

HAZWRAP

HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM

**U.S. AIR FORCE
INSTALLATION RESTORATION PROGRAM
INVESTIGATION OF THE STORM DRAINAGE SYSTEM
TINKER AIR FORCE BASE, OKLAHOMA**

**FINAL STORM SEWER INVESTIGATION
FOR
SOLDIER CREEK**

OCTOBER 6, 1989

**prepared by
NUS CORPORATION**

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STORM SEWER INVESTIGATION
FOR
SOLDIER CREEK

AT

TINKER AIR FORCE BASE, OKLAHOMA

OCTOBER 6, 1989

PREPARED BY
NUS CORPORATION

NUS PROJECT NUMBER 1S19

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EXECUTIVE SUMMARY

BACKGROUND

This investigation was conducted to identify intermittent releases of potential contaminants from the storm sewer system to Soldier Creek located on Tinker Air Force Base (AFB). The broad objectives of the field investigation were to:

- Determine if improper connections exist within the storm sewer system.
- Determine source(s) of storm sewer system contamination to Soldier Creek.
- Identify the contaminants of concern and the associated concentration where the presence of environmental contamination is confirmed.
- Provide recommendations for corrective modifications to the storm sewer system(s).

Several field investigative methods were used to accomplish the objectives of this study. These included visual inspections, smoke testing, dye testing, flow monitoring, and water quality sampling. The selection of which field method(s) to implement (or which combination of investigative methods) was based on the process or function occurring in each building associated with the Soldier Creek storm sewer system.

This report provides details on the investigation conducted by NUS Corporation on the Soldier Creek storm sewer system at Tinker AFB. The report includes information on testing rationale, testing procedures and equipment, investigation results, observations, and recommendations.

FINDINGS

In general the integrity of the storm sewer system discharging to Soldier Creek is good, with very few cross connections or deteriorated and broken lines. The existing system is primarily tight and the main reason for contamination is improper

disposal operations. The contamination of Soldier Creek has apparently occurred due to routine uncontrolled oil releases.

Based on the results of the study, the waste sources discharging into Soldier Creek can be divided into the following four categories:

- Process discharges, which include non or limited contact process heating and cooling waters or evaporative cooling waters, that have a known, predictable, and controllable analysis and pose no discharge problems. These active discharges to the stormwater system represent a small percentage of the available sources but constitute the majority of the discharge volume. In the case of Building 3001 "Engine Repair," cooling tower blowdown is the major source of chemical discharge to Soldier Creek.
- The second waste source is composed of low volume accumulative wastes consisting of entrained and/or condensable oils and water-based wastes derived from air compressor, vacuum pump, and fume handling systems. The waste concentrations in the receiving stream that serves these sources are erratic and incapable of valid sampling (due to the influences of the rate of discharge, the accumulation time, and the frequency of flushing from the collective area.) The primary sources of oil found in the Soldier Creek outfalls are the compressed air filters and air line condensate traps discharging to the stormwater system.
- The third, and most predominate, source of waste to the system is the manual disposal of waste materials such as spent cleaning solvents, lubricating oils, etc. into convenient receivers such as catch basins and roof, floor, or process drains. Most of these examples are maintenance related and can be associated with the routine discharges of oil/water condensate from Building 3108. This practice will require corrective action in the form of engineering changes, long term education, and monitoring and enforcement programs.
- The last source is a result of cross contamination between waste systems which occurs as a result of improper connections. The two cases which

were noted during the study were the intrusion of industrial wastes into a fractured stormwater sewer in the Building 2122 area and the infiltration of sewage into a stormwater sewer in the Building 3705 area. The Building 2122 cross connection was determined to be discharging to Crutch Creek.

The following buildings were found to have operational problems contributing to the contamination of Soldier Creek:

- Building 3105 - Manufacturing Area
- Building 3102 - Hanger and Fire Station
- Building 3123 - Battery Repair
- Building 3108 - Hydraulic Test and Calibration
- Building 3001 - Engine Repair
- Building 2122 - Air Frame Paint Stripping
- Building 3705 - Engine Parts Storage

Detailed findings reached during the investigation are presented in the Sections 4.1, 4.2, and 4.3.

RECOMMENDATIONS

Detailed recommendations are provided in Section 5.3 for improvement of the operation of the storm water sewer system. These recommendations, by category, pertain to: buildings and open areas, outfalls, and non-contact cooling water discharges, and are summarized as follows:

- High level alarms should be installed in all industrial waste lift stations.
- Management of emulsified waste oil generated at Building 3108 should be restructured.
- At Building 3001, the active floor and sink drains and an inactive sump should be disconnected from the storm water system, the heat treating cleaning station drain should be rerouted to an industrial wastewater line, oil filter traps should be routinely emptied to the Industrial Waste

Treatment Plant (IWTP) or an oil/water separator, discharges of vacuum pump seal oil should be discontinued, and non-contact cooling water should be diverted to the storm water system.

- Oil and spent solvents should not be discharged to catch basins or areas associated with catch basins.
- West Soldier Creek should be dredged to lower the elevation and rebuilt to facilitate drainage and sampling requirements.
- The possible rerouting of non contact cooling water and process wastewater from boiler blowdown, softener regenerates and cooling tower blowdown to the storm sewer system from the IWTP should be investigated. This would:
 - Decrease the hydraulic loading to the IWTP
 - Supply flushing water to the storm sewer system to facilitate sampling

1.0 INTRODUCTION

This report provides the results of the storm sewer investigation conducted by NUS Corporation (NUS) at Tinker Air Force Base (AFB). In this phase of the project, activities were limited to the Soldier Creek storm sewer system and immediate adjacent areas. The primary objective of the project was delineation and testing of sections of the storm sewer system discharging into Soldier Creek. The other objectives included determinations of improper cross connections into the storm sewer system, sources of contamination, and corrective modifications required as a result of the findings.

Various tasks were implemented to accomplish these objectives. These tasks included:

- visual inspections
- smoke testing
- dye testing
- flow monitoring
- water sampling
- data review

Equipment was designed and field tested to conduct the smoke testing and flow monitoring tasks. All equipment designs, testing procedures, monitoring techniques, investigation results, and recommendations are included in the following sections of this report.

1.1 PURPOSE

New construction at Tinker AFB has necessitated modification of the original system (i.e., lines have been removed, blocked, or rerouted). No accurate record has been maintained on these modifications which may have allowed for improper connections or operations to occur. Many sections of the storm sewer system are within close proximity to the industrial waste and sanitary sewer lines. Seepage through breaks in these lines could also contribute to the contaminants entering the storm sewer system. The purpose of this investigation was, therefore, to determine

the "as-built" alignment of the storm sewer system and identify cross connections and sources of contamination entering the system.

This study was conducted to identify releases of potential contaminants from the storm sewer system to Soldier Creek located on Tinker AFB. The sampling results indicated potentially unauthorized ties into the Soldier Creek storm sewer system. Cross ties into the storm sewer system could allow oil and various chemicals to enter the system and eventually migrate to Soldier Creek through existing lines. Many of the storm sewer lines have continuous water flow from permitted sources (i.e., cooling towers, non-contact process water) which would allow for waste water from any unpermitted sources to be continually flushed into Soldier Creek.

1.2 OBJECTIVES

The investigation of the storm sewer system discharging into Soldier Creek was conducted primarily to determine the location of any sources of outside contamination entering the system. These objectives were:

- Determination of improper connections existing within the storm sewer discharging into Soldier Creek.
- Determination of sources of storm sewer system contamination to Soldier Creek
- Qualitative and quantitative analyses of contaminants where the presence of environmental contaminants are suspected.
- Provide recommendations for corrective modifications to the storm sewer system.

The objectives in this phase of the project were accomplished using a combination of smoke testing, dye testing, flow monitoring and water quality sampling.

1.3 SCOPE OF WORK

To obtain the information and data needed to meet the stated objectives, NUS performed several field activities in accordance with the approved work plan dated May, 1988. These activities included:

- Visual observations to define hard piped connections to the roof and floor drains
- Smoke testing to define both main storm sewer routes and open unmarked entry points
- Dye testing to verify cross connections and determine routing
- Flow monitoring to determine regular flow patterns at outfalls, detect inconsistencies, and assess contaminant mass balance
- Sampling to determine contaminant concentrations at the outfalls

Since the Soldier Creek investigation area contained several buildings within its drainage area, the method(s) used to evaluate the lines was selected on a case by case basis depending on the ongoing process or function of the individual building being investigated. The scope of work also included updating existing base maps to show the correct delineation of the storm sewer system.

2.0 INVESTIGATION RATIONALE

This section presents NUS' rationale for implementing certain procedures when performing smoke/dye testing or sampling/flow monitoring. The field investigation tasks are segregated into these two categories because the tasks within the categories were performed simultaneously. A decision matrix (i.e., logic diagram) was employed by the field crew when deciding on the type and order of tasks to be performed. Logic diagrams for both smoke/dye testing and flow monitoring/sampling have been prepared and are referred to in the following sections. Overall, the number of sewer sections that were smoke tested was considerably fewer than anticipated in the work plan due to visual confirmation of the drawings and lack of proximity to the industrial waste (IW) system. Smoke/dye testing was basically used for confirmatory purposes upon suspicion of potential problems.

The following buildings were determined to be partially or totally associated with the Soldier Creek storm sewer system and were investigated for potential contributors of contamination using the logic described in Section 2.1.1:

- Building 2122 - Airframe paint stripping
- Building 3234 - Jet engine test stands
- Building 3703 - Jet engine test stands
- Building 3105 - Hangar and process vacuum heat treat area
- Building 3102 - Hangar and fire station
- Building 3123 - Battery repair
- Building 3108 - Hydraulic test and calibration
- Building 3705 - Engine parts storage
- Building 3001 - Engine repair
- Building 3333 - Administrative
- Building 2210 - Accessories
- Building 3220 - Missiles and avionics
- Building 3221 - Blade repair
- Building 2212 - Boiler house
- Defense Reutilization and Marketing Office Area

Several of the buildings contain single process areas [2122, 3234, 3703, 3123, 3108, 2210, 3220, 3221, 2212, 3105,3102], three are non waste-producing areas (3705, 3333 and the DRMO area), and Building 3001 contains many various processes. The single process and non- process areas required only minimal smoke and dye testing to define the storm sewer system routing and possible process water connections. Building 3001 required a series of test methods to define the storm sewer system and to determine improper connections.

2.1 SMOKE/DYE TESTING

The major factor considered in selecting the method of sewer line tracing depended on whether the sewer system test section was located in a building or in an open yard area. Figure 2-1 is the logic diagram of the smoke/dye testing procedures employed for buildings versus open yard areas. The different logic processes used for testing buildings and open yards are described in the following sections.

2.1.1 Building Testing Logic

The following activities were conducted when investigating and testing a building located within the Soldier Creek storm sewer system:

- Determine the building activities or processes
- Obtain available drawings of the building
- Conduct survey of building and verify drawing or prepare new sketch
- Inspect storm sewer system appurtenances (i.e., manholes, roof drains, and floor drains)
- Select appropriate test procedure(s) based on survey and investigation

The more specific rationale used in surveying and inspecting each building involved the examination of six permutations that could result in storm water contamination. The permutations include the following:

- Direct process discharges to the storm water system
- Convenient receivers (floor drains, sink drains, catch basins, etc.) connected to the system
- Waste sump and process overflow connections to the system

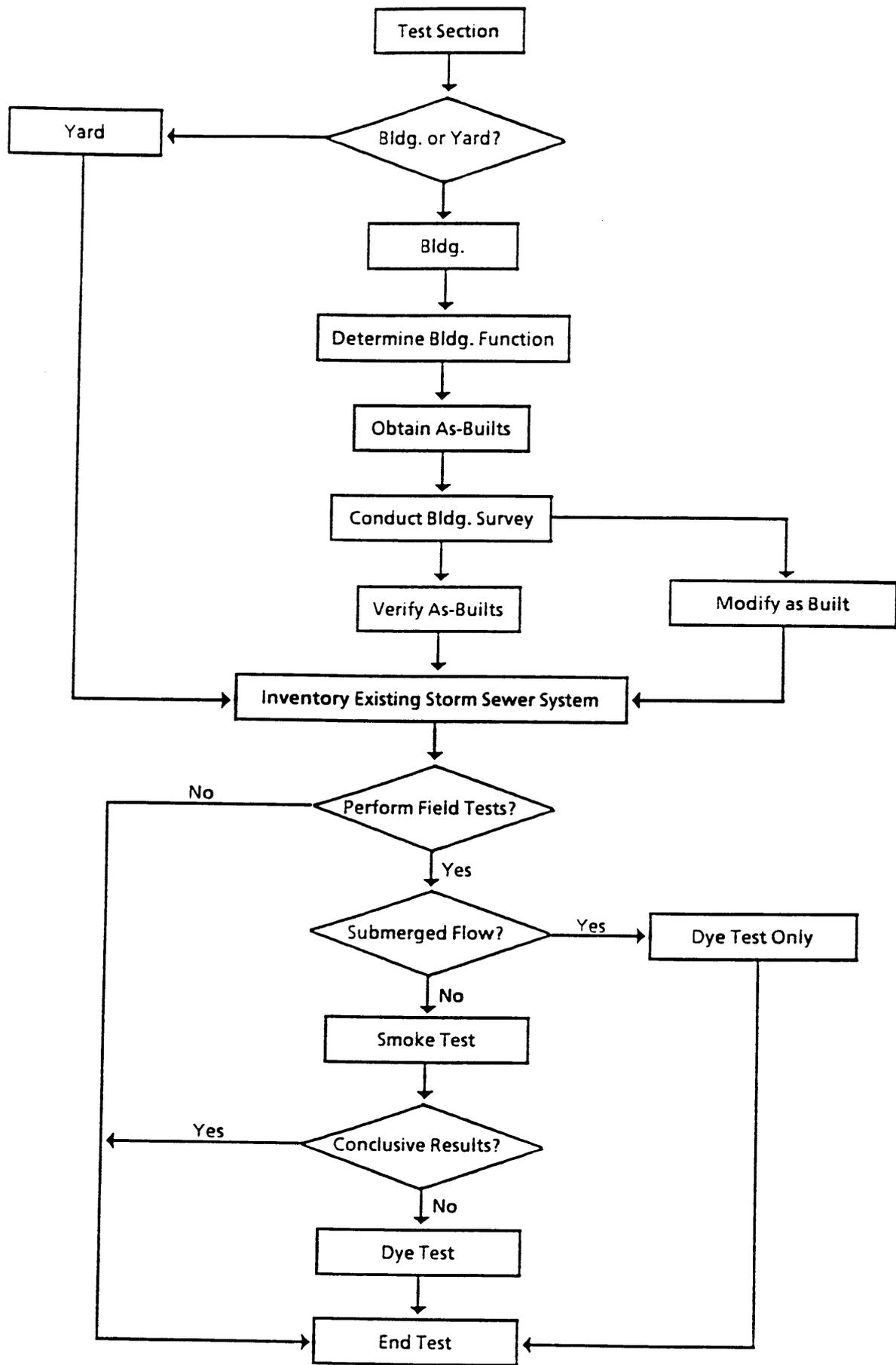


FIGURE 2-1
 LOGIC DIAGRAM OF SMOKE/DYE TESTING RATIONALE
 TINKER AIR FORCE BASE
 OKLAHOMA CITY, OKLAHOMA

- Waste line interconnections such as diversion weirs or fractured waste lines
- Vapor transfer of condensable or entrained wastes to the system
- Wastewater flooding to the system

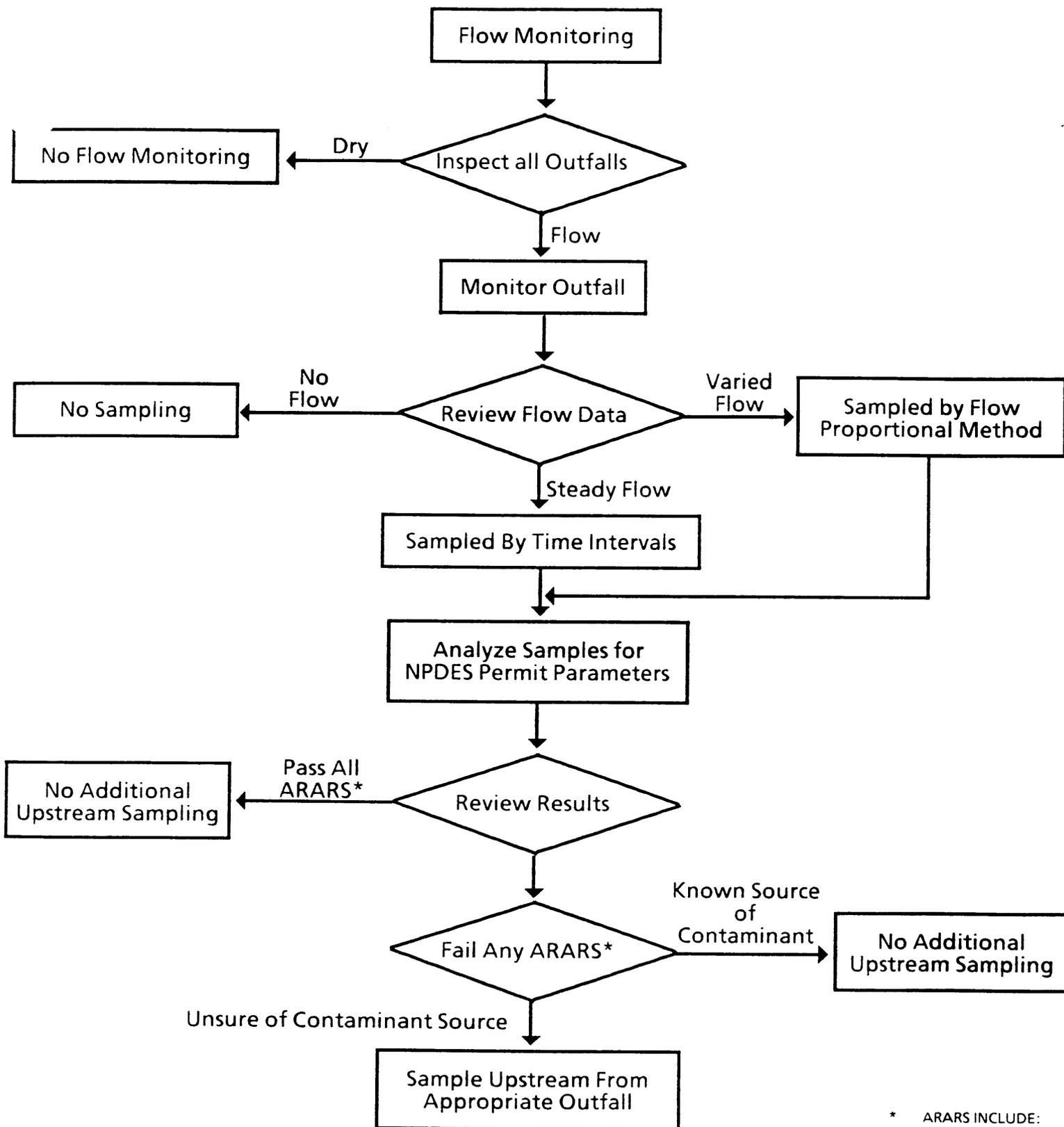
Confirmation of any of the above contamination pathways was accomplished by employing one or more of the following test methods:

- Visual observations to define hard piped waste connections to the roof drains or discharge to the floor drains
- Smoke tracing to define both waste main routing and open unmarked entry points
- Dye tracing to confirm contamination in any totally submerged pipeline or to provide additional testing when smoke testing was inconclusive
- Sampling to determine contaminant presence and routing

Due to the diversity of operations in Building 3001, the exploratory use of smoke and dye tracers was impractical. Smoke and dye testing were used only for confirmatory purposes upon visual identification of the following items:

- all storm water sewers
- all storm water collection laterals and its associated roof and floor drain intrusion points
- all manholes and its influent discharges
- all processes using water as a process media
- all direct discharges to the storm sewer system (as pressure discharges into either vertical roof drain lines or floor drains)
- all contaminated process water collection sumps by post number
- all possible sump overflow connections to the storm water system (either visually or with smoke/dye testing)
- all industrial water force mains from the base contaminated water collection system (with dye confirmation when necessary)

The industrial wastewater collection system located in Building 3001 was superimposed onto the storm sewer system to determine areas of proximity and potential cross connections.



- * ARARS INCLUDE:
- NPDES Permit Limits
 - Federal MCL'S
 - Oklahoma MCL'S
 - Oklahoma Water Quality Standards

FIGURE 2-2
 LOGIC DIAGRAM OF FLOW MONITORING/SAMPLING RATIONALE
 TINKER AIR FORCE BASE
 OKLAHOMA CITY, OKLAHOMA

implemented using a flow proportional method. A composite sampler was used to collect the required sample aliquots for either method. The time interval method involved the collection of an aliquot every 15 minutes for a 24 hour period. The flow proportional sampling method collected an aliquot every 1000 cubic feet of flow through the outfall for a 24 hour period.

2.3 LABORATORY ANALYSIS

Composite samples were collected every 24 hours for 3 days and shipped to the laboratory for analysis of metals, inorganics, phenols, methylene blue active substance (MBAS), and chemical oxygen demand (COD). At the same time, grab samples were collected at the point of overflow from the v-notch in the weir to analyze the storm water for volatiles and oil/grease.

Table 2-1 is a listing of the specific parameters that were analyzed for each sample. This table also provides the EPA test method used for each parameter. These particular parameters were selected because it was economically advantageous to select only those group(s) of analytes that are on both the priority pollutant list and applicable to the site as evidenced by the NPDES permit requirements. NUS employed a level of quality assurance/quality control that is consistent with NPDES sampling projects.

TABLE 2-1

SUMMARY OF ENVIRONMENTAL SAMPLES FOR SOLDIER CREEK
(QA/QC NOT INCLUDED)

TINKER AIR FORCE BASE, OKLAHOMA CITY, OKLAHOMA

Parameter	EPA Method
Volatiles(a)	624
Oils and Grease	413.1
Metals(b) (Total)	(b)
Methylene Blue Activated Substance (MBAS)	SM 512 B
Chemical Oxygen Demand (COD)	410.1
Cyanide	ASTM D2036
Phenol (Total)	420.1
Phosphorus	365.2
Chromium (Hex)	SM 312B

			<u>EPA Method</u>
(a)	Benzene	1,2-Dichloroethane	(b) Cadmium E200.7
	Bromodichloromethane	1,1-Dichloroethene	Chromium E200.7
	Bromoform	trans-1,2-Dichloroethene	Copper E200.7
	Bromomethane	1,2-Dichloropropane	Lead E239.2
	Carbon tetrachloride	cis-1,3-Dichloropropene	Nickel E200.7
	Chlorobenzene	trans-1,3-Dichloropropane	Zinc E200.7
	Chloroethane	Ethyl benzene	
	2-Chloroethylvinyl ether	Methylene chloride	
	Chloroform	1,1,2,2-Tetrachloroethane	
	Chloromethane	Tetrachloroethene	
	Dibromochloromethane	Toluene	
	1,2-Dichlorobenzene	1,1,1-Trichloroethane	
	1,3-Dichlorobenzene	1,1,2-Trichloroethane	
	1,4-Dichlorobenzene	Trichloroethene	
	1,1-Dichloroethane	Trichlorofluoromethane	
		Vinyl chloride	

3.0 PROCEDURES AND EQUIPMENT

The field investigation of the Soldier Creek storm sewer system included the following tasks:

- Visual observations
- Smoke testing
- Dye testing
- Flow monitoring
- Water sampling

Details of the procedures and equipment used for each task are provided in the following sections.

3.1 VISUAL OBSERVATIONS

The section of the storm sewer system at Tinker AFB that discharges into Soldier Creek is a complex array of sewer lines ranging in size from 12-inch to 72-inch diameter. Since no accurate records have been maintained on the modifications made to the system, tracing the lines was necessary. The first step in delineating the system was a visual inspection from the surface. This inspection was conducted to locate any obvious tie-ins to the system, storm roof drains, and manholes for access to the system, and to assist in the identification of sections that may require smoke and/or dye testing. All work was conducted from the surface, and no entry into the system was required in this task.

3.2 SMOKE TESTING

The next task in the investigation was to determine the routing and tie-ins to the storm sewer that were not readily obvious from the visual inspection. This was accomplished by smoke testing. Smoke testing is performed by forcing a carrier gas (air) containing a visible tracer (smoke) through an isolated sewer section to determine the discharge points of an open line or the integrity of the test section. The procedure is governed by the following points:

- The carrier gas always follows the path of least resistance.
- The volume of smoke required is directly proportional to the volume of the test section.
- The volume of smoke moved through an opening in the system is a function of the pressure applied to the test section.

The application of this procedure required sealing finite areas of the system at strategically selected points. The location of the seals was determined by accessibility, length and volume of the test section, static pressure required for the test, and routing of smoke to suspected problem areas. After the test section was adequately sealed, smoke was then introduced into the system with a blower. The test section was consequently flooded with smoke and kept under a constant pressure. Smoke in the test section was forced through any appreciable openings in the system. Releases of smoke to the surface were then observed by personnel placed at various intervals along the test section. The coordinates of identified breeches were plotted and mapped for future reference and possible corrective actions.

The equipment used in this phase of the project was specifically designed and field-modified to meet the project requirements of Tinker AFB. The equipment consisted primarily of a specially designed blower assembly for injection of the colored smoke and inflation of polyethylene tubing for blocking the test sections. The blower is powered by a gasoline engine mounted on a frame and is rated at approximately 2500 cubic feet per minute (CFM). A smaller blower was also mounted on the frame to inflate the tubing and operated off the same power source. It has an approximate rating of 300 CFM. A flexible hose was then placed on the outlet of the smoke injection blower. A solid piece of piping with a bladder assembly attached was placed on the end of the hose joint and inserted into the storm sewer system. The bladder assembly was made from 6 millimeter polyethylene tubing. The tubing was cut into the required lengths, sealed around the rigid pipe section, and inflated by the smaller blower after insertion into the sewer line. After inflation, the bladder formed an impermeable seal. The polyethylene tubing is flexible allowing it to form to the constraints of the surrounding pipe. Smoke was then injected into the system from the intake side of the blower after the test section was secure.

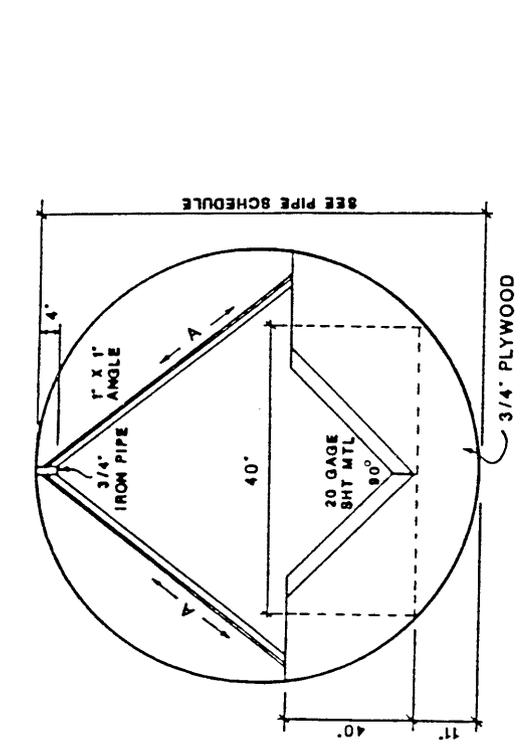
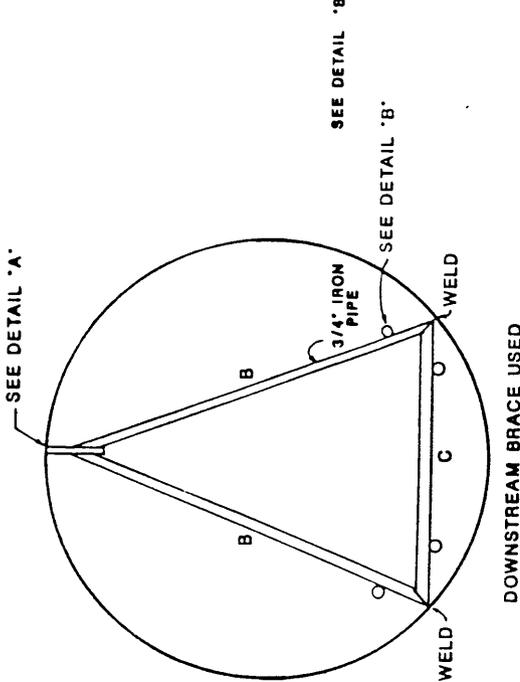
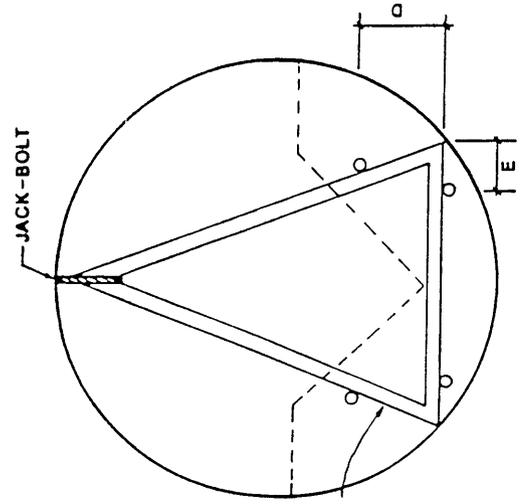
Other areas of the test section that required an airtight seal were also blocked off with the "bladder" method. This bladder type can seal a line up to 48 inches in diameter. Larger pipe diameters required the use of more than one bladder. Detailed specifications on the equipment and procedural methods are located in Appendix A.

3.3 DYE TESTING

Certain sections of the storm sewer system were not amenable to smoke testing due to large volume lines or submerged flow. Therefore, dye testing methods were utilized to delineate those test sections. A fluorescent aniline dye was introduced into the test section. The section was then flushed with water. Personnel downstream monitored the flow for a change in color, indicating the presence of the dye. Areas of suspected cross ties (i.e., where industrial waste lines and/or sanitary lines ran in close proximity to the storm sewer system) were also dye tested. The dye was allowed to flow freely since it is biodegradable and considered environmentally safe.

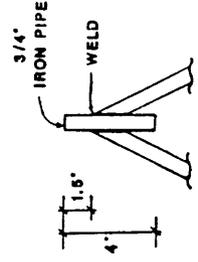
3.4 FLOW MONITORING

After completing the smoke and dye tests, the outfalls into Soldier Creek were inspected for flow monitoring. The stormwater outfalls to Soldier Creek are denoted on Figure 3-1 with bold letters A through N. Figure 3-1 indicates 14 outfalls to Soldier Creek. Isco 2870 flow meters were utilized for this task. At the outfalls designated for flow monitoring, v-notch weirs were constructed and set in place (refer to Figure 3-2). Water then accumulated behind the weir and eventually overflowed at the v-notch. Flow rates correspond to certain depths of water above the v-notch. A bubble tube was attached to the flow meter on the upstream side of the weir so the end of the tube was at the same elevation as the bottom of the v-notch. The meter then forced air through the bubble tube and recorded a water depth that corresponded to the resistance created to force the air through that water depth. The weirs were sealed with bentonite clay to prevent leaking. All flow data was analyzed by the field engineer for peak flow periods and distinguishable patterns.

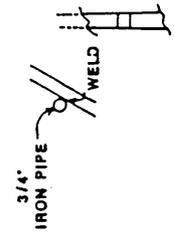


DOWNSTREAM BRACE USED FOR LATERAL SUPPORT

PIPE SCHEDULE	
A	48"
B	62"
C	45"
D	14"
E	7"



DETAIL 'A'



DETAIL 'B'


 NUS CORPORATION

DIAGRAM OF WEIRS
 TINKER AIR FORCE BASE
 OKLAHOMA CITY, OKLAHOMA

DATE: _____ FIGURE 3-2

3.5 WATER SAMPLING

The final task of the investigation included the collection of water samples at the outfalls for which flows were monitored. The samples were composite samples collected over a 24 hour period using Isco 2700 continuous samplers. Samples were collected through 3/8-inch diameter PVC tubing and automatically composited in a 3-gallon glass collection vessel. The composite samples were transferred from the collection vessel to individual sample bottles for shipment to the laboratory.

The Isco sampler was selected for use due to its capability to be used in conjunction with the Isco 2870 flow meters. The sampler can function as an independent unit taking aliquots at regular time intervals or can be interfaced with the flow meter for sample collection based on flow rate (i.e., aliquot/gallons thru the outfall). Grab samples collected for volatiles and oil/grease analyses were obtained by filling the sample bottles directly from the storm water overflow at the v-notch. The sample bottles were tagged and sealed prior to shipment. Chain-of-custody forms were filled out for all samples and sent with each container for tracking purposes. All sample collection bottles contained the required preservatives prior to being filled with stormwater.

4.0 INVESTIGATION RESULTS

During the investigation of all building and open areas associated with the Soldier Creek storm sewer system, numerous incorrect operational activities and relatively few cross connections were discovered. This section presents the findings of each investigation task by building and outfall conducted on the Soldier Creek storm sewer system.

4.1 SMOKE / DYE TESTING

The results of the smoke and dye tests are presented for each building investigated and, in general, for the open areas associated with the Soldier Creek storm sewer system. Results of the investigation were recorded on existing base site plans to provide complete information on the current storm sewer systems. Refer to Figures 4-1a, 4-1b, and 4-1c for the revised site plans.

4.1.1. Building Investigation Results

The following buildings were determined to be partially or totally associated with the Soldier Creek storm sewer system and were investigated for potential contributors of contamination. The buildings are listed below by category:

- Process with connections to Soldier Creek
 - Building 3001 - Engine repair
 - Building 3108 - Hydraulic test and calibration

- Storm connections with no process discharge
 - Building 3234 - Jet engine test facility
 - Building 3703 - Jet engine test facility
 - Building 3102 - Hangar and fire station
 - Building 3105 - Hangar and dry storage
 - Building 3220 - Missiles and avionics
 - Building 3221 - Blade repair
 - Building 2122 - Hangar

- No stormwater connections
 - Building 3333 - Administrative
 - Building 3705 - Engine parts storage
 - Building 3123 - Battery Repair
 - Building 2210 - Accessories
 - Building 2212 - Boiler house
 - DRMO Area

Table 4-1 lists the outfalls and buildings associated with the outfalls.

Several of the buildings contain single process areas [2122, 3234, 3703, 3123, 3108, 2210, 3220, 3221, 3105,3102], three are non process areas (3705, 3333, DRMO Area), and Building 3001 is comprised of many processes. The single process and non-process areas required only minimal smoke and dye testing to define the storm sewer system routing and possible process water connections. Building 3001 required a series of test methods to define the storm sewer system and to determine improper connections. The results of each building investigation are presented below.

Building 2122 - Airframe Paint Stripping

This complex consists of two hangar areas and a central support area. The south hangar area contains a paint stripping operation and discharges all process wastewater to the IWTP collection system. It contains no stormwater floor drains and discharges its roofwater and adjacent apron stormwater to Crutcho Creek Outfall A. The north hangar area is dedicated to dry structural air craft repair and generates no liquid wastes. The north hangar area roof water, floor drains and the adjacent north and east apron areas discharge to Soldier Creek Outfall I. A small consistent flow of clear water (<1 gpm) discharges from the north hangar stormwater sewer and is believed to be derived form either ground-water intrusion into the sewer or from a small cooling water source in the central support area. Two entries to the stormwater system from the second floor support area, which currently houses administrative and sensitive electronic repair facilities, have been observed at post numbers E-38 and D-39.

TABLE 4-1
SOLDIER CREEK
OUTFALLS AND ASSOCIATED BUILDINGS

Outfall	Buildings
A	3001
B	Drains roadways
C	3001
D	3001
E	3001, 3108
F	3001
G	3001
H	2122, 2210, 3001, 3102, 3105, 3220, 3221, 3234, 3703
I	2122, 2210, 3001, 3102, 3105, 3220, 3221, 3234, 3703
J	Drains roadways, DRMO Area
K	Not an Outfall
L	3001
M	Drains roadways
N	Combination of Outfalls A, B, C, D, E

The overflow line from the industrial wastewater lift station to catch basin 2048 was verified as closed by pressure testing. The Crutch Creek stormwater system contained a ruptured line section that diverted industrial wastes to the Crutch Creek stormwater sewer under high flow wastewater conditions. This has been rectified.

Building 3234 - Jet Engine Test Facility

This facility is served by a stormwater collection system that discharges into catch basins associated with the Soldier Creek stormwater system and an IW collection system that gravity discharges to the industrial wastewater lift station at Building 3703. The industrial wastewater is primarily high volume combustion quench water that contains unburned fuels, oils, and residue. Smoke tracing and visual stormwater line observations indicated a complete separation of the two systems and, subsequently, no storm water contamination.

Building 3703 - Jet Engine Test Facility

This area is similar in type to Building 3234 in that it is served by a stormwater collection system that discharges into catch basins associated with the Soldier Creek stormwater system and an IW collection system that gravity discharges to the industrial wastewater lift station at Building 3703. Smoke testing indicated a complete separation of the stormwater and industrial wastewater systems. A residual clear water flow in the stormwater discharge sewer was traced to groundwater intrusion caused by a contractor's use of water sprays to control demolition dust in the vicinity of the stormwater collection sewer. There were no cross connections or stormwater contamination problems discovered at this building.

Building 3105 - Hangar Area

This building contains a non waste producing hangar area along with a dry materials storage area and small tool shop located in its north quadrant. This area is served by two stormwater systems. The Crutch Creek system handles the south hangar floor trenches. The Soldier Creek system serves the storage area, roof drains and surrounding apron areas. The storage area contains waste trenches that used to serve a vacuum heat treating area. At the time of the study, the heat treat area was

active and in place. Prior to issuance of the final report it has been removed and relocated to the heat treat area in Building 3001. These trenches are active and are connected to stormwater Outfall H by a cross connection beneath the floor. This connection was confirmed by dye testing.

Building 3102 - Hangar and Fire Station

This building is composed of a hangar and an attached fire station located in the northeast corner. It is served by two stormwater systems; the Soldier Creek system which serves the roof, hangar apron, and fire station areas and the Crutch Creek system which serves the hangar floor trenches. The only discharge from the fire station is vehicle wash water that discharges to an apron catch basin located midway between the 3102 and 3105 buildings and ultimately to Outfall H.

Building 3123 - Battery Repair

This area consists of several small work areas that gravity drain dilute sulfuric acid waste to an adjacent industrial waste water lift station. Stormwater contamination in this area could occur through a lift station pump failure allowing wastewater to backup into associated process areas. These wastes would enter the storm sewer system through catch basins on the north face of Building 3123 and would emerge at Outfall G.

Building 3108 - Hydraulic Test and Calibration

This area is devoted to the testing and calibration of hydraulic components. The building contains large numbers of hydraulic test stands and their associated ancillary or support equipment such as cooling towers, closed loop chiller systems, air compressors, etc. The area is served by the Soldier Creek stormwater system for roof and adjacent road areas. A series of internal process area floor trenches gravity discharge to two captive waste oil storage tanks located west of the building. Smoke and dye testing of the area indicated the following:

- No cross connections exist between the stormwater and hydraulic waste oil collection system.
- The cooling tower blowdown discharges to the sanitary system.

- A compressed air condensate leg on the north air compressor discharge line was being manually drained to a 5-gallon collection pail, which when full was routinely discharged to West Soldier Creek via a convenient air compressor cooling water line (intercooler box). This results in discharges of viscous emulsified oil to West Soldier Creek through Outfall E.

Building 3705 - Engine Parts Storage

This building is devoted to parts storage and generates no aqueous wastes. All external roof drains were smoke tested to determine possible internal ties to the stormwater system. No internal ties were discovered. Infiltration of sanitary sewage was discovered in catch basin 3045. Base utility drawings indicate the close proximity of a shallow sanitary line to the catch basin in which sewage was visually observed. Base sewage personnel indicated no repair was made to the line but that shortly after the leak was observed, the sanitary line was plugged due to building deactivation in the DRMO area.

Building 3333 - Administrative

This building is used for administrative purposes only and generates no aqueous wastes. No internal ties to the stormwater system exist.

Building 2212 - Boiler House

This building is not yet in active service producing steam. There are no internal storm drains and stormwater is runoff to the surrounding road surfaces. Process wastes are discharged to the IWTP via a sump located east of Building 2210.

Building 2210 - Accessories

This building is used for the repair of aircraft accessories. Roof drains are external. Internal process wastes discharge to the IWTP via an external sump located east of the building. The cooling tower associated with this building also discharges to the IWTP.

Building 3220 - Missiles and Avionics

The north area of the building contains repair and calibration facilities which use hydraulic oils and dye penetrants. All internal wastes and floor drains discharge to a captive industrial waste sump. A oil/water separator located on the west side of the building is inoperative. The cooling tower discharges to the sanitary waste system. The south portion of the building is computer oriented and generates no internal wastes.

Building 3221 - Blade Repair

This building contains manufacturing and process areas used in the repair of turbine blades. All internal waste sources, cleaning processes, floor drains, and the cooling tower discharge to the IWTP.

DRMO Area

This area consists of two building complexes. The north complex (Buildings 3766, 3769, 3765), is devoted to the storage of mechanical equipment and parts. No wastes are generated here. Stormwater is comprised of surface runoff and ultimately discharges to Soldier Creek Outfall J.

The south complex (Buildings 3770, 3726, 3728, and a waste transfer area), is used for the storage of supplies awaiting disposition and spent chemicals awaiting disposal. Building 3770 is an open sided shed containing raised curbs and sumps to contain any spills. Building 3726 is a metal shed with a concrete floor but no effective curbing or sumps to contain spills. The area surrounding this building is poorly graded allowing stormwater to accumulate inside the building. This accumulated stormwater can potentially be contaminated by the materials stored in the building. Building 3728 is fully curbed and sealed to contain wastes and exclude stormwater.

Building 3001 - Engine Repair

This area is a complex repair area primarily devoted to the rebuilding of jet engines. Because of it's complexity, it was examined in a series of steps. Physical intrusions

into the storm water system were identified through the methodical examination of each vertical roof drain conduit and floor drain within the confines of Building 3001. All physical intrusions were identified as to source and waste type and entered on a revised drawing of the area. Figure 4-2 is a detailed drawing of the stormwater system located inside Building 3001. The drawing also indicates the routes of the system outside the building to the outfalls. Table 4-2 illustrates specific post locations of tie-ins in Building 3001 to the Soldier Creek Storm Sewer system.

All atmospheric entry points into the stormwater collection system such as floor drains, roof drains, subsurface gravity connections to process discharges, lift station overflow lines, and abandoned sumps were identified in the area defined by post numbers 33-110, A-X by smoke and dye tracing methodologies. The evaluation utilized smoke pressurization of discrete stormwater test sections that had been atmospherically isolated at known junction points to maintain a useful test pressure. The adjacent post numbers I-33 area, being a non waste producing hangar area with no processes, was visually examined for stormwater tie-ins. The results of this examination indicated the following:

- Approximately 30 percent of the listed floor drains are still active, all of which are in non-waste producing areas. The inactive drains were either blocked with cement or dirt. In general, the southern portion of building (excluding the hanger area) contains the majority of the active floor drains. Active floor drains are noted on Figure 4-2 and Table 4-2.
- No atmospheric connections between the stormwater collection system and industrial sources such as lift station overflows or process discharges were located within the designated test area.
- A potential source of stormwater contamination from the heat treating area was identified as a process cleaning area (post D-73) which discharged to an internal lift station (post C-77) used to collect quench and non-contact cooling water. This source could be considered as a general cleaning area that discharges process rinse waters, soaps, detergents, waste oils and solvents.

TABLE 4-2
LOCATIONS OF STORM SEWER TIE-INS IN BUILDING 3001
BY POST LOCATION

Air Conditioner Condensate	Air Filter*	Fire Water Main Drain	Cooling Water	Floor Drain	Air Line Drain*	Steam Condensate	Fire Water	Water Cooler	Chilled Water Drain
X-7	Y-3	Y-99	T-47	Y-9	Y-31	X-18	X-9	Y-9	P-49
X-17	Y-9	Y-103	M-63	X-13	S-43	S-39	V-33	X-15	O-63
X-25	Y-13	Y-109	V-93	Y-19	Y-62	W-41	Q-37	P-39	O-69
X-37	X-13	M-33	S-43	X-23	Y-59	Y-45	V-43	P-49	P-33
U-37	Y-19	M-59	J-63	Y-29	D-93	Y-53	M-48	V-53	N-39
T-37	Y-23	Y-57	V-99	Y-39		Y-60	M-53	X-59	P-43
Q-37	Y-33	Y-63	D-111	T-37		W-71	V-59	F-77	S-47
X-47	X-33	Y-95		P-39		Y-67	P-59	X-31	P-53
S-47	Y-39	M-49		V-43			V-63	X-71	U-57
Q-47	Y-45			P-43			M-63		P-57
P-47	Y-49			Y-45			J-63		S-59
X-57	X-31			P-49			V-69		X-63
U-57	X-37			X-53			J-69		O-63
T-57	X-89			X-59			V-73		O-69
P-57				S-47			S-73		X-73
X-67				M-45			J-73		M-73
T-67				X-49			F-77		P-79
S-67				D-83			P-79		

*These storm sewer tie-ins are sources of oil into the storm sewer system.

TABLE 4-2 (CONTINUED)
 LOCATIONS OF STORM SEWER TIE-INS IN BUILDING 3001
 BY POST LOCATION
 PAGE TWO OF TWO

Air Conditioner Condensate	Air Filter*	Fire Water Main Drain	Cooling Water	Floor Drain	Air Line Drain*	Steam Condensate	Fire Water	Water Cooler	Chilled Water Drain
J-69				S-93			V-83		
X-77				S-59			M-89		
U-77				Y-59			G-89		
S-77				X-63			M-93		
L-75				O-63			N-33		
K-77				R-68			J-81		
Y-93				O-69			H-83		
S-93				X-71			M-99		
D-93				X-73			M-103		
				S-73					
				M-73					
				F-77					
				Y-79					
				U-79					
				Y-89					

*These storm sewer tie-ins are sources of oil into the storm sewer system.

- Entrained or condensable wastes have been identified in Building 3001 in three instances; compressed air condensate from line drains and filters, vacuum pump discharges, and liquid entrainment in vapor removal systems. Wastes of this type will passively accumulate until resolubilized or physically dislodged by storm or process water flows as demonstrated below:
 - Compressed air condensate discharges are low volume sources of water/oil mixtures of varying ratios that will accumulate in zero flow stormwater collection mains until dislodged by a stormwater or other suitable discharge stream. This could produce the effects of an oil spill. Refer to Figure 4-2 and Table 4-2 for locations of compressed air condensate discharges.
 - Soluble waste entrainment has been visually observed in the plating area, where droplets of plating solution have been transferred to the roof areas by the plating bath vapor or fume removal systems. These droplets have been redeposited on the roof surface leaving, after evaporation, a concentrated coating of heavy metals in a soluble form suitable for resolubilization in stormwater. All pertinent exhausts from the plating tanks have scrubbers that are of questionable effectiveness. This condition is acknowledged by the plating area personnel. A State-imposed compliance date of 1991 has been set to remedy the situation. The intended changes are major and include the redesign and relocation of both the chrome line and associated areas.
 - Vapor discharges from oil sealed vacuum pumps (post M-89) will contain considerable volumes of oil and have been observed as a stormwater contaminant originating from an oil saturated roof area surrounding a vacuum pump discharge, (Building 3001, Post M-89).

The IW collection system is composed of two distinct sections; subsurface gravity sewers that serve the post 85-110 area and a series of collection sumps with pressure main discharges that serve the post 33-85 area. The collection systems accommodate both gravity and pressure main influents from isolated processes of both dilute chemical wastes and non-contact cooling water. Examples of the influents include process rinse waters, paint booth wastes (suspended solids), detergent wash waters

(oils), wet abrasive blasting operation (suspended solids) and vapor degreaser cooling water. Concentrated wastes such as alkaline and acidic cleaners, scale conditioners, surface activators, chromate wastes, and specialized organic solvents are collected at the point of use for off-site disposal.

Superimposing the two IW collection systems over the stormwater system was performed to indicate areas of proximity in which possible subsurface cross connections between the industrial and stormwater systems may exist. Refer to Figure 4-3 for a drawing that overlays the industrial wastewater system in Building 3001 on the stormwater system.

The evaluation of possible cross connections between the industrial waste line and the stormwater line was performed by injecting smoke under pressure into three test sections:

- Stormwater sewers in internal plant areas (posts 95-103/A-D)
- Stormwater sewers in internal plant areas (posts 86-91/A-Z)
- External north/south industrial waste line (posts 61-87) west of the building and the two transverse southwest outfall lines

In the last case, the IW line was smoke tested instead of the storm sewer system due to the lack of known branching in the storm system. Testing the IW line greatly simplified the testing procedure. In all three cases, no cross connections were indicated.

4.1.2 Adjacent Areas

The results of the open area investigation (roads, aprons, parking areas) revealed that the potential for two forms of stormwater contamination exists. The first concerns direct discharge of oils, grease, paints, solvents, and detergent via manual dumping into stormwater catch basins. The evidence for this is indicated by residual oil and paint stains adhering to catch basin sidewalls and grate covers. The second involves precipitation runoff over parking lots and roads sweeping accumulated oils, grease and antifreeze from vehicles into the stormwater system. These discharges are not active but the potential exists.

4.2 FLOW MONITORING

NUS' original understanding was that 11 outfalls discharged to Soldier Creek as indicated on Figure 3-1. Upon inspection of the outfalls, there are 13 outfalls that discharge to the creek but one of the original set is not actually an outfall while three new outfalls were discovered. There is no outfall at the point labeled "K" on Figure 3-1. The three new outfalls are labeled "L", "M" and "N". Of the 13 outfalls, only 8 appeared to have flow and were subsequently flow monitored. Outfall "L" had stagnant water around the outfall. Outfall "L" could not have a weir installed because of three small diameter pipes running through it. Outfall N is a combination of runway drainage and Outfalls A, B, C, D, E. Outfalls "B", "J" and "M" drain only roadways and have no flow unless it is raining. Table 4-3 is a listing of all outfalls located on Figure 3-1, their corresponding condition, and flow monitoring status. Table 4-4 summarizes details on outfall diameters, water depths, flow rates and comments on the outfall conditions. Outfalls A and G were flow monitored at the first available upstream manhole or catch basin due to the location of the outfalls. The integrity of the storm sewer section located between Outfalls A and G and the first manhole was previously verified with either smoke or dye testing.

All but two of the eight flowing outfalls recorded a steady flow rate. Outfall C exhibited no flow conditions during the period in which field investigations were performed and Outfall G recorded a varied flow. The steady flows were largely attributed to non-contact cooling water. The varied flow at Outfall G is primarily attributed to fluctuations from cooling tower blowdown. Outfalls D, E and H were observed discharging oil or solvents, while Outfalls A, F, G and I discharged primarily sources of uncontaminated water. Table 4-5 summarizes details on what each outfall was observed to be discharging and the corresponding contributing source.

4.3 SAMPLING/ANALYSIS RESULTS

Sampling was conducted at the following seven of the eight outfalls that were flow monitored:

- Outfalls A, D, E, F, G, H, I

TABLE 4-3
SOLDIER CREEK OUTFALLS
FLOW MONITORING STATUS

Outfall	Condition	Flow Monitored	Sampled
A	flow	yes ^①	yes ^①
B	no flow	no	no
C	no flow	yes	no ^②
D	flow	yes	yes
E	flow	yes	yes
F	flow	yes	yes
G	flow	yes ^{①, ③}	yes ^{①, ③}
H	flow	yes	yes
I	flow	yes	yes
J	no flow	no	no
K	not an outfall	no	no
L	flow ^④	no	no
M	no flow	no	no
N	flow ^⑤	no	no

Notes:

- ① Flow monitoring and sampling were conducted at the first available upstream manhole or catch basin.
- ② There was no actual flow only stagnant water; therefore no sample was collected.
- ③ Outfall G was the only outfall where a varied flow was observed and therefore, a flow proportional sample was collected.
- ④ The flow observed in this outfall was very small and estimated at <1 gpm. In addition, there were three pipes located in the sewer pipe which did not allow for placement of a flow meter.
- ⑤ The flow observed at this outfall is a combination of that from Outfalls A, B, C, D, and E.

TABLE 4-4
OUTFALL SPECIFICATIONS

Outfall Letter	Diameter (in.)	Water Depth (Avg) (inches)	Base Flow Rate (Avg)	Comments
A	24 CMP	(1)	< 5 gpm	Discharges to an inaccessible joint. Excess concrete removal required for weir installation.
B	12 RCP	(1)	No flow	Drains roadway only.
C	21 RCP	(1)	No flow	Total submerged and grated. This outfall can only be sampled at its discharge structure.
D	27 RCP	20	50 gpm	Installation of a flat plate weir at the discharge structure.
E	18 RCP	6	35 gpm	Weir installation at the outfall structure.
F	30 RCP	1.5	4.5 gpm	Installed at road ditch intrusion point.
G	54 RCP	3.5	114 gpm	Installed at road ditch intrusion point.
H	72 RCP	6	6.3 gpm	Installed at outfall point.
I	72 RCP	6	0.7 gpm	None
J	42 RCP	1	No flow	Drains roadways only
K				(2)
L	30 RCP	(1)	< 1 gpm	(3)
M	36 RCP	(1)	No flow	Drains roadways only(3)
N	3X48 RCP	1	90 gpm	Combination of Outfalls A, B, C, D, E

1. Outfall submerged
2. Included originally in the work plan, but determined not to be an outfall to Soldier Creek, but discharges to Outfall J.
3. Not included in the original work plan as an outfall, but discovered to be one during the field investigation.

RCP - Reinforced concrete pipe
CMP- Corrugated metal pipe

TABLE 4-5

**SOLDIER CREEK OUTFALLS
DISCHARGE OBSERVATIONS AND CONTRIBUTING SOURCE**

Outfall	Observations	Contributing Source
A	Clean water	Non contact cooling water from air compressor in Bldg. 3001 at post 111-D
B	No flow	N/A
C	No flow	N/A
D	Clean water with occasional oil sheen	Furnace cooling water, quench water and wash water from Heat Treating area (post 73-81/A-F) in Bldg. 3001
E	Clean water with intermittent oil slug	Cooling water from air compressor located in utility room in northeast corner of Building 3108
F	Clean water	Process non contact cooling water from machine shop into drain at post 99-V
G	Clean water	Cooling water from air compressors and chiller units located in the AC/Heating section (post 64-75/Y-Z) and blowdown from cooling tower number 3301 into roof drain at post 67-Y
H	Clean water with intermittent oil slug	N/A
I	Clean water with occasional oil sheen	Cooling water from Bldg. 2122
J	No flow	N/A
K	Not an Outfall	N/A
L	Clean water	Air conditioner condensate
M	No flow	N/A
N	Clean water with occasional oil sheen	Combination of Outfalls A, B, C, D, E

Since Outfall C recorded no flow, but only stagnant water, no sample was collected because it would not represent the outfall's discharge. The stagnant water is a combination of stormwater and outfall discharges from other outfalls due to the elevation of the ditch to the outfall. Table 4-3 is a listing of which outfalls were sampled. As indicated on Table 4-3, Outfall G was the only sample for which a flow proportional sample was collected. The remaining outfalls were sampled using a time interval method. Three sets of samples were collected for each outfall over three 24-hour periods. Table 4-6 is a list of the total number of samples collected (including QA/QC). Appendix B contains the raw analytical laboratory reports for all seven outfalls.

The regulatory limits used for comparison include the existing Tinker AFB NPDES permit parameters and limits, the Oklahoma State Water Quality Standards, and State and Federal Maximum Contaminant Levels (MCLs) allowed for drinking water. Due to the lack of water quality standards, drinking water standards were utilized and were found to be in compliance. The contaminants that were determined to be of concern from the first sampling event are listed in Table 4-7 for each outfall. In addition, this table lists the applicable regulatory limit used for comparison. The contaminants of concern can be separated into three main categories: organics, metals, and oil/grease. The results of the analytical data review from the first event are addressed by these categories in the following sections.

4.3.1 Organics

Table 4-7 indicates that there are only three organic compounds of concern entering Soldier Creek from the storm sewer system. These organics and the outfalls from which they are discharging are listed below:

- Outfall D - tetrachloroethene (perchloroethene-PCE) and trans-1,2-dichloroethene
- Outfall E - tetrachloroethene
- Outfall G - bromoform

Even though the levels of these organics are very low (5-8 ug/l (ppb) excluding one instance of bromoform), they are a concern when compared to Oklahoma Water Quality Standards and Federal or State MCLs. NUS recommended a confirmatory

TABLE 4-6
 OVERALL SUMMARY OF THE WATER SAMPLING AND ANALYTICAL PROGRAM
 SOLDIER CREEK
 TINKER AIR FORCE BASE

Parameter Level III	EPA Methodology	Outfall						Building 3001 Tap Water	Quality Control				Total	
		A	D	E	F	G	H		I	Trip Blank (VOA only)	Field Blanks	Equipment Rinsates		Field Duplicate (1 in 20)
Volatiles (a)	624	3	8	5	3	15	3	3	1	8	1	1	1	52
Oils and Grease	413.1	3	3	3	3	3	3	3	1		1	1	1	25
Metals	(b)	3	3	3	3	5	3	3	1		1	1	1	27
MBAS	SM 5512 B	3	3	3	3	3	3	3	1		1	1	1	25
COD	410.1	3	3	3	3	3	3	3	1		1	1	1	25
Cyanide	ASTM D2036	3	3	3	3	3	3	3	1		1	1	1	25
Phenol (Total)	420.1	3	3	3	3	3	3	3	1		1	1	1	25
Phosphorus	365.2	3	3	3	3	3	3	3	1		1	1	1	25
Chromium (Hex)	SM 312B	3	3	3	3	3	3	3	1		1	1	1	25

(a) Benzene
 Bromodichloromethane
 Bromoform
 Bromomethane
 Carbon tetrachloride
 Chlorobenzene
 Chloroethane
 2-Chloroethylvinyl ether
 Chloroform
 Chloromethane

Dibromochloromethane
 1,2-Dichlorobenzene
 1,3-Dichlorobenzene
 1,4-Dichlorobenzene
 1,1-Dichloroethane
 1,2-Dichloroethane
 1,1-Dichloroethene
 trans-1,2-Dichloroethene
 1,2-Dichloropropane
 cis-1,3-Dichloropropane

trans-1,3-Dichloropropane
 Ethyl benzene
 Methylene chloride
 1,1,2,2-Tetrachloroethane
 Tetrachloroethene
 Toluene
 1,1,1-Trichloroethane
 1,1,2-Trichloroethane
 Trichloroethene
 Trichlorofluoromethane
 Vinyl chloride

(b) Cadmium
 Chromium
 Copper
 Lead
 Nickel
 Zinc

EPA Method
 E200.7
 E200.7
 E200.7
 E239.2
 E200.7
 E200.7

sampling event to verify or dispute the presence of the above mentioned organics for the following reasons:

- Extremely low rates of water flow and organic concentrations from Outfalls D and E would indicate a very diffuse source
- Concentration levels are very close to detection limits
- Outfall G indicated a concentration of bromoform at 100 ug/l one day with a decrease to 11 ug/l the next day and finally below detection limits the next day. This pattern indicated an intermittent discharge condition.

The confirmatory sampling event included the collection of two samples (one each day for 2 days) from Outfalls D, E, and G. The samples were analyzed for the organic(s) of concern only. Since all organics of concern were volatile, grab samples were collected. The confirmatory sampling event provided the following results:

- Outfall D - Confirmed the presence of tetrachloroethene and trans-1,2-dichloroethene
- Outfall E - Did not confirm the presence of tetrachloroethane
- Outfall G - Confirmed the presence of bromoform

Consequently, a third sampling event was recommended for locations upstream from Outfalls D and G. Three upstream locations were sampled for Outfall D and ten upstream locations were sampled for Outfall G. The third (and final) sampling event for Soldier Creek confirmed that the Heat Treat Lift Station in Building 3001 was the source for tetrachloroethene and trans-1,2-dichloroethene discharging through Outfall D. In addition, it was determined that the bromoform was originating from the cooling tower number 3301. Dibromonitropropamine and bromochlorodimethylhydantion are used as bromobiocides to control biological growth in the cooling tower system and may degrade to bromoform. The chemicals are in solid form and are used at a rate of 40 lbs per day. Tables 4-8, 4-9, 4-10, and 4-11 are summaries of the sampling events on Outfalls D, E, and G for the problem contaminants only.

TABLE 4-8
OUTFALL D
SOLDIER CREEK INVESTIGATION
ANALYTICAL RESULTS

Parameter	1st Event			2nd Event		3rd Event		
	Outfall D			Outfall D		MH98S ^①	MH98NE	H.T. Lift ^②
	8/17	8/18	8/19	11/3	11/4	12/29	12/29	12/29
Tetrachloroethene (ug/l)	< 5	6.6	7.7	18	21	< 5	< 5	14
Trans-1,2-Dichloroethene (ug/l)	< 5	< 5	11	15	26	< 5	< 5	< 5

- ① Manhole (MH) 98 South (S). Where there is more than one conduit into a manhole, the manhole number is followed by the direction of the conduit that was sampled in order to distinguish it from the other conduits.
- ② Heat Treat Lift Station in Bldg. 3001 Post B-75

TABLE 4-9
OUTFALL E
SOLDIER CREEK INVESTIGATION
ANALYTICAL RESULTS

Parameter	1st Event			2nd Event	
	Outfall E			Outfall E	
	8/17	8/18	8/19	11/3	11/4
Tetrachloroethene (ug/l)	< 5	< 5	5	< 2	< 2

TABLE 4-10
OUTFALL G
SOLDIER CREEK INVESTIGATION
ANALYTICAL RESULTS
FIRST AND SECOND EVENTS ONLY

Parameter	1st Event			2nd Event	
	8/24	8/25	8/26	11/3	11/4
Bromoform (ug/l)	< 5	100	11	19	27
Copper (mg/l)	0.190	0.190	0.200	①	①

① No analysis performed because copper was believed to be originating from the cooling tower and no confirmation was needed.

TABLE 4-11
OUTFALL G
SOLDIER CREEK INVESTIGATION
UPSTREAM SAMPLING
THIRD SAMPLING EVENT (12/29/88)

Sample Location	Parameter Concentration	
	Bromoform (ug/l)	Copper (mg/l)
MH 40 N [ⓐ]	< 5	<0.02
MH 40 W	< 5	-
C.T. Basin	17	0.160
MH 39 N	< 5	-
MH 41 A W	23	-
MH 41 A N	58	-
MH 64 N	< 5	-
MH 64 W	< 5	-
MH 63 N	< 5	-
MH 63 NW	< 5	-
Tap H ₂ O (Bldg. 3001)	< 5	<0.02

- ⓐ Manhole No. 40 North
- Parameter not analyzed

4.3.2 Metals

The only metal of concern was copper. This metal is present in every outfall in the .02-.04 milligrams per liter (mg/l) (ppm) range.

Outfall G indicates a higher than normal copper level (.20 mg/l) and it has been determined that this is originating from the main cooling tower number 3301. A sample of the cooling tower blowdown was obtained during the third sampling event and analyzed for copper. The cooling tower blowdown copper data was consistent with the Outfall G data. Table 4-11 shows the copper concentrations obtained from the cooling tower basin sample.

No additional sampling and analysis of copper was recommended due to the data obtained on copper levels in the cooling tower blowdown and tap water.

In the interim period since sampling on the cooling tower was performed, various changes in cooling tower treatment and cycles have occurred. The tower is currently being operated on four cycles of concentration as opposed to the two cycles of concentration under previous operations. The tower has been recently reslatted with treated wood containing copper and chrome biocide preservatives resulting in high discharge concentrations of these elements. A precipitate (dithiocarbamate) is being added to the system to reduce the metals concentrations. Therefore, the discharge of the cooling tower is currently in a state of flux. No recommendations concerning outfall discharges can be made as they would not be representative of past or future operations.

4.3.3 Oil and Grease

The major source of contamination of Soldier Creek has been discovered to be releases of oil and grease. Discharges of oil were observed at Outfalls E and H. The sources of oil from these two outfalls have been determined to be the following:

- Outfall E - Building 3108
- Outfalls H and I - Building 3105

The source of oil discharging from Building 3108 is a compressed air condensate drain on the north air compressor discharge line. This section of line is being manually drained to a collection pail, which when full is being discharged to West Soldier Creek via a convenient air compressor intercooler water line.

The source of the oil release in Building 3105 is vacuum pump seal oil that accumulates in area floor trenches that are connected to the storm sewer system. Sporadic discharges from cooling water systems in this building flush the accumulated oil through the cross connection to Soldier Creek via the storm sewer system. In the interim time period since field work and sampling were completed, the vacuum heat treat area has been removed from the building, thus eliminating the source of the oil and grease.

In addition, higher than normal oil and grease values were reported for Outfalls F and G even though oil was not visually observed at these outfalls. NUS' investigation in Building 3001 indicated the primary source of the oil discharging from these outfalls would be from oil filter and line condensate traps on compressed air lines. These condensate trappings contain oil and are being discharged to the storm sewer system via roof and floor drains. Figure 4-2 and Table 4-2 show locations of storm sewer tie-ins.

No additional oil and grease sampling and analysis was recommended because the building investigations revealed the sources of the oil discharges.

5.0 CONCLUSIONS, OBSERVATIONS AND RECOMMENDATIONS

Certain conclusions, observations and recommendations have been developed during this storm sewer investigation. They are addressed in the following sections.

5.1 CONCLUSIONS

Based on the results of the study, the waste sources discharging into Soldier Creek can be divided into the following four categories:

- Process discharges, non or limited contact process heating and cooling waters or evaporative cooling waters, that have a known, predictable, and controllable analysis and pose few discharge problems. These active discharges to the stormwater system represent a small percentage of the available sources but constitute the majority of the discharge volume. In the case of Building 3001, cooling tower blowdown is the major source of chemical discharge to Soldier Creek.
- The next source is low volume accumulative wastes consisting of entrained and/or condensable oils and water-based wastes derived from compressed air condensate (line and filter discharges), vacuum pump, and fume handling systems. The waste concentrations in the receiving stream that serves these sources are erratic and incapable of valid sampling (due to the influences of the rate of discharge, and the frequency of flushing from the collective area.)
- The third source of waste to the system is the manual disposal of waste materials such as spent cleaning solvents, lubricating oils, etc. into convenient receivers such as catch basins and roof, floor, or process drains. Most of these examples are maintenance related and are exemplified by the routine discharges of oil/water condensate from Building 3108. This practice will require corrective action in the form of engineering changes, long term education, and monitoring and enforcement programs.

- The last source is the cross contamination between waste systems occurring from sewer system failures. The two cases which were noted during the study were the intrusion of industrial wastes into a fractured stormwater sewer in the Building 2122 area and the infiltration of sewage into a stormwater sewer in the Building 3705 area. The Building 2122 cross connection was discharging into Crutch Creek. Both areas were repaired upon confirmation.

5.2 OBSERVATIONS

Large areas of stormwater collection sewers have no continuous flow, resulting in the possible accumulation of wastes which are dislodged only by an intermittent process or stormwater flow. This can result in massive nonrepresentative discharges and invalid analytical samples.

Concurrently, the past practice of routing all available wastes including non-contact and limited contact cooling water to the IWTP for treatment has resulted in both the unnecessary dilution of the waste to be treated, decreasing the effective capacity of the treatment facility and increasing the cost of treatment, and the loss of flushing water in the stormwater sewers to facilitate sampling operations.

Three of the five outfalls (A, B, C) into West Soldier Creek have submerged discharges. This condition is detrimental to good sampling practice for three reasons:

- It produces an accumulator action, diluting small process flows
- It introduces intolerable time delays into flow proportional sampling programs at low flow rates
- It functions as a trap to effectively separate and hold oil until washed out by increased water flow

5.3 RECOMMENDATIONS

NUS has developed several recommendations for improvements of the storm water sewer system. These recommendations have been segregated into the following categories: buildings and open areas, outfalls, and general.

5.3.1 Buildings

5.3.1.1 Building 3105 - Hangar Area

The former vacuum heat treat process waste trenches still exist and should be sealed off from the stormwater system by plugging the exits to the trenches. This area is now a dry storage area with a small tool shop. The trenches are of sufficient volume to contain any accumulation of liquid wastes for later removal by waste truck to the IWTP.

5.3.1.2 Building 3108 - Hydraulic Test and Calibration

Discontinue the operation of filling a collection pail with emulsified oil from a compressed air condensate line on the north air compressor discharge line located adjacent to the compressor in the northeast corner of building 3108. There is no flow rate associated with the oil as it is intermittently dumped when the compressor is manually blowdown. Recommendations for possible corrective action include:

- Route the condensate discharge line and its control valve by means of a small diameter copper tubing to a suitable holding container (covered 55 gallon drum) in the adjacent water chiller utility room where it would be accessible to the removal of the drum or its contents. The waste from the holding container would eventually be sent to the industrial wastewater treatment system.
- Install a condensate discharge line from the compressor at the north end of the building for discharge to an IWTP sump for disposal.
- In addition to routing a line from the condensate discharge line to the holding container in the adjacent room, the top of the intercooler should be covered to prevent convenient disposal of wastes which would ultimately discharge through Outfall E.

5.3.1.3 DRMO Area

The drum transfer/storage area should be rebuilt as a shed type structure having either a curbed and ramped concrete floor or a curbed basin utilizing an open grated surface and a sump of sufficient capacity for spill collection.

5.3.1.4 Building 3726

This area should be physically regraded to keep stormwater runoff away from the structure. The building perimeter should be resealed and ramps installed to provide effective curbing. The interior lighting should be upgraded for safety and product identification.

5.3.1.5 Building 3001 - Engine Repair

The following changes should be performed in Building 3001:

- Disconnect the active floor drains and clean water sinks located in Building 3001 from the storm water system due to their convenience as possible dumping areas for small batches of maintenance materials such as lubricants, cleaning solutions, solvents, etc.
- Reroute the discharge of rinsewaters, soaps, detergents, and possible oils and solvents generated in the heat treat area cleaning station (C-73) from the clean process water lift station (B-75) to the industrial wastewater line which serves the air compressors at post F-73 or move the washing operation to the air compressor room at post F-73.
- Seal off an abandoned floor sump located at S-35 in Building 3001 from the storm water system to eliminate the availability for convenient dumping. The sump discharge can be sealed with concrete or with an expansion plug.
- The removal of all oil/water condensate discharges from the stormwater system will be required. These sources are all high pressure, low volume and intermittent, and should be amenable to the use of extended small diameter manifolds for collection and ultimate disposal to the industrial

water collection system. The manifold could consist of small diameter copper tubing extending from each discharge trap to a single larger diameter copper pipe running the length of the east wall. The discharge then can be routed to any conveniently located industrial wastewater disposal connection. If filter drains are disconnected, they will need to be reconnected onto a waste collection line. The choice of disposal points is best made by base personnel familiar with the building.

- Discontinue the discharge of oil vapor and condensate through a pipe from the vacuum pump to the roof at Post M-89 by one of three options:
 - Reroute the discharge to the industrial waste system
 - Replace the pump with a non lubricated variety
 - Install demisters in the pump discharge line

Rerouting the discharge to the industrial waste system is the recommended alternative. Replacing the pump would be expensive and dependent upon process requirements. Demisters would require a oil storage collection system be installed.

- The connections to the roof drains identified as sprinkler water (firewater), and chiller water, represent drain/vent connections to isolatable segments of the distribution system to facilitate system servicing or repairs. The volume of water from these sources would be minimal and could be ignored. The firewater main drains are low points in the overhead distribution system, which as a stagnant system, should contain appreciable quantities of suspended materials (corrosion products) making it a source of visual stormwater contamination. These discharges exist, with few exceptions, adjacent to outside walls through which they can discharge to the outside ground surface or to an attached waste truck. A limited number of drains located on the internal east and west building walls, however, discharge to the stormwater system and should be removed and repiped to a temporary hose connection in the internal IW system or rerouted to a wall point where an outside discharge could be achieved. The discharge should be routed to the most convenient point of attachment as decided by base personnel familiar with the building.

- Sources of clean water should be installed at the headends of the stormwater mains and allowed to run a constant small volume of water through the systems. This would provide a continuous flushing action to the collection main allowing realistic sampling conditions to be established.
- The possible removal of the boiler blowdown and softener wastes from the sanitary system to the stormwater system should be investigated. These large volumes of water (generally clean) discharging to the sanitary treatment facilities result in a loss of treatment efficiency and the increased hydraulic loading of the treatment facility. The feasibility of this action is dependent on chemical analysis of the blowdown and softener wastes.
- The utility room system drains, located on the east face of the building posts 65-77/Y-Z, which accommodate both the main 3001 cooling tower number 3301 blowdown and the chilled water recirculation loops discharges to the stormwater system through a roof drain connection at post 67 Y. The cooling tower discharge being a known and controllable discharge should be left as is. The chilled water, unlike the firewater, however, is of unknown chemistry and should be analyzed for both chemical and suspended solids content to determine its suitability for discharge to the stormwater system. The chilled water system runs in a closed loop and is only emptied for maintenance. The make up water used is tap water and it is not chemically treated. It is scheduled for nitrite/borate treatment in the near future.

5.3.1.6 Surface Runoff Areas

The possibility of the manual disposal of oil or spent solvents into stormwater catch basins along with surface runoff from areas such as parking lots, roads and aprons represents a potential problem.

- An education and enforcement program should be implemented to inform base personnel of the consequences of dumping materials into the stormwater system.

- Prompt control and cleanup of spills of oils, fuels, and antifreezes onto paved and unpaved surfaces will reduce the likelihood of runoff of these materials into the stormwater system.

5.3.2 Outfalls

The outfalls on West Soldier Creek vary from partial to total submergence which is detrimental to effective sampling. This condition is the result of vegetative growth occurring in the water channel resulting in a semi-swamp condition that both traps contaminants and raises the water level to the outfalls. This area should be:

- Reconstructed as an open lined culvert incorporating a weir and gate at its discharge end to both measure flows and control the discharge in case of a spill condition.
- The individual outfall discharges to this culvert should also be designed to accept simple weir plates to provide measurement capabilities for possible future water studies for conservation purposes.

The east Soldier Creek Outfall L consists of a 30-inch line through which three 4-inch reinforced plastic pipes have been placed. The three pipes are out of service. One line extends into MH 67. This line used to serve IW lift station number 33 which was removed from service when the IW gravity main was installed. The other two lines, both of which terminate at the parking lot stormwater entry point, are inactive. This condition is detrimental to proper sampling due to the following:

- The lines effectively hide the bottom of the stormwater main making the visual observation of flow difficult
- The lines do not allow for flow measurement or sampling

All three pipes should be removed from the inside of the outfall line.

5.3.3 General Comments

High level alarm contacts should be installed in all lift stations to minimize the potential of an industrial waste overflow into building areas or the stormwater system and minimize the health hazard, downtime and clean up costs.

Permanent or semi permanent weirs should be installed in outfall structures to facilitate future flow monitoring and sampling programs.

5.3.4 Wastewater Reduction Recommendations

The manipulation of non-contact process water to reduce their volume, treatment costs, and possible reuse should be pursued to derive full use from the current IWTP. Several recommendations for accomplishing this task are:

- The reduction in volume of the non-contact cooling water (air compressors, vacuum pumps, vapor degreasers, etc.) could be achieved through the use of process temperature control valves. These valves operate by controlling the optimum cooling water rates to achieve the manufacturers operating temperature recommendations.
- Wastes from processes, located in the AC/Heating Utility room (posts 65-77/Y-Z), such as boiler blowdown, softener regenerates, cooling tower number 3301 blowdown, etc. are predictable and in some cases controllable. They generally consist of substances that are unreactive to the waste treatment process and serve mostly to dilute the waste before discharge to the receiving stream. The treatment of these wastes generally serves to increase the hydraulic loading and operating costs of the associated treatment plant, and if possible, should be transferred to the stormwater system for possible reuse and dilution before discharge to the receiving stream. The utility room area produces four waste streams. Boiler water blowdown, softner regenerate wastes and dealkalyzer wastes discharge to the sanitary treatment plant which provides essentially dilution and not treatment prior to discharge. The fourth, cooling tower blowdown, discharges to the stormwater system. The boilers blowdown continuously 37500 gpd and in intermittently 2300 gpd for a total of

39800 gpd. The pH of the blowdown is 10.5-11.0 with a methyl orange (M.O.) alkalinity of 500 mg/l. Cyclohexamine and morpholine are present in low concentrations in the boiler water. The softeners undergo three regenerations per day using 1671 lb/day of sodium chloride. Each cycle uses 975 gallons backwash, 177 gallons brine, 548 gallons displacement, and 1750 gallons rinse for a total of 3450 gallons. Three cycles per day equals 10350 gallons.

The dealkalyzers undergo one regeneration per day using 25 lbs sodium hydroxide. The cycle uses 900 gallons backwash, 705 gallons brine, 388 gallons displacement and 4200 gallons rinse for a total of 6193 gallons/day.

The cooling tower blowdown varies with each season. (i.e., for July, a high uses month, the tower blowdown 150,000 gallons/day). The pH was 7.5-8.0 and the M.O. alkalinity < 170 mg/l.

- The supportive data required for this wastewater redistribution would include:
 - The chemical analysis and flow values of the process wastes
 - The determination of optimum non-contact cooling water rates based on the manufacturers operating temperature recommendations

APPENDIX A
DETAILED SMOKE TESTING EQUIPMENT SPECIFICATIONS
AND PROCEDURAL METHODS

APPENDIX A

DETAILED SMOKE TESTING EQUIPMENT SPECIFICATIONS AND PROCEDURAL METHODS

Main Blower Pipe and Tube Assembly by Steps

1. Connect a 20 foot section of 1/4 in. diameter tubing with a rubber coupling to the small tip located in the bottom quadrant of the blower discharge port.
2. Slip the 10 inch diameter x 15 foot air delivery take over the 1/4 inch polyethylene static pressure tube and assemble to the blower discharge collar with a hose clamp.
3. Fasten the 10 inch diameter tube 90° elbow onto the discharge end of the air delivery tube with a hose clamp. Fasten with the serrated end of this fitting on the discharge end.
4. Tape a rigid tube approximately 3 feet long to the side of the static tube to aid insertion into the sewer section to be tested.

Transition Tubes (Equipment Assembly)

1. Equipment consists of three sections which measure 2 feet in length and 10 inches in diameter. (Rigid Tubing)
2. The assembly of the transition tubing is completed in two main steps:
 - Open a 38 inch wide by 60 inch long polyethylene bag and cut it to a length of 48 inches. Discard the bottom closed section.
 - Position the plastic sleeve section over a 24 inch section of rigid tubing. Gather the end of the plastic film.

Main Blower Engine Requirements

1. This consists of one gasoline engine driving two blowers: one Omuin air blower of approximately 2500 CFM connected to a 10 inch diameter by 15 foot flexible air line which enables the unit to serve both the line to be tested and to supply sweep air to the manhole prior to personnel entry if required.
2. A secondary blower of approximately 300 CFM with a cut-off pressure of 8 inch water was used to supply air for the inflatable seals and line blocks.
3. A back pressure gauge of 0-1 inch water was included to allow the rough evaluation of the line to be tested before the introduction of smoke. This procedure enables field technicians to assess the need and/or the size of smoke candles required for the line test.

4. A small separate gasoline powered leaf (yard) blower was used to inflate the remote air bags or bladders used in the isolating of test sections. (Sewer line isolation and coupling components)

Testing Procedures and Additional Equipment

Accuracy of testing procedures requires the ability to both couple the blower to the test section without leakage and the leak free isolations of the test section at the selected points of isolation.

The coupling of the blower to the test section can be made in two ways.

1. The selective coupling of the blower discharge to the specific test section in the manhole.
 - 1A. Line blockage to achieve test section isolation is performed with inflatable tubes or bladders fabricated from 6 millimeter tubing. Use of polyethylene PE tubing is the best in light of its low cost and the expendable nature of its use. Factors such as sharp, rough surfaces and possible unwanted surface contamination along with rough handling can be attributed to its use. Two sizes of tubing were selected; 38 inch width to accommodate openings to 24 inch in diameter, and 80 inch width to accommodate openings to 48 inches in diameter. Lines larger than the latter are blocked by the use of multiple bladders inflated in a parallel fashion. Inflation air for these bladders is supplied continually to compensate for leakage.
2. The pressurization of the total manhole in conjunction with the selective blockage of unwanted waste lines into the manhole can be achieved with the following method.
 - 2A. Use a 10 inch rigid transition tube from the end of the attached blower hose for the directing of flow. These sections must be pre-fitted with plastic film bladders inflated to achieve the required sealing to the test section or manhole entry point. Air for this purpose is obtained from the small inflation blower via a separate 2 inch delivery line.

New Pressurized Seals

These devices were developed to seal sewer line entries not amendable by bladder sealing (i.e., roadway catch basins, grated manholes, etc.). These seals are made of a plastic film that is weight sealed to the area surrounding the entry. Weights of 12-15 lbs. proved sufficient. They can easily be made by filling 5 mil 5 inches wide PE tubing with pea gravel or sand and sealing them at both ends.

Smoke Candles

Four sizes of smoke candles were used; 30, 60, 120 second duration (low volume) and 60 second high volume. The candle selected (by volume) always must commensurate with the volume of the pipe section being tested and its suspected volume of leakage, degree of isolation, and the sensitivity of the surrounding area to smoke.

The Test Methodologies

Test methodologies are not definable because too many variables are dependent, but they do follow a general form. (General)

1. Connect the smoke generator to the test section in an appropriate manner to satisfy the entry point conditions.
2. Block all known associated system entries such as sumps and manholes for smoke direction.
3. Position personnel at critical points to observe the smoke discharge in suspected areas. Radio communication is essential between all parties involved in this phase.
4. Start the blower and note the gauge back pressure and/or flow of air to the blower for several minutes if steady.
5. Light a smoke candle (or a set of candles) which commensurates with the estimated test conditions and place into position.

APPENDIX B
RAW ANALYTICAL DATA



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFD)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083284
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/18/88

REPORT DATE: 09/09/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: OUTFALL A - SOLDIER CREEK SAIA

08/17 PMS:0002

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l ✓				
M140	Chromium (Cr)	< 0.01	ug/l ✓				
M160	Copper (Cu)	0.02	ug/l ✓				
M200	Lead (Pb)	0.005	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.05	ug/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
W120	COD (O2)	< 4	ug/l				
W212	Chromium, Hexavalent (Cr+6)	< 0.01	ug/l ✓				
W270	Cyanide, Total (CN)	< 0.01	ug/l				
W490	pH	7.3					
W500	Phenolics	< 0.1	ug/l				
W540	Phosphorus, Total (P)	0.12	ug/l				
W680	Oil, Extraction-Gravimetric	< 5	ug/l ✓				
W700	Specific Conductance @ 25C	280	umhos/cm				
W770	Surfactants (MBAS)	0.15	ug/l ←				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (YINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083284
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/18/88

REPORT DATE: 09/09/88

ATTENTION: TEKRI O'BRIANT

SAMPLE IDENTIFICATION: OUTFALL A - SOLDIER CREEK SA 1A

08/17 PMS:DB02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	7.0	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 5	us/l				
OV70	Trichlorofluoroethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OV50	d8-Toluene(Surrogate)			50	us/l	98	%
OV51	Bromofluorobenzene(Surrogate)			50	us/l	104	%
OV52	d4-1,2-Dichloroethane(Surr.)			50	us/l	100	%

← lab cont.

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083560
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/19/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

SAMPLE IDENTIFICATION: SA1B-OUTFALL A-SOLDIER CREEK

09/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	0.005	ug/l ✓				
M140	Chromium (Cr)	< 0.01	ug/l ✓				
M160	Copper (Cu)	0.04	ug/l ✓				
M200	Lead (Pb)	0.005	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.06	ug/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	27	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.10	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	7.9					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.08	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l ✓				
M700	Specific Conductance @ 25C	290	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



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713 - 488-1810

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ADDRESS: 16360 PARK 10 PLACE #300
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WORK ORDER NO: 1S190
DATE RECEIVED: 08/19/88

REPORT DATE: 09/09/88

ATTENTION: YEKKI O'BRIANT

SAMPLE IDENTIFICATION: SA18-OUTFALL A-SOLDIER CREEK

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0V17	1,2-Dichloropropane	< 5	us/l				
0V18	cis-1,3-Dichloropropene*	< 5	us/l				
0V19	Ethylbenzene	< 5	us/l				
0V20	Methyl bromide	< 10	us/l				
0V21	Methyl chloride	< 10	us/l				
0V22	Methylene chloride	10	us/l				
0V23	1,1,2,2-Tetrachloroethane	< 5	us/l				
0V24	Tetrachloroethene	< 5	us/l				
0V25	Toluene	< 5	us/l				
0V26	trans-1,2-Dichloroethene	< 5	us/l				
0V27	1,1,1-Trichloroethane	< 5	us/l				
0V28	1,1,2-Trichloroethane	< 5	us/l				
0V29	Trichloroethene	< 5	us/l				
0V31	Vinyl chloride	< 10	us/l				
0V70	Trichlorofluoroethane	< 20	us/l				
0V80	1,2-Dichlorobenzene	< 10	us/l				
0V81	1,3-Dichlorobenzene	< 10	us/l				
0V82	1,4-Dichlorobenzene	< 10	us/l				
0VS0	d8-Toluene (Surrogate)			50	us/l	98	us/l
0VS1	Bromofluorobenzene (Surrogate)			50	us/l	94	us/l
0VS2	d4-1,2-Dichloroethane (Surr.)			50	us/l	90	us/l

← lab cont.

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083613
VENDOR NO: KC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/20/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SA1C-OUTFALL A-SOLDIER CREEK

08/19 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l ✓				
M140	Chromium (Cr)	0.01	ug/l ✓				
M160	Copper (Cu)	0.04	ug/l ✓				
M200	Lead (Pb)	0.005	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.05	ug/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	< 4	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.01	ug/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ug/l ✓				
M490	pH	7.6					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.04	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l ✓				
M700	Specific Conductance @ 25C	280	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083613
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/20/88

SAMPLE IDENTIFICATION: SA1C-OUTFALL A-SOLDIER CREEK

08/19 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	ug/l				
OV18	cis-1,3-Dichloropropene*	< 5	ug/l				
OV19	Ethylbenzene	< 5	ug/l				
OV20	Methyl bromide	< 10	ug/l				
OV21	Methyl chloride	< 10	ug/l				
OV22	Methylene chloride	11	ug/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	ug/l				
OV24	Tetrachloroethene	< 5	ug/l				
OV25	Toluene	< 5	ug/l				
OV26	trans-1,2-Dichloroethene	< 5	ug/l				
OV27	1,1,1-Trichloroethane	< 5	ug/l				
OV28	1,1,2-Trichloroethane	< 5	ug/l				
OV29	Trichloroethene	< 5	ug/l				
OV31	Vinyl chloride	< 10	ug/l				
OV70	Trichlorofluoromethane	< 20	ug/l				
OV80	1,2-Dichlorobenzene	< 10	ug/l				
OV81	1,3-Dichlorobenzene	< 10	ug/l				
OV82	1,4-Dichlorobenzene	< 10	ug/l				
OVS0	d8-Toluene(Surrogate)			50	ng	96	%
OVS1	Bromofluorobenzene(Surrogate)			50	ng	96	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	ng	90	%

← lab cont.

COMMENTS:

Reviewed and Approved by: Diane Mayer

PAGE NO: 2



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083282
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/18/88

SAMPLE IDENTIFICATION: OUTFALL D-SOLDIER CREEK SDIA

08/17 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l ✓				
M140	Chromium (Cr)	0.01	ug/l ✓				
M160	Copper (Cu)	0.02	ug/l ✓				
M200	Lead (Pb)	< 0.005	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.06	ug/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	4	ug/l ✓				
M212	Chromium, Hexavalent (Cr+6)	0.02	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l ✓				
M490	pH	7.8					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.22	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l ✓				
M700	Specific Conductance @ 25C	400	umhos/cm				
M770	Surfactants (MBAS)	0.06	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083282
 VENDOR NO: RC2034
 WORK ORDER NO: 15190
 DATE RECEIVED: 08/18/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

SAMPLE IDENTIFICATION: OUTFALL D-SOLDIER CREEK SDIA

08/17 PMS:0B02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	7.3	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene(Surrogate)			50	us/l	100	%
OVS1	Bromofluorobenzene(Surrogate)			50	us/l	106	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	us/l	106	%

← lab contaminant

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083558
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/19/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

SAMPLE IDENTIFICATION: SD18-OUTFALL D-SODIER CREEK

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	0.005	ug/l ✓				
M140	Chromium (Cr)	< 0.01	ug/l ✓				
M160	Copper (Cu)	< 0.02	ug/l ✓				
M200	Lead (Pb)	< 0.005	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.07	ug/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	19	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.02	ug/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	7.9					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.12	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l ✓				
M700	Specific Conductance @ 25C	400	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083558
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/19/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

SAMPLE IDENTIFICATION: SD1B-OUTFALL D-SODIER CREEK

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene#	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	11	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	6.6	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OV50	d8-Toluene(Surrogate)			50	us/l	98	%
OV51	Bromofluorobenzene(Surrogate)			50	us/l	102	%
OV52	d4-1,2-Dichloroethane(Surr.)			50	us/l	90	%

lab cont.
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COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083611
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/20/88

REPORT DATE: 09/09/88

ATTENTION: TERRI O'DRIANT

SAMPLE IDENTIFICATION: SD1C-OUTFALL D-SOLDIER CREEK

08/19 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
4090	Cadmium (Cd)	< 0.005	ug/l				
M140	Chromium (Cr)	0.01	ug/l				
M160	Copper (Cu)	< 0.02	ug/l				
M200	Lead (Pb)	< 0.005	ug/l				
M270	Nickel (Ni)	< 0.03	ug/l				
M390	Zinc (Zn)	0.12	ug/l				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	8	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.02	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	7.9					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.03	ug/l				
M680	Oil, Extraction-Gravimetric	7	ug/l				
M700	Specific Conductance @ 25C	380	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (YINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083611
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/20/88

REPORT DATE: 09/09/88

ATTENTION: TERKI O'BRIANT

SAMPLE IDENTIFICATION: SD1C-OUTFALL D-SOLDIER CREEK

08/19 PMS:0D02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	8.1	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	7.7	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	11	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene(Surrogate)			50	us/l	96	us/l
OVS1	Bromofluorobenzene(Surrogate)			50	us/l	94	us/l
OVS2	d4-1,2-Dichloroethane(Surr.)			50	us/l	90	us/l

← lab cont.

COMMENTS:

Reviewed and Approved by: Diane Meyer

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LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058
713 - 489-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 11/22/88

ATTENTION: TERRI O'BRIANT

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28110628
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 11/07/88

SAMPLE IDENTIFICATION: SD1D OUTFALL D SOLDIER CREEK

11/03 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS
0J18	Tetrachloroethene (EPA-601)	18	us/l
0M21	trans-1,2-Dichloroethene (601)	21	us/l

COMMENTS:

Reviewed and Approved by: Diane Meyer



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 11/22/88

MUS CLIENT NO: 960138
MUS SAMPLE NO: 28110629
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 11/07/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SD1E OUTFALL D SOLDIER CREEK

11/04 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS
DJ18	Tetrachloroethene (EPA-601)	15	ug/l
DM21	trans-1,2-Dichloroethene (601)	26	ug/l

COMMENTS:

Reviewed and Approved by: Diane Meyer



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 11/22/88

ATTENTION: TERRI O'BRIANT

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28110630
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 11/07/88

SAMPLE IDENTIFICATION: SB1E-D OUTFALL D SOLDIER CREEK DUP.

11/04 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS
DJ18	Tetrachloroethene(EPA-601)	14	us/l
DM21	trans-1,2-Dichloroethene(601)	26	us/l

COMMENTS:

Reviewed and Approved by: Diane Meyer



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713-488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77034

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122483
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIAN

SAMPLE IDENTIFICATION: SD3A MH98 S. INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
QVS0	mB-Toluene (Surrogate)			500	ug/l	100	%
QVS1	Bromofluorobenzene (Surrogate)			500	ug/l	100	%
QVS2	d4-1,2-Dichloroethane (Surr.)			500	ug/l	92	%
QV24	Tetrachloroethene	< 5	ug/l				
QV26	trans-1,2-Dichloroethene	< 5	ug/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713-488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122484
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SD3A MH98 NE INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
QVS0	d8-Toluene(Surrogate)			50	ug/l	102	%
QVS1	Bromofluorobenzene(Surrogate)			50	ug/l	100	%
QVS2	d4-1,2-Dichloroethane(Surr.)			50	ug/l	96	%
QV24	Tetrachloroethene	< 5	ug/l				
QV26	trans-1,2-Dichloroethene	< 5	ug/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer



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LAD ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28122485
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 12/30/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 01/24/89

SAMPLE IDENTIFICATION: SD2A HEAT TREAT LIFT STAT. SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
0VS0	d8-Toluene(Surrogate)			50	us/l	100	%
0VS1	Bromofluorobenzene(Surrogate)			50	us/l	100	%
0VS2	d4-1,2-Dichloroethane(Surr.)			50	us/l	96	%
0V24	Tetrachloroethene	14	us/l				
0V26	trans-1,2-Dichloroethene	< 5	us/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083283
VENDOR NO: KC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/18/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: OUTFALL E - SOLDIER CREEK *SEIA*

08/17 PMS:0D02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	mg/l ✓				
M140	Chromium (Cr)	0.02	mg/l ✓				
M160	Copper (Cu)	0.02	mg/l ✓				
M200	Lead (Pb)	< 0.005	mg/l ✓				
M270	Nickel (Ni)	< 0.03	mg/l ✓				
M390	Zinc (Zn)	0.18	mg/l ✓				
S890	Aqueous Dig.-furnace						
S898	Aqueous Digestion						
M120	COD (O2)	4	mg/l ✓				
M212	Chromium, Hexavalent (Cr+6)	0.03	mg/l ✓				
M270	Cyanide, Total (CN)	< 0.01	mg/l ✓				
M490	pH	7.4					
M500	Phenolics	< 0.1	mg/l				
M540	Phosphorus, Total (P)	0.55	mg/l				
M680	Oil, Extraction-Gravimetric	< 5	mg/l ✓				
M700	Specific Conductance @ 25C	530	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	mg/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083283
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/18/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: OUTFALL E - SOLDIER CREEK SE1A 08/17 PMS:DB02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	7.6	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene(Surrogate)			50	us/l	98	%
OVS1	Bromofluorobenzene(Surrogate)			50	us/l	104	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	us/l	100	%

← lab contaminant

COMMENTS:

Reviewed and Approved by: Diane Mayer

PAGE NO: 2



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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083559
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/19/88

ATTENTION: TERKI O'BRIANT

SAMPLE IDENTIFICATION: SE1B-OUTFALL E-SOLDIER CREEK

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	0.006	ug/l ✓				
M140	Chromium (Cr)	0.02	ug/l ✓				
M160	Copper (Cu)	0.04	ug/l ✓				
M200	Lead (Pb)	0.006	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.23	ug/l ✓				
S890	Aqueous Dig.-Furnace						
S898	Aqueous Digestion						
M120	COB (O2)	4	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.02	ug/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ug/l ✓				
M490	pH	8.1					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.67	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l ✓				
M700	Specific Conductance @ 25C	480	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



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REMIT TO:
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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083559
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/19/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SEIB-OUTFALL E-SOLDIER CREEK

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	7.9	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene (Surrogate)			50	us/l	96	%
OVS1	Bromofluorobenzene (Surrogate)			50	us/l	98	%
OVS2	d4-1,2-Dichloroethane (Surr.)			50	us/l	92	%

← lab cont.

COMMENTS:

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PAGE NO: 2



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713-488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77034

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083612
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 08/20/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SEIC-OUTFALL E-SOLDIER CREEK

08/19 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	0.007	us/l				
M140	Chromium (Cr)	< 0.01	us/l				
M160	Copper (Cu)	0.03	us/l				
M200	Lead (Pb)	< 0.005	us/l				
M270	Nickel (Ni)	< 0.03	us/l				
M390	Zinc (Zn)	0.15	us/l				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	4	us/l				
M212	Chromium, Hexavalent (Cr+6)	0.02	us/l				
M270	Cyanide, Total (CN)	< 0.01	us/l				
M490	pH	8.1					
M500	Phenolics	< 0.1	us/l				
M540	Phosphorus, Total (P)	0.40	us/l				
M680	Oil, Extraction-Gravimetric	8	us/l				
M700	Specific Conductance @ 25C	480	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	us/l				
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloromethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloromethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				



LABORATORY SERVICES DIVISION
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HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083612
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 08/20/88

REPORT DATE: 09/09/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SE1C-OUTFALL E-SOLDIER CREEK

08/19 PMS:DB02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	11	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene(Surrogate)			50	ng	96	%
OVS1	Bromofluorobenzene(Surrogate)			50	ng	94	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	ng	88	%

← lab cont.
←

COMMENTS:

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PAGE NO: 2



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 11/22/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28110631
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 11/07/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SE1D OUTFALL E SOLDIER CREEK

11/03 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS
0J18	Tetrachloroethene (EPA-601)	< 2	us/l

COMMENTS: CHLOROBENZENE =127% 1-1,2- * DICHLOROBENZENE =101 * BRONOFORM =108 * SPIKED IN ADDITION

Reviewed and Approved by: Diane Meyer



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 11/22/88

ATTENTION: TERRI O'BRIANT

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28110632
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 11/07/88

SAMPLE IDENTIFICATION: SE1E OUTFALL E SOLDIER CREEK

11/04 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS
0J18	Tetrachloroethene(EPA-601)	< 2	us/l

COMMENTS: CHLOROBENZENE =120%

Reviewed and Approved by: Diane Meyer



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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084026
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/25/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SF1A OUTFALL F-SODIER CREEK

08/24 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	us/l ✓				
M140	Chromium (Cr)	0.01	us/l ✓				
M160	Copper (Cu)	0.02	us/l ✓				
M200	Lead (Pb)	< 0.005	us/l ✓				
M270	Nickel (Ni)	< 0.03	us/l ✓				
M390	Zinc (Zn)	0.05	us/l ✓				
S890	Aqueous Dis.-Furnace						
S89B	Aqueous Digestion						
M120	COD (O2)	12	us/l				
M212	Chromium, Hexavalent (Cr+6)	0.01	us/l ✓				
M270	Cyanide, Total (CN)	< 0.01	us/l ✓				
M490	pH	7.6					
M500	Phenolics	< 0.1	us/l				
M540	Phosphorus, Total (P)	< 0.01	us/l				
M680	Oil, Extraction-Gravimetric	24	us/l ←				
M700	Specific Conductance @ 25C	380	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	us/l				
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloromethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloromethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				



LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084026
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/25/88

ATTENTION: TERRI O'BRIANT
 REPORT DATE: 09/09/88

SAMPLE IDENTIFICATION: SF1A OUTFALL F-SODIER CREEK 08/24 PMS:0B02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	ug/l				
OV18	cis-1,3-Dichloropropene*	< 5	ug/l				
OV19	Ethylbenzene	< 5	ug/l				
OV20	Methyl bromide	< 10	ug/l				
OV21	Methyl chloride	< 10	ug/l				
OV22	Methylene chloride	8.8	ug/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	ug/l				
OV24	Tetrachloroethene	< 5	ug/l				
OV25	Toluene	< 5	ug/l				
OV26	trans-1,2-Dichloroethene	< 5	ug/l				
OV27	1,1,1-Trichloroethane	< 5	ug/l				
OV28	1,1,2-Trichloroethane	< 5	ug/l				
OV29	Trichloroethene	< 5	ug/l				
OV31	Vinyl chloride	< 10	ug/l				
OV70	Trichlorofluoroethane	< 20	ug/l				
OV80	1,2-Dichlorobenzene	< 10	ug/l				
OV81	1,3-Dichlorobenzene	< 10	ug/l				
OV82	1,4-Dichlorobenzene	< 10	ug/l				
OV50	d8-Toluene (Surrogate)			50	ng	99	%
OV51	Bromofluorobenzene (Surrogate)			50	ng	96	%
OV52	d4-1,2-Dichloroethane (Surr.)			50	ng	91	%

← lab cont.

COMMENTS:

Reviewed and Approved by: Diane Meyer



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REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

NUS
SEP 14 1988
CORPORATION

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084245
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/26/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SF1B OUTFALL F-SOLDIER CREEK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	mg/l ✓				
M140	Chromium (Cr)	< 0.01	mg/l ✓				
M160	Copper (Cu)	0.03	mg/l ✓				
M200	Lead (Pb)	< 0.005	mg/l ✓				
M270	Nickel (Ni)	< 0.03	mg/l ✓				
M390	Zinc (Zn)	0.19	mg/l				
S890	Aqueous Dig.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	8	mg/l				
M212	Chromium, Hexavalent (Cr+6)	< 0.01	mg/l ✓				
M270	Cyanide, Total (CN)	< 0.01	mg/l ✓				
M490	pH	7.8					
M500	Phenolics	< 0.1	mg/l				
M540	Phosphorus, Total (P)	0.05	mg/l ✓				
M680	Oil, Extraction-Gravimetric	12	mg/l				
M700	Specific Conductance @ 25C	360	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	mg/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77034

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084245
VENDOR NO: KC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/26/88

REPORT DATE: 09/09/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SF1B OUTFALL F-SOLDIER CREEK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropane*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	6	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OV50	d8-Toluene (Surrogate)			50	us/l	98	%
OV51	Bromofluorobenzene (Surrogate)			50	us/l	100	%
OV52	d4-1,2-Dichloroethane (Surr.)			50	us/l	98	%

← lab cont.

COMMENTS:

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LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713-488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084357
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/27/88

REPORT DATE: 09/24/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SF1C-OUTFALL F SOLDIER CREEK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l				
M140	Chromium (Cr)	0.01	ug/l				
M160	Copper (Cu)	0.04	ug/l				
M200	Lead (Pb)	< 0.005	ug/l				
M270	Nickel (Ni)	< 0.03	ug/l				
M390	Zinc (Zn)	0.15	ug/l				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	4	ug/l				
M212	Chromium, Hexavalent (Cr+6)	< 0.01	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	7.5					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.12	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l				
M700	Specific Conductance @ 25C	380	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
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REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713-488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084357
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/24/88

SAMPLE IDENTIFICATION: SF1C-OUTFALL F SOLDIER CREEK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	ug/l				
OV18	cis-1,3-Dichloropropene*	< 5	ug/l				
OV19	Ethylbenzene	< 5	ug/l				
OV20	Methyl bromide	< 10	ug/l				
OV21	Methyl chloride	< 10	ug/l				
OV22	Methylene chloride	6	ug/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	ug/l				
OV24	Tetrachloroethene	< 5	ug/l				
OV25	Toluene	< 5	ug/l				
OV26	trans-1,2-Dichloroethene	< 5	ug/l				
OV27	1,1,1-Trichloroethane	< 5	ug/l				
OV28	1,1,2-Trichloroethane	< 5	ug/l				
OV29	Trichloroethene	< 5	ug/l				
OV31	Vinyl chloride	< 5	ug/l				
OV70	Trichlorofluoromethane	< 20	ug/l				
OV30	1,2-Dichlorobenzene	< 10	ug/l				
OV81	1,3-Dichlorobenzene	< 10	ug/l				
OV82	1,4-Dichlorobenzene	< 10	ug/l				
OVS0	d8-Toluene (Surrogate)			50	ug/l	98	%
OVS1	Bromofluorobenzene (Surrogate)			50	ug/l	102	%
OVS2	d4-1,2-Dichloroethane (Surr.)			50	ug/l	98	%

COMMENTS:

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LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
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REMIT TO:
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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084027
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/25/88

SAMPLE IDENTIFICATION: 361A OUTFALL 6-SOLDIER CREEK

08/24 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l ✓				
M140	Chromium (Cr)	0.02	ug/l ✓				
M160	Copper (Cu)	0.19	ug/l ←				
M200	Lead (Pb)	< 0.005	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.05	ug/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	36	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.02	ug/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	7.6					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	2.5	ug/l ✓				
M680	Oil, Extraction-Gravimetric	18	ug/l ←				
M700	Specific Conductance @ 25C	550	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



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713 - 488-1810

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084027
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/25/88

ATTENTION: TEKRI O'BRIANT

REPORT DATE: 09/09/88

SAMPLE IDENTIFICATION: SG1A OUTFALL 6-SOLDIER CREEK

08/24 PMS:DB02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	16	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OV50	d8-Toluene (Surrogate)			50	us/l	102	%
OV51	Bromofluorobenzene (Surrogate)			50	us/l	100	%
OV52	d4-1,2-Dichloroethane (Surr.)			50	us/l	95	%

← lab cont.

COMMENTS:

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LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
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REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084246
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/26/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: 5618 OUTFALL 6-SOLDIER CREEK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	µg/l ✓				
M140	Chromium (Cr)	0.01	µg/l ✓				
M160	Copper (Cu)	0.19	µg/l ←				
M200	Lead (Pb)	< 0.005	µg/l ✓				
M270	Nickel (Ni)	< 0.03	µg/l ✓				
M390	Zinc (Zn)	0.04	µg/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	31	µg/l				
M212	Chromium, Hexavalent (Cr+6)	0.02	µg/l ✓				
M270	Cyanide, Total (CN)	< 0.01	µg/l ✓				
M490	pH	8.1					
M500	Phenolics	< 0.1	µg/l				
M540	Phosphorus, Total (P)	1.7	µg/l ✓				
M680	Oil, Extraction-Gravimetric	65	µg/l ←				
M700	Specific Conductance @ 25C	880	µmhos/cm				
M770	Surfactants (MBAS)	< 0.05	µg/l				
OV03	Benzene	< 5	µg/l				
OV05	Bromoform	100	µg/l ←				
OV06	Carbon tetrachloride	< 5	µg/l				
OV07	Chlorobenzene	< 5	µg/l				
OV08	Dibromochloromethane	< 5	µg/l				
OV09	Chloroethane	< 10	µg/l				
OV10	2-Chloroethylvinyl ether	< 10	µg/l				
OV11	Chloroform	< 5	µg/l				
OV12	Bromodichloromethane	< 5	µg/l				
OV13	trans-1,3-Dichloropropene*	< 5	µg/l				
OV14	1,1-Dichloroethane	< 5	µg/l				
OV15	1,2-Dichloroethane	< 5	µg/l				
OV16	1,1-Dichloroethene	< 5	µg/l				



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713-488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084246
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/26/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SS1B OUTFALL G-SOLDIER CREEK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	5	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OV50	d8-Toluene(Surrogate)			50	us/l	96	%
OV51	Bromofluorobenzene(Surrogate)			50	us/l	98	%
OV52	d4-1,2-Dichloroethane(Surr.)			50	us/l	92	%

COMMENTS:

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LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713-488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/24/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084358
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/27/88

SAMPLE IDENTIFICATION: SG1C-OUTFALL S SOLDIER CREEK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l				
M140	Chromium (Cr)	0.03	ug/l				
M160	Copper (Cu)	0.20	ug/l				
M200	Lead (Pb)	< 0.005	ug/l				
M270	Nickel (Ni)	< 0.03	ug/l				
M390	Zinc (Zn)	0.07	ug/l				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	31	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.02	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	8.0					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	1.9	ug/l				
M680	Oil, Extraction-Gravimetric	5	ug/l				
M700	Specific Conductance @ 25C	940	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	11	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
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REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713-488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084358
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/24/88

SAMPLE IDENTIFICATION: SG1C-OUTFALL & SOLDIER CREEK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	6	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoroethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OV50	d8-Toluene (Surrogate)			50	us/l	100	%
OV51	Bromofluorobenzene (Surrogate)			50	us/l	100	%
OV52	d4-1,2-Dichloroethane (Surr.)			50	us/l	106	%

COMMENTS:

Reviewed and Approved by: Diane Meyer

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LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058
713 - 488-1810

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 11/22/88

ATTENTION: TERRI O'BRIANT

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28110633
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 11/07/88

SAMPLE IDENTIFICATION: S61D OUTFALL 6 SOLDIER CREEK

11/03 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS
DM22	Bromoform (EPA-601)	19	ug/l

COMMENTS:

Reviewed and Approved by: Diane Meyer



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 11/22/88

ATTENTION: TERRI O'BRIANT

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28110634
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 11/07/88

SAMPLE IDENTIFICATION: S61E OUTFALL 6 SOLDIER CREEK

11/04 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS
GM22	Bromoform (EPA-601)	27	ug/l

COMMENTS:

Reviewed and Approved by: Diane Meyer



LABORATORY SERVICES DIVISION
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REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122486
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: 858A MH40 NORTH INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M160	Copper (Cu)	< 0.02	ug/l				
M390	Zinc (Zn)	< 0.01	ug/l				
8898	Aqueous Digestion						
M540	Phosphorus, Total (P)	0.02	ug/l				
0904	SURROGATES/P.P. VOA IN WATER						
QV50	d8-Toluene(Surrogate)			50	ug/l	100	%
QV51	Bromofluorobenzene(Surrogate)			50	ug/l	100	%
QV52	d4-1,2-Dichloroethane(Surr.)			50	ug/l	96	%
QV05	Bromoform	< 5	ug/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
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REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122487
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SG8A MH40 W. INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
OVS0	d8-Toluene(Surrogate)			50	us/l	96	%
OVS1	Bromofluorobenzene(Surrogate)			50	us/l	100	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	us/l	102	%
OVS5	Bromoform	< 5	us/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122488
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: 63306 COOLING TWR RETURN SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M160	Copper (Cu)	0.16	ug/l				
M390	Zinc (Zn)	(0.01	ug/l				
S898	Aqueous Digestion						
M540	Phosphorus, Total (P)	1.2	ug/l				
Q904	SURROGATES/P.P. VOA IN WATER						
QVS0	mB-Toluene(Surrogate)			50	ug/l	100	%
QVS1	Bromofluorobenzene(Surrogate)			50	ug/l	100	%
QVS2	d4-1,2-Dichloroethane(Surr.)			50	ug/l	92	%
QV05	Bromoform	17	ug/l				

COMMENTS:

Reviewed and Approved by: Diane Mayer



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122489
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIAN

SAMPLE IDENTIFICATION: 569A MH39 N. INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
	0VS0			50	us/l	100	%
	0VS1			50	us/l	98	%
	0VS2			50	us/l	94	%
0V05	Bromoform	< 5	us/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (YINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 01/24/89

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28122490
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 12/30/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SS3A-W MH41A W. INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
QVS0	d8-Toluene(Surrogate)			50	ug/l	100	%
QVS1	Bromofluorobenzene(Surrogate)			50	ug/l	98	%
QVS2	d4-1,2-Dichloroethane(Surr.)			50	ug/l	94	%
0905	Bromoform	23	ug/l				

COMMENTS:

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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28122491
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIAN

SAMPLE IDENTIFICATION: 963A-N MH41A N. INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
	DVS0 d8-Toluene(Surrogate)			50	ug/l	100	%
	DVS1 Bromofluorobenzene(Surrogate)			50	ug/l	98	%
	DVS2 d4-1,2-Dichloroethane(Surr.)			50	ug/l	94	%
0905	Bromoform	58	ug/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (YINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122492
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIAN

SAMPLE IDENTIFICATION: SSSA-N MH64 N. INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
	DVS0			50	us/l	100	%
	DVS1			50	us/l	98	%
	DVS2			50	us/l	98	%
0V05	Bromoform	< 5	us/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122493
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SG5A-W MH64 W. INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
	DVS0 d8-Toluene(Surrogate)			50	us/l	100	%
	DVS1 Bromofluorobenzene(Surrogate)			50	us/l	98	%
	DVS2 d4-1,2-Dichloroethane(Surr.)			50	us/l	96	%
0V05	Bromoform	< 5	us/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28122494
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIAN

SAMPLE IDENTIFICATION: 567A-N MH63 N. INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
QVS0	d3-Toluene(Surrosate)			500	us/l	100	%
QVS1	Bromofluorobenzene(Surrosate)			500	us/l	98	%
QVS2	d4-1,2-Dichloroethane(Surr.)			500	us/l	96	%
QV05	Bromoform	< 5	us/l				

COMMENTS:

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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28122495
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SS7A-NW MH63 NW INFLUENT SOLDIER CREEK 12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
QVS0	mB-Toluene(Surrogate)			50	ug/l	98	%
QVS1	Bromofluorobenzene(Surrogate)			50	ug/l	98	%
QVS2	d4-1,2-Dichloroethane(Surr.)			50	ug/l	94	%
QV05	Bromoform	< 5	ug/l				

COMMENTS:

Reviewed and Approved by: Diane Mayer

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084029
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/25/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

SAMPLE IDENTIFICATION: SH1A OUTFALL H-SOLDIER CREEK

08/24 PMS:DD02

EST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
4090	Cadmium (Cd)	< 0.005	ug/l ✓				
140	Chromium (Cr)	0.01	ug/l ✓				
n160	Copper (Cu)	0.03	ug/l ✓				
M200	Lead (Pb)	< 0.005	ug/l ✓				
270	Nickel (Ni)	< 0.03	ug/l ✓				
390	Zinc (Zn)	0.03	ug/l ✓				
S890	Aqueous Dis.-Furnace						
7000	Aqueous Digestion						
	COD (O2)	59	ug/l				
W	Chromium, Hexavalent (Cr+6)	0.01	ug/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ug/l ✓				
490	pH	7.7					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.15	ug/l ✓				
580	Oil, Extraction-Gravimetric	5	ug/l ✓				
700	Specific Conductance @ 25C	900	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
V03	Benzene	< 5	ug/l				
705	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084
ATTENTION: TEKRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084248
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/26/88

SAMPLE IDENTIFICATION: SH1B OUTFALL H-SOLDIER CREEK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l ✓				
M140	Chromium (Cr)	0.02	ug/l ✓				
M160	Copper (Cu)	< 0.02	ug/l ✓				
M200	Lead (Pb)	0.007	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.10	ug/l ✓				
S890	Aqueous Dig.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	35	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.01	ug/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ug/l ✓				
M490	pH	7.8					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.16	ug/l ✓				
M680	Oil, Extraction-Gravimetric	< 5	ug/l ✓				
M700	Specific Conductance @ 25C	500	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084248
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/26/88

REPORT DATE: 09/09/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SH1B OUTFALL H-SOLDIER CREEK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	6	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 5	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene (Surrogate)			50	us/l	98	%
OVS1	Bromofluorobenzene (Surrogate)			50	us/l	102	%
OVS2	d4-1,2-Dichloroethane (Surr.)			50	us/l	98	%

COMMENTS:

Reviewed and Approved by: Diane Meyer

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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/24/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28004361
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SH1C-OUTFALL H SOLDIER CREEK

08/26 PMS:DB02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	µg/l ✓				
M140	Chromium (Cr)	< 0.01	µg/l ✓				
M160	Copper (Cu)	< 0.02	µg/l ✓				
M200	Lead (Pb)	< 0.005	µg/l ✓				
M270	Nickel (Ni)	< 0.03	µg/l ✓				
M390	Zinc (Zn)	0.18	µg/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	8	mg/l				
M212	Chromium, Hexavalent (Cr+6)	0.01	µg/l ✓				
M270	Cyanide, Total (CN)	< 0.01	µg/l ✓				
M490	pH	7.4					
M500	Phenolics	< 0.1	µg/l				
M540	Phosphorus, Total (P)	0.09	µg/l ✓				
M680	Oil, Extraction-Gravimetric	10	µg/l ✓				
M700	Specific Conductance @ 25C	460	µmhos/cm				
M770	Surfactants (MBAS)	0.075	µg/l				
OV03	Benzene	< 5	µg/l				
OV05	Bromoform	< 5	µg/l				
OV06	Carbon tetrachloride	< 5	µg/l				
OV07	Chlorobenzene	< 5	µg/l				
OV08	Dibromochloromethane	< 5	µg/l				
OV09	Chloroethane	< 10	µg/l				
OV10	2-Chloroethylvinyl ether	< 10	µg/l				
OV11	Chloroform	< 5	µg/l				
OV12	Bromodichloromethane	< 5	µg/l				
OV13	trans-1,3-Dichloropropene*	< 5	µg/l				
OV14	1,1-Dichloroethane	< 5	µg/l				
OV15	1,2-Dichloroethane	< 5	µg/l				
OV16	1,1-Dichloroethene	< 5	µg/l				



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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084361
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/24/88

SAMPLE IDENTIFICATION: SH1C-OUTFALL H SOLDIER CREEK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	< 5	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
QVS0	d8-Toluene (Surrogate)			50	us/l	100	%
QVS1	Bromofluorobenzene (Surrogate)			50	us/l	98	%
QVS2	d4-1,2-Dichloroethane (Surr.)			50	us/l	100	%

COMMENTS:

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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TEKKI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084028
 VENDOR NO: RC2034
 WORK ORDER NO: 15190
 DATE RECEIVED: 08/25/88

SAMPLE IDENTIFICATION: S11A OUTFALL I-SOLDIER CREEK

08/24 PMS:0002

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	0.007	ug/l ✓				
M140	Chromium (Cr)	0.02	ug/l ✓				
M160	Copper (Cu)	0.04	ug/l ✓				
M200	Lead (Pb)	0.005	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.09	ug/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	40	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.01	ug/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	8.2					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.17	ug/l ✓				
M680	Oil, Extraction-Gravimetric	3	ug/l ✓				
M700	Specific Conductance @ 25C	470	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				

LAB ANALYSIS REPORT

 CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

 NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084028
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/25/88

SAMPLE IDENTIFICATION: SI1A OUTFALL I-SOLDIER CREEK

08/24 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	7.9	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene(Surrogate)			50	ng	97	%
OVS1	Bromofluorobenzene(Surrogate)			50	ng	95	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	ng	92	%

← lab cont.

COMMENTS:



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
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REMIT TO:
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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084247
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/26/88

ATTENTION: TERKI O'BRIANT

SAMPLE IDENTIFICATION: SI1B OUTFALL I-SOLDIER CREEK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l ✓				
M140	Chromium (Cr)	0.02	ug/l ✓				
M160	Copper (Cu)	0.02	ug/l ✓				
M200	Lead (Pb)	< 0.005	ug/l ✓				
M270	Nickel (Ni)	< 0.03	ug/l ✓				
M390	Zinc (Zn)	0.13	ug/l ✓				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	31	ug/l				
M212	Chromium, Hexavalent (Cr+6)	0.04	ug/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ug/l ✓				
M490	pH	7.8					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.11	ug/l ✓				
M680	Oil, Extraction-Gravimetric	< 5	ug/l ✓				
M700	Specific Conductance @ 25C	550	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



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REMIT TO:
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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084247
 VENDOR NO: RC2034
 WORK ORDER NO: 15190
 DATE RECEIVED: 08/26/88

REPORT DATE: 09/09/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SI18 OUTFALL I-SOLDIER CREEK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	6	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OV50	d8-Toluene(Surrogate)			50	us/l	98	%
OV51	Bromofluorobenzene(Surrogate)			50	us/l	100	%
OV52	d4-1,2-Dichloroethane(Surr.)			50	us/l	98	%

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2

LAB ANALYSIS REPORT

 CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

REPORT DATE: 09/24/88

 NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084359
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SI1C-OUTFALL I SOLDIER CREEK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ns/l				
M140	Chromium (Cr)	0.01	ns/l				
M160	Copper (Cu)	< 0.02	ns/l				
M200	Lead (Pb)	< 0.005	ns/l				
M270	Nickel (Ni)	< 0.03	ns/l				
M390	Zinc (Zn)	0.08	ns/l				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	8	ns/l				
M212	Chromium, Hexavalent (Cr+6)	0.06	ns/l				
M270	Cyanide, Total (CN)	< 0.01	ns/l				
M490	pH	7.6					
M500	Phenolics	< 0.1	ns/l				
M540	Phosphorus, Total (P)	0.10	ns/l				
M680	Oil, Extraction-Gravimetric	32	ns/l				
M700	Specific Conductance @ 25C	530	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ns/l				
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloromethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloromethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				



LABORATORY SERVICES DIVISION
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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084359
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/27/88

ATTENTION: TERKI O'BRIANT

REPORT DATE: 09/24/88

SAMPLE IDENTIFICATION: SI1C-OUTFALL I SOLDIER CREEK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	< 5	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 10	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene (Surrogate)			50	us/l	100	%
OVS1	Bromofluorobenzene (Surrogate)			50	us/l	100	%
OVS2	d4-1,2-Dichloroethane (Surr.)			50	us/l	98	%

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084360
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/24/88

SAMPLE IDENTIFICATION: SIIC-D-OUTFALL I DUPLICATE SOLDIER CREEK 08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ns/l ✓				
M140	Chromium (Cr)	0.02	ns/l ✓				
M160	Copper (Cu)	0.02	ns/l ✓				
M200	Lead (Pb)	< 0.005	ns/l ✓				
M270	Nickel (Ni)	< 0.03	ns/l ✓				
M390	Zinc (Zn)	0.04	ns/l ✓				
SB90	Aqueous Dis.-Furnace						
SB98	Aqueous Digestion						
M120	COD (O2)	16	ns/l				
M212	Chromium, Hexavalent (Cr+6)	0.01	ns/l ✓				
M270	Cyanide, Total (CN)	< 0.01	ns/l				
M490	pH	7.6					
M500	Phenolics	< 0.1	ns/l				
M540	Phosphorus, Total (P)	0.12	ns/l ✓				
M680	Oil, Extraction-Gravimetric	5	ns/l ✓				
M700	Specific Conductance @ 25C	530	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ns/l				
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloromethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloromethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/24/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084360
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SI1C-D-OUTFALL I DUPLICATE SOLDIER CREEK 08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	< 5	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoroethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene (Surrogate)			50	us/l	98	%
OVS1	Bromofluorobenzene (Surrogate)			50	us/l	101	%
OVS2	d4-1,2-Dichloroethane (Surr.)			50	us/l	102	%

COMMENTS:

Reviewed and Approved by: Diane Maser

PAGE NO: 2



LABORATORY SERVICES DIVISION
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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28122481
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 12/30/88

REPORT DATE: 01/24/89

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SH20-BKDG 3001 TAP H2O SOLDIER CREEK 12/29 PMS:D

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l				
M140	Chromium (Cr)	< 0.03	ug/l				
M160	Copper (Cu)	< 0.02	ug/l				
M200	Lead (Pb)	< 0.05	ug/l				
M270	Nickel (Ni)	< 0.03	ug/l				
M390	Zinc (Zn)	0.02	ug/l				
S898	Aqueous Digestion						
M120	COD (O2)	< 4	ug/l				
M212	Chromium, Hexavalent (Cr+6)	< 0.01	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	7.63					
M500	Phenolics	< 0.01	ug/l				
M540	Phosphorus, Total (P)	0.02	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l				
M700	Specific Conductance @ 25C	390	umhos/cm				
M770	Surfactants (MBAS)	< 0.4	ug/l				
0904	SURROGATES/P.P. VOA IN WATER						
QVS0	d8-Toluene(Surrogate)			50	ug/l	98	%
QVS1	Bromofluorobenzene(Surrogate)			50	ug/l	96	%
QVS2	d4-1,2-Dichloroethane(Surr.)			50	ug/l	94	%
QE21	Trichlorofluoromethane	< 50	ug/l				
QV03	Benzene	< 5	ug/l				
QV05	Bromoform	< 5	ug/l				
QV06	Carbon tetrachloride	< 5	ug/l				
QV07	Chlorobenzene	< 5	ug/l				
QV08	Dibromochloromethane	< 5	ug/l				
QV09	Chloroethane	< 10	ug/l				
QV10	2-Chloroethylvinyl ether	< 10	ug/l				
QV11	Chloroform	< 5	ug/l				
QV12	Bromodichloromethane	< 5	ug/l				



LABORATORY SERVICES DIVISION
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REMIT TO:
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713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 01/24/89

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28122481
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 12/30/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: SH20-BKDG 3001 TAP H2O SOLDIER CREEK 12/29 PMS:D

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	< 5	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2

LAB ANALYSIS REPORT

 CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

 NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083562
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/19/88

SAMPLE IDENTIFICATION: ER818-EQUIPMENT RINSATE

08/18 PMS:DB02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l				
M140	Chromium (Cr)	< 0.01	ug/l				
M160	Copper (Cu)	0.09	ug/l				
M200	Lead (Pb)	< 0.005	ug/l				
M270	Nickel (Ni)	< 0.03	ug/l				
M390	Zinc (Zn)	0.01	ug/l				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	12	ug/l				
M212	Chromium, Hexavalent (Cr+6)	< 0.01	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	6.0					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.02	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l				
M700	Specific Conductance @ 25C	2.60	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
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REMIT TO:
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LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083562
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/19/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: ER818-EQUIPMENT RINSATE

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	7.4	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoroethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene (Surrogate)			50	us/l	96	us/l
OVS1	Bromofluorobenzene (Surrogate)			50	us/l	96	us/l
OVS2	d4-1,2-Dichloroethane (Surr.)			50	us/l	90	us/l

← lab cont.

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB: ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084249
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/26/88

REPORT DATE: 09/09/88

ATTENTION: YERRI O'BRIANT

SAMPLE IDENTIFICATION: ER825-EQUIPMENT RINSATE

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	6	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene(Surrogate)			50	us/l	96	%
OVS1	Bromofluorobenzene(Surrogate)			50	us/l	100	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	us/l	100	%

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084
ATTENTION: TEKRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084249
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/26/88

SAMPLE IDENTIFICATION: ER825-EQUIPMENT RINSATE

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l				
M140	Chromium (Cr)	< 0.01	ug/l				
M160	Copper (Cu)	< 0.02	ug/l				
M200	Lead (Pb)	< 0.005	ug/l				
M270	Nickel (Ni)	< 0.03	ug/l				
M390	Zinc (Zn)	< 0.01	ug/l				
SB90	Aqueous Dis.-Furnace						
SB98	Aqueous Digestion						
M120	COD (O2)	4	ug/l				
M212	Chromium, Hexavalent (Cr+6)	< 0.01	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	7.4					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.04	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l				
M700	Specific Conductance @ 25C	1.40	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	< 5	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084
ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083561
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/19/88

SAMPLE IDENTIFICATION: FBS-FIELD BLANK SOLDIER CREEK

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
M090	Cadmium (Cd)	< 0.005	ug/l				
M140	Chromium (Cr)	< 0.01	ug/l				
M160	Copper (Cu)	0.02	ug/l				
M200	Lead (Pb)	< 0.005	ug/l				
M270	Nickel (Ni)	< 0.03	ug/l				
M390	Zinc (Zn)	< 0.01	ug/l				
S890	Aqueous Dis.-Furnace						
S898	Aqueous Digestion						
M120	COD (O2)	8	ug/l				
M212	Chromium, Hexavalent (Cr+6)	< 0.01	ug/l				
M270	Cyanide, Total (CN)	< 0.01	ug/l				
M490	pH	6.8					
M500	Phenolics	< 0.1	ug/l				
M540	Phosphorus, Total (P)	0.02	ug/l				
M680	Oil, Extraction-Gravimetric	< 5	ug/l				
M700	Specific Conductance @ 25C	2.10	umhos/cm				
M770	Surfactants (MBAS)	< 0.05	ug/l				
OV03	Benzene	< 5	ug/l				
OV05	Bromoform	< 5	ug/l				
OV06	Carbon tetrachloride	< 5	ug/l				
OV07	Chlorobenzene	< 5	ug/l				
OV08	Dibromochloromethane	< 5	ug/l				
OV09	Chloroethane	< 10	ug/l				
OV10	2-Chloroethylvinyl ether	< 10	ug/l				
OV11	Chloroform	6.2	ug/l				
OV12	Bromodichloromethane	< 5	ug/l				
OV13	trans-1,3-Dichloropropene*	< 5	ug/l				
OV14	1,1-Dichloroethane	< 5	ug/l				
OV15	1,2-Dichloroethane	< 5	ug/l				
OV16	1,1-Dichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
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 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083561
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/19/88

REPORT DATE: 09/09/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: FBS-FIELD BLANK SOLDIER CREEK

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	< 5	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				
OV50	m8-Toluene (Surrogate)			50	us/l	106	%
OV51	Bromofluorobenzene (Surrogate)			50	us/l	94	%
OV52	d4-1,2-Dichloroethane (Surr.)			50	us/l	88	%

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
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HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083285
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/18/88

REPORT DATE: 09/09/88

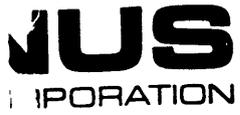
ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: TRIP BLANK

08/17 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloromethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloromethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	11	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				

← lab cont.



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

REMIT TO:
900 GEMINI AVENUE
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AVENUE
77058

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084
ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 96013B
NUS SAMPLE NO: 28083285
VENDOR NO: KC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/18/88

0138
183563
2034
190
/19/88

SAMPLE IDENTIFICATION: TRIP BLANK

08/17 PMS:DD02

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DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
1,4-Dichlorobenzene	< 10	us/l	50	ng/l	96	%
d8-Toluene(Surrogate)			50	ng/l	102	%
Bromofluorobenzene(Surrogate)			50	ng/l	102	%
d4-1,2-Dichloroethane(Surr.)						

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NO: 1

Reviewed and Approved by: Diane Meyer

PAGE NO: 2



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28083563
 VENDOR NO: RC2034
 WORK ORDER NO: 15190
 DATE RECEIVED: 08/19/88

SAMPLE IDENTIFICATION: T8818-TRIP BLANK

08/18 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d8-Toluene(Surrogate)			50	us/l	96	us/l
OVS1	Bromofluorobenzene(Surrogate)			50	us/l	94	us/l
OVS2	d4-1,2-Dichloroethane(Surr.)			50	us/l	92	us/l

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084
ATTENTION: TERRI O'BRIANT

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083614
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/20/88

SAMPLE IDENTIFICATION: T9819-1 TRIP BLANK

08/19 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloromethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloromethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	15	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				

← lab conf.



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28083614
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/20/88

ATTENTION: YEKRI O'BRIANT

SAMPLE IDENTIFICATION: TB819-1 TRIP BLANK

08/19 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV82	1,4-Dichlorobenzene	< 10	ug/l				
OVS0	d8-Toluene(Surrogate)			50	ng	96	%
OVS1	Bromofluorobenzene(Surrogate)			50	ng	94	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	ng	90	%

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084030
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/25/88

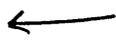
REPORT DATE: 09/09/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: T8824-1 TRIP BLANK

08/24 PHS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloromethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloromethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	11	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				





LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084
 ATTENTION: TERRI O'BRIAN

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084030
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/25/88

SAMPLE IDENTIFICATION: T8824-1 TRIP BLANK

08/24 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV82	1,4-Dichlorobenzene	< 10	ug/l				
OV50	mB-Toluene(Surrogate)			50	ng/ml	94	%
OV51	Bromofluorobenzene(Surrogate)			50	ng/ml	94	%
OV52	d4-1,2-Dichloroethane(Surr.)			50	ng/ml	88	%

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFD)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084250
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/26/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: T8825 TRIP BLANK

08/25 PMS:DB02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloromethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloroethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				
OV17	1,2-Dichloropropene	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	7	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/09/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084250
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/26/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: T8825 TRIP BLANK

08/25 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV82	1,4-Dichlorobenzene	< 10	us/l				
OVS0	d3-Toluene(Surrogate)			50	us/l	98	%
OVS1	Bromofluorobenzene(Surrogate)			50	us/l	100	%
OVS2	d4-1,2-Dichloroethane(Surr.)			50	us/l	90	%

COMMENTS:

Reviewed and Approved by: Diane Mayer

PAGE NO: 2



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HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 09/24/88

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28084362
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: TB826-1-TRIP BLANK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV03	Benzene	< 5	us/l				
OV05	Bromoform	< 5	us/l				
OV06	Carbon tetrachloride	< 5	us/l				
OV07	Chlorobenzene	< 5	us/l				
OV08	Dibromochloroethane	< 5	us/l				
OV09	Chloroethane	< 10	us/l				
OV10	2-Chloroethylvinyl ether	< 10	us/l				
OV11	Chloroform	< 5	us/l				
OV12	Bromodichloroethane	< 5	us/l				
OV13	trans-1,3-Dichloropropene*	< 5	us/l				
OV14	1,1-Dichloroethane	< 5	us/l				
OV15	1,2-Dichloroethane	< 5	us/l				
OV16	1,1-Dichloroethene	< 5	us/l				
OV17	1,2-Dichloropropane	< 5	us/l				
OV18	cis-1,3-Dichloropropene*	< 5	us/l				
OV19	Ethylbenzene	< 5	us/l				
OV20	Methyl bromide	< 10	us/l				
OV21	Methyl chloride	< 10	us/l				
OV22	Methylene chloride	7.2	us/l				
OV23	1,1,2,2-Tetrachloroethane	< 5	us/l				
OV24	Tetrachloroethene	< 5	us/l				
OV25	Toluene	< 5	us/l				
OV26	trans-1,2-Dichloroethene	< 5	us/l				
OV27	1,1,1-Trichloroethane	< 5	us/l				
OV28	1,1,2-Trichloroethane	< 5	us/l				
OV29	Trichloroethene	< 5	us/l				
OV31	Vinyl chloride	< 10	us/l				
OV70	Trichlorofluoromethane	< 20	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
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REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

REPORT DATE: 09/24/88

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28084362
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 08/27/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: TB826-1-TRIP BLANK

08/26 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV82	1,4-Dichlorobenzene	< 10	ug/l				
OV80	d8-Toluene(Surrogate)			50	ug/l	96	%
OV81	Bromofluorobenzene(Surrogate)			50	ug/l	100	%
OV82	d4-1,2-Dichloroethane(Surr.)			50	ug/l	117	%

COMMENTS:

Reviewed and Approved by: Diane Mayer

PAGE NO: 2



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HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28110635
VENDOR NO: RC2034
WORK ORDER NO: 1S190
DATE RECEIVED: 11/07/88

REPORT DATE: 11/22/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: TB11-4 TRIP BLANK

11/04 PMS:DD02

TEST	DETERMINATION	RESULTS	UNITS
QJ18	Tetrachloroethene(EPA-601)	< 2	ug/l
QM21	trans-1,2-Dichloroethene(601)	< 2	ug/l
QM22	Bromoform (EPA-601)	< 2	ug/l

COMMENTS: CHLOROBENZENE SAMPLE INTERFERENCE PREVENTE ACCURATE DETERMINATION OF SURROGATE RECOVERY

Reviewed and Approved by: Diane Meyer



LABORATORY SERVICES DIVISION
 900 GEMINI AVENUE
 HOUSTON, TX 77058

REMIT TO:
 900 GEMINI AVENUE
 HOUSTON, TX 77058

713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
 ADDRESS: 16360 PARK 10 PLACE #300
 HOUSTON TX 77084

NUS CLIENT NO: 960138
 NUS SAMPLE NO: 28122482
 VENDOR NO: RC2034
 WORK ORDER NO: 1S190
 DATE RECEIVED: 12/30/88

ATTENTION: TERRI O'BRIANT

REPORT DATE: 01/24/89

SAMPLE IDENTIFICATION: TB12-29 TRIP BLANK SOLDIER CREEK

12/29 PMS:DB

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
0904	SURROGATES/P.P. VOA IN WATER						
QVS0	d8-Toluene(Surrogate)	50	ug/l	50	ug/l	96	%
QVS1	Bromofluorobenzene(Surrogate)	50	ug/l	50	ug/l	98	%
QVS2	d4-1,2-Dichloroethane(Surr.)	50	ug/l	50	ug/l	98	%
QV21	Trichlorofluoromethane	< 50	ug/l				
QV03	Benzene	< 5	ug/l				
QV05	Bromoform	< 5	ug/l				
QV06	Carbon tetrachloride	< 5	ug/l				
QV07	Chlorobenzene	< 5	ug/l				
QV08	Dibromochloromethane	< 5	ug/l				
QV09	Chloroethane	< 10	ug/l				
QV10	2-Chloroethylvinyl ether	< 10	ug/l				
QV11	Chloroform	< 5	ug/l				
QV12	Bromodichloromethane	< 5	ug/l				
QV13	trans-1,3-Dichloropropene*	< 5	ug/l				
QV14	1,1-Dichloroethane	< 5	ug/l				
QV15	1,2-Dichloroethane	< 5	ug/l				
QV17	1,2-Dichloropropane	< 5	ug/l				
QV18	cis-1,3-Dichloropropene*	< 5	ug/l				
QV19	Ethylbenzene	< 5	ug/l				
QV20	Methyl bromide	< 10	ug/l				
QV21	Methyl chloride	< 10	ug/l				
QV22	Methylene chloride	10	ug/l				
QV23	1,1,2,2-Tetrachloroethane	< 5	ug/l				
QV24	Tetrachloroethene	< 5	ug/l				
QV25	Toluene	< 5	ug/l				
QV26	trans-1,2-Dichloroethene	< 5	ug/l				
QV27	1,1,1-Trichloroethane	< 5	ug/l				
QV28	1,1,2-Trichloroethane	< 5	ug/l				
QV29	Trichloroethene	< 5	ug/l				



LABORATORY SERVICES DIVISION
900 GEMINI AVENUE
HOUSTON, TX 77058

REMIT TO:
900 GEMINI AVENUE
HOUSTON, TX 77058
713 - 488-1810

LAB ANALYSIS REPORT

CLIENT NAME: NUS CORP. (TINKER AFB)
ADDRESS: 16360 PARK 10 PLACE #300
HOUSTON TX 77084

REPORT DATE: 01/24/89

NUS CLIENT NO: 960138
NUS SAMPLE NO: 28122482
VENDOR NO: RC2034
WORK ORDER NO: 15190
DATE RECEIVED: 12/30/88

ATTENTION: TERRI O'BRIANT

SAMPLE IDENTIFICATION: TB12-29 TRIP BLANK SOLDIER CREEK

12/29 PMS:DD

TEST	DETERMINATION	RESULTS	UNITS	SURROGATE CONC	UNITS	SURROGATE RECOVERY	UNITS
OV31	Vinyl chloride	< 10	us/l				
OV80	1,2-Dichlorobenzene	< 10	us/l				
OV81	1,3-Dichlorobenzene	< 10	us/l				
OV82	1,4-Dichlorobenzene	< 10	us/l				

COMMENTS:

Reviewed and Approved by: Diane Meyer

PAGE NO: 2

APPENDIX C
NPDES PERMIT

PART I
 REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 001

*EAST SOLDIER
 /WTP DISCHARGE*

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 001 - treated industrial process waste.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations (*4)</u>			
	<u>Mass (lbs/day)</u>		<u>Other Units (Specify)</u>	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Chemical Oxygen Demand	563	1126	75 mg/l	150 mg/l
Total Suspended Solids	113	226	15 mg/l	30 mg/l
Cadmium, Total	(*1)	0.15	(*1) mg/l	0.02 mg/l
Chromium, Total	(*1)	0.75	(*1) mg/l	0.1 mg/l
Chromium, Hexavalent	(*1)	0.75	(*1) mg/l	0.1 mg/l
Cyanide, Total	(*1)	0.20	(*1) mg/l	0.025 mg/l
Copper, Total	(*1)	0.38	(*1) mg/l	0.05 mg/l
Lead, Total	(*1)	0.76	(*1) mg/l	0.1 mg/l
Nickel, Total	(*1)	3.75	(*1) mg/l	0.5 mg/l
Zinc, Total	(*1)	4.50	(*1) mg/l	0.6 mg/l
Phenols	(*1)	1.50	(*1) mg/l	0.2 mg/l
Oil and Grease	(*1)	113	(*1) mg/l	15 mg/l
Biomonitoring	N/A	N/A	N/A	N/A

<u>Effluent Characteristic</u>	<u>Monitoring Requirements (*4)</u>	
	<u>Measurement Frequency</u>	<u>Sample Type</u>
	Flow (MGD)	Continuous
Chemical Oxygen Demand	3/week	24-Hr. Composite (*2)
Total Suspended Solids	3/week	24-Hr. Composite (*2)
Cadmium, Total	3/week	24-Hr. Composite (*2)
Chromium, Total	3/week	24-Hr. Composite (*2)
Chromium, Hexavalent	3/week	24-Hr. Composite (*2)
Cyanide, Total	3/week	24-Hr. Composite (*2)
Copper, Total	3/week	24-Hr. Composite (*2)
Lead, Total	3/week	24-Hr. Composite (*2)
Nickel, Total	3/week	24-Hr. Composite (*2)
Zinc, Total	3/week	24-Hr. Composite (*2)
Phenols	3/week	24-Hr. Composite (*2)
Oil and Grease	3/week	Grab
Biomonitoring	1/month	(*3)

OUTFALL 001

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 3/week by 24-hr. composite (*2).

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): The treated industrial process waste will normally be reused on the base. It will occasionally be discharged to the unnamed tributary of Soldier Creek when the recycling upstream is not functioning. When discharging, the sample is to be taken at the Parshall flume just prior to discharge. Latitude: 35° 25' 35"; Longitude: 97° 22' 15".

FOOTNOTES

- (*1) Report.
- (*2) See Part II, Paragraph B.
- (*3) See Part II, Paragraph C.
- (*4) This permit may be reopened and limitations and monitoring for Outfall 001 modified to address Volatile Organic Compounds (VOC's) based on monitoring required under the Federal Facilities Compliance Agreement.

PART I
REQUIREMENTS FOR NPDES PERMITS

*Downstream of
Outfall F*

NOT A-K

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 002 *EAST SOLDIER
(JUST S. OF IWTTP)*

SOLID SEPARATOR

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge through the 002 - stormwater and previously monitored cooling tower blowdown.

Such discharges shall be limited and monitored by the permittee as specified below:
→ already out of 'G'

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>			
	<u>Mass (lbs/day)</u>		<u>Other Units (Specify)</u>	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Total Organic Carbon	N/A	N/A	(*1) mg/l	70 mg/l
Total Suspended Solids	N/A	N/A	(*1) mg/l	50 mg/l
Oil and Grease	N/A	N/A	(*1) mg/l	15 mg/l
Temperature	N/A	N/A	85°F	90°F

<u>Effluent Characteristic</u>	<u>Monitoring Requirements</u>	
	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (MGD)	1/week	Estimate
Total Organic Carbon	1/week	Grab
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab
Temperature	1/week	Grab

OUTFALL 002

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the V-notch weir which overflows from the sedimentation basin located on the east side of East Soldier Creek. Latitude: 35° 25' 32"; Longitude: 97° 22' 18".

FOOTNOTES

(*1) Report.

PART I
 REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 003 *COOLING TOWER
 DISCHARGE TO E. SOLDIER*

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 003 - cooling tower blowdown from building 3306.

*OUTFALL
 'G'*

Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>			
	Mass (lbs/day)		Other Units (Specify)	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Phosphates, Total (as P)	N/A	N/A	5.0 mg/l	5.0 mg/l

<u>Effluent Characteristic</u>	<u>Monitoring Requirements</u>	
	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (MGD)	1/week	Estimate
Phosphates, Total (as P)	1/week	Grab

OUTFALL 003

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the cooling tower blowdown outfall before the discharge is combined with Outfall 002.
Latitude: 35° 25' 18"; Longitude: 97° 22' 35".

FOOTNOTES

(*1) Report.

PART I
 REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 004

*COOLING TOWER TO
 WEST SOLDIER*

"E"

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 004 - cooling tower blowdown from building 3108.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic

	<u>Discharge Limitations</u>			
	<u>Mass (lbs/day)</u>		<u>Other Units (Specify)</u>	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Phosphates, Total (as P)	N/A	N/A	5.0 mg/l	5.0 mg/l
Temperature	N/A	N/A	85°F	98°F

Effluent Characteristic

	<u>Monitoring Requirements</u>	
	<u>Measurement</u>	<u>Sample</u>
	<u>Frequency</u>	<u>Type</u>
Flow (MGD)	1/week	Estimate
Phosphates, Total (as P)	1/week	Grab
Temperature	1/week	Grab

OUTFALL 004

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the cooling tower blowdown outfall before the discharge reaches the storm sewer. Latitude: 35° 25' 17"; Longitude: 97° 22' 45".

FOOTNOTES

(*1) Report.

PART I
 REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 005 *EAST SOLDIER
 SOLID SEPARATOR DIVERSION*

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 005 - storm water overflow.

*NORTH OF
 F*

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic

	<u>Discharge Limitations</u>			
	<u>Mass (lbs/day)</u>		<u>Other Units (Specify)</u>	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Oil and Grease	N/A	N/A	(*1) mg/l	50 mg/l

Effluent Characteristic

	<u>Monitoring Requirements</u>	
	<u>Measurement - Frequency</u>	<u>Sample Type</u>
Flow (MGD)	1/week	Estimate
Oil and Grease	1/week	Grab

OUTFALL 005

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the overflow from the low water dam.

FOOTNOTES

(*1) Report.

PART I
 REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 'F'

OUTFALL 006

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 006 - non-contact cooling water and storm sewer serving the north end of B/3001.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>			
	Mass (lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
* Oil and Grease	N/A	N/A	(*1) mg/l	15 mg/l
Ammonia (as N)	N/A	N/A	(*1) mg/l	(*1) mg/l

<u>Effluent Characteristic</u>	<u>Monitoring Requirements</u>	
	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (MGD)	1/week	Estimate
* Oil & Grease	1/week (*2)	Grab
Ammonia (as N)	1/week (*2)	Grab

OUTFALL 006

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week (*2) by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the V-notch weir which overflows to Soldiers Creek. Latitude: 35° 25' 32"; Longitude: 97° 22' 25".

FOOTNOTES

(*1) Report.

(*2) When discharge occurs.

PART I
 REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 007

*KUHLMAN CREEK
 S. OF ROADS & GROUNDS*

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 007 - storm sewer serving area "A", including discharges from occasional rinse water from an aircraft washrack.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>			
	<u>Mass (lbs/day)</u>		<u>Other Units (Specify)</u>	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Ammonia (as N)	N/A	N/A	(*1) mg/l	(*1) mg/l
Oil & Grease	N/A	N/A	(*1) mg/l	15 mg/l

<u>Effluent Characteristic</u>	<u>Monitoring Requirements</u>	
	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (MGD)	1/week	Estimate
Ammonia (as N)	1/week (*2)	Grab
Oil & Grease	1/week (*2)	Grab

OUTFALL 007

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week (*2) by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the sluice gate on Kuhlman Creek. Latitude: 35° 25' 33.3"; Longitude: 97° 24' 15.9".

FOOTNOTES

- (*1) Report.
- (*2) During periods of discharge.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 008

- W. SOLDIER
V-NOTCH WEIR JUST ABOVE 'A'
OUTFALL 'A'

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 008 - stormwater, plasma spray booth, and previously monitored cooling tower blowdown.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>			
	<u>Mass (lbs/day)</u>		<u>Other Units (Specify)</u>	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Oil & Grease	N/A	N/A	(*1) mg/l	15 mg/l

<u>Effluent Characteristic</u>	<u>Monitoring Requirements</u>	
	<u>Measurement Frequency</u>	<u>Sample Type</u>
	Flow (MGD)	1/week
Oil & Grease	1/week (*2)	Grab

OUTFALL 008

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week (*2) by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the V-notch ~~main~~ *weir* located on unnamed tributary of Soldier Creek. Latitude: 35° 25' 37.3"; Longitude: 97° 22' 45".

FOOTNOTES

(*1) Report.

(*2) During periods of discharge.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 009

- CRUTCH CREEK
SLUICE GATE S. OF
PISTOL
RANGE

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 009 - two oil separators near B1030 and oil/water separator at the AWACW alert facility; runoff from a washrack, a chemical storage area and the base fire training pit; and discharge from storm sewers serving the AWACW alert facility and part of area "C" B2280 in are "C"; and in the event of a fire discharges aqueous film forming foam (AFFF fire extinguishing foam).

Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>			
	<u>Mass (lbs/day)</u>		<u>Other Units (Specify)</u>	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Biochemical Oxygen Demand (5-day)	N/A	N/A	(*1) mg/l	(*3) mg/l
Chemical Oxygen Demand	N/A	N/A	(*1) mg/l	100 mg/l
Ammonia (as N)	N/A	N/A	(*1) mg/l	(*1) mg/l
Oil & Grease	N/A	N/A	(*1) mg/l	15 mg/l

<u>Effluent Characteristic</u>	<u>Monitoring Requirements</u>	
	<u>Measurement Frequency</u>	<u>Sample Type</u>
	Flow (MGD)	1/week
Biochemical Oxygen Demand (5-day)	1/week (*2)	Grab
Chemical Oxygen Demand	1/week (*2)	Grab
Ammonia (as N)	1/week (*2)	Grab
Oil & Grease	1/week (*2)	Grab

OUTFALL 009

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week (*2) by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the sluice gate on an unnamed tributary of Crutch Creek. Latitude: 35° 24' 47.6"; Longitude: 97° 23' 56.6".

FOOTNOTES

- (*1) Report.
- (*2) During periods of discharge.
- (*3) 50 mg/l (November 1 to March 31)
30 mg/l (April 1 to October 31)

PART I
 REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 01S

JANITARY DISCHARGE
 TO E SOLDIER
 CREEK

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 01S - sanitary sewage discharge.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>			
	<u>Mass (lbs/day)</u>		<u>Other Units (Specify)</u>	
	<u>Daily Avg</u>	<u>Daily Max</u>	<u>Daily Avg</u>	<u>Daily Max</u>
Flow (MGD)	N/A	N/A	(*1)	(*1)
Biochemical Oxygen Demand (5-day)	72	(*1)	10 mg/l	15 mg/l
Total Suspended Solids	108	(*1)	15 mg/l	25 mg/l

<u>Effluent Characteristic</u>	<u>Monitoring Requirements</u>	
	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (MGD)	Continuous	Record
Biochemical Oxygen Demand (5-day)	1/week	24-Hr. Composite (*2)
Total Suspended Solids	1/week	24-Hr. Composite (*2)

OUTFALL 01S

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by 24-hr. composite (*2).

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): After the pressure filter at the manhole located approximately 10 feet north of the pressure filter building before discharging to Soldier Creek. Latitude: 35° 25' 35"; Longitude: 97° 22' 19".

FOOTNOTES

(*1) Report.

(*2) See Part II, Paragraph B.