

**SECOND SEMIANNUAL  
GROUND WATER SAMPLING REPORT  
JULY 17 - JULY 20, 1990  
HOLLOMAN AIR FORCE BASE, NEW MEXICO**

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## 1.0 INTRODUCTION

International Technology Corporation (IT) is the prime Architect-Engineer (A-E) contracted by the U.S. Army Corps of Engineers, Omaha District, to implement a Resource Conservation and Recovery Act (RCRA) Ground Water Monitoring Program (described in Code of Federal Regulations Title 40, Part 265 [40 CFR 265]) at the sewage lagoons and Lakes Holloman and Stinky, Holloman Air Force Base, New Mexico. The ground water monitoring program is being performed under Contract No. DACW45-88-D-0008 and in accordance with the December 22, 1989, signed Federal Facility Compliance Agreement (FFCA) between Holloman Air Force Base, the New Mexico Environmental Improvement Division, and the U.S. Environmental Protection Agency, Region VI. As part of the ground water monitoring program, this ground water sampling episode, the sixth since August, 1989, was performed during the period July 17 through 20, 1990, by IT. Ground water sampling was conducted in accordance with the Architect-Engineer Safety, Health and Emergency Response Plan (A-E SHERP) (IT, 1989a) and the Architect-Engineer Quality Control Plan/Sampling Plan for Ground Water Study and Monitoring Program, Holloman Air Force Base, New Mexico (A-E QCP/SP) (IT, 1989b). The A-E QCP/SP is based on the Hydrogeologic Investigation Report and Ground Water Monitoring Plan for the Sewage Treatment Lagoons, Holloman Air Force Base, NM 88330 (Radian, 1989). The ground water monitoring plan was approved by the EPA in 1989.

This July, 1990, sampling episode is the second of a series of four semiannual sampling episodes planned at the Holloman Air Force Base sewage treatment lagoons monitoring wells designed to satisfy the semiannual and annual sampling requirements of 40 CFR 265.92(d)(1) and (2) and the FFCA. Total organic compound (TOC) analysis that must be performed in quadruplicate was inadvertently performed only one time on the July, 1990, samples. Therefore, samples were re-collected on September 13 and 14, 1990, and re-analyzed in quadruplicate by IT Analytical Services (Appendix F, Conformation Notice).

In accordance with the ground water monitoring requirements of 40 CFR 265.92(d), samples were collected and analyzed for concentrations of ground water contamination indicator parameters [40 CFR 265.92(b)(3)]. Descriptions of field methods employed and a discussion of analytical and quality control results are provided below. Job logs documenting daily field activities for July and September sampling events are presented in Appendix A.

## 2.0 FIELD METHODS AND MEASUREMENTS

Field measurements made prior to ground water sample collection determined the presence or absence of organic vapors and nonaqueous phase liquids in the wells, well water-levels, and total well depths. This information led to calculation of well-bore water volumes, the volumes of water to be purged prior to well sampling, and the frequency of field pH and specific conductance measurements taken during well purging. Data forms documenting field measurement activities are provided in Appendix B.

### 2.1 ORGANIC VAPOR DETECTION

The presence of organic vapors in a well-bore atmosphere can be an indicator of nonaqueous phase liquids possibly being present in the well. Prior to measuring water levels in each well, the well head atmosphere was analyzed for organic vapors using a calibrated Hnu PI-101 field photoionization detector with a 10.2-eV lamp. Calibration of the Hnu instrument was accomplished using a standard reference gas (100-ppm isobutylene/air) prior to analyzing any well head atmospheres. Additionally, a background organic vapor concentration value was measured at each well location by sampling the atmosphere at large. Then, immediately after opening the monitor well cap, the detector was inserted into the well casing and the organic vapor content was measured. Well head organic vapor concentrations and background organic vapor concentrations ranged from not detectable to 0.3 parts per million (ppm). All well head organic vapor measurement values were less than atmospheric background values, except for well MW-7 which exceeded background by one ppm. The low concentrations of measurable organic vapors in the well head atmospheres and the fact that nine of ten well head organic vapor values were less than background indicated a probable absence of nonaqueous phase liquids in the wells.

### 2.2 WATER LEVEL, TOTAL DEPTH, AND IMMISCIBLE ORGANIC LAYER DETERMINATIONS

Water level, total well depth, and the location or absence of immiscible organic layers were determined by measurement from surveyed points indicated on the tops of the well casings. An ORS interface probe, calibrated using a steel surveyor's tape, was used to measure the distances between top of casing and both water surface and well bottom. The ORS probe creates a beeping tone when water is encountered and a steady tone when encountering immiscible layers either less dense or denser than water. Immiscible layers were not detected in any of the monitoring wells during either the July or September measurements. IT noted a potential malfunction of the ORS probe in July that may have caused a floating or sinking phase to have been missed (Appendix F).. The September round, using a known functional probe showed no separate phases, verifying the conclusion that no separate phases are

present. Results of the water level and total well depth measurements, as well as calculated well volumes and sampling purge volumes, are listed in Table 1, for the July, 1990, sampling round, and Table 2, for the September, 1990, sampling rounds.

### 2.3 WELL EVACUATION

Well evacuation and ground water sampling were performed following procedures in the A-E QCP/SP. New protective clothing was donned by site personnel at each well, and nondedicated sampling equipment was decontaminated using nonphosphate detergent wash, tap water rinse, deionized water rinse, methanol and hexane rinses prior to actual well evacuations. Dedicated 1-1/2 inch diameter teflon bailers with stainless steel leaders attached to polypropylene ropes were used to purge and sample the wells. Approximately five well volumes of water were purged from the wells with five to eight measurements of pH, specific conductance, and temperature being recorded at intervals during bailing. Field observations for July and September are shown in Table 3. Field notes describing the July and September well evacuations are contained in Appendix B. Following the purge of approximately five well volumes of water from each monitoring well, collection of ground water samples began.

### 2.4 GROUND WATER SAMPLING

The monitor wells were sampled upon completion of the purging. The wells sampled include the upgradient wells MW-1 and S-2, and downgradient wells MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, and S-4. Quality assurance samples were collected during the July and September, 1990, sampling episodes. These samples included a blind field duplicate sample collected at well MW-4 and identified as well MW-12, two duplicate quality assurance samples collected at wells MW-2 and MW-4 which were forwarded to the U.S. Army Corps of Engineers, Missouri River Division Laboratory, Omaha, Nebraska, for independent analysis, and a trip blank sample for purgeable organic halides (POX) identified as well MW-11. (No POX trip blank was included for the September sampling round.)

#### Field Measurements

The parameters specific conductance, pH, and temperature were measured in the field during well purging, and before and after each sampling sequence. Specific conductance was determined using a Cole-Palmer model 1481-60 conductance meter in automatic temperature compensation mode. This meter is capable of determining the specific conductance of ground water over a wide range of values. This proved necessary to measure specific conductance of ground water from the Holloman sewage lagoon monitoring wells. All specific conductance measurements were made using the meter's 0 to 200,000 micromohs per centimeter ( $\mu\text{mhos/cm}$ ) scale. The meter was calibrated daily by standard solution at the scale midpoint.

pH was determined using an Orion SA-250 meter, calibrated at least daily, and recalibrated in the field prior to initial well purging if a check on the pH 7.0 buffer solution failed to be within  $\pm 0.1$  pH unit tolerance. Temperature was determined using a mercury in glass thermometer. These field measurements were recorded on the field sampling data sheets located in Appendix B. Specific conductance and pH measurements are also summarized in Tables 4 and 5. Specific conductance measurements taken during the September, 1990, re-sampling are suspect due to operator error and/or equipment malfunction and are not reported here.

### Sample Collection

Ground water samples were obtained from each well by carefully pouring from the dedicated teflon bailers. All samples were poured directly into prepared sampling containers. There were no field filtrations of samples. Clean surgical gloves were donned immediately prior to sample collection. Ground water samples for laboratory analysis were collected in the following order for the July sampling round:

Purgeable organic halides (POX)  
Total organic carbon (TOC).

Only TOC samples were collected in September.

### Sample Containers and Preservatives

Sample collection containers were supplied by the International Technology Analytical Services (ITAS) laboratories in Cincinnati, Ohio and Middlebrook (Knoxville), Tennessee. Appropriate sample preservatives were added to the containers in the field immediately prior to sample collection. Litmus (pH) papers were used to check proper preservation of samples in the field prior to shipment.

## 2.5 SAMPLE HANDLING AND SHIPMENT

All samples were isolated in sealable plastic bags and placed on ice in a shipping cooler immediately after collection. For both July and September sampling rounds, samples were shipped by overnight carrier in a sealed shipping container with complete chain-of-custody documentation to the ITAS laboratories in Middlebrook (Knoxville), Tennessee and Cincinnati, Ohio, and to the U.S. Army Corps of Engineers, Missouri River Division Laboratory in Omaha, Nebraska. July samples for POX analysis originally scheduled for analysis at the ITAS Cincinnati, Ohio laboratory were instead analyzed by Radian Corporation, Austin, Texas (See Section 2.6). September samples for TOC were shipped directly to ITAS--Knoxville. Chain-of-custody documentation for all samples are located in Appendix C.

## **2.6 GROUND WATER RE-SAMPLING (JULY)**

Four of the Holloman wells were re-sampled during the July, 1990, sampling episode. Five wells, MW-2, MW-3, MW-4, MW-6, and S-4, were initially sampled on July 18, 1990. Samples from four of those wells were shipped overnight by common carrier to the analytical laboratories listed in Section 2.5 that same day. Samples from well MW-3 remained on ice in custody of field personnel. The samples shipped to the U.S. Army Corps at Engineers, Missouri River Division Laboratory in Omaha, Nebraska, arrived warm and were not accepted for analysis. Samples for POX analysis arrived at the ITAS Cincinnati, Ohio laboratory in good condition; however, due to equipment failure that lab was unable to perform any POX analyses. Consequently, water levels were re-measured, purge volumes re-calculated, and wells MW-2, MW-4, and S-4 re-sampled for all parameters on July 20, 1990. Water levels of the affected wells for both initial and re-sampling events, are included in Table 1 for the July round. The pH and specific conductance determinations in Table 4; however, reflect only the values from re-sampling as those determinations correspond to the reported POX analysis results. POX analyses for July samples were performed at Radian Corporation, Austin, Texas. The events relative to resampling are documented in Appendix E.

## **2.7 GROUND WATER RE-COLLECTED (SEPTEMBER)**

Monitor well samples were re-collected on September 13 and 14 due to errors in laboratory analyses of the July samples for TOC. The wells sampled included one upgradient wells MW-1 and S-2, and downgradient wells MW-2, MW-3, MW-4, MW-5,, MW-6, MW-7, MW-8, and S-4. As with the July samples quality assurance samples were collected during the September, 1990, sampling episode. Water levels of the wells are included in Table 2. POX was not reanalyzed; therefore, no trip blank was collected or shipped. Samples were shipped to the U.S. Army Corps of Engineers, Missouri River Division Laboratory in Omaha, Nebraska, and to ITAS--Knoxville. Samples for TOC analysis arrived at ITAS--Knoxville in good condition. Results are included in Table 5.

## **3.0 ANALYTICAL RESULTS**

Samples from each of the wells were analyzed for the parameters listed in 40 CFR 265.92(b)(3) as ground water contamination indicator parameters. Laboratory analytical reports containing analytical results, quality control results, and method detection limits are presented in Appendix D. Summaries of analytical results are presented in Tables 4 and 5. Table 6 presents the TOC data from July, which were not performed in quadruplicate.

### **3.1 METHOD DETECTION LIMITS**

Method detection limits (MDL) actually achieved by the analytical laboratories during analyses of the July and September, 1990, samples are listed in Table 7. The ground water contamination indicator parameter, POX, was analyzed for but not detected at the method detection limit value listed in Table 7. All TOC analyses were quantifiable above the method detection limit except for the MW-1 sample.

### **3.2 CONTAMINATION INDICATOR PARAMETERS**

Concentrations of the ground water contamination indicator parameters (pH, specific conductance, total organic carbon, and purgeable organic halides) for samples from the Holloman Air Force Base monitor wells are listed in Tables 4 and 5. Four replicate measurements of each contamination indicator parameter are reported for all the wells sampled in July and September. However, during the September re-sampling, three of the four replicates were inadvertently not sampled for the MW-6 well. For the environmental duplicate (MW-12) quadruplicate laboratory analyzed parameters are presented. pH values measured in the field after sampling ranged from 6.83 to 7.36 pH units for the July sampling, to 6.69 to 7.28 for the September sampling. Specific conductance, also measured in the field, ranged from 12,100 to 88,600  $\mu\text{mhos/cm}$  at 25°C for the July sampling. Due to operator error and/or equipment malfunction, specific conductance results are not reported for the September sampling. All specific conductance measurements were made using a conductivity meter set on a 0 to 200,000  $\mu\text{mhos/cm}$  scale. Total organic carbon (TOC) analytical results were distributed between not detectable at 1 mg/l to 7 mg/l across the Holloman well samples for July samples (Table 6) as well as for September samples (Table 5). Results for analyses of purgeable organic halides (POX) on the well samples are reported in Table 4. Concentrations of POX were not detectable at 0.020 mg/l as chloride in all the analyzed samples.

## **4.0 QUALITY CONTROL**

Field sampling procedures conforming to the A-E QCP/SP were documented daily on an "A-E Daily Quality Control Report for Ground Water Monitoring at Holloman Air Force Base, New Mexico" form. These daily quality control reports are contained in Appendix E.

Quality control (QC) samples were collected during the July and September, 1990, sampling effort for analysis in accordance with the procedures specified in the A-E QCP/SP. Environmental duplicate samples and purgeable organic halide trip blank samples were collected.

Duplicate samples from wells MW-2 and MW-4 were collected and transmitted to the U.S. Army Corps of Engineers, Missouri River Division Laboratory in Omaha, Nebraska, for independent analysis. An additional set of blind duplicate field samples were collected at well MW-4 and submitted to the ITAS, and Radian Corporation laboratories for analysis. These blind duplicate samples (July and September) are identified in Tables 4 and 5, as monitoring well MW-12, where the analytical results are listed along with the results for the MW-4 sample analyses. Each duplicate sample fraction was collected from a new bail of ground water immediately after collecting the sample fraction in order to minimize variabilities due to time or sampling mechanics. Duplicate analysis showed good responsibility in the ITAS and Radian Laboratories.

For the July samples, a purgeable organic halide (POX) trip blank sample was prepared in the field by IT prior to traveling to the sampling site, and was shipped to the analytical laboratory with the POX samples from the Holloman wells. The POX trip blank sample was designated as well number MW-11. Results of the POX trip blank sample analysis are listed in Table 3, and indicate that no in-transit contamination of the samples occurred.

Sample analysis holding times were met for all analyses of the July, 1990, Holloman well samples.

## 6.0 REFERENCES

International Technology Corporation (IT), 1989a, "Safety, Health & Emergency Response Plan (A-E SHERP)," Ground Water Detection Monitoring Program, Holloman Air Force Base, New Mexico.

International Technology Corporation (IT), 1989b, "A-E Quality Control Plan and Sampling Plan (A-E QCP/SP) For Ground Water Study and Monitoring Program," Holloman Air Force Base, New Mexico.

Radian Corporation, 1989, "Hydrogeologic Investigation Report and Proposed Ground Water Monitoring Plan for the Sewage Treatment Lagoons, Holloman Air Force Base, NM 88330," Holloman Air Force Base, New Mexico.

**TABLE 1**

**GROUND WATER ELEVATIONS AND WATER VOLUMES PURGED FROM  
THE SEWAGE TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
JULY 1990**

MONITOR WELL	TOP OF CASING ELEVATION <sup>a</sup> (FAMSL)	DEPTH TO GROUND WATER <sup>b</sup> (FEET)	GROUND WATER ELEVATION (FAMSL)	TOTAL DEPTH <sup>b</sup> (FEET)	WELL VOLUME (GALLONS)	GALLONS DISCHARGED PRIOR TO SAMPLING	WELL VOLUMES DISCHARGED PRIOR TO SAMPLING
MW-1	4053.42	11.52	4041.90	17.81	4.1	21	5.1
S-2	4040.56	11.27	4029.29	20.24	1.5	7	4.7
MW-2	4039.78	6.51	4033.27	17.77	7.4	37	5.0
MW-2 <sup>c</sup>	4039.78	6.76	4033.02	17.76	7.2	36	5.0
MW-3	4037.38	10.08	4027.30	17.73	5.0	25	5.0
MW-4	4030.30	7.45	4022.85	17.81	6.8	34	5.0
MW-4 <sup>c</sup>	4030.30	7.41	4022.89	17.77	6.8	34	5.0
MW-5	4039.30	7.76	4031.54	17.72	6.5	33	5.1
MW-6	4031.21	6.72	4024.49	17.78	7.2	37	5.1
MW-6 <sup>c</sup>	4031.21	6.82	4024.40	17.76	7.1	36	5.1
MW-7	4039.88	8.70	4031.18	17.70	5.9	30	5.1
MW-8	4040.50	7.83	4032.67	17.75	6.5	33	5.1
S-4	4034.46	9.32	4025.14	14.36	0.8	3	3.8
S-4 <sup>c</sup>	4034.46	9.37	4025.09	14.36	0.8	4	5.0

<sup>a</sup>A-E Groundwater Monitoring Report/Quality Control Summary for the First Groundwater Sampling Round Holloman Air Force Base, New Mexico, October 1989, Radian Corporation, Austin, Texas.

<sup>b</sup>Reference from top of casing. Measured on July 17, 1990, except as noted.

<sup>c</sup>Indicated wells were re-measured and re-sampled on July 20, 1990.

**TABLE 2****GROUND WATER ELEVATIONS AND WATER VOLUMES PURGED FROM  
THE SEWAGE TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
SEPTEMBER 1990**

MONITOR WELL	TOP OF CASING ELEVATION <sup>a</sup> (FAMSL)	DEPTH TO GROUND WATER <sup>b</sup> (FEET)	GROUND WATER ELEVATION (FAMSL)	TOTAL DEPTH <sup>b</sup> (FEET)	WELL VOLUME (GALLONS)	GALLONS DISCHARGED TO SAMPLING	WELL VOLUMES DISCHARGED PRIOR TO SAMPLING
MW-1	4053.42	11.13	4042.29	17.81	4.4	21	4.8
S-2	4040.56	10.75	4029.81	20.23	1.5	7	4.7
MW-2	4039.78	5.79	4033.39	17.73	7.8	36	4.6
MW-3	4037.38	9.48	4027.90	17.72	5.4	24	4.4
MW-4	4030.30	6.19	4024.11	17.80	7.6	36	4.7
MW-5	4039.30	7.64	4031.66	17.71	6.6	30	4.5
MW-6	4031.21	6.32	4024.89	17.77	7.5	36	4.8
MW-7	4039.88	8.43	4031.45	17.69	6.0	30	5.0
MW-8	4040.50	8.0	4032.50	17.75	6.4	30	4.7
S-4	4034.46	9.13	4025.33	14.35	0.9	4	4.4

<sup>a</sup>A-E Groundwater Monitoring Report/Quality Control Summary for the First Groundwater Sampling Round Holloman Air Force Base, New Mexico, October 1989, Radian Corporation, Austin, TX.

<sup>b</sup>Reference from top of casing. Measured on September 12, 1990.

**TABLE 3**

**GROUND WATER FIELD OBSERVATIONS DURING WELL EXCAVATION  
FROM THE SEWAGE TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
JULY AND SEPTEMBER, 1990**

WELL	JULY			SEPTEMBER		
	CLEAR	TURBID	ODOROUS	CLEAR	TURBID	ODOROUS
MW-1	X				X	
S-2	X			X		
MW-2	X		X	X		X
MW-2 <sup>a</sup>	X					
MW-3	X		X	X		
MW-4	X		X		X	X
MW-4 <sup>a</sup>	X		X			
MW-5		X	X		X	X
MW-6	X		X	X		
MW-6 <sup>a</sup>	X					
MW-7	X				X	X
MW-8	X				X	
S-4		X		X		
S-4 <sup>a</sup>	X					

<sup>a</sup>Wells were re-measured and re-sampled on July 20, 1990.

**TABLE 4**

**CONCENTRATIONS OF GROUND WATER CONTAMINATION INDICATOR PARAMETERS  
SEWAGE TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
JULY 1990**

MONITOR WELL	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	PURGEABLE ORGANIC HALIDES (mg/l as Cl)
MW-1	6.82	57,500	ND
	6.84	57,400	ND
	6.83	57,200	ND
	6.84	57,500	ND
S-2	7.28	12,500	ND
	7.31	12,300	ND
	7.30	12,200	ND
	7.32	12,200	ND
MW-2	7.31	10,700	ND
	7.31	10,900	ND
	7.32	11,200	ND
	7.32	11,100	ND
MW-3	7.36	16,400	ND
	7.34	16,100	ND
	7.32	16,000	ND
	7.36	15,900	ND
MW-4	7.00	16,800	ND
	7.03	17,200	ND
	7.02	17,100	ND
	7.08	16,900	ND
MW-12 (Duplicate MW-4)	NA	NA	ND
			ND
			ND
			ND
MW-5	6.85	14,000	ND
	6.87	13,700	ND
	6.87	13,600	ND
	6.88	13,600	ND
MW-6	6.99	86,200	ND
	6.96	87,800	ND
	7.02	88,600	ND
	7.01	87,700	ND
MW-7	6.97	12,300	ND
	6.91	12,300	ND
	6.90	12,200	ND
	6.90	12,100	ND

**TABLE 4****CONCENTRATIONS OF GROUND WATER CONTAMINATION INDICATOR PARAMETERS  
SEWAGE TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
JULY 1990  
(CONTINUED)**

<b>MONITOR WELL</b>	<b>pH</b>	<b>SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)</b>	<b>PURGEABLE ORGANIC HALIDES (mg/l as Cl)</b>
<b>MW-8</b>	6.94	14,500	ND
	6.96	12,200	ND
	6.94	12,500	ND
	6.94	13,500	ND
<b>S-4</b>	7.32	59,900	ND
	7.33	59,600	ND
	7.34	59,900	ND
	7.36	59,400	ND
<b>MW-11 (trip blank)</b>	NA	NA	ND

ND = Not detected at 0.20 mg/l as chloride.  
NA = Not Applicable.

**TABLE 5**

**CONCENTRATIONS OF GROUND WATER CONTAMINATION INDICATOR PARAMETERS  
SEWAGE TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
SEPTEMBER 1990**

<b>MONITOR WELL</b>	<b>pH</b>	<b>TOTAL ORGANIC CARBON (mg/l)</b>
MW-1	6.69	1-U
	6.70	1-U
	6.69	1-U
	6.71	1-U
S-2	7.28	4
	7.28	3
	7.28	3
	7.29	3
MW-2	7.16	4
	7.14	4
	7.14	4
	7.15	4
MW-3	7.08	7
	7.08	7
	7.08	7
	7.07	7
MW-4	6.95	5
	6.93	5
	6.96	5
	6.91	5
MW-12 (Duplicate MW-4)	NA	5
		5
		5
		6
MW-5	6.73	6
	6.73	6
	6.70	6
	6.72	6
MW-6	6.80	5
		5
		5
		5
MW-7	6.92	3
	6.93	4
	6.92	4
	6.92	4

**TABLE 5**

**CONCENTRATIONS OF GROUND WATER CONTAMINATION INDICATOR PARAMETERS  
SEWAGE TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
SEPTEMBER 1990  
(CONTINUED)**

<b>MONITOR WELL</b>	<b>pH</b>	<b>TOTAL ORGANIC CARBON (mg/l)</b>
<b>MW-8</b>	6.83	4
	6.81	4
	6.82	4
	6.82	4
<b>S-4</b>	7.04	2
	7.10	1
	7.06	2
	7.08	2

U = Compound was analyzed for but not detected. The table value is the detection limit for the sample.  
NA = Not Applicable.

**TABLE 6**

**TOTAL ORGANIC CARBON FROM THE SEWAGE  
TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
JULY, 1990\***

<b>MONITORING WELLS</b>	<b>TOTAL ORGANIC CARBON (mg/l)</b>
MW-1	<1
S-2	4
MW-2	5
MW-3	7
MW-4	6
MW-12 (Duplicate MW-4)	6
MW-5	6
MW-6	4
MW-7	4
MW-8	4
S-4	1

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\*Samples were not processed in quadruplicate.

WP:HOL:T-1645/6

**TABLE 7**

**METHOD DETECTION LIMITS  
SEWAGE TREATMENT LAGOONS MONITORING WELLS  
HOLLOMAN AIR FORCE BASE, NEW MEXICO  
JULY AND SEPTEMBER, 1990**

<b>PARAMETER</b>	<b>DETECTION LIMIT</b>
TOC	1 mg/L
POX	0.20 mg/L as Cl

**APPENDIX A**

**JOB LOGS**



# JOB LOG

COMPANY COE - Holloman Air Force Base DATE 071790  
 LOCATION Alamogordo, NM JOB NUMBER 301251.02 00  
 WORK PERFORMED Semi-Annual RCRA gw sample collection at wastewater treatment lagoons  
 PREPARED BY: Ann Hauska SUPERVISOR Dann Meyer

CLASS.	NAME	START	ARRIVED JOB	TIME OUT	LEFT JOB	STOP	TOTAL
APSc	Ann Hauska	0700	1250	-	1610	1655	~10 hrs
APSc	Mark Lyon	0700	1250	-	1600	1655	~10 hrs
Tech	John Boyd	0700	1250	-	1610	1655	~10 hrs

AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT
	HNu PID				
	ORS Probe				
	Decon Equipment				
	Surgical Gloves				

TIME FIELD ACTIVITY DAILY LOG

0700	Load gear in IT van; drive to rental agency - pick-up 4 wheel drive vehicle.
0740	Sample team is enroute to Alamogordo.
0900	Stop in Socorro, NM to contact Sharon Moore, HAFB about delivery of acid for sample preservative. Everything arrived.
0925	Continue driving to Alamogordo.
1205	Arrive at HAFB - Check in at gate.
1250	Cleared to enter base.
1255	Stop at base store for minor supplies. Pick-up bucket/keys + acid from Sharon Moore's office. - Drive to Shed, unload gear, calibrate equipment; Prep for field activities.
1325	Arrive at MW-3 being taking headspace readings + fluid level measurements. Decon down-hole equipment between wells. Continue with all 10 wells.
1600	Field activities complete; M. Lyon leaves to take HNu PID to





**JOB LOG**

COMPANY COE- Holloman Air Force Base

DATE 071890

LOCATION Alamogordo, NM

JOB NUMBER 301251.02.06

WORK PERFORMED Semi-Annual RCRA gw sample collection at wastewater treatment lagoons.

PREPARED BY: Ann Houska

SUPERVISOR Dann Meyer

CLASS.	NAME	START	ARRIVED JOB	TIME OUT	LEFT JOB	STOP	TOTAL
APSc	Ann Houska	0700	0740	—	1530	AM 1700	10 hrs
APSc	Mark Lyon	0700	0740	—	1530	AM 1700	10 hrs
APSc	John Boyd	0700	0740	—	1530	AM 1700	10 hrs

AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT
	pH Meter		Visqueen		
	Cond. Meter		Bailers - Dedicated		
	Sample containers		Ice		
	Vermiculite		Tyvek suits		
	Decon Equipment		Nitrile gloves		
	Coolers		Surgical gloves		

TIME

FIELD ACTIVITY DAILY LOG

0700	Load gear, enroute to HAFB. Stop at store for ice.
0740	Arrive at MW-6; calibrate equipment + prep for sample collection. Collect sample.
0925	Move to S-4; Prep for sampling; purge well + collect sample.
1025	Sampling complete move to MW-4; Set-up + sample. COE sample also collected at this well.
1210	Leave MW-4. Drive to main part of base. Stop to make fed-X pick-up arrangements + to see Sharon Moore. Stop at Shed + reload equipment.
1305	Arrive at MW-2; sample prep, purge well + collect sample equipment. - Sample set includes enviro. duplicate + COE sample.
1435	Sampling complete at MW-2. Return to Shed + pack samples for fed-X pick-up. - Reload gear - go to MW-3 to collect sample (sample prep, well purge + sample)
1555	A. Houska returns to shed to meet fed-X pick-up.



**JOB LOG**

COMPANY COE - Holloman Air Force Base DATE 07 1990  
 LOCATION Alamogordo, NM JOB NUMBER 301251-02.06  
 WORK PERFORMED RCRA Semi Annual gw sample collection at wastewater treatment lagoons.  
 PREPARED BY: Ann Houska SUPERVISOR Dann Meyer

CLASS.	NAME	START	ARRIVED JOB	TIME OUT	LEFT JOB	STOP	TOTAL
APSc	Ann Houska	0630	0650	.25 hr	1610	1630	9 hr .75 hr
APSc	Mark Lyon	0630	0650	.25 hr	1610	1630	9 hr .75 hr
Tech	John Boyd	0630	0650	.25 hr	1610	1630	9 hr .75 hr
						?	hr

AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT
	pH Meter		Viscquem		
	Cond Meter		Bailers - Dedicated		
	Sample Containers		Ice		
	Vermiculite		Tyvek suits		
	Decon Equipment		Nitrile gloves		
	Coolers		Surgical gloves		

TIME	FIELD ACTIVITY DAILY LOG
0630	Load equipment; Leave motel; stop at store for ice. Stop at Shed for equipment. Set-up on MW-8; <sup>calibrat equipment</sup> sample prep, purge + collect sample.
0835	Set-up on MW-5; sample prep, purge ground water + collect sample.
0955	Move to MW-7; sample prep, purge ground water + collect sample.
1115	Move to 45-4; sample prep, purge ground water + collect sample.
1230	go to officers club for lunch + to contact laboratories. Need to resample all samples sent on 071890 to labs because they arrived warm. - Consult with Dann Meyers. Make arrangements to get needed supplies.
1320	Arrive at MW-1; sample prep, purge gw; collect sample
1450	Sample collection complete, equipment recalibrated.



# JOB LOG

COMPANY COE - Holloman Air Force Base

DATE 071990

LOCATION \_\_\_\_\_

JOB NUMBER 301257.02.06

WORK PERFORMED See Page 1

PREPARED BY: \_\_\_\_\_

SUPERVISOR \_\_\_\_\_

TIME

FIELD ACTIVITY DAILY LOG

1600

~~1600~~ Arrive at shed; pack samples; POX samples hold until laboratory doing analysis can be determined. Prep for resampling - Continue making arrangements for supplies.

1610 am

~~1600~~ Fed-X on-site, pick-up samples. - A. Huska stops at S. Maxres office

1630 IT at motel, equipment unloaded. STOP



# JOB LOG

COMPANY COE-Holloman Air Force Base

DATE 072090

LOCATION Alamogordo, NM

JOB NUMBER 301251.0204

WORK PERFORMED RCRA Semi-Annual gw sample collection at wastewater treatment lagoons.

PREPARED BY: Ann Hruska

SUPERVISOR Dawn Meyer

CLASS.	NAME	START	ARRIVED JOB	TIME OUT	LEFT JOB	STOP	TOTAL
APSc	Ann Hruska	0645	0720	-	1540	1930	2 75 hr.
APSc	Mark Lyon	0645	0720	-	1540	1930	12 75 hr.
Tech	John Boyd	0645	<del>0720</del> 10:30 AM	-	1540	1930	12 75 hr.

AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT
	pH Meter		Visqueen		
	Cond Meter		Bankers - Dedicated		
	Sample Containers		Ice		
	Vermiculite		Tyvek Suits		
	Decon Equipment		Nitrile gloves		
	Coolers		Surgical gloves.		

TIME Check out of metal rooms. FIELD ACTIVITY DAILY LOG

0650	John Boyd drives to El Paso to pick-up Fed X shipment. Ann Hruska, M. Lyon pour new trip blank for POX, load gear + drive to
0720	HAFB. Renew base pass, Stop at Bradley's trailer to discuss need/lack of for safety briefing. Drive to MW-2 for fluid levels.
0810	Leave MW-2. Stop at store for supplies + to make phone calls.
0835	Arrive at MW-4 for FL's.
0910	Arrive at <del>MW-4</del> S-4 for FL's
0925	Arrive at MW-6 for FL's + began prep for resampling (all parameters)
<del>1030</del>	John Boyd arrives with supplies from El Paso.
1110	Arrive at S-4, collect sample (prep, purge + sample)
1200	Arrive at MW-4. Prep for resampling, purge + sample. Collect COE sample (resample) at this well.
1320	Drive to MW-2.
1345	Arrive at MW-2, (resample - prep, purge + sample).
1505	Resampling complete. Stop at shed to load gear and





## JOB LOG

COMPANY COE - Holloman Air Force Base      DATE 091290  
 LOCATION Alamogordo, NM      JOB NUMBER 361251.02.06  
 WORK PERFORMED Resampling for TOC - COE Holloman Air Force Base, Waste water treatment Lagoons.  
 PREPARED BY: A. Houska      SUPERVISOR D. Meyer

CLASS.	NAME	START	ARRIVED JOB	TIME OUT	LEFT JOB	STOP	TOTAL
ABC	A. Houska	0500	1010	-	1600	1730	12.5 hrs
Tech	J. Saavedra	0500	1010	-	1600	1730	12.5 hrs

AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT
	ORS probe				
	HNu PID				
	Surgical Gloves				
	Decon Equipment				

TIME	FIELD ACTIVITY DAILY LOG
0500	Load gear into vehicle.
0525	Begin drive to Alamogordo
1010	Arrive at HAFB. Get base pass. Stop at Sharon Moores office for keys/batons. Unload gear in shed. Prep for days field activities. Calibrate equipment.
1120	Begin taking headspace + fluid-level readings at all 10 monitor wells. Decon down-hole equipment between wells.
1540	FL's complete, recalibrate equipment
1600	Leave HAFB
1615	Stop at airport to ship ORS probe back to ABQ.
1650	Stop at store to pick-up supplies.
1715	Check in at motel; unload gear.
1730	Stop.



# JOB LOG

COMPANY COE - Holloman Air Force Base DATE 091390  
 LOCATION Alamogordo, NM JOB NUMBER 301251-02-06  
 WORK PERFORMED Resampling gw for TOC - COE HAFB Wastewater Treatment Lagoons.  
 PREPARED BY: A. Houska SUPERVISOR D. Meyer

CLASS.	NAME	START	ARRIVED JOB	TIME OUT	LEFT JOB	STOP	TOTAL
APSc	A. Houska	0630	0720	15 min	1940	<del>2000</del>	13.25 hr
Tech	J. Saavedra	0630	0720	15 min	1940	<del>2000</del>	13.25 hr

AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT
	pH Meter		paper goods -		Thermometer
	Cond. Meter		trash bags, baggies		
	Sample containers		paper towels		
	coolers/ice		Decon Equipment		
	visqueen		Buckets		
	vermiculite		Dedicated Buckers		

TIME FIELD ACTIVITY DAILY LOG

0630	Load gear in vehicle.
0640	Leave motel; stop for ice enroute.
0720	Arrive at monitor well MW-6 in back area. Prep for sample collection, purge water + collect sample.
0905	Arrive at S-4, purge well + sample.
1025	Drive to MW-4, Set-up for sampling; sample collection included COE sample.
1220	Leave MW-4. Drive to main base area. Stop 15 min for lunch. Make phone calls to fed X. Stop at shed for equipment.
1320	Arrive at MW-2; Sample prep; purge water + sample. Enviro duplicate + COE samples also collected here.
1510	Go to shed, pack coolers / paperwork. Jan to store for ice.
1610	Fed X pick-up.





**JOB LOG**

COMPANY COE - Holloman Air Force Base

DATE 09/14/90 <sup>at</sup>

LOCATION Alamogordo, NM

JOB NUMBER 301251.02.06

WORK PERFORMED Resampling gw for TOC - COE HAFB Wastewater Treatment Lagoons

PREPARED BY: A. Houska

SUPERVISOR D. Meyer

CLASS	NAME	START	ARRIVED JOB	TIME OUT	LEFT JOB	STOP	TOTAL
APSc	A. Houska	0700	0720	—	1520	1945	12.45 hrs
Tech	J. Saavedra	0700	0720	—	1520	1945	12.45 hrs

AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT	AMT./ HRS.	MATERIAL/EQUIPMENT
	pH Meter		thermometer		
	Cond Meter		paper products		
	Sample Containers		Decon Equipment		
	coolers/ice		Buckets		
	visqueen		Dedicated Bucklers		
	vermiculite				

TIME FIELD ACTIVITY DAILY LOG

0700	Load gear in vehicle - check out of motel. Drive to HAFB - stop for ice. Stop at shed for equipment
0730	Arrive at MW-5 - Calibrate equipment, sample prep; purge gw + collect sample.
0915	Move to MW-7 - Sample prep; purge gw + collect sample. Move to MW-1, Sample prep; purge gw + collect sample. Go to store for supplies
1350	arrive at S-2 - Sample prep; purge gw + collect sample. Recalibrate equipment.
1435	Leave S-2, go to storage shed; clean-up, load gear
1455	Stop at Sharon Moores office. Leave keys + trailers.
1510	Stop at store - use phone to call Dann Meyer + Labs - okay to leave HAFB.
1520	Begin drive to ABO.
1900	Arrive at FedEx in ABO; Ship coolers to labs



**APPENDIX B**  
**FIELD DATA**

GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

IT Project No. 301251.02, 06

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-010790
DATE SAMPLED	071990
TIME	070930 (1) 1415
SAMPLER'S INITIALS	AH.ML. JB
WELL/BORING LOCATION	MW-1
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4053.42 FAMSL
WATER-LEVEL MEASUREMENT 071790	---
Total Depth (ft)	17.81
Depth to Groundwater (ft)	11.52
CALCULATIONS	
Thickness of Groundwater (ft)	6.29
Well Volume (gallons)	4.11
Purge Volume (gallons) for five casing volumes	20.5 → 31
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance ( $\mu$ mhos)	See page 2
Temperature ( $^{\circ}$ C)	See page 2

## COMMENTS:

° HNu PID Background =  $\frac{0.2}{0.2 \text{ ummH}}$  ppm; Well borehole =  $\frac{0.2}{0.2 \text{ ummH}}$  ppm.  
 Date 071790; Time 1439

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 7.00 (read 6.89)

slope = 99.4%

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1342	4	21.5	6.85	57,100	ok
1351	8	20.5	6.82	57,100	}
1357	12	20.0	6.82	57,500	
1404	16	20.0	6.72	57,600	
1413	21	21.5	6.87	57,100	

Reading after sample collection: (4 replicates)

1420	20.5	6.82	57,500
1424	20.0	6.84	57,400
1427	20.0	6.83	57,200
1431	20.0	6.84	57,500

Additional Comments:

All S.C. read on 0-700,000 umhos/cm scale

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

IT Project No. 301251.02.06

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-020790
DATE SAMPLED	071790
TIME	1415 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	MW-2
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4039.78 FAMSL
WATER-LEVEL MEASUREMENT 071790	---
Total Depth (ft)	<del>24.13</del> 17.77
Depth to Groundwater (ft)	<del>24.03</del> 6.51
CALCULATIONS	
Thickness of Groundwater (ft)	11.26
Well Volume (gallons)	7.35
Purge Volume (gallons) for five casing volumes	36.76 → 37
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

## COMMENTS:

° HNu PID Background = 0 ppm; Well borehole = 0 ppm.  
Date 071790; Time 1342

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

No sample MW-020790 collected followed by QA sample QMW-020790 (1/23/90)  
Sample sets alternated in that order. All containers of a parameter filled prior to alternating to next <sup>sample set</sup> parameter. New barrels used for new <sup>AW</sup> <sub>at</sub>

ph Meter check against 7.00 buffer: Reading 7.02

PURGING DATA:

TIME	VOLUME PURGED (GAL)	TEMP (C°)	pH	SC (umHos/cm)	COMMENTS
1318	1	23.0	7.52	10,500	clear - some color
<del>1325</del> 1318	14	22.5	7.42	10,400	" "
1330	21	22.5	7.36	10,400	" "
1336	28	22.0	7.34	10,400	" "
1341	35	<del>22.0</del> 21.5	7.41	10,500	" "
1344	37	21.0	7.36	10,400	" "

Reading after sample collection: (4 replicates)

1357	22.0	7.41	10,500
1401	21.0	7.39	10,300
1405	21.0	7.35	10,300
1408	21.0	7.33	10,000

Additional Comments:

All S.C. read on 0-200,000 umhos/cm scale

# Resample Data

IT Project No. 301251.02.06  
 GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-020790B
DATE SAMPLED	072090
TIME	1500 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	MW-2
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4039.78 FAMSL
WATER-LEVEL MEASUREMENT - 072090/0755	---
Total Depth (ft)	17.76
Depth to Groundwater (ft)	6.76
<b>CALCULATIONS</b>	
Thickness of Groundwater (ft)	11
Well Volume (gallons)	7.2
Purge Volume (gallons) for five casing volumes	35.9 → 36
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

- COMMENTS:**
- ° HNu PID Background= \_\_\_\_\_ ppm; Well borehole= \_\_\_\_\_ ppm. (na)
  - ° Date \_\_\_\_\_; Time \_\_\_\_\_
  - ° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.
  - ° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

Sample MW-020790B collected followed by QA sample QMW-020790 (COE).  
 Sample sets alternated in that order. All containers of a parameter filled prior to alternating to next sample set. New bucket of gw used for new sample set.

# Resample Data

Page 2 of 2  
Well No. MW-2  
Date 0702090  
IT Project No. 301251.02.  
COE-HAFB

ph Meter check against 7.00 buffer: Reading 6.93

## PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1401	7	23.0	7.40	10,200	clear
1407	14	22.5	7.38	10,400	clear
1412	21	22.5	7.36	10,800	clear
1418	28	22.0	7.32	10,800	'
1424	36	23.0	7.36	10,500	'

## Reading after sample collection: (4 Replicates)

1431	23.0	7.31	10,700
1435	21.5	7.31	10,900
1438	21.0	7.32	11,200
1442	20.5	7.32	11,100

Additional Comments:

IT Project No. 301251.02.06.

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-03079C
DATE SAMPLED	071890
TIME	12:00 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	MW-3
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4037.38 FAMSL
WATER-LEVEL MEASUREMENT 071790	----
Total Depth (ft)	17.73
Depth to Groundwater (ft)	15.08
<b>CALCULATIONS</b>	
Thickness of Groundwater (ft)	7.65
Well Volume (gallons)	7.94
Purge Volume (gallons) for five casing volumes	24.97 → 25
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

**COMMENTS:**

° HNu PID Background= 0.3ppm; Well borehole= 0.2ppm.  
Date 071790; Time 12:37

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading ~~7.00~~ <sup>7.99</sup> 6.99

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1519	5	20.0	7.21	17,200	clear - 1/4" color
1524	10	19.5	7.18	16,900	clear
1528	15	19.0	7.21	16,900	" "
1535	20	19.5	7.22	17,200	" "
1544	25	19.5	7.35	16,400	" "

Reading after sample collection: (4 replicates)

1550	19.0	7.36	16,400
1553	19.5	7.34	16,100
1556	19.5	7.32	16,000
1559	19.5	7.36	15,900

Additional Comments:

All S.C. read on 0-200,000 umhos/cm scale

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

IT Project No. 301251.02.00.

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-040790
DATE SAMPLED	0719 90
TIME	1130 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	MW-4
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4030.30 FAMSL
WATER-LEVEL MEASUREMENT 071790	---
Total Depth (ft)	17.81
Depth to Groundwater (ft)	7.45
CALCULATIONS	
Thickness of Groundwater (ft)	10.36
Well Volume (gallons)	6.76
Purge Volume (gallons) for five casing volumes	33.32 → 34
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

## COMMENTS:

° HNu PID Background = 0.2 ppm; Well borehole = 0.2 ppm.  
Date 071790; Time 1500

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

Sample MW-040790 (time=1130), MW-120790 (field dup. time=1230) and QA sample (COE) @ MW-040790 (time=1130) collected by alternating parameters in accordance with above order. All bottles of a set completed before alternating.

ph Meter check against 7.00 buffer: Reading 7.08

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1053	5	21.0	7.34	12,400	clear strong color
1059	10	20.5	7.21	12,600	" "
1104	15	20.0	7.13	13,100	" "
1107	20	20.0	7.10	13,300	" "
1112	25	20.0	7.12	13,900	" "
1116	30	20.0	7.11	14,400	" "
1120	34	20.0	7.12	14,500	" "

Reading after sample collection: (4 replicates)

1134	20.5	7.20	14,700
1137	20.0	7.16	15,400
1141	19.5	7.11	15,800
1144	19.5	7.12	15,900

Additional Comments:

All S.C. Read on 0-200,000 umhos/cm

ph Meter check against 7.00 buffer: Reading 6.97

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
0858	7	20.5	6.77	12,700	slight turbid - g... " " "
0905	14	20.0	6.78	12,800	" " "
0912	21	20.0	6.81	12,900	mostly clear
0919	28	20.0	6.81	13,100	
0924	33	20.5	6.85	13,200	

Reading after sample collection: (4 replicates)

0936	19.0	6.85	14,000
0940	19.5	6.87	13,700
0943	19.5	6.87	13,600
0946	20.0	6.88	13,600

Additional Comments:

All S.C. read on 0-200,000 umhos/cm scale

GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

IT Project No. 301251.02.06

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-060790
DATE SAMPLED	0718 90
TIME	0845 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	MW-06
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4031.21 FAMSL
WATER-LEVEL MEASUREMENT	071790
Total Depth (ft)	17.78
Depth to Groundwater (ft)	6.72
<b>CALCULATIONS</b>	
Thickness of Groundwater (ft)	1.06
Well Volume (gallons)	7.22
Purge Volume (gallons) for five casing volumes	36.1 → 36
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

**COMMENTS:**

° HNu PID Background= 0.7 ppm; Well borehole= 0.0 ppm.  
 Date 071790; Time 1535

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 7.00

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
0811	5	21.0	7.20	85,300	clear slight odor
0817	10	20.0	7.08	85,500	" " "
0822	15	20.0	7.01	85,400	" " "
0827	20	20.0	6.99	85,200	" " "
0831	25	20.0	6.96	85,200	" " "
0836	30	19.5	6.93	86,000	" " "
0841	35	20.0	6.94	85,800	" " "
0845	37	19.5	6.93	85,700	" " "

Reading after sample collection: (4 replicates)

0852	20.5	6.98	85,200
0855	20.0	6.95	85,900
0859	20.0	6.95	86,100
0903	20.0	6.96	85,500

Additional Comments:

SC read on 0-200,000 umHos/cm scale

## Resample Data

IT Project No. 301251.02.cu

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-060790B
DATE SAMPLED	072090
TIME	1030 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	MW-6
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4031.21 FAMSL
WATER-LEVEL MEASUREMENT	072090/0930
Total Depth (ft)	17.76
Depth to Groundwater (ft)	6.82
CALCULATIONS	
Thickness of Groundwater (ft)	10.94
Well Volume (gallons)	7.14
Purge Volume (gallons) for five casing volumes	35.7 → 36
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

## COMMENTS:

° HNu PID Background= \_\_\_ ppm; Well borehole= \_\_\_ ppm.  
Date \_\_\_\_\_; Time \_\_\_\_\_

NA

- ° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.
- ° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

Resample Data

ph Meter check against 7.00 buffer: Reading 7.00

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1006	2	22.0	7.27	81,000	clear no filter
1016	14	22.0	7.11	83,400	" "
1025	21	21.0	7.02	84,900	" "
1034	28	21.0	7.01	85,300	" "
1045	36	21.0	7.00	85,400	" "

Reading after sample collection:

(4 replicates)

1051	21.0	6.99	86,200	
1056	20.0	6.96	87,800	
1059	20.0	7.02	88,600	turbid
1102	20.0	7.01	87,700	

Additional Comments:

All SC read on 0-200,000 scale in ATC

IT Project No. 301251.02,06. GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-070790
DATE SAMPLED	071990
TIME	1045 (1)
SAMPLER'S INITIALS	AH,ML, JB
WELL/BORING LOCATION	MW-7
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4039.88 FAMSL
WATER-LEVEL MEASUREMENT	071790
Total Depth (ft)	17.70
Depth to Groundwater (ft)	8.70
<b>CALCULATIONS</b>	
Thickness of Groundwater (ft)	9.0
Well Volume (gallons)	5.9
Purge Volume (gallons) for five casing volumes	29.4 → 30.5 gal
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

- COMMENTS:**
- HNu PID Background=0.2 ppm; Well borehole= 0.3 ppm.  
Date 071790; Time 1357
  - See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.
  - See field notebook for decontamination procedure.
- (1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 6.93

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1011	6	21.5	6.86	10,400	Clear
1017	12	21.0	6.85	10,920	"
1025	18	20.5	6.92	11,300	"
1035	24	21.0	6.92	11,800	"
1045	30	21.0	6.93	12,100	"

Reading after sample collection: (4 replicates)

1053	21.0	6.97	12,300
1056	21.0	6.91	12,300
1059	21.0	6.90	12,200
1103	20.5	6.90	12,100

Additional Comments:

All S.C. Read on 0-200,000 umhos/cm scale

IT Project No. 301251.02 00

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-030790
DATE SAMPLED	071990
TIME	0800 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	MW-8
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4040.50 FAMSL
WATER-LEVEL MEASUREMENT 071790	---
Total Depth (ft)	17.75
Depth to Groundwater (ft)	7.83
<b>CALCULATIONS</b>	
Thickness of Groundwater (ft)	9.92
Well Volume (gallons)	6.5
Purge Volume (gallons) for five casing volumes	32.4 → 33
<b>NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED</b>	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

**COMMENTS:**

° HNu PID Background= 0 ppm; Well borehole= 0 ppm.  
Date 071790; Time 1347

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 7.00

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
0739	5	20.0	6.88	14,200	clear to color
0745	10	20.0	6.93	11,600	" "
0750	15	20.0	6.93	11,300	" "
0754	20	20.0	6.93	11,300	" "
0759	25	20.0	6.93	12,200	" "
0804	30	20.0	6.93	12,100	" "
0808	33	20.0	6.94	10,800	

Reading after sample collection: (4 replicates)

0814	19.5	6.94	14,500
0817	20.0	6.96	12,200
0820	20.0	6.94	12,500
0824	20.0	6.94	13,500

Additional Comments:

All SC Read on 0-200,000 umhos/cm scale

GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

IT Project No. 301251.02.06

Parameter Description	Value
SAMPLE CONTROL NUMBER	S-020790
DATE SAMPLED	071990
TIME	1200 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	S-2
WELL/BORING DIAMETER (in)	2
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4040.56 FAMSL
WATER-LEVEL MEASUREMENT 071790	----
Total Depth (ft)	20.24
Depth to Groundwater (ft)	uv 17 11 27
CALCULATIONS	
Thickness of Groundwater (ft)	8.91
Well Volume (gallons)	1.5
Purge Volume (gallons) for five casing volumes	7.3 → 7
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

COMMENTS:

° HNu PID Background = 0.2 ppm; Well borehole = 0.2 ppm.  
 Date 071790; Time 1200

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 6.91

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1134	1.5	18.5	7.15	13,100	clear
1137	3.0	17.5	7.24	13,300	"
1141	4.5	17.0	7.30	13,600	"
1145	6.0	17.0	7.31	13,000	"
1148	7.0	17.0	7.31	12,800	"

Reading after sample collection: (4 replicates)

1154	17.5	7.28	12,500
1158	17.0	7.31	12,300
1202	17.0	7.30	12,200
1206	17.5	7.32	12,200

Additional Comments:

IT Project No. 301251.02:00  
 GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	S-040790
DATE SAMPLED	071790
TIME	1000 (1)
SAMPLER'S INITIALS	AH, ML, JB
WELL/BORING LOCATION	S-4
WELL/BORING DIAMETER (in)	2
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4034.46 FAMSL
WATER-LEVEL MEASUREMENT 071790	---
Total Depth (ft)	14.30
Depth to Groundwater (ft)	9.82
CALCULATIONS	
Thickness of Groundwater (ft)	5.04
Well Volume (gallons)	0.42
Purge Volume (gallons) for five casing volumes	2.47
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

COMMENTS:

° HNu PID Background = 0.3 ppm; Well borehole = 0.2 ppm.  
 Date 071790; Time 1438 1525  
 AH

- ° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.
- ° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 6.99

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1143	3	21.5	6.77	10,100	slightly cloudy, lt. green color, no odor
1149	6	21.5	6.77	10,100	same
1154	9	21.5	6.74	10,050	"
1202	12	21.0	6.74	10,052	"
1206	15	21.5	6.69	10,090	"
1210	18	21.5	6.69	10,090	"
1218	21	21.5	6.70	10,090	"

Reading after sample collection: (4 replicates)

1224	22	22.0	6.69	10,090	"
1228	<del>21.5</del> 22.5 out	21.5	6.70	10,090	"
1233	22.75	22.0	6.69	10,090	"
1237	23	22.0	6.71	10,080	"

Additional Comments:

Field monitoring equipment maintained in shade. Readings taken after 2 minutes in ground water. Sample container consists of clear glass jar which is dechlorinated between wells and double rinsed with ground water between each reading at a monitor well.

TOC Resample  
IT Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	S-020990
DATE SAMPLED	091490
TIME	1400 (1)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	S-2
WELL/BORING DIAMETER (in)	2
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	FMSL
WATER-LEVEL MEASUREMENT	----
Total Depth (ft)	20.23
Depth to Groundwater (ft)	10.75
CALCULATIONS	
Thickness of Groundwater (ft)	9.48
Well Volume (gallons)	1.54
Purge Volume (gallons) for five casing volumes	7.71
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance ( $\mu$ hos)	See page 2
Temperature ( $^{\circ}$ C)	See page 2

COMMENTS:

° HNu PID Background = 0.8 ppm; Well borehole = 0.6 ppm.  
Date 091290; Time 1428

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 7.00

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1323	1	20.0	7.2 <sup>0</sup> <del>5</del> at	10,070	Clear, no odor, grass in well
1328	2	19.0	7.23	10,070	"
1331	3	18.5	7.24	10,070	"
1335	4	18.5	7.25	10,080	"
1340	5	18.5	7.25	10,080	" - Decrease in amt of grass
1344	6	18.5	7.2 <sup>2</sup> <del>5</del> at	10,080	"
1350	7	18.0	7.2 <sup>at</sup> <del>5</del> 7	10,080	"

Reading after sample collection: In Quadruplicate

1556	8.5	18.0	7.28	10,080	"
1602	8.75	18.0	7.28	10,080	"
1405	<del>8.908</del> at	18.0	7.28	10,080	"
1412	9.25	18.0	7.29	10,080	"

Additional Comments:

TOC Resample  
IT Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-020990
DATE SAMPLED	0911390
TIME	1430 (1)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	MW-2
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4039.78 FAMSL
WATER-LEVEL MEASUREMENT	----
Total Depth (ft)	17.73
Depth to Groundwater (ft)	5.79
CALCULATIONS	
Thickness of Groundwater (ft)	11.94
Well Volume (gallons)	7.77
Purge Volume (gallons) for five casing volumes	38.85
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance ( $\mu$ hos)	See page 2
Temperature ( $^{\circ}$ C)	See page 2

COMMENTS:

° HNu PID Background = 0.8 ppm; Well borehole = 0.5 ppm.  
Date 091290; Time 1355

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

Collection Order: MW-020990 followed by QMW-020990. Samples poured from same batch.  
↳ COE QA sample.

ph Meter check against 7.00 buffer: Reading 6.97

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1351	<sup>alt</sup> 7	23.0	7.23	10,130	clean, slight yellow + slight odor
1358	12	23.0	7.23	10,130	"
1407	18	23.0	7.18	10,130	"
1416	24	23.0	7.14	10,140	"
1424	30	23.0	7.14	10140	"
1432	36	23.0	7.13	10140	"
<del>14</del> alt					

Reading after sample collection:

(4 replicates)

1442	40	23.0	7.14	10130	"
1447	40.5	23.0	7.14	10130	"
1450	41.0	23.0 alt	7.14	10130	"
1454	41.5	23.5	7.15	10130	"

Additional Comments:

TOC Resample  
IT Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-030990
DATE SAMPLED	091290
TIME	1407 (1)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	MW-3
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4037.38 FMSL
WATER-LEVEL MEASUREMENT	---
Total Depth (ft)	17.72
Depth to Groundwater (ft)	9.48
CALCULATIONS	
Thickness of Groundwater (ft)	8.24
Well Volume (gallons)	5.36
Purge Volume (gallons) for five casing volumes	26.8
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

COMMENTS:

° HNu PID Background = 1.0 ppm; Well borehole = 0.2 ppm.  
Date 091290; Time 1407

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 6.95

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1639	4	22.5	7.04	10,140	clean, 14 umHos/cm but
1645	8	21.5	7.08	10,140	no particulates, no color
1653	12	21.5	7.06	10,150	"
1701	16	20.5	7.05	10,150	"
1707	20	21.0	7.08	10,160	"
1714	24	20.5	7.02	10,170	"
<del>1723</del>	<del>28</del>	<del>21.0</del>	<del>7.08</del>	<del>10,160</del>	<del>"</del>

Reading after sample collection: (4 replicates)

1723	27.5	20.5	7.04	10,160	"
1729	28	21.0	7.08	10,140	"
1732	28.0	21.0	7.08	10,160	"
1735	28.5	21.0	7.07	10, <del>160</del> 150	"

Additional Comments:

TOC Resample  
 IT Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-040990
DATE SAMPLED	091390
TIME	1145 (1)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	MW-4
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4030.30 FAMSL
WATER-LEVEL MEASUREMENT	---
Total Depth (ft)	17.80
Depth to Groundwater (ft)	6.19
CALCULATIONS	
Thickness of Groundwater (ft)	11.61
Well Volume (gallons)	<del>6.08</del> 7.56
Purge Volume (gallons) for five casing volumes	37.78
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

COMMENTS:

° HNu PID Background = 0.8 ppm; Well borehole = 10.0 ppm. *negative, below*  
 Date 091290; Time 1543

- ° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.
- ° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.  
*Collection order: MW-040990 followed by Q MW-040990 followed by MW-120990 (time = 1230, Duplicate of MW-4). All samples poured from the same boiler of ground water*

ph Meter check against 7.00 buffer: Reading 7.02

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1058	6	22.0	7.12	10,070	Clear to Cloudy,
1108	12	21.5	6.95	10,070	black particulates, sulfate odor
1114	18	21.5	6.89	10,070	"
1123	24	21.5	6.89	10,070	slight decrease in amt of particulate
1132	30	21.5	6.89	10,070	same
1141	36	21.5	6.88	10,080	"

Reading after sample collection: (4 replicates)

1151	38.5	22.0	6.95	10,080	"
1154	38.75	22.0	6.93	10,080	"
1157	39	22.0	6.96	10,080	"
1202	39.5	22.0	6.91	10,080	"

Additional Comments:

TOC Resample  
IT Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
COE-HOLLOMAN AIR FORCE BASE  
WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-050990
DATE SAMPLED	091290
TIME	0840 (1)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	MW-5
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	FAMSL
WATER-LEVEL MEASUREMENT	----
Total Depth (ft)	17.71
Depth to Groundwater (ft)	7.64
CALCULATIONS	
Thickness of Groundwater (ft)	10.07
Well Volume (gallons)	6.55
Purge Volume (gallons) for five casing volumes	32.77
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance ( $\mu$ hos)	See page 2
Temperature ( $^{\circ}$ C)	See page 2

COMMENTS:

◦ HNu PID Background = 0.7 ppm; Well borehole = 0.7 ppm.  
Date 091290; Time 1300

◦ See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

◦ See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 7.00

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
0766	5	22.0	6.69	9,990,	cloudy, yellowish green tint, slight petre odor,
0806	10	21.5	6.72	10,000	"
0814	15	22	6.75	10,000	"
0821	20	21.5	6.71	10,010	same, sewer odor
0830	25	21.5	6.76	10,010	"
0839	30	22.0	6.77	10,010	"

Reading after sample collection:

(4 replicates)

0850	33.5	22	6.73	10,030	"
0854	33.75	22	6.73	10,040	"
0858	34 <sub>alt</sub>	22	6.70	10,050	"
0901	34.25	22	6.72	10,050	"

Additional Comments:

TOC Resample  
 IT Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-060990
DATE SAMPLED	091390
TIME	0820 (1)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	MW-6
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4031.21 FAMSL
<b>WATER-LEVEL MEASUREMENT</b>	
Total Depth (ft)	17.77
Depth to Groundwater (ft)	6.32
<b>CALCULATIONS</b>	
Thickness of Groundwater (ft)	11.45
Well Volume (gallons)	7.45
Purge Volume (gallons) for five casing volumes	37.25
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

COMMENTS:

- ° HNu PID Background = 0.8 ppm; Well borehole = neg ppm. (below 0.0)  
 Date 091290; Time 1520
- ° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.
- ° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 7.00

PURGING DATA:

~~9.96 at 2,000 alt~~

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
0756	6	21.7	7.04	9,960 <sup>alt</sup>	yellow color, no noticeable odor
0807	12	22.0	6.96	9,950 <sup>alt</sup>	lighter yellow, no odor
0815	18	21.6	<del>4.95</del> <sup>alt</sup>	9,950 <sup>alt</sup>	light yellow color
0826	24	22.1	6.83	9,950	lt yellow/clear
0836	30	22.1	6.80	9,950	"
0846	36	21.5	6.77	9,950	"
<del>0852</del>	<del>2</del>		<del>6.80</del> <sup>alt</sup>		

Reading after sample collection:

0852 38 21.5 6.80 9,960 — lt. yellow/clear no odor

→ Did not take quadruplicate measurement. (Forgot). alt.

Additional Comments: Field parameter data allowed to stabilize for 2 minutes prior to recording readings

TOC Resample  
 IT Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-070990
DATE SAMPLED	091490
TIME	1040 (L)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	MW-7
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	FAMSL
<b>WATER-LEVEL MEASUREMENT</b>	
Total Depth (ft)	17.69
Depth to Groundwater (ft)	8.43
<b>CALCULATIONS</b>	
Thickness of Groundwater (ft)	9.26
Well Volume (gallons)	6.03
Purge Volume (gallons) for five casing volumes	30.13
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance (µmhos)	See page 2
Temperature (°C)	See page 2

**COMMENTS:**

° HNu PID Background = 0.8 ppm; Well borehole = 0.6 ppm.  
 Date 1317; Time 091290

° See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

° See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 7.03

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
0938	5	22.0	6.79	10,800 <sup>air</sup>	Cloudy, yellow-green, slight sediment
0949	10	22.5	6.86	10,090	
air 0958	15	22.0	6.89	10,090	"
1007	20	22.0	6.89	10,910 <sup>air</sup>	"
1014	25	21.5	6.92	10,120	"
1026	30	22	6.91	10,110	"

Reading after sample collection: *In Quadruplicate*

1034	31.5	22.5	6.92	10,160	Not as cloudy, other
1037	31.75	23.0	6.93	10,180	"
1041	32.0	22.5	6.92	10,195	"
1045	32.25	23.0	6.92	10,210	"

*Same as above*

Additional Comments:

TOC Resample  
 IT Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	MW-080990
DATE SAMPLED	091390
TIME	1900 (1)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	MW-8
WELL/BORING DIAMETER (in)	4
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	4040.50 FAMSL
WATER-LEVEL MEASUREMENT	----
Total Depth (ft)	17.75
Depth to Groundwater (ft)	8.00
CALCULATIONS	
Thickness of Groundwater (ft)	9.75
Well Volume (gallons)	6.35
Purge Volume (gallons) for five casing volumes	31.75
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance ( $\mu$ mhos)	See page 2
Temperature ( $^{\circ}$ C)	See page 2

COMMENTS:

◦ HNu PID Background = 1.0 ppm; Well borehole = 0.7 ppm.  
 Date 091290; Time 1342

◦ See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.

◦ See field notebook for decontamination procedure.

(1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 6.98

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
1812	5	22	6.86	10,140	+ cloudy Clear yellow-green tint, no particulates, no odor
1819	10	23	6.85	10,130	Same, not as cloudy
1827	15	22	6.85	10,130	"
1834	20	22	6.86	10,120	"
<del>1845</del> 1845	<del>25</del> 25	22	6.83	10,120	"
1844	30	22	6.87	10,110	"

Reading after sample collection: In Quadruplicate

1903	32.5	22	6.83	10,110	Clear, slightly cloudy, yellow-green tint, no odor
1908	32.75	22	6.82 <sup>alt</sup>	10,100	"
1912	33	22	6.82	10,100	"
1916	33.5	22	6.82	10,100	"

Additional Comments:

TOC Resample  
 II Project No. 301251.02.06

GROUNDWATER FIELD DATA SHEET  
 COE-HOLLOMAN AIR FORCE BASE  
 WASTEWATER TREATMENT LAGOONS

Parameter Description	Value
SAMPLE CONTROL NUMBER	S-040990
DATE SAMPLED	091390
TIME	0940 (1)
SAMPLER'S INITIALS	JS, AH
WELL/BORING LOCATION	S-4
WELL/BORING DIAMETER (in)	2
ELEVATION OF TOP OF WELL CASING REFERENCED TO MEAN SEA LEVEL (MSL)	— FMSL
WATER-LEVEL MEASUREMENT	---
Total Depth (ft)	14.35
Depth to Groundwater (ft)	9.13
CALCULATIONS	
Thickness of Groundwater (ft)	5.22
Well Volume (gallons)	0.85
Purge Volume (gallons) for five casing volumes	4.25
NUMBER OF SAMPLE BOTTLES AND TYPE COLLECTED	See field notebook
pH	See page 2
Conductance ( $\mu$ hos)	See page 2
Temperature ( $^{\circ}$ C)	See page 2

COMMENTS:

- HNu PID Background=0.8 ppm; Well borehole= 0.7 ppm.  
 Date 091290; Time 1505
  - See field notebook for equipment type and calibration data; equipment calibrated at beginning and end of each field day.
  - See field notebook for decontamination procedure.
- (1) Coliform Bacteria sample collection time = NA.

ph Meter check against 7.00 buffer: Reading 7.00

PURGING DATA:

<u>TIME</u>	<u>VOLUME PURGED (GAL)</u>	<u>TEMP (C°)</u>	<u>pH</u>	<u>SC (umHos/cm)</u>	<u>COMMENTS</u>
0931	1	21.5	7.05	10,000	Clear, no odor
0935	2	21.5	7.06	10,000	Clear, no odor
0940	3	21.5	7.06	10,000	Clear, no odor
0945	4	21.0	7.06	10,010	Clear, no odor

Reading after sample collection: (4 replicates)

0958	5	21.5	7.04	10,030	Clear, no odor
1001	5.25	21.5	7.10	10,030	"
1004	5.5	21.5	7.06	10,040	"
1008	6.25	22.0	7.08	10,050	"

Additional Comments:



# WATER LEVEL INDICATOR CALIBRATION

EQUIPMENT NUMBER 06-01535

EQUIPMENT NAME ORS Interface Probe

DATE 091290 DATE LAST CALIBRATED 091290

CALIBRATION PERIOD Calibrated before and after field use

*Prior to field use time = 1115 - calibrated to 40 feet  
Downwell fluid level measurement (triplicate) confirmed by checked reading (probe)*

Interface Probe MARKER (FT.)	CALIBRATED READING (FT.) <i>Stainless Steel Tape</i>	MARKER (FT.)	CALIBRATED READING (FT.)						
0	NA	105		205		305		405	
5	4.99	110		210		310		410	
10	9.99	115		215		315		415	
15	14.99	120		220		320		420	
20	19.99	125		225		325		425	
25	24.99	130		230		330		430	
30	29.99	135		235		335		435	
35	34.99	140		240		340		440	
40	39.99	145		245		345		445	
45	—	150		250		350		450	
50	—	155		255		355		455	
55	—	160		260		360		460	
60	—	165		265		365		465	
65		170		270		370		470	
70		175		275		375		475	
75		180		280		380		480	
80		185		285		385		485	
85		190		290		390		490	
90		195		295		395		495	
95		200		300		400		500	
100									

NOTE: ACCEPTANCE IS  $\pm 0.1$  FEET

*Calibrated to 40 ft.*

SIGNED *Jim M. Hasler*



# WATER LEVEL INDICATOR CALIBRATION

EQUIPMENT NUMBER 06-01535  
EQUIPMENT NAME ORS Interface Probe  
DATE 091290 DATE LAST CALIBRATED 091290  
CALIBRATION PERIOD Calibrated before and after field use  
After field use time = 1550.

Interface Probe MARKER (FT.)	CALIBRATED READING (FT.) <small>Stainless Steel</small>	MARKER (FT.)	CALIBRATED READING (FT.)						
0	NA	105		205		305		405	
5	4.99	110		210		310		410	
10	9.99	115		215		315		415	
15	14.99	120		220		320		420	
20	19.99	125		225		325		425	
25	24.99	130		230		330		430	
30	29.99	135		235		335		435	
35	34.99	140		240		340		440	
40	39.99	145		245		345		445	
45	—	150		250		350		450	
50		155		255		355		455	
55		160		260		360		460	
60		165		265		365		465	
65		170		270		370		470	
70		175		275		375		475	
75		180		280		380		480	
80		185		285		385		485	
85		190		290		390		490	
90		195		295		395		495	
95		200		300		400		500	
100									

NOTE: ACCEPTANCE IS  $\pm 0.1$  FEET

Calibrated to 40 ft.

SIGNED Ann M. Howka

**APPENDIX C**  
**SAMPLE CHAIN-OF CUSTODY DOCUMENTATION**



CHAIN-OF-CUSTODY RECORD

R/A Control No. 118911

C/C Control No. 125953

PROJECT NAME/NUMBER COE-Holloman AFB/301251.02.06

LAB DESTINATION ITAS-Knoxville

SAMPLE TEAM MEMBERS A. Houska, M. Lyon

CARRIER/WAYBILL NO. Federal Express 5346357796

Table with 7 columns: Sample Number, Sample Location and Description, Date and Time Collected, Sample Type, Container Type, Condition on Receipt (Name and Date), Disposal Record No. Handwritten entries include MW-060790, S-040790, MW-040790, MW-120790, MW-020790.

Special Instructions: IF sample is received damaged, or seal is broken, contact project manager immediately.

Possible Sample Hazards: Biological

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Ann M Houska, IT Corp, 071890, 1601

Received By: Beth Wager ITAS, 7-19-90, 0900

3. Relinquished By: \_\_\_\_\_

Received by: \_\_\_\_\_

2. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_

4. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_



**INTERNATIONAL  
TECHNOLOGY  
CORPORATION**

**REQUEST FOR ANALYSIS**

R/A Control No. 118911  
C/C Control No. 125953

PROJECT NAME COE-Holloman AFB DATE SAMPLES SHIPPED 07/ 18 /90  
 PROJECT NUMBER 301251.02.06 LAB DESTINATION ITAS-Knoxville  
 PROJECT MANAGER Dann Meyer LABORATORY CONTACT Mary Tyler  
 BILL TO International Technology Corporation SEND LAB REPORT TO International Technology Corp.  
5301 Central Ave, NE, Suite 700 Albuquerque, NM 87108  
 PURCHASE ORDER NO. \_\_\_\_\_ DATE REPORT REQUIRED 08/17/90  
 PROJECT CONTACT Dann Meyer  
 PROJECT CONTACT PHONE NO. (505)262-8800

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW-060790	Ground water	1 x <sup>500</sup> <del>250</del> ml	Ice, H <sub>2</sub> SO <sub>4</sub>	TOC x 4 replicates	See attached sheets
S-040790	↓	↓ ↓	↓ ↓	↓ ↓	for specific analytical
MW-040790	↓	↓ ↓	↓ ↓	↓ ↓	requirements.
MW-120790	↓	↓ ↓	↓ ↓	↓ ↓	
MW-020790	↓	↓ ↓	↓ ↓	↓ ↓	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Project Manager.)  
 Normal  Rush \_\_\_\_\_ (Subject to rush surcharge)

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)  
 Nonhazard \_\_\_\_\_ Flammable \_\_\_\_\_ Skin Irritant \_\_\_\_\_ Highly Toxic \_\_\_\_\_ Other Biological  
 (Please Specify)

SAMPLE DISPOSAL (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, and disposal.)  
 Return to Client \_\_\_\_\_ Disposal by Lab

FOR LAB USE ONLY

Received By Beth Hager

Date/Time 7-19-90 0900



**INTERNATIONAL  
TECHNOLOGY  
CORPORATION**

**CHAIN-OF-CUSTODY RECORD**

R/A Control No. 118910

C/C Control No. 125954

PROJECT NAME/NUMBER COE-Holloman AFB/301251.02.06

LAB DESTINATION ITAS-Knoxville

SAMPLE TEAM MEMBERS A. Houska, M. Lyon

CARRIER/WAYBILL NO. Federal Express 5346357811

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW-030790	Monitor well MW-3	071890; 1600	Groundwater	Amber glass	Contact BMW Cooler: 7-20-90	
MW-080790	MW-8	071990; 0800				
MW-050790	MW-5	071990; 0945				
MW-070790	MW-7	071990; 1045				
MW-010790	MW-1	071990; 1415				
S-020790	S-2	071990; 1200				

Special Instructions: If sample is received damaged, or seal is broken, contact project manager immediately.

Possible Sample Hazards: Biological

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Ann M. Houska, IT Corp; 071990; 1540

3. Relinquished By: \_\_\_\_\_

Received By: Keith Hager, ITAS, 7-20-90, 0900

Received by: \_\_\_\_\_

2. Relinquished By: \_\_\_\_\_

4. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_

Received By: \_\_\_\_\_



**INTERNATIONAL  
TECHNOLOGY  
CORPORATION**

**REQUEST FOR ANALYSIS**

R/A Control No. 118910  
C/C Control No. 125954

PROJECT NAME COE-Holloman AFB DATE SAMPLES SHIPPED 07/19/90  
 PROJECT NUMBER 301251.02.06 LAB DESTINATION ITAS-Knoxville  
 PROJECT MANAGER Dann Meyer LABORATORY CONTACT Mary Tyler  
 BILL TO International Technology Corporation SEND LAB REPORT TO International Technology Corp.  
5301 Central Ave, NE, Suite 700 Albuquerque, NM 87108  
 PURCHASE ORDER NO. \_\_\_\_\_ DATE REPORT REQUIRED 08/17/90  
 PROJECT CONTACT Dann Meyer  
 PROJECT-CONTACT PHONE NO. (505)262-8800

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW-030790	Groundwater	1 x <sup>500 ml</sup> 250 ml	Ice; H <sub>2</sub> SO <sub>4</sub>	TOC x 4 replicates	See attached sheets
MW-080790	↓	↓	↓	↓	for specific analytical
MW-050790	↓	↓	↓	↓	requirements.
MW-070790	↓	↓	↓	↓	
MW-010790	↓	↓	↓	↓	
S-020790	↓	↓	↓	↓	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Project Manager.)  
 Normal  Rush \_\_\_\_\_ (Subject to rush surcharge)

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)  
 Nonhazard \_\_\_\_\_ Flammable \_\_\_\_\_ Skin Irritant \_\_\_\_\_ Highly Toxic \_\_\_\_\_ Other Biological  
 (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, and disposal.)  
 Return to Client \_\_\_\_\_ Disposal by Lab

FOR LAB USE ONLY  
 Received By Ben Hager Date/Time 7-20-90 0930

WHITE - Original, to accompany samples  
 YELLOW - Field copy

IT-10-110

9007234



INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 118913

C/C Control No. 146140

PROJECT NAME/NUMBER COE- Holloman AFB / 301251.02.06.

LAB DESTINATION Radian Corp.

SAMPLE TEAM MEMBERS A. Hruska, M. Lyon

CARRIER/WAYBILL NO. Fed. Express 4330214184

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW-110790B ✓	Monitor Well MW-11	072090; 0700	Groundwater	Amber glass w- septa cap		
MW-060790B ✓	MW-6	; 1030	↓	↓	↓	
S-040790B ✓	am # S-4	; 1200	↓	↓	↓	
MW-040790B ✓	MW-4	; 1330	↓	↓	↓	
MW-120790B ✓	MW-12	; 1430	↓	↓	↓	
MW-020790B ✓	MW-2	; 1500	↓	↓	↓	

Special Instructions: If sample is received damaged, or seal is broken, contact project manager immediately.

Possible Sample Hazards: Biological

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Jan M. Hruska, IT Corp, 072390; 1430

3. Relinquished By: \_\_\_\_\_

Received By: Kelly Conise, Radian, 7-24-90 0900  
Rec'd 3°C

Received by: \_\_\_\_\_

2. Relinquished By: \_\_\_\_\_

4. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_

Received By: \_\_\_\_\_



# REQUEST FOR ANALYSIS

Contract No. 23893C/C Control No. 146140

PROJECT NAME COE-Holloman AFB  
 PROJECT NUMBER 301251-02-06  
 PROJECT MANAGER Dann Meyer  
 BILL TO International Technology Corporation  
5301 Central Ave, NE, Suite 700  
Albuquerque, NM 87108  
 PURCHASE ORDER NO. NA

DATE SAMPLES SHIPPED 072390  
 LAB DESTINATION Radian Corp.  
 LABORATORY CONTACT Karen Achord  
 SEND LAB REPORT TO International <sup>at</sup> Technology  
5301 Central Ave, NE Suite 700 Corp.  
Albuquerque, NM 87108  
 DATE REPORT REQUIRED 08/17/90  
 PROJECT CONTACT Dann Meyer  
 PROJECT CONTACT PHONE NO. (505) 262-8500

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW-110790B	Ground Water	1 X 250 ml	ICE	POX x 1	See attached sheet for specific analytical requirements.
MW-060790B	✓	4 X 250 ml	↓	POX x 4 replicates	
S-040790B	✓	↓	↓	↓	
MW-040790B	✓	↓	↓	↓	
MW-120790B	✓	↓	↓	↓	
MW-020790B	✓	↓	↓	↓	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Project Manager.)  
 Normal  Rush  (Subject to rush surcharge)

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)  
 Nonhazard  Flammable  Skin Irritant  Highly Toxic  Other Biological (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, and disposal.)  
 Return to Client  Disposal by Lab

FOR LAB USE ONLY  
 Received By Polly Carose Date/Time 7/24/90  
0900

WHITE - Original, to accompany samples  
 YELLOW - Field copy



**CHAIN-OF-CUSTODY RECORD**

R/A Control No. 118690

C/C Control No. 161298

PROJECT NAME/NUMBER COE-Holloman AFB/301251.02.06

LAB DESTINATION <sup>Out</sup> ~~TIAS - Cincinnati~~ Radian Corp.

SAMPLE TEAM MEMBERS A. Houska, M. Lyon

CARRIER/WAYBILL NO. Federal Express 5346357785  
4330214184

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW-030790	Monitor well MW-3 ✓	071890; 1600	groundwater	Amber glass		
MW-080790	MW-8 ✓	071990; 0800		w/septa cap		
MW-090790	MW-5 ✓	071990; 0945				
MW-070790	MW-7 ✓	071990; 1645				
MW-010790	MW-1 ✓	071990; 1415				
S-020790	↓ S-2 ✓	071990; 1200	↓	↓		

Special Instructions: If sample is received damaged, or seal is broken, contact project manager immediately.

Possible Sample Hazards: Biological

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Ann M Houska, IT Corp; 071990; 1430  
<sub>Out</sub>

3. Relinquished By: \_\_\_\_\_

Received By: Polly Gorse, Radian, 7-24-90 0900  
Rec'd 3°C

Received by: \_\_\_\_\_

2. Relinquished By: \_\_\_\_\_

4. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_

Received By: \_\_\_\_\_





CHAIN-OF-CUSTODY RECORD

R/A Control No. 111477

C/C Control No. 146009

PROJECT NAME/NUMBER HAFB-COE / 301<sup>04</sup>~~137~~.02.06

LAB DESTINATION ITAS - Knoxville

SAMPLE TEAM MEMBERS A. Hruska, J. Saavedra

CARRIER/WAYBILL NO. Fed X 4330214254

Table with 7 columns: Sample Number, Sample Location and Description, Date and Time Collected, Sample Type, Container Type, Condition on Receipt (Name and Date), Disposal Record No. Rows include MW-060990, S-040990, MW-040990, MW-120990, MW-020990.

Special Instructions: Contact Project Manager immediately if samples arrive damaged.

Possible Sample Hazards: Biological

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Ann M. Hruska; IT; 091390; 1600

3. Relinquished By: \_\_\_\_\_

Received By: J. Saavedra 11/14/90 0900

Received by: \_\_\_\_\_

2. Relinquished By: \_\_\_\_\_

4. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_

Received By: \_\_\_\_\_





CHAIN-OF-CUSTODY RECORD

R/A Control No. 118701

C/C Control No. 145486

OCT 12 1990

IT CORP. - ALBUQUERQUE

PROJECT NAME/NUMBER COE-HAFB/301251.02.06

LAB DESTINATION ITAS - Knoxville

SAMPLE TEAM MEMBERS A. Huska / J. Saavedra

CARRIER/WAYBILL NO. Fed X 4330214210

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW-030990	Monitor Well MW-3	091390; 1825	Ground Water	Amber Glass	rec'd OK 4°C JSA 9/15/90	
MW-080990	↓ ↓ MW-8	091390; 1900	↓	↓	↓	
MW-050990	↓ ↓ MW-5	091490; 0840	↓	↓	↓	
MW-070990	↓ ↓ MW-7	091490; 1040	↓	↓	↓	
MW-010990	↓ ↓ MW-1	091490; 1230	↓	↓	↓	
S-020990	↓ ↓ S-2	091490; 1400	↓	↓	↓	

Special Instructions: Contact project manager immediately if samples arrive damaged.

Possible Sample Hazards: Biological

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: A. Huska, IT, 091490; 1900

3. Relinquished By: \_\_\_\_\_

Received By: J. Saavedra ITASK 9/15/90 0900

Received by: \_\_\_\_\_

2. Relinquished By: \_\_\_\_\_

4. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_

Received By: \_\_\_\_\_



**INTERNATIONAL  
TECHNOLOGY  
CORPORATION**

Wastewater Treatment Area

**REQUEST FOR ANALYSIS**

R/A Control No. 111474

C/C Control No. 114681

09/13/90

PROJECT NAME COE-Holloman AFB

DATE SAMPLES SHIPPED

PROJECT NUMBER 301251.02.06.

LAB DESTINATION

USACE - Missouri River Div. Lab

PROJECT MANAGER Dann Meyer

LABORATORY CONTACT

Dr. Joe Sulsky

BILL TO International Technology Corp.

SEND LAB REPORT TO

International Technology Corp.

5301 Central Ave, NE Suite 700

5301 Central Ave, NE Suite 700

ABQ, NM 87108

ABQ, NM 87108

PURCHASE ORDER NO.                     

DATE REPORT REQUIRED

10/3/90

PROJECT CONTACT

Dann Meyer

PROJECT CONTACT PHONE NO. (505) 262-8800

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
QMW-040990	Ground Water	250 ml	ice ; H <sub>2</sub> SO <sub>4</sub>	TOC x 4 replicates	See attached sheets for specific analytical requirements
QMW-020990	↓	↓	↓ / ↓	↓ OH	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Project Manager.)

Normal

Rush  (Subject to rush surcharge)

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)

Nonhazard

Flammable

Skin Irritant

Highly Toxic

Other Biological  
(Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, and disposal.)

Return to Client

Disposal by Lab

FOR LAB USE ONLY

Received By \_\_\_\_\_

Date/Time \_\_\_\_\_

WHITE - Original, to accompany samples

YELLOW - Field copy

**APPENDIX D**  
**CERTIFICATES OF ANALYSES**



INTERNATIONAL  
TECHNOLOGY  
CORPORATION

# ANALYTICAL SERVICES

## CERTIFICATE OF ANALYSIS

IT Corporation  
5301 Central Avenue, N.E., Suite 700  
Albuquerque, NM 87108  
ATTN: Dann Meyer *DL 9/17/90*

September 13, 1990

Job Number: ITNA 46211

P.O. Number: 301251.02.06

This is the Certificate of Analysis for the following samples:

Client Project ID:	Holloman AFB
Date Received by Lab:	07/19 and 07/20/90
Number of Samples:	Eleven (11)
Sample Type:	Water

### I. Introduction

On 07/19 and 07/20/90, eleven (11) water samples arrived at the ITAS-Knoxville, Tennessee, laboratory from the IT-Albuquerque, New Mexico, office in support of the Holloman AFB project. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

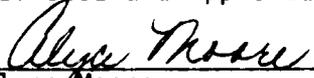
### II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that all data are blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.

One cooler received 07/19/90 had an internal temperature of 12-13°C. The client was informed; replacement samples were collected and sent 07/20/90. The original samples were disposed of; the replacement samples' identification ends with the letter "B."

The samples were analyzed for total organic carbon (TOC) at Galbraith Laboratories, Knoxville, Tennessee. The TOCs were to have been analyzed in quadruplicate: Since this instruction was overlooked at the time of analysis, these samples will be recollected and reanalyzed. The data are submitted at the request of the client.

Reviewed and Approved:

  
Alyce Moore  
Laboratory Manager

American Council of Independent Laboratories  
International Association of Environmental Testing Laboratories  
American Association for Laboratory Accreditation

HARRY W. GALBRAITH, PH.D.  
CHAIRMAN OF THE BOARD

KENNETH S. WOODS  
PRESIDENT

GAIL R. HUTCHENS  
EXECUTIVE VICE-PRESIDENT

VELMA M. RUSSELL  
SECRETARY-TREASURER

# GALBRAITH

*Laboratories, Inc.*

## QUANTITATIVE MICROANALYSES

ORGANIC - INORGANIC

615/546-1335

P.O. BOX 51610  
KNOXVILLE, TN 37950-1610

2323 SYCAMORE DR.  
KNOXVILLE, TN 37921-1750

Ms. Kim Laisy  
IT Corporation  
5815 Middlebrook Pike  
Knoxville, Tennessee 37921

August 16, 1990

Received: Aug. 2nd  
PO#: 531376;ITNA46211

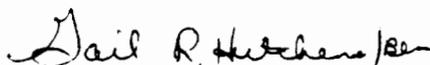
Dear Ms. Laisy:

Analysis of your compounds gave the following results:

Your #,	Our #,	mg/liter Total Organic Carbon,	Date Prepped & Analyzed,
MW-010790	LL3906	M-8858 <1	8/3/90
MW-020790B	LL3907	M-8859 5	8/3/90
MW-030790	LL3908	M-8860 7	8/3/90
MW-040790B	LL3909	M-8861 6	8/3/90
MW-050790	LL3910	M-8862 6	8/3/90
MW-060790B	LL3911	M-8863 4	8/3/90
MW-070790	LL3912	M-8864 4	8/3/90
MW-080790	LL3913	M-8865 4	8/3/90
MW-120790B	LL3914	M-8866 6	8/3/90
S-020790	LL3915	M-8867 4	8/3/90
S-040790B	LL3916	M-8868 1	8/3/90

Sincerely yours,

**GALBRAITH LABORATORIES, INC.**



Gail R. Hutchens,  
Exec. Vice-President

GRH:ew

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# ANALYTICAL SERVICES

## CERTIFICATE OF ANALYSIS

International Technology Corporation  
5301 Central Ave. NE Suite 700  
Albuquerque, NM 87108  
Attn: Dann Meyer *DM 10/8/90*

October 4, 1990

Job Number: ITNA 46662

P.O. Number: 301251.02.06

This is the Certificate of Analysis for the following samples:

Client Project ID: COE-Holloman AFB  
Date Received by Lab: 09/14/90  
Number of Samples: Five (5)  
Sample Type: Water

### I. Introduction

On 09/14/90, five (5) water samples arrived at the ITAS-Knoxville, Tennessee laboratory from International Technology of Albuquerque, New Mexico in support of the COE Holloman AFB project. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

### II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that all data are blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.

The samples were analyzed for total organic carbon (TOC) by chemical wet oxidation/infrared detection using EPA method 415.1.

### III. Quality Control

The samples were analyzed for TOC on 09/18, 09/24, 09/25 and 09/27/90. No problems were encountered.

Reviewed and Approved:

*Alyce Moore*  
Alyce Moore  
Laboratory Manager

American Council of Independent Laboratories  
International Association of Environmental Testing Laboratories  
American Association for Laboratory Accreditation

International Technology Corporation  
October 4, 1990

IT ANALYTICAL SERVICES  
5815 MIDDLEBROOK PIKE  
KNOXVILLE, TN

Client Project ID: COE-Holloman AFB

Job Number: ITNA 46662

TOTAL ORGANIC CARBON ANALYSIS

Results in mg/liter (ppm)

Sample Matrix: Water

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Result</u>
MW-060990	LL7910	5
S-040990	LL7911	2
S-040990	LL7911	1
S-040990	LL7911	2
S-040990	LL7911	2
MW-040990	LL7912	5
MW-120990	LL7913	6
MW-020990	LL7914	4
Method Blank	B0322	1 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Analyzed: 09/18 to 09/27/90

This page is left intentionally blank.



# ANALYTICAL SERVICES

RECEIVED

OCT 05 1990

IT CORP. - ALBUQUERQUE

## CERTIFICATE OF ANALYSIS

International Technology Corporation  
5301 Central Ave. NE Suite 700  
Albuquerque, NM 87108  
Attn: Dann Meyer *SM 10/8/90*

October 4, 1990

Job Number: ITNA 46683

P.O. Number: 301251.02.06

This is the Certificate of Analysis for the following samples:

Client Project ID: COE-Holloman AFB  
Date Received by Lab: 09/15/90  
Number of Samples: Six (6)  
Sample Type: Water

### I. Introduction

On 09/15/90, six (6) water samples arrived at the ITAS-Knoxville, Tennessee laboratory from International Technology of Albuquerque, New Mexico in support of the COE Holloman AFB project. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

### II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that all data are blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.

The samples were analyzed for total organic carbon (TOC) by chemical wet oxidation/infrared detection using EPA method 415.1.

### III. Quality Control

The samples were analyzed for TOC on 09/25, 09/26 and 09/27/90. No problems were encountered.

Reviewed and Approved:

  
Alyce Moore  
Laboratory Manager

American Council of Independent Laboratories  
International Association of Environmental Testing Laboratories  
American Association for Laboratory Accreditation

International Technology Corporation  
October 4, 1990

IT ANALYTICAL SERVICES  
5815 MIDDLEBROOK PIKE  
KNOXVILLE, TN

Client Project ID: COE-Holloman AFB

Job Number: ITNA 46683

TOTAL ORGANIC CARBON ANALYSIS

Results in mg/liter (ppm)

Sample Matrix: Water

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Result</u>
S-020990	LL8160	3
S-020990	LL8160	3
S-020990	LL8160	4
S-020990	LL8160	3
MW-010990	LL8161	1 U
MW-030990	LL8162	7
MW-050990	LL8163	6
MW-070990	LL8164	3
MW-070990	LL8164	4
MW-070990	LL8164	4
MW-070990	LL8164	4
MW-080990	LL8165	4
Method Blank	B0322	1 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Analyzed: 09/25 to 09/27/90

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Analytical Report  
08/16/90

IT Corp

IT Corporation  
5301 Central Ave NE, Suite 700  
Albuquerque, NM 87108

Dann Meyer *will 8/20/90*

Customer Work Identification Holloman AFB  
Purchase Order Number 701017

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services  
8501 Mo-Pac Boulevard  
P. O. Box 201088  
Austin, TX 78720-1088

512/454-4797

Client Services Coordinator: KLACHORD

Certified by: *Linda Carter*

Previously Reported on 08/03/90.

IT Corp  
Radian Work Order: 90-07-234

Method/Analyte	Sample Identifications					
	MW-010790		MW-020790B		MW-030790	
Matrix	01 water		02 water		03 water	
	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
POX by SW9021 Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
POX by SW9021 Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
POX by SW9021 Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
POX by SW9021 Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

IT Corp  
Radian Work Order: 90-07-234

Method/Analyte	Sample Identifications					
	MW-040790B		MW-050790		MW-060790B	
Matrix	04		05		06	
	water		water		water	

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
PCIX by SW9021						
Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
PCIX by SW9021						
Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
PCIX by SW9021						
Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
PCIX by SW9021						
Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

IT Corp  
Radian Work Order: 90-07-234

Method/Analyte	Sample Identifications					
	MW-070790		MW-080790		MW-110790B	
Matrix	07 water		08 water		09 water	
	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
PDX by SW9021 Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
PDX by SW9021 Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20		
PDX by SW9021 Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20		
PDX by SW9021 Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20		

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

IT Corp  
Radian Work Order: 90-07-234

Method/Analyte	Sample Identifications					
	MW-1207908		S-020790		S-0407908	
Matrix	10 water		11 water		12 water	
	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
POX by SW9021						
Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
POX by SW9021						
Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
POX by SW9021						
Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20
POX by SW9021						
Purgeable organic halides	ND	mg/L 0.20	ND	mg/L 0.20	ND	mg/L 0.20

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.

IT Corp  
Radian Work Order: 90-07-234

Method/Analyte		Sample Identifications	
		Method Blank	
		13	
Matrix		water	

	Result	Det. Limit		
PDX by SW9021				
Purgeable organic halides	ND	mg/L	0.20	

ND Not detected at specified detection limit

(1) For a detailed description of flags and technical terms in this report refer to the glossary.



IT Corp  
Radian Work Order: 90-07-234

Sample Identifications and Dates							
Sample ID	MW-070790	MW-080790	MW-110790B	MW-120790B	S-020790	S-040790B	
Date Sampled	07/19/90	07/19/90	07/20/90	07/20/90	07/19/90	07/20/90	
Date Received	07/24/90	07/24/90	07/24/90	07/24/90	07/24/90	07/24/90	
Matrix	water	water	water	water	water	water	
	07	08	09	10	11	12	
POX by SW9021							
Prepared	07/26/90	07/25/90	07/25/90	07/26/90	07/26/90	07/31/90	
Analyzed	07/26/90	07/25/90	07/25/90	07/26/90	07/26/90	07/31/90	
Analyst	MH	MH	MH	MH	MH	MH	
File ID							
Blank ID							
Instrument	DX-20	DX-20	DX-20	DX-20	DX-20	DX-20	
Report as	received	received	received	received	received	received	
POX by SW9021							
Prepared	07/26/90	07/25/90		07/26/90	07/26/90	07/31/90	
Analyzed	07/26/90	07/25/90		07/26/90	07/26/90	07/31/90	
Analyst	MH	MH		MH	MH	MH	
File ID							
Blank ID							
Instrument	DX-20	DX-20		DX-20	DX-20	DX-20	
Report as	received	received		received	received	received	
POX by SW9021							
Prepared	07/26/90	07/25/90		07/26/90	07/26/90	07/31/90	
Analyzed	07/26/90	07/25/90		07/26/90	07/26/90	07/31/90	
Analyst	MH	MH		MH	MH	MH	
File ID							
Blank ID							
Instrument	DX-20	DX-20		DX-20	DX-20	DX-20	
Report as	received	received		received	received	received	
POX by SW9021							
Prepared	07/26/90	07/25/90		07/26/90	07/26/90	07/31/90	
Analyzed	07/26/90	07/25/90		07/26/90	07/26/90	07/31/90	
Analyst	MH	MH		MH	MH	MH	
File ID							
Blank ID							
Instrument	DX-20	DX-20		DX-20	DX-20	DX-20	
Report as	received	received		received	received	received	

IT Corp  
Radian Work Order: 90-07-234

Sample Identifications and Dates	
Sample ID	Method Blank
Date Sampled	
Date Received	07/24/90
Matrix	water
	13

POX by SW9021						
Prepared	07/31/90					
Analyzed	07/31/90					
Analyst	MH					
File ID						
Blank ID						
Instrument	DX-20					
Report as	received					

20-01  
13-04  
07-04  
10-04  
09-04  
05-04  
04-04  
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03-01  
02-01  
01-01

Appendix A  
Comments, Notes and Definitions

IT Corp  
Radian Work Order: 90-07-234

**ND ALL METHODS EXCEPT CLP**

This flag is used to denote analytes which are not detected at or above the specified detection limit.

**EXPLANATION**

The value to the right of the < symbol is the method specified detection limit for the analyte.

IT Corp  
Radian Work Order: 90-07-234

**TERMS USED IN THIS REPORT:**

**Analyte** - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

**Compound** - See Analyte.

**Detection Limit** - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

**EPA Method** - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

**Factor** - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

**Matrix** - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

**Radian Work Order** - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion);liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million);liquids/water
mg/kg	milligrams per kilogram (parts per million);soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt

**RADIAN ANALYTICAL SERVICES  
QUALITY CONTROL SUMMARY  
Form II**

Client ID: IT Corp  
Workorder: 9007234

Compiled: 08/07/90

By: SJS

Submitted:

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Units:mg/L

Parameter	Run Date	Initial Calibration			Continuing Calibration				
		True	Found	%R	True	Found	%R	Found	%R
Purgeable organic halides (samples 01-04,08)	07/25/90	3.963	3.58	90.3	3.963	3.59	90.6	3.6	90.8
					3.963	3.61	91.1	3.59	90.6
Purgeable organic halides (samples 06-07,10-11)	07/26/90	3.963	3.473	87.6	3.963	3.493	88.1	3.50	88.3
					3.963	3.47	87.6		
Purgeable organic halides (samples 05,09,12)	07/31/90	3.963	3.50	88.3	3.963	3.49	88.1	3.50	88.3

Comments Control Limits: 80%-120%

The rubber stopper in the bottle containing sample 09 was broken.

**RADIAN ANALYTICAL SERVICES  
QUALITY CONTROL SUMMARY  
Form V-2**

Client ID: IT Corp  
Workorder: 9007234

**CONTROL LIMITS**  
 %R: 75% - 125%  
 RPD: 20% Relative Percent Difference of MS/MSD %R

Compiled: 08/07/90  
By: SJS  
Submitted:

Matrix: water                      MATRIX SPIKE (MS/MSD) MATRIX SPIKE DUPLICATE                      Units: mg/L

Parameter	Frac- tion	Sample Result	Conc. MS(SA)	Conc. MS	MS %R	Conc. MSD(SA)	Conc. MSD	MSD %R	RPD
Purgeable organic halides	02D	<0.20	3.963	3.52	88.8	3.963	3.50	88.3	0.6
Purgeable organic halides	08D	<0.20	3.963	3.48	87.8	3.963	3.50	88.3	0.6
Purgeable organic halides	07D	<0.20	3.963	3.467	87.5	3.963	3.453	87.1	0.5
Purgeable organic halides	11D	<0.20	3.963	3.47	87.6	3.963	3.44	86.8	0.9
Purgeable organic halides	12D	<0.20	3.963	3.44	86.8	3.963	3.45	87.1	0.3

$\%R = ((\text{Conc MS} - \text{SR}) / \text{SA}) * 100$        $\text{RPD} = 100 * |(\text{MS } \%R - \text{MSD } \%R) / (\text{MS } \%R + \text{MSD } \%R)| / 2$

SA: Spike Added      (Q): %R or RPD outside control limits.

(\*): Value less than 5 x I.D.L.      (NS): Spike added less than 4 x SR, considered insignificant.

**Comments:**

**RADIAN ANALYTICAL SERVICES  
QUALITY CONTROL SUMMARY  
Form VI**

Client ID: IT Corp  
Workorder: 9007234  
Matrix: water

Duplicate Type: analytical

Compiled: 08/07/90  
By: SJS  
Submitted:  
Units: mg/L

**DUPLICATES**

Parameter	Sample Number	Control Limit	Sample	Duplicate	(1) RPD	(2) Flag
Purgeable organic halides	02D	<=20%	<0.20	<0.20		
Purgeable organic halides	08D	<=20%	<0.20	<0.20		
Purgeable organic halides	07D	<=20%	<0.20	<0.20		
Purgeable organic halides	11D	<=20%	<0.20	<0.20		
Purgeable organic halides	12D	<=20%	<0.20	<0.20		

(\*): Indicates value is < 5 x instrument detection limit.  
(Q): RPD outside control limit.  
(1):  $RPD = 100 * |(S - D) / (S + D)| / 2$   
(2): "NC" Not calculable due to a value < 5 x IDL.

**Comments:**

**APPENDIX E**

**A - E DAILY QUALITY CONTROL REPORTS**

Date: 07/17/90Sheet No.: 019Page 1 of 1A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICOTask/site No.: 6<sup>th</sup> Sampling Round: RCRA Detection Monitoring for Semi-Annual Parameters at Wastewater Treatment Lagoons.Weather: Hot, humid, clear skies. Low temperature ~ 65°F, high ~ 95°F. Storm threatening to west in late afternoon.Work Performed: At 10 monitor wells: 1) Monitor background and wellbore headspace with HNu Photoionization Detector for presence of organic vapors. 2) Measure depth to fluids and total well depths using an ORS interface probe - No light or dense immisible phases detected in any monitor well.Sampling Performed: NAProblems and Corrective Actions: Lock on S-4 required cutting.It required 45 minutes for the sampling team to be cleared through HAFB gate due to no available contacts in the Environmental Group.Quality Control Activities Initiated: Field equipment was calibrated before and after use. One POX trip blank (laboratory prepared) was maintained on ice under Cham. of Custody. All down-well equipment was deconned between monitor wells.Signature: Ann M. Houska, IT Corp-ABQ.

Date: 07/13/90Sheet No.: 020

Page 1 of 2

A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICOTask/Site No.: 6<sup>th</sup> Sampling Round: RCRA Detection Monitoring for Semi-Annual Parameters at Wastewater Treatment Lagoons.Weather: Hot, humid, clear skies. Low temperature ~66° F, high ~96° F.Work Performed: Equipment calibration; Purge + Sample 5 monitor wells; Ship samples to respective analytical laboratories via Federal Express. Sample collected at MW-3 held until next day shipment.

Sampling Performed: Sampling conducted at MW-6, S-4, MW-4 (including environmental duplicate and QA for COE), MW-2 (including QA for COE), and MW-3. Sampling parameters included POX and TOC, and field parameters (pH, spec. cond + temp) collected/measured in 4 replicates at all monitor wells. Additional parameters included PCB/Pest collected at all wells per COE's request.

Problems and Corrective Actions: request.

A new field procedure was implemented during this round; purge water and decon rinseate were containerized in 55-gallon drums located near each well. Water contained in the drums was discharged to the ground prior to purging the well in accordance with personal conversation with Sharon Moore. S-4 and MW-1 did not have drums + the purge water was discharged to the ground (per S. Moore). Most of the drums did not have caps.

Quality Control Activities Initiated: Dedicated sampling equipment used at all monitor wells. Field equipment was calibrated daily before and after field use. One POX trip blank, provided by ITAS-Cinc. was present in field + returned

~~Signature~~(Continued on page 2 of 2)

Date: 07/18/90

Sheet No.: 021

Page 2 of 2

A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICO

Task/Site No.: See page 1 of 2

Weather: \_\_\_\_\_

Work Performed: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Sampling Performed: \_\_\_\_\_

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Problems and Corrective Actions: Sample preservative added in field, (H<sub>2</sub>SO<sub>4</sub> for TOC) tested pH with litmus paper (for less than 2.0) and taped litmus paper to sample container.

\_\_\_\_\_

\_\_\_\_\_

Quality Control Activities Initiated: along with other POX samples. An environmental duplicate was collected at MW-4. Two QA-COE samples were collected for analysis by COE-Missouri River Division Lab at MW-4 and MW-2. All samples were maintained under Signature: Anna Mitrowska, IT-ABQ. Chain of Custody Procedure

Date: 07/19/90Sheet No.: 022

Page 1 of 2

A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICO

Task/Site No.: 6<sup>th</sup> Sampling Round: RCRA Detection Monitoring for Semi-Annual Parameters at Wastewater Treatment Lagoons.

Weather: Hot, humid, clear skies, low temperatures ~ 65°F, high temperatures ~ 97°F. Thunderstorms threatening to northeast in late afternoon.

Work Performed: Purge and sample 5 monitor wells; ship samples to respective analytical laboratories via Federal Express. POX samples held until analytical laboratory determined (see below). Arrangements made for repeat sampling (see below).

Sampling Performed: Sampling conducted at MW-1, MW-5, MW-7, MW-8 and S-4. Sampled parameters included POX and TOC and field parameters (pH, spec. cond. + temp) collected/measured in 4 replicates at all monitor wells. Additional parameters included PCB/Pest collected at all wells per COE's request.

Problems and Corrective Actions: IT's sampling team was notified that some of the samples sent out on 07/18/90 arrived warm at the analytical laboratories. The sampling team was instructed by IT's Project Manager to resample for all parameters (including enviro. dup. + QA-COE) collected and shipped on 07/18/90 and arrangements were made accordingly. Corrective actions include future sample

Quality Control Activities Initiated: Dedicated sampling equipment used at all wells. Field equipment was calibrated daily before and after use. All samples were maintained under Chain of Custody procedures.

~~Signature:~~ (continued on page 2 of 2)

Date: 07/19/90

Sheet No.: 023

Page 2 of 2

A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICO

Task/Site No.: See page 1 of 2

Weather: \_\_\_\_\_

Work Performed: \_\_\_\_\_

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Sampling Performed: \_\_\_\_\_

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Problems and Corrective Actions: packaging with extra ice to compensate for heat and not using small coolers. Sharon Moore was advised of this situation.

IT's analytical laboratory (Cincinnati) which was designated to conduct the POX analysis notified IT's Project Manager that they could not run this analysis due to equipment problems. POX samples collected on 07/19/90 were held by sampling team until a laboratory could be designated. - local Quality Control Activities Initiated: replaced on S-4 (provided by HAFB).

Signature: Ann M Huska, IT-ABQ

Date: 07/20/90Sheet No.: 024

Page 1 of 1

A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICO

Task/Site No.: 6<sup>th</sup> Sampling Round: RCRA Detection Monitoring for Semi-Annual parameters at Wastewater Treatment Lagoons.

Weather: hot, humid, clear skies, Low temperature ~ 65°F, high ~ 98°F. Thunderstorms threatening in afternoon.

Work Performed: Resampling of parameters shipped to analytical labs on 07/18/90. Fluid-levels remeasured at 4 wells effected prior to purging and sampling.

Sampling Performed: Resampling conducted at MW-6, S-4, MW-4 (including an environmental duplicate and QA-COE sample) and MW-2 (including a QA-COE sample). Parameters included POX, TDC (4 replicate) and Pest/PCB at all monitor wells. Field parameter measurements also in 4 replicates.

Problems and Corrective Actions: \_\_\_\_\_

MW-2's lock required cutting. It was replaced with a lock provided by HAFB.

Samples collected 07/20/90 (and POX from 07/19/90) held until Monday shipment.

Dedicated bailers and well keys left at HAFB at Sharon Moores request.

Quality Control Activities Initiated: One POX trip blank was prepared by the sampling team prior to going into field. Dedicated sampling equipment was used at all monitor wells. Field equipment was calibrated daily

Signature: Ann M. Howska, IT-ABQ

before and after field use. An environmental duplicate was collected at MW-4. Two QA-COE samples were collected for analysis by COE-Missouri River Division Lab at MW-4 and MW-2. All samples were maintained under Chain of Custody Procedures.

Date: 09/12/90

Sheet No.: 025

Page 1 of 1

RCRA Detection Monitoring  
A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICO

Task/Site No.: 6<sup>th</sup> Sampling Round - Repeat sampling for TOC

Weather: Hot, clear, high of approximately 95°F.

Work Performed: At 10 monitor wells: 1) Monitor background and wellbore headspace with an ~~HNu~~ Photoionization Detector for presence of organic vapors 2) Measure depth to fluids and total well depths using an ORS interface probe - No light or dense immisible phases detected in any monitor well.

Sampling Performed: NA

Problems and Corrective Actions: Lock on MW-8 required cutting.

Quality Control Activities Initiated: Field equipment was calibrated daily before and after use. All down-well equipment was deconned between monitor wells.

Signature: Ann M. Houska, IT Corp-ABO

Date: 09/13/90

Sheet No.: 026

Page 1 of 1

RCRA Detection Monitoring  
A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICO

Task/Site No.: 6<sup>th</sup> Sampling Round - Repeat Sampling for TOC

Weather: Hot, clear, high of approximately 90°F

Work Performed: Equipment Calibration; Purge and sample 6 monitor wells; Ship samples to respective analytical laboratories via Federal Express. Samples collected at MW-3 and MW-8 held until next day shipment.

Sampling Performed: Sampling conducted at MW-6, S-4, MW-4 (including environmental duplicate and QA for COE), MW-2 (including QA for COE), MW-3 and MW-8. TOC (repeat) was sampled parameter - for 4 replicate analysis. Post-sample collection field parameters (pH, spec. cond + temp) were measured in 4 replicates at all monitor wells.

**Problems and Corrective Actions:**

55-gallon drums located at wells were mostly full from the July portion of the 6<sup>th</sup> Sampling Round. Purge water + rinse water was discharged on the ground once the drums were full.

MW-1 and S-4 do not have 55-gallon drums. Most of the drums did not have caps. - Sample preservative (H<sub>2</sub>SO<sub>4</sub> for TOC) was added in the field, pH (<2.0) was field verified + litmus test paper was taped to each COE.

**Quality Control Activities Initiated:** Dedicated sampling equipment used at all monitor wells. Field equipment was calibrated daily before and after field use. Two QA-COE samples were collected for analysis

signature: Ann M. Houska, IT Corp - ABQ

by the COE-Missouri River Division Lab at MW-4 and MW-2. An environmental duplicate was collected at MW-4. All samples were maintained under Chain of Custody Procedures.

act

Date: 09/14/90

Sheet No.: 027

Page 1 of 1

RCRA Detection Monitoring  
A-E DAILY QUALITY CONTROL REPORT FOR GROUNDWATER MONITORING  
HOLLOMAN AFB, NEW MEXICO

Task/Site No.: 6<sup>th</sup> Sampling Round - Repeat Sampling for TOC

Weather: Cloudy, cooler (high ~ 70°F), thunderclouds building.

Work Performed: Equipment Calibration, Purge and Sample 4 monitor wells; Drive to Albuquerque; Ship samples to analytical laboratory via Federal Express.

Sampling Performed: Sampling conducted at MW-5, MW-7, MW-1 and S-2. TOC<sup>(repeat)</sup> was sampled parameter - for 4 replicate analysis. Post sample collection field parameters (pH, spec. cond. + temp) were measured in 4 replicates at all monitor wells.

Problems and Corrective Actions: See 9/13/90.

Lock on MW-8 was replaced (provided by IT).

Dedicated trailers and well keys were left in Sharon Moores (HAF) custody.

Quality Control Activities Initiated: Field equipment was calibrated daily before and after use. All down-well equipment was decontaminated between monitor wells. All samples were maintained under Chain-of-Custody procedures.

Signature: John Houska, IT-ABQ.

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**APPENDIX F**  
**CONFIRMATION NOTICES**

Project No. 301251.02.06  
20 July, 1990

From: D. Meyer *20 July 90*  
IT Corporation  
Albuquerque, NM  
505-262-8800

To: B. Stewart  
U. S. Army Corps of Engineers  
Omaha District  
Omaha, NE  
402-221-7807 (fax)

Confirmation Notice. HAFB Ground Water Monitoring

Subject: Sample preservation

This notice serves as confirmation of the change in procedure regarding sample preservation, following review comments received from the Corps of Engineers, Omaha District on the first five sampling and analysis data reports prepared by IT Corporation.

All samples requiring acidification as a means of preservation will be acidified upon sample collection, in the field. The pH of the sample will be field checked prior to sealing the sample in the shipping container using litmus paper. The used litmus paper will be taped to the outside of the preserved sample to confirm the pH of the sample prior to shipment.

Project No. 301251.02.06  
20 July, 1990

*OK 20 July 90*  
From: D. Meyer  
IT Corporation  
Albuquerque, NM  
505-262-8800

To: B. Stewart  
U. S. Army Corps of Engineers  
Omaha District  
Omaha, NE  
402-221-7807 (fax)

Confirmation Notice. HAFB Ground Water Monitoring

Subject: POX Analysis by Radian Corporation

Upon receipt of the first set of samples by IT-Cincinnati, they informed me their equipment for the POX analysis had recently broken down. IT has, at the present time, no available capacity to perform the Holloman ground water analyses within the holding time limits. Radian Corporation (Austin, TX) has been contracted to perform the analyses. I presume Radian is qualified by the Corps to perform these analyses because they have done them for Holloman on earlier sampling rounds. They will be able to complete the POX analyses within the holding time limits. I have been dealing with Karen Achord at Radian. If, for any reason, this is unacceptable, please contact me.

CONFIRMATION NOTICE  
Holloman Air Force Base

To: Brian Stewart  
U.S. Army Engineer District, Omaha  
CEMRO-ED-EA  
215 North 17th Street  
Omaha, Nebraska 68102-4978  
FAX: 402-221-7777

From: Dann Meyer *du 9/7/90*  
IT Corporation  
5301 Central Ave. NE, Suite 700  
Albuquerque, New Mexico 87108  
505-362-8800

Date: 7 September, 1990

Subject: TOC RESAMPLING FOR SECOND SEMI-ANNUAL (JULY, 1990)  
ROUND

The IT Analytical Services (AS) Laboratory in Middlebrook, Tennessee, recently notified me that an oversight on their part caused them to neglect to perform the TOC analyses on the Holloman ground water samples in quadruplicate. The Request for Analysis forms had been correctly prepared by the field team and had specified quadruplicate analyses were required.

I have instructed the field personnel to resample the Holloman wells according to standard protocols. They will be onsite by Wednesday, September 12. They will purge wells, check for organic vapors, recheck water levels, check pH and SC during purge. They will retake four replicate pH and SC measurements.

As per our agreement over the phone today, I will not recollect or reanalyze for POX. We have received POX analyses for July, 1990 samples.