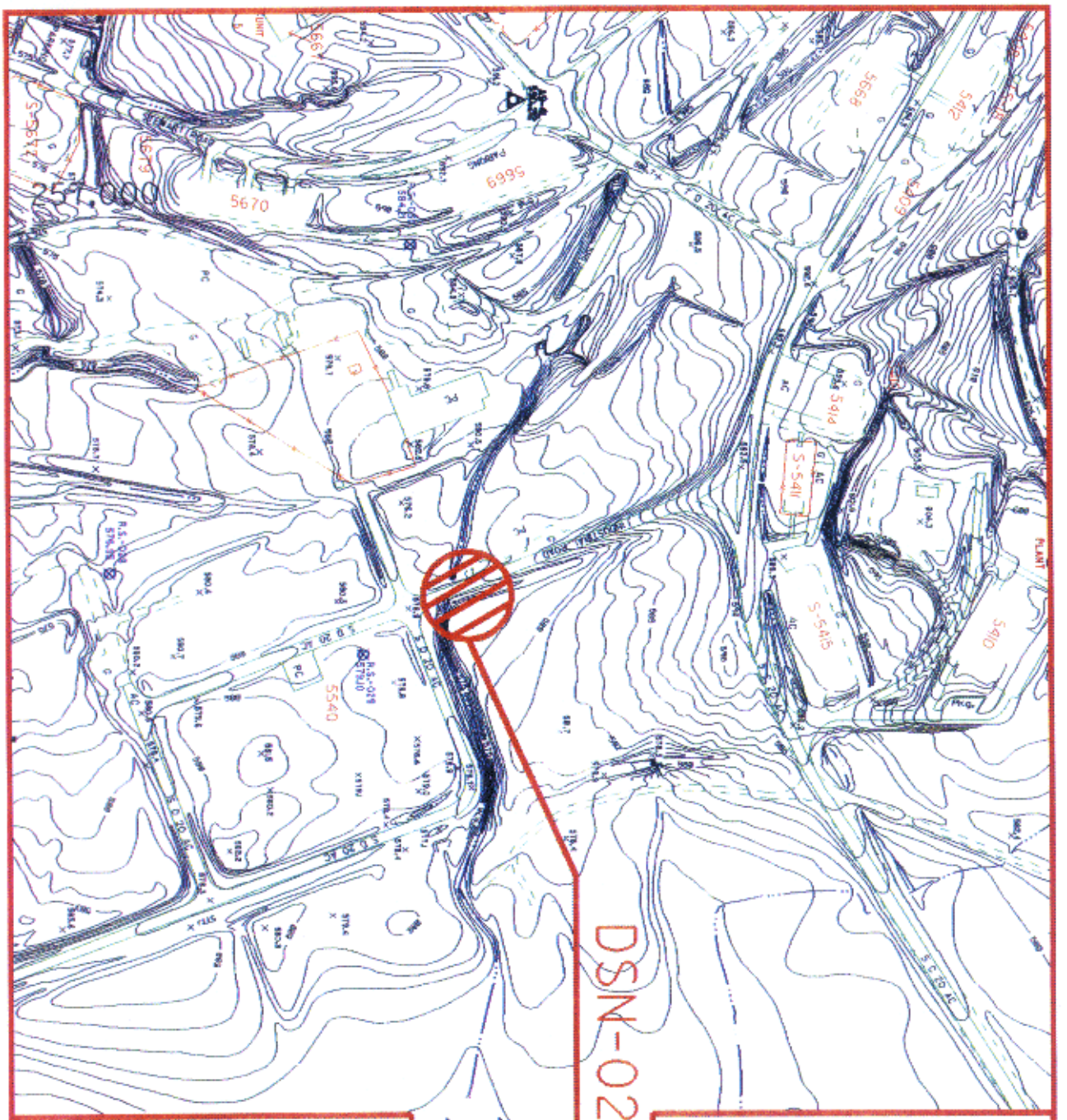

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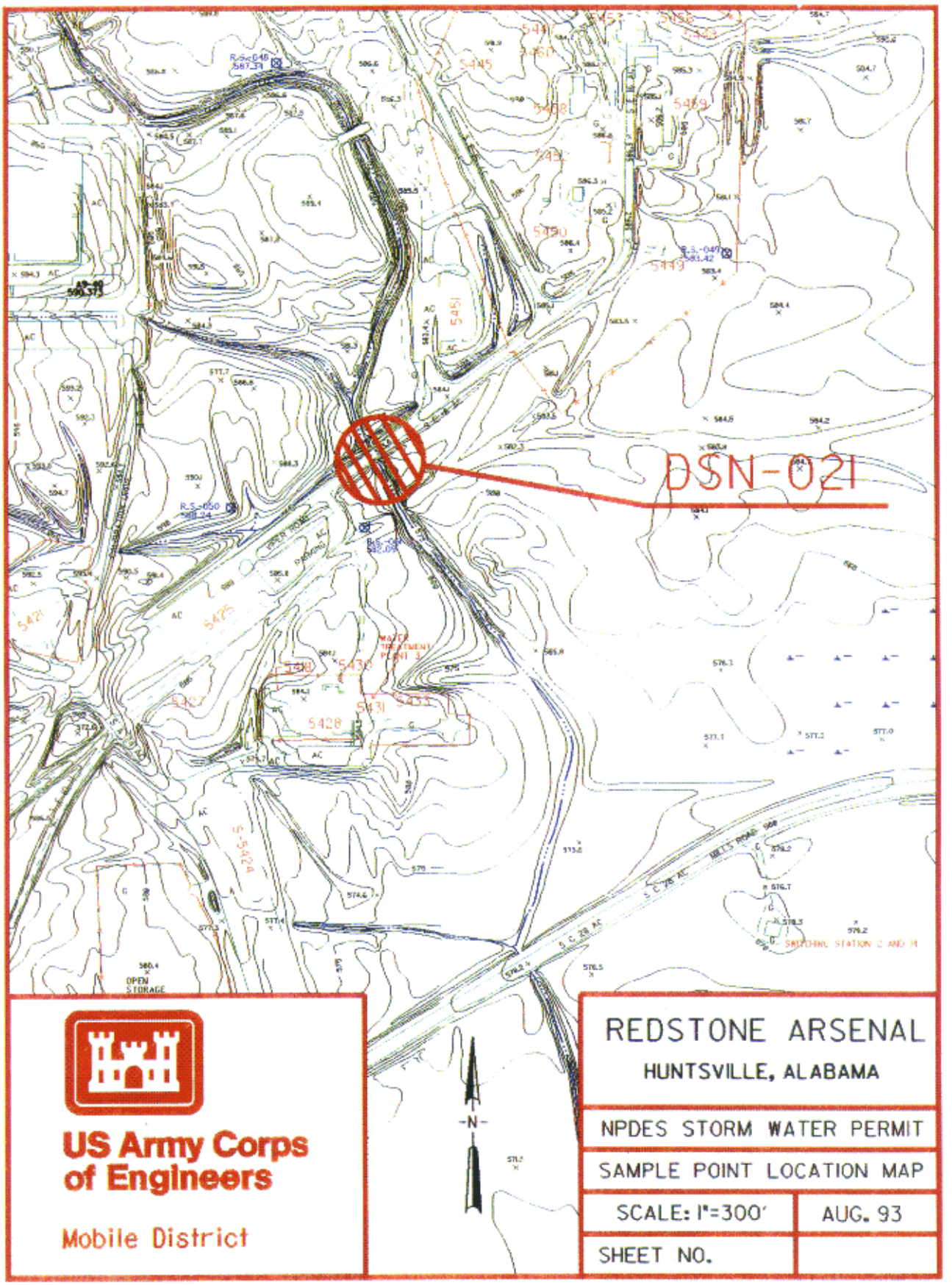

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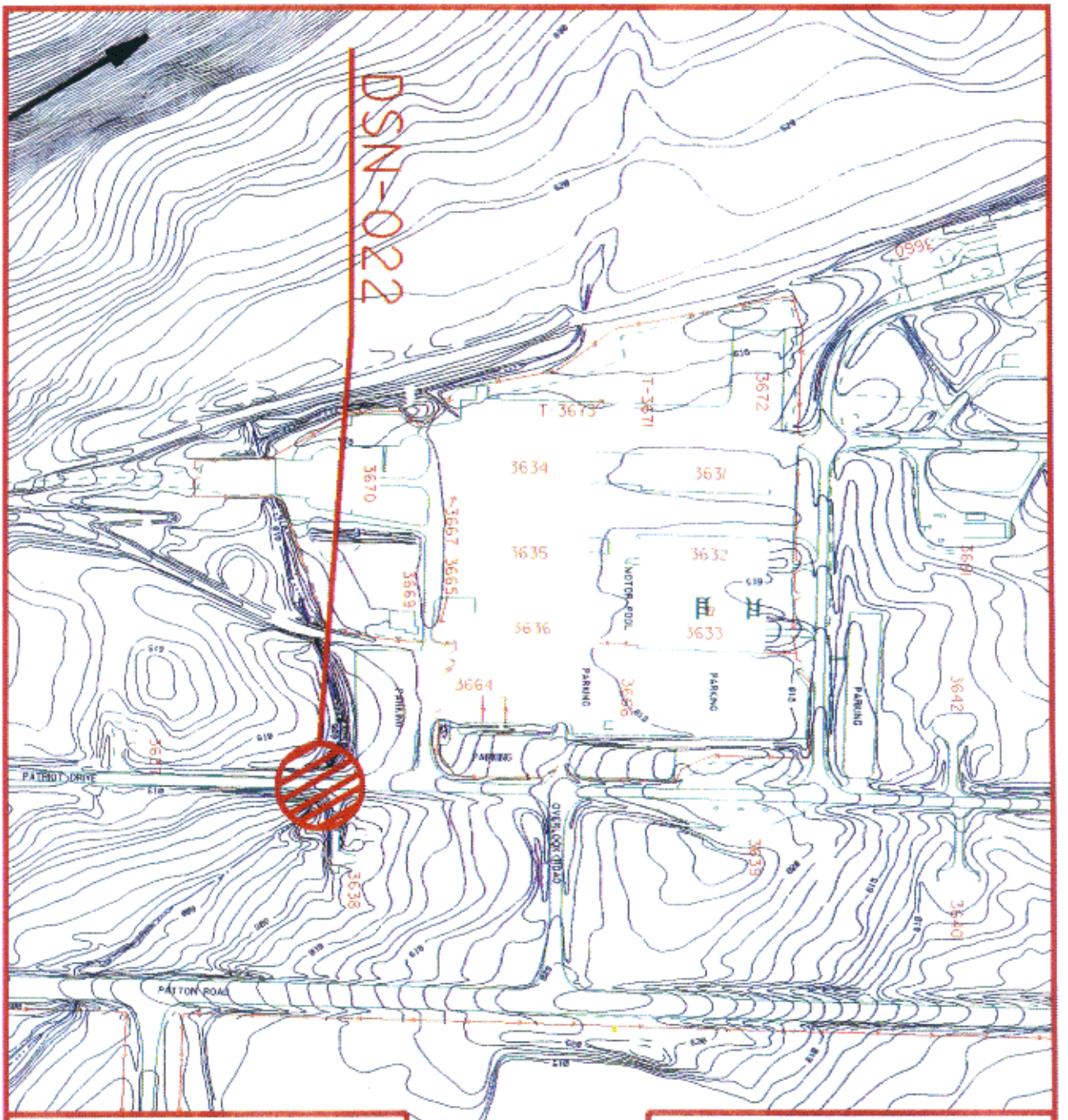

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NPDES STORM WATER PERMIT

SAMPLE POINT LOCATION MAP

SCALE: 1"=300'	AUG. 93
SHEET NO.	

3. STORM WATER SAMPLING PROTOCOL

The characteristics of a storm water discharge event will be accomplished by monitoring the quantity and quality of runoff of selected separate outfalls during one storm. U.S. Geological Survey (USGS) staff will collect grab and flow-composite sample from each outfall selected for sampling. Sampling will be handled under chain-of-custody procedures and documented USGS quality-control-assurance protocols. The sampling will be shipped to U.S Army Corps of Engineers South-Atlantic Division Laboratory in Marietta, Georgia within the retention times specified.

3.1 Rainfall Data Collection.

Six continuous monitoring rain gages have been installed at Redstone Arsenal (Appendix 'B',Figure 1.). An inspection sheet (Figure 2) will be used to document the rainfall at each gage. During periods of rain showers the gages will be inspected daily. In addition, a temporary volumetric rain gage will be installed at each outfall to be sampled. This network of rain gages will assist documenting rainfall intensity and duration, the number of days since previous rainfall, total rainfall in an event, and the distribution of rainfall around the Arsenal property. Storms sample must follow a dry spell of at least 72 hours, and where feasible, should not vary more than 50 percent from the average rainfall volume and duration of storm events. For Huntsville, the duration range is 4.2 to 12.6 hours and magnitude range is 0.37 to 1.10 inches.

FIGURE 2- **RAIN GAGE INSPECTION SHEET**

LOCATION_____

OUTFALL NO_____

PROJECT_____

DATE	TIME	READING	INSPECTOR	WEATHER CONDITIONS

3.2 Grab Sample

A discrete water sample (grab sample) will be collected manually during the first 30 minutes of storm water discharge. Pertinent information regarding parameter, analytical method, preservative, holding time, and size type of container for each site is identified in table 1 (see Section 4). Samples will be collected in the main flow of the stream channel where turbulence and mixing is greatest. Following collection, all samples will be maintained at 4 degrees C until analyses are performed. Sample containers will be properly cleaned and prepared prior to the event to meet quality assurance/quality control (QA/QC) standards. When wading is impractical to collect the sample, a stainless steel collection device will be used (figure 3). Prior to use the device is washed with a non-phosphate detergent, rinsed with deionized water, rinsed with pesticide grade methanol and allowed to dry then wrapped in aluminum foil until ready for use.

A log (figures 4) will be maintained to document the storm as beginning, intensity, and end of rainfall, first observed runoff, time of grab sample collection, and any other information that may be valuable in interpreting the data. Field measurements of temperature, specific conductance, dissolved oxygen, pH, and stream discharge will also be recorded on the log.

FIGURE 3

STAINLESS STEEL SAMPLER

NOT TO SCALE

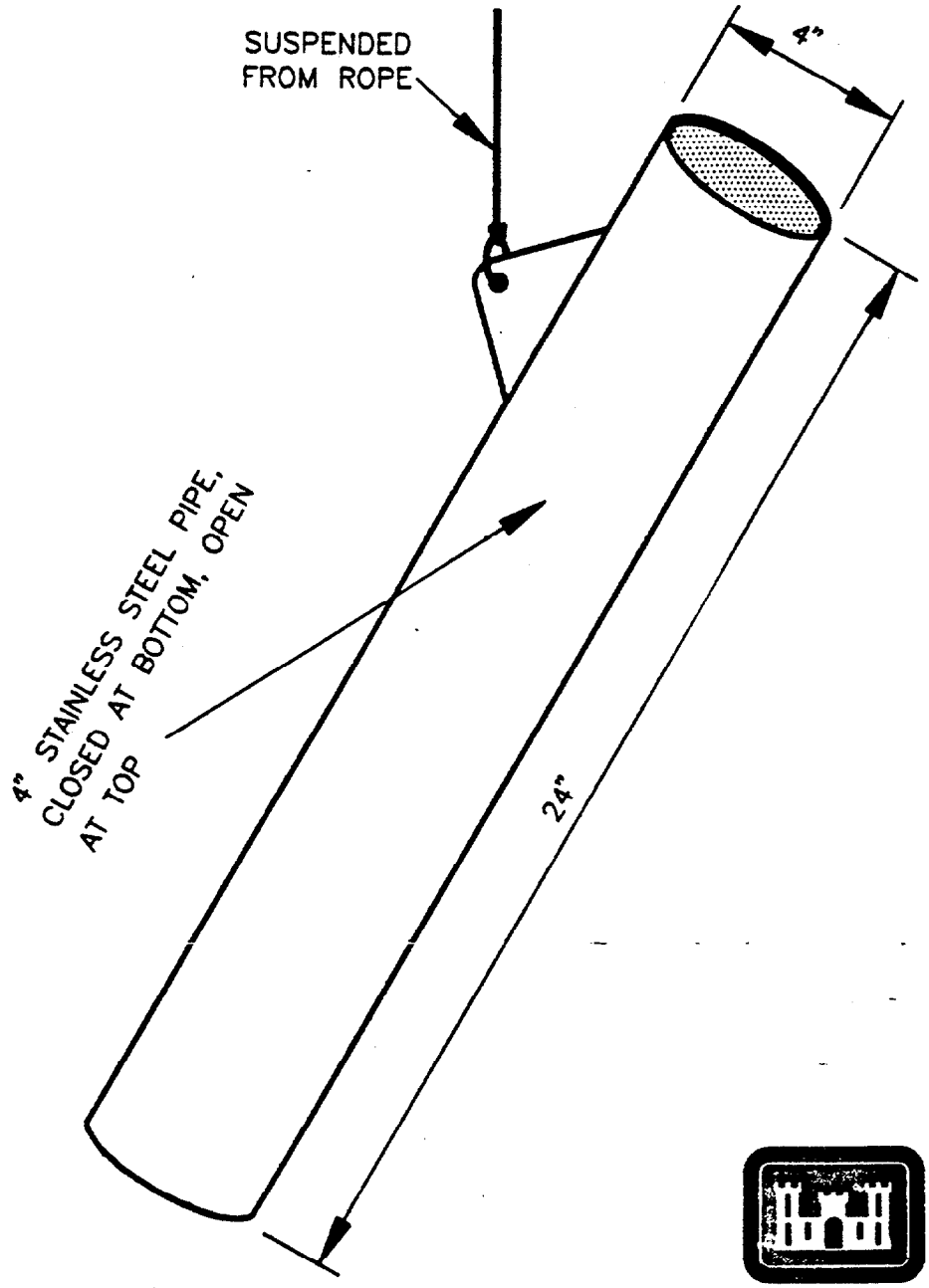

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FIGURE 4- **LOG OF RAINFALL EVENT**

LOCATION_____ PROJECT_____
OUTFALL NO._____ DATE OF EVENT_____

SAMPLE NUMBER	TIME RAIN BEGAN	TIME RAIN ENDED	SC*	DO**	pH	FLOW RATE (Q)	RAIN INCH	REMARKS
GRAB								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

*SPECIFIC CONDUCTANCE
**DISSOLVED OXYGEN
Q=(VELOCITY) X (CROSS-SECTIONAL AREA)

3.3 Determination of Discharge Data

EPA provides flexibility for the determination of discharge data associated with the Army Storm Water Runoff Program (ASWRP). The intent of the industrial National Pollutant Discharge Elimination System (NPDES) program is not to require an accurate determination of the outfall discharge. However, the USGS will collect the best-possible data within the time limitations to meet State and Federal Deadlines on submitting permit applications. The quality of the discharge data also will be affected by the physical constraints of the outfall. For each fifteen minute time increment during the sampling period a discharge calculation will be recorded. Following a reconnaissance and assessment, the following method will be used. A temporary staff gage or similar point-measuring device will be installed at each outfall to be sampled.

Stage reading to determine hydraulic area (A) will be taken in tandem with flow velocity measurements (V). Stream velocity (V) will be measured with a current meter. The formula for calculating discharge (Q) will be: $Q = V \times A$

Measurements of water depth relative to a point at the outfall will be recorded at the same time as velocity-area measurements are obtained. Incremental discharge rates will be multiplied by the incremental time duration to determine the incremental flow volume. The total volume of the event will be the summation of the incremental volumes.

FIGURE 5- **DISCHARGE VOLUME RECORDING FORM**

LOCATION_____
OUTFALL NO._____
DATE_____
RECORDER_____

TIME	FLOW VELOCITY	FLOW DEPTH	FLOW AREA	INCREMENT Q	TIME (SEC)	VOLUME CU. FT.
0						
15						
30						
45						
1HR						
15						
30						
45						
2HR						
15						
30						
45						
3HR						
SUMMATION INCREMENT VOLUMES						

3.4 Flow-Weighted Composite Samples.

The flow-weighted composite sample will provide the average water quality measurements for an entire storm event. All composite sampling at Redstone Arsenal will be done manually. To accomplish this, discrete samples will be collected at 15 minute intervals for the entire event or for the first 3 hours, whichever come first. The first sample (3 liters) will be collected immediately after storm runoff is observed. Three liters of water will then be collected at each 15-minute interval using 1-liter glass bottles with Teflon caps. All containers and associated equipment will have been prepared before the event by washing with a non-phosphate detergent, and then rinsed with deionized water, and then rinsed again with pesticide grade methanol and allowed to air dry before being recapped. After sample collection, the bottles will be placed in ice until returned to the laboratory where the composite sample can be mixed. Discharge measurements will be made at each 15-minute sampling interval using procedures described earlier.

Procedures for calculating the sampling aliquot to make the composite are as follows:

Compute the discharges for each 15 minute sample time.

Compute volume of each 15 minute sample to be added to the composite bottle using the following formula:

$$V_{sample} = \frac{Q_{sample} \times V_{total}}{Q_{total}}$$

where,

V sample = required volume of sample, in milliliters

Q sample = discharge at the time the sample was collected

V total = total volume of composite sample needed, add 2-3 liters to the total volume needed to allow for spillage and proper mixing

Q total = sum of all discharges at each sample time

Compute the volume of sample needed at the peak first to assure that enough water is available for the composite. If not, reduce the total volume of composite water needed.

Composite the sample into 3-5 gallon glass jars that have been cleaned with methanol. Make sure that any equipment (funnels beakers, graduated cylinders, etc.) that come in contact with any sample water have been cleaned with methanol. Table 2 is a work sheet to aid with compositing the sample.

TABLE 2-COMPOSITE PROPORTIONS CHART

Outfall No._____

Date Sampled_____

Proportions Equation:

$$V_{sample} = \frac{Q_{sample} \times V_{total}}{Q_{total}}$$

Where:

V sample= Volume of each sample needed to mix for the composite.

V total= Total amount of composite sample needed. Be sure to add 2 to 3 liters to the amount specified in Table 1 in order to have some extra water for spillage and mixing.

Q sample= Stream discharge at the time sample was taken.

Q Total= Sum of each 15 minute discharge for each sampling time during the event.

SAMPLE NO.	TIME INCREMENT	Q SAMPLE	Q SAMPLE X V TOTAL	V SAMPLE
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
Q TOTAL				

3.5 Personnel Sampling and Safety Training.

All USGS personnel involved with storm water at Redstone Arsenal have received training in the proper sampling procedures. Particular emphasis has been given to the prevention of sample contamination. The responsible person for activating the sampling teams is Tommy Schaefer with Paul Cole and Will Mooty as alternates. James Pearman may also be contacted if the additional personnel are needed.

The primary sampling members are as follows:

	Work	Home
Tommy Schaefer	(205) 737-0292	(205) 340-9227
Paul Cole	(205) 734-0292	(205) 352-5767
Will Mooty	(205) 752-8104	(205) 752-9202
Doug Batemon	(205) 734-0292	(205) 287-2828

Additional personnel that may be used as necessary for sampling are as follows:

James Pearman	(205) 223-7510	(205) 285-4766
Bob Kidd	(205) 752-8104	(205) 339-9044
Vic Stricklin	(205) 752-8104	(205) 556-0557
Bill Hard	(205) 752-8104	(205) 345-9928
Brett Johnston	(205) 752-8104	(205) 339-0143
Jim Tucker	(205) 752-8104	(205) 556-4189

Each employee has received up-to-date safety procedures and are first aid and CPR certified. Two members will be at each site at all times. At no time will personnel enter confined areas such as manholes or culverts. Each person will be briefed on the location and phone number of the nearest rescue station. Precise locations are necessary in order to provide rescue personnel with proper directions to the site should an emergency arise.

A major safety concern with collecting storm water sampling during the summer months is the danger of lightning strikes.

If lightning should begin near the sampling site, personnel should immediately take cover in their vehicles until the danger has passed. If no more than 20 minutes has passed then sampling can most likely resume without any adverse effects on the composite sample. Good common sense judgement will be required at each site to assess whether the composite has been compromised. Factors to consider include the rate the stream is rising or falling and the size of the drainage area. A missed sample at or near the peak stream stage could significantly affect the results of water sample analysis.

Emergency Contacts, Telephone Numbers, and Hospital Locations

	On Base	Off Base
Fire Department	876-2117	911
Police	876-2222	911
Ambulance	876-8239	911 or 536-6658
Huntsville Hospital	--	533-8202
Fox Hospital (Life-Threatening emergencies only	876-6110	
Poison Control	--	1-800-462-0800 or 1-800-292-6678

Directions to Huntsville Hospital

Take Redstone Road East and exit Base through Gate #3 (figure 1). Proceed approximately 1.1 miles past the gate. Turn left (north) onto Memorial Parkway. Follow Memorial Parkway for approximately 7.5 miles. Exit right onto Governor's Drive East and proceed approximately 0.7 miles. Huntsville Hospital is located on the left at the intersection of Madison street and Governor's Drive.

Directions to Fox Hospital (Life-threatening emergencies only)

From all site locations drive north on Patton Road. Take the Martin Road West exit and proceed approximately one mile. Take the Toftoy Road North exit and proceed approximately two mile to Rideout Road North. Turn right onto Goss Road after approximately one mile. Fox Hospital will be on the immediate right.

3.6 Access to Redstone Arsenal.

Refer to Appendix 'B' for locations of access roads and gates.

Gate Hours:

GATE 1	**Martin Road East**	**0430-2130 7 days/week, Closed on Holidays, One-Way in Mon.-Fri. 0615-0815, One-Way out 1515-1715**
GATE 2	**Buxton Road**	**Open 0600-0830 1500-1730**
GATE 3	**Redstone Road**	**Open 24 Hours/ 7 Days week**
GATE 5	**Hansen Road**	**0600-0830 Mon-Fri. 1500-1730 Mon-Fri Closed weekends and Holidays**
GATE 7	**Martin Road West**	**0600-1800 Mon-Fri Closed weekends and Holidays**
GATE 8	**Goss Road**	**24 hours, 7 days/week**
GATE 9	**Rideout Road**	**24 hours, 7 days/week**
Gate 10	**Patton Road**	**0430-1800 Mon-Fri Closed Weekends 7 Holidays**

3.7 Security Procedures and POC'S.

A. Security Procedures.

Access to Redstone Arsenal Will require badges for all sampling team personnel. Security badges will be obtained at Main gate No.1 and will be coordinated through the MICOM Environmental Office.

Additional requirements for accessing Thiokol are as follows:

1. Thiokol will be furnished the names and social security number of all sampling team members on company letterhead.

2. Provide the description and tag numbers for all vehicles to enter the Thiokol area.

3. All sampling equipment will be listed and described.

4. Sampling team members will attend a security briefing to be scheduled at Thiokol.

B. Point of Contacts (POC'S).

1. MICOM Environmental Office, Redstone
   Bill Schroder 205/867-8607

2. Thiokol
   Frank Showalter 205/882-8496

Some of the sampling points will require a gate key to access the site. The following POC'S can be contacted for keys and clearances:

1. Sites DSN-012 & DSN-013.

   BAMSI control room on MIlls Road, Bldg. 5414. Mr. George Burruss, manager, 876-1739.

2. Site DSN-014.

   Call Jim Henley for access key. For clearance-call the following control rooms-control room at TA-1, 876-8911, TA-4,876-1321, and RA-5,876-2920.

3. Site DSN-015 & DSN-016.

   For access keys-see Carl Green, 842-6982.

4. Site DSN-018 & DSN-019.

   See Frank Showalter, Thiokol, 882-8492.

4. STORM WATER SAMPLING REQUIREMENTS

4.1 Parameter Analysis List

In addition to the site specific test which are listed by DSN numbers on pages 4-2 thru 4-8. EPA Form 3510-2F (11-90) Item VII-Part A requires the reporting of the results of at least one grab sample analysis and one composite sample analysis of the following for each DSN sample point:

1. Oil and Grease
2. Biological oxygen demand
3. Chemical oxygen demand
4. Total suspended solids
5. Total kjeldahl nitrogen
6. Nitrate plus nitrite nitrogen
7. Total phosphorus
8. pH

REGULATIONS AND DEFINITIONS:

1. **Subchapter N effluent guideline pollutants.** EPA Form 3510-2F Item VII Part B requires the reporting of all pollutants that are limited in an effuent guideline for which the facility is subject to (40 CFR Subchapter N) or any pollutant listed in the facility's NPDES permit for process wastewater.

2. **Tables 2F-2, 2F-3, & 2F-4.** EPA Form 3510-2F (11-90) Part VII-C requires the permitee to address the pollutants listed in the referenced tables for each outfall. See Appendix No.1 fora list of pollutants in each table. Note pollutants listed under Table 2F-4 do not require an analysis to be reported.

A. GC/MS Fraction Volatiles Compounds- **All** pollutants listed under the referenced heading contained on Table 2F-3.

B. Acid Compounds- **All** pollutants listed under the referenced heading contained on Table 2F-3.

C. Base/Neutral- **All** polluants listed under the referenced heading contained on Table 2F-3.

Testing Requirments for 1992 NPDES Industrial Storm Water Discharge Permit Application.

ANALYSIS LIST BY DESIGNATED SAMPLE POINT

DSN-010

TABLE 2F-2

SURFACTANT
ALUMINUM, total

TABLE 2F-3

LEAD, Total
GC/MS FRACTION VOLATILE COMPOUNDS
ACID COMPOUNDS
BASE/NEUTRAL

DSN-011

TABLE 2F-2

IRON, total

TABLE 2F-3

LEAD, total
GC/MS FRACTION VOLATILE COMPOUNDS
BASE/NEUTRAL COMPOUNDS

DSN-012

SUBCHAPTER 'N' EFFLUENT GUIDELINE

FECAL COLIFORM
CHLORINE, Total residual

TABLE 2F-3
Cadmium, Total
Chromium, Total
Lead, Total
Mercury, Total
Nickel, Total
Selenium, Total
Zinc, total
GC/MS FRACTION VOLATILE COMPOUNDS
BASE NEUTRAL COMPOUNDS

DSN-013

TABLE 2F-2

ALL POLLUTANTS **EXCEPT:** BORON
COBALT
MOLYBDENUM
TITANIUM

TABLE 2F-3

ALL POLLUTANTS **EXCEPT:** PHENOLS
BERYLLIUM
SILVER

DSN-014

TABLE 2F-2

ALUMINUM, total

TABLE 2F-3

GC/MS FRACTION VOLATILE COMPOUNDS

DSN-015

TABLE 2F-2

PHOSPHORUS
BARIUM, total
TITANIUM, total

TABLE 2F-3

ARSENIC, total
COPPER, total
LEAD, total
MERCURY, total
ZINC, total

GC/MS/ FRACTION VOLATILES COMPOUNDS
BASE/NEUTRAL COMPOUNDS
ACID COMPOUNDS

DSN-016

PHOSPHORUS

TABLE 2F-2

BARIUM, total

TABLE 2F-3

ARSENIC, total
CADMIUM, total
CHROMIUM, total
LEAD, total
MERCURY, total
ZINC, total

GC/MS FRACTION VOLATILE COMPOUNDS
BASE/NEUTRAL COMPOUNDS
PESTICIDES

DSN-017

TABLE 2F-2

ALUMINUM, total
IRON, total
TIN, total

TABLE 2F-3

ALL TOXIC METALS AND TOTAL PHENOL
GC/MS FRACTION VOLATILES COMPOUNDS
ACID COMPOUNDS
BASE/NEUTRAL COMPOUNDS
PESTICIDES

DSN-018

TABLE 2F-3

GC/MS FRACTION VOLATILE COMPOUNDS

DSN-019

SUBCHAPTER 'N' EFFLUENT GUIDELINE
CADMIUM, total
CHROMIUM, total
COPPER, total
LEAD, total
NICKEL, total
SILVER, total
ZINC, total
CYANIDE, total

TABLE 2F-2
FLUORIDE
ALUMINUM, total
IRON, total
MAGNESIUM, total
MOLYBDENUM, total
TITANIUM, total

TABLE 2F-3
ANTIMONY, total
ARSENIC, total
BERYLLIUM, total
MERCURY, total
SELENIUM, total
THALLIUM, total
PHENOLS, total
GC/MS FRACTION VOLATILES COMPOUNDS
BASE/NEUTRAL COMPOUNDS

DSN-020

SUBCHAPTER 'N' EFFLUENT GUIDELINE
ORGANIC PESTICIDE CHEMICALS

TABLE 2F-2

ALUMINUM, total
BARIUM
IRON, total

TABLE 2F-3
ARSENIC, total
CADMIUM, total
CHROMIUM, total
LEAD, total
MERCURY, total
NICKEL, total
ZINC, total
GC/MS FRACTION VOLATILES COMPOUNDS
BASE/NEUTRAL COMPOUNDS

DSN-021

TABLE 2F-2
BARIUM, total
ALUMINUM
BORON
COBALT
IRON
MAGNESIUM
MOLYBDENUM
TIN
TITANIUM

TABLE 2F-3
ARSENIC, total
CADMIUM, total
CHROMIUM, total
COPPER, total
LEAD, total
MERCURY, total
NICKEL, total
SILVER, total
ZINC, total
CYANIDE, total
GC/MS FRACTION VOLATILES COMPOUNDS
ACID COMPOUNDS
BASE/NEUTRAL COMPOUNDS
PESTICIDES

DSN-022

TABLE 2F-2

SURFACTANT

TABLE 2F-3
CHROMIUM, total
LEAD, total
GC/MC FRACTION VOLATILES COMPOUNDS
ACID COMPOUNDS
BASE/NEUTRAL COMPOUNDS

4.3 Analytical Methods

PARAMETER	ANALYTICAL METHOD (EPA)
Oil & Grease	413.2
5 day BOD	405.1
Chemical Oxygen Demand	410.4
Total Suspended Solids	160.2
Total Kjeldahl Nitrogen	351.2
Nitrate plus Nitrite Nitrogen	353.2
Total Phosphorus	365.2

EPA FORM 3510-2F, TABLE 2F-2

Bromide	320.1
Chlorine, Total Residual	330.4
Fecal Coliform	909C
Fluoride	340.2
Sulfate	375.4
Sulfide	376.1
Sulfite	377.1
Surfactant	425.1
Aluminum, Total	202.1 (Flame)/ 202.2 (Furnace)
Barium, Total	208.1 / 208.2
Boron, Total	212.3
Iron, Total	236.1 (Flame)/ 236.2 (Furnace)
Magnesium, Total	242.1
Molybdenum, Total	246.1 / 246.2
Tin, Total	282.1 / 282.2
Titanium, Total	283.1 / 283.2

EPA FORM 3510-2F, TABLE 2F-3

Antimony, Total	204.1 (Flame)/ 204.2 (Furnace)
Arsenic, Total	206.2 (Furnace)
Beryllium, Total	210.1 / 210.2
Cadmium, Total	213.1 / 213.2
Chromium, Total	218.1 / 218.2
Copper, Total	220.1 / 220.2
Lead, Total	239.1 / 239.2
Mercury, Total	245.1 / 245.2
Nickel, Total	249.1 / 249.2
Selenium, Total	270.2 (Furnace)
Silver, Total	272.1 / 272.2
Thallium, Total	279.1 / 279.2
Zinc, Total	289.1 / 289.2
Cyanide, Total	335.2
Phenols, Total	420.1
GC/MS fraction Volatile Compounds	8240
Acid Compounds	8270
Base/Neutral compounds	8270
Pesticides	8080

Outfall DSN-010
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H_2SO_4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H_2SO_4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H_2SO_4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Surfactants	(2)	None	28 days	500 ml polyethylene bottle	1	X	X
Aluminum, Lead	(2)	HNO_3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X
Base/Neutral, Acid Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X

Total Composite Sample Volume = 3.5 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analyses
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

TABLE 1

Outfall DSN-011
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Base/Neutral Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X

Total Composite Sample Volume = 5.0 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analyses
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

TABLE 1

Outfall DSN-012
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Base/Neutral Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Total Chlorine	(2)	None	28 days	1 L polyethylene bottle	1	X	X
Fecal Coliform	(1)	None	6 hours	300 ml sterilized glass bottle	1	X	

Total Composite Sample Volume = 4.5 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analyses
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

TABLE 1

Outfall DSN-013
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Base/Neutral, Acid Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Metals (4)	(2)	HNO3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X
Chlorine, Bromide, Flouride	(2)	None	28 days	1 L polyethylene bottle	1	X	X
Fecal Coliform	(1)	None	6 hours	300 ml sterilized bacteria bottle	1	X	
Sulfate, Sulfite	(2)	None	28 days	250 ml polyethylene bottle	1	X	X
Sulfide	(2)	0.04% zinc acetate, 1N NaOH until pH >9	7 days	1 L polyethylene bottle	1	X	X
Cyanide	(2)	1N NaON, pH >12	14 days	250 ml polyethylene bottle	1	X	X
Pesticides	(2)	None	7 days	1 L amber baked glass bottle	2	X	X

Total Composite Sample Volume = 9.0 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.
(4) -- Analyze for all metals in tables 2F2 and 2F3 except boron, cobalt, molybdenum, titanium, beryllium, and silver

TABLE 1

Outfall DSN-014
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Aluminum	(2)	HNO3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X

Total Composite Sample Volume = 2.5 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

Outfall SN01
Location Arsenal
Huntsville Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None		500 ml polyethylene bottle	1	X	
Oil and Grease	(2)	H_2SO_4, pH		1 L amber baked glass jar w/	1	X	
BOD	(2)	None		1 gallon polyethylene bottle	2	X	X
TSS	(2)	None	7 days	1 liter polyethylene bottle	1	X	X
COD	(2)	H_2SO_4, pH	28 days	250 ml polyethylene bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H_2SO_4	28 days	1 liter polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Base/Neutral, Acid Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Arsenic, Copper, Lead, Mercury, Zinc	(2)	HNO_3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X

Total Composite Sample Volume = 4.5 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to make a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

TABLE 1

Outfall DSN-016
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Base/Neutral, Acid Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Arsenic, Copper, Lead, Mercury, Zinc, Cadmium, Chromium	(2)	HNO3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X

Total Composite Sample Volume = 4.5 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

TABLE 1

Outfall DSN-017
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Base/Neutral, Acid Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Metals, listed in Table 2F2 and 2F3	(2)	HNO3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X
Phenols	(2)	H2SO4, pH <2	28 days	1 L amber baked glass bottle w/ Teflon cap	1	X	X
Pesticides	(2)	None	7 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Cyanide	(2)	1N NaOH, pH >12	14 days	250 ml polyethylene bottle	1	X	X

Total Composite Sample Volume = 7.8 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

TABLE 1

Outfall DSN-018
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X

Total Composite Sample Volume = 1.5 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

TABLE 1

Outfall DSN-019
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H_2SO_4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H_2SO_4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H_2SO_4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Metals (4)	(2)	HNO_3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X
Phenols	(2)	H_2SO_4, pH <2	28 days	1 L amber baked glass bottle w/ Teflon cap	1	X	X
Cyanide	(2)	1N NaOH, pH >12	14 days	250 ml polyethylene bottle	1	X	X
Base/Neutral Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Flouride	(2)	None	28 days	1 L polyethylene bottle	1	X	X

Total Composite Sample Volume = 6.8 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.
(4) -- Specifically analyze for cadmium, chromium, copper, lead, nickel, silver, zinc, aluminum, iron, molybdenum, magnesium, titanium, atimony, arsenic, beryllium, mercury, selenium and thallium.

Outfall DSN-020
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Metals (4)	(2)	HNO3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X
Base/Neutral Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Pesticides	(2)	None	7 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X

Total Composite Sample Volume = 6.5 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.
(4) -- Specifically analyze for aluminum, barium, iron, arsenic, cadmium, chromium, lead, mercury, nickel and zinc.

Outfall DSN-021
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Base/Neutral, Acid Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Pesticides	(2)	None	7 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Cyanide	(2)	1N NaOH, pH >12	14 days	250 ml polyethylene bottle	1	X	X
Metals (4)	(2)	HNO3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X

Total Composite Sample Volume = 6.8 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.
(4) -- Specifically analyze for barium, aluminum, boron, cobalt, iron, magnesium, molybdenum, tin, titanium, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc.

TABLE 1

Outfall DSN-022
Redstone Arsenal
Huntsville, Alabama

Parameter	Analytical Method	Preservative **	Holding Time	Size and Type of Container	Number of Containers	First Flush Grab Sample	Composite Sample
pH	Field	None	-	500 ml polyethylene bottle	1	X	
Oil and Grease	*	H2SO4, pH <2	28 days	1 L wide-mouthed, baked glass jar w/ Teflon cap	1	X	
BOD	(1)	None	24 hours	300 ml BOD bottle	2	X	X
TSS	(2)	None	7 days	500 ml polyethylene bottle	1	X	X
COD	(2)	H2SO4, pH <2	28 days	125 ml baked glass bottle	1	X	X
TKN Nitrate/Nitrite Nitrogen Total Phosphorus	(2)	H2SO4, pH <2	28 days	250 ml amber polyethylene bottle	1	X	X
VOCs	(2)	HCl, pH <2	14 days	40 ml vial w/ septum	(3)	X	X
Acrolein & 2-CEVE	(2)	HCl, pH 4-5	14 days	40 ml vial w/ septum	(3)	X	X
Base/Neutral, Acid Compounds	(2)	None	28 days	1 L amber baked glass bottle w/ Teflon cap	2	X	X
Surfactants	(2)	None	28 days	500 ml polyethylene bottle	1	X	X
Chromium, Lead	(2)	HNO3, pH <2	28 days	1 L acid-rinsed polyethylene bottle	1	X	X

Total Composite Sample Volume = 5.0 liters ***

NOTES:
* -- Analytical methods conform to NPDES requirements
** -- All samples are cooled to 4 degrees Centigrade though not necessary in some cases
*** -- Does not include volumes from vials collected for VOC and acrolein analysis
(1) -- Analyses performed at USGS office collecting the sample
(2) -- Analyses performed at US Army Corps of Engineers South Atlantic Division Laboratory in Marietta, Georgia
(3) -- For grab samples, only 2 vials are needed. For composite samples, 1 vial is collected every 15 minutes for the duration of the storm then the volumes needed to mix a 50 ml flow-weighted composite sample are computed. The laboratory will composite the samples immediately before analysis.

TABLE 1

FAC.NO.	KEY NO.	SAMPLE NO.	FACILITY NAME/FUNCTION	REG.	SIC CODE	SHEET	BASIN
0	RSA034	DSN010	Waste AvGas Storage Area (@ RSA AAF)	Y	4581	5	N
4803	N07	DSN010	Hanger	Y	4581	5	N
4812	N08	DSN010	Aircraft Flam. Storage	Y	4581	5	N
4812	RSA035	DSN010	OWS (@ 4812)	Y	4581	5	N
4815	N09	DSN010	NASA Hanger	Y	4581	5	N
4832	N10	DSN010	Helibourne Facility	Y	4581	5	N
4832	RSA036	DSN010	OWS (@ 4832)	Y	4581	5	N
7630	RSA100	DSN010	Waste Oil Tank (Near 7630)	Y	4953F	15	G
4812	RSA042	DSN010	U'ground Waste Oil Storg Tank (4812e)	Y	7538	5	N
5656	J13	DSN011	Bulk Fuel Storage	Y	5171	14	J
5690	J12	DSN011	Pump Station	Y	5171	10	J
5693	RSA028	DSN011	OWS (@ 5693)	Y	5171	14	J
5695	J15	DSN011	Fuel Storage Tanks	Y	5171	14	J
3764	D09	DSN012	Sewage Treatment Plant #4	Y	4952A	6	D
3764	RSA008	DSN012	STP #4	Y	4952A	6	D
G	RSA048	DSN012	Inactive Sanitary Landfill, Area G	Y	4953B	6	D
4631	P09	DSN012*	Sewage Treatment Plant #3	Y	4952A	9	P
4631	RSA009	DSN012*	STP #3	Y	4952A	9	P
8728	L17	DSN012*	Sewage Lift Station #10	Y	4952A	18	L
STP1	F03	DSN012*	Sewage Treatment Plant #1	Y	4952A	15	F
STP1	RSA011	DSN012*	STP #1	Y	4952A	15	F
Q2	K04	DSN013	Sanitary Landfill, Q2	Y	4952B	13	K
Q2	RSA010	DSN013	Sanitary Landfill, Q2-Unit 1	Y	4953B	13	K
Q3	RSA053	DSN013	Inactive Sanitary Landfill, Area Q3	Y	4953B	13	M
56	K03	DSN013	Open storage Area 56-2	Y	5093B	10	K
6109	O01	DSN013*	Stor. FPR. ASP-Range #3	Y	1442	1	O
0	Q03	DSN014	DRMO Storage Area (GSA)	Y	4953C	17	Q
0	RSA108	DSN014	2.75 Rocket Test Firing Site (W TA4)	Y	8734A	16	Q
TA4	Q02	DSN014	Test Area # 4	Y	8734A	17	Q
0	RSA131	DSN015	Open Detonation Area, Unit 2	Y	4953A	20	V
8401	RSA014	DSN015	Contam. Waste Burn Trenches (Near 8401	Y	4953C	20	V
8405	V04	DSN015	Open Burn Pans	Y	4953C	20	V
8405	RSA012	DSN015	Open Burn Pans, Unit 2 (Near 8405)	Y	4953C	20	V
8405	RSA013	DSN015	Unlined Open Burn Pads-Unt 2 (Nr 8405)	Y	4953C	20	V
EE	RSA047	DSN015*	Chemical Training Facility EE	Y	4953A	6	D
0	RSA113	DSN015*	Inactive Disp. Trenchs (N of Creek Rd)	Y	4953C	10	E
0	RSA132	DSN015*	Former Popping Furnace, Unit 2	Y	4953C	20	V
0	RSA134	DSN015*	Former Disposal Trench/Burning Pit	Y	4953C	10	H
8401	V05	DSN015*	Open Burn Trenches	Y	4953C	20	V
0	F01	DSN015*	Burn Area	Y	3569	10	F
0	RSA129	DSN015*	Thiokol Burn Pit Area(End Magazine Rd)	Y	3569	10	H
Q4	RSA060	DSN016	Inactive Sanitary Landfill, Area Q4	Y	4953B	14	J
AA	RSA067	DSN016	Former Chem Storage Area AA	Y	4953G	17	V
X	RSA065	DSN016	Former Chem Storage Area X	Y	4953G	17	V
X1	RSA066	DSN016	Former Demolition/Ash Disp Site X1	Y	4953G	17	V

FAC.NO.	KEY NO.	SAMPLE NO.	FACILITY NAME/FUNCTION	REG.	SIC CODE	SHEET:	BASIN
Y	RSA069	DSN016	Former Mustard Gas Storage Area Y	Y	4953G	20	V
Y1	RSA070	DSN016	Toxic Chem Area Y1	Y	4953G	20	V
Z	RSA068	DSN016	Toxic Area Z	Y	4953G	17	V
8883	U08	DSN016	Static Test Facility	Y	8734A	21	U
Y	RSA110	DSN016*	Former Drum Storage Area (SW Area Y)	Y	4953G	20	V
BB	RSA064	DSN016*	Former Mustard Gas Demil Site BB	Y	4953G	18	S
0	RSA114	DSN016*	Large Quarry (N Neal & Mills Rd Int)	Y	4953G	10	J
5427	RSA128	DSN016*	Formr Mustard Gas Demil OP Area(@5427)	Y	4953G	10	H
I	RSA051	DSN016*	Inactive Demil Area I	Y	4953G	12	P
CC	RSA046	DSN016*	Former Chem Shell Test Area CC	Y	4953G	18	S
H	RSA050	DSN016*	Inactive Chem Disposal Site H	Y	4953G	8	P
0	RSA109	DSN016*	Suspected WW II Staging Area	Y	4953G	13	M
M	RSA063	DSN016*	Former Chem Disposal Site M	Y	4953G	13	P
N	RSA052	DSN016*	Inactive Disposal Site N	Y	4953G	13	P
O	RSA062	DSN016*	Former Disposal Site O	Y	4953G	13	M
P	RSA061	DSN016*	Former Disposal Site P	Y	4953G	13	M
0	RSA126	DSN016*	Formr Burn Trench(SW Martin/Patton Rd)	Y	4953C	10	E
V	RSA057	DSN016*	Former Lewisite Storage Area V	Y	4953G	10	E
7405	S06	DSN017	Thiokol Open Storage (Scrap Yard)	Y	5093A	19	S
7411	S05	DSN017	Maint. Shop (Scrap Yard)	Y	5093A	18	S
0	RSA120	DSN017*	Mathews Cave & Ravine (NW Corner RSA)	Y	5093A	2	N
80	L05	DSN017*	Open Storage Area 80-1	Y	5093A	17	L
85	U02	DSN017*	Open Storage Area 85-1	Y	5093A	21	U
3134	A02	DSN017*	Reserve Navy Const. Bat.	Y	5093A	3	A
3775	RSA045	DSN017*	U'ground Waste Oil Storg Tank	Y	5093A	6	D
3779	D10	DSN017*	Metal & Woodworking Shop	Y	5093A	6	D
4491	RSA032	DSN017*	Scrap Metal Storage Area (Near 4491)	Y	5093A	17	V
6108	O04	DSN017*	Scrap Yard	Y	5093A	4	O
6230	P03	DSN017*	Aerospace Physics Lab. (Scrap Yard)	Y	5093A	8	P
7293	S02	DSN017*	Rocket Storage (Scrap Yard)	Y	5093A	18	S
7810	L02	DSN017*	Conditioning	Y	5093A	14	L
8023	L07	DSN017*	Warehouse	Y	5093A	17	L
8971	S07	DSN017*	Lab & Admin (Scrap Yard)	Y	5093A	19	S
TA1	Q01	DSN017*	Test Area # 1 - Open Stor.	Y	5093A	17	Q
5487	J04	DSN017*	Plumbing/Refrig./AC Shop	Y	7623	10	J
8975	S10	DSN017*	Electromagnetic Test Area (S8B)	Y	8734C		S
8976	S08	DSN017*	Classroom Bldg. (S8A)	Y	9711	19	S
0	RSA094	DSN018	TCE/TCA Solvent Still No. 1	Y	3764A	15	R
0	RSA095	DSN018	TCE/TCA Solvent Still No. 2	Y	3764A	15	R
0	RSA096	DSN018	TCE/TCA Solvent Still No. 3	Y	3764A	15	R
0	RSA097	DSN018	TCE/TCA Solvent Still No. 4	Y	3764A	15	R
0	RSA098	DSN018	TCE/TCA Solvent Still No. 5	Y	3764A	15	R
7664	R01	DSN018	Metal Loading Fac.	Y	3764E	15	R
7363	RSA135c	DSN019	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	15	G
7595	RSA135j	DSN019	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	14	G

FAC.NO.	KEY NO.	SAMPLE NO.	FACILITY NAME/FUNCTION	REG.	SIC CODE	SHEET	BASIN
7690	RSA135m	DSN019	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	14	G
7695	RSA135n	DSN019	Captive Waste Sump For 1.1 Prop. &7694	Y	2869A	14	G
7352	RSA136b	DSN019	Temp Storage Area For 1.1 Prop Waste	Y	2869B	14	G
7689	RSA137j	DSN019	Sump For 1.3 Wastes (to SS & SD)	Y	2869C	14	G
7691	RSA137k	DSN019	Sump For 1.3 Wastes (to SS)	Y	2869C	14	G
7691	RSA137l	DSN019	Former Septic Tank & Fld Lines (to SS)	Y	2869C	14	G
7359	RSA138c	DSN019	Temp Storage Area For 1.3 Wastes	Y	2869D	15	G
7359	RSA138d	DSN019	Temp Storage Area For 1.3 Wastes	Y	2869D	15	G
7359	RSA138e	DSN019	Temp Storage Area For 1.3 Wastes	Y	2869D	15	G
7689	RSA138j	DSN019	Temp Storage Area For 1.3 Wastes	Y	2869D	14	G
7691	RSA138k	DSN019	Temp Storage Area For 1.3 Wastes	Y	2869D	14	G
7691	RSA138l	DSN019	Temp Storage Area For 1.3 Wastes	Y	2869D	14	G
7687	G01	DSN019	Oxidizer Facility (SIC 3764/2869)	Y	2869F	14	G
7689	G02	DSN019	Grinding Area (SIC 3764/2869)	Y	2869G	14	G
7621	RSA135k	DSN019	Captive Waste Sump For 1.1 Prop Waste	Y	3764B		RSA135k
7625	RSA137g	DSN019	Sump For 1.3 Wastes (to SS)	Y	3764B		RSA137g
7652	RSA137i	DSN019	Sump For 1.3 Wastes (to SS)	Y	3764B		RSA137i
7654	RSA135l	DSN019	Captive Waste Sump For 1.1 Prop Waste	Y	3764B		RSA135l
7363	RSA136f	DSN019	Temp Storage Area For 1.1 Prop Waste	Y	3764C	15	G
7366	G03	DSN019	Container Storage	Y	3764C	15	G
7368	G04	DSN019	Motor processing	Y	3764C	15	G
7368	RSA138f	DSN019	Temp Storage Area For 1.3 Wastes	Y	3764C	15	G
7625	RSA138h	DSN019	Temp Storage Area For 1.3 Wastes	Y	3764C		RSA138h
7660	RSA138i	DSN019	Temp Storage Area For 1.3 Wastes	Y	3764C	15	G
7601	G05	DSN019	Metal Shop	Y	3764F	15	G
7668	R02	DSN019	Boiler Plant	Y	4961B	15	R
3380	RSA080	DSN019*	RDX/HMX Filtr. Unloading Pad (3380A)	Y	4952A		RSA080
7595	RSA082	DSN019*	Former Sparge Unit	Y	2869A	19	R
7726	F06	DSN019*	Motor Production	Y	3764C	15	F
7726	RSA138n	DSN019*	Temp Storage Area For 1.3 Wastes	Y	3764C	15	F
7740	RSA138o	DSN019*	Temp Storage Area For Solvents	Y	3764C	15	R
7742	RSA138p	DSN019*	Temp Storage Area For 1.3 Wastes	Y	3764C		RSA138p
7368	RSA138g	DSN019*	Temp Storage Area For 1.3 Wastes	Y	3764C	15	G
7740	R04	DSN019*	Degreaser	Y	3764D	15	R
7740	RSA137p	DSN019*	Sump For 1.3 Wastes (to SS)	Y	3764D	15	R
7353	RSA135a	DSN019*	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	14	F
7354	RSA135b	DSN019*	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	14	F
7386	RSA135d	DSN019*	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	15	F
7387	RSA135e	DSN019*	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	15	F
7521	RSA135f	DSN019*	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	19	R
7522	RSA135g	DSN019*	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	19	R
7593	RSA135h	DSN019*	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	19	R
7594	RSA135i	DSN019*	Captive Waste Sump For 1.1 Prop Waste	Y	2869A	19	R
7354	RSA136c	DSN019*	Temp Storage Area For 1.1 Prop Waste	Y	2869B	14	F
7354	RSA136d	DSN019*	Temp Storage Area For 1.1 Prop Waste	Y	2869B	14	F

FAC.NO.	KEY NO.	SAMPLE NO.	FACILITY NAME/FUNCTION	REG.	SIC CODE	SHEET	BASIN
7386	RSA136g	DSN019*	Temp Storage Area For 1.1 Prop Waste	Y	2869B	15	F
7387	RSA136h	DSN019*	Temp Storage Area For 1.1 Prop Waste	Y	2869B	15	F
7595	RSA136i	DSN019*	Temp Storage Area For 1.1 Prop Waste	Y	2869B	19	R
7339	RSA137a	DSN019*	Sump For 1.3 Wastes (to SS)	Y	2869C	14	F
7356	RSA137c	DSN019*	Captive Waste Sump For 1.3 Prop Waste	Y	2869C	15	F
7722	RSA137m	DSN019*	Sump For 1.3 Wastes (to SS)	Y	2869C	15	F
7309	RSA138a	DSN019*	Temp Storage Area For 1.3 Wastes	Y	2869D	15	F
7354	F02	DSN019*	Pre-mix Bldg.	Y	2869E	14	F
7721	R03	DSN019*	Freon Bldg.	Y	2869G	15	R
7340	RSA137b	DSN019*	Sump For 1.3 Wastes (to SS)	Y	3764B		RSA137b
7601	RSA137e	DSN019*	Sump For 1.3 Wastes (to SS)	Y	3764B	15	F
7724	RSA137n	DSN019*	Sump For 1.3 Wastes (to Farmers Field)	Y	3764B	15	F
7340	RSA138b	DSN019*	Temp Storage Area For 1.3 Wastes	Y	3764C		RSA138b
7344	RSA136a	DSN019*	Former Temp Storage Area For 1.1 Waste	Y	3764C		RSA136a
7358	RSA136e	DSN019*	Temp Storage Area For 1.1 Prop Waste	Y	3764C		RSA136e
7368	RSA093	DSN019*	Empty Drum Storage Area (@ 7368)	Y	3764C	15	G
7552	RSA092	DSN019*	Temp Storage Area (@ 7552)	Y	3764C		RSA092
7660	G12	DSN019*	Storage Area	Y	3764C	15	G
7722	RSA138m	DSN019*	Temp Storage Area For 1.3 Wastes	Y	3764C	15	F
7724	F04	DSN019*	Degreaser (Missle Propulsion)	Y	3764C	15	F
7724	RSA136j	DSN019*	Temp Storage Area For 1.1 Prop Waste	Y	3764C	15	F
7742	RSA138q	DSN019*	Temp Storage Area For 1.3 Wastes	Y	3764C		RSA138q
3711	C07	DSN019*	Boiler Plant (REC. CTR.)	Y	4961B	6	C
7289	L09	DSN019*	Boiler Plant	Y	4961B	18	L
7291	S03	DSN019*	Boiler Plant	Y	4961B	18	S
7579	R05	DSN019*	Boiler Plant	Y	4961B	15	R
7604	RSA137f	DSN019*	Sump For 1.3 Wastes (to SS)	Y	4961B	15	G
8028	L08	DSN019*	Boiler Plant	Y	4961B	17	L
8786	L18	DSN019*	Boiler Plant	Y	4961B	18	L
8874	U06	DSN019*	Boiler Plant	Y	4961B	21	U
8977	S09	DSN019*	Boiler Plant	Y	4961B	19	S
7636	RSA137h	DSN019*	Captive Waste Sump For 1.3 Prop Waste	Y	8734B		RSA137h
Q6	RSA102	DSN020	DDT Plant Site Q6	Y	2879	10	J
5495	J08	DSN020	Sheet Metal Shop	Y	3343	10	J
S	RSA055	DSN020	Inactive San & Ind Landfill, Area S	Y	4953B	10	J
56	J01	DSN020	Open Storage Area 56-1	Y	5093C	10	J
5661	J09	DSN020	Electrical Storage Yard	Y	5093C	10	J
5688	J11	DSN020	Field Print Plant	Y	7384	10	J
54	H02	DSN020*	Open Storage Area 54-1	Y	5093A	10	H
4500	K01	DSN020*	Test and Evaluation Fac.	Y	5093C	9	K
5432	RSA033	DSN021	Plating Shop Floor Drain	Y	3471	10	H
5477	RSA125	DSN021	Satellite Waste Accum Area (@ 5477)	Y	3471		RSA125
U	RSA122	DSN021	WWII Lewisite Manuf Fac Site(N Area U)	Y	4953	10	H
T	RSA054	DSN021	Inactive San & Ind Landfill, Area T	Y	4953B	10	J
5434	RSA139	DSN021	Arsenic Waste Lagoon (N of 5434)	Y	4953D	10	H

FAC.NO.	KEY NO.	SAMPLE NO.	FACILITY NAME/FUNCTION	REG.	SIC CODE	SHEET	BASIN
U	RSA056	DSN021	Former Arsenic Ponds South, Area U	Y	4953D	10	H
F	RSA049	DSN021*	Former Arsenic Ponds North, Area F	Y	4953D	9	K
R	RSA117	DSN021*	Formr Liquid Caustic Plnt (W Area R)	Y	2812	10	J
R	RSA059	DSN021*	Inactive Rubble Fill, Area R	Y	4953B	10	H
W	RSA058	DSN021*	Inactive Rubble Fill, Area W	Y	4953B	10	E
W	RSA111	DSN021*	Building Debris (SW Area W)	Y	4953B	10	H
3630	RSA005	DSN022	Sat. Waste Accum. Area (@ RSA MP)	Y	7538	6	D
3631	E01	DSN022	Maintenance Shops	Y	7538	6	E
3634	RSA006	DSN022	Paint Shop & PB Sumps (@ 3634)	Y	7538	6	D
3636	RSA004	DSN022	OWS & Wash Rack (@ RSA Motor Pool)	Y	7538	6	D
4762	P11	DSN022*	Paint Shop	Y	3479	9	P
4762	RSA121	DSN022*	Paint Shop	Y	3479	9	P
8518	U03	DSN022*	Control & Inst.	Y	3812	21	U
8879	U07	DSN022*	Vertical Test Stand	Y	8734A	21	U
TA5	RSA116	DSN022*	Blowdown Lagoon (S Side TA 5)	Y	8734A	21	U
8884	V03	DSN022*	Hazardous Test Pad	Y	8734B	18	V
TA5	RSA115	DSN022*	Blowdown Lagoon (E Side TA 5)	Y	8734A	21	T
7727	F05	DSN022*	Paint Booth	Y	3764G	15	F
7344	M01	DSN022*	Engine Prep. & Assembly	Y	3764G	14	M
7344	RSA083	DSN022*	Paint Spray Booth Sump (@ 7344)	Y	3764G	19	R
3161	A03	DSN022*	U.S. Army Reserve Center	Y	7538	3	A
3221	C04	DSN022*	Motor Pool	Y	7538	6	C
3338	C03	DSN022*	Motor Pool	Y	7538	3	C
3338	RSA002	DSN022*	OWS (@ 3338)	Y	7538	3	C
3338	RSA039	DSN022*	U'ground Waste Oil Storg Tank	Y	7538	3	C
3617	RSA003	DSN022*	OWS Sump (@ 3617)	Y	7538	6	D
5408	J02	DSN022*	Flammable Storage	Y	7538	10	J

BLANK FORMS

FOR FUTURE REPORTS

1. INTRODUCTION

A. Authority. U.S. Army Corps of Engineers, Mobile District, under contract to the U.S. Army Missile Command, Redstone Arsenal has prepared and implemented a two phase storm water sampling and analysis plan. This plan is in accordance with Federal Regulation 40 CFR Part 122 and State of Alabama Department of Environmental Management Regulations.

B. Implementation. _____ retained the services of the _____ to perform the field work associated with collecting storm water samples. Analytical testing of the samples will be performed by _____ _____.

C. Storm Water Sampling and Testing Plan. This sampling and testing plan was prepared by _____. This plan is a supplement to the Phase I Report of the National Pollution Discharge Elimination System Permit for Redstone Arsenal prepared by Mobile District, Corps of Engineers, August 1992. This plan documents the sampling point locations, parameters to be tested, and field procedures for collecting, compositing, documenting, and shipping the samples to the lab.

3. STORM WATER SAMPLING PROTOCOL

The characteristics of a storm water discharge event will be determined by monitoring the quantity and quality of runoff of selected separate outfalls during one storm. _____ _____ will collect grab and flow-composite sample from each outfall selected for sampling. Sampling will be handled under chain-of-custody procedures and documented _____ quality-control-assurance protocols. The sampling will be shipped to _____ _____ within the retention times specified in Section 4.2.

3.1 Rainfall Data Collection.

Six continuous monitoring rain gages have been installed at Redstone Arsenal (Appendix 'B',Figure 1.). An inspection sheet (Figure 2) will be used to document the rainfall at each gage. During periods of rain showers the gages will be inspected daily. In addition, a temporary volumetric rain gage will be installed at each outfall to be sampled. This network of rain gages will assist documenting rainfall intensity and duration, the number of days since previous rainfall, total rainfall in an event, and the distribution of rainfall around the Arsenal property. Storms sample must follow a dry spell of at least 72 hours, and where feasible, should not vary more than 50 percent from the average rainfall volume and duration of storm events. For Huntsville, the duration range is 4.2 to 12.6 hours and magnitude range is 0.37 to 1.10 inches.

3.3 Determination of Discharge Data

EPA provides flexibility for the determination of discharge data associated with the Army Storm Water Runoff Program (ASWRP). The intent of the industrial National Pollutant Discharge Elimination System (NPDES) program is not to require an accurate determination of the outfall discharge. However, _____ will collect the best-possible data in order to meet the regulatory requirements. The quality of the discharge data also will be affected by the physical constraints of the outfall. For each fifteen minute time increment during the sampling period a discharge calculation will be recorded. Following a reconnaissance and assessment, the following method will be used. A temporary staff gage or similar point-measuring device will be installed at each outfall to be sampled. Stage reading to determine hydraulic area (A) will be taken in tandem with flow velocity measurements (V). Stream velocity (V) will be measured with a current meter. The formula for calculating discharge (Q) will be: $Q = V \times A$ Measurements of water depth relative to a point at the outfall will be recorded at the same time as velocity-area measurements are obtained. Incremental discharge rates will be multiplied by the incremental time duration to determine the incremental flow volume. The total volume of the event will be the summation of the incremental volumes.

3.5 Personnel Sampling and Safety Training.

All personnel involved with storm water at Redstone Arsenal will be trained in the proper sampling procedures. Particular emphasis will be given to the prevention of sample contamination. The responsible person for activating the sampling teams will be _____with _____ and _____ as alternates. _____ may also be contacted if additional personnel are needed.The primary sampling members are as follows:

	Work	Home
_____	(___) ___-____	(___) ___-____
_____	(___) ___-____	(___) ___-____
_____	(___) ___-____	(___) ___-____
_____	(___) ___-____	(___) ___-____

Additional personnel that may be used as necessary for sampling are as follows:

_____	(___) _____
_____	(___) ___-____
_____	(___) ___-____
_____	(___) ___-____
_____	(___) ___-____
_____	(___) ___-____

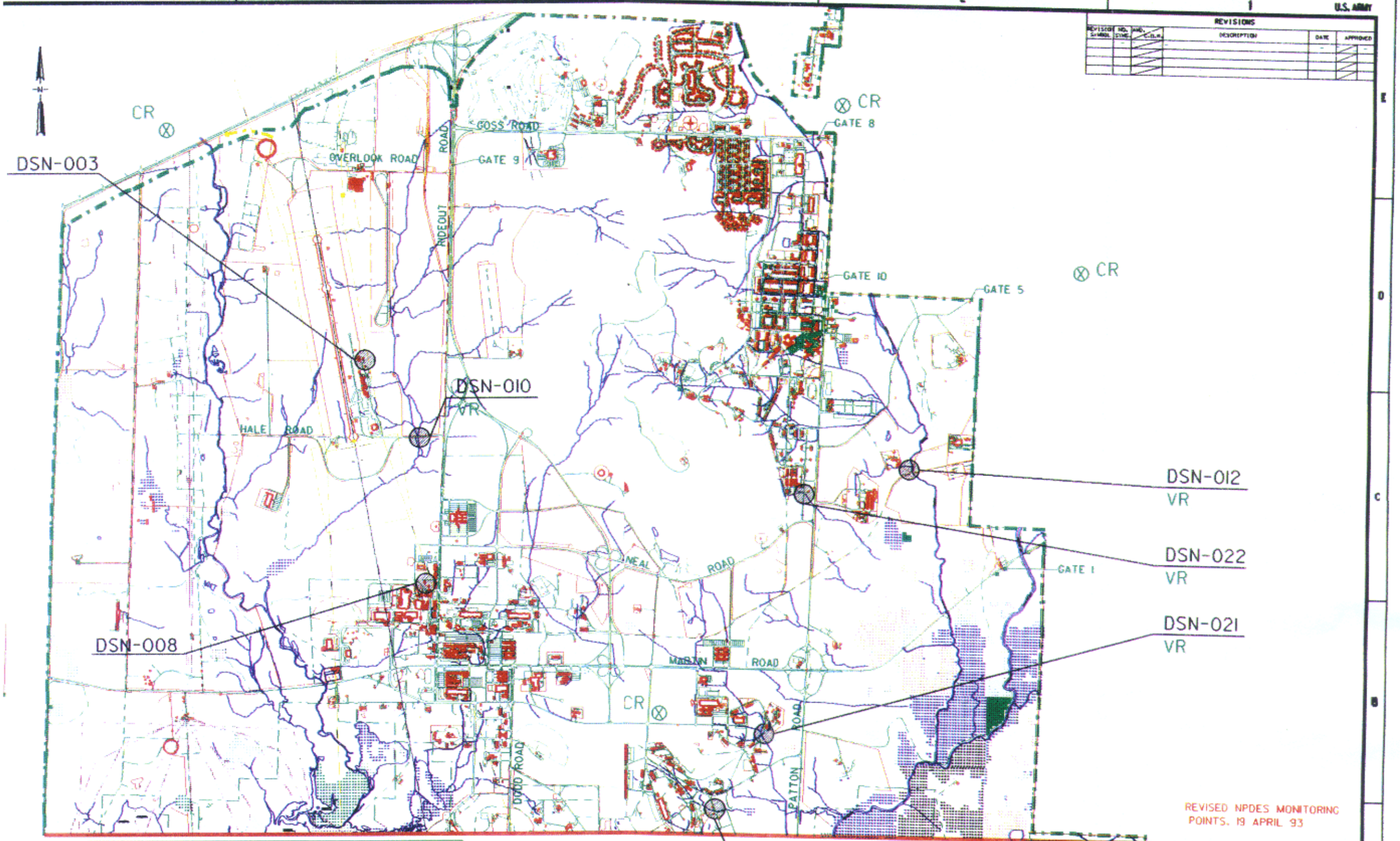
Each employee will receive up-to-date safety procedures and are first aid and CPR certified. Two members will be at each site at all times. At no time will personnel enter confined areas such as manholes or culverts. Each person will be briefed on the location and phone number of the nearest rescue station. Precise locations are necessary in order to provide rescue personnel with proper directions to the site should an emergency arise.

A major safety concern with collecting storm water sampling

RPS OF ENGINEERS

U.S. ARMY

REVISIONS					
REVISION SYMBOL	NO. SYMB.	REV. C.I.N.	DESCRIPTION	DATE	APPROVED
				-	-



REVISED NPDES MONITORING POINTS. 19 APRIL 93

LEGEND

DSN-020	DESIGNATED SAMPLING POINT
⊗ CR	CONTINUOUS RECORDING RAINGAGE
VR	VOLUMETRIC RAINGAGE

FOR RURTHER SYMBOLS SEE SHT. C-1.

DESIGNED BY:	J.L. LONG
DRAWN BY:	S.W. TURNER
TRACED BY:	J.L. LONG
CHECKED BY:	P. DOUGLAS

U.S. ARMY ENGINEER DISTRICT. MOBILE
CORPS OF ENGINEERS
MOBILE, ALA.

REDSTONE ARSENAL, ALABAMA
NPDES STORM WATER
DISCHARGE PERMIT
APPENDIX "B" (FIG. 1)
RAIN GAGE LOCATION & SITE MAP

SH REF NO.	ADD FILE NAME	FILE NO.
B-1		SPEC. NO.
		DRAWING NO.
SCALE:	DATE:	SHEET

U.S. ARMY

REVISIONS

REVISION SYMBOL	NO. TYPES	AND.	DESCRIPTION	DATE	APPROVED

MATCHLINE X-I

DSN-013
VR

DSN-004,005,006

DSN-011
VR

DSN-001

DSN-019

DSN-018
VR
GATE 3

CR
GATE 2

DSN-017
VR

DSN-014
VR

DSN-009

DSN-015
VR

DSN-016
VR

DSN-002

PATTON ROAD

REDSTONE ROAD

DODD ROAD

SHELL ROAD

DUNTON ROAD

REVISED NPDES MONITORING POINTS, 19 APRIL 93

NOTE: FOR LEGEND SEE SHT. X-I.

DESIGNED BY: J.L. LONG	U.S. ARMY ENGINEER DISTRICT, MOBILE CORPS OF ENGINEERS MOBILE, ALA.
DRAWN BY: S.W. TURNER	REDSTONE ARSENAL, ALABAMA NPDES STORM WATER DISCHARGE PERMIT APPENDIX "B" (FIG. 1) RAIN GAGE LOCATION & SITE MAP
CHECKED BY: J.L. LONG	SH REF NO: B-2 ; CADD FILE NAME: ; FILE NO. ; SPEC. NO. ; DRAWING NO.
SUPERVISED BY: P.A. DOUGLAS	SCALE: ; DATE: ; SHEET