

**UNITED STATES AIR FORCE
ARMSTRONG LABORATORY**

**Missouri Industrial Wastewater System
Characterization and Analysis,
Whiteman Air Force Base**

James H. Morgan

TEAM, LC.
118 Casa Del Vista
San Antonio, TX 78232

Mary K. Fields, Master Sergeant, USAF

19980505 121

March 1998

*Approved for public release;
distribution is unlimited.*

Occupational and Environmental Health
Directorate
Bioenvironmental Engineering Division
2402 E Drive
Brooks Air Force Base TX 78235-5114

NOTICES

When Government drawing, specifications, or other data are used for any purpose other than in connection with a definitely Government-related procurement, the United States Government incurs no responsibility or any obligation whatsoever. The fact that Government may have formulated or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication, or otherwise in any manner construed, as licensing the holder or any other person or corporation; or as conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.


The Office of Public Affairs has reviewed this report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

This report has been reviewed and is approved for publication.

Government agencies and their contractors registered with Defense Technical Information Center (DTIC) should direct requests for copies to: DTIC, 8725 John J. Kingman Road, Ste 0944, Ft. Belvoir, VA 22060-6218.

Non-Government agencies may purchase copies of this report from: National Technical Information Services (NTIS), 5285 Port Royal Road, Springfield, VA 22161-2103.


WILLIAM GOODEN, Major, USAF, BSC
Chief, Water Quality Branch


LARRY T. KIMM, Major, USAF, BSC
Chief, Bioenvironmental Engineering Division

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 1998	3. REPORT TYPE AND DATES COVERED Final (17 March - 4 April 1997)	
4. TITLE AND SUBTITLE Missouri Industrial Wastewater System Characterization and Analysis, Whiteman Air Force Base			5. FUNDING NUMBERS	
6. AUTHOR(S) Master Sergeant Mary Fields James H. Morgan				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Detachment 1, Human Systems Center Occupational and Environmental Health Directorate Bioenvironmental Engineering Division 2402 E Drive Brooks Air Force Base, Texas 78235-5114			8. PERFORMING ORGANIZATION REPORT NUMBER AL-OE-BR-TR-1998-0007	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) Personnel from the Armstrong Laboratory Water Quality Branch conducted an industrial wastewater system characterization survey (IWSCS) at Whiteman Air Force Base, Missouri; 17 March through 4 April 1997. The scope of the investigation was to determine the cause of existing operational difficulties with the industrial wastewater system and to identify pollution prevention opportunities that could enhance system management. The IWSCS analysis indicated industrial wastewater treatment plant unit operations were performing significantly below design expectations and the overall volume and character of industrial wastewater generated at Whiteman AFB was of low flow during dry weather and less strength than typical domestic sewage. The cause of the poor IWTP performance was determined to be related to the 1) hydraulic and organic characteristics of the raw influent wastewater and 2) fundamental modifications of basic plant operation. The general character and nature of industrial wastewater at the base was found to be controlled by industrial and flight operations, fuel releases, and fire protection system alarms.				
14. SUBJECT TERMS Industrial Wastewater System, Industrial Wastewater Treatment Plant, Clarifier, Dissolved Air Flotation, Activated Carbon Filter, Aqueous film Forming Foam, Pollution Prevention, Fire Protection.			15. NUMBER OF PAGES 178	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified		18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT SAR

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Item	Topic	Page
Section 1.0	Introduction	1
1.1	Purpose	2
1.2	Background	3
1.3	Overview of Industrial Operations	4
1.4	Description of Industrial Wastewater Treatment System	5
1.5	Problem Summary	6
1.6	Problem Analysis	7
Section 2.0	Industrial Wastewater System Characterization Survey Methods and Approach	9
2.1	Review of Key Industrial Shops and Flight Support Operations	9
2.2	Industrial Shop Pollution Prevention Opportunity Assessments	11
2.3	Industrial Wastewater System Sampling and Analysis	12
2.3.1	Sampling Procedures, Techniques, and Laboratory Analytical Methods	12
2.3.2	Quality Assurance/Quality Control Samples	14
Section 3.0	Industrial Wastewater System Element Description	15
3.1	Industrial Wastewater Collection	15
3.2	Industrial Wastewater Treatment Plant	16
3.3	Federally Owned Treatment Works	17
3.4	B-2 Industrial Shops and Flight Operations Support	20
3.5	Other Aircraft Industrial Shops and Flight Operations Support	20
3.6	Fire Protection Systems	21
3.7	Jet Fuel Storage and Distribution	25

Item	Topic	Page
Section 4.0	Industrial Wastewater System Operation/Problem Analysis, Sample Data, and Observations	27
4.1	Sample Site Locations and Industrial Wastewater Contributors	28
4.2	IWSCS Sample Data and Analysis	29
4.3	Zone 1 and Confluence 1	34
4.4	Zone 2 and Confluence 1 and 2	35
4.5	Zone 3 and Confluence 2	38
4.6	Zone 4 and Confluence 3	39
4.7	Zone 5 and Fire Protection Systems	40
4.8	Confluence 4 and Jet Fuel Distribution System	43
Section 5.0	IWSCS Conclusions and Recommendations	45
5.1	Conclusions	45
5.2	Recommendations	47
Section 6.0	List of References/Reviewed Materials	53

List of Tables

Table #	Title	Page
1	Industrial Wastewater Function and Building Number	9
2	Principal Laboratory Analytical Procedures	14
3	“As Built” IWTP Design Basis	17
4	NPDES Permit Effluent Discharge Limitations	18
5	Whiteman AFB Fire Protection Information Sheet	24
6	Whiteman AFB Sample Location Information	29
7	Whiteman AFB Industrial Wastewater System Simplified Sample Data	30
8	Sample Site 12 Simplified Sample Data Table	35
9	Sample Site 15 and 16 Simplified Data Table	37
10	Sample Site 7 Simplified Data Table	39

List of Figures

Figure #	Caption	Page
1	Drawing of Whiteman AFB Industrial Sewer, Shops and Treatment Plant	6
2	Building and Industrial Functions	10
3	ISCO Automatic Sampler	12
4	Typical Industrial Wastewater Flow	13
5	Simplified IWTP Process Flow Chart	16
6	Overview of FOTW	19
7	Wetlands Ponds	19
8	Army Helicopter Building	21
9	Fire Protection System #1	23
10	B-2 Fire Protection System Tele-video	24
11	Jet Fuel Storage Tanks	25
12	Industrial Sewer, Shops and Sampling Locations	27
13	Simplified Shop/Wastewater Flow Diagram	28
14	Building 1125 Oil/Water Separator Slop Oil Tank	36
15	Sample Site 7	42

Appendices

Appendix	Title	Page
A	March IWSCS Inbriefing Outline	55
B	April IWSCS Outbriefing Outline	57
C	March 1997 Industrial Wastewater System Assessment Sample Data: Laboratory Analyses	59
D	Defoamer WAFB Material Safety Data Sheet	119
E	3M Material Safety Data Sheets and Environmental Data Sheets	123
F	March 1997 Whiteman AFB Pollution Prevention Opportunity Assessment Surveys	129

SECTION I

INTRODUCTION

At the request of Mr. Gary Nault, Headquarters Air Combat Command, and the 509th Civil Engineering Squadron, personnel from the Armstrong Laboratory/Occupational Environmental Health Directorate, Water Quality Branch (AL/OEBW) visited Whiteman Air Force Base (AFB) with support from Mitretek Systems (AL/OEBW contractor) to conduct an *Industrial Wastewater System Characterization Survey* (IWSCS). Initial direction for this survey was based on recommendations from the *Whiteman AFB Industrial Wastewater Treatment Plant Characterization and Analysis Report* (May 1997). The characterization of the operational problems associated with the Whiteman AFB Industrial Wastewater Treatment Plant (IWTP) was conducted in December 1996. The report determined that insufficient information and data concerning the actual hydraulic and organic loading characteristics of Whiteman AFB industrial wastewater was available to finalize recommendations concerning needed operations changes or modifications to the IWTP. The IWSCS was initiated during a site visit that began 17 March 1997 and concluded 4 April 1997 to address this need for additional information. All IWSCS activities were coordinated through the Whiteman AFB 509th CES/CEV. This report would not have been possible without extensive help and support from Mr. Ed Lenz-509th CE/CEO, Mr. Darrell Tackett-509th CE/CEOI, Mr. Jerry Whitford-509th CE/CEC, Captain Pollack 509th CE/CEO, and Mr. Jim Diddier-509th CE/CEF. The principal Whiteman AFB points of contact for the AL/OEBW team were:

- Mr. Ed Lenz
- Mr. Darrell Tackett, and
- Mr. Jerry Whitford.

AL/OEBW field team members on this project were:

- Master Sergeant Mary Fields, Enlisted Team Leader
- Lieutenant David Mihalik, Field Team Leader,
- Staff Sergeant Rusty Habel,
- Senior Airman Richard Charles,
- Senior Airman Jason Giles,
- Captain Scott Nickerson, and
- James Morgan, Principal Engineer and Hydrologist, TEAM, LC.

A special note of appreciation is extended to Capt. Nickerson, Lt. Mihalick, S. Sgt. Habel, Sr. A. Charles and Sr. A. Giles, whose long hours of hard work enabled the field elements of this project to be completed successfully.

Other team members made important contributions at the analytical laboratory facilities located at Brooks AFB, Texas. Armstrong Laboratories Analytical Services Group provided accurate and precise analytical data during a time critical turn around period that enabled this report to be produced rapidly. Project team members who worked in support of this project element were:

- Lt. Colonel Victoria Dunovant, Analytical Services Chief,
- 2nd. Lieutenant Gerardo Ramos, AL/OEA
- Master Sergeant Doris Dohner, AL/OEBW
- Staff Sergeant Carl Bates, AL/OEA
- Ruth Weddell, AL/OEA
- Sr. A. Barry Calhoun, AL/OEA
- Susan Smith, AL/OEA
- Denene Turner, AL/OEA and
- Lt. Colonel Locke, AL/OEA

The IWSCS was organized into three distinct activities that occurred during the AL/OEBW field team visit at Whiteman AFB. The activities were:

- 1) initial review and familiarization with base industrial, fire protection, fuel distribution, and other flight support operations,
- 2) site visits to all industrial shops generating wastewater adjacent to the flight line area, and
- 3) intensive observation and long term sampling of industrial wastewater at critical points within the industrial wastewater collection system.

After completion of the above activities, the AL/OEBW Field Team made an initial assessment of the industrial wastewater problems and the associated flight support and industrial operations impacting industrial wastewater character. These initial field review results and recommendations were organized within an out-briefing outline. The out-briefing outline was presented by Master Sergeant Mary Fields Friday, 4 April 1997 to interested parties at Whiteman AFB. The initial findings and IWSCS assessment were reviewed at that time.

1.1 Purpose

The purpose of the *AL/OEB Industrial Wastewater System Characterization Survey* (IWSCS) conducted at Whiteman AFB was to:

- 1) develop an understanding of the Whiteman AFB industrial operations impacting the quality, quantity and character of raw industrial wastewater,

- 2) observe, characterize and identify flight operations and wastewater discharges adversely impacting the IWTP or general character of industrial wastewater,
- 3) develop recommendations and/or a plan of action to address any issues having an adverse impact on the general industrial wastewater system, the IWTP, and the Federally Owned Treatment Works (FOTW).

The purpose of the IWSCS was accomplished. Initial observations and recommendations from the AL/OEBW Field Team were provided to Whiteman Air Force Base personnel at the out-briefing. A copy of the AL/OEBW Field Team's out-briefing outline is provided as Appendix 1. The purpose of this report is to present follow up information developed as a result of the field investigation and analysis of the industrial wastewater samples collected. An important function of this report is to integrate the sample data collected from the IWTP on 12 December 1996 and other written technical information obtained during the Whiteman AFB site visit, with the actual observations and recommendations made during this survey. This approach will allow the 509th CES to develop decisions for managing and treating the industrial wastewater generated by the current flight operations in a manner that will cause minimal disruption to other base operations and will support continued compliance with the wastewater discharge limitations of the National Pollutant Discharge Elimination System (NPDES) Permit.

1.2 Background

Whiteman AFB, Missouri is the home of the 509th Bomber Wing. The 509th Bomber Wing is comprised of the most technically advanced and sophisticated airplane in the world, the B-2 Stealth Bomber. An A-10 fighter squadron and helicopters are also located at Whiteman AFB. Prior to this new air wings' location at Whiteman AFB, the primary base occupant was the 351st Missile Wing. The location of the new air wings at Whiteman AFB has impacted a large number of base operations that generate industrial wastewater. Sverdrup Corporation conducted an industrial wastewater pretreatment survey in the spring of 1995. The base's primary occupant during the 1995 pretreatment survey was still only the 351st Missile Wing. Operations supporting the mission of the B-2 Stealth Bomber potentially generate wastewater containing many contaminants not historically associated with the industrial activities at Whiteman AFB. Addition of the A-10 fighter wing has resulted in additional jet engine maintenance activity and plane washing wastes. Consequently, the hydraulic and organic characteristics of industrial wastewater at Whiteman AFB have changed since the original IWTP was designed.

The new 509th mission has had many impacts. One impact of the new mission is heightened concern for worker safety. Many components used for construction and maintenance of the B-2 are hazardous materials. As such, special training and medical monitoring has been provided for some workers that could be exposed to chemical hazards. Also, maintenance activities and flight support operations that may expose workers to chemical hazards have been submitted to intensive review by base management

and general awareness of the dangers of exposure to chemical hazards has been improved among both civilian and military workers.

Workers at the IWTP have not been subjected to an annual medical monitoring program designed to monitor their exposure to chemical hazards. Many plant operators have reported odors similar to rotten eggs or hydrogen sulfide. Some workers believe headaches and fatigue they experience may have been related to the odors. A health and safety incident occurred at the facility in August 1994 that resulted in plant shut down. Employees experienced acute respiratory tract irritations, which required medical attention. Many parties involved with the industrial wastewater treatment operations have generally expressed a concern for personal safety at the IWTP. The adequacy of industrial wastewater pretreatment and questioning of the need for industrial treatment facilities have also become issues because suspension of the IWTP operations since September 1996 has not resulted in an apparent effluent violation of the NPDES permit governing discharges from the FOTW. Also, industrial shop workers supporting B-2 operations at Whiteman AFB have expressed heightened interest and concern relating to both the use of hazardous materials and their ultimate disposal or treatment. This increased chemical hazard awareness has focused substantial effort on pollution prevention amongst the B-2 related industrial shops. This background information was very useful to the AL/OEBW Field Team when evaluating actual operations.

1.3 Overview of Industrial Operations

The principal industrial operations at Whiteman AFB are associated with support of the 509th Bomber Wing. Flight operations and maintenance in support of the A-10 fighter wing, T-38 flight training wing and a helicopter squadron were also believed to significantly impact the characteristics of the industrial wastewater at the base and were a prominent element of focus and study by the IWSCS field team. Typical industrial activities performed at Whiteman AFB are:

- jet engine maintenance and repair,
- non-destructive structural inspection activities,
- routine airframe maintenance,
- plane fueling operations,
- petroleum storage,
- hydraulic maintenance,
- plane washing,
- aircraft deicing,
- Aircraft ground equipment (AGE) operation and maintenance,
- corrosion control,
- electrical equipment and instrument maintenance,
- equipment testing,

- refueling vehicle maintenance,
- photographic development laboratory,
- fire protection and fire protection hydrant testing,
- vehicle and AGE washing,
- floor cleaning in shops and hangars, and
- other routine aircraft maintenance activities.

Wastewater generated from these industrial activities has the potential to vary markedly as a result of potential chemical releases from maintenance and flight operations in support of the B-2 wing. Potential releases of complex organic and heavy metal contaminants to the industrial wastewater system have been a concern of the CES/EM flight for some time. Consequently, extensive pollution prevention activities and awareness training has been provided to many Whiteman AFB personnel. Generally, wastewater produced at Whiteman AFB, Missouri was believed to be similar to the industrial wastewater generated from comparable activities at other Air Force facilities. However, field observations and sample data collected during the survey determined that many of the Whiteman AFB industrial shops and flight operations produce very small volumes and very weak or mild strength industrial wastewater when compared to those of other Air Force facilities.

1.4 Description of Industrial Wastewater Treatment System (IWTS)

The Whiteman AFB Industrial Wastewater Treatment System is comprised of six primary elements. The design and construction of the system was initiated in February 1991 before any B-2's were operational. Consequently, many critical design parameters were not based on actual data. The primary IWTS elements are the; 1) industrial wastewater pretreatment units, 2) industrial wastewater collection system, 3) aqueous film forming foam (AFFF) surge facilities, 4) industrial waste equalization facilities, 5) the IWTP, and 6) the FOTW. Each IWTS element serves an important purpose with respect to the conceptual design and operation of the industrial wastewater treatment system. The principal function of each IWTS element is:

1. industrial wastewater pretreatment units (e.g., oil/water separators) are in place to remove shock loads of oil and grease or suspended solids,
2. the collection system conveys the industrial wastewater from their source to the IWTP for initial treatment,
3. the AFFF surge facility provides temporary storage for hi-oxygen demanding wastes associated with fire protection,
4. equalization facilities normalize extreme variances of hydraulic and organic wastewater characteristics,
5. the IWTP provides the principal pre-treatment for industrial wastes to ensure NPDES Permit No. MO-0029378 compliance and

- the FOTW provides a secondary or last option capability to treat industrial wastewater and ensure permit compliance at a point of discharge to waters of the State of Missouri.

The technical focus of this IWSCS was on elements two and three noted above. Attention was also given to element one, industrial wastewater pretreatment facilities, in order to assess any adverse impact on industrial wastewater character resulting from insufficient maintenance or improper operation. A drawing of the Whiteman AFB IWTS facilities and a legend identifying their location is presented as Figure 1.

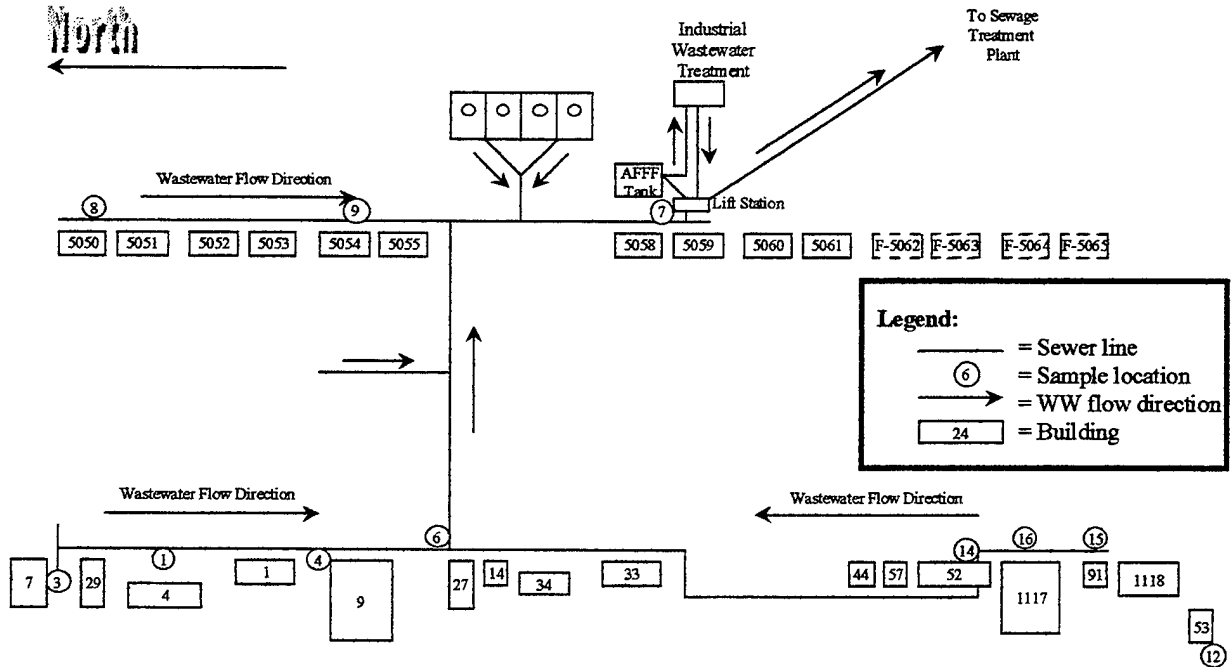


Figure 1: Drawing of Whiteman AFB Industrial Sewer, Shops, and Industrial Wastewater Treatment Plant

1.5 Problem Summary

Many questions and uncertainties concerning operation of the IWTP and the character and nature of industrial wastewater have been raised by managers, and workers at Whiteman AFB. Some of the more critical issues are:

- Workers are concerned that they are exposed to unknown chemical hazards that may affect their health.
- The character and nature of industrial wastewater at Whiteman AFB has not been previously established with sufficient certainty.
- The impact of individual industrial shops at the base on environmental operations is not adequately known.
- Management is concerned industrial wastes may cause the FOTW to not comply with the NPDES discharge limitations.
- Are there odors at the IWTP and, if so what are they?
- Does the IWTP work effectively?
- Is the IWTP actually needed?
- How can wastewater foaming caused by AFFF be prevented?
- Will an oil/water separator eliminate any or all remaining industrial wastewater system problems?

Many of the concerns listed above were addressed in a previous report entitled the *Whiteman Air Force Base, Missouri Industrial Wastewater Treatment Plant Characterization and Analysis* (May 1997, Morgan & Fields). This report provides answers to all the significant remaining issues.

1.6 Problem Analysis

The *Whiteman Air Force Base, Missouri Industrial Wastewater Treatment Plant Characterization and Analysis* report provided answers to the questions:

- Are there odors at the IWTP and, if so what are they? *Yes, hydrogen sulfide and jet fuel odors are two examples*
- Does the IWTP work effectively? *No, 12 December 1996 operation of the IWTP resulted in negative average treatment efficiencies for chemical oxygen demand and heavy metals reduction.*
- Management is concerned industrial wastes may cause the FOTW to not comply with the NPDES discharge limitations. *Surges of industrial waste such as AFFF or a major fuel spill could cause the FOTW to operate in a manner non-compliant with the NPDES permit requirements. Such an event would likely be of short duration (<30 days).*

The answers to the remaining significant issues were addressed by this study. These answers are:

- The character and nature of industrial wastewater at Whiteman AFB has not been previously established with sufficient certainty. *The character and nature of Whiteman AFB industrial wastewater is of very low flow or volume and generally of organic strength less than domestic sewage. Potential surges of AFFF or jet fuel contaminants may occur and may cause serious FOTW operational problems that could result in NPDES permit non-compliance.*
- The impact of individual industrial shops at the base on environmental operations is not adequately known. *Generally, operations associated with the B-2 mission have very little detrimental impact on industrial wastewater. Maintenance activities and flight support operations associated with the A-10 and T-38 wings generate industrial wastewater that have the greatest potential for routine industrial wastewater management problems.*
- Is the IWTP actually needed? *Under normal conditions the IWTP is not needed to ensure compliance with the NPDES permit. However, additional treatment facilities are needed to manage industrial wastewater loads that could occasionally surge the FOTW capacity. It is recommended that the IWTP be modified and maintained as operational to treat potential industrial contaminants that may be generated as a result of a spill or from a change in the existing B-2 maintenance and flight operations support.*
- How can wastewater foaming be prevented? *Addition of a foam suppressant at critical points within the industrial wastewater collection system is currently effective for control of normal discharges of AFFF.*
- Will an oil/water separator located downstream from the AFFF surge basin eliminate any or all remaining industrial wastewater system problems? *An additional oil/water separator is needed to effectively manage free jet fuel associated with industrial wastewater.*
- Workers are concerned that they are exposed to unknown chemical hazards that may affect their health. *No unexpected chemical hazards were identified during the IWSCS, however both IWTP and FOTW workers are confronted with potential exposure to chemical hazards. A wastewater treatment plant worker has historically been a profession that is very prone to accidents and chemical hazards. It is recommended that both IWTP and FOTW workers undergo annual medical monitoring in compliance with EPA/OSHA requirements for workers exposed to hazardous wastes and materials.*

Additional information on all of these issues is provided within this report.

SECTION 2

INDUSTRIAL WASTEWATER SYSTEM CHARACTERIZATION SURVEY METHODS and APPROACH

The Industrial Wastewater System Characterization Survey (IWSCS) was organized into three distinct investigative activities. The activities were:

- 1) initial review and familiarization with base industrial, fire protection, fuel distribution, and other flight support operations,
- 2) site visits to all industrial shops generating wastewater adjacent to the flight line area, and
- 3) intensive observation and long term sampling of industrial wastewater at critical points within the industrial wastewater collection system.

Significant study of the Whiteman AFB industrial wastewater system (IWS) and careful planning of the IWSCS objectives, data needs, sampling protocols and analytical laboratory methods prior to the March-April 1997 site visit enabled the requirements of each IWSCS investigation activity to be accomplished. The methods of approach and other important elements for accomplishing each of the IWSCS activities are presented in this section of the report.

2.1 Review of Key Industrial Shops and Flight Support Operations

Each industrial shop and flight operation support activity was assessed and prioritized prior to the field survey for identification of problems and actions likely to impact the character and nature of the industrial wastewater at Whiteman AFB. Table 1 identifies the maintenance activity or flight support function and associated building number of industrial activities at Whiteman AFB.

Building #	Function	Building #	Function
1	B-2 Fuel Cell Hanger	2	B-2 Engine Maintenance
4	AGE and BRA Storage	7	AGE
9	B-2 Maintenance Hanger	14	B-2 Weapons Load Trainer
19	Hangar 9 Storage	27	B-2 Corrosion Control Hangar
33	393 rd Bomb Squadron	34	Fire Station
35	Base Operations	36	Generator/Equipment Building
44	Army National Guard (ANG) Administration	50	Control Tower
52	ANG Maintenance	69	TE Load Test Facility
90	Petroleum Operations	91	T-38 Maintenance Hangar

Table 1 Continued: Industrial Wastewater Function and Building Number			
Building #	Function	Building #	Function
190	Hangar 9 Break Patio	1117	A-10 Maintenance Hangar
1118	A-10 Special Purpose Hangar	1119	A-10 Composite Maintenance
1125	Refueler Vehicle Maintenance	5050	B-2 Maintenance Dock # 1
5051	B-2 Maintenance Dock # 2	5052	B-2 Maintenance Dock # 3
5053	B-2 Maintenance Dock # 4	5054	B-2 Maintenance Dock # 5
5055	B-2 Maintenance Dock # 6	5058	B-2 Maintenance Dock # 7
5059	B-2 Maintenance Dock # 8	5060	B-2 Maintenance Dock # 9
5061	B-2 Maintenance Dock # 10	5062	B-2 Maintenance Dock # 11 (FY 97)
5063	B-2 Maintenance Dock # 12 (FY 97)	5064	B-2 Maintenance Dock # 13 (FY 99)
5065	B-2 Maintenance Dock # 14 (FY99)	5068	Hydrant CASS Systems
5069	Hydrant CASS Systems	5070	Hydrant CASS Systems
5070	CASS Maintenance Shop	5300	Fuel Tank
5301	Fuel Tank	5302	Fuel Tank
5303	Fuel Tank	5400	Fuel Pump House
5401	Fuel Pump Control house	5402	Fuel Pump house
5403	Hydrant CASS Systems	5413	AFFF Storage Tank
5415	Industrial Wastewater Treatment Plant		

Figure 2 presents a building location map of the maintenance and flight operations support areas generating industrial wastewater.

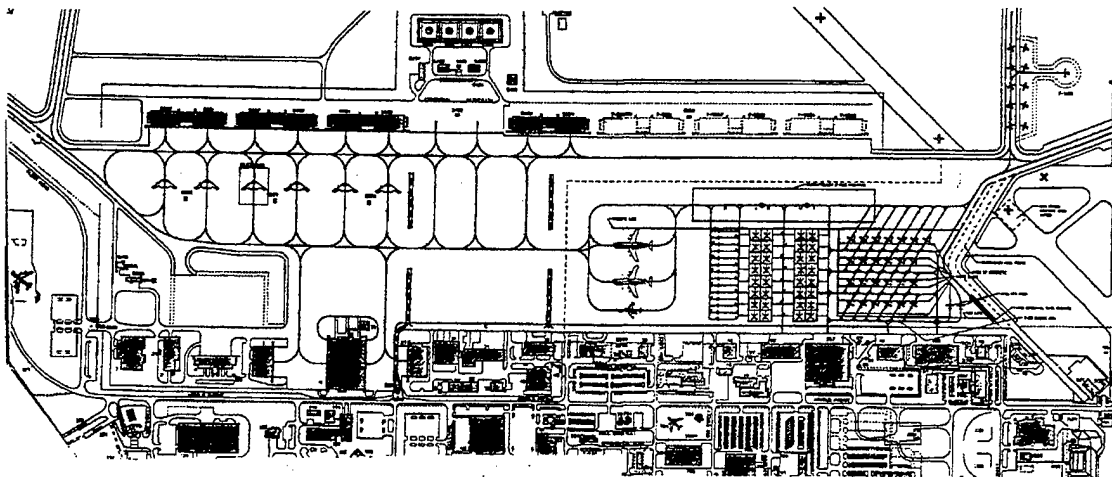


Figure 2: Building and Industrial Functions

Based upon information developed in December 1996 by the *Whiteman AFB IWTP Characterization and Analysis* and supplemented by a working knowledge of air base operations,

the fuel distribution and fire protection systems were identified as areas having significant potential impact on the IWSCS. The B-2 industrial shops located in buildings 7, 9, and 27 (*Aircraft Ground Equipment, Structural Maintenance, Jet Engine Maintenance and Corrosion Control shops*) were also prioritized as facilities likely to generate wastewater that would have a negative impact on the character and nature of industrial wastewater. In addition to sampling industrial wastewater and conducting pollution prevention opportunity assessments of the previously noted systems and industrial shops, intensive interviews were conducted by Jim Morgan and Mary Fields with;

- Ralph McHenry, Fire Chief
- Richard Organowski, Assistant Fire Chief
- Jim Didier, Deputy Fire Chief
- Tim Alms, Refueling Maintenance Foreman
- Ed Lenz, Utilities Engineer CES/CED
- Darrell Tackett, Wastewater Treatment Plant Operator

The purpose of the interviews was to develop information specific to each persons expertise as it could relate to incidents that might generate industrial wastes and contaminants that could enter the industrial wastewater collection system. Information obtained from these interviews is incorporated into the analysis and recommendations associated with their specific problem area, industrial shop, or sample site.

2.2 Industrial Shop Pollution Prevention Opportunity Assessments

Master Sergeant Mary Fields, NCOIC, conducted pollution prevention opportunity assessments (P2OA) of all industrial shops at Whiteman AFB. P2OA's were conducted by:

- interviewing key shop operations personnel,
- observation of the shop maintenance and flight operations support activities,
- review of the shop specific material safety data sheets of inventoried chemicals,
- observation of chemical storage facilities,
- evaluating operation and maintenance of hazardous waste management and industrial wastewater pretreatment facilities, and
- developing practical recommendations for pollution prevention and environmental improvement.

Individual reports outlining the specific findings and recommendations with respect to individual industrial shops and flight support activities are provided in Appendix 6 of this report. When appropriate, pollution prevention opportunity assessment observations and opportunities were incorporated within Section 4.

2.3 Industrial Wastewater System Sampling and Analysis

Sixteen sites within the Whiteman industrial wastewater collection system were identified prior to the field survey as locations providing wastewater quality information useful for system analysis. Additionally, samples of any wastewater contained within the primary AFFF surge tank (building 5413) and the IWTP equalization basin were also deemed appropriate. Table 1 identifies the sample site location with its' associated building location, industrial shop activity, and the planned sample frequency. Samples from sites 1, 3, and 14 were unable to be collected during the survey, as no industrial wastewater was generated from the associated facilities during the IWSCS.

2.3.1 Sampling Procedures, Techniques, and Laboratory Analytical Methods

Industrial wastewater sampling procedures and techniques were guided by the use of ASTM Standards D5956 and E1689. Individual aliquot's (approximately 500 ml) of composite samples were automatically collected by an ISCO peristaltic pump type sampler, at each sample site every hour. Sample aliquot's were iced and stored in glass containers until the containers were collected and manually composited and preserved.

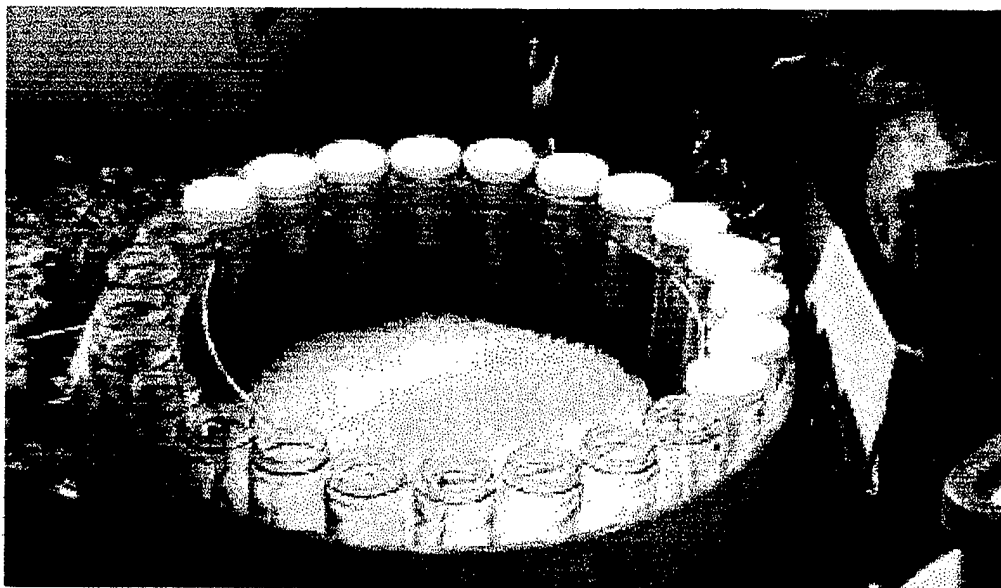


Figure 3: Composite samples were collected in glass containers with an ISCO automatic sampler, preserved for the analyte of interest and identified for Chain of Custody control before to shipment to Armstrong Laboratories Water Analysis Branch at Brooks AFB, Texas.

Original IWSCS plans were to flow weight individual composite samples using Sigma flow recorders to determine individual aliquot volumes. However insufficient industrial wastewater

flow was generated during the survey period to utilize the flow meters. Flow at most sample sites was estimated to be less than 1 gpm for most times. Consequently, only time weighted composite samples were collected during the survey.

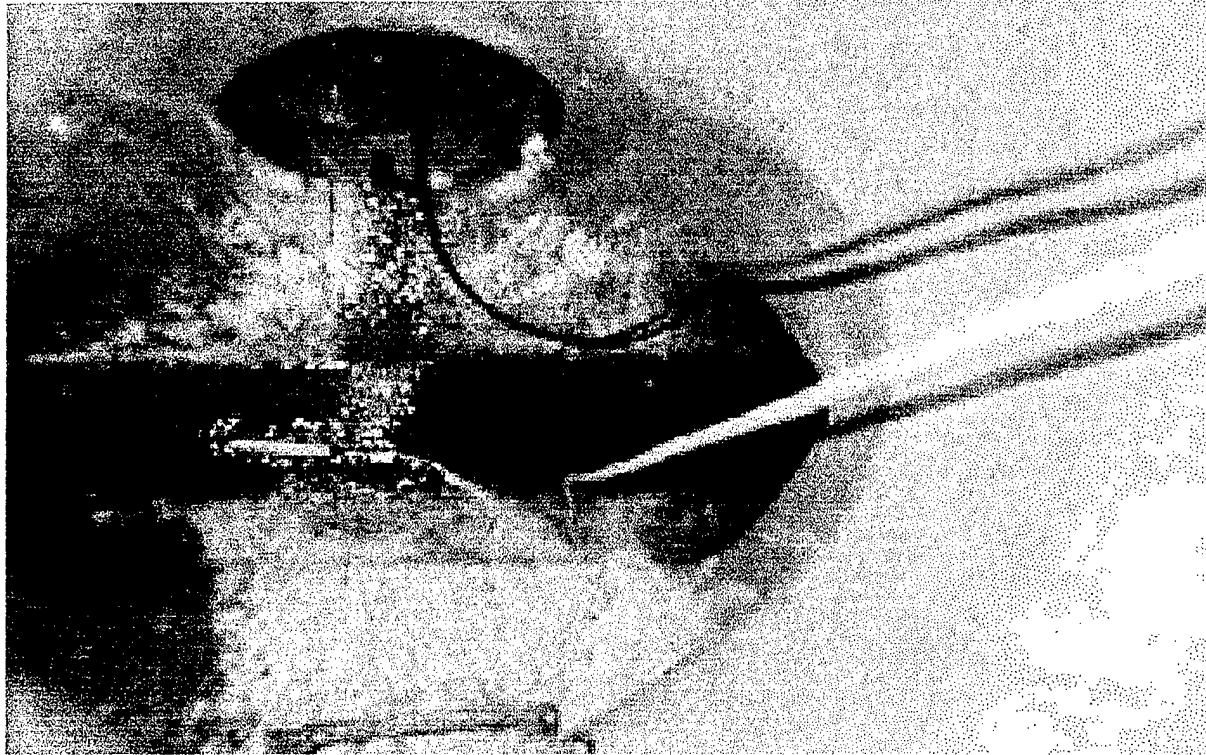


Figure 4: Industrial wastewater flow was typical of that shown at the manhole above. Lack of sufficient industrial wastewater flow to submerge the Sigma flow sensor (depicted at the top center of the photograph) resulted in collection of time-weighted composite samples for the Whiteman AFB IWSCS.

Grab samples were also collected in glass VOA vials for analysis of volatile organics from each sample site at the conclusion of each composite sample period. Standard sample preservation techniques referenced in *Standard Methods for the Examination of Water and Wastewater* guided sample preservation and transport. ASTM Type II Reagent Water and Alquinox Soap were the primary materials used for decontamination of sampling equipment and containers. The analytical method number, standard sample preservation requirements, and the method detection limit of the laboratory analytical methods used by the Armstrong Laboratory-Water Analysis Section to analyze Whiteman AFB IWSCS samples is identified in Table 2.

Table 2 Principal Laboratory Analytical Procedures

Chemical Analyte	Analytical Method Number	Sample Preservatives	Method Detection Limit
Chemical Oxygen Demand	E 410.4	1L, 2 ml H ₂ SO ₄	<10 mg/L
Total Organic Carbon	E 415.1	1L, 2 ml H ₂ SO ₄	-
Oil & Grease	E 413.1	1L, Glass/ 2 ml H ₂ SO ₄	<0.3 mg/L
Ammonia as N	E 350.1	1L, 2 ml H ₂ SO ₄	<0.2 mg/L
T-Phosphate	E 365.1	1L, 2 ml H ₂ SO ₄	<.1 mg/L
Total Cyanide	E 335.1	1L, NaOH	<.005 mg/L
Total Residue	-	1L, 4° C	<1 mg/L
Filterable Residue	E 160.3	1L, 4° C	<1 mg/L
Volatile Residue	E 160.4	1L, 4° C	<1 mg/L
Sulfides	E 376.1	1L, 4° C	<0.1 mg/L
Volatile Organic Compounds	E 601/602	2-40 ml VOA vials/4° C	<.005 mg/L
Metals	E 200.7	5 ml HNO ₃	-
2(2-Butoxyetoxy) Ethanol	GC/MS	2-40 ml VOA vials/4° C	<0.1 mg/L

2.3.2 Quality Assurance/Quality Control Samples

Quality Assurance/Quality Control (QA/QC) samples were collected at appropriate times during the IWSCS. QA/QC samples were collected of sampling equipment rinse water, ISCO sampling equipment blank, field reagent water, heavy metals preservative, sampling pitcher equipment blank, and blind known samples. Results of the QA/QC samples indicate the laboratory analytical methods; sampling procedures and sample preservation techniques were within the necessary control limits with respect to the precision and method detection limits required by the IWSCS. Laboratory analytical values associated with the QA/QC samples are provided with the data tables included as Appendix 3.

SECTION 3

INDUSTRIAL WASTEWATER SYSTEM ELEMENT DESCRIPTION

Seven independent elements interact systematically to compose the Whiteman AFB industrial wastewater system. At times the interaction is synergistic in nature. The seven industrial wastewater system elements are the:

- Industrial wastewater collection system
- Industrial wastewater treatment plant (IWTP)
- Federally owned treatment works (FOTW) or domestic sewage treatment plant
- B-2 industrial shops and flight operations support
- Other aircraft industrial shops and flight operations
- Five separate industrial fire protection systems
- Jet fuel distribution

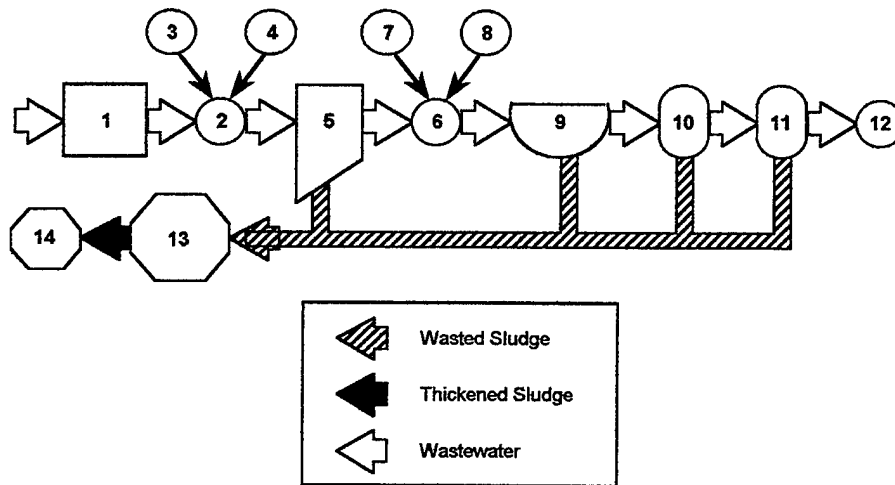
This section of the *Industrial Wastewater System Characterization Survey* provides information critical to understanding each of the above elements' environmental problems and describes their systematic interaction. Linkage of environmental problems between industrial shops, flight operations, and flight utilities sources generating industrial wastewater, the treatment capabilities and permit requirements of the FOTW, and the industrial wastewater treatment plant operations is described. The information presented here is organized by its industrial wastewater system component.

3.1 Industrial Wastewater Collection

Industrial wastewater generated from fifty one industrial shops and base operations are collected by four industrial sewer legs and trunk lines that drain to a wet well and lift station at the AFFF surge tank. Industrial wastes at the AFFF wet well either gravity flow to the AFFF surge Tank, are pumped to the equalization basin for treatment at the IWTP, or divert directly to the sanitary wastewater collection system for final treatment at the FOTW. The approximate location of the industrial wastewater collection system is shown on Figure 2. No major problems with the industrial wastewater collection system have been identified as a result of the IWSCS. Some problems with infiltration have been reported in the past and an infiltration/inflow (I&I) study of the system is currently contracted. In addition to identification of specific causes of infiltration/inflow, the contracted I&I study may possibly identify one or more industrial waste exfiltration problem within the sewer. The industrial wastewater collection system was not a primary focus of the IWSCS.

3.2 Industrial Wastewater Treatment Plant

Operational problems associated with the IWTP are responsible for initiating the IWSCS study. May 1997 report AL/OE-TR-1997-0067 provides an initial AL/OEBW assessment of industrial wastewater problems at Whiteman AFB and also describes past operational problems encountered at the facility in detail. The treatment components of the Whiteman AFB IWTP are an inclined plate clarifier, pH adjustment, dissolved air flotation, sand filters, activated carbon filters, sludge thickener, sludge filter press and effluent recycle capability. A simplified flow chart of the industrial wastewater treatment process units is provided as Figure 5. The average design flow rate or design hydraulic loading of these facilities is 60 gpm or 86,400 gpd during continuous twenty-four hour operation.



Identification Key of Numerical Operating Units

- | | |
|--|---|
| 1 Equalization Basin | 8 Alum Addition |
| 2 Mixer | 9 Dissolved Air Flotation Unit |
| 3 NaOH pH Adjustment | 10 Sand Filters (2 in series) |
| 4 Nalco Defoaming Polymer | 11 Activated Carbon Filters (2 in series) |
| 5 Inclined Plate Clarifier | 12 FOTW Sewer System |
| 6 Mixer | 13 Sludge Handling and Storage |
| 7 H ₂ SO ₄ pH Adjustment | 14 Sludge Filter Press |

Figure 5: Simplified process Flow Chart of the Whiteman AFB IWTP

The “as built” IWTP design assumptions were identified during a review of the *B-2 Support Facilities Industrial Wastewater Treatment Facility Construction Specifications and Bid Documents*. The basis of design assumptions are presented in Table 3 below.

Table 3: "As Built" IWTP Design Basis				
Contaminant or Design Parameter	Influent		Effluent Treat. Objective mg/L	Treatment Unit
	Concentration mg/L	Waste Load ppd.		
Max. flow (system)		220 gpm	N/A	
Average flow		60 gpm	N/A	
pH	6.0-9.0		N/A	
Biochemical Oxygen Demand (BOD ₅)			N/A	
AFFF*	2,000	1,441		AFFF* Surge
Chemical Oxygen Demand				
Suspended Solids	1,000	720	<1	Clarifier
Heavy Metals	200	144	<10	Clarifier
Oils/Grease	2,000	1,441	<10	DAF**
Fuels	100	72	<10	DAF**
Emulsified Oils	500	360	<10	DAF**
Solvents	500	360	<10	Carbon Filter
Phenols	25	18	<10	Carbon Filter

• Aqueous Film Forming Foam
 ** Dissolved Air Flotation

Identification of the design specifications was necessary for the AL/OEB field team to perform the systematic engineering evaluation of both the IWTP process units and the industrial wastewater system. Analysis of raw industrial wastewater samples collected as part of the initial AL/OEBW IWTP study indicated that Whiteman AFB industrial wastewater had very low organic strength and low flows. Initial sample data indicates the IWTP may not normally be required for compliance with the NPDES permit. Comparison of the "as built" IWTP design values to the analytical values derived from samples collected during the March-April 1997 investigation are critical to understanding the problems and providing recommendations that are supportive of FOTW NPDES compliance, IWTP performance, future industrial wastewater management system upgrades, and to maximize the benefit derived from good environmental practices related to aircraft maintenance and flight support operations.

3.3 Federally Owned Treatment Works (FOTW)

The FOTW's role in the management of the industrial wastewater system is to serve as a secondary wastewater treatment system for some industrial wastes (e.g., oil and grease, biological oxygen demand, pH) and to provide the last line of "defense" for compliance with the NPDES permit. The primary discharge requirements of the NPDES permit require compliance with the constituents and parameters identified in Table 4.

**Table 4: NPDES Permit No. MO-0029378 Effluent Discharge Limitations,
Effective Date: 1 June 1997**

Parameter	Unit	Daily Max.	Weekly Avg.	Mo. Avg.
Flow	MGD	2.19		1.26
BOD ₅				
June 1-Sept.30	mg/L		15	10
Oct. 1-May 31	mg/L		20	15
C.O.D.				
June 1-Sept.30	mg/L	90		60
Oct. 1-May 31	mg/L	120		90
T. Susp. Solids	mg/L		20	15
Oil/Grease	mg/L	20		15
pH	SU			
Temperature	°F			
Total Copper	mg/L	.043		.043
Total Lead	mg/L	.020		.020
Total Zinc	mg/L	.150		.150
Cyanide	mg/L	.022		.022
Total Phenol	mg/L	.100		.100
Total Silver	mg/L	.0082		.0082
Ammonia as N				
June 1-Sept.30	mg/L	3		2
Oct. 1-May 31	mg/L	4.5		3.5

The principal "systems" operation problem posed to the FOTW that would threaten the ability to comply with the identified requirements is a surge or slug of oxygen demanding waste or a surge of oil and grease from a petroleum spill. The Whiteman AFB FOTW incorporates primary, secondary and tertiary treatment components within the sewage treatment plant's design. The FOTW consists of pairs of primary and secondary clarifiers, two high rate trickling filters operated in parallel, two anaerobic digestors, sludge handling facilities, and four constructed wetlands treatment ponds designed for effluent polishing and metals removal. Figures 6 and 7 provide an overview picture of the general treatment units and the constructed wetland.

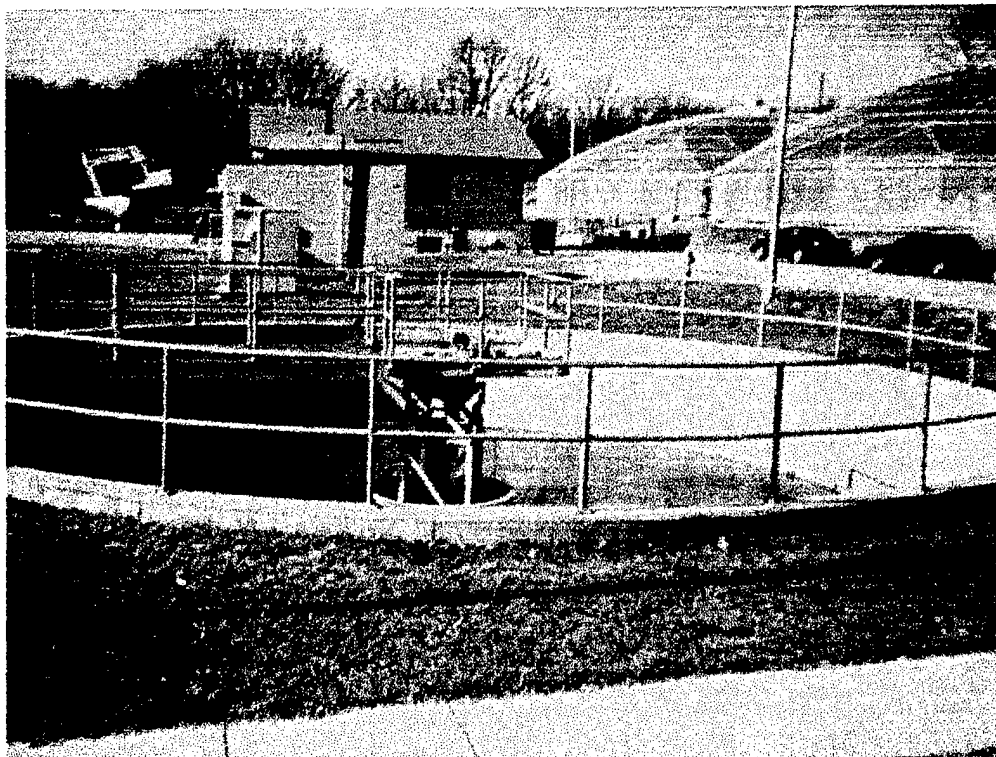


Figure 6: Photograph depicts an overview of the FOTW primary/secondary treatment units.



Figure 7: Photograph depicts one of four constructed wetland ponds that provide for tertiary treatment of wastewater at Whiteman AFB.

There are no treatment units at the FOTW that are specifically designed for the treatment of industrial wastes. The FOTW was not designed to respond to slugs of toxic or strong organic industrial wastes and petroleum spills. Those type industrial wastes can and have adversely impacted the FOTW. The primary surge or slug treatment capabilities at Whiteman AFB are maintained in the storage capacity of the AFFF storage tank and the IWTP equalization basin. Final characterization of the industrial wastewaters may indicate a need for secondary surge or slug treatment capabilities to be located at the headworks to the FOTW. Additionally, the average organic load on the FOTW is 760 pounds BOD₅ per day. This is significantly less loading than plant design and increases the FOTW's vulnerability to a serious surge of organics from industrial waste. If the plant were operating nearer the design load capacity of 3,150 pounds BOD₅ per day, it would be more capable to operationally respond to surges of organic loading from industrial wastewater.

3.4 B-2 Industrial Shops and Flight Operations Support

There are approximately fifty-one industrial shops supporting aircraft maintenance and flight operations at Whiteman AFB. Most major industrial shops primary mission is support of the B-2 Wing. The B-2 industrial shops having the greatest potential impact on the industrial wastewater system are the; 1) corrosion control facility, 2) structural maintenance and 3) jet engine maintenance. The principal industrial wastewater generated from these shops is floor wash water. Solvents, fuels, oil and grease, metals, and carbon filament compounds are typical contaminants that could be present in the wastewater generated from these and other shops supporting B-2 operations. Most shop operations have intensive waste minimization and pollution prevention programs in place. A "pharmacy" program for dispensing hazardous materials has also been established. Hazardous materials and wastes are normally strictly controlled and would not be released to the industrial sewer unless a spill or emergency occurred. Spill response equipment and intensive HAZMAT training has been provided to all B-2 industrial shop personnel. Industrial shops supporting the B-2 program are located throughout the flight line area.

3.5 Other Aircraft Industrial Shops and Flight Operations

Most industrial shops at Whiteman AFB principally provide support to the B-2 mission. However, several large shops provide aircraft maintenance and flight operations support for the tenant T-38 and A-10 fighter aircraft wings, as well as the Army helicopter squadron. Primary industrial activities not related to the B-2 are aircraft washing, hydraulic maintenance, and routine repair of T-38, A-10 and helicopter aircraft. The largest volumes of wastewater generated by these activities result from aircraft wash rack waste and floor washing. Solvents, soaps, oil and grease, and fuels are contaminants that can routinely be expected to be found in this wastewater. Most of the non B-2 related industrial shops are located near the southeastern most area of the

flight line. Figure 8 depicts a typical maintenance operation associated with the Apache helicopter aircraft.



Figure 8: Routine maintenance is performed on an U.S. Army Apache helicopter at building 52. Normally, very small volumes of wastewater are generated as a result of these and similar routine maintenance activities.

3.6 Fire Protection Systems

Fire protection systems are an integral element of the industrial wastewater system and associated problems at Whiteman AFB. All industrial shop fire protection is based on the use of aqueous film forming foam (AFFF). Industrial wastewater is adversely impacted by AFFF in two ways; 1) it exerts a potential biochemical oxygen demand of approximately 20,000-35,000 mg/L, a very high strength wastewater that will severely damage FOTW operations, and 2) water based foams also create handling and mechanical hazards from foam piles and possible electrical shorts circuits. AFFF wastewater generated from spills, fire tests, building acceptance tests, false fire alarms, and real fire alarms may result in surges of high strength oxygen demanding wastewater within the industrial wastewater management system or may create foam piles that create other hazards. AFFF wastewater resulting from building acceptance tests has created the most difficult IWTP operation problems to date. An understanding of the fire protection systems at Whiteman AFB is necessary to characterize the greatest potential industrial wastewater system problems that may be experienced at the base.

Industrial wastewater handling problems that occur as a result of "foaming" are primarily managed at the influent structure to the FOTW with the addition of a foam control additive manufactured by G.S. Robins and Company. *DEFOAMER WAFB* has proven to be a very effective additive for control of AFFF foaming. *DEFOAMER WAFB* is composed of eighty-percent mineral seal oil and twenty-percent alkylphenol ethoxylate and works as a foam suppressant by increased surface tension. A copy of the MSDS sheet for *DEFOAMER WAFB* is included as Appendix 4. When the IWTP is operated, foaming problems are suppressed with a foam control additive manufactured by NalCo. No foam control system is in place at the confluence of the industrial wastewater system with the sanitary sewer.

Two brands of three percent AFFF are used for fire fighting at Whiteman AFB, 3M and Ansil. Both brands have similar, if not identical chemical and wastewater characteristics. Currently, only 3M product FC-203CF Light Water AFFF is purchased by the Whiteman AFB fire department. Manufacturer's Environmental Data information and Material Safety Data Sheets (MSDS) for FM-203CF are included in Appendix 5. The primary chemical ingredients of AFFF are water (approximately 70 percent), diethylene glycol butyl ether or DGBE (approximately 20 percent), amphoteric sulfate salt (< 5 percent), alkyl sulfate salt (< 5 percent), triethanolamine (< 1.5 percent), perfluoroalkyl sulfonate salt (< 1.5 percent), and tolyl triazole (< 1 percent). DGBE is identified as a toxic chemical. The chemical manufacturer recommended water exposure guideline is 35 mg/L. Prolonged or repeated over exposure may cause blood disorders, bone marrow depression, kidney effect, liver effects, and/or pulmonary edema. Inhalation and adsorption are the two primary human health pathways of exposure. According to the 3M Environmental Data Sheet a three percent solution of product FC-203CF in water exerts a BOD₅ of .35 g/g and a BOD₂₀ of .72g/g or 34,900 mg/L and 71,953 mg/L of oxygen demand respectively.

The basic fire protection system at Whiteman AFB consists of an alarm, AFFF storage tanks, water supply, AFFF makeup/mixing manifold, fire water supply pumps, fire water distribution lines and spray nozzles or delivery mechanism. There are six individual fire protection systems located in the flight line area. Each of the six fire protection systems is similar, but differs in size, alarm type, and spray distribution system. Each fire protection system has one or more raw AFFF storage tanks used for in-line makeup of firewater. At least two fire pumps charge four of the individual fire protection systems. Two of the fire protection systems are charged with domestic water pressure. Water is mixed with raw AFFF through a positive pressure manifold and in-line static mixer for all systems (See Figure 9).



Figure 9: Fire Protection System #1 AFFF firewater makeup manifold.

Each storage tank is currently filled with raw three percent AFFF, the bulk AFFF product mixture that is diluted with water through the manifold system with three parts AFFF to ninety seven parts fresh water to provide fire protection foam. All six fire alarm systems incorporate the use of "thermister" cable, a temperature sensitive fire alarm detection wire. The overhead deluge fire protection lines of all Whiteman AFB fire protection systems is actuated by "thermister" cable detection alarms. All B-2 underwing deluge fire protection systems are actuated by ultra-violet/infrared detection sensors. The fire alarm systems at all B-2 facilities and buildings, also use 10 remote video cameras (See Figure 10) in each hangar for fire confirmation of fire alarms. A seventeen-second-response time exists for the fire alarm attendant to manually override actuation of a fire protection system at B-2 facilities in case of a false alarm. Table 5 provides basic technical information concerning each fire protection system at Whiteman AFB.

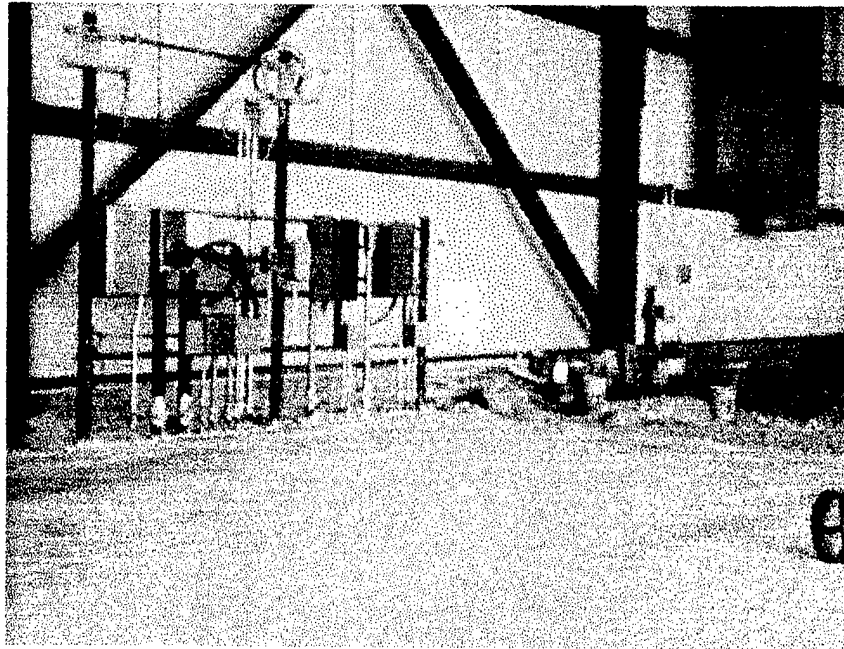


Figure 10: Mounting brackets for the B-2 hangar fire protection tele-video monitors are shown.

Table 5: Whiteman AFB Fire Protection Information Sheet						
System #	Description	AFFF Tank Cap. Gal.	Alarm Type	# Fire Pumps	Fire Pump Rate	Est. Max. Fire H₂O Production
1	Corrosion/Control, Hangar 9, BRA	10,000	T/V/uv-ir	4	2,500	333,000
2	B-2 Docks	3,000	T/V/uv-ir	-	-	100,000
3	T-38, Helicopter Hangar	800	T	0	Unk.	26,600
4	A-10 Hangars (5 bay)	1,200	T	4	1,500	39,600
5	Refueler Maintenance	800	T/V/uv-ir	1	Unk.	26,600
6	A-10 Hangar (3bay)	700	T	0	Unk.	23,300

A review of Table 5 indicates the largest volume of AFFF wastewater that could be discharged to the industrial wastewater sewer resulting from an individual fire is 333,000 gallons of dilute fire water, plus the foam generated by fire trucks, and the rinse water generated from cleanup. An AFFF release of this magnitude would generate a five-day biochemical oxygen demand load of approximately 96,924 pounds and a twenty-day biochemical oxygen demand of approximately 199,829 pounds. Since the FOTW is designed to treat a maximum capacity of 5,000 pounds BOD₅/day, a worst case AFFF discharge event would result in a major NPDES permit violation unless the AFFF industrial wastewater is diverted to the 250,000 gallon AFFF storage tank and the 150,000 gallon IWTP equalization basin. Provided AFFF wastewater is diverted to these temporary storage facilities during a worst case event, NPDES compliance

should be maintained as long as the stored wastewater is not diverted to the FOTW at greater than approximately 2,000 pounds per day or about 5 gpm. Approximately fifty days of FOTW operation is required to work off a worst case AFFF discharge event and maintain compliance. If a greater safety factor is required by the Air Force, larger AFFF storage facilities are needed. Current AFFF wastewater storage capacity provides for an approximate twenty percent or 67,000 gallon reserve buffer of additional AFFF wastewater to store fire truck and clean up wastewater for a single worst case event.

3.7 Jet Fuel Storage and Distribution

There are four fuel storage tanks located in the vicinity of the flight line at Whiteman AFB. Each of the four fuel tanks has a capacity of 10,000 bbls. or 420,000 gallons. Each tank is surrounded by a spill prevention, control, and countermeasures (SPCC) concrete lined retention levee to prevent unauthorized wastewater discharges to the storm or industrial wastewater collection system. Each SPCC levee retains 120 percent of the tank capacity and a manual diversion valve that can route retained wastewater to either the storm or industrial wastewater collection system controls discharges. Sampling and laboratory testing determines the appropriate course of wastewater disposal from these retention areas. There is a very low probability for a significant release of fuel from the four fuel storage tanks beyond the SPCC levees.

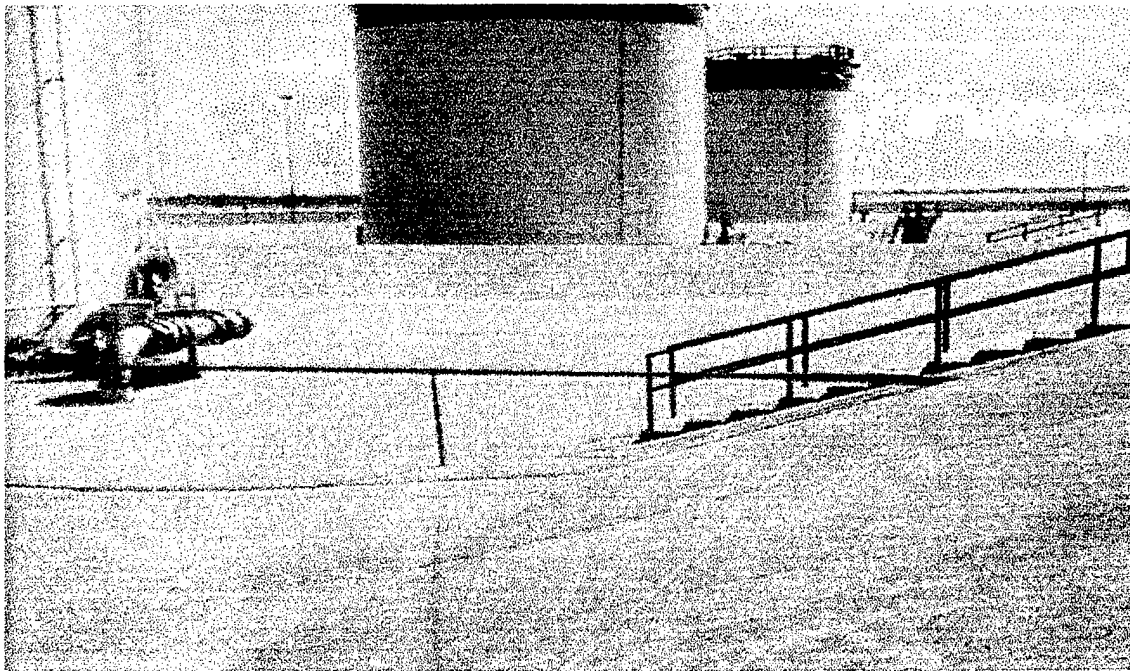


Figure 11: 10,000 bbl. jet fuel storage tanks. Note wastewater diversion drain in background of the second levee.

Moderate size (500 to 5,000 gallons) fuel spills and leaks resulting from the distribution, loading and unloading of jet fuel represent a serious potential threat to the industrial wastewater management system. Jet fuel is pumped from the four storage tanks through a series of fuel distribution lines throughout the flight line. Numerous fuel hydrants are also located in underground pits throughout the flight line, especially within the B-2 dock area. Fuel spills from fueling and refueling planes are probably a less common source of petroleum releases than leaks. The coefficient of expansion for JP-8 is 75 psi/°F, consequently a temperature change of a few degrees exerts great stress on jet fuel distribution at pipe joints and pipe bends. It is believed that the greatest stress for leaks occurs within the fuel hydrants and pits on days when the temperature difference between ambient subsurface ground temperature and ambient air temperature is the greatest.

Nine significant fuel spills have been reported to the Fire Chief in the nine months proceeding March 1997. Other significant fuel spills or leaks are suspected to have occurred, but have apparently been unreported. Some unreported spills have been indicated by occasional slugs of petroleum and oil and grease in the raw influent to the FOTW.

SECTION 4

INDUSTRIAL WASTEWATER SYSTEM OPERATION/PROBLEM ANALYSIS, SAMPLE DATA, and OBSERVATIONS

This section of the report presents sample data and observations obtained during the March/April 1997 Industrial Wastewater System Characterization Survey (IWSCS) and provide an analysis of the industrial wastewater system operations and problems. In order to simplify results and conclusions, this section of the report is divided into three parts. Section 4.1 provides information concerning sample collection locations and identifies the various industrial shops and wastewater contributors monitored at each sample location site. Section 4.2 presents the sample data and provides an analysis of the data by sample location. The final section, 4.3, provides an analysis of the IWSCS observations, information and sample data as it relates to the fire protection and jet fuel distribution systems.

4.1 Sample Site Locations and Industrial Wastewater Contributors

Figure 12 is a general schematic (not drawn to scale) depicting the relative location of the industrial maintenance and flight operation support shops in the flight line vicinity of Whiteman AFB.

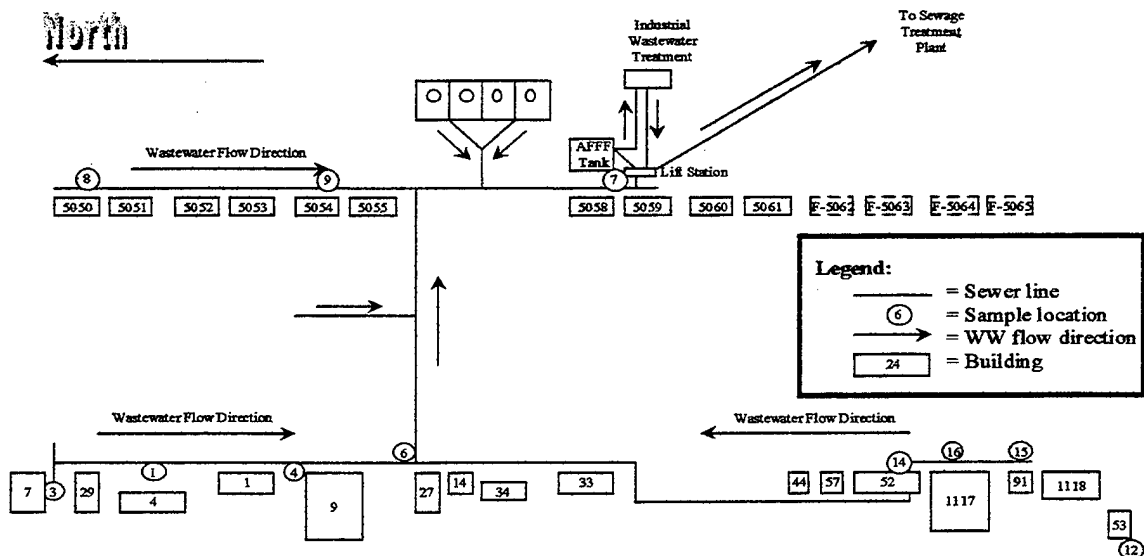


Figure 12. Industrial Sewer and Shops and Sampling Locations

A general description and key of the industrial shops associated with each location building number identified on Figure 12 are presented in Table 6. Also identified on the figure is the location of eighteen sample collection points utilized during the IWSCS. Figure 13 groups each sample collection location into a category or group that; 1) visually identifies the industrial activity with a sample collection location, 2) groups the industrial activity with other industrial shops and flight operations that are also monitored by samples collected at a common location, and 3) identifies sample collection locations that monitored a confluence of industrial waste streams throughout the survey period.

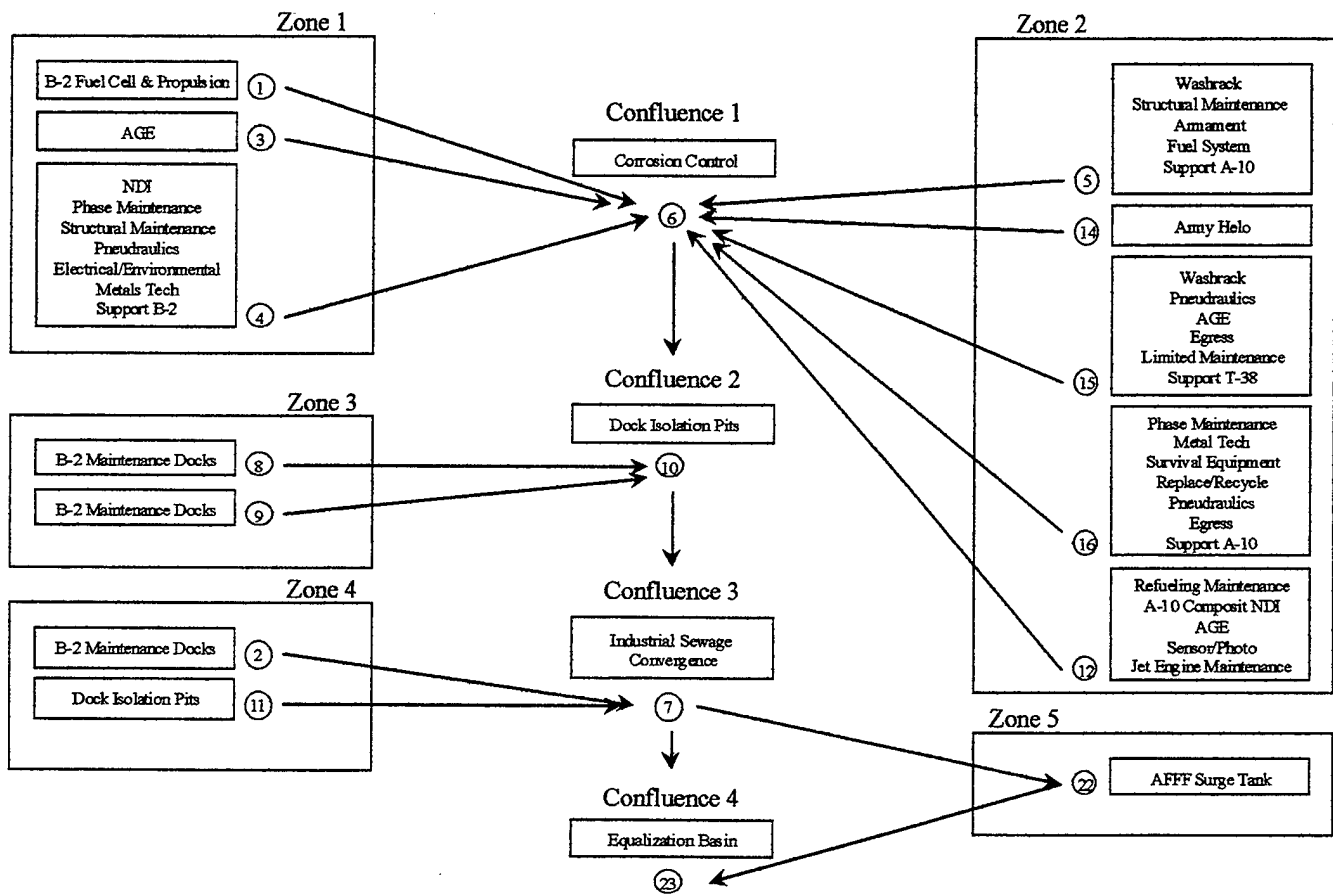


Figure 13: Simplified Shop/Wastewater Flow Diagram

Twenty-four hour composite samples or representative grab samples were collected from each sample location identified in Figure 13. Table 6 provides additional information associating the individual sample site location with the building number, other industrial shops common to the monitoring point and sample collection frequency.

Table 6: Whiteman AFB Sample Location Information			
Site #	Building/Description	Associated Industrial Shops	Sample Frequency
1	1	B-2 fuel cell	dry
2	5056 & 5067	B-2 maintenance dock	1 day
3	7	Aircraft grounds equipment (AGE)	dry
4	9	Non-destructive investigation (NDI), phase, structural maintenance, pneudraulics, electrical, & metals tech support	4 days
5	118	A-10 aircraft wash rack, structural maintenance, armaments, fuel system support	3 days
6	27	B-2 corrosion control	8 days
7	5413	AFFF diversion, industrial wastewater convergence manhole	8 days
8	5050-5053	B-2 maintenance dock	3 days
9	5054-5055	B-2 maintenance dock	4 days
10	North Jet Drain	Service dock and isolation pits	4 days
11	South Jet Drain	Service dock and isolation pits	3 days
12	1125 & 1119	A-10 refueling maintenance, A-10 composite NDI, AGE, photographic/sensor support, & jet engine maintenance	3 days
13	Site deleted* (Site 12)	See Site 12	N/A
14	52	Army helicopter limited maintenance hangar	dry
15	91	T-38 aircraft wash rack, pneudraulics, limited aircraft maintenance support, egress	2 days
16	1117	A-10 pneudraulics, phase, metals tech support, surveillance equipment	2 days
17-21	N/A	Sample site locations were assigned to blind QA/QC samples	N/A
22	5413	Raw industrial wastewater contained within the AFFF surge tank	grab
23	Equalization Basin	Raw industrial wastewater contained within the IWTP equalization basin	grab

* Sample site 13 sample objective was combined with sample location 12

4.2 IWSCS Sample Data and Analysis

Appendix 3 provides the Armstrong Laboratory analytical data sheet for each sample collected as a part of the Whiteman AFB IWSCS. The authors intensively reviewed the data sheets and a simplified data table presenting the primary information necessary to characterize and understand the industrial wastewater system was prepared. The simplified data tabulation is provided as Table 7.

**TABLE 7: March 1997: Whiteman Air Force Base, Missouri
Industrial Wastewater System Simplified Sample Data**

Date	Location and Site #	Sample #	Flow gpm	COD mg/l	ONC mg/l	TPH mg/l	Ortho Phos. mg/l	Total Phos. mg/l	Surf. mg/l	Complex Organics mg/l	Stron. mg/l	Metals mg/l
	Site 1: Bldg. 1 B2 Fuel Cell		Dry									
03/28	Site 2: Bldg. 5056-5057 B2 Maintenance Dock	20497		1480	1152	1088	1.6	2.5	<1	TCE 5; BOE 8.16	.486	NSM
	Site 3: Bldg. 7 Aircraft Ground Equipment (AGE)		Dry									
03/21	Site 4: Building T9- NDJ, Structural Maintenance, B2 Tech support	19184		65	6	5	<1	<1	NT	NT	.313	NSM
03/22	Site 4:	19168		202	15	9	<1	<1	17	N/A	.29	NSM
03/23	Site 4:	19174		123	51	16	<1	<1	4	N/A	.309	NSM
N/A	Site 4: Avg. Data Values	N/A		130	24	10	<1	<1	7	N/A	.304	NSM
03/21	Site 5: Building 1118- Washrack, Fuel System Support A-10	19161		36	5	3	3	3	<1	NT	.775	NSM
03/22	Site 5:	19165		423	4	2	8	14	<1	<.010	.547	NSM
03/23	Site 5:	19171		42	5	4	4	4	<1	<.010	.792	NSM
N/A	Site 5: Avg. Data Values	N/A		167	4.6	3	5	7	<1	<.010	.704	NSM
03/21	Site 6: Building 27- Corrosion Control	19164		375	70	38	<1	<1	NT	NT	.303	NSM
03/22	Site 6:	19167		176	8	4	<1	<1	29	<.010	.405	NSM
03/23	Site 6:	19173		76	18	10	<1	<1	<1	<.010	.304	NSM
03/24	Site 6:	19597		174	22	13	<1	<1	3	<.010	.316	NSM

Date	Location and Site #	Sample #	Flow gpm	COD mg/l	O&G mg/l	TPH mg/l	Ortho Phos. mg/l	Total Phos. mg/l	Surf. Mg/l	Complex Organics mg/l	Strom. mg/l	Metals mg/l
03/25	Site 6:	19797		126	8	<1	<1	<1	1.5	<.010	.300	NSM
03/26	Site 6:	20048		21	83	83	<1	<1	<1	<.010	.321	NSM
03/27	Site 6:	20311		<10	3	2	<1	<1	<1	<.010	.325	NSM
03/28	Site 6:	20465		660	3	3	1	2	<1	<.010	.408	NSM
N/A	Site 6: Avg. Data Values	N/A		202	27	19	<1	1	5	<.010	.335	NSM
03/21	Site 7: Building 5413 AFFE manhole	19162		65	8	6	<1	<1	39	<.010	.385	NSM
03/22	Site 7:	19166		302	16	16	3	3	9	<.010	.261	NSM
03/23	Site 7:	19172		NT	16	15	NT	NT	NT	<.010	NT	NSM
03/24	Site 7:	19598		74	5	5	1	1	1.5	<.010	.480	NSM
03/25	Site 7:	19792		66	14	13	2	4	1	TCE .006, m-Xylene .008, o-Xylene .005	.325	NSM
03/26	Site 7:	20049		NSR								NSM
03/27	Site 7:	20312		236	5	2	<1	<1	<1	<.010	.470	NSM
03/28	Site 7:	20486		31	13	6	<1	<1	<1	<.010	.397	NSM
N/A	Site 7: Avg. Data Values	N/A		129	11	9	1.42	1.8	9		.386	NSM
03/21	Site 8: Bldg. 5050-5053 B2 Maintenance Docks	19163		1140	64	62	18	34	NT	<.010	.902	NSM
03/22	Site 8:	19169		308	42	4	11	11	<1	<.010	.655	NSM
03/23	Site 8:	19175		263	96	40	8	8	1.25	<.010	1.32	Zn-5;Cu-2.5, Al-20
03/25	Site 8:	19795		NT	696	690	NT	NT	NT	BIT	NT	NT
N/A	Site 8: Avg. Data Values	N/A		570	225	199	12	18	<1.25	<.010	.563	NSM
03/23	Site 9: Bldg. 5054-5055 B2 Maintenance Docks	19176		123	9	8	3	3	<1	<.010	1.470	NSM
03/25	Site 9:	19801		28	NT	NSR	1	1	<1	<.010	.761	NSM
03/26	Site 9:	20050		<10	1	1	3	3	<1	<.010	.628	NSM
03/27	Site 9:	20313		<10	2	2	<1	<1	<1	<.010	.768	NSM
N/A	Site 9: Avg. Data Values	N/A		<16	1.5	1.5	2	2	<1	<.010	.719	NSM

Date	Location and Site #	Sample #	Flow gpm	COD mg/l	ONC mg/l	TPH mg/l	Ortho Phos mg/l	Total Phos mg/l	Surf. Mg/l	Complex Organics mg/l	Stron. mg/l	Metals mg/l
03/25	Site 10: North Jet Drain	19793		<10	98	82	265	290	NT	<100	.501	NSM
03/26	Site 10:	20054		CBC	25	23	<1	<1	<1	<100	.415	NSM
03/27	Site 10:	20315		1290	56	54	<1	<1	1.5	Naphthalene 76;	.510	NSM
03/28	Site 10:	20487		150	1497	1459	<1	<1	NT	<.50	.377	NSM
N/A	Site 10: Avg. Data Value	N/A		720	526	512	<1	<1	<1.25		434	NSM
03/26	Site 11: South Jet Drain	20055		<10	12	12	<1	<1	<1	<010	.576	NSM
03/27	Site 11:	20316		<10	12	1	<1	<1	<1	<010	.636	NSM
03/28	Site 11:	20489		11	10	<1	<1	<1	NT	NT	.669	
N/A	Site 11: Avg. Data Value	N/A		<10	10.6	<5	<1	<1	<1	<010	.627	NSM
03/25	Site 12: Bldg. 1125 & 1119 Refueling Maintenance & A10 Composite Wing	19794		3680	98	82	265	290	NT	<010	.347	Cu-4.2, Pb-2.0, Zn-6.5
03/26	Site 12:	20057		149	15	11	2	2	13	<010	.391	NSM
03/27	Site 12	20314		65	7	7	2	2	NT	<050	.349	NSM
03/28	Site 12:	20489		1030	224	208	<1	1.5	NT	<050	.199	
N/A	Site 12: Avg. Data Value	N/A		1231	86	77	68	74	13	<050	.321	
03/24	Site 13:	19599		5320	70	2	130	198	8	NT	NT	Al-13.9, Ba-2.76, Cu-9.23, Pb-6.5, Zn-21
	Site 14: Bldg. 52 Army Helicopter Wing		Dry									
03/26	Site 15: Bldg. 91 T-38 Maintenance & Washrack	20051		262	230	19	1	1.2	460	<100	5.170	NSM
03/27	Site 15:	20317		7200	NT	NT	<1	<1	330	NT	.404	NSM
N/A	Site 15: Avg. Data Value	N/A		3731	230	19	<1	<1.1	395	<100	2.787	NSM

Date	Location and Site #	Sample #	Flow gpm	COD mg/l	ONC mg/l	TPH mg/l	Ortho Phos. mg/l	Total Phos. mg/l	Surf. Mg/l	Complex Organics mg/l	Stron. mg/l	Metals mg/l
03/26	Site 16: Bldg. 1117 A10 Support	20064		<10	1	1	<1	<1	NT	NT	264	NSM
03/27	Site 16:	20318		<10	8	2	<1	<1	<1	<010	286	NSM
03/28	Site 16:	20504		25	120	115	<1	<1	NT	NT	.178	NSM
N/A	Site 16: Avg. Data Value	N/A		15	43	39	<1	<1	<1	<010	243	NSM
03/28	Site 22: AHFF Surge Basin	20490		660	30	30	1.3	2.1	<1	TCE .065; BOE 26.5	.465	NSM
03/28	Site 23: IWTP Equalization Basin	20491		270	66	50	1	1	3.6	Ebz 8.3; Tol. 6.6; Xylene 25	.423	NSM
03/26	Influent WWTP	20052		347	54	14	1.7	2.6	3.4	<.010	.319	NSM
03/26	Effluent WWTP	20053		13	1.68	1.52	1.6	1.9	<1	<.010	.297	NSM
03/23	Whiteman AFB Potable Water Supply	70220		<10	.5	.3	.2	.2	<1	<.010	.262	NSM
03/23	Reagent water	70221		<10	.3	<1	<1	<1	NT	<.010	<.005	NSM

NT: not tested
N/A: not applicable
NSR: no sample received
BIT: broken in transit
NSM: no metals of significance

Chemistry data presented in Table 7 can be grouped or characterized as belonging in categories. Some categories are; oxygen demanding contaminants (chemical oxygen demand or COD), oil and petroleum contaminants (oil and grease, total petroleum hydrocarbons or TPH), detergents (ortho-phosphate, total phosphate, surfactants), complex organic contaminants (pesticides, volatile, and semi-volatile organic) and metal contaminants (strontium and other heavy metals). Analysis of the sample data presented in Table 7 and a discussion of the related IWSCS observations and pollution prevention opportunities are grouped and presented by the five Zones and four confluence points depicted in Figure 13.

Zone 1 and Confluence 1

Zone 1 is comprised of sample site locations 1, 3, and 4. No discharges were observed from buildings 1 and 7, the B-2 fuel cell or aircraft grounds equipment shops (sample site locations 1 and 3). All industrial wastewater sampled in this zone during the IWSCS was generated from building 9 (sample site location 4). Building 9 houses the non-destructive inspection, structural maintenance, pneudraulics, electrical instrument repair, and metals tech support shops supporting B-2 maintenance and flight operations. Twenty-four hour composite samples were collected on three consecutive days at sample location 4. Observed flow at the site was less than 1 gpm each day. No significant or unexpected industrial wastewater contamination was observed during the survey the sample location in Zone 1.

Closely associated with the Zone 1 shops, is the B-2 corrosion control shop at building 27. Twenty-four hour composite samples of the wastewater generated from building 27 were collected eight consecutive days at confluence 1. Two of the eight samples indicated excessive amounts of oil and grease were discharged to the industrial sewer. The pre-treatment limits for oil and grease at Whiteman AFB are 50 mg/L. Wastewater generated from building 27 on 21 March and 26 March exceeded the established pre-treatment limit by about fifty percent for those two days. No likely specific source of the oil and grease was identified as an element of the pollution prevention opportunity assessments conducted at building 27. Two possible scenarios that may have resulted in the oil and grease excursions are parts cleaning, possibly using excessive detergent or improper disposal of a few gallons of oily wastewater.

The industrial wastewater generated at building 27 and within Zone 1 generally presents no wastewater treatment challenges. Good pollution prevention practices observed at these sites during the IWSCS undoubtedly contributed to lack of industrial wastewater problems identified in these areas. The sample data indicate only occasional oil and grease excursions occur and they had only minor impact to the industrial wastewater.

Zone 2, Confluence 1 and 2

Samples collected within Zone 2 were obtained from sample site locations 5, 12, 14, 15, and 16. Zone 2 is comprised of the industrial maintenance shops flight operations located adjacent to the southwestern edge of the flight line. The shops within this area are generally associated with the tenant organizations at Whiteman AFB. Among the tenants are an A-10 wing and an Army helicopter squadron. T-38 aircraft maintenance and flight operations also are supported within this sector.

The industrial wastewater generated within Zone 2 presents the most serious routine industrial wastewater problems identified by the IWSCS. No industrial wastewater was observed to be generated from building 52 (Army helicopter maintenance), or sample location 14, during the survey. Sample location 14 was monitored daily, including weekends, and was always found to be dry. Maintenance and flight operations associated with the Army helicopter squadron had no impact on the industrial wastewater system during the course of the survey. Sample location 5 monitored discharges of industrial wastewater from building 1118. This sample point included wastewater generated from the A-10 wash rack, structural maintenance, armaments, and fuels system support shops. No problems are indicated by the chemical data collected during the 3 days this location was sampled. Sample locations 5 and 14 were the only sample points monitored within Zone 2 that did not indicate some routine problems with the management of industrial activities generating oxygen demanding contaminants, oil and grease, detergent or heavy metals.

Sample locations 12 and 15 had twenty-four hour composite samples collected. Flows were generally observed to be less than two gpm at these sample points. Analysis of observations and chemistry data related to each of these sample locations is presented separately.

Sample location 12 was selected to monitor industrial wastewater generated from the A-10 refueling maintenance activities conducted at building 1125. Industrial wastewater generated from the building 1119 industrial shops was also monitored at this sample point. Chemical data collected on five consecutive (Sample 19599 became sample location 12) dates indicate serious industrial wastewater problems occur as a result of the industrial maintenance and flight operations activities in this area. The data is presented in Table 8. Average data values for Chemical Oxygen Demand were 1,231 mg/L,

Date	Sam. #	COD mg/L	O&G mg/L	TPH mg/L	O-phos. mg/L	T-phos. mg/L	Surf. mg/L	Organics mg/L	Metals mg/L
03/25	19794	3680	98	82	265	290	NT	<.01	
03/26	20057	149	15	11	2	2	13	<.05	
03/27	20314	65	7	7	2	2	NT	<.05	
03/28	20489	1030	224	208	<1	1.5	NT	<.05	
Avg.		1231	86	77	68	74	13	<.05	
03/24	19599	5320	70	2	130	198	8	NT	

or five times stronger than normal industrial wastewater generated at Whiteman AFB during the survey. Oil and grease sample concentrations were as high as 224 mg/L and were consistently measured at levels higher than the allowable pre-treatment limit of 50 mg/L. Chemical data indicating the presence of detergents (e.g., ortho-phosphate, total phosphate, surfactants) also inferred that excessive oil and grease in composite samples collected 25 and 28 March may have been related to emulsions formed from the use of soaps. Ortho-phosphate concentrations in samples ranged from a low of <1 mg/L to 265 mg/L and correlated to high oil and grease concentrations in the samples. It is likely that cleaning operations (buildings 1125 and 1119) generating the industrial wastewater at these times used excessive amounts of soap. Use of excessive soap then emulsified oil and grease from grease traps or oil/water separators.

An observation made by the IWSCS field team also identified an operation and maintenance problem with the oil/water separator at building 1125 that certainly contributed to the oil and grease sample results obtained at sample location 12. Building 1125 supports the maintenance and operations of the refueling maintenance group. Refueling vehicles are maintained and refueling flight operations are supported by the work activities performed here. Industrial wastewater pre-treatment facilities include an oil/water separator, an above ground slop oil storage tank and an underground, 30,000 gallon capacity, AFFF surge tank. The underground oil/water separator at this facility contains two non-submersible motors that drive a slop oil lift pump and a flow diversion valve. Storm water intermittently drains into two sumps that contain the motors, occasionally submerging them and creating electrical short circuits that damage the equipment. This results in an oil build-up within the oil/water separator that eventually overloads the oil removal capacity of the separator and consequently causes industrial wastewater discharges to exceed the pre-treatment limits. Additionally, the above ground slop oil storage tank has a valve/drain plumbed to the 30,000 gallon AFFF surge tank to decant water. This valve configuration can result in a discharge of removed oil and grease back into the industrial wastewater system and should be corrected.

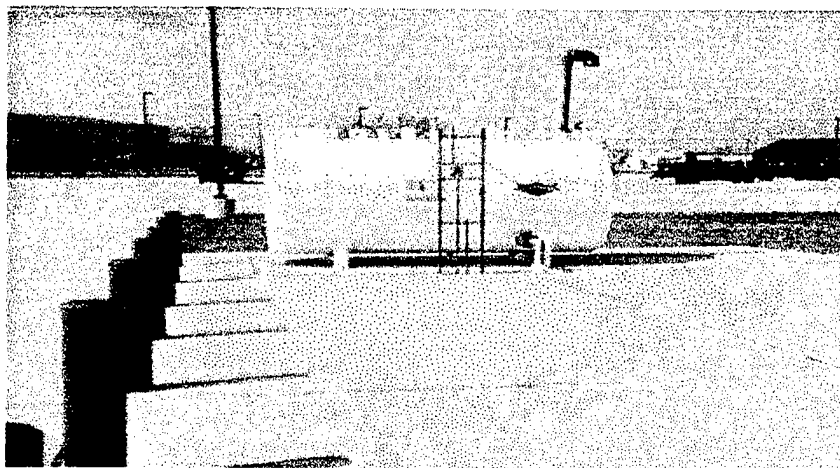


Figure 14: The building 1125 oil/water separator slop oil tank. Note the manual valve drained to the 30,000 gallon underground AFFF surge tank

In addition to sample locations 5, 12, and 14, industrial wastewater samples were also collected at sites 15 and 16 in Zone 2. Industrial wastewater sampled at these locations was generated from building 91 and building 1117, respectively. Samples collected from

Table 9: Sample Site 15 and 16 Simplified Data Table

Date	Site #	Sam. #	COD mg/L	O&G mg/L	TPH mg/L	Complex Organics mg/L	Strontium mg/L	Other mg/L
03/26	15	20051	262	230	19	TCE .0095	5.170	Al, Fe, Ni, Zn; Surf
03/27	15	20317	7200	NT	NT	N T	.404	Phenol & Surf.
Average	15	N/A	3731	230	19	<100	2.787	
03/26	16	20064	<10	1	1	NT	.264	
03/27	16	20318	<10	8	2	<.01	.286	
03/28	16	20504	25	120	115	NT	.178	
Average	16	N/A	15	43	39	<.01	.243	

site 15 is generated primarily by activities that support T-38 flight operations. Samples collected from site 16 are generated primarily by activities that support A-10 flight operations. Table 9 is a simplified presentation of the relevant chemistry data needed to assess industrial wastewater problems from these sample locations. A single oil and grease excursion above the Whiteman AFB pre-treatment limit was identified at sample location 16. Analysis of the data indicates the 120 mg/L oil and grease determination on 28 March may be due to disposal of a minor amount (<1 quart) of oil and grease through a drain. Chemistry data obtained from samples collected at site 15 indicate more serious problems.

Chemistry data for the two composite samples collected at site 15 indicate serious industrial wastewater problems. The highest value of chemical oxygen demanding contaminants was sampled here. High concentrations of oil and grease were detected on 26 March and visible volumes of oil and grease contained within the sample collected 27 March precluded testing for oil and grease. The presence of large amounts of surfactant in both composite samples indicate intensive use of detergents and cleaners associated with the T-38 maintenance and wash rack operations conducted at building 91. Detection of .0095 mg/L trichloroethene in sample 20051 may also indicate that hazardous materials are not properly disposed at this facility. Also, the detection of 5.17 mg/L strontium and significant concentrations of aluminum, iron, nickel and zinc indicate maintenance activities may occur that could result in exceeding recommended personal exposure limits (PEL) by aircraft maintenance workers and industrial wastewater system maintenance personnel.

All industrial wastewater generated within Zone 1 eventually flows to the B-2 corrosion control manhole (sample site 6). At this point, Zone 2 industrial wastewater converges with Zone 1 industrial wastewater and then flows east towards the B-2 fuel dock isolation pits. The high average contaminant (COD, O&G, & TPH) concentrations identified in composite samples collected at site 10 indicate that the values are most likely related to the industrial wastewater flow generated from Zone 2. Some fuel contamination at site 10 is also likely a result of a fuel hydrant leak detected during the IWSCS.

Zone 3 and Confluence 2

Zone 3 includes sample sites 8 and 9, which are manholes that collect industrial wastewater generated from the B-2 maintenance docks located within the northeast section of the Whiteman AFB flight line. Sample site 8 received industrial wastewater from maintenance docks 5050 and 5051 and sample site 9 received industrial wastewater from maintenance docks 5052, 5053, 5054, and 5055. Twenty-four hour composite samples were collected at both sample sites 8 and 9 on four consecutive days. Samples were collected from site 8 on 21, 22, 23, and 25 March. Samples were collected from site 9 on 23, 25, 26, and 27 March. Flow from both sample sites was very low each sampling day, always < 1 gpm. The small volumes of industrial wastewater generated from the northeast maintenance docks must be factored into the analysis of contaminant impact on the Whiteman AFB industrial wastewater system.

Analysis of chemistry data collected from site 8 indicates that the maintenance activities generated small volumes of moderate strength industrial wastewater. Excessive oil and grease and detergent contamination was found in each sample collected at site 8. Chemical oxygen demand from site 8 wastewater was of greater strength than normally found in Whiteman AFB industrial wastewater. Average daily site 8 analyte values were; chemical oxygen demand-570 mg/L, oil and grease-225 mg/L, and detergents approximately 18 mg/L. The use of excessive detergents or floor washing may be responsible for oil and grease contamination. Two elevated strontium values also occurred at site 8. On 21 March, .902 mg/L strontium was detected and on 23 March, 1.32 mg/L was measured. Sufficient dilution of these values occurs within the industrial wastewater system to preclude a wastewater treatment problem, however undesirable exposure to strontium wastes may result from the type industrial or maintenance activity that occurred in building 5050 and 5051 on 21 and 23 March.

No unexpected contamination was identified in samples collected at site 9. Strontium was found to be 1.47 mg/L in a sample collected 23 March. However later samples fell below a value of < .76 mg/L. Average sample values varied in a range from <.760 mg/L to .400 mg/L.

Industrial wastewater flow from sample sites 8 and 9 converge at sample site 10 with industrial wastewater from the western flight line area before flowing south to confluence 3. Samples collected at site 10 contained visible oil and grease most days. Visible indications of oil increased each day sampled. A significant increase in the amount of visual oil occurred on 28 March. The field team reported this observation to Tim Alm of the Refueling Maintenance. A nearby underground B-2 fuel hydrant nearby was pressure tested and found to be leaking. The hydrant was then repaired and serviced.

Zone 4 and Confluence 3

Sample sites 2 and 11 are located within Zone 4. No unusual or unexpected contaminants were identified in the three composite samples collected at site 11.

Only one composite sample was collected at site 2. It was collected on 28 March. The site 2 sample contained fuel. Contaminant concentrations were; chemical oxygen demand-1,480 mg/L, oil and grease 1152 mg/L, total petroleum hydrocarbon 1,088 mg/L. Some detergents were also present in the sample. Trichloroethene and 2(2-Butoxyetoxy)ethanol, the primary component of AFFF was also identified. No explanation is offered by the authors as to the cause of contamination found at site 2, however since no similar contamination was identified in the site 11 composite samples this may be an isolated event. Contractor related activities or a minor fuel spill treated with AFFF, might also be responsible for the irregularity.

Industrial wastewater from site 2 and site 11 converges with the main industrial sewage collection line just prior to sample site 7, the AFFF diversion and industrial wastewater confluence manhole. Twenty-four hour composite samples of Site 7 were collected for eight consecutive days. Chemistry data obtained from these samples present the most accurate picture of normal daily industrial wastewater characteristics. A simplified data summary table of the chemistry results is presented below for site 7.

Date	Sam. #	COD mg/L	O&G mg/L	TPH mg/L	O-phos. mg/L	T-phos. mg/L	Surf. mg/L	Organics mg/L	Metals mg/L
03/21	19162	65	8	6	<1	<1	39	<.010	
03/22	19166	302	16	16	3	3	9	<.010	
03/23	19172	NT	15	15	NT	NT	NT	<.010	
03/24	19598	74	5	5	1.5	1	1.5	<.010	
03/25	19792	66	14	13	1	4	1	<.010	
03/26	20049	NSR							
03/27	20312	236	5	2	<1	<1	<1	<.010	
03/28	20486	31	13	6	<1	<1	<1	<.010	
Avg.	N/A	129	11	9	1.42	1.8	9	<.010	

Analysis of the analytical data obtained from site 7 indicates that industrial wastewater at Whiteman AFB is uniform in nature and of relatively weak strength when compared to industrial wastewater generated from major commercial airport facilities. The chemical oxygen demand and oil and grease concentrations found in samples at site 7 were less than the strength normally found in domestic sewage. Similar results were found for detergents and complex organic contaminants. No unusual or unexpected heavy metals contamination was identified in any of the site 7 samples. The data indicate that normal industrial wastewater generated at Whiteman AFB does not present a problem for treatment at the

FOTW. The data also indicate that under normal conditions there is no need to operate the IWTP for treatment of industrial wastewater.

Zone 5 and Fire Protection Systems

Zone 5 is the industrial wastewater AFFF surge basin, which is also sample site 22. In the event of a fire alarm the IWTP/sanitary sewer lift station is designed to automatically shut down. If a fire alarm occurs, the system is designed for industrial wastewater and fire protection water to gravity flow to the manhole at sample site 7, until approximately 3 feet of head is overcome due to shut down of the IWTP/sanitary sewer lift station. At that point, the combined wastewater will gravity flow through a pipe to the 250,000 gallon AFFF surge tank. Wastewater contained within the AFFF tank must be pumped to the IWTP effluent lift station where it is diverted to the 150,000 gallon equalization basin for treatment at the IWTP or pumped to a wet well and lift station that primes a sanitary sewer force (pressurized) trunk line. The result of this configuration is a combined AFFF surge tank/IWTP equalization basin industrial wastewater/fire water total system surge capacity of approximately 400,000 gallons. 400,000 gallons is sufficient retention capacity for combined firewater/industrial wastewater flow for a single worst-case fire event. Such an event would generate approximately 333,000 gallons AFFF fire protection water, fire truck AFFF (estimated < 35,000 gallons), an unknown quantity of clean up water, and normal daily industrial wastewater flow (estimated < 10,000 gpd). It seems reasonable that sufficient industrial wastewater surge capacity exists for a one-time event.

Other situations are known to occur at Whiteman AFB that might also impact the normal available firewater/industrial wastewater flow surge capacity. Seven systematic events occur that could exceed or bypass the industrial wastewater system surge capacity. These events are:

- ***Bi-annual testing*** of the individual fire protection systems to ensure compliance with National Fire Protection Standard 25 (NFPA 25).
- ***Acceptance testing*** (fire protection system demonstration test is required by contract) of a B-2 maintenance dock or hangar.
- ***Multiple fire events***
- ***Diversion of industrial wastewater to the AFFF surge tank*** or equalization basin for treatment at the IWTP or waste load leveling and control at the FOTW.
- ***Submergence of the AFFF surge tank*** manway entrances by storm water.

- ***A fire alarm system failure*** to automatically or manually divert fire protection wastewater to the AFFF surge system.
- ***Any combination of the above events***

A short description and discussion of historical issues and information concerning the events that could damage or result in exceeding the industrial wastewater system surge capacity is provided below:

- ***NFPA 25 fire protection testing:*** NFPA 25 compliance testing is conducted every two years on all fire protection systems at Whiteman AFB. The plumbing shop of the CES is responsible for the testing and normally coordinates this effort with the fire protection squadron. A single NFPA 25 test does not normally discharge more than 5 percent of the available firewater from any fire protection system. However, cumulative tests conducted on consecutive days could temporarily reduce the available AFFF/industrial wastewater surge capacity significantly.
- ***Acceptance testing*** (fire protection system demonstration test is required by contract) of a B-2 maintenance dock or hangar: B-2 maintenance hangars constructed during the early phases of the B-2 program experienced difficulties in meeting the requirements of fire protection acceptance tests. Each test could result in the generation of 100,000 to 150,000 gallons of AFFF fire protection wastewater. In the past, these tests were often performed five or six times at each new hangar. Usually the tests were performed within one to two weeks of each preceding test before the contract requirements were met. Acceptance testing has improved and become more efficient, however wastewater generated from these activities has resulted in NPDES compliance and operation problems with both the IWTP and the FOTW. Only two B-2 hangars are currently incomplete and still require acceptance testing.
- ***Multiple fire events:*** Determination of the probability of multiple fire events occurring simultaneously or sequentially is not within the scope of this report, however, the possibility exists for such an event. This report used computations of waste loads and system capacities that were calculated using single event/worst case assumptions. Multiple or sequential fire events could create hydraulic demands for AFFF/industrial wastewater surge capacity than those estimated.
- ***Diversion of industrial wastewater*** to the AFFF surge system or equalization basin: Industrial wastewater has been diverted to the AFFF surge system many times in the past. Diversion of industrial wastewater

to this system reduces the system surge capacity temporarily by a like volume. Industrial wastewater diversion will occur again (most likely during summer periods) in order to control wastewater loads upon the FOTW.

- ***Submergence of the AFFF surge tank:*** Entrance to the AFFF surge tank is not water proof. Major storm events frequently generate sufficient volumes of storm water to submerge the AFFF surge tank area (See Figure 15). Surge capacity is reduced during these periods and the FOTW is more vulnerable to damage from a fire protection event in these periods.



Figure 15: This photograph is of sample site 7 (note reflector cone). The vents in the background background are associated with oil/water separator. The control panel of the lift station and an AFFF surge tank manway are also visible in the photo. Note that storm drainage slope to this general area.

- ***Fire alarm system failure*** to divert fire protection wastewater: The fire alarm system was designed to actuate shut down of the primary industrial wastewater lift station near the AFFF surge tank in order to divert fire protection wastewater to the AFFF surge tank. The telemetry of the system is damaged and requires repair to function properly. Currently,

industrial and fire protection wastewater must be diverted to the AFFF surge tank manually in the event of a fire protection event.

- ***Any combination of the above events:*** Combination of any of these events will act both cumulatively to reduce AFFF fire protection/industrial wastewater surge capacity.

A single grab sample of wastewater was collected from the AFFF surge tank or site 22 on 28 March. Chemical oxygen demand, oil and grease, total petroleum hydrocarbon concentrations were elevated above normal Whiteman AFB generated industrial wastewater. 2-(butoxyethoxy)ethanol or BOE, the primary component of AFFF, was also found in the sample. The BOE concentration was 26.2 mg/L or about .0026 of one percent. A standard AFFF solution would contain about .6 of one percent BOE or roughly 230 times more BOE than concentrated in sample 20490. If agitated the site 22 industrial wastewater would result in minimal foaming problems. No significant threat would be presented to operation of the FOTW or to NPDES compliance by discharge of the 28 March AFFF wastewater to the domestic sewer for treatment at the FOTW,

Confluence 4 and the Jet Fuel Distribution System

Confluence 4 is the IWTP equalization basin or sample site 23. Industrial wastewater contained in the equalization basin normally flows through sample site 7, then through a buried 100 gpm type B oil/water separator (OWS #5413), and finally the industrial wastewater is pumped from a 250 gpm lift station. When the diversion valve to the sanitary sewer is closed, industrial wastewater is discharged to the IWTP equalization basin or site 23.

A secondary industrial wastewater flow route to the IWTP equalization tank exists. This flow route is through the AFFF diversion pipe at sample site 7, through the AFFF surge tank, through the AFFF lift pump to the IWTP effluent wet well, and then through the effluent lift pumps and a manual flow diversion valve to the equalization basin.

Samples collected from the IWTP equalization basin exhibit the characteristics of normal Whiteman AFB industrial wastewater except for a 66 mg/L concentration of oil and grease. The elevated oil and grease value was not unexpected, since the main industrial wastewater lift pump immediately following OWS #5413 has a constant rate capacity of 250 gpm that exceeds the design flow of the oil/water separator by a factor of 2.5. The basic design of the equalization basin will also tend to concentrate floating oil and grease. The materials of construction (e.g., concrete), size of the equalization tank, its nature to accumulate oil and grease that precludes free oxygen exchange, and the potential accumulation of wastewater that may contain significant oxygen demanding contaminants creates a potentially hazardous situation for IWTP workers. Oxygen devoid atmospheres that are both corrosive and

potentially explosive may occur within this tank. Toxic gases (e.g., H₂S) may also be contained within the tank.

The design purpose of OWS # 5413 was to provide the primary oil and grease removal capability for the industrial wastewater system before discharge to either the sanitary sewer system or IWTP. At least three problems prevent the unit from achieving that purpose. They are:

- OWS hydraulic flow limits of 100 gpm and hydraulic demand of >250 gpm at the lift station
- underground construction and burial depth >30 feet
- lack of a defoamer system

No adequate fuel or oil spill removal capability presently exists to manage spills or fuel leaks. An example of this difficulty is no practical capability to remove fuel entering the industrial wastewater system from the observed fuel hydrant leak near sample site 10. The only operational fuel/oil removal management capability that exists within the entire wastewater treatment system is the primary clarifier at the FOTW. Prevention of fuel spills and detection of fuel leaks are critical to maintaining compliance with the Whiteman AFB oil and grease pretreatment requirements.

SECTION 5

CONCLUSIONS and RECOMMENDATIONS

5.1 Conclusions

The Whiteman AFB industrial wastewater system is a complex network that addresses dynamic problems. The general character of the industrial wastewater generated and sampled at Whiteman AFB during the survey is; small to very moderate flow rates (estimated 10-30 gpm), low strength or very small organic waste loads, and normally uniform in nature. The conclusions and recommendations associated with this network are best presented as groups of related and interdependent problems. For purposes of this report the industrial wastewater system problems are addressed as related to either:

- General characteristics of the industrial wastewater system,
- Fire fighting systems,
- Fuel storage/distribution system,
- B2 mission support,
- Tenant wing support, or
- Industrial wastewater treatment plant and management system

With respect to each of the above areas, conclusions have been identified. The conclusions are as follows:

General Characteristics of the Industrial Wastewater System

- Industrial wastewater flow at Whiteman AFB is extremely low (< 10 gpm) during normal operations.
- Samples collected during the survey indicate no routine industrial wastewater contamination occurs from the use of chlorinated or complex organic chemicals.
- Generally the strength of the industrial wastewater generated at Whiteman AFB is less than that of domestic sewage.
- The industrial wastewater survey was conducted during a dry period and provides a very accurate assessment of the real industrial wastewater issues.
- Survey samples are believed to be the most representative possible and reflect the full strength industrial wastewater normally generated at Whiteman AFB.
- Also, no indication of the presence or absence of infiltration within the industrial wastewater collection system can be inferred from the survey results.

Fire Fighting Systems

- The most likely cause of past and future hydraulic surges of industrial wastewater are either a fire alarm (false or real) or a test of the fire fighting systems themselves.
- Large volumes (>330,000 gallons) of industrial wastewater generated by one of the five separate fire fighting systems represent the single most serious threat to the successful operation of the industrial and sanitary wastewater treatment systems, as well as a likely cause of non-compliance with the NPDES Permit requirements.
- Many of the past operational problems experienced at the Whiteman AFB IWTP are related to fire alarms and tests of the fire fighting systems.
- An industrial wastewater system surge capacity of approximately 400,000 gallons is required to manage the worst case hydraulic/organic loading industrial wastewater system problem for a single fire alarm or fire test event.

Fuel Storage/Distribution Systems

- Spills or leaks of jet fuel to the industrial wastewater collection system represent a threat to proper operation of the industrial and sanitary wastewater treatment systems.
- Numerous small spills and leaks of jet fuel to the industrial wastewater collection system have caused some past operational problems at the IWTP.
- A common cause of oil and grease discharges to the industrial wastewater collection system is due to excessive use of soaps or surfactants when washing and maintaining aircraft.
- In general, operation and maintenance of spill control and containment facilities is effective.
- A fuel leak was identified during the IWSCS at an underground fuel hydrant near the blast shield and north jet drain manhole (site 10). A leak was suspected in the area as a result of field observations made by the AL/OEB field team. Modification of the standard fuel distribution line test by the CEV/fuels group confirmed the suspected source of the fuel.

B2 Mission Support and B2 Operations

- With the exception of activities that occurred at corrosion control, the site 8 maintenance docks, the site 2 maintenance docks and the blast shield/north jet drain area, the B2 mission support activities and B2 operations had a minimal impact upon the character, volume and nature of the industrial wastewater generated during the industrial wastewater characterization survey.
- Sample data indicated that sample site 2 (buildings 5056-5057) maintenance nose docks released fuel and organic wastes and solvents to the industrial sewer on 28 March 1997. Analysis of the data indicates the event was likely due to improper or unauthorized disposal of fuel and hazardous materials to the sewer.

- Review of the sample site 6 data collected from the (building 27) Corrosion Control area identified a routine problem involving the release of oil and grease.
- Information derived at the sample site 8 (buildings 5050-5053) B2 maintenance docks identified recurring releases of oil and grease. Sample data indicate the cause of the oil and grease release is likely related to the use of excessive or inappropriate soaps during routine maintenance activities (suspect floor washing).

Tenant Wing Support and Operations

The most serious routinely recurring activities that adversely impact the character of industrial wastewater generated at Whiteman AFB results from tenant facilities and the refueling maintenance at building 1125.

- Samples collected and analyzed during the industrial wastewater characterization survey indicate that Tenant Wing operations and support have the most significant adverse impact on the nature and quality of routine industrial wastewater.
- Industrial wastewater collected at sample site 12 and flowing from (buildings 1125 and 1119) the A10 Composite Wing and Refueling Maintenance Squadron generate excessively strong industrial wastewater from routine operations. IWSCS observations and chemistry data indicate that pollution prevention activities should be considered for implementation at these buildings. Routine operational procedures that occur in these buildings should be reviewed and improved with respect to industrial wastewater management.
- Analytical data collected at Sample Site 15, (building 91) the T-38 maintenance and wash rack area, have problems similar to those noted at Sample Site 12. Chemistry data indicate the industrial wastewater management problems generated from this area are severe.

Industrial Wastewater Treatment Plant and Management System

- Normal industrial wastewater strength and flow is insufficient to justify continued operation of the Industrial Wastewater Treatment Plant.
- Analysis of the information obtained from this survey and information obtained as part of the *Whiteman AFB Industrial Wastewater Treatment Plant Characterization and Analysis, May 1997*, indicate that modifications to both the IWTP system and IWTP units need to be made.
- The IWTP equalization basin functions as an effective industrial wastewater surge protection unit, but is ineffective as a unit for normalization of industrial wastewater characteristics.

Recommendations

A number of Whiteman AFB wastewater management issues and questions can be resolved by using the information presented in this report. Recommendations designed to address general and specific issues frequently raised by Whiteman AFB and Air Combat Command environmental management personnel are framed as responses to the following questions.

- *Should the IWTP be used to treat industrial wastewater and if so when?*
- *What IWTP modifications are needed to assure safe and efficient operation of the IWTP?*
- *What industrial wastes can and cannot be treated by the Whiteman AFB IWTP?*
- *What improvements to the fire protection and industrial wastewater system are needed to effectively manage releases of fire protection wastewater?*
- *Is there sufficient oil and grease removal capacity within the industrial wastewater collection system?*
- *What pollution/prevention initiatives would benefit the Whiteman AFB industrial wastewater management program?*
- *Which industrial shops have the greatest impact on industrial wastewater at Whiteman AFB?*
- *What can be done to improve and assist the control and manage foam within the industrial wastewater system at Whiteman?*
- *Are modifications to the Whiteman AFB NPDES permit needed?*
- *What other problems need to be addressed within the Whiteman AFB industrial wastewater management system?*

Recommendations in response to these issues are presented below:

- ***Should the IWTP be used to treat industrial wastewater and if so when?***

The IWTP is not needed to treat the industrial wastewater presently generated at Whiteman AFB. It is the recommendation of this report that the IWTP be modified to address several key operation and safety issues. The IWTP should be maintained on stand by and in operable condition to supplement industrial waste treatment capacity for treatment of complex and chlorinated organic contaminants and heavy metals wastes that could be generated as a result of future B-2 maintenance and flight operations support.

- ***What IWTP modifications are needed to assure safe and efficient operation of the IWTP?***

The principal IWTP safety issues involve hydrogen sulfide emissions, noxious odors and chemical storage and handling. Portable hydrogen sulfide monitors (e.g., Draeger Tubes)

and training in their use should be provided to the plant operators and maintenance personnel.

The IWTP ventilation system should be analyzed and improved to remove noxious odors and hydrogen sulfide gas from the building.

The use of sulfuric acid for pH adjustment should be discontinued. Hydrochloric acid should be restored as the acid used for pH adjustment.

The bulk chemical storage facilities should be modified to prevent contact of reactive chemicals (acid spill containment separated from alkaline spill containment) in the event of a chemical spill or chemical storage tank failure. The IWTP spill prevention and countermeasures plan should also be updated to reflect these modifications and operations changes.

Incorporation of the dissolved air flotation unit within the IWTP treatment scheme adds a difficult set of operational problems when managing AFFF wastes. The normal IWTP treatment scheme should incorporate only the use of the settling, sand and carbon filtration treatment components of industrial wastewater treatment system.

The IWTP is principally designed to remove heavy metal and complex organic contaminants from industrial wastewater. No monitoring devices or system to detect high strength organic and heavy metal wastes exists within the industrial wastewater collection system. Installation of automatic recorders and specific ion detectors, conductivity meters, etc., at the industrial wastewater confluence points would improve information for management of the industrial wastewater.

- **What industrial wastes can and cannot be treated by the Whiteman AFB IWTP?**

Normal or routine industrial wastewater generated at Whiteman AFB does not require treatment at the IWTP. Whiteman AFB industrial wastewater that does not contain alcohol (AFFF contains approximately 20% OH), > 50 mg/L oil and grease, or AFFF can be effectively treated for removal of heavy metals and complex organic contaminants at the IWTP, provided the noted safety concerns are addressed.

- **What improvements to the fire protection and industrial wastewater system are needed to effectively manage releases of fire protection wastewater?**

Numerous industrial wastewater system improvements are needed to improve effective management of fire protection wastewater. Principal recommendations to address this need are as follows:

- 1) Develop a fire protection system testing communications plan. The plan should establish a set of procedures to ensure good communication, cooperation and

coordination between the fire department, FOTW operators, fire test plumbers, B-2 maintenance hangar construction contractors, and the B-2 hangar acquisition officials.

- 2) Institute repairs to the B-2 fire alarm system that will enable all fire sensors to communicate to the fire alarm control room and shut the industrial wastewater lift station off automatically to divert fire protection wastewater to the AFFF surge basin.
 - 3) Improve drainage in the vicinity of the AFFF surge tank. Divert floodwater away from all points that allow entry into the industrial wastewater surge protection system.
 - 4) Brief top management of the 509th Bomb Wing on the potential operation and NPDES compliance consequences of sequential fire protection system testing and multiple fire events. Communication of the information will enable cost-effective decisions related to the need for additional AFFF surge protection capacity and the likelihood of a multiple fire event.
 - 5) In the event that the risk determination of a multiple fire event requires additional AFFF surge protection capacity, it is recommended that the surge tank facilities be constructed above ground.
 - 6) Full strength fire protection wastewater diverted to the AFFF surge tank or IWTP equalization basin should be introduced to the industrial wastewater collection system for treatment at the FOTW at a rate of no more than 5 gpm.
- **Is there sufficient oil and grease removal capacity within the industrial wastewater collection system?**

No effective oil and grease removal capability exists internal to the Whiteman AFB industrial wastewater collection system. An oil/water removal system or separator is needed to provide fuel leak and spill protection for both the FOTW and IWTP. An above ground parallel or inverted plate oil/water separator with a capacity of approximately 300 gpm is recommended for construction. Joint installation of a defoaming unit prior to wastewater entry to the OWS would enhance the operational capability of the unit. Since the existing oil/water separator at building 5413 it can not be effectively serviced due to its depth, it should be circumvented and abandoned.

- **What can be done to improve and assist the control and manage foam within the industrial wastewater system at Whiteman?**

In addition to installation of a defoaming unit at the recommended oil/water separator, awareness training concerning the adverse impact of AFFF on operation of the industrial wastewater management system is likely to be very beneficial. Instructions for industrial wastewater foam control could be provided with the awareness training.

- **Which industrial shops have the greatest impact on industrial wastewater at Whiteman AFB?**

Activities related to testing fire protection systems and the air craft maintenance and flight operations support shops associated with tenants occupying buildings 1125, 1119, and 91 have the most routine and significant adverse impact on the Whiteman AFB industrial wastewater management facilities.

The most significant B-2 industrial shop impact on the nature of industrial wastewater observed by the IWSCS team occurred at site 2, building 5056-5057 on 28 March 1997. This event is discussed as part of Zone 4, presented within Section 4.

- **What pollution/prevention initiatives would benefit the Whiteman AFB industrial wastewater management program?**

The pollution prevention initiatives that will have the greatest benefit for the Whiteman AFB industrial wastewater management program are outlined in Appendix 6. Pollution prevention opportunities identified for industrial shops located at buildings 1125, 1119, and 91 will have the most immediate positive benefit on industrial wastewater.

- **Are modifications to the Whiteman AFB NPDES permit needed?**

Non-utilization of the existing IWTP could be considered a violation of the operating conditions of NPDES permit MO-0029378. Use of the IWTP as currently configured is not recommended. The appropriate State of Missouri regulatory agency administering the NPDES permit should be advised of the current IWTP status and consulted for direction with respect to any needed permit modifications.

- **What other problems need to be addressed within the Whiteman AFB industrial wastewater management system?**

- 1 Small flow measuring devices, such as a 30⁰ V-notch weir, should be installed at the confluence points throughout the industrial wastewater system.
- 2 If an above ground oil/water separator is constructed upstream of the sanitary sewer it should also incorporate a flow measuring device.
- 3 Installation of inset sensors at key confluence points for measurement of specific conductance, pH, chlorides, selected metal ions would improve internal monitoring and management of industrial wastewater contaminants at their source.

The historic problems of industrial wastewater management at Whiteman AFB are readily solvable. Some additional equipment and technical changes are required to achieve satisfactory management and treatment of industrial wastewater at Whiteman AFB. Proven practical technologies and systems exist to address most of the pressing technical issues confronting the

industrial wastewater system. Many of the problems observed by the field team during the survey are related to "human factors". Management initiatives can provide considerable benefits requiring minimal expenditures towards solving some of the problems. Two general management areas that can improve industrial wastewater handling at Whiteman AFB are 1) better communication of issues and specific actions that cause industrial wastewater problems at the base and 2) improving cooperation between flight operations and flight support units (e.g., communicate and coordinate fire alarm acceptance testing six to eight weeks in advance).

SECTION 6

LIST OF REVIEWED INFORMATION and REFERENCES

AL/OEBW, *Whiteman AFB, Missouri Industrial Wastewater Treatment Plant Characterization and Analysis*, Armstrong Laboratory, May 1997.

Sverdrup Corporation, "*B-2 Support Facility, Package 56-A Industrial Wastewater Treatment Plant Facility Design*", US Army Corps of Engineers, September 1992.

Sverdrup Corporation, *Oil/Water Separator management Plan-Whiteman AFB*, US Army Corps of Engineers, October 1995

Sverdrup Corporation, *Whiteman AFB Sanitary Sewer Pretreatment Study-Phase I and II*, US Army Corps of Engineers, May 1995.

State of Missouri, Department of Natural Resources, *Whiteman AFB NPDES Permit # Mo.0029378*.

ACS Environmental, *Operations and Maintenance Manual ACS 220/60/SB Clarifier*, Baumgartner General Contractors, March 1993.

Westech Engineering, Inc., *Instruction Manual for 4316C Thickener*; June 1993.

Vulcan Industries, Inc., *Installation, Operation and Maintenance Manual-Sand Filters*, Baumgartner General Contractors, February 1994.

Vulcan Industries, Inc., *Installation, Operation and Maintenance Manual-Activated Carbon Filters*, Baumgartner General Contractors, February 1994.

Lee Mathews Equipment, Inc., *Operations and Maintenance Manuals for Guide-Mounted Sewage Lift Station Pumps*; Baumgartner General Contractors, February 1994.

Whiteman AFB, Missouri, *FOTW Self Reporting Records for 1995 and 1996*.

Whiteman AFB, Missouri, *Industrial Wastewater Treatment Plant Influent/Effluent Laboratory Analytical Results for 1995 and 1996*.

Whiteman AFB, Missouri, *IWTP Operators Log*, Darrel Tackett, 1995-96

FC-203CF Light Water™ Aqueous Film Forming Foam Material Safety Data Sheets, 3M Corporation, 22 August 1996.

FC-203CF Light Water™ Aqueous Film Forming Foam Product Environmental Data Sheet, 3M Corporation, 11 March 1994.

Air Force Center for Environmental Excellence, *Guidance for Reporting and Properly Disposing of Aqueous Film Forming Foam Spills*, PRO-ACT, March/April 1994.

PRO-ACT Information Packet Aqueous Film Forming Foam, PRO-ACT, 1995.

APPENDIX A

**17 March 1997 Whiteman AFB, Missouri
Industrial Wastewater System Characterization Survey
In Briefing Outline**

Whiteman AFB, Missouri
Industrial Wastewater System Characterization Survey
In Briefing Outline
17 March 1997

- 1.0 Participants/Introduction:**
- 2.0 Project purpose: Review Whiteman AFB industrial wastewater system, identify problems and alternatives, and develop a plan to address issues of significance.**
- 3.0 Initial Findings:**
 - 3.1 Industrial wastewater not as predicted**
 - 3.2 IWTP over designed**
 - 3.3 IWTP design impracticalities identified**
 - 3.4 NPDES permit compliance is tentative until industrial wastewater system and treatment system better understood**
 - 3.5 AFFF/industrial wastewater impact assessment needed to complete analysis**
- 4.0 Current Investigation Purpose:**
 - 4.1 Sample/Analyze/Characterize industrial wastewater**
 - 4.2 Understand AFFF impact on industrial wastewater system**
 - 4.3 Develop a basis to make predictive changes of wastewater character**
 - 4.4 Develop final recommendations for modifications/additions to Whiteman AFB conceptual industrial wastewater treatment management system.**
- 5.0 AL/OEB Expectations**
 - 5.1 Organized to support wartime mission with peacetime contract support**
 - 5.2 Program designed to collect samples/develop information to characterize industrial wastewater with current operations and anticipated future changes.**
 - 5.3 AL/OEBW team organized into three groups**
 - two sample teams
 - one investigation team
 - 5.4 Effort is focused on being responsive and providing correct answer**

APPENDIX B

**4 April 1997 Whiteman AFB, Missouri
Industrial Wastewater System Characterization Survey
Out Briefing Outline**

Whiteman AFB, Missouri
Industrial Wastewater System Characterization Survey
Out Briefing Outline
4 April 1997

1.0 Participants/Introduction

2.0 Project purpose: Review Whiteman AFB industrial wastewater system, identify problems and alternatives, and develop a plan to address issues of significance.

3.0 Expectations: Review process is continuing, sample collection efforts were successful, pollution prevention opportunity assessments of industrial shops are near completion and the survey has established a direction to the process that will enable successful industrial wastewater system management.

4.0 Initial Findings:

- **Industrial wastewater is a system of dynamic problems. Historical source of many issues is related to Whiteman AFB expanding and changing mission.**
- **Design assumptions for wastewater characterization not representative of current industrial waste streams.**
- **Processes generating industrial wastewater have significantly changed and are still changing.**
- **Hydraulic/organic wastewater characteristics appear to be very low flow and weak strength. However the industrial wastewater character and nature is subject to rapid change due to fuel spills, fire alarms, and industrial shop activities.**
- **Some industrial wastewater treatment plant (IWTP) design characteristics are impractical (e.g., volume indicator NaOH tank, chemical storage tank layout, simplicity of operation).**
- **IWTP requires sophisticated operation and management. Upgrade needed for operator training and analytical/operational control testing.**

5.0 "Get Well" Plan

- **Initiate industrial wastewater pretreatment controls**
- **Schedule routine wastewater characterization/treatment study**
- **Initiate IWSCS recommended corrective action**

APPENDIX C

**17 March 1997 Whiteman AFB, Missouri
Industrial Wastewater System Characterization Survey
Sample Data Tables**

WHITEMAN PROJECT 17

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples

Method Detection Limit	Date Collected	Sample Numbers Tracking Numbers	9/7/03/28			9/7/03/28			9/7/03/28			9/7/03/28			9/7/03/28			
			Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q
<5	2,4-Dinitrophenol	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	2,6-Dinitrophenol	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	2,4-Dinitrophenol	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Fluoranthene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Fluorene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Hexachlorobenzene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Hexachlorobutadiene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Hexachlorocyclopentadiene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Hexachloroethane	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Indeno(1,2,3-cd)pyrene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Isophorone	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	4,4-Methylendianiline	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Naphthalene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	N,N-Diisopropylamine	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	N,N-Diisopropylamine	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Nitrobenzene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	2-Nitrophenol	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	4-Nitrophenol	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Penta-chlorophenol	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Phenanthrene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Phenol	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Pyrene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	Toxaphene	SEE EPA METHOD0608	ABSENT	97/020495	97/04/02	b,c	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	1,2,4-Trichlorobenzene	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b
<5	2,4,6-Trichlorophenol	NT	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b	<10	97/020495	97/04/02	b

WHITEMAN PROJECT 17

DATA SUMMARY FORM

METALS

Wastewater Samples (mg/L)

Method	Date Collected	Sample Numbers	Tracking Numbers	Site	Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q				
Detection Limit	97/03/28	97020485:493:499-510:525-531	CN970265 & GN970265	Site 6	Aluminum	0.064	97020510	97/04/07		0.045	97020511	97/04/07		0.354	97020512	97/04/08		0.054			
					Antimony	0.004	97020510	97/04/07		0.003	97020511	97/04/07		0.006	97020512	97/04/08		<0.003	97020513	97/04/07	
					Arsenic	<0.005	97020510	97/04/07		0.005	97020511	97/04/07		<0.005	97020512	97/04/08		<0.005	97020513	97/04/07	
					Barium	0.037	97020510	97/04/07		0.046	97020511	97/04/07		0.052	97020512	97/04/08		0.047	97020513	97/04/07	
					Beryllium	<0.0005	97020510	97/04/07		<0.0005	97020511	97/04/07		0.0008	97020512	97/04/08		<0.0005	97020513	97/04/07	
					Boron	NT	97020510	97/04/07		NT	97020511	97/04/07		NT	97020512	97/04/08		NT	97020513	97/04/07	
					Cadmium	0.007	97020510	97/04/07		0.002	97020511	97/04/07		<0.001	97020512	97/04/08		<0.001	97020513	97/04/07	
					Calcium	NT	97020510	97/04/07		NT	97020511	97/04/07		NT	97020512	97/04/08		NT	97020513	97/04/07	
					Chromium	<0.005	97020510	97/04/07		<0.005	97020511	97/04/07		0.047	97020512	97/04/08		<0.005	97020513	97/04/07	
					Cobalt	<0.025	97020510	97/04/07		<0.025	97020511	97/04/07		<0.025	97020512	97/04/08		<0.025	97020513	97/04/07	
					Copper	0.016	97020510	97/04/07		0.024	97020511	97/04/07		0.012	97020512	97/04/08		<0.010	97020513	97/04/07	
					Iron	0.646	97020510	97/04/07		0.332	97020511	97/04/07		3.76	97020512	97/04/08		0.316	97020513	97/04/07	
Lead	0.011	97020510	97/04/07		0.003	97020511	97/04/07		0.017	97020512	97/04/08		0.001	97020513	97/04/07						
Magnesium	NT	97020510	97/04/07		NT	97020511	97/04/07		NT	97020512	97/04/08		NT	97020513	97/04/07						
Manganese	NT	97020510	97/04/07		NT	97020511	97/04/07		NT	97020512	97/04/08		NT	97020513	97/04/07						
Mercury	<0.0002	97020510	97/04/07		0.0002	97020511	97/04/07		0.0003	97020512	97/04/08		<0.0002	97020513	97/04/07						
Molybdenum	<0.030	97020510	97/04/07		<0.030	97020511	97/04/07		<0.030	97020512	97/04/08		<0.030	97020513	97/04/07						
Nickel	0.014	97020510	97/04/07		<0.010	97020511	97/04/07		0.039	97020512	97/04/08		<0.010	97020513	97/04/07						
Potassium	NT	97020510	97/04/07		NT	97020511	97/04/07		NT	97020512	97/04/08		NT	97020513	97/04/07						
Selenium	<0.005	97020510	97/04/07		<0.005	97020511	97/04/07		<0.005	97020512	97/04/08		<0.005	97020513	97/04/07						
Silver	<0.005	97020510	97/04/07		<0.005	97020511	97/04/07		<0.005	97020512	97/04/08		<0.005	97020513	97/04/07						
Sodium	<1	97020510	97/04/07		NT	97020511	97/04/07		NT	97020512	97/04/08		NT	97020513	97/04/07						
Strontium	0.008	97020510	97/04/07		0.009	97020511	97/04/07		0.017	97020512	97/04/08		0.008	97020513	97/04/07						
Thallium	<0.001	97020510	97/04/07		<0.001	97020511	97/04/07		<0.001	97020512	97/04/08		<0.001	97020513	97/04/07						
Titanium	<0.025	97020510	97/04/07		<0.025	97020511	97/04/07		<0.025	97020512	97/04/08		<0.025	97020513	97/04/07						
Vanadium	NT	97020510	97/04/07		NT	97020511	97/04/07		NT	97020512	97/04/08		NT	97020513	97/04/07						
Zinc	0.050	97020510	97/04/07		0.027	97020511	97/04/07		0.372	97020512	97/04/08		0.35	97020513	97/04/07						
		8016 MOD (AFFP)																			
<0.10 mg/L		Z12-Butoxyethoxy/Ethanol			<0.1	97020485	97/04/02		0.442	97020486	97/04/02		<0.1	97020487	97/04/01		<0.1				
		Selenium low recovery			21.9%	97020510	97/04/07		51.6%	97020486	97/04/02		41.2%	97020487	97/04/01		17.3%				
		Thallium low recovery			44.0%	97020510												47.6%			

COMMENTS

Wastewater Samples

Page 1 of 2

< - Signifies non detected and the detection limits.


SN : SEE COMMENT

ABS : ABSENT

Comment Code

- a: HOLD TIME EXCEEDED.
- b: OTHER FUEL HYDROCARBONS ARE PRESENT.
- c: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ALKALINE COMPOSITION OF SAMPLE FOR SELENIUM AND/OR THALLIUM.
- d: MATRIX SPIKE WAS BELOW ACCEPTABLE LIMITS FOR CARBON TETRACHLORIDE AND TRICHLOROETHENE DUE TO MATRIX INTERFERENCE.
- e: PESTICIDES ARE ABSENT QUALITATIVELY (EPA 625)
- f: Comments for OEHd Sample #: 97020493 HEAVY EMULSION. SAMPLE CONTAINED MODERATE AMOUNT OF JET FUEL TYPE HYDRO CARBONS (C12-C16).
- g: Comments for OEHd Sample #: 97020494 TOLUENE APPROXIMATELY 1.1 UG/L, ETHYLBENZENE APPROXIMATELY 1.3 UG/L, M,P,XYLENE APPROXIMATELY 2.4 UG/L, O-XYLENE APPROXIMATELY 1.9 UG/L.
- h: Comments for OEHd Sample #: 97020499 VINYL CHLORIDE APPROXIMATELY 3.3 UG/L, 1,1,1-TRICHLOROETHANE APPROXIMATELY 1.8 UG/L, M,P,XYLENE APPROXIMATELY 1.2 UG/L, O-XYLENE APPROXIMATELY 1.0 UG/L.
- i: Comments for OEHd Sample #: 97020501 SAMPLE DILUTED DUE TO OTHER FUEL HYDROCARBONS AT APPROXIMATELY 200-300UG/L.
- j: Comments for OEHd Sample #: 97020547 (CBC) CANCELLED BY CHEMIST DUE TO FUEL LAYER OF SAMPLE WHICH WOULD BE DETRIMENTAL TO ANALYZER EQUIPMENT.
- k: Comments for OEHd Sample #: 97020548 SMALL AMOUNTS OF JP-8.
- l: Comments for OEHd Sample #: 97020540 MODERATE AMOUNTS OF JP-8.
- m:

Reviewed By:


 VICTORIA S. DUNOVANT, LI Col, USAF, BSC
 Chief, Environmental Chemistry Branch

WHITEMAN PROJECT 17

DATA SUMMARY FORM

COMMENTS

Wastewater Samples

page 1 of 2

< - Signifies none detected and the detection limits.


SN : SEE COMMENT

ABS : Absent

Comment Code

- a: HOLD TIME EXCEEDED.
- b: HEAVY EMULSION. SAMPLE CONTAINED A LARGE AMOUNT OF JET-FUEL-TYPE HYDROCARBONS.
- c: PESTICIDES QUALITATIVELY ABSENT (EPA 629).
- d: OTHER FUEL HYDROCARBONS ARE PRESENT.
- e: MATRIX SPIKE WAS BELOW ACCEPTABLE LIMITS FOR CARBON TETRACHLORIDE AND TRICHLOROETHENE DUE TO MATRIX INTERFERENCE.
- f: Comments for OEHD Sample #: 97020505 VINYL CHLORIDE APPROXIMATELY 1.8 UGL, 1,1,1-TRICHLOROETHANE APPROXIMATELY 1.0 UGL, M.P.-XYLENE APPROXIMATELY 0.9 UGL, O-XYLENE APPROXIMATELY 1.1 UGL.
- g: Comments for OEHD Sample #: 97020506 VINYL CHLORIDE APPROXIMATELY 2.2 UGL.
- h: Comments for OEHD Sample #: 97020507 M.P.-XYLENE APPROXIMATELY 1.3 UGL, O-XYLENE APPROXIMATELY 1.3 UGL.
- i: Comments for OEHD Sample #: 97020508 SAMPLE DILUTED DUE TO PRESENCE OF OTHER FUEL HYDROCARBONS AT APPROXIMATELY 200-300 UGL.
- j: Comments for OEHD Sample #: 97020552 LARGE AMOUNTS OF JP-8.
- k: Comments for OEHD Sample #: 97020581 SMALL AMOUNTS OF JP-8.
- l: Comments for OEHD Sample #: 97020581 RESULTS ARE IN mg/Bottle (ERA QC)
- m: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ALKALINE COMPOSITION OF SAMPLE FOR SELENIUM AND/OR THALLIUM.
- n: Comments for OEHD Sample #: 97020555 TRACE AMOUNTS OF JP-8.

Reviewed By:


VICTORIA S. DUNOVANT, Lt Col, USAF, BSC
Chief, Environmental Chemistry Branch

METALS

Wastewater Samples

Method Detection Limit	Date Collected	Sample Numbers Tracking Numbers	97/03/23			97/03/23			97/03/23			97/03/23					
			Result	OE NUMBER	Date	Result	OE NUMBER	Date	Result	OE NUMBER	Date	Result	OE NUMBER	Date			
			H2O POTABLE OC			PRESERVATIVE OC			PITCHER BLK			ISCO EQUIP BLK					
			97/019177, 196, 261, 335-341			97/019178, 197, 342-347			97/019179, 348			97/019198, 350-354					
			GP970220			GP970221			GP970222			GP970223					
			Group F														
<0.030		Aluminum	<0.015	97/019196	97/04/03	<0.015	97/019197	97/04/02	NT		<0.015	97/019198	97/04/04				
<0.003		Antimony	<0.003	97/019196	97/04/03	0.004	97/019197	97/04/02	NT		<0.003	97/019198	97/04/04				
<0.005		Arsenic	<0.005	97/019196	97/04/03	<0.005	97/019197	97/04/02	NT		<0.005	97/019198	97/04/04				
<0.050		Barium	0.033	97/019196	97/04/03	<0.025	97/019197	97/04/02	NT		<0.025	97/019198	97/04/04				
<0.001		Beryllium	<0.0005	97/019196	97/04/03	<0.0005	97/019197	97/04/02	NT		<0.0005	97/019198	97/04/04				
<0.05		Boron	NT			NT			NT		NT						
<0.001		Cadmium	<0.001	97/019196	97/04/03	<0.001	97/019197	97/04/02	NT		<0.001	97/019198	97/04/04				
<1		Calcium	NT			NT			NT		NT						
<0.01		Chromium	<0.005	97/019196	97/04/03	<0.005	97/019197	97/04/02	NT		<0.005	97/019198	97/04/04				
<0.05		Cobalt	<0.025	97/019196	97/04/03	<0.025	97/019197	97/04/02	NT		<0.025	97/019198	97/04/04				
<0.02		Copper	0.015	97/019196	97/04/03	<0.010	97/019197	97/04/02	NT		<0.010	97/019198	97/04/04				
<0.03		Iron	0.045	97/019196	97/04/03	<0.030	97/019197	97/04/02	NT		0.073	97/019198	97/04/04				
<0.02		Lead	0.001	97/019196	97/04/03	0.001	97/019197	97/04/02	NT		<0.001	97/019198	97/04/04				
<1		Magnesium	NT			NT			NT		NT						
<0.03		Manganese	NT			NT			NT		NT						
<0.0002		Mercury	<0.0002	97/019196	97/04/03	<0.0002	97/019197	97/04/02	NT		<0.0002	97/019198	97/04/04				
<0.03		Molybdenum	<0.030	97/019196	97/04/03	<0.030	97/019197	97/04/02	NT		<0.030	97/019198	97/04/04				
<0.03		Nickel	<0.010	97/019196	97/04/03	<0.010	97/019197	97/04/02	NT		<0.010	97/019198	97/04/04				
<1		Potassium	NT			NT			NT		NT						
<0.005		Selenium	<0.005	97/019196	97/04/03	c.*	97/019197	97/04/02	NT		<0.005	97/019198	97/04/04				
<0.01		Silver	<0.005	97/019196	97/04/03	<0.005	97/019197	97/04/02	NT		<0.005	97/019198	97/04/04				
<1		Sodium	NT			NT			NT		NT						
<0.14		Strontium	0.262	97/019196	97/04/03	<0.005	97/019197	97/04/02	NT		<0.005	97/019198	97/04/04				
<0.001		Thallium	<0.001	97/019196	97/04/03	c.**	97/019197	97/04/02	NT		<0.001	97/019198	97/04/04				
<0.21		Titanium	<0.025	97/019196	97/04/03	<0.025	97/019197	97/04/02	NT		<0.025	97/019198	97/04/04				
<0.05		Vanadium	NT			NT			NT		NT						
<0.05		Zinc	0.006	97/019196	97/04/03	0.002	97/019197	97/04/02	NT		0.011	97/019198	97/04/04				
<0.10 mg/L		2-(2-Butoxyethoxy)Ethanol	NT			NT			NSR	97020673	NT						
		Selenium (low recoveries)	78.6%	97/019196	97/04/03												
		Thallium (low recovery)	74.1%	97/019196	97/04/03												

WHITEMAN PROJECT 17

DATA SUMMARY FORM

COMMENTS

Wastewater Samples

Page 1 of 1

< - Signifies none detected and the detection limits.

SN : SEE COMMENT.

ABS : Absent

Comment Code

- a: HOLD TIME EXCEEDED.
- b: RECOVERY OF BROMOFORM WAS BELOW ACCEPTABLE LIMITS IN THE LABORATORY FORTIFIED BLANK.
- c: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION SELENIUM AND/OR THALLIUM.
- d: All pesticides (EPA METHOD 625) were absent qualitatively.
- e: Comments for OEH Sample #: 97019177 POSITIVELY IDENTIFIED BROMODICHLOROMETHANE AT APPROXIMATELY 0.8 UG/L AND DIBROMOCHLOROMETHANE AT 3.3 UG/L AND BROMOFORM AT 8.5 UG/L.
- f: Comments for OEH Sample #: 97020873 CANCELED-NSR : NO SAMPLE RECEIVED

Reviewed By:


VICTORIA S. DUNOVANT, Lt Col, USAF, BSC
Chief, Environmental Chemistry Branch

DATA SUMMARY FORM

METALS
Wastewater Samples
(mg/L)

Method Detection Limit (mg/L)	Sample Numbers Tracking Numbers	Date Collected	Result		Date		Q		OE NUMBER		Date		Q		OE NUMBER		Date		Q		
			Result	OE NUMBER	Date	Q	OE NUMBER	Date	Q	OE NUMBER	Date	Q	OE NUMBER	Date	Q	OE NUMBER	Date	Q			
		97/03/11																			
	97017721-27 & 97017742-45																				
	GN970200																				
	Rinse Water																				
	Compound																				
	Group F																				
<0.030	Aluminum		<0.030	97017742	97/03/18																
<0.003	Antimony		<0.003	97017742	97/03/18																
<0.005	Arsenic		<0.005	97017742	97/03/18																
<0.050	Barium		<0.050	97017742	97/03/18																
<0.001	Beryllium		<0.001	97017742	97/03/18																
<0.05	Boron		NT																		
<0.001	Cadmium		<0.001	97017742	97/03/18																
<1	Calcium		NT																		
<0.01	Chromium		<0.010	97017742	97/03/18																
<0.05	Cobalt		<0.050	97017742	97/03/18																
<0.02	Copper		<0.020	97017742	97/03/18																
<0.03	Iron		<0.030	97017742	97/03/18																
<0.02	Lead		<0.020	97017742	97/03/18																
<1	Magnesium		NT																		
<0.03	Manganese		<0.030	97017742	97/03/18																
<0.0002	Mercury		<0.0002	97017742	97/03/18																
<0.03	Molybdenum		<0.030	97017742	97/03/18																
<0.03	Nickel		<0.020	97017742	97/03/18																
<1	Potassium		NT																		
<0.005	Selenium		<0.005	97017742	97/03/18																
<0.01	Silver		<0.010	97017742	97/03/18																
<1	Sodium		NT																		
<0.14	Strontium		<0.005	97017742	97/03/18																
<0.001	Thallium		<0.001	97017742	97/03/18																
<0.21	Titanium		<0.050	97017742	97/03/18																
<0.05	Vanadium		<0.050	97017742	97/03/18																
<0.05	Zinc		<0.050	97017742	97/03/18																
	8015MOD																				
<0.10 mg/L	2-(Butoxyethoxy)Ethanol		<0.1	97017744	97/03/27																

< - Signifies none detected and the detection limits.


SN : SEE COMMENT.

ABS : Absent

Comment Code

- a: HOLD TIME EXCEEDED.
- b: ABSENT = QUALITATIVE ANALYSIS ONLY
NO DUPLICATE WAS PROVIDED, THEREFORE, SAMPLE WAS ANALYZED WITHOUT MATRIX SPIKE.
SOME COMPOUNDS WERE REPORTED AS "SEE COMMENT" BECAUSE THE GC WAS BELOW ACCEPTABLE LIMITS. THE RESULTS OF THE ANALYSIS FOR THESE COMPOUNDS WERE <10 UG/L.

Reviewed By:


VICTORIA S. DUNOVANT, Lt Col, USAF, BSC
Chief, Environmental Chemistry Branch



ARMSTRONG LABORATORY
Occupational & Environmental Health Directorate/OEA
2402 E. Drive, Bldg 140
Brooks AFB, Texas 78235-5114
(210) 536-3626, FAX (210) 536-9043
WHITEMAN PROJECT 17
DATA SUMMARY FORM
INORGANIC
Wastewater Samples (mg/L)

Wastewater Samples (mg/L)

Kam

Method	Date Collected		Sample Numbers	Tracking Numbers	97/03/26		97/03/26		97/03/26		97/03/26		97/03/26		97/03/26		97/03/26		97/03/26	
	Result	OE NUMBER			Result	OE NUMBER	Result	OE NUMBER	Result	OE NUMBER	Result	OE NUMBER	Result	OE NUMBER	Result	OE NUMBER	Result	OE NUMBER	Result	OE NUMBER

Group A		Group B		Group C		Group D		Group E											
<10	COD	262	97/02/103	97/04/01	<10	97/02/135	97/04/01	124	97/02/176	97/04/01	NT	NT	347	97/02/107	97/04/01	13	97/02/114	97/04/01	
<1	Total Organic Carbon	226	97/02/103	97/04/01	15	97/02/135	97/04/01	66	97/02/176	97/04/01	NT	NT	276	97/02/107	97/04/01	100	97/02/114	97/04/01	
Group B		Group C		Group D		Group E		Group F		Group G		Group H		Group I		Group J		Group K	
<0.3	Oil & Grease	230.4	97/02/104	97/04/08	1.12	97/02/136	97/04/08	NT					54.4	97/02/108	97/04/08	1.68	97/02/115	97/04/08	
<1	TPH	19.2	97/02/104	97/04/08	1	97/02/136	97/04/08	NT					14.4	97/02/108	97/04/08	1.52	97/02/115	97/04/08	
Group C		Group D		Group E		Group F		Group G		Group H		Group I		Group J		Group K		Group L	
<0.2	Ammmonia	4.25	97/02/105	97/04/04	0.35	97/02/137	97/04/04	7.2	97/02/177	97/04/08	NT	NT	12.5	97/02/109	97/04/04	0.47	97/02/116	97/04/04	
<0.1	Ketohshi Nitrogen	58	97/02/105	97/04/04	1.1	97/02/137	97/04/04	9.0	97/02/177	97/04/08	NT	NT	20	97/02/109	97/04/04	2.2	97/02/116	97/04/04	
<0.1	Nitrate+Nitrite	2.3	97/02/105	97/04/04	2.1	97/02/137	97/04/04	3.4	97/02/177	97/04/08	NT	NT	<0.1	97/02/109	97/04/04	6.4	97/02/116	97/04/04	
<0.10	Phosphate Ortho	1	97/02/105	97/04/04	<0.1	97/02/137	97/04/04	7.9	97/02/177	97/04/08	NT	NT	1.7	97/02/109	97/04/04	1.65	97/02/116	97/04/04	
<0.10	Phosphorus, Total	1.2	97/02/105	97/04/04	<0.1	97/02/137	97/04/04	9.9	97/02/177	97/04/08	NT	NT	2.6	97/02/109	97/04/04	1.95	97/02/116	97/04/04	
Group D		Group E		Group F		Group G		Group H		Group I		Group J		Group K		Group L		Group M	
<0.005	Cyanide Total	NT			NT			0.50	97/02/178	97/04/01	NT	NT	<0.005	97/02/110	97/04/01	<0.005	97/02/117	97/04/01	
Group E		Group F		Group G		Group H		Group I		Group J		Group K		Group L		Group M		Group N	
<10 ug/L	Phenols	NT			NT			110	97/02/179	97/04/03	NT	NT	12	97/02/111	97/04/01	<10	97/02/118	97/04/01	
Group G		Group H		Group I		Group J		Group K		Group L		Group M		Group N		Group O		Group P	
<1	Acidity Total	NT			NT			NT			NT	NT	NT			NT			NT
<1	Alkalinity Total	NT			NT			NT			NT	NT	NT			NT			NT
<1	Bromide	NT			NT			NT			NT	NT	NT			NT			NT
<1	Chloride	35.1	97/02/106	97/03/31	NT			88.1	97/02/180	97/03/31	NT	NT	84.8	97/02/112	97/03/31	89.6	97/02/119	97/03/31	
<1	Color	NT			NT			NT			NT	NT	NT			NT			NT
<1	Lampter Index	NT			NT			NT			NT	NT	NT			NT			NT
<1	Residue, Total	NT			NT			NT			NT	NT	NT			NT			NT
<0.2 mL	Residue, Seilable	1.8	97/02/106	97/03/31	a	NT		<0.2	97/02/180	97/03/31	a	NT	0.8	97/02/112	97/03/31	0.3	97/02/119	97/03/31	
<1	Residue, Filterable	2334	97/02/106	97/03/31	NT			174	97/02/180	97/03/31	NT	NT	508	97/02/112	97/03/31	461	97/02/119	97/03/31	
<1	Residue, Nonfilterable	94	97/02/106	97/03/31	NT			390	97/02/180	97/03/31	NT	NT	63	97/02/112	97/03/31	7	97/02/119	97/03/31	
<1	Residue, Volatile	NT			NT			NT			NT	NT	NT			NT			NT
<1	Silica	NT			NT			NT			NT	NT	NT			NT			NT
<1	Specific Conductance	1226	97/02/106	97/03/31	NT			135	97/02/180	97/03/31	NT	NT	892	97/02/112	97/03/31	719	97/02/119	97/03/31	
<1	Sulfates	202.6	97/02/106	97/03/31	NT			1.5	97/02/180	97/03/31	NT	NT	68.8	97/02/112	97/03/31	78.2	97/02/119	97/03/31	
<0.1	Sulfides	NT			NT			4.2	97/02/181	97/04/07	a	NT	3.8	97/02/113	97/04/07	a	<0.1	97/02/120	97/04/07
<0.1	Surfactants	460	97/02/106	97/03/31	a	NT		<0.1	97/02/180	97/03/31	a	NT	3.4	97/02/112	97/03/31	a	0.18	97/02/119	97/03/31
<0.1	Turbidity	NT			NT			NT			NT	NT	NT			NT			NT
<1	Volatile Suspended Solids	60	97/02/106	97/03/31	NT			221	97/02/180	97/03/31	NT	NT	46	97/02/112	97/03/31	3	97/02/119	97/03/31	

VOLATILE ORGANICS

Wastewater Samples

(µg/L)

Method	Date Collected	Sample Numbers	Tracking Numbers	Site	Method	Date Collected	Sample Numbers	Tracking Numbers	Site	Method	Date Collected	Sample Numbers	Tracking Numbers	Site	Method	Date Collected	Sample Numbers	Tracking Numbers	Site																								
EPA 624 OR 601/602	97/03/26	59, 69, 75, 103, 106	CN970244 & GN970244	SITE 15	97/03/26	97/020064, 80, 135, 137	CN970292 & GN970292	SITE 16	97/03/26	97/020081, 92, 83, 176, 181	97/03/26	97/020182	GN970259	SITE 19	97/03/26	60, 69, 76, 107, 113	CN970245 & GN970245	INF WWT#	97/03/26	97/020053, 61, 70, 77, 114, 120	CN970246 & GN970246	EFF WWT#																					
																							Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q					
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT
																							<5.0	97/020075	97/04/01	h	<5	97/020080	97/03/31	NT	<5	97/020093	97/03/28	b1	NT	<5	97/020076	97/03/31	NT	<5	97/020077	97/03/31	NT



ARMSTRONG LABORATORY
 Occupational & Environmental Health Directorate/OEA
 2402 E. Drive, Bldg 140
 Brooks AFB, Texas 78235-5114
 (210) 536-3626, FAX (210) 536-9043
WHITEMAN PROJECT 17
DATA SUMMARY FORM
INORGANIC
 Wastewater Samples

(mg/L)

Method	Date Collected	Sample Numbers	Tracking Numbers	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23	97/03/23
Limit				97/019177, 196, 261, 335-341; GP970220	97/019178, 197, 342-347; GP970221	97/019179, 348; GP970222	97/019198, 350-354; GP970223													
Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q
Group A																				
COD	<10	97/019335	97/03/31		<10	97/019342	97/03/31	NT	<10	97/019349	97/03/31		<10	97/019350	97/03/28					
Total Organic Carbon	<1	97/019335	97/03/31		<1	97/019342	97/03/31	NT	<1	97/019349	97/03/31		<1	97/019350	97/03/28					
Group B																				
Oil & Grease	0.48	97/019336	97/03/26		0.32	97/019343	97/03/26	1	NT	97/019350	97/03/28		<0.1	97/019350	97/03/28					
TPH	0.32	97/019336	97/03/26		<1	97/019343	97/03/26	0.8	97/019348	97/03/26			<0.1	97/019350	97/03/28					
Group C																				
Ammonia	0.34	97/019337	97/03/31		<0.2	97/019344	97/03/28		NT	97/019350	97/03/28		<0.2	97/019350	97/03/28					
Kjeldahl Nitrogen	0.3	97/019337	97/03/31		0.4	97/019344	97/03/28		0.6	97/019350	97/03/28		<0.1	97/019350	97/03/28					
Nitrate+Nitrite	<0.1	97/019337	97/03/31		<0.1	97/019344	97/03/28		<0.1	97/019350	97/03/28		<0.1	97/019350	97/03/28					
Phosphate, Ortho	0.22	97/019337	97/03/31		<0.1	97/019344	97/03/28		<0.1	97/019350	97/03/28		<0.1	97/019350	97/03/28					
Phosphorus, Total	0.22	97/019337	97/03/31		<0.1	97/019344	97/03/28		NT	97/019350	97/03/28		<0.1	97/019350	97/03/28					
Group D																				
Cyanide, Total	<0.005	97/019338	97/03/27		<0.005	97/019345	97/03/27		NT	97/019351	97/03/27		<0.005	97/019351	97/03/27					
Group E																				
Phenols	<10	97/019339	97/03/31		<10	97/019346	97/03/31		<10	97/019352	97/04/01		<10	97/019352	97/04/01					
Group G																				
Acidity, Total	NT				NT				NT				NT							
Alkalinity, Total	NT				NT				NT				NT							
Ironide	NT				NT				NT				NT							
Chloride	30.3	97/019340	97/03/26		NT				<1.0	97/019353	97/03/26		<1.0	97/019353	97/03/26					
Color	NT				NT				NT				NT							
Langelier Index	NT				NT				NT				NT							
Residue, Total	NT				NT				NT				NT							
<1	<0.2	97/019340	97/03/26		<0.2	97/019344	97/03/26		<0.2	97/019353	97/03/26		<0.2	97/019353	97/03/26					
Residue, Sulfide	269	97/019340	97/03/26		NT				1	97/019353	97/03/26		1	97/019353	97/03/26					
Residue, Filterable	<1	97/019340	97/03/26		NT				NT				NT							
Residue, Nonfilterable	<1	97/019340	97/03/26		NT				1	97/019353	97/03/26		1	97/019353	97/03/26					
Residue, Volatile	NT				NT				NT				NT							
Silica	NT				NT				NT				NT							
Specific Conductance	461	97/019340	97/03/26		NT				3	97/019353	97/03/26		3	97/019353	97/03/26					
Sulfides	33.2	97/019340	97/03/26		NT				<1.0	97/019353	97/03/26		<1.0	97/019353	97/03/26					
Sulfides	<0.2	97/019341	97/03/27		0.6	97/019347	97/03/27		<0.1	97/019354	97/03/27		<0.1	97/019354	97/03/27					
Sulfates	<0.1	97/019340	97/03/26		NT				<0.1	97/019354	97/03/26		<0.1	97/019354	97/03/26					
Turbidity	NT				NT				NT				NT							
Volatile Suspended Solids	<1	97/019340	97/03/26		NT				<1	97/019353	97/03/26		<1	97/019353	97/03/26					

WHITEMAN PROJECT 17

DATA SUMMARY FORM

VOLATILE ORGANICS
Wastewater Samples

(ug/L)

Method Detection Limit	Compound	Date Collected 97/03/23			97/03/23			97/03/23			97/03/23					
		Sample Numbers	Tracking Numbers	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	
<5.0	Benzene	97019177, 196, 261, 335, 341	GP970220	<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Bromodichloromethane			SN	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Bromotoluene			8.5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Bromonethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Carbon Tetrachloride			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Chlorobenzene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Chloroethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	2-Chloroethylvinyl ether			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Chloroform			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Chloromethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Dibromochloromethane			SN	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	1,2-Dichlorobenzene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	1,3-Dichlorobenzene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	1,4-Dichlorobenzene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	1,1-Dichloroethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	1,2-Dichloroethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	trans-1,2-Dichloroethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	cis-1,3-Dichloropropene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	trans-1,3-Dichloropropene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Ethylbenzene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Methylene Chloride			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	1,1,2,2-Tetrachloroethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Toluene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	1,1,1-Trichloroethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	1,1,2-Trichloroethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Trichloroethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Trichlorofluoromethane			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	m-Xylene & p-Xylene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	o-Xylene			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT
<5.0	Vinyl Chloride			<5	97019177	97/03/26	b	<5	97019178	97/03/26	b	<5	97019179	97/03/27	b	NT



ARMSTRONG LABORATORY

Occupational & Environmental Health Director/EOA
 2402 E. Drive, Bldg 140
 Brooks AFB, Texas 78235-5114

(210) 536-3626, FAX (210) 536-9043
 WHITEMAN PROJECT 17
 DATA SUMMARY FORM

INORGANIC
 Wastewater Samples

(mg/L)

Method Detection Limit	Compound	Result	OE NUMBER	Date	Q Result	OE NUMBER	Date	Q Result	OE NUMBER	Date	Q Result	OE NUMBER	Date	Q Result	OE NUMBER	Date	Q Result	OE NUMBER	Date
Date Collected: 9/7/03 Sample Numbers: 97017721-27 & 97017742-45 Tracking Numbers: GNS70200 In 6/17/03																			
<10	Group A COD	<10	97017721	9703121															
	Total Organic Carbon	<1	97017721	9703121															
<0.3	Group B Oil & Grease	<0.3	97017722	9703117															
<1	TPH	<1	97017722	9703117															
<0.2	Group C Ammonia	<0.2	97017723	9703120															
	Kjeldahl Nitrogen	<0.2	97017723	9703120															
<0.1	Nitrate+Nitrite	<0.1	97017723	9703120															
<0.1	Phosphate, Ortho	<0.1	97017723	9703120															
<0.10	Phosphorus, Total	<0.1	97017723	9703120															
<0.005	Group D Cyanide, Total	<0.005	97017724	9703113															
<10 ug/L	Group E Phenols	<10	97017725	9703114															
	Group G Acidity, Total	NT																	
	Alkalinity, Total	NT																	
	Bromide	NT																	
<1	Chloride	3.8	97017726	9703118															
units	Color	NT																	
	Langlier Index	NT																	
	Residue, Total	NT																	
<0.2m/L	Residue, Sulfate	<0.2	97017726	9703118	a														
<1	Residue, Filterable	<1	97017726	9703118	b														
<1	Residue, Nonfilterable	<1	97017726	9703118	b														
<1	Residue, Volatile	<1	97017726	9703118	a														
	Silica	NT																	
umhos	Specific Conductance	2	97017726	9703118															
<1	Sulfides	5.4	97017726	9703118															
<0.1	Sulfides	<0.1	97017727	9703113	1														
	Surfactants	<0.1	97017726	9703118	a														
units	Turbidity	NT																	
	Volatile Suspended Solids	<1	97017726	9703118	b														

DATA SUMMARY FORM
VOLATILE ORGANICS
Wastewater Samples

Method Detection Limit	Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	
	Date Collected 97/03/11																					
	Sample Numbers 97017721-27 & 97017742-45																					
	Tracking Numbers GNY970200																					
	Rinse Water																					
	EPA 824 OR 601/602																					
<5.0	Benzene	<5	97017745	97/03/14																		
<5.0	Bromodichloromethane	<5	97017745	97/03/14																		
<5.0	Bromoforn	<5	97017745	97/03/14																		
<5.0	Bromomethane	<5	97017745	97/03/14																		
<5.0	Carbon Tetrachloride	<5	97017745	97/03/14																		
<5.0	Chlorobenzene	<5	97017745	97/03/14																		
<5.0	Chloroethane	<5	97017745	97/03/14																		
<5.0	2-Chloroethylvinyl ether	<5	97017745	97/03/14																		
<5.0	Chloroform	<5	97017745	97/03/14																		
<5.0	Chloromethane	<5	97017745	97/03/14																		
<5.0	Dibromochloromethane	<5	97017745	97/03/14																		
<5.0	1,2-Dichlorobenzene	<5	97017745	97/03/14																		
<5.0	1,3-Dichlorobenzene	<5	97017745	97/03/14																		
<5.0	1,4-Dichlorobenzene	<5	97017745	97/03/14																		
<5.0	1,1-Dichloroethane	<5	97017745	97/03/14																		
<5.0	1,2-Dichloroethane	<5	97017745	97/03/14																		
<5.0	trans-1,2-Dichloroethane	<5	97017745	97/03/14																		
<5.0	1,2-Dichloropropane	<5	97017745	97/03/14																		
<5.0	cis-1,3-Dichloropropane	<5	97017745	97/03/14																		
<5.0	trans-1,3-Dichloropropane	<5	97017745	97/03/14																		
<5.0	Ethylbenzene	<5	97017745	97/03/14																		
<5.0	Methylene Chloride	<5	97017745	97/03/14																		
<5.0	1,1,2,2-tetrachloroethane	<5	97017745	97/03/14																		
<5.0	Tetracloroethene	<5	97017745	97/03/14																		
<5.0	Toluene	<5	97017745	97/03/14																		
<5.0	1,1,1-Trichloroethane	<5	97017745	97/03/14																		
<5.0	1,1,2-Trichloroethane	<5	97017745	97/03/14																		
<5.0	Trichloroethene	<5	97017745	97/03/14																		
<5.0	Trichlorofluoromethane	<5	97017745	97/03/14																		
<5.0	m-Xylene & p-Xylene	<5	97017745	97/03/14																		
<5.0	o-Xylene	<5	97017745	97/03/14																		
<5.0	Vinyl Chloride	<5	97017745	97/03/14																		

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS
Wastewater Samples

Method Detection Limit	Date Collected Sample Numbers Tracking Numbers	9/7/03/23 97019177-196, 291, 335-341 GP970220	9/7/03/23 97019178-197, 342-347 GP970221	9/7/03/23 97019179-348 GP970222	9/7/03/23 97019198-350-354 GP970223	H2O POTABLE OC		PRESERVATIVE OC		PITCHER BLK		ISCO EQUIP BLK															
						Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q										
<5	EPA 625	<10	97019261	97/03/25	NT																						
<5	Acanaphthene	<10	97019261	97/03/25	NT																						
<5	Acanaphthylene	<10	97019261	97/03/25	NT																						
<5	Aldrin	ABSENT			SEE EPA METHOD608																						
<5	Antracene	<10	97019261	97/03/25	NT																						
<5	Aroclor 1260	ABSENT			SEE EPA METHOD608																						
<5	Benzidine	<10	97019261	97/03/25	NT																						
<5	Benz(a)anthracene	<10	97019261	97/03/25	NT																						
<5	Benz(b)pyrene	<10	97019261	97/03/25	NT																						
<5	Benz(b)fluoranthene	<10	97019261	97/03/25	NT																						
<5	Benz(g,h,i)perylene	<10	97019261	97/03/25	NT																						
<5	Benzofluoranthene	<10	97019261	97/03/25	NT																						
<5	beta-BHC	ABSENT			SEE EPA METHOD608																						
<5	delta-BHC	ABSENT			SEE EPA METHOD608																						
<5	Bis(2-chloro ethoxy)methane	<10	97019261	97/03/25	NT																						
<5	Bis(2-chloro ethyl)ether	<10	97019261	97/03/25	NT																						
<5	Bis(2-chloroisopropyl)ether	<10	97019261	97/03/25	NT																						
<5	Bis(2-ethylhexyl)phthalate	<10	97019261	97/03/25	NT																						
<5	4-Bromophenyl Phenyl Ether	<10	97019261	97/03/25	NT																						
<5	Buylbenzylphthalate	<10	97019261	97/03/25	NT																						
<5	Chlordane	ABSENT			SEE EPA METHOD608																						
<5	4-chloro-3-methyl Phenol	<10	97019261	97/03/25	NT																						
<5	2-chloronaphthalene	<10	97019261	97/03/25	NT																						
<5	2-chlorophenol	<10	97019261	97/03/25	NT																						
<5	4-chlorophenyl Phenyl Ether	<10	97019261	97/03/25	NT																						
<5	Chrysene	<10	97019261	97/03/25	NT																						
<5	4,4-DDD	ABSENT			SEE EPA METHOD608																						
<5	4,4-DOE	ABSENT			SEE EPA METHOD608																						
<5	4,4-DDT	ABSENT			SEE EPA METHOD608																						
<5	Dieldrin	ABSENT			SEE EPA METHOD608																						
<5	Dibenzod a,h)anthracene	<10	97019261	97/03/25	NT																						
<5	1,2-Dichlorobenzene	<10	97019261	97/03/25	NT																						
<5	1,3-Dichlorobenzene	<10	97019261	97/03/25	NT																						
<5	1,4-Dichlorobenzene	<10	97019261	97/03/25	NT																						
<5	3,3-Dichlorobenzidine	<10	97019261	97/03/25	NT																						
<5	2,4-Dichlorophenol	<10	97019261	97/03/25	NT																						
<5	Diethylphthalate	<10	97019261	97/03/25	NT																						
<5	2,4-Dimethylphenol	<10	97019261	97/03/25	NT																						
<5	Dimethylphthalate	<10	97019261	97/03/25	NT																						
<5	Di-n-Butylphthalate	<10	97019261	97/03/25	NT																						
<5	Di-n-Propylphthalate	<10	97019261	97/03/25	NT																						
<5	Di-n-Octylphthalate	<10	97019261	97/03/25	NT																						
<5	4,6-Dinitro-2-Methylphenol	<10	97019261	97/03/25	NT																						

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples

(ug/l)

Method Detection Limit	Date Collected Sample Numbers Tracking Numbers	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	
	97/03/23 97019177, 196, 201, 335-341; GP970220 H2O POTABLE OC	97/03/23 97019178, 197, 342-347; GP970221 PRESERVATIVE OC	97/03/23 97019179, 348; GP970222 PITCHER BLK	97/03/23 97019198, 350-354 GP970223 ISCO EQUIP BLK																	
<5	2,4-Dinitrophenol	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	2,6-Dinitrophenol	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	2,4-Dinitrotoluene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Fluoranthene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Fluorene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Hexachlorobenzene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Hexachlorobutadiene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Hexachlorocyclopentadiene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Hexachloroethane	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Indenyl (2,3-c-d)pyrene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Isophorone	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	4,4-Methylendianiline	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Naphthalene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	N-Nitrosodl-n-Propylamine	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	N-Nitrosodiphenylamine	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Nitrobenzene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	2-Nitrophenol	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	4-Nitrophenol	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Perchlorophenol	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Phenanthrene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Phenol	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Pyrene	<10	97019261	97/03/25	NT	<10	97019262	97/03/25	NT												
<5	Toxaphene	ABSENT																			
<5	1,2,4-Trichlorobenzene	<10	97019261	97/03/25	NT																
<5	2,4,6-Trichlorophenol	<10	97019261	97/03/25	NT																
						SEE EPA METHOD0608															
						SEE EPA METHOD0608															

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS
Wastewater Samples
(ug/L)

Method	Date Collected	Sample Numbers	Tracking Numbers	Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	
Method	9/7/03/11	97017721-27 & 97017742-45		EPA 625																	
Detection Limit			GN970200	Rinse Water																	
<5				Acenaphthene	<10	97017743	97/03/18	b													
<5				Acenaphthylene	<10	97017743	97/03/18	b													
<5				Aldrin	ABS	97017743	97/03/18	b													
<5				Anthracene	<10	97017743	97/03/18	b													
<5				Aroclor 1260	ABS	97017743	97/03/18	b													
<5				Benzidine	<10	97017743	97/03/18	b													
<5				Benzof(a)anthracene	<10	97017743	97/03/18	b													
<5				Benzof(b)pyrene	<10	97017743	97/03/18	b													
<5				Benzof(k)fluoranthene	<10	97017743	97/03/18	b													
<5				Benzof(k)fluoranthene	ABS	97017743	97/03/18	b													
<5				beta-BHC	ABS	97017743	97/03/18	b													
<5				delta-BHC	ABS	97017743	97/03/18	b													
<5				Bis(2-chloro ethoxy)methane	<10	97017743	97/03/18	b													
<5				Bis(2-chloro ethyl)ether	<10	97017743	97/03/18	b													
<5				Bis(2-chloroisopropyl)ether	SN	97017743	97/03/18	b													
<5				Bis(2-ethylhexyl)phthalate	<10	97017743	97/03/18	b													
<5				4-Bromophenyl Phenyl Ether	<10	97017743	97/03/18	b													
<5				Butyldibenzylphthalate	<10	97017743	97/03/18	b													
<5				Chlordane	ABS	97017743	97/03/18	b													
<5				4-chloro-3-methyl Phenol	<10	97017743	97/03/18	b													
<5				2-chloronaphthalene	SN	97017743	97/03/18	b													
<5				2-chlorophenol	<10	97017743	97/03/18	b													
<5				4-chlorophenyl Phenyl Ether	<10	97017743	97/03/18	b													
<5				Chrysene	<10	97017743	97/03/18	b													
<5				4,4-DDD	ABS	97017743	97/03/18	b													
<5				4,4-DDE	ABS	97017743	97/03/18	b													
<5				4,4-DDT	ABS	97017743	97/03/18	b													
<5				Dieldrin	ABS	97017743	97/03/18	b													
<5				Dibenzof(a,h)anthracene	<10	97017743	97/03/18	b													
<5				1,2-Dichlorobenzene	<10	97017743	97/03/18	b													
<5				1,3-Dichlorobenzene	<10	97017743	97/03/18	b													
<5				1,4-Dichlorobenzene	<10	97017743	97/03/18	b													
<5				3,3-Dichlorobenzidine	<10	97017743	97/03/18	b													
<5				2,4-Dichlorophenol	<10	97017743	97/03/18	b													
<5				Diethylphthalate	<10	97017743	97/03/18	b													
<5				2,4-Dimethylphenol	<10	97017743	97/03/18	b													
<5				Dimethylphthalate	<10	97017743	97/03/18	b													
<5				Di-n-Butylphthalate	<10	97017743	97/03/18	b													
<5				Di-n-Octylphthalate	<10	97017743	97/03/18	b													
<5				4,6-Dinitro-2-Methylphenol	<10	97017743	97/03/18	b													

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples
(ug/L)

Method	Date Collected	Sample Numbers	Tracking Numbers	Rinse Water	Compound	Results	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	
	97/03/11	97017721-27 & 97017742-45	GN970200																			
Method																						
Detection Limit																						
<5					2,4-Dinitrophenol	<10	97017743	97/03/18	b													
<5					2,6-Dinitrotoluene	<10	97017743	97/03/18	b													
<5					2,4-Dinitrotoluene	<10	97017743	97/03/18	b													
<5					Fluoranthene	<10	97017743	97/03/18	b													
<5					Fluorene	<10	97017743	97/03/18	b													
<5					Hexachlorobenzene	<10	97017743	97/03/18	b													
<5					Hexachlorobutadiene	<10	97017743	97/03/18	b													
<5					Hexachlorocyclopentadiene	SN	97017743	97/03/18	b													
<5					Hexachloroethane	<10	97017743	97/03/18	b													
<5					Indenol 1,2,3-c-dipylene	<10	97017743	97/03/18	b													
<5					Isophorone	<10	97017743	97/03/18	b													
<5					4,4-Methylenedianiline	ABS	97017743	97/03/18	b													
<5					Naphthalene	<10	97017743	97/03/18	b													
<5					N-Nitrosodl-n-Propylamine	<10	97017743	97/03/18	b													
<5					N-Nitrosodiphenylamine	<10	97017743	97/03/18	b													
<5					Nitrobenzene	<10	97017743	97/03/18	b													
<5					2-Nitrophenol	<10	97017743	97/03/18	b													
<5					4-Nitrophenol	<10	97017743	97/03/18	b													
<5					Perchlorophenol	<10	97017743	97/03/18	b													
<5					Phenanthrene	<10	97017743	97/03/18	b													
<5					Phenol	<10	97017743	97/03/18	b													
<5					Pyrene	<10	97017743	97/03/18	b													
<5					Toxaphene	ABS	97017743	97/03/18	b													
<5					1,2,4-Trichlorobenzene	<10	97017743	97/03/18	b													
<5					2,4,6-Trichlorophenol	<10	97017743	97/03/18	b													

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples

Method Detection Limit	Date Collected Sample Numbers Tracking Numbers	97/03/26 97020051, 59, 68, 75, 103-106, CN970244 & GN970244	97/03/26 97020064, 80, 135-137, CN970252 & GN970252	97/03/26 97020081, 82, 83, 176-181 CN970257 & GN970257	97/03/26 97020182 GN970259	97/03/26 9720052, 60, 69, 76, 107-113, CN970245 & GN970245	97/03/26 97020053 61, 70, 77, 114-120 CN970246 & GN970246	97/03/26						
								Result	OE					
ug/L	Compound	Result	OE	Result	OE	Result	OE	Result	OE					
<5	2,4-Dinitrophenol	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	2,6-Dinitrololeane	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	2,4-Dinitrofluorene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Fluorene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Hexachlorobenzene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Hexachlorobutadiene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Hexachlorocyclopentadiene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Hexachloroethane	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Indeno(1,2,3-c-d)pyrene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Isophorone	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	4,4-Methylmethylaniline	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Naphthalene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	N-Nitrosodl-n-Propylamine	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	N-Nitrosodiphenylamine	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Nitrobenzene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	2-Nitrophenol	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	4-Nitrophenol	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Pentachlorophenol	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Phenanthrene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Pyrene	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	Toxaphene	ABSENT	97020051	97/03/31	g	SEE EPA METHOD 808		<10	97020052	97/03/31	g	ABSENT	97020053	97/03/31
<5	1,2,4-Trichlorobenzene	ABSENT	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31
<5	2,4,6-Trichlorophenol	<100	97020051	97/03/31	f	NT		<10	97020052	97/03/31	g	<10	97020053	97/03/31

DATA SUMMARY FORM

METALS
Wastewater Samples
(mg/L)

Method	Date Collected	Result	OE	Date	Q	Result	OE	Date	Q	Result	OE	Date	Q	Result	OE	Date	Q	
Sample Numbers	97/03/26	97/03/26				97/03/26				97/03/26				97/03/26				
Tracking Numbers	97020051, 59, 68, 75, 103, 106;	97020064, 80, 135, 137;				97020081, 82, 83, 176, 181				97020052, 60, 69, 76, 107, 113;				97020053, 61, 70, 77, 114, 120				
Init	CN970244 & GN970244	CN970252 & GN970252			CN970257 & GN970257					CN970245 & GN970245				CN970246 & GN970246				
Compound	Group F	Group F			Group F					Group F				Group F				
<0.030	Aluminum	2.04	97020059	97/04/03	1.84	97020064	97/04/03	1.97	97020081	97/04/03	NT		0.803	97020060	97/04/03	0.180	97020061	97/04/03
<0.003	Antimony	<0.003	97020059	97/04/03	0.005	97020064	97/04/03	0.365	97020081	97/04/03	NT		<0.003	97020060	97/04/03	<0.003	97020061	97/04/03
<0.005	Arsenic	<0.005	97020059	97/04/03	0.005	97020064	97/04/03	0.217	97020081	97/04/03	NT		<0.005	97020060	97/04/03	<0.005	97020061	97/04/03
<0.050	Barium	0.077	97020059	97/04/03	0.161	97020064	97/04/03	<0.025	97020081	97/04/03	NT		0.057	97020060	97/04/03	0.027	97020061	97/04/03
<0.001	Beryllium	0.0028	97020059	97/04/03	0.0008	97020064	97/04/03	0.028	97020081	97/04/03	NT		<0.0005	97020060	97/04/03	<0.0005	97020061	97/04/03
<0.005	Boron	NT			NT			NT					NT			NT		
<0.001	Cadmium	0.009	97020059	97/04/03	0.006	97020064	97/04/03	0.027	97020081	97/04/03	NT		<0.001	97020060	97/04/03	<0.001	97020061	97/04/03
<1	Calcium	NT			NT			NT					NT			NT		
<0.01	Chromium	0.016	97020059	97/04/03	<0.005	97020064	97/04/03	0.2	97020081	97/04/03	NT		<0.005	97020060	97/04/03	<0.005	97020061	97/04/03
<0.05	Cobalt	<0.025	97020059	97/04/03	<0.025	97020064	97/04/03	0.269	97020081	97/04/03	NT		<0.025	97020060	97/04/03	<0.025	97020061	97/04/03
<0.02	Copper	0.116	97020059	97/04/03	0.022	97020064	97/04/03	0.109	97020081	97/04/03	NT		0.03	97020060	97/04/03	<0.010	97020061	97/04/03
<0.03	Iron	35.4	97020059	97/04/03	3.4	97020064	97/04/03	1.4	97020081	97/04/03	NT		0.76	97020060	97/04/03	0.207	97020061	97/04/03
<0.02	Lead	0.012	97020059	97/04/03	0.007	97020064	97/04/03	0.381	97020081	97/04/03	NT		0.004	97020060	97/04/03	0.002	97020061	97/04/03
<1	Magnesium	NT			NT			NT					NT			NT		
<0.03	Manganese	NT			NT			NT					NT			NT		
<0.0002	Mercury	<0.0002	97020059	97/04/03	0.0004	97020064	97/04/03	0.0019	97020081	97/04/03	NT		0.0003	97020060	97/04/03	0.0004	97020061	97/04/03
<0.03	Molybdenum	<0.030	97020059	97/04/03	<0.030	97020064	97/04/03	<0.030	97020081	97/04/03	NT		<0.030	97020060	97/04/03	<0.030	97020061	97/04/03
<0.03	Nickel	1.67	97020059	97/04/03	0.025	97020064	97/04/03	0.17	97020081	97/04/03	NT		<0.010	97020060	97/04/03	<0.010	97020061	97/04/03
<1	Potassium	NT			NT			NT					NT			NT		
<0.005	Selenium	<0.005	97020059	97/04/03	<0.005	97020064	97/04/03	0.496	97020081	97/04/03	d.*		<0.005	97020060	97/04/03	<0.005	97020061	97/04/03
<0.01	Silver	0.007	97020059	97/04/03	<0.005	97020064	97/04/03	<0.005	97020081	97/04/03	NT		<0.005	97020060	97/04/03	<0.005	97020061	97/04/03
<1	Sodium	NT			NT			NT					NT			NT		
<0.14	Strontium	6.17	97020059	97/04/03	0.284	97020064	97/04/03	<0.005	97020081	97/04/03	NT		0.319	97020060	97/04/03	0.297	97020061	97/04/03
<0.001	Thallium	<0.001	97020059	97/04/03	d.**			<0.001	97020081	97/04/03	NT		<0.001	97020060	97/04/03	<0.001	97020061	97/04/03
<0.21	Titanium	<0.025	97020059	97/04/03	<0.025	97020064	97/04/03	<0.025	97020081	97/04/03	NT		<0.025	97020060	97/04/03	<0.025	97020061	97/04/03
<0.05	Vanadium	NT			NT			NT					NT			NT		
<0.05	Zinc	1.41	97020059	97/04/03	0.07	97020064	97/04/03	1.08	97020081	97/04/03	NT		0.09	97020060	97/04/03	0.035	97020061	97/04/03
<0.10 mg/L	2,2-Di-butoxyethyl Ether	52	97020068	97/04/04	NT			NT					<0.1	97020069	97/04/02	<0.1	97020070	97/04/04
*	Selenium (Low Recoveries)	4.5%	97020059	97/04/03	46%	97020064	97/04/03	73.8%	97020081	97/04/03	NT		35.1%	97020060	97/04/03	49.9%	97020061	97/04/03
**	Thallium (Low Recovery)	27%	97020059	97/04/03	57%	97020064	97/04/03											

COMMENTS

Wastewater Samples

Page 1 of 1

< - Signifies none detected and the detection limits.


SN : SEE COMMENT.

ABS : Absent

Comment Code

- a: HOLD TIME EXCEEDED.
- b: RECOVERY OF BROMOFORM WAS BELOW ACCEPTABLE LIMITS IN THE LABORATORY FORTIFIED BLANK.
- c: OTHER FUEL HYDROCARBONS ARE PRESENT.
- d: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION FOR SELENIUM AND/OR THALLIUM.
- e: All pesticides (EPA METHOD 625) were absent qualitatively.
- f: Comments for OEH Sample #: 97020051 VERY HEAVY EMULSION. RESULTS BASED ON A 1:10 DILUTION OF SAMPLE. SAMPLE CONTAINED EXTREMELY HIGH QUANTITY OF 2(2-BUTOXY ETHANOL) ETHANOL AND LARGE AMOUNTS OF 2-BUTOXY ETHANOL, 1-OCTANOL, 1-DECANOL, AND DODECANOL.
- g: Comments for OEH Sample #: 97020052 HEAVY EMULSION. SAMPLE CONTAINED MODERATE AMOUNTS OF LINALYL PROPANOATE AND VARIOUS ORGANIC FATTY ACIDS.
- h: Comments for OEH Sample #: 97020075 1,2-DICHLOROETHENE TENTATIVELY IDENTIFIED AT 13.2 UGL.
- i: Comments for OEH Sample #: 97020077 TENTATIVELY IDENTIFIED ACETONE AT 40.5 UGL. ALSO IDENTIFIED CHLOROFORM AT APPROXIMATELY 2.1 UGL AND TRICHLOROETHENE AT 4.2 UGL.
- j: Comments for OEH Sample #: 97020083 IDENTIFIED 1,1,1-TRICHLOROETHANE AT APPROXIMATELY 4.8 UGL, BENZENE AT 4.8 UGL, 1,2-DICHLOROPROPANE AT 4.7 UGL, ETHYLBENZENE AT 3.0 UGL AND 1,4-DICHLOROENZENE AT 4.8 UGL.
- k: Comments for OEH Sample #: 97020182 RESULTS ARE FOR OIL AND GREASE 38 mg/bottle AND TOTAL PETROLEUM HYDROCARBONS 36 mg/bottle.

Reviewed By:


 VICTORIA S. DUNOVANT, Lt Col, USAF, BSC
 Chief, Environmental Chemistry Branch



ARMSTRONG LABORATORY

Occupational & Environmental Health Directorate/OEA
 2402 E. Drive, Bldg 140
 Brooks AFB, Texas 78235-5114

(210) 536-3626, FAX (210) 536-9043
 WHITEMAN PROJECT 17

DATA SUMMARY FORM

INORGANIC

Wastewater Samples

(mg/L)

Method Detection Limit	Date Collected Sample Numbers Tracking Numbers	97/03/27 97020317, 97020354, 359, 367, CN970263 & GN970263	97/02/03/18, 355, 360, 366, 374, 79, 385, CN970284 & GN970284	SITE 15		SITE 16											
				Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER
Group A																	
<10	COD	NT	97020350	97/04/07	<10	97020355	97/04/07	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Total Organic Carbon	20.8	97020350	97/04/07	121.2	97020355	97/04/07	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Group B																	
<0.3	Oil & Grease	NT			7.52	97020375	97/04/08	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	TPH	NT			1.76	97020375	97/04/08	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Group C																	
<0.2	Ammonia	4.35	97020351	97/04/04	0.4	97020376	97/04/04	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Kydan Nitrogen	24	97020351	97/04/04	1.3	97020376	97/04/04	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.1	Nitrate-Nitrite	4.8	97020351	97/04/04	0.8	97020376	97/04/04	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.1	Phosphate, Ortho	0.39	97020351	97/04/04	0.14	97020376	97/04/04	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.10	Phosphorus, Total	0.69	97020351	97/04/04	0.23	97020376	97/04/04	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Group D																	
<0.005	Cyanide, Total	<0.005	97020352	97/04/01	<0.005	97020377	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Group E																	
<10 ug/L	Phenols	53	97020353	97/04/03	<10	97020378	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Group G																	
	Acidity, Total	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Alkalinity, Total	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Bromide	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Chloride	9.79	97020354	97/04/01	29.8	97020379	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Color	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Langlier Index	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Residue, Total	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.2 mL/L	Residue, Settlesable	<0.2	97020354	97/04/01	0.4	97020379	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Residue, Filterable	1037	97020354	97/04/01	249	97020379	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Residue, Nonfilterable	32	97020354	97/04/01	28	97020379	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Residue, Volatile	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Silica	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Specific Conductance	997	97020354	97/04/01	462	97020379	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Sulfates	204.4	97020354	97/04/01	53.5	97020379	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.1	Sulfides	NT			<0.1	97020385	97/04/08	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.1	Surfactants	380.0*	97020354	97/04/01	<0.1	97020379	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Turbidity	NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Volatile Suspended Solids	29	97020354	97/04/01	10	97020379	97/04/01	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Date Collected: 9/7/03/27
Sample Numbers: 97020317, 350-54, 359, 397;
Tracking Numbers: CN970263 & GN970263
SITE 15

Date Collected: 9/7/03/27
Sample Numbers: 97020318, 355, 360, 368, 374-79, 385;
Tracking Numbers: CN970264 & GN970264
SITE 16

Method Detection Limit	Compound (ug/L)	SITE 15				SITE 16											
		Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q
<5.0	Benzene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Bromodichloromethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Bromoforn	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Bromomethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Carbon Tetrachloride	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Chlorobenzene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Chloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	2-Chloroethylvinyl ether	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Chloroform	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Chloromethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Dibromodichloromethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	1,2-Dichlorobenzene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	1,3-Dichlorobenzene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	1,4-Dichlorobenzene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	1,1-Dichloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	1,2-Dichloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	trans-1,2-Dichloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	cis-1,2-Dichloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	trans-1,3-Dichloropropene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Ethylbenzene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Methylene Chloride	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	1,1,2,2-Tetrachloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Tetrahydrofuran	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Toluene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	1,1,1-Trichloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	1,1,2-Trichloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Trichloroethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Trichlorofluoromethane	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	m-Xylene & p-Xylene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	o-Xylene	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<5.0	Vinyl Chloride	<5	97020317	970401	<5	97020318	970401	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS
Wastewater Samples
(ug/L)

Method Detection Limit	Date Collected Sample Numbers Tracking Numbers	Result		Q	Result		Q	Result		Q	Result		Q	Result		Q	
		OE	NUMBER		OE	NUMBER		OE	NUMBER		OE	NUMBER		OE	NUMBER		OE
<5	Acenaphthene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Acenaphthylene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Aldrin	SEE EPA METHOD608		ABSENT	97020374	97/04/02	c,d	SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	Anthracene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Arochlor 1260	SEE EPA METHOD608		ABSENT	97020374	97/04/02	c,d	SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	Benidine	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Benzol(a)anthracene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Benzol(b)pyrene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Benzol(b)fluoranthene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Benzol(k)fluoranthene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Benzol(k)perylene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Beta-BHC	SEE EPA METHOD608		ABSENT	97020374	97/04/02	d	NT		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	delta-BHC	SEE EPA METHOD608		ABSENT	97020374	97/04/02	c,d	SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	Bis(2-chloro ethoxy)methane	NT		<10	97020374	97/04/02	d	NT		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	Bis(2-chloro ethyl)ether	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Bis(2-chloroisopropyl)ether	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Bis(2-ethylhexyl)phthalate	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	4-Bromophenyl Phenyl Ether	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Butylbenzylphthalate	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Chlordane	SEE EPA METHOD608		ABSENT	97020374	97/04/02	c,d	SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	4-chloro-3-methyl Phenol	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	2-chloromaphthalene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	2-chlorophenol	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	4-chlorophenyl Phenyl Ether	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Chrysene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	4,4-DDD	SEE EPA METHOD608		ABSENT	97020374	97/04/02	c,d	SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	4,4-DDE	SEE EPA METHOD608		ABSENT	97020374	97/04/02	c,d	SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	4,4-DDT	SEE EPA METHOD608		ABSENT	97020374	97/04/02	c,d	SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	Dieldrin	SEE EPA METHOD608		ABSENT	97020374	97/04/02	c,d	SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608		SEE EPA METHOD608	
<5	Dibenz(a,h)anthracene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	1,2-Dichlorobenzene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	1,3-Dichlorobenzene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	1,4-Dichlorobenzene	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	3,3-Dichlorobenzidine	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	2,4-Dichlorophenol	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Diallylphthalate	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	2,4-Dimethylphenol	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Dimethylphthalate	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Di-n-Butylphthalate	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	Di-n-Octylphthalate	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	
<5	4,6-Dinitro-2-Methylphenol	NT		<10	97020374	97/04/02	d	NT		NT		NT		NT		NT	

WASTEWATER SAMPLES
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples (ug/L)

Method Detection Limit	Date Collected	Sample Numbers Tracking Numbers	970327 97020318, 355, 360, 368, 374, 79, 385; CN970264 & GN970264	970327 SITE 16	970327		970327		970327		970327		970327													
					Result	OE	Result	OE	Result	OE	Result	OE														
(ug/L)	Compound	Result	NUMBER	Date	Q	Result	OE	NUMBER	Date	Q	Result	OE	NUMBER	Date	Q	Result	OE	NUMBER	Date	Q	Result	OE	NUMBER	Date	Q	
<5	2,4-Dinitrophenol	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	2,6-Dinitrotoluene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	2,4-Dinitrotoluene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Fluoranthene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Fluorene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Hexachlorobenzene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Hexachlorobutadiene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Hexachlorocyclopentadiene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Hexachloroethane	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Indeno(1,2,3-c-d)pyrene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Isophorone	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	4,4-Methylenedianiline	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Naphthalene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	N-Nitroso-di-n-butylamine	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	N-Nitroso-dimethylamine	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	N-Nitroso-n-Propylamine	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	N-Nitrosodiphenylamine	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	N-Nitrosodiphenylamine	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Nitrobenzene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	2-Nitrophenol	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	4-Nitrophenol	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Pentachlorophenol	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Phenanthrene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Phenol	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Pyrene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	Toxaphene	SEE EPA METHOD0608			ABSENT	NT																				
<5	1,2,4-Trichlorobenzene	NT			<10	NT				<10	NT				<10	NT					<10	NT				
<5	2,4,6-Trichlorophenol	NT			<10	NT				<10	NT				<10	NT					<10	NT				

Method Detection Limit	Date Collected	97/03/27		97/03/27		97/03/27		97/03/27		97/03/27		97/03/27		97/03/27		97/03/27		97/03/27				
		Sample Numbers Tracking Numbers SITE 15	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q
Group F																						
<0.030	Aluminum	97020317, 350-54, 359, 367, CN970263 & GN970263	0.158	97020367	97/04/03	0.903	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.003	Antimony		0.005	97020367	97/04/03	0.004	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.005	Arsenic		<0.005	97020367	97/04/03	<0.005	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.050	Barium		0.044	97020367	97/04/03	0.094	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.001	Beryllium		<0.0005	97020367	97/04/03	<0.0005	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.05	Boron		NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.001	Cadmium		0.003	97020367	97/04/03	0.002	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Calcium		NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.01	Chromium		0.006	97020367	97/04/03	<0.005	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.05	Cobalt		<0.025	97020367	97/04/03	<0.025	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.02	Copper		0.049	97020367	97/04/03	0.03	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.03	Iron		2.42	97020367	97/04/03	1.75	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.02	Lead		0.004	97020367	97/04/03	0.005	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Magnesium		NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.03	Manganese		NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.002	Mercury		<0.0002	97020367	97/04/03	<0.0002	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.03	Molybdenum		<0.030	97020367	97/04/03	<0.030	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.03	Nickel		0.022	97020367	97/04/03	0.016	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Potassium		NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.005	Selenium		<0.005	97020367	97/04/03	b.* <0.005	97020368	97/04/03	b.* NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.01	Silver		<0.005	97020367	97/04/03	<0.005	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<1	Sodium		NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.14	Strontium		0.404	97020367	97/04/03	0.286	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.001	Tantalum		<0.001	97020367	97/04/03	<0.001	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.21	Titanium		<0.025	97020367	97/04/03	<0.025	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.05	Vanadium		NT			NT			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
<0.05	Zinc		0.077	97020367	97/04/03	0.031	97020368	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
8015 MOD																						
<0.10 mg/L	2,2-Dibutoxyethoxy/Ethanol		1420	97020359	97/04/08	<0.1	97020360	97/04/04	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
8015 MOD																						
*	Selenium (Low Recoveries)		9.3%	97020367	97/04/03	53.3%	97020368	97/04/03														
**	Thallium (Low Recovery)																					

< Signifies none detected and the detection limits.
SN : SEE COMMENT.
ABS : Absent

Comment Code

- a: HOLD TIME EXCEEDED.
- b: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION FOR SELENIUM AND/OR THALLIUM.
- c: All pesticides (EPA METHOD 625) were absent qualitatively.
- d: Comments for OEHHA Sample #: 97020374 SAMPLE CONTAINED A SMALL AMOUNT OF JET FUEL TYPE HYDROCARBONS (C12-C16).

Reviewed By:


VICTORIA S. DUNOVANT, Lt Col, USAF, BSC
Chief, Environmental Chemistry Branch



ARMSTRONG LABORATORY
 Occupational & Environmental Health Directorate/OEA
 2402 E. Drive, Bldg 140
 Brooks AFB, Texas 78235-5114
 (210) 536-3626, FAX (210) 536-9043
 WHITEMAN PROJECT 17
DATA SUMMARY FORM
 INORGANIC
 Wastewater Samples

Method Detection Limit	Date Collected	Sample Numbers	Tracking Numbers	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q			
																				Site 16	Site 22	Site 23
<10 <1	9/7/03/28	97020504;515;551-553	GN970271	25	97020551	97/04/07		270	97020581	97/04/07		108.6	97020568	97/04/07		NT						
				11.6	97020551	97/04/07		21.7	97020581	97/04/07		NT										
				NT																		
<0.3 <1	9/7/03/28	97020490;495;505;518;554;560	GN970272	30.3	97020555	97/04/08		50.4	97020582	97/04/08			97020569	97/04/08		NT						
				NT																		
				NT																		
<0.2 <0.1 <0.1 <0.10	9/7/03/28	97020491;496;506;517;561;567	GN970273	0.5	97020553	97/04/09		3.5	97020583	97/04/09		1	97020570	97/04/09		NT						
				1.3	97020553	97/04/09		4.5	97020583	97/04/09		4.1	97020570	97/04/09		NT						
				0.75	97020553	97/04/09		0.1	97020583	97/04/09		0.1	97020570	97/04/09		NT						
<0.1 <0.10	9/7/03/28	97020559	97/04/01	0.1	97020553	97/04/09		0.95	97020583	97/04/09		1.6	97020570	97/04/09		NT						
				0.1	97020553	97/04/09		1.1	97020583	97/04/09		2.55	97020570	97/04/09		NT						
				0.1	97020553	97/04/09																
<0.005 <10 ug/L	9/7/03/28	97020557	97/04/07	<0.005	97020557	97/04/07		<0.005	97020584	97/04/07		<0.005	97020571	97/04/07		NT						
				NT																		
				NT																		
Group E	9/7/03/28	97020558	97/04/03	21	97020558	97/04/03		35	97020585	97/04/03		21	97020572	97/04/03		NT						
				NT																		
				NT																		
Group G	9/7/03/28	97020559	97/04/01	73.1	97020559	97/04/01		105.1	97020586	97/04/01		89	97020573	97/04/01		NT						
				NT																		
				NT																		
<1	9/7/03/28	97020559	97/04/01	0.4	97020559	97/04/01		-0.2	97020586	97/04/01		0.2	97020573	97/04/01		NT						
				556	97020559	97/04/01		885	97020586	97/04/01		522	97020573	97/04/01		NT						
				24	97020559	97/04/01		17	97020586	97/04/01		33	97020573	97/04/01		NT						
<1	9/7/03/28	97020559	97/04/01	NT				NT				NT				NT						
				NT				NT				NT				NT						
				NT				NT				NT				NT						
umhos	9/7/03/28	97020559	97/04/01	185	97020559	97/04/01		142	97020588	97/04/01		730	97020573	97/04/01		NT						
				NT				NT				NT				NT						
				NT				NT				NT				NT						
<1	9/7/03/28	97020559	97/04/01	0.2	97020559	97/04/01		69.6	97020588	97/04/01		1.4	97020574	97/04/01		NT						
				0.14	97020559	97/04/01		3.6	97020588	97/04/01												
				NT				NT				NT				NT						
<1	9/7/03/28	97020559	97/04/01	20	97020559	97/04/01			97020588	97/04/01			97020573	97/04/01		NT						
				NT				NT				NT				NT						
				NT				NT				NT				NT						

WHITEMAN PROJECT 17

DATA SUMMARY FORM
VOLATILE ORGANICS
Wastewater Samples

(ug/L)

Method Detection Limit	Date Collected	Sample Numbers	Tracking Numbers	Site	Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q					
<5.0	9/7/03/28	97020504-515-551-553	GN970271	Site 16	Benzene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5				
					Bromodichloromethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Bromomethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Carbon Tetrachloride	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Chlorobenzene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Chloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					2-Chloroethylmethylmer	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Chloroform	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Chloromethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Dichlorochloromethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					1,2-Dichlorobenzene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					1,3-Dichlorobenzene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					1,4-Dichlorobenzene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					1,1-Dichloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					1,2-Dichloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					trans-1,2-Dichloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					cis-1,3-Dichloropropene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					trans-1,3-Dichloropropene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Ethylbenzene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
					Methylchloride	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5
1,1,2,2-tetrachloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
Tetrachloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
Toluene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
1,1,1-Trichloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
1,1,2-Trichloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
Trichloroethane	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
Trichloroethylene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
m-Xylene & p-Xylene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
o-Xylene	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					
Vinyl Chloride	<5	97020504	97/04/02	d	<5	97020505	97/04/02	d	<5	97020506	97/04/02	d	<5	97020507	97/04/02	d	<5	97020508	97/04/02	d	<5					

DATA SUMMARY FORM
 METALS
 Wastewater Samples
 (µg/L)

Method Detection Limit	Date Collected	Sample Numbers Tracking Numbers	Site	Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date		
				Group F	Site 6	Site 7	Site 10	Site 12	Site 9	Site 8											
<0.030	97/03/25	97/019797, 807, 834-40, 971	Site 6	Aluminum	0.056	97019797	97/04/03	0.205	97019798	97/04/03	0.285	97019799	97/04/03	3.47	97019800	97/04/03	0.948	97019801	97/04/03	97/03/25	97/019795, 806, 811, 865
<0.003		CN97/0228 & GN97/0228	Site 6	Antimony	<0.003	97019797	97/04/03	0.004	97019798	97/04/03	<0.003	97019799	97/04/03	0.351	97019800	97/04/03	0.005	97019801	97/04/03	97/019801, 858-64	CN97/0249 & GN97/0249
<0.005			Site 7	Arassic	<0.005	97019797	97/04/03	<0.005	97019798	97/04/03	<0.005	97019799	97/04/03	0.005	97019800	97/04/03	0.02	97019801	97/04/03	97/03/25	
<0.050				Barium	0.038	97019797	97/04/03	0.033	97019798	97/04/03	0.035	97019799	97/04/03	0.379	97019800	97/04/03	0.07	97019801	97/04/03		
<0.001				Beryllium	<0.0005	97019797	97/04/03	<0.0005	97019798	97/04/03	0.0005	97019799	97/04/03	0.0013	97019800	97/04/03	0.0094	97019801	97/04/03		
<0.05				Boron	NT			NT			NT		NT			NT					
<0.001				Cadmium	0.003	97019797	97/04/03	0.006	97019798	97/04/03	<0.001	97019799	97/04/03	0.891	97019800	97/04/03	0.001	97019801	97/04/03		
<1				Calcium	NT			NT			NT		NT			NT					
<0.01				Chromium	0.034	97019797	97/04/03	<0.005	97019798	97/04/03	0.005	97019799	97/04/03	0.659	97019800	97/04/03	0.01	97019801	97/04/03		
<0.05				Cobalt	<0.025	97019797	97/04/03	<0.025	97019798	97/04/03	<0.025	97019799	97/04/03	<0.025	97019800	97/04/03	<0.025	97019801	97/04/03		
<0.02				Copper	0.030	97019797	97/04/03	0.022	97019798	97/04/03	<0.010	97019799	97/04/03	4.21	97019800	97/04/03	0.025	97019801	97/04/03		
<0.03				Iron	0.561	97019797	97/04/03	0.55	97019798	97/04/03	2.86	97019799	97/04/03	6.09	97019800	97/04/03	18.2	97019801	97/04/03		
<0.02				Lead	0.006	97019797	97/04/03	0.011	97019798	97/04/03	0.008	97019799	97/04/03	2	97019800	97/04/03	0.006	97019801	97/04/03		
<1				Magnesium	NT			NT			NT		NT			NT					
<0.003				Manganese	NT			NT			NT		NT			NT					
<0.0002				Mercury	0.0003	97019797	97/04/03	0.0002	97019798	97/04/03	0.0003	97019799	97/04/03	0.0005	97019800	97/04/03	0.0004	97019801	97/04/03		
<0.03				Molybdenum	<0.030	97019797	97/04/03	<0.030	97019798	97/04/03	<0.030	97019799	97/04/03	0.276	97019800	97/04/03	<0.030	97019801	97/04/03		
<0.03				Nickel	0.019	97019797	97/04/03	0.011	97019798	97/04/03	0.023	97019799	97/04/03	0.712	97019800	97/04/03	0.067	97019801	97/04/03		
<1				Potassium	NT			NT			NT		NT			NT					
<0.005				Selenium	<0.005	97019797	97/04/03	<0.005	97019798	97/04/03	<0.005	97019799	97/04/03	<0.005	97019800	97/04/03	<0.005	97019801	97/04/03		
<0.01				Silver	<0.005	97019797	97/04/03	<0.005	97019798	97/04/03	0.152	97019799	97/04/03	0.007	97019800	97/04/03	0.007	97019801	97/04/03		
<1				Sodium	NT			NT			NT		NT			NT					
<0.14				Strontium	0.300	97019797	97/04/03	0.335	97019798	97/04/03	0.501	97019799	97/04/03	0.347	97019800	97/04/03	0.781	97019801	97/04/03		
<0.001				Thallium	<0.001	97019797	97/04/03	<0.001	97019798	97/04/03	<0.001	97019799	97/04/03	0.092	97019800	97/04/03	<0.001	97019801	97/04/03		
<0.21				Titanium	<0.025	97019797	97/04/03	<0.025	97019798	97/04/03	<0.025	97019799	97/04/03	0.079	97019800	97/04/03	0.03	97019801	97/04/03		
<0.05				Vanadium	NT			NT			NT		NT			NT					
<0.05				Zinc	0.067	97019797	97/04/03	0.058	97019798	97/04/03	0.046	97019799	97/04/03	6.5	97019800	97/04/03	0.128	97019801	97/04/03		
<0.10				EPA 8016 MOD (AFFE) 2,2-Dibutylolxoyl Ethanol	BIT	97019803		<0.1	97019804	97/04/02	NT		<0.1	97019805	97/04/02	NT					
p *				Selenium (low recovery)	59.7%	97019797	97/04/03				35.2%	97019799	97/04/03	3.6%	97019800	97/04/03					

WHITEMAN PROJECT 17

DATA SUMMARY FORM

COMMENTS

Wastewater Samples

Page 1 of 1

< - Signifies none detected and the detection limits.

SN : SEE COMMENT

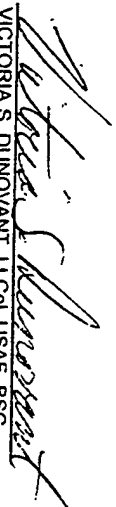
ABS : Absent

NSR : No Sample Received.

Comment Code

- a: HOLD TIME EXCEEDED.
- b: BROKEN IN TRANSIT (BIT)
- c: All pesticides (EPA METHOD 625) were absent qualitatively.
- d: Comments for OEHD Sample #: 97019791 SAMPLE CONTAINED TRACES OF 4-HYDROXY-4-METHYL PENTANONE AND SILICIC ACID.
- e: Comments for OEHD Sample #: 97019792 SAMPLE CONTAINED A SMALL QUANTITY OF FUEL-TYPE HYDROCARBON, MOST LIKELY JET FUEL.
- f: Comments for OEHD Sample #: 97019793 SAMPLE CONTAINED A LARGE AMOUNT OF HYDROCARBONS TYPICAL OF JET FUEL.
- g: Comments for OEHD Sample #: 97019794 SAMPLE CONTAINED LARGE QUANTITIES OF UNKNOWN HYDROCARBONS, POSSIBLY WEATHERED MOTOR OIL.
- h: Comments for OEHD Sample #: 97019795 SAMPLE WAS BROKEN IN TRANSIT (BIT).
- i: Comments for OEHD Sample #: 97019797 SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION FOR SELENIUM 59.7%.
- j: Comments for OEHD Sample #: 97019799 SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION FOR SELENIUM 35.2%.
- k: Comments for OEHD Sample #: 97019800 SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION FOR SELENIUM 3.6%.
- l: Comments for OEHD Sample #: 97019801 SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ALKALINE COMPOSITION OF SAMPLE FOR SELENIUM 41.3% AND THALLIUM 13%.
- m: Comments for OEHD Sample #: 97019808 SAMPLE ALSO IDENTIFIED VINYL CHLORIDE AT APPROXIMATELY 2.8 UG/L, 1,1,1-TRICHLOROETHANE AT 1.4 UG/L, TOLUENE AT 1.7 UG/L AND ETHYLBENZENE AT 2.5 UG/L. OTHER FUEL HYDROCARBONS ARE PRESENT.
- n: Comments for OEHD Sample #: 97019809 SAMPLE REQUIRED DILUTION FOR SAMPLE ANALYSIS, RESULTS HAVE BEEN ADJUSTED. OTHER FUEL HYDROCARBONS ARE PRESENT.
- o: Comments for OEHD Sample #: 97019810 ALSO IDENTIFIED M AND/OR P XYLENE AT APPROXIMATELY 2.20 UG/L. OTHER FUEL HYDROCARBONS ARE PRESENT.
- p: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION FOR SELENIUM AND/OR THALLIUM.
- q: Comments for OEHD Sample #: 97019811 OTHER FUEL HYDROCARBONS PRESENT.
- r: Comments for OEHD Sample #: 97019849 LARGE AMOUNTS OF SUBSTITUTED SILOXANE COMPOUNDS (SYNTHETIC HYDROCARBONS)?
- s: Comments for OEHD Sample #: 97019849 TRACE AMOUNTS OF JP-8.

Reviewed By:


VICTORIA S. DUNOVANT, Lt Col, USAF, BSC
Chief, Environmental Chemistry Branch



ARMSTRONG LABORATORY
 Occupational & Environmental Health Directorate/OEA
 2402 E. Drive, Bldg 140
 Brooks AFB, Texas 78235-5114
 (210) 536-3626, FAX (210) 536-9043
WHITEMAN PROJECT 17
DATA SUMMARY FORM
INORGANIC
 Wastewater Samples
 (mg/L)

Method	Date Collected	Sample Numbers	Tracking Numbers	Limit	Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	
	97/03/26	97/020048; 56; 65; 71; 84; 90	CN970240 & GN970240	SITE 6	Group A																	
	97/03/26	97/020048; 66; 72; 91	CN970241 & GN970241	SITE 7	Group A																	
	97/03/26	97/020050; 58; 67; 74; 96; 102	CN970243 & GN970243	SITE 9	Group A																	
	97/03/26	97/020054; 62; 78; 121-127	CN970247 & GN970247	SITE 10	Group A																	
	97/03/26	97/020055; 63; 79; 128-134	CN970248 & GN970248	SITE 11	Group A																	
	97/020057; 73; 92-95	CN970242 & GN970242		SITE 12	Group A																	
					Group B																	
					Group C																	
					Group D																	
					Group E																	
					Group F																	
					Group G																	

DATA SUMMARY FORM
VOLATILE ORGANICS
Wastewater Samples
(ug/L)

Method Detection Limit	Sample Numbers Tracking Numbers	97/03/26		97/03/26		97/03/26		97/03/26		97/03/26		97/03/26		97/03/26		97/03/26	
		Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q
<5.0	Benzene	97/020048: 59, 65, 71, 84-90; CN970240 & GN970240 SITE 6	97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Bromodichloromethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Bromoform		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Bromotrichloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Carbon Tetrachloride		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Chlorobenzene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Chloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	2-Chloroethylvinyl ether		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Chloroform		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Chloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Dibromochloromethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	1,2-Dichlorobenzene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	1,3-Dichlorobenzene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	1,4-Dichlorobenzene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	1,1-Dichloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	1,1-Dichloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	trans-1,2-Dichloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	1,2-Dichloropropane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	cis-1,3-Dichloropropene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	trans-1,3-Dichloropropene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Ethylbenzene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Methylene Chloride		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	1,1,2,2-Tetrachloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Tetrachloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Toluene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	1,1,2-Trichloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Trichloroethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Trichlorofluoromethane		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	m-Xylene & p-Xylene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	o-Xylene		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k
<5.0	Vinyl Chloride		97/020071	97/03/31	NSR	97/020072	97/03/31	<5	97/020074	97/03/31	<100	97/020078	97/03/31	b,k	97/020079	97/03/31	b,k

DATA SUMMARY FORM

METALS
Wastewater Samples
(mg/L)

Method Detection Limit	Date Collected	Sample Numbers Tracking Numbers	97/03/26			97/03/26			97/03/26			97/03/26								
			Result	OE NUMBER	Date	Result	OE NUMBER	Date	Result	OE NUMBER	Date	Result	OE NUMBER	Date						
Group F																				
<0.030	Aluminum	97020048; 56; 65; 71; 84-90;	0.070	97020056	97/04/03	NT			0.925	97020058	97/04/03	0.141	97020062	97/04/03	0.025	97020063	97/04/03	0.103	97020057	97/04/03
<0.003	Antimony	CN970240 & GN970240	<0.003	97020056	97/04/03	NT			<0.003	97020058	97/04/03	<0.003	97020062	97/04/03	<0.003	97020063	97/04/03	0.008	97020057	97/04/03
<0.005	Arsenic		<0.005	97020056	97/04/03	NT			0.01	97020058	97/04/03	<0.005	97020062	97/04/03	<0.005	97020063	97/04/03	<0.005	97020057	97/04/03
<0.050	Barium		0.046	97020056	97/04/03	NT			0.062	97020058	97/04/03	0.038	97020062	97/04/03	0.038	97020063	97/04/03	0.04	97020057	97/04/03
<0.001	Beryllium		<0.0005	97020056	97/04/03	NT			0.004	97020058	97/04/03	<0.0005	97020062	97/04/03	<0.0005	97020063	97/04/03	<0.0005	97020057	97/04/03
<0.05	Boron		NT			NT			NT			NT			NT			NT		
<0.001	Cadmium		0.002	97020056	97/04/03	NT			0.001	97020058	97/04/03	<0.001	97020062	97/04/03	<0.001	97020063	97/04/03	0.014	97020057	97/04/03
<1	Calcium		NT			NT			NT			NT			NT			NT		
<0.01	Chromium		<0.005	97020056	97/04/03	NT			0.041	97020058	97/04/03	<0.005	97020062	97/04/03	<0.005	97020063	97/04/03	<0.005	97020057	97/04/03
<0.05	Cobalt		<0.025	97020056	97/04/03	NT			<0.025	97020058	97/04/03	<0.025	97020062	97/04/03	<0.025	97020063	97/04/03	<0.025	97020057	97/04/03
<0.02	Copper		0.028	97020056	97/04/03	NT			0.021	97020058	97/04/03	<0.010	97020062	97/04/03	0.088	97020063	97/04/03	0.088	97020057	97/04/03
<0.03	Iron		0.488	97020056	97/04/03	NT			52.7	97020058	97/04/03	0.674	97020062	97/04/03	0.1	97020063	97/04/03	0.27	97020057	97/04/03
<0.02	Lead		0.005	97020056	97/04/03	NT			0.004	97020058	97/04/03	0.005	97020062	97/04/03	<0.001	97020063	97/04/03	0.022	97020057	97/04/03
<1	Magnesium		NT			NT			NT			NT			NT			NT		
<0.03	Manganese		NT			NT			NT			NT			NT			NT		
<0.0002	Mercury		0.0005	97020056	97/04/03	NT			0.0003	97020058	97/04/03	0.0011	97020062	97/04/03	0.0006	97020063	97/04/03	0.0003	97020057	97/04/03
<0.03	Molybdenum		<0.030	97020056	97/04/03	NT			<0.030	97020058	97/04/03	<0.030	97020062	97/04/03	<0.030	97020063	97/04/03	<0.030	97020057	97/04/03
<0.03	Nickel		<0.010	97020056	97/04/03	NT			0.162	97020058	97/04/03	0.012	97020062	97/04/03	<0.010	97020063	97/04/03	0.012	97020057	97/04/03
<1	Potassium		NT			NT			NT			NT			NT			NT		
<0.005	Selenium		0.016	97020056	97/04/03	c *			<0.005	97020058	97/04/03	<0.005	97020062	97/04/03	<0.005	97020063	97/04/03	<0.005	97020057	97/04/03
<0.01	Silver		0.006	97020056	97/04/03	NT			<0.005	97020058	97/04/03	<0.005	97020062	97/04/03	<0.005	97020063	97/04/03	<0.005	97020057	97/04/03
<1	Sodium		NT			NT			NT			NT			NT			NT		
<0.14	Strontium		0.321	97020056	97/04/03	NT			0.628	97020058	97/04/03	0.415	97020062	97/04/03	0.578	97020063	97/04/03	0.391	97020057	97/04/03
<0.001	Thallium		<0.001	97020056	97/04/03	NT			<0.001	97020058	97/04/03	<0.001	97020062	97/04/03	<0.001	97020063	97/04/03	<0.001	97020057	97/04/03
<0.21	Titanium		<0.025	97020056	97/04/03	NT			<0.025	97020058	97/04/03	<0.025	97020062	97/04/03	<0.025	97020063	97/04/03	<0.025	97020057	97/04/03
<0.05	Vanadium		NT			NT			NT			NT			NT			NT		
8016 MOD (AFFP)																				
<0.10 mg/L	2-(2-Butoxyethyl)Ethanol		<0.1	97020055	97/04/02	0.587	97020056	97/04/02	<0.1	97020067	97/04/02	NT			NT			NT		
*	Selenium (low recoveries)		38.2	97020056	97/04/03				9.5%	97020058	97/04/03	25%	97020062	97/04/03	24.3%	97020063	97/04/03	21%	97020057	97/04/03
**	Thallium (low recovery)																			

COMMENTS

Wastewater Samples

page 1 of 1

* * * Signifies none detected and the detection limits


SN : SEE COMMENT

FBS : Absent

Comment Code

- a: HOLD TIME EXCEEDED.
- b: OTHER FUEL HYDROCARBONS ARE PRESENT.
- c: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION SELENIUM AND/OR THALLIUM.
- d: All pesticides (EPA METHOD 625) were absent qualitatively.
- e: Comments for OEHD Sample #: 97020048 HEAVY EMULSION. SAMPLE CONTAINED TRACES OF FUEL-TYPE HYDROCARBONS.
- f: Comments for OEHD Sample #: 97020049 HEAVY EMULSION. SAMPLE CONTAINED MODERATE AMOUNTS OF HEXYLENE GLYCOL AND 3,3-DIMETHYL-2-BUTANOL.
- g: Comments for OEHD Sample #: 97020050 HEAVY EMULSION. SAMPLE CONTAINED LARGE AMOUNTS OF FUEL-TYPE HYDROCARBONS AND MODERATE AMOUNTS OF BUTYLATED HYDROXY TOLUENE, SILICIC ACID, AND PHOSPHORIC ACID.
- h: Comments for OEHD Sample #: 97020054 SAMPLE CONTAINED LARGE FUEL LAYER. DETECTION LIMITS ADJUSTED TO REFLECT CALCULATION FOR SAMPLE SIZE OF 375 ml.
- i: Comments for OEHD Sample #: 97020055 SAMPLE CONTAINED A MODERATE AMOUNT OF JET FUEL (HYDROCARBONS C12-C16)
- j: Coded Results for OEHD Sample #: 97020072 CANCELLED NSR : NO SAMPLE RECEIVED
- k: Comments for OEHD Sample #: 97020078 & 97020079 DILUTION WAS REQUIRED FOR SAMPLE ANALYSIS, RESULTS HAVE BEEN ADJUSTED
- l: Coded Results for OEHD Sample #: 97020121 CANCELLED CBC : CANCELLED BY CHEMIST
SAMPLE WAS CANCELLED BECAUSE OF THE NATURE OF THE SAMPLE BEING PRIMARILY FUEL.
- m: Comments for OEHD Sample #: 97020122 SMALL AMOUNTS OF JP-8
- n: Coded Results for OEHD Sample #: 97020125 CANCELLED CBC : CANCELLED BY CHEMIST
SAMPLE COULD NOT BE ANALYZED FOR PHENOL BECAUSE IT WAS MOSTLY OIL AND FUEL.

Reviewed By:


 VICTORIA S. DUNOVANT, Lt Col, USAF, BSC
 Chief, Environmental Chemistry Branch



ARMSTRONG LABORATORY
 Occupational & Environmental Health Director/OEA
 2402 E. Drive, Bldg 140
 Brooks AFB, Texas 78235-5114
 (210) 536-3626, FAX (210) 536-9043
 WHITEMAN PROJECT 17
DATA SUMMARY FORM
INORGANIC

Wastewater Samples

Method Detection Limit	Date Collected	Sample Numbers	Tracking Numbers	Site	Site	Site	Site	Site	Site	Site	Site	Site	Site	Site	Site
	97/03/27	97020311: 321-25, 369.													
	97/03/27	97020312, 326-331, 370.													
	97/03/27	97020313, 332-38, 371.													
	97/03/27	97020316, 346-49, 373.													
	97/03/27	97020314, 339-341.													

(mg/L)	Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q										
<10	COD	97020321	97/04/04	10.2		97020326	97/04/04	<10		97020332	97/04/04	4.6		97020333	97/04/08	54.4		97020342	97/04/07	h.l	<10	97020346	97/04/07	65		97020339	97/04/04
		4.4		97020321	97/04/04	46.9		97020326	97/04/04	7.9		97020332	97/04/04	CBC		97020342	97/04/07	h.l	3.9		97020346	97/04/07	22.1		97020339	97/04/04	
<1	Total Organic Carbon	97020327	97/04/08	5.1		97020327	97/04/08	2.48		97020333	97/04/08	4.64		97020343	97/04/08	1.12		97020347	97/04/08	7.36		97020347	97/04/08	7.34		97020340	97/04/08
		1.84		97020322	97/04/08	2.2		97020327	97/04/08	2.32		97020333	97/04/08	54.4		97020343	97/04/08	1.12		97020347	97/04/08	7.34		97020340	97/04/08		
<0.3	Oil & Grease	97020322	97/04/08	0.2		97020328	97/04/04	<0.2		97020334	97/04/04	0.8		97020344	97/04/04	<0.2		97020347	97/04/08	7.36		97020347	97/04/08	7.36		97020340	97/04/08
		1.0		97020323	97/04/04	1.8		97020328	97/04/04	1.1		97020334	97/04/04	1.8		97020344	97/04/04	0.7		97020347	97/04/08	7.36		97020340	97/04/08		
		<0.1		97020323	97/04/04	0.46		97020328	97/04/04	0.46		97020334	97/04/04	1.18		97020344	97/04/04	0.66		97020347	97/04/08	7.36		97020340	97/04/08		
<0.1	Nitrate+Nitrite	97020323	97/04/04	0.33		97020328	97/04/04	0.83		97020334	97/04/04	<0.1		97020344	97/04/04	<0.1		97020347	97/04/08	7.36		97020347	97/04/08	7.36		97020340	97/04/08
		0.15		97020323	97/04/04	0.33		97020328	97/04/04	0.83		97020334	97/04/04	<0.1		97020344	97/04/04	<0.1		97020347	97/04/08	7.36		97020340	97/04/08		
<0.10	Phosphorus, Ortho	97020323	97/04/04	0.39		97020328	97/04/04	0.86		97020334	97/04/04	<0.1		97020344	97/04/04	<0.1		97020347	97/04/08	7.36		97020347	97/04/08	7.36		97020340	97/04/08
		0.29		97020323	97/04/04	0.39		97020328	97/04/04	0.86		97020334	97/04/04	<0.1		97020344	97/04/04	<0.1		97020347	97/04/08	7.36		97020340	97/04/08		
<0.005	Cyanide, Total	97020323	97/04/04	<0.005		97020328	97/04/04	<0.005		97020334	97/04/04	NT		97020344	97/04/04	NT		97020347	97/04/08	7.36		97020347	97/04/08	7.36		97020340	97/04/08
		<0.005		97020324	97/04/01	<0.005		97020329	97/04/01	<0.005		97020335	97/04/01	NT		97020344	97/04/04	<0.1		97020347	97/04/08	7.36		97020340	97/04/08		

<10 ug/L	Phenols	NT	97020330	97/04/03	<10	97020336	97/04/03	NT	NT	NT	NT	NT	NT	NT	NT	
Group A	Acidity, Total	NT			NT				NT				NT			
	Alkalinity, Total	NT			NT				NT				NT			
Group B	Bromide	NT			NT				NT				NT			
	Chloride	39.0	97020325	97/04/01	31.9	97020331	97/04/01	36.5	97020337	97/04/01	12.8	97020345	97/03/31	21.3	97020349	97/04/01
Group C	Color	NT			NT				NT				NT			
	Langlier Index	NT			NT				NT				NT			
Group D	Residue, Total	NT			NT				NT				NT			
	Residue, Seizable	0.4	97020325	97/04/01	0.4	97020331	97/04/01	1	97020337	97/04/01	<0.2	97020345	97/03/31	0.2	97020349	97/04/01
Group E	Residue, Filterable	3.12	97020325	97/04/01	6.01	97020331	97/04/01	9.76	97020337	97/04/01	6.82	97020345	97/03/31	7.02	97020349	97/04/01
	Residue, Nonfilterable	22	97020325	97/04/01	23	97020331	97/04/01	54	97020337	97/04/01	9	97020345	97/03/31	11	97020349	97/04/01
Group G	Sulfate	NT			NT				NT				NT			
	Specific Conductance	514	97020325	97/04/01	834	97020331	97/04/01	1246	97020337	97/04/01	806	97020345	97/03/31	975	97020349	97/04/01
Group H	Sulfides	67.8	97020325	97/04/01	245.2	97020331	97/04/01	407.2	97020337	97/04/01	280.6	97020345	97/03/31	282.5	97020349	97/04/01
	Surfactants	0.6	97020325	97/04/01	0.6	97020331	97/04/01	<0.1	97020337	97/04/01	<0.1	97020345	97/03/31	<0.1	97020349	97/04/01
Group I	Turbidity	NT			NT				NT				NT			
	Volatile Suspended Solids	8	97020325	97/04/01	19	97020331	97/04/01	10	97020337	97/04/01	2	97020345	97/03/31	6	97020349	97/04/01

WHITEMAN PROJECT 17

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS
Wastewater Samples

Table with columns: Compound, Date Collected, Sample Numbers, Tracking Numbers, Detection Limit, Result, OE NUMBER, Date, Q, Result, OE NUMBER, Date, Q, Result, OE NUMBER, Date, Q. Rows list various organic compounds like Acenaphthene, Aldrin, Antrene, etc., with their respective detection results and analysis dates.

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples

Method Detection Limit	Date Collected	Sample Numbers Tracking Numbers	97/03/27			97/03/27			97/03/27			97/03/27			97/03/27		
			Result	OE	NUMBER	Result	OE	NUMBER	Result	OE	NUMBER	Result	OE	NUMBER	Result	OE	NUMBER
<5	2,4-Dinitrophenol	97020311; 321-25; 369; CN970254 & GN970254	<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	2,6-Dinitrotoluene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	2,4-Dinitrotoluene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Fluoranthene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Fluorene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Hexachlorobenzene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Hexachlorobiphenyl		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Hexachlorocyclopentadiene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Hexachloroethane		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Indeno(1,2,3-c-d)pyrene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Isophorone		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	4-Methylenedianiline		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Naphthalene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	N-Nitrosodipropylamine		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	N-Nitrosodiphenylamine		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Nitrobenzene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	2-Nitrophenol		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	4-Nitrophenol		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Benzo(a)anthracene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Phenanthrene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Pyrene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	Toluene		ABSENT		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	1,2,4-Trichlorobenzene		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373
<5	2,4,6-Trichlorophenol		<10		97020369	<10		97020370	<10		97020371	<13		97020372	<10		97020373

WHITEMAN PROJECT 17

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples

Method Detection Limit	Date Collected Sample Numbers Tracking Numbers	97/03/23 97019174, 193, 258, 309-315 CN970217 & GN970217 SITE 4 (See Comment o)	97/03/23 97019171, 191, 255, 294-300, 779 CN970214 & GN970214 SITE 5 (See Comment q)	97/03/23 97019173, 192, 243, 257, 302-308 CN970216 & GN970216 SITE 6	97/03/23 97019172, 301, 242, 256, CN970215 & GN970215 SITE 7	97/03/23 97019175, 194, 244, 259, 316-332 CN970218 & GN970218 SITE 8 (See Comment p)	97/03/23 97019176, 323-329, 280, 245, 195 CN970219 & GN970219 SITE 9						
(ug/L)	Compound	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q
<5	2,4-Dinitrophenol	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	2,6-Dinitrofluorene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	2,4-Dinitrotoluene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Fluoranthene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Fluorene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Hexachlorobenzene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Hexachlorobutadiene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Hexachlorocyclopentadiene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Hexachloroethane	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Indenol (2,3-c-d)pyrene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Isophorone	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	4-Methylmethylaniline	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Naphthalene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	N-Nitrosodl-Propylamine	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	N-Nitrosodiphenylamine	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Nitrobenzene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	2-Nitrophenol	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	4-Nitrophenol	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Pentachlorophenol	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Phenanthrene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Phenol	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Pyrene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	Toxaphene	ABSENT	97019258	97/03/25	e,m	ABSENT	97019257	97/03/25	e,j	ABSENT	97019259	97/03/25	e
<5	1,2,4-Trichlorobenzene	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n
<5	2,4,6-Trichlorophenol	<10	97019258	97/03/25	m	<10	97019257	97/03/25	k	<10	97019259	97/03/25	n

WHITEMAN PROJECT 17

DATA SUMMARY FORM

METALS
Wastewater Samples

(mg/L)

Method Detection Limit	Date Collected	Sample Numbers Tracking Numbers	97/03/23 97019174, 193, 258, 309, 315 CN970217 & GN970217	97/03/23 97019171, 191, 255, 294, 300, 779 CN970214 & GN970214	97/03/23 97019173, 192, 243, 257, 302, 308 CN970216 & GN970216	97/03/23 97019172, 301, 242, 256; CN970215 & GN970215	97/03/23 97019175, 194, 244, 259, 316, 322 CN970218 & GN970218	97/03/23 97019176, 323, 229, 260, 245, 195 CN970219 & GN970219											
									Site 4 (See Comment q)	Site 5 (See Comment q)	Site 6	Site 7	Site 8 (See Comment p)	Site 9					
Compound (mg/L)	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q							
Aluminum	0.560	97019193	97/04/02		0.204	97019191	97/04/01		0.029	97019192	97/04/02		19.8	97019194	97/04/02		13	97019195	97/04/02
Antimony	<0.003	97019193	97/04/02		0.028	97019191	97/04/01		<0.003	97019192	97/04/02		0.015	97019194	97/04/02		0.01	97019195	97/04/02
Arsenic	<0.005	97019193	97/04/02		<0.005	97019191	97/04/01		<0.005	97019192	97/04/02		0.014	97019194	97/04/02		0.078	97019195	97/04/02
Barium	0.063	97019193	97/04/02		0.046	97019191	97/04/01		<0.005	97019192	97/04/02		1.11	97019194	97/04/02		0.911	97019195	97/04/02
Beryllium	0.0007	97019193	97/04/02		<0.0005	97019191	97/04/01		<0.0005	97019192	97/04/02		0.0774	97019194	97/04/02		0.039	97019195	97/04/02
Boron	NT				0.029	97019191	97/04/01		NT				NT				NT		
Cadmium	0.010	97019193	97/04/02		0.008	97019191	97/04/01		0.001	97019192	97/04/02		0.043	97019194	97/04/02		0.009	97019195	97/04/02
Calcium	NT				0.006	97019191	97/04/01		NT				NT				NT		
Chromium	0.014	97019193	97/04/02		<0.025	97019191	97/04/01		<0.005	97019192	97/04/02		0.083	97019194	97/04/02		0.038	97019195	97/04/02
Cobalt	<0.025	97019193	97/04/02		0.089	97019191	97/04/01		<0.025	97019192	97/04/02		0.125	97019194	97/04/02		0.061	97019195	97/04/02
Copper	0.051	97019193	97/04/02		0.375	97019191	97/04/01		0.116	97019192	97/04/02		2.45	97019194	97/04/02		0.169	97019195	97/04/02
Iron	3.71	97019193	97/04/02		0.015	97019191	97/04/01		0.003	97019192	97/04/02		1.06	97019194	97/04/02		29.2	97019195	97/04/02
Lead	0.042	97019193	97/04/02		NT				NT				0.253	97019194	97/04/02		0.126	97019195	97/04/02
Magnesium	NT				NT				NT				NT				NT		
Manganese	NT				0.0002	97019191	97/04/01		<0.0002	97019192	97/04/02		<0.0002	97019194	97/04/02		<0.0002	97019195	97/04/02
Mercury	<0.0002	97019193	97/04/02		0.171	97019191	97/04/01		<0.030	97019192	97/04/02		<0.030	97019194	97/04/02		<0.030	97019195	97/04/02
Molybdenum	<0.030	97019193	97/04/02		0.025	97019191	97/04/01		<0.010	97019192	97/04/02		0.424	97019194	97/04/02		0.241	97019195	97/04/02
Nickel	0.021	97019193	97/04/02		NT				NT				NT				NT		
Potassium	NT				<0.005	97019191	97/04/01		<0.005	97019192	97/04/02		0.006	97019194	97/04/02		0.006	97019195	97/04/02
Selenium	<0.005	97019193	97/04/02		<0.005	97019191	97/04/01		<0.005	97019192	97/04/02		0.196	97019194	97/04/02		<0.005	97019195	97/04/02
Silver	<0.005	97019193	97/04/02		0.792	97019191	97/04/01		0.304	97019192	97/04/02		1.32	97019194	97/04/02		1.47	97019195	97/04/02
Sodium	NT				0.001	97019191	97/04/01		<0.001	97019192	97/04/02		0.002	97019194	97/04/02		0.002	97019195	97/04/02
Strontium	0.309	97019193	97/04/02		<0.025	97019191	97/04/01		<0.025	97019192	97/04/02		0.417	97019194	97/04/02		0.083	97019195	97/04/02
Thallium	<0.001	97019193	97/04/02		NT				NT				NT				NT		
Titanium	<0.025	97019193	97/04/02		0.049	97019191	97/04/01		0.02	97019192	97/04/02		4.97	97019194	97/04/02		0.939	97019195	97/04/02
Vanadium	NT				<0.1	97019243	97/03/27		<0.1	97019242	97/03/27		<0.1	97019244	97/03/27		<0.1	97019245	97/03/27
Zinc	0.293	97019193	97/04/02		70%	97019192	97/04/02		25.3%	97019194	97/04/02		2.1%	97019194	97/04/02		1.7%	97019195	97/04/02
8015 MOD(AFFF)																			
2,2-Butoxyethyl Ethanol																			
NT																			
Selenium (low recoveries)																			
53.4%																			
Thallium (low recovery)																			
24%																			

WHITEMAN PROJECT 17

DATA SUMMARY FORM

COMMENTS
Wastewater Samples

page 1 of 1

< Signifies none detected and the detection limit.


SN : SEE COMMENT.

ABS : Absent

Comment Code

- a: HOLD TIME EXCEEDED.
- b: RECOVERY OF BROMOFORM WAS BELOW ACCEPTABLE LIMITS IN THE LABORATORY FORTIFIED BLANK.
- c: OTHER FUEL HYDROCARBONS ARE PRESENT.
- d: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION SELENIUM AND/OR THALLIUM.
- e: All pesticides (EPA METHOD 629) were absent qualitatively.
- f: Comments for OEHD Sample #: 97019172 POSITIVELY IDENTIFIED VINYL CHLORIDE AT APPROXIMATELY 2.6 UG/L, 1,1,1-TRICHLOROETHANE AT 1.0 UG/L AND TRICHLOROETHENE AT 4.2 UG/L.
- g: Comments for OEHD Sample #: 97019173 POSITIVELY IDENTIFIED M AND/OR P-XYLENE AT APPROXIMATELY 1 UG/L. SAMPLE WAS FOAMY
- h: Comments for OEHD Sample #: 97019174 POSITIVELY IDENTIFIED M AND/OR P-XYLENE AT APPROXIMATELY 1.3 UG/L AND O-XYLENE AT 0.8 UG/L. SAMPLE WAS FOAMY
- i: Comments for OEHD Sample #: 97019255 HEAVY EMULSION. SAMPLE CONTAINED LARGE MOUNTS OF 1-BUTOXY-2-PROPANOL AND 2,2-DIMETHYL PROPANOIC ACID.
- j: Comments for OEHD Sample #: 97019256 SAMPLE CONTAINED A MODERATE AMOUNT OF FUEL (HYDRO-CARBONS C11-C16) AND A LARGE AMOUNT OF SILICIC ACID.
- k: Comments for OEHD Sample #: 97019257 SAMPLE CONTAINED A MODERATE AMOUNT OF JET FUEL (C11-C17), SILICIC ACID, AND SULFUR.
- l: Comments for OEHD Sample #: 97019258 SAMPLE CONTAINED A MODERATE AMOUNT OF JET FUEL (C11-C17), SILICIC ACID, AND SULFUR.
- m: Comments for OEHD Sample #: 97019259 SAMPLE CONTAINED A MODERATE AMOUNTS OF FUEL-TYPE HYDROCARBONS, MOST LIKELY JET FUEL.
- n: Comments for OEHD Sample #: 97019310 (CN970217, SITE 4) TRACE AMOUNTS OF HYDRAULIC FLUID.
- o: Comments for OEHD Sample #: 97019310 (CN970218, SITE 8) LARGE AMOUNTS OF HYDRAULIC FLUID.
- p: Comments for OEHD Sample #: 97019779 SAMPLE ANALYZED BY CAPILLARY COLUMN GC/MS. SAMPLE CONTAINED N-ALKANES C12-C15 (DODECANE THROUGH PENTADECANE),
- q: SAMPLE MOST CLOSELY RESEMBLED JP-8.

Reviewed By:


VICTORIA S. DUNOVANT, Lt Col, USAF, BSC
Chief, Environmental Chemistry Branch



ARMSTRONG LABORATORY
 Occupational & Environmental Health Directorate/OEA
 2402 E. Drive, Bldg 140
 Brooks AFB, Texas 78235-5114
 (210) 536-3626, FAX (210) 536-9043
WHITEMAN PROJECT 17
DATA SUMMARY FORM
INORGANIC
 Wastewater Samples
 (mg/L)

see 15716

Method	Date Collected	Sample Number	Tracking Number	Result	OE	Date	Q	Result	OE	Date	Q	Result	OE	Date	Q	Result	OE	Date	Q
Method	97/03/24	97019597	601, 604, 608, 612, 8	97/03/24	97019598	605, 609, 619-25	97/03/24	97019600	607, 611, 633-35	97/03/24	97019751	755, 760, 758-59	97/03/24	97019599	603, 606, 610, 626-631	97/03/24	97019756	57	
Detection Limit		CN970224 & GN970224		CN970225 & GN970225	CN970227		CN970233 & GN970233		GN970226		GN970234								
Compound	Group A	Group B	Group C	Group D	Group E	Group G	Group G	Group G	Group G	Group G	Group G	Group G	Group G	Group G	Group G	Group G	Group G	Group G	Group G
<10	COD	174	97019612	97/03/26	74	97019619	97/03/26	257	97019633	97/03/26	111	97019751	97/03/31	6320	97019626	97/03/26	NT		
<1	Total Organic Carbon	42	97019612	97/03/26	16	97019619	97/03/26	61	97019633	97/03/26	472	97019751	97/03/31	128	97019626	97/03/26	NT		
<0.3	Oil & Grease	22.4	97019613	97/03/26	5.44	97019620	97/03/26	51.2	97019634	97/03/26	NT			70.4	97019627	97/03/26	54 mg/Bl	97019756	97/03/27
<1	TPH	12.8	97019613	97/03/26	4.72	97019620	97/03/26	15.2	97019634	97/03/26	NT			2	97019627	97/03/26	NT		
<0.2	Ammonia	<0.2	97019614	97/03/27	<0.2	97019621	97/03/27	0.5	97019635	97/03/28	7	97019752	97/04/04	0.8	97019628	97/03/28	NT		
<0.1	Kjeldahl Nitrogen	4.1	97019614	97/03/27	2.5	97019621	97/03/27	5	97019635	97/03/28	8.1	97019752	97/04/04	11	97019628	97/03/28	NT		
<0.1	Nitrate-Nitrite	<0.1	97019614	97/03/27	0.22	97019621	97/03/27	0.1	97019635	97/03/28	8	97019752	97/04/04	4.3	97019628	97/03/28	NT		
<0.10	Phosphorus, Ortho	0.25	97019614	97/03/27	1	97019621	97/03/27	0.45	97019635	97/03/28	7.7	97019752	97/04/04	130	97019628	97/03/28	NT		
<0.005	Phosphorus, Total	0.25	97019614	97/03/27	1.2	97019621	97/03/27	0.45	97019635	97/03/28	8.7	97019752	97/04/04	188	97019628	97/03/28	NT		
<10 ug/L	Cyanide, Total	<0.005	97019615	97/03/27	<0.005	97019622	97/03/27	NT			0.44	97019753	97/03/27	0.014	97019629	97/03/27	NT		
	Group E																		
	Phenols	<10	97019616	97/04/01	<10	97019623	97/04/01	NT			115	97019754	97/04/01	184	97019630	97/04/01	NT		
	Group G																		
	Acidity, Total	NT			NT			NT			NT			NT			NT		
	Alkalinity, Total	NT			NT			NT			NT			NT			NT		
	Bromide	NT			NT			NT			NT			NT			NT		
	Chloride	40.2	97019617	97/03/26	31.5	97019624	97/03/26	NT			5.7	97019755	97/03/26	<1.0	97019631	97/03/26	NT		
	Color	NT			NT			NT			NT			NT			NT		
	Langlier Index	NT			NT			NT			NT			NT			NT		
	Residue, Total	NT			NT			NT			NT			NT			NT		
<0.2 mL/L	Residue, Soluble	<0.2	97019617	97/03/26	<0.2	97019624	97/03/26	NT			0.2	97019755	97/03/26	1.8	97019631	97/03/26	NT		
<1	Residue, Filterable	344	97019617	97/03/26	552	97019624	97/03/26	NT			30	97019755	97/03/26	6440	97019631	97/03/26	NT		
<1	Residue, Nonfilterable	4	97019617	97/03/26	8	97019624	97/03/26	NT			5	97019755	97/03/26	908	97019631	97/03/26	NT		
<1	Residue, Volatile	NT			NT			NT			NT			NT			NT		
	Silica	NT			NT			NT			NT			NT			NT		
umhos	Specific Conductance	525	97019617	97/03/26	771	97019624	97/03/26	NT			3	97019755	97/03/26	5900	97019631	97/03/26	NT		
<1	Sulfates	93.5	97019617	97/03/26	179.4	97019624	97/03/26	NT			1.5	97019755	97/03/26	5.5	97019631	97/03/26	NT		
<1	Sulfides	0.2	97019618	97/03/27	0.3	97019625	97/03/26	NT			NT			<0.1	97019632	97/03/26	NT		
<0.1	Surfactants	3.0	97019617	97/03/26	1.5	97019624	97/03/26	NT			<0.1	97019755	97/03/26	8	97019631	97/03/26	0.9	97019757	97/03/31
	Turbidity	NT			NT			NT			NT			NT			NT		
	Volatile Suspended Solids	7	97019617	97/03/26	8	97019624	97/03/26	NT			2	97019755	97/03/26	498	97019631	97/03/26	NT		

DATA SUMMARY FORM
VOLATILE ORGANICS
Wastewater Samples

(µg/L)

Method Detection Limit	Compound	Date Collected 97/03/24				97/03/24				97/03/24				97/03/24				97/03/24					
		Sample Numbers Tracking Numbers	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	
<5.0	Benzene	97/019597, 601, 604, 608, 612-9	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	4.2	97/019760	97/03/26						
<5.0	Bromodichloromethane	CN970224 & GN970224	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Bromofom	CN970225 & GN970225	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Bromomethane	SITE 6	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Carbon Tetrachloride	SITE 7	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	10.5	97/019760	97/03/26						
<5.0	Chlorobenzene	SITE 4	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	13.8	97/019760	97/03/26						
<5.0	Chloroethane	CN970227	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	2-Chloroethylvinyl Ether	SITE 17	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Chloroform	SITE 13	6.3	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Chloromethane	SITE 21	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Dibromochloromethane		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	1,2-Dichlorobenzene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	1,3-Dichlorobenzene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	6.6	97/019760	97/03/26						
<5.0	1,4-Dichlorobenzene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	5.3	97/019760	97/03/26						
<5.0	1,1-Dichloroethane		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	12.3	97/019760	97/03/26						
<5.0	1,2-Dichloroethane		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	5.7	97/019760	97/03/26						
<5.0	trans-1,2-Dichloroethane		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	4.6	97/019760	97/03/26						
<5.0	cis-1,3-Dichloropropene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	3.8	97/019760	97/03/26						
<5.0	trans-1,3-Dichloropropene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Ethylbenzene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Methylene Chloride		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	3.7	97/019760	97/03/26						
<5.0	1,1,2,2-tetrachloroethane		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	4.2	97/019760	97/03/26						
<5.0	Tetrachloroethene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	<5	97/019760	97/03/26						
<5.0	Toluene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	13.5	97/019760	97/03/26						
<5.0	1,1,1-Trichloroethane		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	9.7	97/019760	97/03/26						
<5.0	1,1,2-Trichloroethane		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	4	97/019760	97/03/26						
<5.0	Trichloroethylene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	5.4	97/019760	97/03/26						
<5.0	Trichlorofluoromethane		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	6.6	97/019760	97/03/26						
<5.0	m-Xylene & p-Xylene	SN	<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	20.3	97/019760	97/03/26						
<5.0	o-Xylene		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	12.1	97/019611	97/03/27	b	18.6	97/019760	97/03/26						
<5.0	Vinyl Chloride		<5	97/019608	97/03/27	b,l	<5	97/019609	97/03/26	b,l	<5	97/019611	97/03/27	b	5.8	97/019760	97/03/26						

WHITEMAN PROJECT 17

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples
(ug/L)

Table with columns: Method, Detection Limit, Date Collected, Sample Numbers, Tracking Numbers, Compound, Result, OE, NUMBER, Date, Q, Result, OE, NUMBER, Date, Q, Result, OE, NUMBER, Date, Q, Result, OE, NUMBER, Date, Q. Rows include various chemical compounds such as 2,4-Dinitrophenol, 2,6-Dinitrotoluene, 2,4-Dinitrotoluene, Fluoranthene, Hexachlorobenzene, Hexachlorocyclopentadiene, Hexachloroethane, Indeno(1,2,3-c)pyrene, Isophthone, 4,4-Methylenedianiline, Naphthalene, N-Nitrosodipropylamine, N-Nitrosodiphenylamine, Nitrobenzene, 2-Nitrophenol, 4-Nitrophenol, Pentachlorophenol, Phenanthrene, Phenol, Pyrene, and Toxaphene. Results are generally <10 or ABSENT.

WHITEMAN PROJECT 17

DATA SUMMARY FORM

COMMENTS

Wastewater Samples

page 1 of 1

< - Signifies none detected and the detection limits.


SN : SEE COMMENTS

ABS : Absent

Comment Code

- a: HOLD TIME EXCEEDED
- b: OTHER FUEL HYDROCARBONS ARE PRESENT.
- c: SAMPLE SPIKE RECOVERIES ARE LOW DUE TO ORGANIC OR ALKALINE COMPOSITION FOR SELENIUM AND/OR THALLIUM
- d: Comments for OEHD Sample #: 97019597 - HEAVY EMULSION. SAMPLE CONTAINED SMALL AMOUNT OF FUEL TYPE HYDROCARBONS
- e: Comments for OEHD Sample #: 97019604 - FOR SELENIUM 64.7%
- f: Comments for OEHD Sample #: 97019608 - Comments for OEHD Sample #: 97019608 CHLOROETHANE DETECTED AT APPROXIMATELY 3.9 UG/L. M,P-XYLENES DETECTED AT APPROXIMATELY 1.0 UG/L.
- h: Comments for OEHD Sample #: 97019598 - HEAVY EMULSION. SAMPLE CONTAINED SMALL QUANTITY OF JET-TYPE FUEL.
- i: Comments for OEHD Sample #: 97019609 - VINYL CHLORIDE DETECTED AT APPROXIMATELY 2 UG/L. TRICHLOROETHYLENE DETECTED AT APPROXIMATELY 4 UG/L. OTHER FUEL HYDROCARBONS ARE PRESENT.
- j: Comments for OEHD Sample #: 97019600 - HEAVY EMULSION. SAMPLE CONTAINED SMALL AMOUNTS OF FUEL-TYPE HYDROCARBONS AND SULFUR.
- k: Comments for OEHD Sample #: 97019758 - SAMPLE ALSO CONTAINED APPROXIMATELY 142 UG/L OF DIBENZOFURAN (CALCULATED ESTIMATE BASED ON RESPONSE RELATIVE TO INTERNAL STANDARD ACENAPHTHENE-D 9).
- l: Comments for OEHD Sample #: 97019599 - VERY HEAVY EMULSION. SAMPLE CONTAINED VERY LARGE AMOUNT OF HYDROCARBON COMPOUNDS MOST LIKELY FROM LUBRICATING OIL.
- m: Comments for OEHD Sample #: 97019610 - LIMONENE TENTATIVELY IDENTIFY AT 10 UG/L. OTHER FUEL HYDROCARBONS ARE PRESENT.
- n: All pesticides (EPA 625) were absent qualitatively.
- o: Result is 54 mg/bottle (ERA QC)

Reviewed By:


VICTORIA S. DUNOIVANT, LT COL USAF, BSC
Chief, Environmental Chemistry Branch

DATA SUMMARY FORM
VOLATILE ORGANICS
Wastewater Samples

Method Section mill	Date Collected	Sample Numbers Tracking Numbers	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	E NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q
EPA 824 OR 601602	97/03/25	97/019792; 799; 804; 808; 841; 847	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019793; 799; 804; 809; 848; 854	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019794; 800; 805; 810; 855-57	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019795; 806; 811; 865	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019796; 807; 834-40; 971	<5	97/019807	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019797; 807; 834-40; 971	<5	97/019807	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019801; 858-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019802; 859-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019803; 860-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019804; 861-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019805; 862-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019806; 863-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019807; 864-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019808; 865-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019809; 866-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019810; 867-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019811; 868-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	
	97/03/25	97/019812; 869-64	<5	97/019808	97/03/28	<100	97/019809	97/03/28	n	<5	97/019810	97/03/28	o	NSR	97/019859	97/03/28	q	<5	97/019811	97/03/28	q	

WHITEMAN PROJECT 17

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS
Wastewater Samples
(µg/l)

Table with columns: Method, Compound, EPA 625, Date Collected, Result, OE NUMBER, Date, Q, Result, OE NUMBER, Date, Q, Result, OE NUMBER, Date, Q, Result, OE NUMBER, Date. Rows list compounds like Acanaphthene, Aldrin, Anthracene, etc., across multiple sites (6-12) and dates (97/03/28, 97/03/22, 97/03/28, 97/03/28).

DATA SUMMARY FORM
SEMI-VOLATILE ORGANICS (cont'd)
Wastewater Samples
(ug/L)

Method	Sample Numbers	Date Collected		Results	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q	Result	OE NUMBER	Date	Q				
		97/03/25	97/03/28																	97/03/25	97/03/28	97/03/25	97/03/28
mg/L	Compound	2,4-Dinitrophenol	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		2,6-Dinitrotoluene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		2,4-Dinitrotoluene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		Fluoranthene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		Fluorene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		Hexachlorobenzene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		Hexachlorobiphenyl	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		Hexachlorocyclopentadiene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		Hexachloroethane	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
		Indenol(1,2,3-c-d)pyrene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h
Isophorone	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
4,4-Methylendianiline	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
Naphthalene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
N-Nitrosodipropylamine	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
N-Nitrosodiphenylamine	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
N-Nitrosodiphenylamine	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
Nitrobenzene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
4-Nitrophenol	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
2-Nitrophenol	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
Phenanthrene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
Phenol	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
Pyrene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
Toxaphene	97/019791	97/03/28	ABSENT	97/019791	d	ABSENT	97/019792	97/03/28	e	ABSENT	97/019793	97/03/28	f	ABSENT	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
1,2,4-Trichlorobenzene	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		
2,4,6-Trichlorophenol	97/019791	97/03/28	<10	97/019791	d	<10	97/019792	97/03/28	e	<10	97/019793	97/03/28	f	<10	97/019794	97/03/28	g	97/03/25	97/019795	97/03/28	h		

APPENDIX D

17 March 1997 Whiteman AFB, Missouri
Industrial Wastewater System Characterization Survey
DEFOAMER WAFB MSDS

3.85 per gallon

MATERIAL SAFETY DATA SHEET

Effective Date: July 22, 1996

DEFOAMER WAFB

IDENTIFICATION

Product Name: DEFOAMER WAFB MANUFACTURER: G.S. Robins & Company
126 Chouteau Avenue
St. Louis, MO 63102
Ph# (314) 621-5155

CAS Registry Number: Mixture EMERGENCY PHONE NUMBER:
TSCA Inventory Number: 9016-45-9, 64741-44-2 CHEMTREC: (800)424-9300

COMPOSITION

Component	CAS Number	Percent	OSHA PEL	ACGIH TLV
Mineral Seal Oil	64741-44-2	80 %	400 PPM TWA	400 PPM TWA
Alkylphenol Ethoxy etc	9016-45-9	20 %	None	None

EMERGENCY OVERVIEW:

Caution! Harmful if inhaled and may cause delayed lung injury. Can cause nervous system depression. Aspiration hazard if swallowed - can enter lungs and cause damage. Keep away from heat and flame. Avoid breathing vapor. Use ventilation adequate to keep vapor below recommended exposure limits. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

POTENTIAL HEALTH EFFECTS:

Inhalation: Headache, nasal and respiratory irritation, nausea, drowsiness, breathlessness, fatigue, central nervous system depression, convulsions, and loss of consciousness.

Eye Contact: Irritation experienced as mild discomfort and seen as slight excess redness of the eye.

Skin Contact: May cause irritation. Prolonged exposure may cause dermatitis.

Ingestion: Aspiration hazard, headache, nausea, diarrhea, drowsiness, fatigue, pneumonitis, pulmonary edema, central nervous system depression, convulsions and loss of consciousness.

Cancer: Not considered a carcinogen.

Inhalation: If irritation, headache, nausea, or drowsiness occurs, remove to fresh air. If breathing has stopped, perform artificial respiration. Get medical attention if breathing becomes difficult or respiratory irritation persists.

Eye Contact: Immediately flush eyes with plenty of water for a minimum of 15 minutes. Hold eyelids apart while flushing to rinse entire surface of eye and lids with water. Get medical attention.

Skin Contact: If clothing soaked, immediately remove clothing and wash skin with soap and water. Launder clothing before wearing. Get medical attention promptly.

Ingestion: Call a physician immediately. ONLY induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

MATERIAL SAFETY DATA SHEET

No data is available or blended product.

No data is available or blended product.

Disposal Guidance: Utilize licensed waste disposal company. Consider recycling or incineration. Utilize permitted hazardous waste disposal site or industrial waste disposal site as appropriate.

DOT Hazardous Material Classification: Defoamer WAFB is not a US Department of Transportation (DOT) Hazardous Material.

DOT Hazardous Substance Classification: Defoamer WAFB is not a DOT Hazardous Substance.

TSCA No.: Components of Defoamer WAFB appear on the EPA TSCA inventory list.

RCRA: Defoamer WAFB is not listed as a hazardous waste under any sections of the Resource Conservation and Recovery Act or regulations (40 CFR 261 et seq.).

Superfund: CERCLA/SARA. Not listed under CERCLA (the Comprehensive Environmental Response Compensation and Liability Act) or its 1986 amendments, SARA, (the Superfund Amendments and Reauthorization Act), including substances listed under Section 313 of SARA, Toxic Chemicals, 42 USC 11023, 40 CFR 372.65; Section 302 of SARA, Extremely Hazardous Substances, 42 USC 11002, 40 CFR 355; or the CERCLA Hazardous Substances list, 42 USC 9604, 40 CFR 302.

IARC: The International Agency for Research on Cancer (of the World Health Organization) does not list or categorize the components of Defoamer WAFB as a carcinogen.

NTP Annual Report on Carcinogens: Not listed.

OSHA Carcinogen: Not listed.

National Fire Protection Association (NFPA) Classification:

Health	1
Flammability	2
Reactivity	0

Hazardous Materials Information Systems (HMIS):

Blue (Acute Health)	1
Red: Flammability	2
Yellow: (Reactivity)	0

THE INFORMATION, DATA AND RECOMMENDATIONS CONTAINED HEREIN ARE BELIEVED TO BE ACCURATE. G.S. ROBINS AND COMPANY MAKES NO WARRANTY OF ANY KIND AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

MATERIAL SAFETY DATA SHEET

Flash Point: 260°F TCC
Autoignition Temperature: 490°F (estimated)
Flammable Limits: Upper - 6 (estimated)
 Lower - 0.7 (estimated)
Extinguishing Media: Carbon dioxide, dry chemical, or foam. Water stream may spread fire, use water spray only to cool containers exposed to fire. If leak or spill has not ignited, use water spray to disperse the vapors.
Fire and Explosion Hazards: Can form combustible mixtures with air when heated.
Hazardous Decomposition Products: Incomplete combustion can yield carbon monoxide and various hydrocarbons.

General: Evacuate area and remove ignition sources. Build dike to contain flow. Remove free liquid, do not flush to sewer or open water. Pick up with inert absorbent and place in closed container for disposal.

General: Do not store with strong oxidizers. Store as OSHA Class IIIB combustible liquid.

Engineering Controls: Use local or dilution ventilation to keep airborne concentrations below 400 PPM. Loading, unloading, tank ganging, etc., remain upwind.

Personal Protection: Where airborne concentrations are expected to exceed exposure limits, NIOSH/MSHA certified respirators must be used. Use safety glasses, chemical goggles or face shield as appropriate. Use nitrile, or neoprene gloves.

Appearance: Clear, slightly yellow
Specific Gravity: 0.852
Reid Vapor Pressure:
 @ 100°F: estimate less than 0.1 pound
Solubility in Water: Dispersible
Melting Point: 20°
Viscosity: 3.7 cs @ 100°F
Boiling Point: 475° - 610°F
Flash Point: 260°F TCC

Stability: Defoamer WAFB is a stable product
Hazardous Decomposition Products: Incomplete combustion can yield carbon monoxide and various hydrocarbons. Toxic levels of carbon monoxide, carbon dioxide, irritating aldehydes and ketones may be formed on burning. Heating in air may produce irritating aldehydes, acids, and ketones.
Hazardous Polymerization: Will not occur.

APPENDIX E

**Whiteman AFB, Missouri
Industrial Wastewater System Characterization Survey
3M MSDS and Environmental Data Sheets**

MATERIAL SAFETY DATA SHEET
 3M
 3M Center
 St. Paul, Minnesota
 55144-1000
 (612) 733-1110

Copyright, 1996, Minnesota Mining and Manufacturing Company. All rights reserved. Copying and/or downloading of this information for the purpose of properly utilizing 3M products is allowed provided that:

- 1) the information is copied in full with no changes unless prior agreement is obtained from 3M, and
- 2) neither the work nor the original is resold or otherwise...

DIVISION: SPECIALTY CHEMICALS DIVISION

TRADE NAME:

FC-203CF LIGHT WATER(TM) Brand Aqueous Film Forming Foam

ID NUMBER/U.P.C.:

98-0211-5617-3	00-51135-10152-0	98-0211-5618-1	00-51135-10153-7
98-0211-5619-9	00-51135-10154-4	98-0211-5620-7	00-51135-10155-1
98-0211-5621-5	00-51135-10156-8	98-0211-5622-3	00-51135-10157-5
98-0211-5623-1	- - -	ZF-0002-0620-9	- - -
ZF-0002-0789-2	- - -		

ISSUED: August 22, 1996

SUPERSEDES: November 13, 1995

DOCUMENT: 10-4322-3

1. INGREDIENT	C.A.S. NO.	PERCENT	
WATER.....	7732-18-5	69.0	- 71.0
DIETHYLENE GLYCOL BUTYL ETHER.....	112-34-5		20.0
AMPHOTERIC FLUOROALKYLAMIDE DERIVATIVE +(5803P).....	TradeSecret	1	- 5
ALKYL SULFATE SALTS(2) +(5805P, 5806P)..	TradeSecret	1.0	- 5.0
TRIETHANOLAMINE.....	102-71-6	0.5	- 1.5
PERFLUOROALKYL SULFONATE SALTS(5) +(5804P).....	TradeSecret	0.5	- 1.5
TOLYL TRIAZOLE.....	29385-43-1		0.05

New Jersey Trade Secret Registry Number (EIN) 04499600-+

This product contains the following toxic chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Emergency Planning and Community Right-To-Know Act of 1986 and 40 CFR Part 372:

DIETHYLENE GLYCOL BUTYL ETHER

2. PHYSICAL DATA

BOILING POINT:..... 100 C
 (Typical)
 VAPOR PRESSURE.....
 -ca 10^-7 @ 20C-

Abbreviations: N/D - Not Determined N/A - Not Applicable

MSDS: FC-203CF LIGHT WATER(TM) Brand Aqueous Film Forming Foam
August 22, 1996

PAGE 3

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:

Observe precautions from other sections. Ventilate area. Contain spill. Cover with absorbent material. Collect spilled material. Clean up residue with water. Place in an approved metal container. Seal the container.

RECOMMENDED DISPOSAL:

Discharge spent solutions to a wastewater treatment system. Reduce discharge rate if foaming occurs. Large quantities may adversely affect biological wastewater treatment systems. Incinerate in an industrial or commercial facility in the presence of a combustible material. Combustion products will include HF.

ENVIRONMENTAL DATA:

A Product Environmental Data Sheet (PED) is available.

5-Day Biochemical Oxygen Demand (BOD5): 0.35 g/g; 20-Day Biochemical Oxygen Demand (BOD20): 0.75 g/g; 20-Day BOD/COD: 0.96; Chemical Oxygen Demand (COD): 0.75 g/g; 96-Hr LC50, Fathead minnow (*Pimephales promelas*): >1,000 mg/L; 48-Hr EC50, Water flea, (*Daphnia magna*): >1,000 mg/L; 96-Hr EC50, Algae (*Selenastrum capricornutum*): 143 mg/L (130-156); 30-Min EC50, *Photobacterium phosphoreum* (Microtox System): 280 mg/L (260-300); 3-Hr, 20C EC50, Activated Sludge Respiration (OECD Method #209): >1,000 mg/L.

REGULATORY INFORMATION:

Volatile Organic Compounds: 200 gms/liter South Coast Air Quality Mgmt Dist Method Calc. @ 20 C.

VOC Less H2O & Exempt Solvents: N/A.

Since regulations vary, consult applicable regulations or authorities before disposal. In the event of an uncontrolled release of this material, the user should determine if the release qualifies as a reportable quantity. U.S. EPA Hazardous Waste Number = None (Not U.S. EPA Hazardous).

The components of this product are in compliance with the chemical registration requirements of: TSCA, EINECS, CDSL, AICS, MITI.

EPCRA HAZARD CLASS:

FIRE HAZARD: No PRESSURE: No REACTIVITY: No ACUTE: Yes CHRONIC: Yes

6. SUGGESTED FIRST AID

EYE CONTACT:

Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

Abbreviations: N/D - Not Determined N/A - Not Applicable

MSDS: FC-203CF LIGHT WATER(TM) Brand Aqueous Film Forming Foam
August 22, 1996

PAGE 2

2. PHYSICAL DATA (continued)

VAPOR DENSITY:..... ca. 0.77 Air=1
 Calc @ 20C
EVAPORATION RATE:..... < 1 BuOAc=1
SOLUBILITY IN WATER:..... Miscible
SPECIFIC GRAVITY:..... 1.0 Water=1
PERCENT VOLATILE:..... 90 % by wt
pH:..... 8.5
VISCOSITY:..... N/D
MELTING POINT:..... N/A

APPEARANCE AND ODOR:

Clear, amber colored liquid.

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... None (Setaflash CC)
FLAMMABLE LIMITS - LEL:..... N/A
FLAMMABLE LIMITS - UEL:..... N/A
AUTOIGNITION TEMPERATURE:..... N/A

EXTINGUISHING MEDIA:

Product is a fire-extinguishing agent.

SPECIAL FIRE FIGHTING PROCEDURES:

Not applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS:

See Hazardous Decomposition section for products of combustion.

4. REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY - MATERIALS/CONDITIONS TO AVOID:

Not applicable.

HAZARDOUS POLYMERIZATION: Hazardous polymerization will not occur.

HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon Monoxide and Carbon Dioxide, Oxides of Nitrogen, Oxides of Sulfur, Hydrogen Fluoride

Thermal decomposition of usage concentrations does not present a hazard.

Abbreviations: N/D - Not Determined N/A - Not Applicable

MSDS: FC-203CF LIGHT WATER(TM) Brand Aqueous Film Forming Foam
August 22, 1996

PAGE 5

7. PRECAUTIONARY INFORMATION (continued)

EXPOSURE LIMITS

INGREDIENT	VALUE	UNIT	TYPE	AUTH	SKIN*
WATER.....	NONE	NONE	NONE	NONE	
DIETHYLENE GLYCOL BUTYL ETHER.....	35	PPM	TWA	CMRG	
AMPHOTERIC FLUOROALKYLAMIDE ' DERIVATIVE +(5803P).....	NONE	NONE	NONE	NONE	
ALKYL SULFATE SALTS(2) +(5805P, 5806P).....	NONE	NONE	NONE	NONE	
TRIETHANOLAMINE.....	5	MG/M3	TWA	ACGIH	
PERFLUOROALKYL SULFONATE SALTS(5) +(5804P).....	0.1	MG/M3	TWA	3M	Y
TOLYL TRIAZOLE.....	NONE	NONE	NONE	NONE	

* SKIN NOTATION: Listed substances indicated with 'Y' under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:

- ACGIH: American Conference of Governmental Industrial Hygienists
- 3M: 3M Recommended Exposure Guidelines
- CMRG: Chemical Manufacturer Recommended Exposure Guidelines
- NONE: None Established

8. HEALTH HAZARD DATA

EYE CONTACT:

Moderate Eye Irritation: signs/symptoms can include redness, swelling, pain, tearing, and hazy vision.

SKIN CONTACT:

..Moderate Skin Irritation (after prolonged or repeated contact):
signs/symptoms can include redness, swelling, itching, and dryness.

..Prolonged or repeated exposure may cause:

May be absorbed through the skin in harmful amounts.

INHALATION:

Single overexposure, above recommended guidelines, may cause:

Central Nervous System Depression: signs/symptoms can include headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.

Irritation (upper respiratory): signs/symptoms can include

Abbreviations: N/D - Not Determined N/A - Not Applicable

MSDS: FC-203CF LIGHT WATER(TM) Brand Aqueous Film Forming Foam
August 22, 1996

PAGE 4

6. SUGGESTED FIRST AID (continued)

SKIN CONTACT:

Flush skin with large amounts of water. If irritation persists, get medical attention.

INHALATION:

If signs/symptoms occur, remove person to fresh air. If signs/symptoms continue, call a physician.

IF SWALLOWED:

Drink two glasses of water. Call a physician.

7. PRECAUTIONARY INFORMATION

EYE PROTECTION:

Avoid eye contact with vapor, spray, or mist. Wear vented goggles.

SKIN PROTECTION:

Avoid skin contact. Wear appropriate gloves when handling this material. A pair of gloves made from the following material(s) are recommended: butyl rubber.

RECOMMENDED VENTILATION:

Use with adequate dilution ventilation.

RESPIRATORY PROTECTION:

Avoid breathing of vapors, mists or spray. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: Half-mask organic vapor respirator with dust/mist prefilter.

PREVENTION OF ACCIDENTAL INGESTION:

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Wash hands after handling and before eating.

RECOMMENDED STORAGE:

Store away from heat. Keep container closed when not in use.

FIRE AND EXPLOSION AVOIDANCE:

Not applicable.

HMIS HAZARD RATINGS:

HEALTH: 2 FLAMMABILITY: 0 REACTIVITY: 0
PERSONAL PROTECTION: X (See precautions, section 7.)

Abbreviations: N/D - Not Determined N/A - Not Applicable

APPENDIX F

Whiteman AFB, Missouri
Industrial Wastewater System Characterization Survey
March 1997 Pollution Prevention
Opportunity Assessment Surveys

Shop: Metals Technology, Survival Equipment, Repair and Reclamation, Pneudraulics, Egress

BUILDING No. 1117

Office Symbol: 442 MS

POC: Capt Weimer

Telephone: 2155

Mission Narrative:

Repair and Reclamation: Performs general maintenance on the A-10. Heavy maintenance includes all aspects of the aircraft operational systems, with the exception of the fuel system.

Electro -Environmental - Service and maintenance of the electrical and environmental aircraft system components for the A-10. These duties include inspecting, repairing, servicing, and modifying systems and equipment. Personnel also perform service, inspection, and maintenance on nickel-cadmium batteries.

Pneudraulics: Inspection, repair and maintenance of the A-10 hydraulic system.

Wheel and Tire: Responsible for inspecting, maintaining and overhauling the A-10 wheel assembly. This includes the cleaning of wheel bearings.

Egress: Responsible for the inspection, maintenance, and repair of the A-10's ejection system.

Survival Equipment: Responsible for the maintenance, inspection, and repair of the A-10 survival equipment including parachutes, life vests, and rubber survival rafts.

Metals Technology: Responsible for limited structural painting and welding of A-10 parts which includes surface preparation done by sanding and wipe-down prior to touching up with the appropriate surface paint. A bead blast booth is available for paint removal on A-10 parts.

Industrial Wastewater Sources:

There are two large drains in the main bay, one runs the entire width of the hangar and is located by the door. The other drain is located in the middle of the hangar and runs the length of the hangar. Touch-up painting is also conducted in close proximity to the middle drain. Aircraft washing is accomplished along with normal floor cleaning. Possible pollutants in this washwater include carbon, fuels, oils, greases, metals, paint over spray, sanding residual and hydraulic fluid.

Pollutants of Concern based on Analytical Results:

Wastewater sampling was conducted at the manhole which services your building. Pollutant annotations are provided for identification of pollutant sources and ensuing pollution prevention initiatives. Potable water sample results are identified for background, baseline information. The following pollutants were detected:

*Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

Contaminant	Date Detected/Range mg/l	*Possible Source	Remarks
Aluminum	97/03/26,27,28 Range 0.0903-1.84	metal alloy	
Antimony	97/03/26,27 Range 0.004-0.005	constituent with alloys with other metals	
Arsenic	97/03/26 Range <0.005-0.005	pigments, alloy	
Barium	97/03/26,27,28 Range 0.063-0.094	lube oil additive, manufacture of paper electrodes, catalyst for organic reactions	potable water = 0.033 mg/l
Cadmium	97/03/26,27,28 Range 0.001-0.006	electroplating, solder for aluminum, constituent of easily fusible alloys, deoxidizer in nickel plating	
Chromium	97/03/28 Range <0.005-0.01	stainless and alloy steels, pigments, electroplating, corrosion resistant products	
Beryllium	97/03/26 Range <0.0005-0.0008	non-corrodible metal used in alloys	
Copper	97/03/26,27, 28 Range 0.022-0.03	metal alloy	potable water = 0.015 mg/l
Iron	97/03/26,27,28 Range 1.75-3.4	metal	potable water = 0.045 mg/l
Lead	97/03/26, 27, 28 Range 0.005-0.007	paint, ink, ceramics, batteries	potable water = 0.001 mg/l
Mercury	97/03/26 Range <0.0002-0.0004	electrical apparatus, measurement systems, paint	
Nickel	97/03/26,27 Range 0.016-0.025	corrosion resistant alloy, electroplating, nic-cad batteries	
Strontium	97/03/26,27,28 Range 0.178-0.286	stainless and alloy steels, pigments, electroplating, corrosion resistant products	

Contaminant	Date Detected	Possible Source	Remarks
Zinc	97/03/24,25,26,27,28 Range 0.031-0.07	galvanizing, electroplating, alloying, paint pigments	potable water = 0.006 mg/l

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

Reclamation and Repair:

The following chemicals were identified on your chemical authorization listing maintained by the BEE shop. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or by calling the item manager.

*Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8030-01-184-0330	Sealant	Mang Chromate	substitute if possible	health, environment, found in wastestream

Metals Technology/Structural Maintenance: During the survey, I observed numerous containers of methyl ethyl ketone in the paint room, located by the paint guns and gun washer. Recommend investigating the use of a less hazardous substitute to afford worker and environmental protection. Note, it must be in compliance with the applicable Technical Order.

The following chemicals were identified on your chemical authorization listing maintained by the BEE shop. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or by calling the item manager.

*Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8010-00-082-2450	Primer coating kit	strontium chromate	look for substitution	health and detected in wastestream
8010-00-935-7080	Primer	strontium chromate	look for substitution	health and detected in wastestream
8010-01-050-4082	Epoxy resin kit	strontium chromate	look for substitution	health and detected in wastestream
8010-00-297-0593	So Sure Yellow	lead and zinc chromate	look for substitution	health and detected in wastestream
8010-00-515-2208	Paint	lead and zinc	look for substitution	health and detected

		chromate		in wastestream
8030-01-184-0328	PR1436-G	strontium chromate	look for substitution	health and detected in wastestream

Egress: Chemical authorization listing reviewed with no recommendations.

Survival Equipment: Chemical authorization listing reviewed with no recommendations.

Wheel/Tire: Parts washer wastewater used in the Wheel and Tire Shop has been tested and approved for disposal in the drain by Bioenvironmental Engineering. Chemical authorization listing reviewed with no recommendations.

Pneudraulics: Chemical authorization listing reviewed with no recommendations.

Pollution Prevention Recommendations - All:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill or allow paint overspray to reach the drains. Utilize drip pans under any equipment or operation that could generate a spill.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep prior to mopping if in compliance with BEE shop.
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.

Shop: A 10 Phase Inspection, Structural Maintenance, Washrack, Fuels
BUILDING No. 1118
Office Symbol: 442 MS
POC: Mr. Mock - Structural Maintenance, Mr. Chris Jergenson - A-10 Phase
Telephone: 3984

Mission Narrative:

Phase Inspection: This shop is responsible for disassembly, inspection, and repair of the A-10 aircraft. The inspection is required every 400 flying hours. Pre-phase inspection consists of inspection on the fuel system and flight controls. During the 16 day full phase, all applicable shops inspect and repair components as required. The final phase is then conducted where complete functional checks are performed.

Structural Maintenance: Responsible for limited structural painting of the A-10 which includes surface preparation done by sanding and wipe-down prior to touching up with the appropriate surface paint. A bead blast booth is available for paint removal on A-10 parts.

Armament: Inspect, repair, and overhaul the GAU 8/ 30mm gun and associated system components. Inspection involves the removal of the gun and washing in the washrack bay. Repair is done by disassembling the system components and placing in parts washer. Overhaul entails removal, inspection, replacement of parts if indicated, and reassembly.

Fuel System: Maintenance of the A-10 fuel system requirement is identified by excessive fuel leakage or in-flight write-ups. Once the maintenance requirement is identified, the aircraft's fuel tanks are defueled, and depuddled into a bowser. Entry is made into the cell after vapor exhaust/purge is done where the foam is pulled and air dried. Valves and lines are then inspected, repaired, or replaced.

Industrial Wastewater Sources:

Wastewater sources include the washrack wastewater where the A-10 armament is cleaned in addition to normal aircraft washing. Touch-up painting is also conducted in an area close to the washrack drain. Possible pollutants in this wastewater include carbon, fuels, oils, greases, metals, paint over spray, sanding residual and hydraulic fluid.

Pollutants of Concern based on Analytical Results:

Wastewater sampling was conducted at the manhole which services your building. Annotation of detected pollutants are provided for identification of pollutant sources and ensuing pollution prevention initiatives. Potable water sample results are identified for background, baseline information. The following pollutants were detected:

* Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

Contaminant	Date Detected/Range mg/l	*Possible Source	Remarks
Cyanide	97/03/22 Range 0.033	electroplating, hardening of metals	
Aluminum	97/03/21,22,23 Range 0.204-0.291	metal alloy	
Barium	97/03/21,22,23 Range 0.042-0.058	lube oil additive, manufacture of paper electrodes, catalyst for organic reactions	potable water = 0.033 mg/l
Cadmium	97/03/21,22,23 Range 0.015-0.109	electroplating, solder for aluminum, constituent of easily fusible alloys, deoxidizer in nickel plating	
Chromium	97/03/22,23 Range 0.006-0.018	stainless and alloy steels, pigments, electroplating, corrosion resistant products	
Copper	97/03/21,22, 23 Range 0.018-0.232	metal alloy	potable water = 0.015 mg/l
Iron	97/03/21,22,23 Range 0.051-0.663	metal	potable water = 0.045 mg/l
Lead	97/03/21,22,23 Range 0.003-0.078	paint, ink, ceramics, batteries	potable water = 0.001 mg/l
Mercury	97/03/23 Range <0.0002-0.0002	electrical apparatus, measurement systems, paint	
Nickel	97/03/26,27 Range 0.019-0.026	corrosion resistant alloy, electroplating, nic-cad batteries	
Strontium	97/03/21,22,23 Range 0.547-0.792	stainless and alloy steels, pigments, electroplating, corrosion resistant products	potable water = 0.223 mg/l
Zinc	97/03/21,22,23 Range 0.029-0.105	galvanizing, electroplating, alloying, paint pigments	potable water = 0.006 mg/l
Titanium	97/03/22 Range 0.028	enamels, pigment	
Selenium	97/03/21 Range 0.005	rectifiers, photo cells	
Bis2ethylhexly phthalate	97/03/21 Range 18.5	plasticizer for PVC	

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

Fuels Shop: A copy of analysis conducted by the Bioenvironmental Engineering, 27 Mar 96, reference BEF #GM960509-517 was obtained during this survey. The results were for fuel tank sealant from fuel cell repair. Cadmium was detected at 2.47 mg/l with a limit of 1 mg/l. Benzene, ethyl benzene, toluene, and xylene (F001-005) were detected in high concentrations. Please obtain written guidance from the BEE shop for proper disposal of this waste and maintain in your files.

The following chemical was identified on your chemical authorization listing maintained by the BEE shop. Given its hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or contacting the item manager.

* Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
6810-00-281-2785	methyl ethyl ketone	methyl ethyl ketone	substitute iaw TO	health and environment

Armament: Parts washer water analytical results for the Armament Shop collected by the Bioenvironmental Engineering office 17 Oct 96, reference BEF#GM961342-1344 showed high metal content. Disposal is done as a hazardous waste. Recommend holding and sampling the washwater produced during cleaning of the gun to ensure it does not require disposal as a hazardous waste.

The following chemicals were identified on your chemical authorization listing maintained by the BEE shop. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or by calling the item manager.

Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
9150-00-954-7422	Perma Slik	lead	look for substitution	health and detected in wastestream
8010-00-598-5936	Enamel - OD	lead	look for substitution	health and detected in wastestream
8030-00-181-7884	Accelerator	lead	look for substitution	health and detected in wastestream
8030-00-297-6677	CS3100 Pt B	lead	look for substitution	health and detected

				in wastestream
--	--	--	--	----------------

Structural Maintenance: The following chemicals were identified on your chemical authorization listing maintained by the BEE shop. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or by calling the item manager.

*Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8010-00-082-2450	Primer coating kit	strontium chromate	look for substitution	health and detected in wastestream
8010-00-935-7080	Primer	strontium chromate	look for substitution	health and detected in wastestream
8010-01-050-4082	Epoxy resin kit	strontium chromate	look for substitution	health and detected in wastestream
8010-00-297-0593	So Sure Yellow	lead and zinc chromate	look for substitution	health and detected in wastestream
8010-00-515-2208	Paint	lead and zinc chromate	look for substitution	health and detected in wastestream
8030-01-184-0328	PR1436-G	strontium chromate	look for substitution	health and detected in wastestream

Phase Inspection: The following chemicals were identified on your chemical authorization listing maintained by the BEE shop. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or by calling the item manager

* Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
6850-01-158-3928	Cleaning Compound	1,1,1 Trichloroethane	look for substitution	health and environment
8030-01-184-0328	Sealing Compound	Strontium Chromate	look for substitution	health and environment detected in wastestream
00-823-7860	Lub Compound	1,1,1 Trichloroethane	look for substitution	health and environment

Pollution Prevention Recommendations - All:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill. Utilize drip pans under any equipment or operation that could generate a spill.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep prior to mopping.
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.

Shop: A 10 Composite AGE, NDI, Engine Shops

BUILDING No. 1119

Office Symbol: 442 MXS

POC: Mr Steve Miller - AGE, Mr Alan Scott - NDI, Mr Tom O'Neill - Engine Shop

Telephone: 3239, 6058

Mission Narrative :

AGE: This shop provides support for approximately 200 pieces of AGE equipment utilized in support of the A-10 mission. This maintenance is both scheduled and unscheduled. It is comprised of washing, oil changes, and hydraulic and transmission fluid servicing. Stripping and painting of the equipment is done by contract. There is a battery room that is no longer used due to conversion to self contained gel batteries. There is a washrack in one of the bays where equipment is washed and steam cleaned if necessary. This bay is serviced by a small drain - approximately 4" x 4".

NDI: Inspect the A-10 for structural integrity by means of magnetic particle, ultrasound, eddy current, fluorescent penetrant dye or x-ray. Oils are also analyzed for metal particle content.

Engine Shop: Provide second level and unscheduled maintenance for A-10 engines and repair of APUs.

Customer: A-10

Industrial Wastewater Sources:

AGE: Floor washwater from a floor scrubbing machine which may contain small amounts of oils, greases, fuels, transmission, spray paint overspray and hydraulic fluids. This washwater is poured down the drain which flows into an Oil Water Separator (OWS). There are 8 - 4"x4" drains located throughout the bays. Equipment washwater is produced in the washrack bay which may contain oils, greases, fuels, transmission, paint leachate, and hydraulic fluid. The washrack is serviced by an OWS.

NDI: All spent fluorescent penetrant solutions are disposed as hazardous waste. The only wastewater discharges from this activity are the rinsate residuals which occur each time an aircraft part is dipped into straight solution and then followed by a rinse. This shop did not have a silver recovery unit at the time of the survey. According to Mr. Scott all chemical waste from the x-ray process is captured and turned into hazardous waste. Oil waste from oil/metal analysis is turned into hazardous waste.

Engine Shop: A Safety Kleen parts washer is utilized by this shop for the cleaning of bearings. According to Mr. O'Neill, Safety Kleen disposes of the spent fluid (NSN 6850-00-F01-4954) and refills the unit. The only wastewater source would be the result of floor washing which could contain soaps, fuel, oils, greases, and hydraulic fluid.

Pollutants of Concern based on Analytical Results:

Wastewater sampling was conducted at the manhole which services your building and Building 1125 (97/03/25, 26, 27, 28) and sampling was conducted at a manhole which services only your facility (97/03/24). Annotation of detected pollutants is provided for identification of sources and ensuing pollution prevention initiatives. Potable water sample results are identified for background, baseline information. Noteworthy, during the sampling period was a discharge of a green substance similar to glycol or fluorescent dye detected:

* Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

Contaminant	Date Detected/Range mg/l	*Possible Source	Remarks
Oil and Grease	97/03/28 Range 7.36-224	oils, fuels, hydraulic fluid, greases	Wastewater Treatment Plant (WWTP)limit=20
COD	97/03/25,26,28,24 Range 65-5320	organic matter	(WWTP)limit=120
Ammonia	97/03/25,26,27,28 Range 0.8-7.25	organic matter	(WWTP)limit=4.5
Phenols	97/03/24 Range 164	disinfectant, chemical intermediate in synthesis of organic chemicals	(WWTP)limit=100
m,p Xylene	97/03/25,27 Range 1.3-2.2	solvent, cleaning agent, fuel component	
Bis(2-ethylhexyl)phthalate	97/03/25,24 Range 28.6-353	plasticizer for PVC	
Aluminum	97/03/24,25,26,27,28 Range 0.027-13.9	metal alloy	
Antimony	97/03/24,25,26,27,28 Range 0.007-0.351	constituent with alloys with other metals	
Arsenic	97/03/24,25 Range <0.005-0.007	pigments, alloy	
Barium	97/03/24,25,26,27,28 Range 0.038-2.76	lube oil additive, manufacture of paper electrodes, catalyst for organic reactions	potable water = 0.033 mg/l

Contaminant	Date Detected/Range mg/l	Possible Source	Remarks
Cadmium	97/03/24,25,26,27,28 Range 0.009-2.36	electroplating, solder for aluminum, constituent of easily fusible alloys, deoxidizer in nickel plating	
Chromium	97/03/24,25,28 Range 0.017-0.845	stainless and alloy steels, pigments, electroplating, corrosion resistant products	
Cobalt	97/03/24 Range 0.038	alloys, high speed steels, paints, electroplating	
Copper	97/03/24,25,26,27,28 Range 0.079-9.23	metal alloy	potable water = 0.015 mg/l
Iron	97/03/24,25,26,27,28 Range 0.363-30.3	metal	potable water = 0.045 mg/l
Lead	97/03/24,25,26,27,28 Range 0.017-6.42	paint, ink, ceramics, batteries	potable water = 0.001 mg/l
Mercury	97/03/25,26 Range 0.0003-0.0005	electrical apparatus, measurement systems, paint	
Molybdenum	97/03/24,25 Range 0.238-0.276	corrosion inhibitor, lubricant	
Nickel	97/03/24,25,26,27,28 Range 0.012-0.756	corrosion resistant alloy, electroplating, nic-cad batteries	
Silver	97/03/25 Range 0.152-0.337	photography, silver plating, oxidizing agent	
Strontium	97/03/24,25,26,27,28 Range 0.199-1.77	stainless and alloy steels, pigments, electroplating, corrosion resistant products	
Thallium	97/03/25 Range 0.092	easily fusible heavy metal	
Titanium	97/03/24,25 Range 0.079-0.39	welding rod coating, acid resistant enamels, paint pigment	
Zinc	97/03/24,25,26,27,28 Range 0.068-21	galvanizing, electroplating, alloying, paint pigments	potable water = 0.006 mg/l

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

AGE - Submit a work order to have your washrack drain size/piping and capacity increased. Block all other bay drains by using temporary or permanent drain blocks. Request analysis of floor washwater prior to disposal. After review of the shop's chemical listing, recommend researching hazardous material substitution ONLY in accordance with the applicable Technical Order for the following:

* Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
3439-00-269-9610	rosin core solder	lead copper	substitute iaw TO	detected in wastewater
8010-00-936-8371	lacquer - yellow	lead chromate	substitute iaw TO	detected in wastewater
8030-00-764-6658	antisieze compound	lead monoxide	substitute iaw TO	detected in wastewater
8010-00-852-9033	enamel, yellow	lead chromate	substitute iaw TO	detected in wastewater
9150-01-260-2534	lubricant, solid film	lead	substitute iaw TO	detected in wastewater
6810-00-281-2785	methyl ethyl ketone	methyl ethyl ketone	substitute iaw TO	health and environmental pollutant
6810-00-351-8185	glycol	glycol	contact CEV for recycling	best management practice
8010-00-721-9479	lacquer - orange		check for lead	
8010-00-721-9479	lacquer - blue		check for lead	
8010-00-988-1458	enamel - blue		check for lead	

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

NDI - Purchase a silver recovery unit and ensure proper waste disposal of x-ray development and fluorescent dye penetrant solutions. Ensure parts that are dipped in the fluorescent dye processes are allowed to air dry as much as possible prior to rinsing.

Engine Shop - Contact CEV concerning solvent recycling and/or maintaining Safety Kleen product.

Pollution Prevention Recommendations - All:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill. Utilize drip pans under any equipment or operation that could generate a spill.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep prior to mopping.
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.

Shop: AGE - Structural Maintenance
Building # : 7
Office Symbol: 509 MXS /LGMFS
POC: A1C Waggoner
Telephone: 7710

Mission Narrative:

This facility is co-located with the AGE facility and segregated in an area designed for stripping and painting. The paint barn is utilized for stripping, preparing, and repainting of AGE equipment, and aircraft parts for the T-38s and B2s. Bead-blasting is used for paint stripping, followed by a surface preparation wipe-down with alcohol or methyl ethyl ketone. Aircraft armament is cleaned with Safestrip. The paint residue from the bead blasting operation is swept from the floor and processed through a hopper which separates by particle size prior to disposal as hazardous waste.

Customer: B2, T38, AGE

Industrial Wastewater Sources:

There are no floor drains located in this shop.

Recommendations/Conclusions based on Visual Observation or Chemical Listing Review:

Please see recommendations for Structural Maintenance, Bldg 27. Also, recommend strict housekeeping to preclude paint over spray on personal protective equipment. Additionally, recommend review by the base BEE shop to ensure appropriate personnel safety measures are in place and adhered to i.e. sweeping up paint residue that may contain lead, chromates etc.

Pollution Prevention Recommendations:

- a. Ensure spill kits are readily available and easily accessible.
- b. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.
- c. Utilize drip pans under any equipment or operation that could generate a spill. If the floor is cleaned, using either an automatic floor scrubber or mop/water, recommend analysis of wastewater prior to disposal to preclude possible pollutant discharges.
- e. Investigate the possibility of hazardous material substitution ONLY if in accordance with the applicable technical order.

Shop: Armament Systems and Weapons Standardization
BUILDING No. 14
Office Symbol: 509 MXS/LGMR and 509 OG/OGW
POC: TSgt Uptegraft and SMSgt Duffman
Telephone: 7099, 7100

Mission Narrative:

Armament Systems: Responsible for the maintenance and inspection of weapons suspension systems to include the Bomb Rack Assembly (BRA), Bomb Rack Unit 44 (BRU-44) which goes onto the Rotary Launcher Assembly (RLA) for the B2. Cleaning of the BRU 44 is accomplished annually by scraping and wiping off the carbon residue which occurs after firing. The BRA will not be used until later on in the year. It is electrically activated and as such will only require wipe down after firing.

Weapons Standardization: As a support element for the wing this shop provides bomb loading training for the B2. Storage of bomb and AGE support equipment is located in a bay.

Customer: B2

Industrial Wastewater Sources:

There are two circular drains located in the Armament Shop which are used for floor cleaning wastewater which may contain oils and greases. Floor washwater from the bay area where support equipment for the Weapons Standardization is stored may contain small amounts of fluids to include fuel, hydraulic fluid, oils and greases, and glycols.

Pollutants of Concern based on Analytical Results:

Sampling was not done at this facility due to no flow at the appropriate manhole the duration of the survey.

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

Armament Systems:

The following chemicals were identified on your chemical authorization listing maintained by the BEE shop and also from the listing obtained from shop personnel during the survey. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or contacting the item manager.

Additionally, recommend written tracking of hazardous materials brought in to your facility by contractor employees. This tracking should include, as a minimum; chemical, NSN, amount, application, and method of disposal.

*Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
3439-00-163-4348	Bow Solder	lead, copper, arsenic, zinc	substitute IAW T.O.	health, environment found in wastewater downstream
8030-01-319-0554	Sealing Compound	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater
8030-00-762-8007	Manganese Dioxide	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater
8030-00-965-2444	Pro Seal	Lead	substitute IAW T.O.	health, environment found in wastewater downstream
8030-00-762-8807	Pro Seal	magnesium chromate	substitute IAW T.O.	health, environment, found in wastewater downstream
8010-00-242-2089	stoddard solvent	stoddard solvent	substitute IAW T.O.	health, environment
8030-01-088-0088	Sealant	Lead	substitute IAW T.O.	health, environment, found in wastewater
8030-00-616-9191	Flamemaster - B	Lead	substitute IAW T.O.	health, environment, found in wastewater

Given the inherent characteristics of the B2, it is understood substitution of hazardous materials may not be possible. For this reason, extreme caution must be followed, both to protect the worker and the environment. Additionally, any pollutant discharges from this facility are conveyed through the industrial discharge system and ultimately go to the wastewater treatment plant (WWTP). This is a crucial concern because of possible exposures to the treatment plant personnel and the ultimate disposal of wastewaters unique to this base. The sludge from the WWTP is dewatered, analyzed and land applied, and the effluent is being used to create artificial wetlands. It is critical the wetlands be maintained in a delicate balance in order to afford their continued use.

Pollution Prevention Recommendations - All:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill. Utilize drip pans under any equipment or

- operation that could generate a spill.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep prior to mopping.
 - d. Place flow restrictors on all hoses.
 - e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.

Shop: Building Name: Army National Guard Helicopter Maintenance
Shop: Helicopter Maintenance
BUILDING No. 52
Office Symbol:
POC: Mr Wedley
Telephone: 5523

Mission Narrative:

Provide maintenance and operational support for the 25 Apache helicopters assigned to this battalion. Extensive maintenance is performed at the depot located in Springfield Mo. Phase inspections are performed every 150 hours where disassembly, component removal, and reassembly is done. Limited cosmetic painting and sanding is performed. Removal and installation of pneudraulic and hydraulic systems is conducted in this shop. The 20mm guns are cleaned an average of 1-2 times per year, with waste disposal as hazardous waste. Washing of the helicopter occurs once per 30 days. Engine turbine washes are performed every 50 flying hours using water and Gas Path Cleaner. There are four parts washers in this facility which are maintained by Safety Kleen to include removal and replacement of the naptha based cleaning solution.

Customer: Apache Helicopter

Industrial Wastewater Sources:

NOTE: This facility currently flows to the sanitary sewer and will be diverted to the industrial line. Floor washes are done one time per month with a floor scrubbing machine. The washwater may contain small amounts of oils, greases, fuels, hydraulic fluid, paint overspray and metal/paint residue from cosmetic painting operations. This washwater is poured down the drain which is serviced by an Oil Water Separator. The helicopters are also washed in this facility once every 30 days per helicopter. Engine washes are performed every 50 flying hours.

Pollutants of Concern based Analytical Results:

Sampling was not done at this facility due to no flow at the appropriate manhole the duration of the survey.

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

The following chemicals were identified on your chemical authorization listing obtained from shop personnel during the survey. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order (T.O.) that mandates its use

and confirming if the T.O. authorized a different chemical or contacting the item manager.

Additionally, recommend the sampling of engine washwater and aircraft washwater to ensure pollutants are not being discharged.

*Hathaway, G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8010-00-852-9033	Enamel, Yellow	Lead Chromates	substitute i.a.w. T.O.?	health, environment
6850-01-158-3928	Cleaning Compound	1,1,1 Trichloroethane	substitute i.a.w. T.O.?	health, environment
6850-00-570-9360	Electr Contact Cleaner	1,1,1 Trichloroethane	substitute i.a.w. T.O.?	health, environment
8030-00-764-6658	Antisieze Comp	Lead Chromate	substitute i.a.w. T.O.?	health, environment
9150-01-260-2534	Lubricant, Solid	Lead, Antimony Trioxide, MEK	substitute i.a.w. T.O.?	health, environment
00-664-4318	Zinc Chromate Putty	Zinc Chromate	substitute i.a.w. T.O.?	health, environment
3439-00-269-9610	Rosin Core Solder	Lead, Antimony, Copper	substitute i.a.w. T.O.?	health, environment
01-229-2659	RP 3265	Fibrous Glass	substitute i.a.w. T.O.?	health, environment
8010-00-936-8371	Lacquer, Yellow	Lead Chromate	substitute i.a.w. T.O.?	health, environment
00-922-6917	Adhesive 1599	1,1,1 Trichloroethane	substitute i.a.w. T.O.?	health, environment
00-F00-1896	Gasket Remover	Methylene Chloride	substitute i.a.w. T.O.?	health, environment
00-242-3467	Patch Bond	1,1,1 Trichloroethane	substitute i.a.w. T.O.?	health, environment

Pollution Prevention Recommendations:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep the floor prior to mopping ONLY with approval from Bioenvironmental Engineering to ensure an inhalation hazard is not created.
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.
- f. Investigate the substitution of the above chemicals with less hazardous chemicals ONLY if allowed by the applicable Technical Order

Shop: B2 Docks

BUILDING #s: 5050, 5051, 5052, 5053, 5054, 5055, 5056, 5057, 5058, 5059, 5060

Office Symbol: 509

POC: TSgt Kiplinger

Telephone: 1739

Mission Narrative:

Provide maintenance on B2 as required. All chemicals are brought in from the Support Section in Bldg 33. The maintenance is summarized as follows:

- a. Addition of 7808 oil
- b. Refueling from in-hangar CASS fuel pit via pentagraph hook-up
- c. Limited structural maintenance for minor repairs to include tape replacement, hand sanding using a hepa-vac, surface preparation with Turco, caulking and primer application as necessary, and painting. Personal protective equipment (PPE) during this operation is a full faced respirator and tyvex suit. The hangar floor is covered with plastic and a plastic tent-like structure encloses the area to be worked on. The plastic is removed following the repair and disposed as hazardous waste
- d. Ops check - avionics, hydraulic, engine, ECS, and radar system are checked

Customer: B2

Industrial Wastewater Sources:

Floor washwater wastestream which may contain oils, greases, fuel, hydraulic fluid, and uncaptured stripping, painting residue.

Pollutants of Concern based on Analytical Results:

Annotation of sampled pollutants are provided for identification of pollutant sources and ensuing pollution prevention initiatives. Pollutant discharges, particularly metals, were inordinately high on 23 Mar. Potable water levels are provided to demonstrate the presence of low metal levels occurring naturally in the water. The following are contaminants found in the wastewater sampled during the survey:

*Hathaway, G. and Proctor, N. Chemical Hazards of the Workplace

Contaminant	Date Detected/Range mg/l	*Possible Source	Remarks
Bis(2ethylhexyl) phthalate	97/03/21,22,26,27 Range 10.9 - 4,760	PVC plasticizer	
Aluminum	97/03/21,22,23,25,26,27 Range 0.886 - 19.8	Corrosion protectant, alloy	

Contaminant	Date Detected/Range mg/l	*Possible Source	Remarks
Antimony	97/03/21,22,23,25,27 Range 0.004-0.01	alloy constituent	
Arsenic	97/03/21,22,23,25,27 Range 0.005-0.02	metal	
Barium	97/03/21,22,23,25,26,27 Range 0.033-1.11	Catalyst for organic reactions, lube oil additive, electroplating	potable water = 0.033 mg/l
Beryllium	97/03/21,22,23,25,26,27 Range 0.0094-0.039	Hardening agent in alloys	
Cadmium	97/03/21,22,23,25 Range 0.001-0.043	Electroplating, alloy	
Chromium	97/03/21,22,23,25,26 Range 0.022-0.01	Stainless and alloy steels, pigments, electroplating, catalysts, and corrosion resistant products	
Cobalt	97/03/21, 22,23 Range 0.043-0.125	Alloys, high speed steels, paints, electroplating	
Copper	97/03/21, 22,23,25,26 Range 0.021-2.45	Copper and brass manufacture, welding of copper-containing metals	inordinately high 3/23 potable water = 0.015 mg/l
Iron	97/03/21,22,23,25,25,26,27 Range 0.426-106	Alloy	inordinately high 3/21,22,23 potable water = 0.045 mg/l
Lead	97/03/21,22,23,25,26,27 Range 0.002-0.253	Batteries, paint	potable water = 0.001mg/l
Mercury	97/03/26,27 Range 0.0003-0.0004	Electrical apparatus, measurement and control systems, catalyst, paint	
Molybdenum	97/03/21,22 Range 0.036-0.065	Pigments, corrosion inhibitor, lubricant, hydrogenation catalyst	
Nickel	97/03/21,22,23,25,26,27 Range 0.067-0.241	Corrosion resistant alloys, electroplating, nic-cad batteries	

Contaminant	Date Detected	Possible Source	Remarks
Selenium	97/03/22,23 Range <0.005-0.005	Glass and ceramics manufacture, rectifiers and photocells	
Silver	97/03/21,22,23,25 Range 0.007-0.03	Oxidizing agent, photography, silver plating	
Strontium	97/03/21,22,23,25,26,27 Range 0.628-1.47	Stainless and alloy steels, refractory products, pigments, electroplating, corrosion resistant products	potable water = 0.262 mg/l
Thallium	97/03/23 Range <0.001-0.002	Easily fusible heavy metal	
Titanium	97/03/21,22,23,25 Range 0.182-0.083	Acid resistant enamels, paint pigment, ceramics	
Zinc	97/03/21,22,23,25, 26,27 Range 0.116-4.97	Galvanized metals, electroplating, alloying, pigments	potable water = 0.006 mg/l
Oil and Grease	97/03/21*,22,25 *64 mg/l		*97/03/21 = hydraulic fluid

Recommendations/Conclusions based on Visual Observation or Chemical Listing:

Recommend strict adherence to policies of minor touch-up only of B2 exterior involving sanding, stripping, or painting and following the plastic covering and draping procedure used in Bldg 27. Also, blocking (temporary or permanent) the drains will preclude pollutant discharges. This recommendation is based on the metals detected in the wastestream during the sampling period.

Given the inherent characteristics of the B2, it is understood substitution of hazardous materials may not be possible. For this reason, extreme caution must be followed, both to protect the worker and the environment. Additionally, any pollutant discharges from this facility are conveyed through the industrial discharge system and ultimately go to the wastewater treatment plant (WWTP). This is a crucial concern because of possible exposures to the treatment plant personnel and the ultimate disposal of wastewaters unique to this base. The sludge from the WWTP is dewatered, analyzed, and land applied and the effluent is being used to create artificial wetlands. It is critical the wetlands be maintained in a delicate balance in order to afford their continued use.

Pollution Prevention Recommendations:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill or paint residue. Utilize drip pans under any equipment or operation that may generate a spill.

- c. Dry sweep the floor prior to mopping (ONLY if procedures for capturing surface preparation residues are followed and concurrence with BEE) and minimize the amount of floor washwater by performing as a mop and bucket operation.
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.
- f. Ensure all drains are blocked off prior to surface preparation and painting.

Shop: Fuel Cell
BUILDING No. 1
Office Symbol: 509 MXS/LGMAF
POC: SSgt Mariani
Telephone: 7603

Mission Narrative:

This section is responsible for fuel systems on the B2. Fuel cells on the B2 are located in the wings. Due to the technical difficulty of removing certain elements on the aircraft required for fuel cell entry, this procedure is performed at another out of state location. Northrop performs the aft deck repairs in this facility. Required chemicals for this repair are brought in from Bldg 27, Structural Maintenance. Tank maintenance performed in this shop involves; 1) roping off the area, 2) defueling into a bowser, 3) depuddling using sponges which are wrung out into a bucket 4) purging the tank, 5) obtaining a Lower Explosive Limit (LEL) reading, 6) changing out the required component and 6) exiting the tank. Structural Maintenance repairs the necessary outer structures, refuels and performs operation checks.

Customer: B2

Industrial Wastewater Sources:

There are two trench drains located in this building. The only discharge to these drains are floor washwater from a floor cleaning machine which could contain fuels. Recommend these drains are closed (temporary blocks) during fuel cell maintenance procedures.

Pollutants of Concern based on Analytical Results:

Sampling was not done at this facility due to no flow at the appropriate manhole the duration of the survey.

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

Recommend floor drains are closed (temporary blocks) during fuel cell maintenance procedures.

The following chemicals were identified on your chemical authorization listing maintained by the BEE shop and also from the listing obtained from shop personnel during the survey. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished

by consulting the Technical Order that mandates its use and confirming if the T.O. authorizes a different chemical or contacting the item manager.

Additionally, recommend written tracking of hazardous materials brought in to your facility by contractor employees. This tracking should include, as a minimum; chemical, NSN, amount, application, and method of disposal.

*Hathaway, G. and Proctor, N. Chemical Hazards of the Workplace

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8030-00-008-7196	Sealing Compound	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater downstream
8030-01-184-0328	PR-1436	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater downstream
6810-00-281-2785	Methyl Ethyl Ketone	Methyl Ethyl Ketone	substitute IAW T.O.	health, environment found in wastewater

Given the inherent characteristics of the B2, it is understood substitution of hazardous materials may not be possible. For this reason, extreme caution must be followed, both to protect the worker and the environment. Additionally, any pollutant discharges from this facility are conveyed through the industrial discharge system and ultimately go to the wastewater treatment plant (WWTP). This is a crucial concern because of possible exposures to the treatment plant personnel and the ultimate disposal of wastewaters unique to this base. The sludge from the WWTP is dewatered, analyzed and land applied, and the effluent is being used to create artificial wetlands. It is critical the wetlands be maintained in a delicate balance in order to afford their continued use.

Pollution Prevention Recommendations - All:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill. Utilize drip pans under any equipment or operation that could generate a spill.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep prior to mopping.
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.

Shop: Propulsion
Building #: 2
Office Symbol: 509 MXS/LGMP
POC: TSgt Fawcette
Telephone: 7123

Mission Narrative:

Supply serviceable engines for the B2, AGE Powered Units, and tail assemblies. The following is a synopsis of each tasking:

- a. B-2 - Disassembly of the B2 engine is limited to the fan section and number one area. The upper-lower fan ducts, all external components, and the upper and lower front frame fan cases are removed. The fan blades are then cleaned by wiping off with acetone and solid film lubricant, MIL N 2338 is applied. Fuel and oil are drained into a bucket, parts are inspected for serviceability and finally reassembled. The fuel system is preserved with 1010 fluid or 2.5 gallons of fuel.
- b. Age Powered Units - Uncrated and preserved with 1010 or 6081 fluid and flushed twice per year to prevent the o-rings from deteriorating.
- c. Tail Pipes - Completely disassembled, inspected, and repaired as required. Lubricated, inner liners replaced and reassembled. Exterior repairs are done by Structures.

Customer: B2, AGE

Industrial Wastewater Sources:

Floor washwater possibly contaminated with incidental spills of fuel, oil, and soap are dumped down the washrack drain located outside the facility. Washrack water containing residual oils, fuels, and engine steam cleaning residue.

Pollutants of Concern based on Analytical Results:

Sampling was not done at this facility due to no flow at the appropriate manhole the duration of the survey.

Recommendations/Conclusions based on Visual Observation or Chemical Listing:

Substitution if possible, of lead containing paints NSN's 8010-00-598-5936 (Olive Drab) and 8010-01-331-6111 (Olive Drab) ONLY if in accordance with appropriate Technical Orders.

Pollution Prevention Recommendations:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable New Pig Catalog (May 96 pp161-165- or permanent) shop drains during any operation that could generate a spill. Utilize drip pans under any equipment or operation that may generate a spill.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep the floor prior to mopping.
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.

Shop: Structural Maintenance
BUILDING No. 27
Office Symbol: 509 MXS/LGMFSM
POC: Sgt. Razick
Telephone: 4722

Mission Narrative:

Responsible for maintaining the structural integrity of the B2 aircraft. This includes repair of the aircraft's outer surface which involves sanding, preparing, and painting the surface. Additionally, adhesive and composite work is performed in order to maintain the B2's structural integrity. The aircraft is washed every 120 days.

Customer: B2

Industrial Wastewater Sources:

Wastewater is produced from washing the aircraft in the main bay of the hangar. Possible pollutants in this wastewater would include oils, greases, fuels, metal/composite material leachates, and hydraulic fluid. The floors are washed using a floor scrubbing machine or manually washing. The aforementioned pollutants, with the addition of sanding residuals (metal, composite materials) and overspray are possible.

Pollutants of Concern based on Analytical Results:

Wastewater sampling was conducted at the manhole which services your building. The annotation of pollutants is provided for identification of pollutant sources and ensuing pollution prevention initiatives. Potable water sample results are identified for background, baseline information. The following pollutants were detected:

*Hathaway G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

Contaminant	Date Detected	Possible Source	Remarks
Toluene	97/03/28	solvent for paints and coatings, component of gasoline	
Bis(2ethylhexyl)phthalate	97/03/22,24,26,27,28	plasticizer for PVC	
Di-n-Octylphthalate	97/03/24,26,28		

Contaminant	Date Detected	Possible Source	Remarks
o,m,p Xylene	97/03/24,26,28	solvent, component of fuel	
Chloroethane* sample contained silicic acid and 4-hydroxy-4methyl pentanone	97/03/24	chemical intermediate, refrigerant, manufacture of ethyl cellulose *silicic acid - arrests decay and disintegration of stone 4-hydroxy-4methyl pentanone- solvent for pigments, cellulose, resins, hydrocarbons, hydraulic brake fluid	
Chloroform* *sample contained silicic acid and 4-hydroxy-4methyl pentanone	97/03/24	solvent *silicic acid - arrests decay and disintegration of stone 4-hydroxy-4methyl pentanone- solvent for pigments, cellulose, resins, hydrocarbons, hydraulic brake fluid	
Ethylbenzene	97/03/28	gasoline, industrial solvent	
Aluminum	97/03/21,22,23,24,25,26,27,28	metal alloy	
Antimony	97/03/22,27,28	constituent with alloys with other metals	
Barium	97/03/21,22,24,25,26,27,28	lube oil additive, manufacture of paper electrodes, catalyst for organic reactions	potable water = 0.033 mg/l

Contaminant	Date Detected	Possible Source	Remarks
Cadmium	97/03/21,22,23,24, 25,26,28	electroplating, solder for aluminum, constituent of easily fusible alloys, deoxidizer in nickel plating	
Chromium	97/03/21,25,27	stainless and alloy steels, pigments, electroplating, corrosion resistant products	
Copper	97/03/21,22,23,24, 25,26,27,28	metal alloy	potable water = 0.015 mg/l
Iron	97/03/21,22,23,24, 25,26,27	metal	potable water = 0.045 mg/l
Lead	97/03/21, 22, 23,24,25,26,28	paint, ink, ceramics, batteries	potable water = 0.001 mg/l
Mercury	97/03/25,26	paint, measure devices	
Molybdenum	97/03/21,22	manufacture of special purpose steel, pigment additive	
Nickel	97/03/21,25,27,28	corrosion resistant alloy, electroplating, nic-cad batteries	
Strontium	97/03/21,22,23,24 25,26,27,28	stainless and alloy steels, pigments, electroplating, corrosion resistant products	potable water = 0.262 mg/l
Zinc	97/03/21,22,23,24, 25,26,27,28	galvanizing, electroplating, alloying, paint pigments	potable water = 0.006 mg/l

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

Following review, chemicals were identified on your chemical authorization listing maintained by the BEE shop and also from the listing obtained from shop personnel during the survey (NOTE: possible classified materials are not identified). Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order (T.O.) that mandates it's use and confirming if the T.O. authorizes a different chemical or contacting the item manager.

Additionally, recommend written tracking of hazardous materials brought in to your facility by contractor employees. This tracking should include, as a minimum; chemical, NSN, amount, application, and method of disposal.

*Hathaway G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8010-01-388-4022	Polyurethane	Chromium III	substitute IAW T.O.	health, environment found in wastewater
6810-00-281-2785	MEK	MEK	substitute IAW T.O.	health, environment
8040-01-386-7185	Toluene	Toluene	substitute IAW T.O.	health, environment found in wastewater
6810-00-664-0387	1,1,1 Trichloroethane	1,1,1 Trichloroethane	substitute IAW T.O.	health, environment found in wastewater

NSN	Name	Haz Constituent	Recommended Action	Rationale
8030-00-008-7196	Sealing Compound	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater
8010-00-935-7080	Primer, Elect	Strontium Chromate	substitute IAW T.O.	health, environment found in wastewater
8030-01-184-0328	PR 1436	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater
8040-01-288-5856	Adhesive	Aluminum	substitute IAW T.O.	health, environment found in wastewater
8030-01-319-0554	Sealing Compound	Manganese Chromate	substitute IAW T.O.	health, environment found in wastewater
8010-01-386-7668	Poly Green	Strontium Chromate	substitute IAW T.O.	health, environment found in wastewater
8030-01-319-0554	Sealing Compound	Nickel	substitute IAW T.O.	health, environment found in wastewater
8040-01-208-9494	Adhesive	Copper Silver	substitute IAW T.O.	health, environment found in wastewater
8010-00-082-2450	Primer	Strontium Chromate	substitute IAW T.O.	health, environment found in wastewater
6810-00-281-2762	MEK	MEK	substitute IAW T.O.	health, environment found in wastewater

NSN	Name	Haz Constituent	Recommended Action	Rationale
8010-00-598-5936	OD Paint	Lead	substitute IAW T.O.	health, environment found in wastewater
8010-01-266-6576	Polyamide	Strontium Chromate	substitute IAW T.O.	health, environment found in wastewater

Given the inherent characteristics of the B2, it is understood substitution of hazardous materials may not be possible. For this reason, extreme caution must be followed, both to protect the worker and the environment. Additionally, any pollutant discharges from this facility are conveyed through the industrial discharge system and ultimately go to the wastewater treatment plant (WWTP). This is a crucial concern because of possible exposures to the treatment plant personnel and the ultimate disposal of wastewaters unique to this base. The sludge from the WWTP is dewatered, analyzed and land applied, and the effluent is being used to create artificial wetlands. It is critical the wetlands be maintained in a delicate balance in order to afford their continued use.

Pollution Prevention Recommendations - All:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill. Utilize drip pans under any equipment or operation that could generate a spill. Designation of one trench drain to contain all washwater and blocking the remaining drains would be a viable option.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep prior to mopping (ONLY with concurrence of the BEE shop, given the dust particles that may be generated).
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.

Shop: Phase Inspection, NDI, Metals Technology, Electro-Environmental, Pneudraulics, Structures

BUILDING No. T9

Office Symbol: 509 MXS

POC: Phase Inspection - TSgt Blaszeck x3189, Pneudraulics - TSgt Williams x7685, NDI - MSgt Anderson x7695, Electro Environmental - SSgt Landreneau x 7679, Structures - SMSgt Garrett x7709, Metals Tech - TSgt Ferencz x7706

Telephone: see above

Mission Narrative:

Phase Inspection - This shop is responsible for the B2 aircraft inspection required after a predetermined number of flying hours. Prior to arrival for the phase inspection, the B2 is washed and prepared for the inspection at Bldg 27. Inspection is performed on the hydraulic systems and engines with Quality Assurance primarily performing the engine inspections.

NDI: Inspection of the T-38, AGE equipment and Munitions for structural integrity by means of magnetic particle, ultrasound, eddy current, fluorescent penetrant dye or x-ray.

Metals Technology: This shop provides machining, repair, welding, and heat treating of metals and plastics requiring fabrication. This service is provided for the base, other DoD agencies (A-10, Apache Helicopter, T-38), Northrop, and Air Combat Command.

Electro Environmental: Shop responsible for charging and recharging aircraft batteries for the B2 and T-38 aircraft. The nickel cadmium batteries are checked for bad cells. If the cells are found to be serviceable they are rinsed off and replaced. Component repair is also done for relay panels, light assemblies, explosion proof panels, cooling packs, and air conditioning for the B2 and T-38.

Pneudraulics: Provides intermediate overhaul of aircraft support equipment and hydraulics for the T-38 and B2. Periodically makes hose assemblies for AGE.

Structural Maintenance: Provides repair of any composite material portions of the B2 to include special coatings. Sheetmetal work is also performed in this section for the local manufacture of shelves and signs.

Industrial Wastewater Sources: Wastewater sources include the parts washer used in Pneudraulics which washes parts of the B2 brakes and master cylinders. This wastewater was collected, analyzed, and determined not to be a hazardous waste (reference Bioenvironmental Engineering sample number BEF#GM961234-1326, 15 Oct 96. Wastewater disposed by the NDI shop consists of rinse water generated during the fluorescent dye penetrant rinse procedure and x-ray development chemicals which are pretreated by a silver recovery unit. Floor washwater is discharged throughout the

facility. The major potential contributor to this wastestream is the Phase Inspection dock. B2 phase inspections could possibly involve leaking fuel, hydraulic fluids, greases, and oils during the inspection which would minimally be contained in the floor washwater.

Pollutants of Concern based on Analytical Results:

Sampling was conducted at the manhole which services your facility. Annotation of detected pollutants are provided for identification of pollutant sources and ensuing pollution prevention initiatives. Potable water sample results are identified for background, baseline information. The following pollutants were detected:

*Hathaway G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

Contaminant	Date Detected	Possible Source	Remarks
Oil and Grease	97/03/23,24	oils, fuels, hydraulic fluid, greases	
Chemical Oxygen Demand	97/03/22,23,24	organic waste	
Toluene	97/03/24	solvent for paints and coatings, component of gasoline	
Bis(2ethylhexyl)phthalate	97/03/22,24	plasticizer for PVC	
Di-n-Octylphthalate	97/03/22		
o,m,p Xylene	97/03/23,24	solvent, component of fuel	
Ethylbenzene	97/03/24	gasoline, industrial solvent	
Aluminum	97/03/21,22,23,24	metal alloy	
Antimony	97/03/21,24	constituent with alloys with other metals	
Barium	97/03/21,22,23,24	lube oil additive, manufacture of paper electrodes, catalyst for organic reactions	potable water = 0.033 mg/l
Cadmium	97/03/21,22,23,24	electroplating, solder for aluminum, constituent of easily fusible alloys, deoxidizer in nickel plating	
Chromium	97/03/21,23	stainless and alloy steels, pigments, electroplating, corrosion resistant products	
Beryllium	97/03/23	non-corrodible metal used in alloys	

Contaminant	Date Detected	Possible Source	Remarks
Copper	97/03/21,22,23,24	metal alloy	potable water = 0.015 mg/l
Lead	97/03/21, 22, 23,24	paint, ink, ceramics, batteries	potable water = 0.001 mg/l
Molybdenum	97/03/22	manufacture of special purpose steel, pigment additive	
Nickel	97/03/23	corrosion resistant alloy, electroplating, nic-cad batteries	
Strontium	97/03/21,22,23,24	stainless and alloy steels, pigments, electroplating, corrosion resistant products	potable water = 0.262 mg/l
Zinc	97/03/21,22,23,24,	galvanizing, electroplating, alloying, paint pigments	potable water = 0.006 mg/l

Recommendations/Conclusions based on Visual Observation and/or Chemical Listing Review:

Phase Inspection:

The following chemicals were identified on your chemical authorization listing maintained by the BEE shop and also from the listing obtained from shop personnel during the survey. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or contacting the item manager.

Additionally, recommend written tracking of hazardous materials brought in to your facility by contractor employees. This tracking should include, as a minimum; chemical, NSN, amount, application, and method of disposal.

*Hathaway G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8030-01-184-0328	Sealing Compound	Strontium chromate	substitute IAW T.O.	health, environment found in wastewater
8030-01-319-0554	Sealing Compound	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater
8030-00-762-8007	Manganese Dioxide	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater
8030-00-008-7196	Sealant	Magnesium Chromate	substitute IAW T.O.	health, environment found in wastewater

NSN	Name	Haz Constituent	Recommended Action	Rationale
6810-00-281-2785	MEK	MEK	substitute IAW T.O.	health, environment
8040-01-208-9494	Adhesive	Copper Silver	substitute IAW T.O.	health, environment, found in wastewater
8030-01-088-0088	Sealant	Lead	substitute IAW T.O.	health, environment, found in wastewater
8040-01-288-5856	EA 9394	Aluminum	substitute IAW T.O.	health, environment, found in wastewater
9150-00-249-9290	Release Agent	1,1,1 Trichloroethane	substitute IAW T.O.	health

Metals Technology: Chemical listing reviewed and only recommendation is to try and locate a lead free solder.

Pneudraulics: The following chemical was identified on your chemical authorization listing maintained by the BEE. Given its hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or contacting the item manager.

*Hathaway G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8030-01-184-0328	Courtaulds Aerosol	magnesium chromate	substitute IAW T.O.	health, environment found in wastewater

Electro-Environmental: The following chemicals were identified on your chemical authorization listing maintained by the BEE shop. Given their hazardous properties both to the human and environment, please investigate substitution with a less hazardous material. This can be accomplished by consulting the Technical Order that mandates it's use and confirming if the T.O. authorizes a different chemical or by calling the item manager.

*Hathaway G. and Proctor N. Chemical Hazards of the Workplace, Third Edition

NSN	Name	*Haz Constituent	Recommended Action	Rationale
8040-01-208-9494	Cho-Bond 1038	copper silver	substitute IAW T.O.	health, environment found in wastewater
8030-00-148-7362	Sealing compound	lead	substitute IAW T.O.	health, environment found in wastewater
8030-00-174-2597	Sealing compound	lead	substitute IAW T.O.	health, environment found in wastewater

Structural Maintenance: Chemical listing review for this shop can be found in the narrative for Structural Maintenance, Bldg 27 where all of the hazardous materials are maintained.

NDI: Chemical listing reviewed with no additional recommendations.

Pollution Prevention Recommendations - All:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable - New Pig Catalog, May 96, pp 161-165 or permanent) shop drains during any operation that could generate a spill. Utilize drip pans under any equipment or operation that could generate a spill.
- c. Minimize the amount of floor washwater by performing as a mop and bucket operation. Dry sweep prior to mopping.
- d. Place flow restrictors on all hoses.
- e. Immediately clean up all spills with absorbant material and dispose as solid waste in drums to be characterized prior to disposal.

Shop: Wheel and Tire
Building #: 4
Office Symbol: 509 MXS/LGMMW
POC: Sgt McCarthy
Telephone: 7727

Mission Narrative:

Inspection, build-up, breakdown and repair of wheel assemblies for the T-38 and B2.

Customer: B2, T-38

Industrial Wastewater Sources:

Floor washwater possibly contaminated with incidental spills of oils and greases. Wheel assembly parts are cleaned in a parts washer that uses hot water and natural orange. The sludge from the oil skimmer on the parts washer is placed in a container for disposal. Samples were collected in Aug 94 of the parts washer fluid and sludge. Given the contaminants detected, recommend resampling by Bioenvironmental Engineering and written records maintained with proper disposal protocol.

Pollutants of Concern based on Analytical Results:

Sampling was not done at this facility due to no flow at the appropriate manhole the duration of the survey.

Recommendations/Conclusions based on Visual Observation or Chemical Listing:

Following review of your authorized chemical listing, there are no recommendations.

Pollution Prevention Recommendations:

- a. Ensure spill kits are readily available and easily accessible.
- b. If applicable, with the exception of drains servicing washracks, cover or block (removable New Pig Catalog (May 96 pp161-165- or permanent) shop drains during any operation that could generate a spill. Utilize drip pans under any equipment or operation that may generate a spill.