Determination of Evaporation Rates from a Potable Water Spill at Los Alamos National Laboratory Technical Area 21, Building 61

May 14, 1997

Project No. 5044.01.0210

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ACRONYMS

TA	Technical Area
LANL	Los Alamos National Laboratory

1.0 INTRODUCTION

On December 24, 1996, a potable water line broke in the Los Alamos National Laboratory (LANL), Technical Area (TA)-21, Building 61 (TA-21-61) and leaked water into a curbed storage area. Gradually, the water level in the curbed area lowered until no water remained on February 3, 1997. The hypothesis was that a major portion of this water loss was due to evaporation. Benchmark was tasked to evaluate the water loss potential due to evaporation by 1) evaluating the feasibility and engineering justification of conducting an indoor pan evaporation test and 2) calculating outdoor evaporation rates and predicting indoor evaporation rates using available data for the event period (December 24, 1996, through February 3, 1997). Data generated by the pan test could be used to develop a correlation between present and event conditions (indoor and outdoor) to predict the potential for indoor evaporation in the building during the event period. The evaluation of evaporation effects included an examination of potential sublimation effects for the portion of the event period when the surface of the water was frozen.

2.0 PAN EVAPORATION TEST FEASIBILITY

A pan evaporation test to determine present evaporation rates (outdoor and indoor) at TA-21-61 would provide the following information. First, a correlation between existing spring conditions and winter conditions would be developed. Second, evaporation rates during the event period would be estimated, and third, the volume of water that evaporated from the curbed area could be estimated.

Benchmark conducted a literature search to verify its understanding of the appropriate methods to determine evaporation rates at TA-21-61 during the event period. The most widely used method of determining evaporation is by means of a standard weather bureau class A evaporation pan (Veissman 1989). Pan test protocols are described in both Veissman 1989 and Bedient 1988. Pan test results vary with exposure and climatic conditions and should be used only for rough estimates of evaporation (Bedient 1988). Considerable care must be taken in installing and using evaporation pans which may be sunken, floating, or set above the ground surface (Veissman 1989). For measuring indoor evaporation at TA-21-61, the evaporation pan would require above-ground installation which may exhibit heat exchange problems related to pan side walls and bottom. In this case, pan evaporation rates must be adjusted to account for radiation and heat exchange effects.

In order to develop a seasonal evaporation correlation, theoretical and empirical equations presented in Veissman and Bedient to determine the relation between evaporation rates (outdoor and indoor) and climatic conditions were reviewed. Climatic data necessary to calculate evaporation rates based on the theoretical and empirical equations include: maximum and minimum daily air temperatures, dew point temperature, humidity, and average daily wind speed. Data is also required to determine heat transfer (e.g., conduction, convection, infiltration, radiant heat) between the building and outdoor conditions. During fall and winter seasons, heat transfer is usually from the interior of a building to the exterior. Under spring and summer conditions, heat transfer is usually from the exterior of a building to the interior. In addition to seasonal changes, heat transfer also depends on the thermal resistance (also known as R-value or the inverse of thermal conductivity) of the building materials, air tightness, and architecture.

During a site visit on April 1, 1997, (Benchmark 1997) we observed, the building was observed to be constructed of a concrete floor at grade level, wood and wall board walls, and a metal roof. The building has several holes in the exterior walls and a noticeable air current was present within the building. Contributors to radiant heat transfer are windows installed on the south, east, and west facing walls, and the metal roof.

LANL provided available meteorological data for the facility (LANL 1997a). Wind speed and temperature data required for evaporation calculations are available for event outdoor conditions only. There is no available data for conditions inside TA-21-61 during the event period.

Based on Benchmark's review of pan test protocols, theoretical and empirical equations, available data, and building conditions, we do not recommend conducting an indoor pan evaporation test at this time because of the excessive number of variables involved to accurately correlate present conditions (spring) with event conditions (winter). The most problematic variables are the seasonal climate effects on building heat transfer and indoor versus outdoor wind speed.

3.0 EVAPORATION EFFECTS

As discussed in Section 2.0, theoretical and empirical equations presented in Veissman and Bedient were reviewed to determine the relation between evaporation rates and climatic conditions during the event period. Based on site conditions and available data, an empirical equation was selected to estimate event period evaporation rates using measured climatic data and some engineering assumptions. The calculation approach, input data, and assumptions used to derive outdoor and indoor (within TA-21-61) evaporation during the event period are provided in this section.

3.1 Calculation Approach

Evaporation is a function of wind speed, air temperature, and dew point temperature. An equation for daily evaporation (Viessman 1988), assuming air and water temperatures are equal is:

$$E_a = (e_0 - e_a)^{0.88} (0.42 + 0.0029u_p)$$

where

E_a	= daily evaporation (mm/d)
$(e_0 - e_a)$	= vapor pressure difference between air and dew point temperature (millibars)
u_p	= wind movement (km/d)

and

$$(e_0 - e_a) = 33.86[(0.00738T_a + 0.8072)^8 - (0.00738T_d + 0.8072)^8]$$

where

T_a	= air temperature (°C)
T_d	= dew point temperature (°C)

3.2 Input Data

Daily weather data (i.e., air, soil, and dew point temperature, humidity, wind speed) for the facility were provided from December 26, 1996 through April 1, 1997 (LANL 1997a, LANL 1997b). Weather data were not available for December 24 and 25, 1996. Therefore, an average of the calculated evaporation rates for the remaining days of the month (December 26 through 31, 1996) was used for December 24 and 25, 1996. During the event period, outdoor wind speed ranged from 1.4 to 5.1 m/s (121 to 441 km/d), with an average wind speed of 2.4 m/s (206 km/d). Outdoor air temperature ranged from minus 17.4 to 13.8° C,

with an average of minus 0.9° C. Soil temperature ranged from minus 9.9 to 10.5° C, with an average of minus 1.9° C. The curbed area surface area is approximately 953.5 ft^2 and the average depth is approximately 0.425 ft (LANL 1997a) with a 3031 gal. capacity.

3.3 Assumptions

Two cases were evaluated to determine TA-21-61 evaporation rates within the curbed area during the event period. Case 1 uses measured air temperature data for T_a in the above equation to calculate evaporation rates. Case 2 uses measured soil temperature data for T_a in the above equation to calculate evaporation rates. These cases are further described below.

3.3.1 Case 1

Case 1 is used to calculate both outdoor and indoor evaporation rates at TA-21 based on available outdoor wind speed and air and dew point temperatures. Two evaporation scenarios were evaluated for outdoor daily evaporation rates for the event period using actual wind speed and maximum and average air temperature. Since indoor wind speed and temperature data are not available for the event period, indoor air and dew point temperatures were assumed to be the same as outdoor conditions. The derived indoor evaporation rate does not take into account heat transfer attributed to the windows, concrete flooring, walls, or metal roof or potential air current impacts. Four indoor air temperature scenarios were evaluated by combining maximum or average outdoor air temperature with zero or 25 percent of outdoor wind speed. This moderate wind speed scenario was selected to provide an understanding of the potential impact of indoor air current.

3.3.2 Case 2

As discussed in Section 2.0, if a pan test was conducted at TA-21-61, the pan would be placed above the surface of the ground. In addition, TA-21-61 is constructed at grade level. Under these conditions, soil temperature may also affect evaporation rates due to heat transfer from the soil through the concrete floor to the interior of the building.

Therefore, to derive TA-21-61 evaporation rates for Case 2, soil and air temperatures were assumed to be in equilibrium, and dew point temperature was assumed to be the same as outdoor conditions. Soil temperature data was provided for the facility by LANL (LANL 1997b). As in Case 1, the derived indoor evaporation rate does not take into account heat transfer through the windows, walls, metal roof, or indoor air current. Three indoor soil temperature scenarios were evaluated by combining average soil temperature with actual outdoor wind speed, zero wind speed, and 25 percent of actual outdoor wind speed.

A complete list of the evaporation scenarios is provided in Table 3-1. The evaporation rates were calculated in an Excel workbook. Table 3-1 also identifies the worksheet used for each scenario. Appendix A includes spreadsheet printouts for each of the evaporation scenarios evaluated.

Table 3-1. Evaporation Rate Scenarios

Worksheet Title	Evaporation Rate Scenario
Case 1	
Act_Max	Actual wind speed and maximum air temperature
Act_Avg	Actual wind speed and average air temperature
Zero_Max	Zero wind speed and maximum air temperature
Zero_Avg	Zero wind speed and average air temperature
Percent_Wind_Max	Twenty-five percent of outdoor wind speed and maximum air temperature
Percent_Wind_Avg	Twenty-five percent of outdoor wind speed and average air temperature
Results_All_Air	Summary of daily, monthly, and total event evaporation for each scenario
Case 2	
Act_Soil_Avg	Actual wind speed and average soil temperature
Zero_Soil_Avg	Zero wind speed and average soil temperature
Percent_Wind_Soil _Avg	Twenty-five percent of outdoor wind speed and average soil temperature
Results_All_Soil	Summary of daily, monthly, and total event evaporation for each soil temperature scenario

4.0 SUBLIMATION EFFECTS

The potential effect of sublimation was reviewed to determine if water loss continued during periods of possible freezing of the potable water release. Sublimation is the process by which a solid changes directly to vapor without passing through the liquid state. In the case of water, ice will sublime to vapor when the water temperature is below zero degrees C and the water vapor pressure in the air is less than 4.56 mm of mercury (Hg) (Masterson 1981). Based on information provided in Lange 1967, Figure 4-1 was generated to show water sublimation as a function of the vapor pressure of ice in contact with its own vapor and temperature. Water will sublime at any point below the line in Figure 4-1.

Water vapor pressure calculations were performed to determine if atmospheric conditions favored sublimation during the event period. Results in Appendix B show that temperature and vapor pressure data for the event period support sublimation conditions, therefore contributing some amount of water loss during periods when evaporation would not occur. The actual rate of sublimation was not determined because sufficient data were not available.

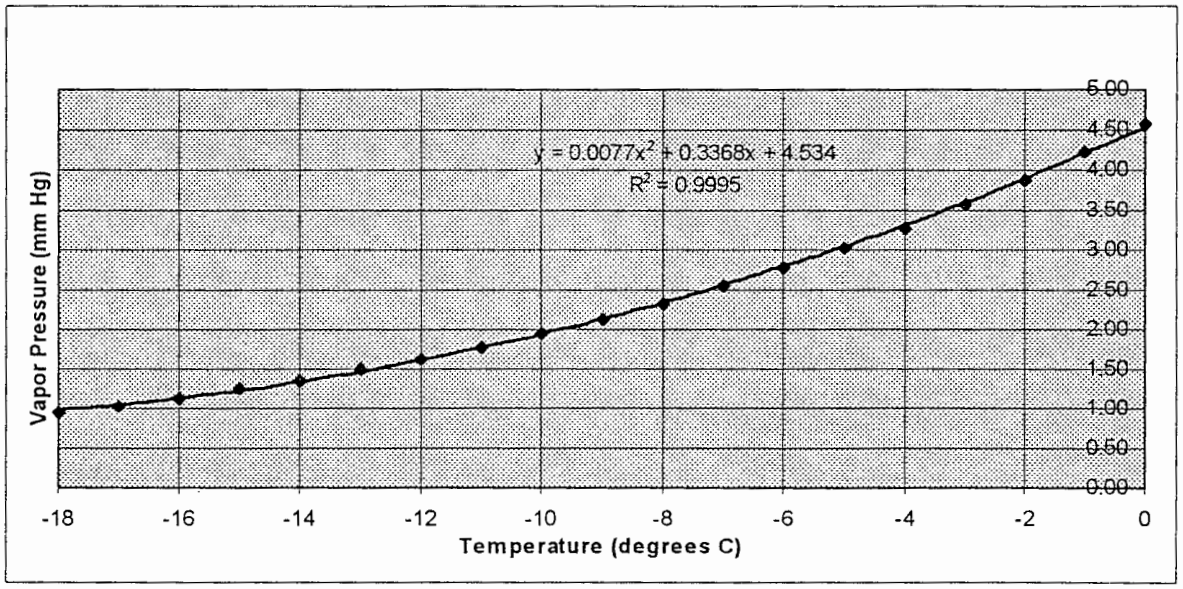

Figure 4-1. Water Sublimation

5.0 RESULTS

Table 5-1 illustrates the results of outdoor and indoor evaporation calculations. Appendix A includes spreadsheet printouts for each of the evaporation scenarios evaluated. Since weather data were provided through March 1997, we have included evaporation rates for these data to illustrate the vastly increased evaporation rate from winter to spring conditions.

Case 1 results for outdoor evaporation for the event period (December 24, 1996, through February 3, 1997,) show a total of 7.21 in., using actual daily wind speed and daily maximum air temperature and 3.99 in. using daily average air temperature. Case 1 results for indoor evaporation for the event period using air temperature ranged from 4.13 in. (least conservative using 25 percent wind speed and maximum air temperature) to 1.72 in. (most conservative using zero wind speed and average air temperature). Case 2 results for indoor evaporation for the event period using soil temperature ranged from 5.63 in. (least conservative using actual wind speed and average soil temperature) to 2.41 in. (most conservative using zero wind speed and average soil temperature). Table 5-2 shows total event period evaporation in inches and gallons based on the scenarios evaluated. Case 1 evaporation ranged from 1,022 to 4,285 gal. depending on the scenario. Using the actual wind speed and maximum air temperature scenario, the entire volume of water in the curbed area would have evaporated during the event period. Case 2 evaporation ranged from 1,432 to 3,346 gal., using actual wind speed and average soil temperature, indicating that the entire volume of water could have evaporated during the event period.

Evaporation increases with wind speed and temperature. Taking into account the building conditions, specifically air current and generally warmer indoor temperatures, the indoor evaporation rate may be higher than that predicted in Case 1 using 25 percent outdoor wind speed and maximum air temperature (4.13 in.). However, data is unavailable to determine actual indoor wind speed and air temperature during the event period.

Table 5-1. TA-21 Evaporation Rates

	Evaporation Rate Scenario								
	Case 1: Outdoor		Case 1: Indoor Using Air Temperature				Case 2: Indoor Using Soil Temperature		
	Actual Wind Max. Temp. (in)	Actual Wind Avg. Temp. (in)	Zero Wind Max. Temp. (in)	Zero Wind Avg. Temp. (in)	25% Wind Max. Temp. (in)	25% Wind Avg. Temp. (in)	Actual Wind Avg. Temp. (in)	Zero Wind Avg. Temp. (in)	25% Wind Avg. Temp. (in)
TA-21-61 Event Period									
December 24 - 31, 1996	2.12	1.28	0.92	0.55	1.22	0.74	1.43	0.62	0.82
January 1 - 31, 1997	4.42	2.30	1.88	0.98	2.52	1.31	3.59	1.51	2.03
February 1 - 3, 1997	0.67	0.42	0.30	0.19	0.39	0.25	0.61	0.27	0.36
Total Event[a]	7.21	3.99	3.10	1.72	4.13	2.29	5.63	2.41	3.21
Monthly									
December 24 - 31, 1996	2.12	1.28	0.92	0.55	1.22	0.74	1.43	0.62	0.82
January 1 - 31, 1997	4.42	2.30	1.88	0.98	2.52	1.31	3.59	1.51	2.03
February 1 - 28, 1997	5.80	3.44	2.18	1.29	3.09	1.83	5.11	1.91	2.71
March 1 - 31, 1997	15.65	9.25	5.30	3.13	7.89	4.66	11.29	3.82	5.69
April 1, 1997	0.43	0.26	0.14	0.08	0.21	0.13	0.35	0.11	0.17

[a]Total Event evaporation rates are for the time period from December 24, 1996 through February 3, 1997.

Table 5-2. Water Volume Evaporated During Event Period

Case	Scenario	Total Evaporation (in)	Curbed Area Volume Evaporated (gal)	Volume Remaining (gal)
Case 1	Actual Wind, Maximum Air Temperature	7.21	4,285	0
Case 1	Actual Wind, Average Air Temperature	3.99	2,371	660
Case 1	Zero Wind, Maximum Air Temperature	3.10	1,842	1,189
Case 1	Zero Wind, Average Air Temperature	1.72	1,022	2,009
Case 1	25 % Wind, Maximum Air Temperature	4.13	2,455	577
Case 1	25 % Wind, Average Air Temperature	2.29	1,361	1,670
Case 2	Actual Wind, Average Soil Temperature	5.63	3,346	0
Case 2	Zero Wind, Average Soil Temperature	2.41	1,432	1,599
Case 2	25 % Wind, Average Soil Temperature	3.21	1,908	1,123

6.0 CONCLUSIONS

Benchmark does not recommend conducting an indoor pan evaporation test at this time because of the excessive number of variables involved to accurately correlate from present spring conditions back to winter conditions. However, equipment is available to measure present indoor wind speed. Based on present indoor and outdoor wind speed measurements, it may be possible to develop a correlation between the measured outdoor event period wind speed and indoor wind speed. Actual methods to develop a correlation between indoor and outdoor wind speeds were not investigated as part of this task.

Based on the available data using the most conservative scenario with air temperature data and zero wind speed, approximately 34 percent (1,022 gal.) of the water volume in the curbed area evaporated. Using the most conservative scenario with soil temperature data and zero wind speed, approximately 47 percent (1,432 gal.) of the water volume in the curbed area evaporated. The percentage of water volume evaporated could be higher because of solar gain, outdoor wind direction, or actual indoor wind speed. Sublimation was also investigated. Conditions during the event period favored sublimation, but an actual sublimation rate was not determined.

7.0 REFERENCES

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Appendix A

Evaporation Calculation Spreadsheets

Appendix A

Evaporation Calculation Spreadsheets

Includes spreadsheet worksheets (identified in upper right corner) for the following scenarios:

Worksheet Title	Evaporation Rate Scenario
Case 1	
Act_Max	Actual wind speed and maximum air temperature
Act_Avg	Actual wind speed and average air temperature
Zero_Max	Zero wind speed and maximum air temperature
Zero_Avg	Zero wind speed and average air temperature
Percent_Wind_Max	Twenty-five percent of outdoor wind speed and maximum air temperature
Percent_Wind_Avg	Twenty-five percent of outdoor wind speed and average air temperature
Results_All_Air	Summary of daily, monthly, and total event evaporation for each scenario
Case 2	
Act_Soil_Avg	Actual wind speed and average soil temperature
Zero_Soil_Avg	Zero wind speed and average soil temperature
Percent_Wind_Soil _Avg	Twenty-five percent of outdoor wind speed and average soil temperature
Results_All_Soil	Summary of daily, monthly, and total event evaporation for each soil temperature scenario

CASE 1

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature (deg-C)	minimum temperature (deg-C)	average temperature (deg-C)	average dewpoint (deg-C)	average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using Actual Wind Speed and Maximum Air Temperature (mm/d)	(in/d)	(in)
12	24	1996									0.26	
12	25	1996									0.26	
12	26	1996	2.1	8.1	-3.7	2.2	-12.4	181.44	8.48	6.21	0.24	
12	27	1996	2.4	8.5	0.5	4.5	-11.6	207.36	8.62	6.80	0.27	
12	28	1996	2.4	8.5	-0.9	3.8	-7	207.36	7.51	6.02	0.24	
12	29	1996	2.2	11.6	-2.3	4.65	-6	190.08	9.78	7.23	0.28	December
12	30	1996	2.2	12.3	-2.2	5.05	-6.4	190.08	10.55	7.72	0.30	Total
12	31	1996	1.9	12	3.4	7.7	-3.5	164.16	9.33	6.40	0.25	2.12
1	1	1997	1.7	12.9	-0.7	6.1	-2.8	146.88	9.93	6.38	0.25	
1	2	1997	1.5	13.8	0.2	7	-2.1	129.6	10.56	6.34	0.25	
1	3	1997	3.5	13.5	0.8	7.15	1.7	302.4	8.58	8.60	0.34	
1	4	1997	1.9	5.9	-2.1	1.9	-8	164.16	5.97	4.32	0.17	
1	5	1997	3.3	-0.7	-5.7	-3.2	-6.4	285.12	2.03	2.32	0.09	
1	6	1997	4.3	-5.7	-13	-9.35	-13.2	371.52	1.80	2.51	0.10	
1	7	1997	1.8	-5	-14.6	-9.8	-16.2	155.52	2.50	1.95	0.08	
1	8	1997	1.5	-2.3	-14.3	-8.3	-14.5	129.6	3.19	2.21	0.09	
1	9	1997	1.4	-1.7	-10.7	-6.2	-12.7	120.96	3.11	2.09	0.08	
1	10	1997	1.9	2	-7.5	-2.75	-8.4	164.16	3.83	2.92	0.12	
1	11	1997	3.6	2.2	-12.6	-5.2	-8.1	311.04	3.86	4.34	0.17	
1	12	1997	5.1	-12.6	-17.3	-14.95	-21.4	440.64	1.22	2.03	0.08	
1	13	1997	4	-10.7	-17.4	-14.05	-19.6	345.6	1.42	1.94	0.08	
1	14	1997	3.3	-5.5	-13	-9.25	-13.7	285.12	1.95	2.24	0.09	
1	15	1997	1.7	-3.3	-12.9	-8.1	-14.6	146.88	2.84	2.12	0.08	
1	16	1997	2.1	-4	-11.4	-7.7	-12.3	181.44	2.18	1.88	0.07	
1	17	1997	2.1	1.2	-13.4	-6.1	-13.8	181.44	4.58	3.61	0.14	
1	18	1997	2.1	4.8	-9.4	-2.3	-12.5	181.44	6.29	4.78	0.19	
1	19	1997	2.2	8.2	-4.4	1.9	-8.3	190.08	7.64	5.81	0.23	
1	20	1997	1.5	5	-3.7	0.65	-6.7	129.6	5.05	3.31	0.13	
1	21	1997	3.2	5.2	-3.5	0.85	-9.1	276.48	5.80	5.74	0.23	
1	22	1997	2.2	2.3	-5.4	-1.55	-10.1	190.08	4.40	3.58	0.14	
1	23	1997	2.1	3.2	-2.7	0.25	-4.3	181.44	3.26	2.68	0.11	
1	24	1997	2.4	4.9	-3.7	0.6	-8.8	207.36	5.55	4.61	0.18	
1	25	1997	2.5	4.3	-4.3	0	-6.8	216	4.66	4.05	0.16	
1	26	1997	2.8	4.3	0.4	2.35	0.8	241.92	1.84	1.92	0.08	
1	27	1997	2.5	4.8	-3.4	0.7	-1.7	216	3.22	2.93	0.12	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
									vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	Actual Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Maximum Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	-5.2	138.24	3.61	2.54	0.10	
1	29	1997	2.8	3.7	-2.8	0.45	-5.8	241.92	4.02	3.81	0.15	January
1	30	1997	1.8	7.5	-5.9	0.8	-6.2	155.52	6.55	4.55	0.18	Total
1	31	1997	1.5	7.7	-3.3	2.2	-6.3	129.6	6.72	4.26	0.17	4.42
2	1	1997	1.7	9.4	1.6	5.5	-8.3	146.88	8.56	5.59	0.22	February 1-3
2	2	1997	1.8	9.3	-2.2	3.55	-5.4	155.52	7.65	5.22	0.21	Total
2	3	1997	2.7	7.8	-1.7	3.05	-7.4	233.28	7.10	6.16	0.24	0.67
2	4	1997	3.4	5.4	-3.2	1.1	-9.9	293.76	6.12	6.26	0.25	Event
2	5	1997	4.4	3.5	-3.2	0.15	-8.9	380.16	4.76	6.01	0.24	(12/24-2/3)
2	6	1997	2.7	0.8	-5.6	-2.4	-5.1	233.28	2.30	2.29	0.09	Total
2	7	1997	1.5	-0.8	-9.1	-4.95	-9.1	129.6	2.71	1.91	0.08	7.21
2	8	1997	2	2.3	-8.2	-2.95	-10.6	172.8	4.51	3.47	0.14	
2	9	1997	2	5.1	-5.4	-0.15	-10.1	172.8	5.98	4.44	0.17	February 1-28
2	10	1997	2.1	6.6	-4	1.3	-12.2	181.44	7.38	5.50	0.22	5.80
2	11	1997	2.1	9.8	-2.9	3.45	-11.3	181.44	9.57	6.91	0.27	
2	12	1997	3.8	7	-4.7	1.15	-7.5	328.32	6.57	7.19	0.28	
2	13	1997	3.4	2.4	-2.8	-0.2	-5.8	293.76	3.31	3.65	0.14	
2	14	1997	2.2	5.9	-5.2	0.35	-8.7	190.08	6.15	4.80	0.19	
2	15	1997	2.2	8.4	-3.2	2.6	-8.9	190.08	7.94	6.01	0.24	
2	16	1997	2.5	10.9	-2.6	4.15	-7.1	216	9.48	7.57	0.30	
2	17	1997	3.5	11.2	0.8	6	-8.2	302.4	10.04	9.87	0.39	
2	18	1997	2.5	13.2	2.2	7.7	-5.4	216	11.11	8.71	0.34	
2	19	1997	4.3	9.3	1.1	5.2	-3.3	371.52	6.95	8.24	0.32	
2	20	1997	2.4	11	-1.2	4.9	-5.6	207.36	9.13	7.15	0.28	
2	21	1997	3.2	0.7	-7	-3.15	-12.5	276.48	4.11	4.24	0.17	
2	22	1997	2.9	4.7	-7.7	-1.5	-10.8	250.56	5.89	5.46	0.21	
2	23	1997	3.7	2.9	-4.1	-0.6	-5.3	319.68	3.42	3.98	0.16	
2	24	1997	4.2	-0.9	-4.7	-2.8	-6.2	362.88	1.89	2.57	0.10	
2	25	1997	3.7	-0.3	-5.5	-2.9	-7.9	319.68	2.62	3.14	0.12	
2	26	1997	1.5	1.2	-6	-2.4	-6.9	129.6	3.04	2.11	0.08	
2	27	1997	4.4	3	-3.7	-0.35	-6.1	380.16	3.72	4.84	0.19	
2	28	1997	4.1	2.1	-5.3	-1.6	-5.6	354.24	3.10	3.91	0.15	
3	1	1997	2.2	1.6	-8.9	-3.65	-13.3	190.08	4.69	3.79	0.15	
3	2	1997	2.3	7.1	-7.8	-0.35	-12.2	198.72	7.72	6.02	0.24	
3	3	1997	4.1	11.2	-2.3	4.45	-12.5	354.24	11.00	11.94	0.47	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature (deg-C)	minimum temperature (deg-C)	average temperature (deg-C)	average dewpoint (deg-C)	average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using Actual Wind Speed and Maximum Air Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	-13.2	388.8	8.41	10.08	0.40	
3	5	1997	2	5.7	-8.9	-1.6	-17.1	172.8	7.60	5.49	0.22	
3	6	1997	3	10.8	-5	2.9	-14.2	259.2	10.96	9.63	0.38	
3	7	1997	2.2	12.8	-0.1	6.35	-11.7	190.08	12.32	8.85	0.35	
3	8	1997	2.6	15.8	1.5	8.65	-11.7	224.64	15.49	11.95	0.47	
3	9	1997	2.5	14.4	0.1	7.25	-11.7	216	13.95	10.64	0.42	
3	10	1997	3	15.3	1.1	8.2	-10.8	259.2	14.74	12.50	0.49	
3	11	1997	3.5	18.4	1.9	10.15	-11.6	302.4	18.68	17.05	0.67	
3	12	1997	2.4	18.1	3.8	10.95	-9	207.36	17.71	12.81	0.50	
3	13	1997	3	17.8	3.8	10.8	-12.9	259.2	18.15	15.02	0.59	
3	14	1997	4.4	11.8	-3.8	4	-8.6	380.16	10.68	12.24	0.48	
3	15	1997	3.1	17.9	1.2	9.55	-8.9	267.84	17.42	14.80	0.58	
3	16	1997	3.3	18.7	3.8	11.25	-8.5	285.12	18.38	16.16	0.64	
3	17	1997	3.6	15.7	6.3	11	-7.6	311.04	14.42	13.84	0.54	
3	18	1997	4.3	15.7	3.1	9.4	-10.6	371.52	15.15	16.37	0.64	
3	19	1997	3.1	19.2	3.7	11.45	-9.3	267.84	19.26	16.16	0.64	
3	20	1997	2.5	22.4	6.1	14.25	-8.1	216	23.79	17.02	0.67	
3	21	1997	2.5	23.2	5.4	14.3	-10.4	216	25.69	18.21	0.72	
3	22	1997	3.7	17.2	3.5	10.35	-3.9	319.68	15.07	14.66	0.58	
3	23	1997	3.3	19.8	6.3	13.05	-10.5	285.12	20.38	17.70	0.70	
3	24	1997	4.9	15.4	-1.2	7.1	-9.4	423.36	14.53	17.37	0.68	
3	25	1997	4.3	4.8	-3.6	0.6	-6.2	371.52	4.78	5.93	0.23	
3	26	1997	3.2	10.7	-3.5	3.6	-5.3	276.48	8.78	8.26	0.33	
3	27	1997	4	16.3	-0.2	8.05	-5.6	345.6	14.53	14.99	0.59	March
3	28	1997	3.6	17.9	8.1	13	-7.6	311.04	17.09	16.07	0.63	Total
3	29	1997	3.9	14.6	3.1	8.85	-10.8	336.96	13.97	14.23	0.56	15.65
3	30	1997	3.3	15.3	-1	7.15	-13.1	285.12	15.20	13.67	0.54	April 1
3	31	1997	4	15	1.3	8.15	-7.5	345.6	13.61	14.15	0.56	Total
4	1	1997	3.6	14.1	3.8	8.95	-2.3	311.04	10.95	10.86	0.43	0.43

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Evaporation was calculated using the actual windspeed and maximum daily temperature.

TA-21-61 event period occurred between December 24, 1996 and February 3, 1997.

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
									vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	Actual Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
12	24	1996									0.16	
12	25	1996									0.16	
12	26	1996	2.1	8.1	-3.7	2.2	-12.4	181.44	4.83	3.78	0.15	
12	27	1996	2.4	8.5	0.5	4.5	-11.6	207.36	5.94	4.90	0.19	
12	28	1996	2.4	8.5	-0.9	3.8	-7	207.36	4.42	3.78	0.15	
12	29	1996	2.2	11.6	-2.3	4.65	-6	190.08	4.63	3.74	0.15	December
12	30	1996	2.2	12.3	-2.2	5.05	-6.4	190.08	4.99	4.00	0.16	Total
12	31	1996	1.9	12	3.4	7.7	-3.5	164.16	5.81	4.22	0.17	1.28
1	1	1997	1.7	12.9	-0.7	6.1	-2.8	146.88	4.46	3.15	0.12	
1	2	1997	1.5	13.8	0.2	7	-2.1	129.6	4.80	3.16	0.12	
1	3	1997	3.5	13.5	0.8	7.15	1.7	302.4	3.22	3.63	0.14	
1	4	1997	1.9	5.9	-2.1	1.9	-8	164.16	3.68	2.82	0.11	
1	5	1997	3.3	-0.7	-5.7	-3.2	-6.4	285.12	1.05	1.30	0.05	
1	6	1997	4.3	-5.7	-13	-9.35	-13.2	371.52	0.80	1.24	0.05	
1	7	1997	1.8	-5	-14.6	-9.8	-16.2	155.52	1.19	1.01	0.04	
1	8	1997	1.5	-2.3	-14.3	-8.3	-14.5	129.6	1.29	1.00	0.04	
1	9	1997	1.4	-1.7	-10.7	-6.2	-12.7	120.96	1.55	1.14	0.04	
1	10	1997	1.9	2	-7.5	-2.75	-8.4	164.16	1.76	1.47	0.06	
1	11	1997	3.6	2.2	-12.6	-5.2	-8.1	311.04	0.84	1.13	0.04	
1	12	1997	5.1	-12.6	-17.3	-14.95	-21.4	440.64	0.81	1.42	0.06	
1	13	1997	4	-10.7	-17.4	-14.05	-19.6	345.6	0.77	1.14	0.04	
1	14	1997	3.3	-5.5	-13	-9.25	-13.7	285.12	0.92	1.16	0.05	
1	15	1997	1.7	-3.3	-12.9	-8.1	-14.6	146.88	1.36	1.11	0.04	
1	16	1997	2.1	-4	-11.4	-7.7	-12.3	181.44	1.05	0.99	0.04	
1	17	1997	2.1	1.2	-13.4	-6.1	-13.8	181.44	1.78	1.57	0.06	
1	18	1997	2.1	4.8	-9.4	-2.3	-12.5	181.44	2.84	2.37	0.09	
1	19	1997	2.2	8.2	-4.4	1.9	-8.3	190.08	3.76	3.11	0.12	
1	20	1997	1.5	5	-3.7	0.65	-6.7	129.6	2.72	1.92	0.08	
1	21	1997	3.2	5.2	-3.5	0.85	-9.1	276.48	3.45	3.63	0.14	
1	22	1997	2.2	2.3	-5.4	-1.55	-10.1	190.08	2.63	2.28	0.09	
1	23	1997	2.1	3.2	-2.7	0.25	-4.3	181.44	1.79	1.58	0.06	
1	24	1997	2.4	4.9	-3.7	0.6	-8.8	207.36	3.26	2.89	0.11	
1	25	1997	2.5	4.3	-4.3	0	-6.8	216	2.45	2.30	0.09	
1	26	1997	2.8	4.3	0.4	2.35	0.8	241.92	0.76	0.89	0.03	
1	27	1997	2.5	4.8	-3.4	0.7	-1.7	216	1.04	1.08	0.04	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
									vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	Actual Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	-5.2	138.24	1.39	1.10	0.04	
1	29	1997	2.8	3.7	-2.8	0.45	-5.8	241.92	2.36	2.39	0.09	January
1	30	1997	1.8	7.5	-5.9	0.8	-6.2	155.52	2.64	2.05	0.08	Total
1	31	1997	1.5	7.7	-3.3	2.2	-6.3	129.6	3.36	2.31	0.09	2.30
2	1	1997	1.7	9.4	1.6	5.5	-8.3	146.88	5.79	3.97	0.16	February 1-3
2	2	1997	1.8	9.3	-2.2	3.55	-5.4	155.52	3.81	2.83	0.11	Total
2	3	1997	2.7	7.8	-1.7	3.05	-7.4	233.28	4.12	3.81	0.15	0.42
2	4	1997	3.4	5.4	-3.2	1.1	-9.9	293.76	3.75	4.07	0.16	
2	5	1997	4.4	3.5	-3.2	0.15	-8.9	380.16	3.08	4.09	0.16	Event
2	6	1997	2.7	0.8	-5.6	-2.4	-5.1	233.28	0.95	1.04	0.04	(12/24 - 2/3)
2	7	1997	1.5	-0.8	-9.1	-4.95	-9.1	129.6	1.17	0.91	0.04	Total
2	8	1997	2	2.3	-8.2	-2.95	-10.6	172.8	2.20	1.85	0.07	3.99
2	9	1997	2	5.1	-5.4	-0.15	-10.1	172.8	3.22	2.58	0.10	
2	10	1997	2.1	6.6	-4	1.3	-12.2	181.44	4.34	3.44	0.14	
2	11	1997	2.1	9.8	-2.9	3.45	-11.3	181.44	5.27	4.09	0.16	
2	12	1997	3.8	7	-4.7	1.15	-7.5	328.32	3.18	3.80	0.15	
2	13	1997	3.4	2.4	-2.8	-0.2	-5.8	293.76	2.07	2.41	0.09	
2	14	1997	2.2	5.9	-5.2	0.35	-8.7	190.08	3.12	2.64	0.10	
2	15	1997	2.2	8.4	-3.2	2.6	-8.9	190.08	4.27	3.48	0.14	
2	16	1997	2.5	10.9	-2.6	4.15	-7.1	216	4.65	4.05	0.16	
2	17	1997	3.5	11.2	0.8	6	-8.2	302.4	6.08	6.35	0.25	
2	18	1997	2.5	13.2	2.2	7.7	-5.4	216	6.45	5.39	0.21	
2	19	1997	4.3	9.3	1.1	5.2	-3.3	371.52	4.07	5.15	0.20	
2	20	1997	2.4	11	-1.2	4.9	-5.6	207.36	4.66	3.96	0.16	
2	21	1997	3.2	0.7	-7	-3.15	-12.5	276.48	2.52	2.75	0.11	
2	22	1997	2.9	4.7	-7.7	-1.5	-10.8	250.56	2.81	2.84	0.11	
2	23	1997	3.7	2.9	-4.1	-0.6	-5.3	319.68	1.74	2.19	0.09	
2	24	1997	4.2	-0.9	-4.7	-2.8	-6.2	362.88	1.13	1.64	0.06	
2	25	1997	3.7	-0.3	-5.5	-2.9	-7.9	319.68	1.57	2.01	0.08	
2	26	1997	1.5	1.2	-6	-2.4	-6.9	129.6	1.49	1.13	0.04	February 1-28
2	27	1997	4.4	3	-3.7	-0.35	-6.1	380.16	2.09	2.92	0.11	Total
2	28	1997	4.1	2.1	-5.3	-1.6	-5.6	354.24	1.42	1.97	0.08	3.44
3	1	1997	2.2	1.6	-8.9	-3.65	-13.3	190.08	2.49	2.17	0.09	
3	2	1997	2.3	7.1	-7.8	-0.35	-12.2	198.72	3.58	3.06	0.12	
3	3	1997	4.1	11.2	-2.3	4.45	-12.5	354.24	6.08	7.09	0.28	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature (deg-C)	minimum temperature (deg-C)	average temperature (deg-C)	average dewpoint (deg-C)	average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using Actual Wind Speed and Average Air Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	-13.2	388.8	4.62	5.95	0.23	
3	5	1997	2	5.7	-8.9	-1.6	-17.1	172.8	3.86	3.02	0.12	
3	6	1997	3	10.8	-5	2.9	-14.2	259.2	5.52	5.27	0.21	
3	7	1997	2.2	12.8	-0.1	6.35	-11.7	190.08	7.12	5.46	0.22	
3	8	1997	2.6	15.8	1.5	8.65	-11.7	224.64	8.75	7.23	0.28	
3	9	1997	2.5	14.4	0.1	7.25	-11.7	216	7.73	6.33	0.25	
3	10	1997	3	15.3	1.1	8.2	-10.8	259.2	8.23	7.48	0.29	
3	11	1997	3.5	18.4	1.9	10.15	-11.6	302.4	9.92	9.77	0.38	
3	12	1997	2.4	18.1	3.8	10.95	-9	207.36	10.02	7.76	0.31	
3	13	1997	3	17.8	3.8	10.8	-12.9	259.2	10.73	9.45	0.37	
3	14	1997	4.4	11.8	-3.8	4	-8.6	380.16	4.96	6.24	0.25	
3	15	1997	3.1	17.9	1.2	9.55	-8.9	267.84	8.83	8.13	0.32	
3	16	1997	3.3	18.7	3.8	11.25	-8.5	285.12	10.16	9.59	0.38	
3	17	1997	3.6	15.7	6.3	11	-7.6	311.04	9.71	9.77	0.38	
3	18	1997	4.3	15.7	3.1	9.4	-10.6	371.52	9.10	10.46	0.41	
3	19	1997	3.1	19.2	3.7	11.45	-9.3	267.84	10.54	9.51	0.37	
3	20	1997	2.5	22.4	6.1	14.25	-8.1	216	12.96	9.97	0.39	
3	21	1997	2.5	23.2	5.4	14.3	-10.4	216	13.57	10.38	0.41	
3	22	1997	3.7	17.2	3.5	10.35	-3.9	319.68	8.02	8.41	0.33	
3	23	1997	3.3	19.8	6.3	13.05	-10.5	285.12	12.31	11.36	0.45	
3	24	1997	4.9	15.4	-1.2	7.1	-9.4	423.36	7.12	9.27	0.36	
3	25	1997	4.3	4.8	-3.6	0.6	-6.2	371.52	2.55	3.41	0.13	
3	26	1997	3.2	10.7	-3.5	3.6	-5.3	276.48	3.81	3.96	0.16	March
3	27	1997	4	16.3	-0.2	8.05	-5.6	345.6	6.76	7.65	0.30	Total
3	28	1997	3.6	17.9	8.1	13	-7.6	311.04	11.56	11.39	0.45	9.25
3	29	1997	3.9	14.6	3.1	8.85	-10.8	336.96	8.72	9.39	0.37	
3	30	1997	3.3	15.3	-1	7.15	-13.1	285.12	7.93	7.71	0.30	April 1
3	31	1997	4	15	1.3	8.15	-7.5	345.6	7.39	8.27	0.33	Total
4	1	1997	3.6	14.1	3.8	8.95	-2.3	311.04	6.30	6.68	0.26	0.26

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average pan evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Evaporation was calculated using the actual windspeed and average daily temperature.

TA-21-61 event period occurred between December 24, 1996 and February 3, 1997.

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
								zero	vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	Zero Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Maximum Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
12	24	1996									0.11	
12	25	1996									0.11	
12	26	1996	2.1	8.1	-3.7	2.2	-12.4	0	8.48	2.76	0.11	
12	27	1996	2.4	8.5	0.5	4.5	-11.6	0	8.62	2.79	0.11	
12	28	1996	2.4	8.5	-0.9	3.8	-7	0	7.51	2.48	0.10	
12	29	1996	2.2	11.6	-2.3	4.65	-6	0	9.78	3.13	0.12	December
12	30	1996	2.2	12.3	-2.2	5.05	-6.4	0	10.55	3.34	0.13	Total
12	31	1996	1.9	12	3.4	7.7	-3.5	0	9.33	3.00	0.12	0.92
1	1	1997	1.7	12.9	-0.7	6.1	-2.8	0	9.93	3.17	0.12	
1	2	1997	1.5	13.8	0.2	7	-2.1	0	10.56	3.34	0.13	
1	3	1997	3.5	13.5	0.8	7.15	1.7	0	8.58	2.78	0.11	
1	4	1997	1.9	5.9	-2.1	1.9	-8	0	5.97	2.02	0.08	
1	5	1997	3.3	-0.7	-5.7	-3.2	-6.4	0	2.03	0.78	0.03	
1	6	1997	4.3	-5.7	-13	-9.35	-13.2	0	1.80	0.70	0.03	
1	7	1997	1.8	-5	-14.6	-9.8	-16.2	0	2.50	0.94	0.04	
1	8	1997	1.5	-2.3	-14.3	-8.3	-14.5	0	3.19	1.17	0.05	
1	9	1997	1.4	-1.7	-10.7	-6.2	-12.7	0	3.11	1.14	0.04	
1	10	1997	1.9	2	-7.5	-2.75	-8.4	0	3.83	1.37	0.05	
1	11	1997	3.6	2.2	-12.6	-5.2	-8.1	0	3.86	1.38	0.05	
1	12	1997	5.1	-12.6	-17.3	-14.95	-21.4	0	1.22	0.50	0.02	
1	13	1997	4	-10.7	-17.4	-14.05	-19.6	0	1.42	0.57	0.02	
1	14	1997	3.3	-5.5	-13	-9.25	-13.7	0	1.95	0.75	0.03	
1	15	1997	1.7	-3.3	-12.9	-8.1	-14.6	0	2.84	1.05	0.04	
1	16	1997	2.1	-4	-11.4	-7.7	-12.3	0	2.18	0.83	0.03	
1	17	1997	2.1	1.2	-13.4	-6.1	-13.8	0	4.58	1.60	0.06	
1	18	1997	2.1	4.8	-9.4	-2.3	-12.5	0	6.29	2.12	0.08	
1	19	1997	2.2	8.2	-4.4	1.9	-8.3	0	7.64	2.51	0.10	
1	20	1997	1.5	5	-3.7	0.65	-6.7	0	5.05	1.75	0.07	
1	21	1997	3.2	5.2	-3.5	0.85	-9.1	0	5.80	1.97	0.08	
1	22	1997	2.2	2.3	-5.4	-1.55	-10.1	0	4.40	1.55	0.06	
1	23	1997	2.1	3.2	-2.7	0.25	-4.3	0	3.26	1.19	0.05	
1	24	1997	2.4	4.9	-3.7	0.6	-8.8	0	5.55	1.90	0.07	
1	25	1997	2.5	4.3	-4.3	0	-6.8	0	4.66	1.63	0.06	
1	26	1997	2.8	4.3	0.4	2.35	0.8	0	1.84	0.72	0.03	
1	27	1997	2.5	4.8	-3.4	0.7	-1.7	0	3.22	1.18	0.05	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
								zero	vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	Zero Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Maximum Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	-5.2	0	3.61	1.30	0.05	
1	29	1997	2.8	3.7	-2.8	0.45	-5.8	0	4.02	1.43	0.06	January
1	30	1997	1.8	7.5	-5.9	0.8	-6.2	0	6.55	2.19	0.09	Total
1	31	1997	1.5	7.7	-3.3	2.2	-6.3	0	6.72	2.25	0.09	1.88
2	1	1997	1.7	9.4	1.6	5.5	-8.3	0	8.56	2.78	0.11	February 1-3
2	2	1997	1.8	9.3	-2.2	3.55	-5.4	0	7.65	2.52	0.10	Total
2	3	1997	2.7	7.8	-1.7	3.05	-7.4	0	7.10	2.36	0.09	0.30
2	4	1997	3.4	5.4	-3.2	1.1	-9.9	0	6.12	2.07	0.08	
2	5	1997	4.4	3.5	-3.2	0.15	-8.9	0	4.76	1.66	0.07	Event
2	6	1997	2.7	0.8	-5.6	-2.4	-5.1	0	2.30	0.88	0.03	(12/24 - 2/3)
2	7	1997	1.5	-0.8	-9.1	-4.95	-9.1	0	2.71	1.01	0.04	Total
2	8	1997	2	2.3	-8.2	-2.95	-10.6	0	4.51	1.58	0.06	3.10
2	9	1997	2	5.1	-5.4	-0.15	-10.1	0	5.98	2.03	0.08	
2	10	1997	2.1	6.6	-4	1.3	-12.2	0	7.38	2.44	0.10	February 1-28
2	11	1997	2.1	9.8	-2.9	3.45	-11.3	0	9.57	3.07	0.12	Total
2	12	1997	3.8	7	-4.7	1.15	-7.5	0	6.57	2.20	0.09	2.18
2	13	1997	3.4	2.4	-2.8	-0.2	-5.8	0	3.31	1.21	0.05	
2	14	1997	2.2	5.9	-5.2	0.35	-8.7	0	6.15	2.08	0.08	
2	15	1997	2.2	8.4	-3.2	2.6	-8.9	0	7.94	2.60	0.10	
2	16	1997	2.5	10.9	-2.6	4.15	-7.1	0	9.48	3.04	0.12	
2	17	1997	3.5	11.2	0.8	6	-8.2	0	10.04	3.20	0.13	
2	18	1997	2.5	13.2	2.2	7.7	-5.4	0	11.11	3.50	0.14	
2	19	1997	4.3	9.3	1.1	5.2	-3.3	0	6.95	2.31	0.09	
2	20	1997	2.4	11	-1.2	4.9	-5.6	0	9.13	2.94	0.12	
2	21	1997	3.2	0.7	-7	-3.15	-12.5	0	4.11	1.46	0.06	
2	22	1997	2.9	4.7	-7.7	-1.5	-10.8	0	5.89	2.00	0.08	
2	23	1997	3.7	2.9	-4.1	-0.6	-5.3	0	3.42	1.24	0.05	
2	24	1997	4.2	-0.9	-4.7	-2.8	-6.2	0	1.89	0.73	0.03	
2	25	1997	3.7	-0.3	-5.5	-2.9	-7.9	0	2.62	0.98	0.04	
2	26	1997	1.5	1.2	-6	-2.4	-6.9	0	3.04	1.12	0.04	
2	27	1997	4.4	3	-3.7	-0.35	-6.1	0	3.72	1.34	0.05	
2	28	1997	4.1	2.1	-5.3	-1.6	-5.6	0	3.10	1.14	0.04	
3	1	1997	2.2	1.6	-8.9	-3.65	-13.3	0	4.69	1.64	0.06	
3	2	1997	2.3	7.1	-7.8	-0.35	-12.2	0	7.72	2.54	0.10	
3	3	1997	4.1	11.2	-2.3	4.45	-12.5	0	11.00	3.46	0.14	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature (deg-C)	minimum temperature (deg-C)	average temperature (deg-C)	average dewpoint (deg-C)	zero average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using Zero Wind Speed and Maximum Air Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	-13.2	0	8.41	2.74	0.11	
3	5	1997	2	5.7	-8.9	-1.6	-17.1	0	7.60	2.50	0.10	
3	6	1997	3	10.8	-5	2.9	-14.2	0	10.96	3.45	0.14	
3	7	1997	2.2	12.8	-0.1	6.35	-11.7	0	12.32	3.83	0.15	
3	8	1997	2.6	15.8	1.5	8.65	-11.7	0	15.49	4.68	0.18	
3	9	1997	2.5	14.4	0.1	7.25	-11.7	0	13.95	4.27	0.17	
3	10	1997	3	15.3	1.1	8.2	-10.8	0	14.74	4.48	0.18	
3	11	1997	3.5	18.4	1.9	10.15	-11.6	0	18.68	5.52	0.22	
3	12	1997	2.4	18.1	3.8	10.95	-9	0	17.71	5.27	0.21	
3	13	1997	3	17.8	3.8	10.8	-12.9	0	18.15	5.38	0.21	
3	14	1997	4.4	11.8	-3.8	4	-8.6	0	10.68	3.38	0.13	
3	15	1997	3.1	17.9	1.2	9.55	-8.9	0	17.42	5.19	0.20	
3	16	1997	3.3	18.7	3.8	11.25	-8.5	0	18.38	5.44	0.21	
3	17	1997	3.6	15.7	6.3	11	-7.6	0	14.42	4.40	0.17	
3	18	1997	4.3	15.7	3.1	9.4	-10.6	0	15.15	4.59	0.18	
3	19	1997	3.1	19.2	3.7	11.45	-9.3	0	19.26	5.67	0.22	
3	20	1997	2.5	22.4	6.1	14.25	-8.1	0	23.79	6.83	0.27	
3	21	1997	2.5	23.2	5.4	14.3	-10.4	0	25.69	7.31	0.29	
3	22	1997	3.7	17.2	3.5	10.35	-3.9	0	15.07	4.57	0.18	
3	23	1997	3.3	19.8	6.3	13.05	-10.5	0	20.38	5.96	0.23	
3	24	1997	4.9	15.4	-1.2	7.1	-9.4	0	14.53	4.43	0.17	
3	25	1997	4.3	4.8	-3.6	0.6	-6.2	0	4.78	1.66	0.07	March
3	26	1997	3.2	10.7	-3.5	3.6	-5.3	0	8.78	2.84	0.11	Total
3	27	1997	4	16.3	-0.2	8.05	-5.6	0	14.53	4.43	0.17	5.30
3	28	1997	3.6	17.9	8.1	13	-7.6	0	17.09	5.11	0.20	
3	29	1997	3.9	14.6	3.1	8.85	-10.8	0	13.97	4.28	0.17	
3	30	1997	3.3	15.3	-1	7.15	-13.1	0	15.20	4.60	0.18	April 1
3	31	1997	4	15	1.3	8.15	-7.5	0	13.61	4.18	0.16	Total
4	1	1997	3.6	14.1	3.8	8.95	-2.3	0	10.95	3.45	0.14	0.14

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average pan evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Evaporation was calculated using zero wind and the maximum daily temperature.

TA-21-61 event period occurred between December 24, 1996 and February 3, 1997.

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
								zero	vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	Actual Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
12	24	1996									0.07	
12	25	1996									0.07	
12	26	1996	2.1	8.1	-3.7	2.2	-12.4	0	4.83	1.68	0.07	
12	27	1996	2.4	8.5	0.5	4.5	-11.6	0	5.94	2.01	0.08	
12	28	1996	2.4	8.5	-0.9	3.8	-7	0	4.42	1.55	0.06	
12	29	1996	2.2	11.6	-2.3	4.65	-6	0	4.63	1.62	0.06	December
12	30	1996	2.2	12.3	-2.2	5.05	-6.4	0	4.99	1.73	0.07	Total
12	31	1996	1.9	12	3.4	7.7	-3.5	0	5.81	1.98	0.08	0.55
1	1	1997	1.7	12.9	-0.7	6.1	-2.8	0	4.46	1.57	0.06	
1	2	1997	1.5	13.8	0.2	7	-2.1	0	4.80	1.67	0.07	
1	3	1997	3.5	13.5	0.8	7.15	1.7	0	3.22	1.18	0.05	
1	4	1997	1.9	5.9	-2.1	1.9	-8	0	3.68	1.32	0.05	
1	5	1997	3.3	-0.7	-5.7	-3.2	-6.4	0	1.05	0.44	0.02	
1	6	1997	4.3	-5.7	-13	-9.35	-13.2	0	0.80	0.35	0.01	
1	7	1997	1.8	-5	-14.6	-9.8	-16.2	0	1.19	0.49	0.02	
1	8	1997	1.5	-2.3	-14.3	-8.3	-14.5	0	1.29	0.53	0.02	
1	9	1997	1.4	-1.7	-10.7	-6.2	-12.7	0	1.55	0.62	0.02	
1	10	1997	1.9	2	-7.5	-2.75	-8.4	0	1.76	0.69	0.03	
1	11	1997	3.6	2.2	-12.6	-5.2	-8.1	0	0.84	0.36	0.01	
1	12	1997	5.1	-12.6	-17.3	-14.95	-21.4	0	0.81	0.35	0.01	
1	13	1997	4	-10.7	-17.4	-14.05	-19.6	0	0.77	0.34	0.01	
1	14	1997	3.3	-5.5	-13	-9.25	-13.7	0	0.92	0.39	0.02	
1	15	1997	1.7	-3.3	-12.9	-8.1	-14.6	0	1.36	0.55	0.02	
1	16	1997	2.1	-4	-11.4	-7.7	-12.3	0	1.05	0.44	0.02	
1	17	1997	2.1	1.2	-13.4	-6.1	-13.8	0	1.78	0.70	0.03	
1	18	1997	2.1	4.8	-9.4	-2.3	-12.5	0	2.84	1.05	0.04	
1	19	1997	2.2	8.2	-4.4	1.9	-8.3	0	3.76	1.35	0.05	
1	20	1997	1.5	5	-3.7	0.65	-6.7	0	2.72	1.01	0.04	
1	21	1997	3.2	5.2	-3.5	0.85	-9.1	0	3.45	1.25	0.05	
1	22	1997	2.2	2.3	-5.4	-1.55	-10.1	0	2.63	0.98	0.04	
1	23	1997	2.1	3.2	-2.7	0.25	-4.3	0	1.79	0.70	0.03	
1	24	1997	2.4	4.9	-3.7	0.6	-8.8	0	3.26	1.19	0.05	
1	25	1997	2.5	4.3	-4.3	0	-6.8	0	2.45	0.92	0.04	
1	26	1997	2.8	4.3	0.4	2.35	0.8	0	0.76	0.33	0.01	
1	27	1997	2.5	4.8	-3.4	0.7	-1.7	0	1.04	0.43	0.02	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
								zero	vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	Actual Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	-5.2	0	1.39	0.56	0.02	
1	29	1997	2.8	3.7	-2.8	0.45	-5.8	0	2.36	0.89	0.04	January
1	30	1997	1.8	7.5	-5.9	0.8	-6.2	0	2.64	0.99	0.04	Total
1	31	1997	1.5	7.7	-3.3	2.2	-6.3	0	3.36	1.22	0.05	0.98
2	1	1997	1.7	9.4	1.6	5.5	-8.3	0	5.79	1.97	0.08	February 1-3
2	2	1997	1.8	9.3	-2.2	3.55	-5.4	0	3.81	1.36	0.05	Total
2	3	1997	2.7	7.8	-1.7	3.05	-7.4	0	4.12	1.46	0.06	0.19
2	4	1997	3.4	5.4	-3.2	1.1	-9.9	0	3.75	1.35	0.05	
2	5	1997	4.4	3.5	-3.2	0.15	-8.9	0	3.08	1.13	0.04	Event
2	6	1997	2.7	0.8	-5.6	-2.4	-5.1	0	0.95	0.40	0.02	(12/24 - 2/3)
2	7	1997	1.5	-0.8	-9.1	-4.95	-9.1	0	1.17	0.48	0.02	Total
2	8	1997	2	2.3	-8.2	-2.95	-10.6	0	2.20	0.84	0.03	1.72
2	9	1997	2	5.1	-5.4	-0.15	-10.1	0	3.22	1.18	0.05	
2	10	1997	2.1	6.6	-4	1.3	-12.2	0	4.34	1.53	0.06	
2	11	1997	2.1	9.8	-2.9	3.45	-11.3	0	5.27	1.81	0.07	
2	12	1997	3.8	7	-4.7	1.15	-7.5	0	3.18	1.16	0.05	
2	13	1997	3.4	2.4	-2.8	-0.2	-5.8	0	2.07	0.80	0.03	
2	14	1997	2.2	5.9	-5.2	0.35	-8.7	0	3.12	1.14	0.04	
2	15	1997	2.2	8.4	-3.2	2.6	-8.9	0	4.27	1.51	0.06	
2	16	1997	2.5	10.9	-2.6	4.15	-7.1	0	4.65	1.63	0.06	
2	17	1997	3.5	11.2	0.8	6	-8.2	0	6.08	2.06	0.08	
2	18	1997	2.5	13.2	2.2	7.7	-5.4	0	6.45	2.17	0.09	
2	19	1997	4.3	9.3	1.1	5.2	-3.3	0	4.07	1.45	0.06	
2	20	1997	2.4	11	-1.2	4.9	-5.6	0	4.66	1.63	0.06	
2	21	1997	3.2	0.7	-7	-3.15	-12.5	0	2.52	0.95	0.04	
2	22	1997	2.9	4.7	-7.7	-1.5	-10.8	0	2.81	1.04	0.04	
2	23	1997	3.7	2.9	-4.1	-0.6	-5.3	0	1.74	0.68	0.03	
2	24	1997	4.2	-0.9	-4.7	-2.8	-6.2	0	1.13	0.47	0.02	
2	25	1997	3.7	-0.3	-5.5	-2.9	-7.9	0	1.57	0.63	0.02	
2	26	1997	1.5	1.2	-6	-2.4	-6.9	0	1.49	0.60	0.02	February 1-28
2	27	1997	4.4	3	-3.7	-0.35	-6.1	0	2.09	0.80	0.03	Total
2	28	1997	4.1	2.1	-5.3	-1.6	-5.6	0	1.42	0.57	0.02	1.29
3	1	1997	2.2	1.6	-8.9	-3.65	-13.3	0	2.49	0.94	0.04	
3	2	1997	2.3	7.1	-7.8	-0.35	-12.2	0	3.58	1.29	0.05	
3	3	1997	4.1	11.2	-2.3	4.45	-12.5	0	6.08	2.06	0.08	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature (deg-C)	minimum temperature (deg-C)	average temperature (deg-C)	average dewpoint (deg-C)	zero average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using Actual Wind Speed and Average Air Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	-13.2	0	4.62	1.62	0.06	
3	5	1997	2	5.7	-8.9	-1.6	-17.1	0	3.86	1.38	0.05	
3	6	1997	3	10.8	-5	2.9	-14.2	0	5.52	1.89	0.07	
3	7	1997	2.2	12.8	-0.1	6.35	-11.7	0	7.12	2.36	0.09	
3	8	1997	2.6	15.8	1.5	8.65	-11.7	0	8.75	2.83	0.11	
3	9	1997	2.5	14.4	0.1	7.25	-11.7	0	7.73	2.54	0.10	
3	10	1997	3	15.3	1.1	8.2	-10.8	0	8.23	2.68	0.11	
3	11	1997	3.5	18.4	1.9	10.15	-11.6	0	9.92	3.16	0.12	
3	12	1997	2.4	18.1	3.8	10.95	-9	0	10.02	3.19	0.13	
3	13	1997	3	17.8	3.8	10.8	-12.9	0	10.73	3.39	0.13	
3	14	1997	4.4	11.8	-3.8	4	-8.6	0	4.96	1.72	0.07	
3	15	1997	3.1	17.9	1.2	9.55	-8.9	0	8.83	2.85	0.11	
3	16	1997	3.3	18.7	3.8	11.25	-8.5	0	10.16	3.23	0.13	
3	17	1997	3.6	15.7	6.3	11	-7.6	0	9.71	3.10	0.12	
3	18	1997	4.3	15.7	3.1	9.4	-10.6	0	9.10	2.93	0.12	
3	19	1997	3.1	19.2	3.7	11.45	-9.3	0	10.54	3.34	0.13	
3	20	1997	2.5	22.4	6.1	14.25	-8.1	0	12.96	4.00	0.16	
3	21	1997	2.5	23.2	5.4	14.3	-10.4	0	13.57	4.17	0.16	
3	22	1997	3.7	17.2	3.5	10.35	-3.9	0	8.02	2.62	0.10	
3	23	1997	3.3	19.8	6.3	13.05	-10.5	0	12.31	3.83	0.15	
3	24	1997	4.9	15.4	-1.2	7.1	-9.4	0	7.12	2.36	0.09	
3	25	1997	4.3	4.8	-3.6	0.6	-6.2	0	2.55	0.96	0.04	
3	26	1997	3.2	10.7	-3.5	3.6	-5.3	0	3.81	1.36	0.05	March
3	27	1997	4	16.3	-0.2	8.05	-5.6	0	6.76	2.26	0.09	Total
3	28	1997	3.6	17.9	8.1	13	-7.6	0	11.56	3.62	0.14	3.13
3	29	1997	3.9	14.6	3.1	8.85	-10.8	0	8.72	2.82	0.11	
3	30	1997	3.3	15.3	-1	7.15	-13.1	0	7.93	2.60	0.10	April 1
3	31	1997	4	15	1.3	8.15	-7.5	0	7.39	2.44	0.10	Total
4	1	1997	3.6	14.1	3.8	8.95	-2.3	0	6.30	2.12	0.08	0.08

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average pan evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Evaporation was calculated using zero wind and average daily temperature.

TA-21-61 event period occurred between December 24, 1996 and February 3, 1997.

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
								indoor	vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	25 % Outdoor Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Maximum Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
12	24	1996									0.15	
12	25	1996									0.15	
12	26	1996	2.1	8.1	-3.7	2.2	-12.4	45.36	8.48	3.62	0.14	
12	27	1996	2.4	8.5	0.5	4.5	-11.6	51.84	8.62	3.80	0.15	
12	28	1996	2.4	8.5	-0.9	3.8	-7	51.84	7.51	3.36	0.13	
12	29	1996	2.2	11.6	-2.3	4.65	-6	47.52	9.78	4.15	0.16	December
12	30	1996	2.2	12.3	-2.2	5.05	-6.4	47.52	10.55	4.43	0.17	Total
12	31	1996	1.9	12	3.4	7.7	-3.5	41.04	9.33	3.85	0.15	1.22
1	1	1997	1.7	12.9	-0.7	6.1	-2.8	36.72	9.93	3.97	0.16	
1	2	1997	1.5	13.8	0.2	7	-2.1	32.4	10.56	4.09	0.16	
1	3	1997	3.5	13.5	0.8	7.15	1.7	75.6	8.58	4.24	0.17	
1	4	1997	1.9	5.9	-2.1	1.9	-8	41.04	5.97	2.60	0.10	
1	5	1997	3.3	-0.7	-5.7	-3.2	-6.4	71.28	2.03	1.17	0.05	
1	6	1997	4.3	-5.7	-13	-9.35	-13.2	92.88	1.80	1.15	0.05	
1	7	1997	1.8	-5	-14.6	-9.8	-16.2	38.88	2.50	1.20	0.05	
1	8	1997	1.5	-2.3	-14.3	-8.3	-14.5	32.4	3.19	1.43	0.06	
1	9	1997	1.4	-1.7	-10.7	-6.2	-12.7	30.24	3.11	1.38	0.05	
1	10	1997	1.9	2	-7.5	-2.75	-8.4	41.04	3.83	1.76	0.07	
1	11	1997	3.6	2.2	-12.6	-5.2	-8.1	77.76	3.86	2.12	0.08	
1	12	1997	5.1	-12.6	-17.3	-14.95	-21.4	110.16	1.22	0.88	0.03	
1	13	1997	4	-10.7	-17.4	-14.05	-19.6	86.4	1.42	0.91	0.04	
1	14	1997	3.3	-5.5	-13	-9.25	-13.7	71.28	1.95	1.13	0.04	
1	15	1997	1.7	-3.3	-12.9	-8.1	-14.6	36.72	2.84	1.32	0.05	
1	16	1997	2.1	-4	-11.4	-7.7	-12.3	45.36	2.18	1.10	0.04	
1	17	1997	2.1	1.2	-13.4	-6.1	-13.8	45.36	4.58	2.11	0.08	
1	18	1997	2.1	4.8	-9.4	-2.3	-12.5	45.36	6.29	2.78	0.11	
1	19	1997	2.2	8.2	-4.4	1.9	-8.3	47.52	7.64	3.34	0.13	
1	20	1997	1.5	5	-3.7	0.65	-6.7	32.4	5.05	2.14	0.08	
1	21	1997	3.2	5.2	-3.5	0.85	-9.1	69.12	5.80	2.92	0.11	
1	22	1997	2.2	2.3	-5.4	-1.55	-10.1	47.52	4.40	2.05	0.08	
1	23	1997	2.1	3.2	-2.7	0.25	-4.3	45.36	3.26	1.56	0.06	
1	24	1997	2.4	4.9	-3.7	0.6	-8.8	51.84	5.55	2.58	0.10	
1	25	1997	2.5	4.3	-4.3	0	-6.8	54	4.66	2.23	0.09	
1	26	1997	2.8	4.3	0.4	2.35	0.8	60.48	1.84	1.02	0.04	
1	27	1997	2.5	4.8	-3.4	0.7	-1.7	54	3.22	1.61	0.06	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
								indoor	vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	25 % Outdoor Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Maximum Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	-5.2	34.56	3.61	1.61	0.06	
1	29	1997	2.8	3.7	-2.8	0.45	-5.8	60.48	4.02	2.02	0.08	January
1	30	1997	1.8	7.5	-5.9	0.8	-6.2	38.88	6.55	2.78	0.11	Total
1	31	1997	1.5	7.7	-3.3	2.2	-6.3	32.4	6.72	2.75	0.11	2.52
2	1	1997	1.7	9.4	1.6	5.5	-8.3	36.72	8.56	3.48	0.14	February 1-3
2	2	1997	1.8	9.3	-2.2	3.55	-5.4	38.88	7.65	3.19	0.13	Total
2	3	1997	2.7	7.8	-1.7	3.05	-7.4	58.32	7.10	3.31	0.13	0.39
2	4	1997	3.4	5.4	-3.2	1.1	-9.9	73.44	6.12	3.12	0.12	
2	5	1997	4.4	3.5	-3.2	0.15	-8.9	95.04	4.76	2.74	0.11	Event
2	6	1997	2.7	0.8	-5.6	-2.4	-5.1	58.32	2.30	1.23	0.05	(12/24 - 2/3)
2	7	1997	1.5	-0.8	-9.1	-4.95	-9.1	32.4	2.71	1.24	0.05	Total
2	8	1997	2	2.3	-8.2	-2.95	-10.6	43.2	4.51	2.05	0.08	4.13
2	9	1997	2	5.1	-5.4	-0.15	-10.1	43.2	5.98	2.63	0.10	
2	10	1997	2.1	6.6	-4	1.3	-12.2	45.36	7.38	3.20	0.13	
2	11	1997	2.1	9.8	-2.9	3.45	-11.3	45.36	9.57	4.03	0.16	
2	12	1997	3.8	7	-4.7	1.15	-7.5	82.08	6.57	3.45	0.14	
2	13	1997	3.4	2.4	-2.8	-0.2	-5.8	73.44	3.31	1.82	0.07	
2	14	1997	2.2	5.9	-5.2	0.35	-8.7	47.52	6.15	2.76	0.11	
2	15	1997	2.2	8.4	-3.2	2.6	-8.9	47.52	7.94	3.45	0.14	
2	16	1997	2.5	10.9	-2.6	4.15	-7.1	54	9.48	4.17	0.16	
2	17	1997	3.5	11.2	0.8	6	-8.2	75.6	10.04	4.87	0.19	
2	18	1997	2.5	13.2	2.2	7.7	-5.4	54	11.11	4.80	0.19	
2	19	1997	4.3	9.3	1.1	5.2	-3.3	92.88	6.95	3.80	0.15	
2	20	1997	2.4	11	-1.2	4.9	-5.6	51.84	9.13	3.99	0.16	
2	21	1997	3.2	0.7	-7	-3.15	-12.5	69.12	4.11	2.15	0.08	
2	22	1997	2.9	4.7	-7.7	-1.5	-10.8	62.64	5.89	2.86	0.11	
2	23	1997	3.7	2.9	-4.1	-0.6	-5.3	79.92	3.42	1.92	0.08	
2	24	1997	4.2	-0.9	-4.7	-2.8	-6.2	90.72	1.89	1.19	0.05	
2	25	1997	3.7	-0.3	-5.5	-2.9	-7.9	79.92	2.62	1.52	0.06	
2	26	1997	1.5	1.2	-6	-2.4	-6.9	32.4	3.04	1.37	0.05	February 1-28
2	27	1997	4.4	3	-3.7	-0.35	-6.1	95.04	3.72	2.21	0.09	Total
2	28	1997	4.1	2.1	-5.3	-1.6	-5.6	88.56	3.10	1.83	0.07	3.09
3	1	1997	2.2	1.6	-8.9	-3.65	-13.3	47.52	4.69	2.17	0.09	
3	2	1997	2.3	7.1	-7.8	-0.35	-12.2	49.68	7.72	3.41	0.13	
3	3	1997	4.1	11.2	-2.3	4.45	-12.5	88.56	11.00	5.58	0.22	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature (deg-C)	minimum temperature (deg-C)	average temperature (deg-C)	average dewpoint (deg-C)	indoor average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using 25 % Outdoor Wind Speed and Maximum Air Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	-13.2	97.2	8.41	4.57	0.18	
3	5	1997	2	5.7	-8.9	-1.6	-17.1	43.2	7.60	3.25	0.13	
3	6	1997	3	10.8	-5	2.9	-14.2	64.8	10.96	5.00	0.20	
3	7	1997	2.2	12.8	-0.1	6.35	-11.7	47.52	12.32	5.09	0.20	
3	8	1997	2.6	15.8	1.5	8.65	-11.7	56.16	15.49	6.50	0.26	
3	9	1997	2.5	14.4	0.1	7.25	-11.7	54	13.95	5.86	0.23	
3	10	1997	3	15.3	1.1	8.2	-10.8	64.8	14.74	6.49	0.26	
3	11	1997	3.5	18.4	1.9	10.15	-11.6	75.6	18.68	8.40	0.33	
3	12	1997	2.4	18.1	3.8	10.95	-9	51.84	17.71	7.15	0.28	
3	13	1997	3	17.8	3.8	10.8	-12.9	64.8	18.15	7.79	0.31	
3	14	1997	4.4	11.8	-3.8	4	-8.6	95.04	10.68	5.59	0.22	
3	15	1997	3.1	17.9	1.2	9.55	-8.9	66.96	17.42	7.59	0.30	
3	16	1997	3.3	18.7	3.8	11.25	-8.5	71.28	18.38	8.12	0.32	
3	17	1997	3.6	15.7	6.3	11	-7.6	77.76	14.42	6.76	0.27	
3	18	1997	4.3	15.7	3.1	9.4	-10.6	92.88	15.15	7.54	0.30	
3	19	1997	3.1	19.2	3.7	11.45	-9.3	66.96	19.26	8.29	0.33	
3	20	1997	2.5	22.4	6.1	14.25	-8.1	54	23.79	9.38	0.37	
3	21	1997	2.5	23.2	5.4	14.3	-10.4	54	25.69	10.03	0.40	
3	22	1997	3.7	17.2	3.5	10.35	-3.9	79.92	15.07	7.09	0.28	
3	23	1997	3.3	19.8	6.3	13.05	-10.5	71.28	20.38	8.89	0.35	
3	24	1997	4.9	15.4	-1.2	7.1	-9.4	105.84	14.53	7.66	0.30	
3	25	1997	4.3	4.8	-3.6	0.6	-6.2	92.88	4.78	2.73	0.11	
3	26	1997	3.2	10.7	-3.5	3.6	-5.3	69.12	8.78	4.20	0.17	March
3	27	1997	4	16.3	-0.2	8.05	-5.6	86.4	14.53	7.07	0.28	Total
3	28	1997	3.6	17.9	8.1	13	-7.6	77.76	17.09	7.85	0.31	7.89
3	29	1997	3.9	14.6	3.1	8.85	-10.8	84.24	13.97	6.76	0.27	
3	30	1997	3.3	15.3	-1	7.15	-13.1	71.28	15.20	6.87	0.27	April 1
3	31	1997	4	15	1.3	8.15	-7.5	86.4	13.61	6.67	0.26	Total
4	1	1997	3.6	14.1	3.8	8.95	-2.3	77.76	10.95	5.30	0.21	0.21

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average pan evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Indoor evaporation was calculated using 25% of outdoor wind and maximum daily temperature.

TA-21-61 event period occurred between December 24, 1996 and February 3, 1997.

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
								indoor	vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	25 % Outdoor Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
12	24	1996									0.09	
12	25	1996									0.09	
12	26	1996	2.1	8.1	-3.7	2.2	-12.4	45.36	4.83	2.20	0.09	
12	27	1996	2.4	8.5	0.5	4.5	-11.6	51.84	5.94	2.73	0.11	
12	28	1996	2.4	8.5	-0.9	3.8	-7	51.84	4.42	2.11	0.08	
12	29	1996	2.2	11.6	-2.3	4.65	-6	47.52	4.63	2.15	0.08	December
12	30	1996	2.2	12.3	-2.2	5.05	-6.4	47.52	4.99	2.29	0.09	Total
12	31	1996	1.9	12	3.4	7.7	-3.5	41.04	5.81	2.54	0.10	0.74
1	1	1997	1.7	12.9	-0.7	6.1	-2.8	36.72	4.46	1.96	0.08	
1	2	1997	1.5	13.8	0.2	7	-2.1	32.4	4.80	2.04	0.08	
1	3	1997	3.5	13.5	0.8	7.15	1.7	75.6	3.22	1.79	0.07	
1	4	1997	1.9	5.9	-2.1	1.9	-8	41.04	3.68	1.70	0.07	
1	5	1997	3.3	-0.7	-5.7	-3.2	-6.4	71.28	1.05	0.65	0.03	
1	6	1997	4.3	-5.7	-13	-9.35	-13.2	92.88	0.80	0.57	0.02	
1	7	1997	1.8	-5	-14.6	-9.8	-16.2	38.88	1.19	0.62	0.02	
1	8	1997	1.5	-2.3	-14.3	-8.3	-14.5	32.4	1.29	0.64	0.03	
1	9	1997	1.4	-1.7	-10.7	-6.2	-12.7	30.24	1.55	0.75	0.03	
1	10	1997	1.9	2	-7.5	-2.75	-8.4	41.04	1.76	0.89	0.03	
1	11	1997	3.6	2.2	-12.6	-5.2	-8.1	77.76	0.84	0.55	0.02	
1	12	1997	5.1	-12.6	-17.3	-14.95	-21.4	110.16	0.81	0.62	0.02	
1	13	1997	4	-10.7	-17.4	-14.05	-19.6	86.4	0.77	0.54	0.02	
1	14	1997	3.3	-5.5	-13	-9.25	-13.7	71.28	0.92	0.58	0.02	
1	15	1997	1.7	-3.3	-12.9	-8.1	-14.6	36.72	1.36	0.69	0.03	
1	16	1997	2.1	-4	-11.4	-7.7	-12.3	45.36	1.05	0.58	0.02	
1	17	1997	2.1	1.2	-13.4	-6.1	-13.8	45.36	1.78	0.92	0.04	
1	18	1997	2.1	4.8	-9.4	-2.3	-12.5	45.36	2.84	1.38	0.05	
1	19	1997	2.2	8.2	-4.4	1.9	-8.3	47.52	3.76	1.79	0.07	
1	20	1997	1.5	5	-3.7	0.65	-6.7	32.4	2.72	1.24	0.05	
1	21	1997	3.2	5.2	-3.5	0.85	-9.1	69.12	3.45	1.84	0.07	
1	22	1997	2.2	2.3	-5.4	-1.55	-10.1	47.52	2.63	1.31	0.05	
1	23	1997	2.1	3.2	-2.7	0.25	-4.3	45.36	1.79	0.92	0.04	
1	24	1997	2.4	4.9	-3.7	0.6	-8.8	51.84	3.26	1.61	0.06	
1	25	1997	2.5	4.3	-4.3	0	-6.8	54	2.45	1.27	0.05	
1	26	1997	2.8	4.3	0.4	2.35	0.8	60.48	0.76	0.47	0.02	
1	27	1997	2.5	4.8	-3.4	0.7	-1.7	54	1.04	0.60	0.02	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)												
								indoor	vapor	Evaporation Using		
			average	maximum	minimum	average	average	average	pressure	25 % Outdoor Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Air Temperature		
(mm)	(dd)	(yyyy)	(m/s)	(deg-C)	(deg-C)	(deg-C)	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	-5.2	34.56	1.39	0.70	0.03	
1	29	1997	2.8	3.7	-2.8	0.45	-5.8	60.48	2.36	1.27	0.05	January
1	30	1997	1.8	7.5	-5.9	0.8	-6.2	38.88	2.64	1.25	0.05	Total
1	31	1997	1.5	7.7	-3.3	2.2	-6.3	32.4	3.36	1.49	0.06	1.31
2	1	1997	1.7	9.4	1.6	5.5	-8.3	36.72	5.79	2.47	0.10	February 1-3
2	2	1997	1.8	9.3	-2.2	3.55	-5.4	38.88	3.81	1.73	0.07	Total
2	3	1997	2.7	7.8	-1.7	3.05	-7.4	58.32	4.12	2.05	0.08	0.25
2	4	1997	3.4	5.4	-3.2	1.1	-9.9	73.44	3.75	2.03	0.08	
2	5	1997	4.4	3.5	-3.2	0.15	-8.9	95.04	3.08	1.87	0.07	Event
2	6	1997	2.7	0.8	-5.6	-2.4	-5.1	58.32	0.95	0.56	0.02	(12/24-2/3)
2	7	1997	1.5	-0.8	-9.1	-4.95	-9.1	32.4	1.17	0.59	0.02	Total
2	8	1997	2	2.3	-8.2	-2.95	-10.6	43.2	2.20	1.09	0.04	2.29
2	9	1997	2	5.1	-5.4	-0.15	-10.1	43.2	3.22	1.53	0.06	
2	10	1997	2.1	6.6	-4	1.3	-12.2	45.36	4.34	2.01	0.08	
2	11	1997	2.1	9.8	-2.9	3.45	-11.3	45.36	5.27	2.38	0.09	
2	12	1997	3.8	7	-4.7	1.15	-7.5	82.08	3.18	1.82	0.07	
2	13	1997	3.4	2.4	-2.8	-0.2	-5.8	73.44	2.07	1.20	0.05	
2	14	1997	2.2	5.9	-5.2	0.35	-8.7	47.52	3.12	1.52	0.06	
2	15	1997	2.2	8.4	-3.2	2.6	-8.9	47.52	4.27	2.00	0.08	
2	16	1997	2.5	10.9	-2.6	4.15	-7.1	54	4.65	2.23	0.09	
2	17	1997	3.5	11.2	0.8	6	-8.2	75.6	6.08	3.13	0.12	
2	18	1997	2.5	13.2	2.2	7.7	-5.4	54	6.45	2.97	0.12	
2	19	1997	4.3	9.3	1.1	5.2	-3.3	92.88	4.07	2.37	0.09	
2	20	1997	2.4	11	-1.2	4.9	-5.6	51.84	4.66	2.21	0.09	
2	21	1997	3.2	0.7	-7	-3.15	-12.5	69.12	2.52	1.40	0.06	
2	22	1997	2.9	4.7	-7.7	-1.5	-10.8	62.64	2.81	1.49	0.06	
2	23	1997	3.7	2.9	-4.1	-0.6	-5.3	79.92	1.74	1.06	0.04	
2	24	1997	4.2	-0.9	-4.7	-2.8	-6.2	90.72	1.13	0.76	0.03	
2	25	1997	3.7	-0.3	-5.5	-2.9	-7.9	79.92	1.57	0.97	0.04	
2	26	1997	1.5	1.2	-6	-2.4	-6.9	32.4	1.49	0.73	0.03	February 1-28
2	27	1997	4.4	3	-3.7	-0.35	-6.1	95.04	2.09	1.33	0.05	Total
2	28	1997	4.1	2.1	-5.3	-1.6	-5.6	88.56	1.42	0.92	0.04	1.83
3	1	1997	2.2	1.6	-8.9	-3.65	-13.3	47.52	2.49	1.24	0.05	
3	2	1997	2.3	7.1	-7.8	-0.35	-12.2	49.68	3.58	1.73	0.07	
3	3	1997	4.1	11.2	-2.3	4.45	-12.5	88.56	6.08	3.32	0.13	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature (deg-C)	minimum temperature (deg-C)	average temperature (deg-C)	average dewpoint (deg-C)	indoor average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using 25 % Outdoor Wind Speed and Average Air Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	-13.2	97.2	4.62	2.70	0.11	
3	5	1997	2	5.7	-8.9	-1.6	-17.1	43.2	3.86	1.79	0.07	
3	6	1997	3	10.8	-5	2.9	-14.2	64.8	5.52	2.73	0.11	
3	7	1997	2.2	12.8	-0.1	6.35	-11.7	47.52	7.12	3.14	0.12	
3	8	1997	2.6	15.8	1.5	8.65	-11.7	56.16	8.75	3.93	0.15	
3	9	1997	2.5	14.4	0.1	7.25	-11.7	54	7.73	3.49	0.14	
3	10	1997	3	15.3	1.1	8.2	-10.8	64.8	8.23	3.88	0.15	
3	11	1997	3.5	18.4	1.9	10.15	-11.6	75.6	9.92	4.82	0.19	
3	12	1997	2.4	18.1	3.8	10.95	-9	51.84	10.02	4.33	0.17	
3	13	1997	3	17.8	3.8	10.8	-12.9	64.8	10.73	4.91	0.19	
3	14	1997	4.4	11.8	-3.8	4	-8.6	95.04	4.96	2.85	0.11	
3	15	1997	3.1	17.9	1.2	9.55	-8.9	66.96	8.83	4.17	0.16	
3	16	1997	3.3	18.7	3.8	11.25	-8.5	71.28	10.16	4.82	0.19	
3	17	1997	3.6	15.7	6.3	11	-7.6	77.76	9.71	4.77	0.19	
3	18	1997	4.3	15.7	3.1	9.4	-10.6	92.88	9.10	4.81	0.19	
3	19	1997	3.1	19.2	3.7	11.45	-9.3	66.96	10.54	4.88	0.19	
3	20	1997	2.5	22.4	6.1	14.25	-8.1	54	12.96	5.49	0.22	
3	21	1997	2.5	23.2	5.4	14.3	-10.4	54	13.57	5.72	0.23	
3	22	1997	3.7	17.2	3.5	10.35	-3.9	79.92	8.02	4.07	0.16	
3	23	1997	3.3	19.8	6.3	13.05	-10.5	71.28	12.31	5.71	0.22	
3	24	1997	4.9	15.4	-1.2	7.1	-9.4	105.84	7.12	4.09	0.16	
3	25	1997	4.3	4.8	-3.6	0.6	-6.2	92.88	2.55	1.57	0.06	March
3	26	1997	3.2	10.7	-3.5	3.6	-5.3	69.12	3.81	2.01	0.08	Total
3	27	1997	4	16.3	-0.2	8.05	-5.6	86.4	6.76	3.61	0.14	4.66
3	28	1997	3.6	17.9	8.1	13	-7.6	77.76	11.56	5.56	0.22	
3	29	1997	3.9	14.6	3.1	8.85	-10.8	84.24	8.72	4.47	0.18	
3	30	1997	3.3	15.3	-1	7.15	-13.1	71.28	7.93	3.88	0.15	April 1
3	31	1997	4	15	1.3	8.15	-7.5	86.4	7.39	3.90	0.15	Total
4	1	1997	3.6	14.1	3.8	8.95	-2.3	77.76	6.30	3.26	0.13	0.13

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average pan evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Indoor evaporation was calculated using 25% of outdoor wind and average daily temperature.

TA-21-61 event period occurred between December 24, 1996 and February 3, 1997.

				Daily Evaporation for Each Evaporation Scenario					
			Actual Wind	Actual Wind	Zero Wind	Zero Wind	25% Wind	25% Wind	
month	day	year	Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.	
(mm)	(dd)	(yyyy)	(in/d)	(in/d)	(in/d)	(in/d)	(in/d)	(in/d)	
12	24	1996	0.26	0.16	0.11	0.07	0.15	0.09	
12	25	1996	0.26	0.16	0.11	0.07	0.15	0.09	
12	26	1996	0.24	0.15	0.11	0.07	0.14	0.09	
12	27	1996	0.27	0.19	0.11	0.08	0.15	0.11	
12	28	1996	0.24	0.15	0.10	0.06	0.13	0.08	
12	29	1996	0.28	0.15	0.12	0.06	0.16	0.08	
12	30	1996	0.30	0.16	0.13	0.07	0.17	0.09	
12	31	1996	0.25	0.17	0.12	0.08	0.15	0.10	
1	1	1997	0.25	0.12	0.12	0.06	0.16	0.08	
1	2	1997	0.25	0.12	0.13	0.07	0.16	0.08	
1	3	1997	0.34	0.14	0.11	0.05	0.17	0.07	
1	4	1997	0.17	0.11	0.08	0.05	0.10	0.07	
1	5	1997	0.09	0.05	0.03	0.02	0.05	0.03	
1	6	1997	0.10	0.05	0.03	0.01	0.05	0.02	
1	7	1997	0.08	0.04	0.04	0.02	0.05	0.02	
1	8	1997	0.09	0.04	0.05	0.02	0.06	0.03	
1	9	1997	0.08	0.04	0.04	0.02	0.05	0.03	
1	10	1997	0.12	0.06	0.05	0.03	0.07	0.03	
1	11	1997	0.17	0.04	0.05	0.01	0.08	0.02	
1	12	1997	0.08	0.06	0.02	0.01	0.03	0.02	
1	13	1997	0.08	0.04	0.02	0.01	0.04	0.02	
1	14	1997	0.09	0.05	0.03	0.02	0.04	0.02	
1	15	1997	0.08	0.04	0.04	0.02	0.05	0.03	
1	16	1997	0.07	0.04	0.03	0.02	0.04	0.02	
1	17	1997	0.14	0.06	0.06	0.03	0.08	0.04	
1	18	1997	0.19	0.09	0.08	0.04	0.11	0.05	
1	19	1997	0.23	0.12	0.10	0.05	0.13	0.07	
1	20	1997	0.13	0.08	0.07	0.04	0.08	0.05	
1	21	1997	0.23	0.14	0.08	0.05	0.11	0.07	
1	22	1997	0.14	0.09	0.06	0.04	0.08	0.05	
1	23	1997	0.11	0.06	0.05	0.03	0.06	0.04	
1	24	1997	0.18	0.11	0.07	0.05	0.10	0.06	
1	25	1997	0.16	0.09	0.06	0.04	0.09	0.05	
1	26	1997	0.08	0.03	0.03	0.01	0.04	0.02	
1	27	1997	0.12	0.04	0.05	0.02	0.06	0.02	
1	28	1997	0.10	0.04	0.05	0.02	0.06	0.03	
1	29	1997	0.15	0.09	0.06	0.04	0.08	0.05	
1	30	1997	0.18	0.08	0.09	0.04	0.11	0.05	
1	31	1997	0.17	0.09	0.09	0.05	0.11	0.06	
2	1	1997	0.22	0.16	0.11	0.08	0.14	0.10	
2	2	1997	0.21	0.11	0.10	0.05	0.13	0.07	
2	3	1997	0.24	0.15	0.09	0.06	0.13	0.08	
2	4	1997	0.25	0.16	0.08	0.05	0.12	0.08	
2	5	1997	0.24	0.16	0.07	0.04	0.11	0.07	
2	6	1997	0.09	0.04	0.03	0.02	0.05	0.02	
2	7	1997	0.08	0.04	0.04	0.02	0.05	0.02	
2	8	1997	0.14	0.07	0.06	0.03	0.08	0.04	

				Daily Evaporation for Each Evaporation Scenario					
			Actual Wind	Actual Wind	Zero Wind	Zero Wind	25% Wind	25% Wind	
month	day	year	Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.	
(mm)	(dd)	(yyyy)	(in/d)	(in/d)	(in/d)	(in/d)	(in/d)	(in/d)	
2	9	1997	0.17	0.10	0.08	0.05	0.10	0.06	
2	10	1997	0.22	0.14	0.10	0.06	0.13	0.08	
2	11	1997	0.27	0.16	0.12	0.07	0.16	0.09	
2	12	1997	0.28	0.15	0.09	0.05	0.14	0.07	
2	13	1997	0.14	0.09	0.05	0.03	0.07	0.05	
2	14	1997	0.19	0.10	0.08	0.04	0.11	0.06	
2	15	1997	0.24	0.14	0.10	0.06	0.14	0.08	
2	16	1997	0.30	0.16	0.12	0.06	0.16	0.09	
2	17	1997	0.39	0.25	0.13	0.08	0.19	0.12	
2	18	1997	0.34	0.21	0.14	0.09	0.19	0.12	
2	19	1997	0.32	0.20	0.09	0.06	0.15	0.09	
2	20	1997	0.28	0.16	0.12	0.06	0.16	0.09	
2	21	1997	0.17	0.11	0.06	0.04	0.08	0.06	
2	22	1997	0.21	0.11	0.08	0.04	0.11	0.06	
2	23	1997	0.16	0.09	0.05	0.03	0.08	0.04	
2	24	1997	0.10	0.06	0.03	0.02	0.05	0.03	
2	25	1997	0.12	0.08	0.04	0.02	0.06	0.04	
2	26	1997	0.08	0.04	0.04	0.02	0.05	0.03	
2	27	1997	0.19	0.11	0.05	0.03	0.09	0.05	
2	28	1997	0.15	0.08	0.04	0.02	0.07	0.04	
3	1	1997	0.15	0.09	0.06	0.04	0.09	0.05	
3	2	1997	0.24	0.12	0.10	0.05	0.13	0.07	
3	3	1997	0.47	0.28	0.14	0.08	0.22	0.13	
3	4	1997	0.40	0.23	0.11	0.06	0.18	0.11	
3	5	1997	0.22	0.12	0.10	0.05	0.13	0.07	
3	6	1997	0.38	0.21	0.14	0.07	0.20	0.11	
3	7	1997	0.35	0.22	0.15	0.09	0.20	0.12	
3	8	1997	0.47	0.28	0.18	0.11	0.26	0.15	
3	9	1997	0.42	0.25	0.17	0.10	0.23	0.14	
3	10	1997	0.49	0.29	0.18	0.11	0.26	0.15	
3	11	1997	0.67	0.38	0.22	0.12	0.33	0.19	
3	12	1997	0.50	0.31	0.21	0.13	0.28	0.17	
3	13	1997	0.59	0.37	0.21	0.13	0.31	0.19	
3	14	1997	0.48	0.25	0.13	0.07	0.22	0.11	
3	15	1997	0.58	0.32	0.20	0.11	0.30	0.16	
3	16	1997	0.64	0.38	0.21	0.13	0.32	0.19	
3	17	1997	0.54	0.38	0.17	0.12	0.27	0.19	
3	18	1997	0.64	0.41	0.18	0.12	0.30	0.19	
3	19	1997	0.64	0.37	0.22	0.13	0.33	0.19	
3	20	1997	0.67	0.39	0.27	0.16	0.37	0.22	
3	21	1997	0.72	0.41	0.29	0.16	0.40	0.23	
3	22	1997	0.58	0.33	0.18	0.10	0.28	0.16	
3	23	1997	0.70	0.45	0.23	0.15	0.35	0.22	
3	24	1997	0.68	0.36	0.17	0.09	0.30	0.16	
3	25	1997	0.23	0.13	0.07	0.04	0.11	0.06	
3	26	1997	0.33	0.16	0.11	0.05	0.17	0.08	
3	27	1997	0.59	0.30	0.17	0.09	0.28	0.14	

				Daily Evaporation for Each Evaporation Scenario					
			Actual Wind	Actual Wind	Zero Wind	Zero Wind	25% Wind	25% Wind	
month	day	year	Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.	
(mm)	(dd)	(yyyy)	(in/d)	(in/d)	(in/d)	(in/d)	(in/d)	(in/d)	
3	28	1997	0.63	0.45	0.20	0.14	0.31	0.22	
3	29	1997	0.56	0.37	0.17	0.11	0.27	0.18	
3	30	1997	0.54	0.30	0.18	0.10	0.27	0.15	
3	31	1997	0.56	0.33	0.16	0.10	0.26	0.15	
4	1	1997	0.43	0.26	0.14	0.08	0.21	0.13	
						Event Evaporation			
				Actual Wind	Actual Wind	Zero Wind	Zero Wind	25% Wind	25% Wind
				Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.
				(in)	(in)	(in)	(in)	(in)	(in)
December 24 - 31, 1996				2.12	1.28	0.92	0.55	1.22	0.74
January 1 - 31, 1997				4.42	2.30	1.88	0.98	2.52	1.31
February 1 - 3, 1997				0.67	0.42	0.30	0.19	0.39	0.25
			Total Event:	7.21	3.99	3.10	1.72	4.13	2.29
						Monthly Evaporation			
				Actual Wind	Actual Wind	Zero Wind	Zero Wind	25% Wind	25% Wind
				Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.	Max. Temp.	Avg. Temp.
				(in)	(in)	(in)	(in)	(in)	(in)
December 24 - 31, 1996				2.12	1.28	0.92	0.55	1.22	0.74
February 1 - 28, 1997				5.80	3.44	2.18	1.29	3.09	1.83
March 1 - 31, 1997				15.65	9.25	5.30	3.13	7.89	4.66
April 1, 1997				0.43	0.26	0.14	0.08	0.21	0.13

CASE 2

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature deg-C	minimum temperature deg-C	average temperature deg-C	soil average temperature deg-C	average dewpoint (deg-C)	average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using Actual Wind Speed and Average Soil Temperature (mm/d)	(in/d)	(in)
12	24	1996										0.18	
12	25	1996										0.18	
12	26	1996	2.1	8.1	-3.7	2.2	2.5	-12.4	181.44	4.98	3.89	0.15	
12	27	1996	2.4	8.5	0.5	4.5	5.4	-11.6	207.36	6.48	5.29	0.21	
12	28	1996	2.4	8.5	-0.9	3.8	5.6	-7	207.36	5.50	4.58	0.18	
12	29	1996	2.2	11.6	-2.3	4.65	4.9	-6	190.08	4.78	3.85	0.15	December
12	30	1996	2.2	12.3	-2.2	5.05	6.4	-6.4	190.08	5.85	4.60	0.18	Total
12	31	1996	1.9	12	3.4	7.7	9.5	-3.5	164.16	7.18	5.08	0.20	1.43
1	1	1997	1.7	12.9	-0.7	6.1	7.1	-2.8	146.88	5.13	3.57	0.14	
1	2	1997	1.5	13.8	0.2	7	8.5	-2.1	129.6	5.88	3.78	0.15	
1	3	1997	3.5	13.5	0.8	7.15	8.6	1.7	302.4	4.28	4.66	0.18	
1	4	1997	1.9	5.9	-2.1	1.9	3.2	-8	164.16	4.36	3.28	0.13	
1	5	1997	3.3	-0.7	-5.7	-3.2	-1.4	-6.4	285.12	1.74	2.03	0.08	
1	6	1997	4.3	-5.7	-13	-9.35	-6.5	-13.2	371.52	1.56	2.21	0.09	
1	7	1997	1.8	-5	-14.6	-9.8	-7.2	-16.2	155.52	1.85	1.49	0.06	
1	8	1997	1.5	-2.3	-14.3	-8.3	-5.4	-14.5	129.6	2.11	1.54	0.06	
1	9	1997	1.4	-1.7	-10.7	-6.2	-3.5	-12.7	120.96	2.43	1.68	0.07	
1	10	1997	1.9	2	-7.5	-2.75	-0.2	-8.4	164.16	2.79	2.21	0.09	
1	11	1997	3.6	2.2	-12.6	-5.2	-2.7	-8.1	311.04	1.70	2.11	0.08	
1	12	1997	5.1	-12.6	-17.3	-14.95	-9.9	-21.4	440.64	1.79	2.83	0.11	
1	13	1997	4	-10.7	-17.4	-14.05	-9.7	-19.6	345.6	1.65	2.21	0.09	
1	14	1997	3.3	-5.5	-13	-9.25	-6.8	-13.7	285.12	1.56	1.84	0.07	
1	15	1997	1.7	-3.3	-12.9	-8.1	-4.8	-14.6	146.88	2.32	1.78	0.07	
1	16	1997	2.1	-4	-11.4	-7.7	-4.1	-12.3	181.44	2.15	1.85	0.07	
1	17	1997	2.1	1.2	-13.4	-6.1	-3.5	-13.8	181.44	2.63	2.22	0.09	
1	18	1997	2.1	4.8	-9.4	-2.3	0.14	-12.5	181.44	3.85	3.10	0.12	
1	19	1997	2.2	8.2	-4.4	1.9	3.5	-8.3	190.08	4.61	3.72	0.15	
1	20	1997	1.5	5	-3.7	0.65	4.2	-6.7	129.6	4.57	3.03	0.12	
1	21	1997	3.2	5.2	-3.5	0.85	4.2	-9.1	276.48	5.20	5.22	0.21	
1	22	1997	2.2	2.3	-5.4	-1.55	3.2	-10.1	190.08	4.88	3.92	0.15	
1	23	1997	2.1	3.2	-2.7	0.25	3.6	-4.3	181.44	3.48	2.83	0.11	
1	24	1997	2.4	4.9	-3.7	0.6	4.2	-8.8	207.36	5.13	4.31	0.17	
1	25	1997	2.5	4.3	-4.3	0	3.9	-6.8	216	4.43	3.87	0.15	
1	26	1997	2.8	4.3	0.4	2.35	7.2	0.8	241.92	3.69	3.54	0.14	
1	27	1997	2.5	4.8	-3.4	0.7	4.2	-1.7	216	2.87	2.64	0.10	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)													
										vapor	Evaporation Using		
			average	maximum	minimum	average	soil average	average	average	pressure	Actual Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Soil Temperature		
(mm)	(dd)	(yyyy)	(m/s)	deg-C	deg-C	deg-C	deg-C	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	2.6	-5.2	138.24	3.23	2.30	0.09	January
1	29	1997	2.8	3.7	-2.8	0.45	3.9	-5.8	241.92	4.13	3.91	0.15	Total
1	30	1997	1.8	7.5	-5.9	0.8	5.1	-6.2	155.52	4.96	3.57	0.14	3.59
1	31	1997	1.5	7.7	-3.3	2.2	6.9	-6.3	129.6	6.16	3.94	0.16	February
2	1	1997	1.7	9.4	1.6	5.5	10.5	-8.3	146.88	9.46	6.11	0.24	(2/1 - 2/3)
2	2	1997	1.8	9.3	-2.2	3.55	6.5	-5.4	155.52	5.61	3.98	0.16	Total
2	3	1997	2.7	7.8	-1.7	3.05	6.2	-7.4	233.28	6.00	5.31	0.21	0.61
2	4	1997	3.4	5.4	-3.2	1.1	3.6	-9.9	293.76	5.05	5.29	0.21	
2	5	1997	4.4	3.5	-3.2	0.15	4.1	-8.9	380.16	5.10	6.38	0.25	Event
2	6	1997	2.7	0.8	-5.6	-2.4	1.4	-5.1	233.28	2.59	2.53	0.10	(12/24 - 2/3)
2	7	1997	1.5	-0.8	-9.1	-4.95	-1.4	-9.1	129.6	2.46	1.76	0.07	Total
2	8	1997	2	2.3	-8.2	-2.95	-0.3	-10.6	172.8	3.27	2.61	0.10	5.63
2	9	1997	2	5.1	-5.4	-0.15	2.5	-10.1	172.8	4.50	3.46	0.14	
2	10	1997	2.1	6.6	-4	1.3	4.2	-12.2	181.44	5.88	4.50	0.18	
2	11	1997	2.1	9.8	-2.9	3.45	6.7	-11.3	181.44	7.27	5.42	0.21	
2	12	1997	3.8	7	-4.7	1.15	5.6	-7.5	328.32	5.64	6.29	0.25	
2	13	1997	3.4	2.4	-2.8	-0.2	2.6	-5.8	293.76	3.42	3.75	0.15	
2	14	1997	2.2	5.9	-5.2	0.35	3.8	-8.7	190.08	4.88	3.92	0.15	
2	15	1997	2.2	8.4	-3.2	2.6	5.9	-8.9	190.08	6.20	4.83	0.19	
2	16	1997	2.5	10.9	-2.6	4.15	8.9	-7.1	216	7.84	6.41	0.25	
2	17	1997	3.5	11.2	0.8	6	11.6	-8.2	302.4	10.40	10.18	0.40	
2	18	1997	2.5	13.2	2.2	7.7	12.3	-5.4	216	10.24	8.11	0.32	
2	19	1997	4.3	9.3	1.1	5.2	8.3	-3.3	371.52	6.18	7.44	0.29	
2	20	1997	2.4	11	-1.2	4.9	7.9	-5.6	207.36	6.65	5.41	0.21	
2	21	1997	3.2	0.7	-7	-3.15	-0.25	-12.5	276.48	3.68	3.85	0.15	
2	22	1997	2.9	4.7	-7.7	-1.5	-0.1	-10.8	250.56	3.40	3.37	0.13	
2	23	1997	3.7	2.9	-4.1	-0.6	0.34	-5.3	319.68	2.15	2.65	0.10	
2	24	1997	4.2	-0.9	-4.7	-2.8	0	-6.2	362.88	2.28	3.04	0.12	
2	25	1997	3.7	-0.3	-5.5	-2.9	0	-7.9	319.68	2.75	3.28	0.13	February
2	26	1997	1.5	1.2	-6	-2.4	-0.1	-6.9	129.6	2.43	1.74	0.07	(2/1 - 2/28)
2	27	1997	4.4	3	-3.7	-0.35	1.56	-6.1	380.16	2.98	3.98	0.16	Total
2	28	1997	4.1	2.1	-5.3	-1.6	2.4	-5.6	354.24	3.25	4.09	0.16	5.11
3	1	1997	2.2	1.6	-8.9	-3.65	-0.28	-13.3	190.08	3.82	3.16	0.12	
3	2	1997	2.3	7.1	-7.8	-0.35	2.3	-12.2	198.72	4.84	3.99	0.16	
3	3	1997	4.1	11.2	-2.3	4.45	8.2	-12.5	354.24	8.57	9.59	0.38	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature deg-C	minimum temperature deg-C	average temperature deg-C	soil average temperature deg-C	average dewpoint (deg-C)	average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using Actual Wind Speed and Average Soil Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	4.1	-13.2	388.8	6.01	7.50	0.30	
3	5	1997	2	5.7	-8.9	-1.6	2.3	-17.1	172.8	5.64	4.22	0.17	
3	6	1997	3	10.8	-5	2.9	4.5	-14.2	259.2	6.42	6.02	0.24	
3	7	1997	2.2	12.8	-0.1	6.35	8.7	-11.7	190.08	8.79	6.58	0.26	
3	8	1997	2.6	15.8	1.5	8.65	11.4	-11.7	224.64	11.02	8.85	0.35	
3	9	1997	2.5	14.4	0.1	7.25	10.2	-11.7	216	9.99	7.93	0.31	
3	10	1997	3	15.3	1.1	8.2	11.6	-10.8	259.2	11.01	9.68	0.38	
3	11	1997	3.5	18.4	1.9	10.15	13.5	-11.6	302.4	13.00	12.39	0.49	
3	12	1997	2.4	18.1	3.8	10.95	13.5	-9	207.36	12.41	9.37	0.37	
3	13	1997	3	17.8	3.8	10.8	13.4	-12.9	259.2	13.15	11.31	0.45	
3	14	1997	4.4	11.8	-3.8	4	7.9	-8.6	380.16	7.49	8.96	0.35	
3	15	1997	3.1	17.9	1.2	9.55	12.9	-8.9	267.84	11.79	10.50	0.41	
3	16	1997	3.3	18.7	3.8	11.25	14.8	-8.5	285.12	13.65	12.44	0.49	
3	17	1997	3.6	15.7	6.3	11	13.6	-7.6	311.04	12.16	11.91	0.47	
3	18	1997	4.3	15.7	3.1	9.4	12.3	-10.6	371.52	11.62	12.96	0.51	
3	19	1997	3.1	19.2	3.7	11.45	14.2	-9.3	267.84	13.21	11.60	0.46	
3	20	1997	2.5	22.4	6.1	14.25	17.1	-8.1	216	16.21	12.14	0.48	
3	21	1997	2.5	23.2	5.4	14.3	17.5	-10.4	216	17.26	12.83	0.51	
3	22	1997	3.7	17.2	3.5	10.35	13.6	-3.9	319.68	11.02	11.13	0.44	
3	23	1997	3.3	19.8	6.3	13.05	16.4	-10.5	285.12	15.94	14.26	0.56	March
3	24	1997	4.9	15.4	-1.2	7.1	11	-9.4	423.36	10.16	12.68	0.50	Total
3	25	1997	4.3	4.8	-3.6	0.6	4.5	-6.2	371.52	4.60	5.73	0.23	11.29
3	26	1997	3.2	10.7	-3.5	3.6	6.1	-5.3	276.48	5.32	5.32	0.21	
3	27	1997	4	16.3	-0.2	8.05	12.5	-5.6	345.6	10.50	11.26	0.44	
3	28	1997	3.6	17.9	*	*	*	-7.6	311.04				See Note A
3	29	1997	3.9	14.6	3.1	8.85	11.3	-10.8	336.96	10.74	11.29	0.44	
3	30	1997	3.3	15.3	-1	7.15	11.2	-13.1	285.12	11.11	10.38	0.41	April 1
3	31	1997	4	15	1.3	8.15	11.5	-7.5	345.6	10.12	10.90	0.43	Total
4	1	1997	3.6	14.1	3.8	8.95	11.9	-2.3	311.04	8.79	8.96	0.35	0.35

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average pan evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Note A: Sufficient data was not available to calculate evaporation.

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)													
									zero	vapor	Evaporation Using		
			average	maximum	minimum	average	soil average	average	average	pressure	Zero Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Soil Temperature		
(mm)	(dd)	(yyyy)	(m/s)	deg-C	deg-C	deg-C	deg-C	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
12	24	1996										0.08	
12	25	1996										0.08	
12	26	1996	2.1	8.1	-3.7	2.2	2.5	-12.4	0	4.98	1.73	0.07	
12	27	1996	2.4	8.5	0.5	4.5	5.4	-11.6	0	6.48	2.18	0.09	
12	28	1996	2.4	8.5	-0.9	3.8	5.6	-7	0	5.50	1.88	0.07	
12	29	1996	2.2	11.6	-2.3	4.65	4.9	-6	0	4.78	1.66	0.07	December
12	30	1996	2.2	12.3	-2.2	5.05	6.4	-6.4	0	5.85	1.99	0.08	Total
12	31	1996	1.9	12	3.4	7.7	9.5	-3.5	0	7.18	2.38	0.09	0.62
1	1	1997	1.7	12.9	-0.7	6.1	7.1	-2.8	0	5.13	1.77	0.07	
1	2	1997	1.5	13.8	0.2	7	8.5	-2.1	0	5.88	2.00	0.08	
1	3	1997	3.5	13.5	0.8	7.15	8.6	1.7	0	4.28	1.51	0.06	
1	4	1997	1.9	5.9	-2.1	1.9	3.2	-8	0	4.36	1.54	0.06	
1	5	1997	3.3	-0.7	-5.7	-3.2	-1.4	-6.4	0	1.74	0.68	0.03	
1	6	1997	4.3	-5.7	-13	-9.35	-6.5	-13.2	0	1.56	0.62	0.02	
1	7	1997	1.8	-5	-14.6	-9.8	-7.2	-16.2	0	1.85	0.72	0.03	
1	8	1997	1.5	-2.3	-14.3	-8.3	-5.4	-14.5	0	2.11	0.81	0.03	
1	9	1997	1.4	-1.7	-10.7	-6.2	-3.5	-12.7	0	2.43	0.92	0.04	
1	10	1997	1.9	2	-7.5	-2.75	-0.2	-8.4	0	2.79	1.04	0.04	
1	11	1997	3.6	2.2	-12.6	-5.2	-2.7	-8.1	0	1.70	0.67	0.03	
1	12	1997	5.1	-12.6	-17.3	-14.95	-9.9	-21.4	0	1.79	0.70	0.03	
1	13	1997	4	-10.7	-17.4	-14.05	-9.7	-19.6	0	1.65	0.65	0.03	
1	14	1997	3.3	-5.5	-13	-9.25	-6.8	-13.7	0	1.56	0.62	0.02	
1	15	1997	1.7	-3.3	-12.9	-8.1	-4.8	-14.6	0	2.32	0.88	0.03	
1	16	1997	2.1	-4	-11.4	-7.7	-4.1	-12.3	0	2.15	0.82	0.03	
1	17	1997	2.1	1.2	-13.4	-6.1	-3.5	-13.8	0	2.63	0.98	0.04	
1	18	1997	2.1	4.8	-9.4	-2.3	0.14	-12.5	0	3.85	1.38	0.05	
1	19	1997	2.2	8.2	-4.4	1.9	3.5	-8.3	0	4.61	1.61	0.06	
1	20	1997	1.5	5	-3.7	0.65	4.2	-6.7	0	4.57	1.60	0.06	
1	21	1997	3.2	5.2	-3.5	0.85	4.2	-9.1	0	5.20	1.79	0.07	
1	22	1997	2.2	2.3	-5.4	-1.55	3.2	-10.1	0	4.88	1.69	0.07	
1	23	1997	2.1	3.2	-2.7	0.25	3.6	-4.3	0	3.48	1.26	0.05	
1	24	1997	2.4	4.9	-3.7	0.6	4.2	-8.8	0	5.13	1.77	0.07	
1	25	1997	2.5	4.3	-4.3	0	3.9	-6.8	0	4.43	1.55	0.06	
1	26	1997	2.8	4.3	0.4	2.35	7.2	0.8	0	3.69	1.33	0.05	
1	27	1997	2.5	4.8	-3.4	0.7	4.2	-1.7	0	2.87	1.06	0.04	January

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)													
									zero	vapor	Evaporation Using		
			average	maximum	minimum	average	soil average	average	average	pressure	Zero Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Soil Temperature		
(mm)	(dd)	(yyyy)	(m/s)	deg-C	deg-C	deg-C	deg-C	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	2.6	-5.2	0	3.23	1.18	0.05	Total
1	29	1997	2.8	3.7	-2.8	0.45	3.9	-5.8	0	4.13	1.46	0.06	1.51
1	30	1997	1.8	7.5	-5.9	0.8	5.1	-6.2	0	4.96	1.72	0.07	
1	31	1997	1.5	7.7	-3.3	2.2	6.9	-6.3	0	6.16	2.08	0.08	February
2	1	1997	1.7	9.4	1.6	5.5	10.5	-8.3	0	9.46	3.03	0.12	(2/1 - 2/3)
2	2	1997	1.8	9.3	-2.2	3.55	6.5	-5.4	0	5.61	1.92	0.08	Total
2	3	1997	2.7	7.8	-1.7	3.05	6.2	-7.4	0	6.00	2.03	0.08	0.27
2	4	1997	3.4	5.4	-3.2	1.1	3.6	-9.9	0	5.05	1.75	0.07	
2	5	1997	4.4	3.5	-3.2	0.15	4.1	-8.9	0	5.10	1.76	0.07	Event
2	6	1997	2.7	0.8	-5.6	-2.4	1.4	-5.1	0	2.59	0.97	0.04	(12/24 - 2/3)
2	7	1997	1.5	-0.8	-9.1	-4.95	-1.4	-9.1	0	2.46	0.93	0.04	Total
2	8	1997	2	2.3	-8.2	-2.95	-0.3	-10.6	0	3.27	1.19	0.05	2.41
2	9	1997	2	5.1	-5.4	-0.15	2.5	-10.1	0	4.50	1.58	0.06	
2	10	1997	2.1	6.6	-4	1.3	4.2	-12.2	0	5.88	2.00	0.08	
2	11	1997	2.1	9.8	-2.9	3.45	6.7	-11.3	0	7.27	2.41	0.09	
2	12	1997	3.8	7	-4.7	1.15	5.6	-7.5	0	5.64	1.93	0.08	
2	13	1997	3.4	2.4	-2.8	-0.2	2.6	-5.8	0	3.42	1.24	0.05	
2	14	1997	2.2	5.9	-5.2	0.35	3.8	-8.7	0	4.88	1.69	0.07	
2	15	1997	2.2	8.4	-3.2	2.6	5.9	-8.9	0	6.20	2.09	0.08	
2	16	1997	2.5	10.9	-2.6	4.15	8.9	-7.1	0	7.84	2.57	0.10	
2	17	1997	3.5	11.2	0.8	6	11.6	-8.2	0	10.40	3.30	0.13	
2	18	1997	2.5	13.2	2.2	7.7	12.3	-5.4	0	10.24	3.25	0.13	
2	19	1997	4.3	9.3	1.1	5.2	8.3	-3.3	0	6.18	2.09	0.08	
2	20	1997	2.4	11	-1.2	4.9	7.9	-5.6	0	6.65	2.23	0.09	
2	21	1997	3.2	0.7	-7	-3.15	-0.25	-12.5	0	3.68	1.32	0.05	
2	22	1997	2.9	4.7	-7.7	-1.5	-0.1	-10.8	0	3.40	1.23	0.05	
2	23	1997	3.7	2.9	-4.1	-0.6	0.34	-5.3	0	2.15	0.83	0.03	
2	24	1997	4.2	-0.9	-4.7	-2.8	0	-6.2	0	2.28	0.87	0.03	
2	25	1997	3.7	-0.3	-5.5	-2.9	0	-7.9	0	2.75	1.02	0.04	February
2	26	1997	1.5	1.2	-6	-2.4	-0.1	-6.9	0	2.43	0.92	0.04	(2/1 - 2/28)
2	27	1997	4.4	3	-3.7	-0.35	1.56	-6.1	0	2.98	1.10	0.04	Total
2	28	1997	4.1	2.1	-5.3	-1.6	2.4	-5.6	0	3.25	1.19	0.05	1.91
3	1	1997	2.2	1.6	-8.9	-3.65	-0.28	-13.3	0	3.82	1.36	0.05	
3	2	1997	2.3	7.1	-7.8	-0.35	2.3	-12.2	0	4.84	1.68	0.07	
3	3	1997	4.1	11.2	-2.3	4.45	8.2	-12.5	0	8.57	2.78	0.11	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature deg-C	minimum temperature deg-C	average temperature deg-C	soil average temperature deg-C	average dewpoint (deg-C)	zero average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using Zero Wind Speed and Average Soil Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	4.1	-13.2	0	6.01	2.04	0.08	
3	5	1997	2	5.7	-8.9	-1.6	2.3	-17.1	0	5.64	1.93	0.08	
3	6	1997	3	10.8	-5	2.9	4.5	-14.2	0	6.42	2.16	0.08	
3	7	1997	2.2	12.8	-0.1	6.35	8.7	-11.7	0	8.79	2.84	0.11	
3	8	1997	2.6	15.8	1.5	8.65	11.4	-11.7	0	11.02	3.47	0.14	
3	9	1997	2.5	14.4	0.1	7.25	10.2	-11.7	0	9.99	3.18	0.13	
3	10	1997	3	15.3	1.1	8.2	11.6	-10.8	0	11.01	3.47	0.14	
3	11	1997	3.5	18.4	1.9	10.15	13.5	-11.6	0	13.00	4.01	0.16	
3	12	1997	2.4	18.1	3.8	10.95	13.5	-9	0	12.41	3.85	0.15	
3	13	1997	3	17.8	3.8	10.8	13.4	-12.9	0	13.15	4.05	0.16	
3	14	1997	4.4	11.8	-3.8	4	7.9	-8.6	0	7.49	2.47	0.10	
3	15	1997	3.1	17.9	1.2	9.55	12.9	-8.9	0	11.79	3.68	0.15	
3	16	1997	3.3	18.7	3.8	11.25	14.8	-8.5	0	13.65	4.19	0.16	
3	17	1997	3.6	15.7	6.3	11	13.6	-7.6	0	12.16	3.78	0.15	
3	18	1997	4.3	15.7	3.1	9.4	12.3	-10.6	0	11.62	3.63	0.14	
3	19	1997	3.1	19.2	3.7	11.45	14.2	-9.3	0	13.21	4.07	0.16	
3	20	1997	2.5	22.4	6.1	14.25	17.1	-8.1	0	16.21	4.87	0.19	
3	21	1997	2.5	23.2	5.4	14.3	17.5	-10.4	0	17.26	5.15	0.20	
3	22	1997	3.7	17.2	3.5	10.35	13.6	-3.9	0	11.02	3.47	0.14	
3	23	1997	3.3	19.8	6.3	13.05	16.4	-10.5	0	15.94	4.80	0.19	March
3	24	1997	4.9	15.4	-1.2	7.1	11	-9.4	0	10.16	3.23	0.13	Total
3	25	1997	4.3	4.8	-3.6	0.6	4.5	-6.2	0	4.60	1.61	0.06	3.82
3	26	1997	3.2	10.7	-3.5	3.6	6.1	-5.3	0	5.32	1.83	0.07	
3	27	1997	4	16.3	-0.2	8.05	12.5	-5.6	0	10.50	3.32	0.13	
3	28	1997	3.6	17.9	*	*	*	-7.6	0				See Note A
3	29	1997	3.9	14.6	3.1	8.85	11.3	-10.8	0	10.74	3.39	0.13	
3	30	1997	3.3	15.3	-1	7.15	11.2	-13.1	0	11.11	3.50	0.14	April 1
3	31	1997	4	15	1.3	8.15	11.5	-7.5	0	10.12	3.22	0.13	Total
4	1	1997	3.6	14.1	3.8	8.95	11.9	-2.3	0	8.79	2.85	0.11	0.11

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average pan evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Note A: Sufficient data was not available to calculate evaporation.

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)													
									indoor	vapor	Evaporation Using		
			average	maximum	minimum	average	soil average	average	average	pressure	25 Percent Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Soil Temperature		
(mm)	(dd)	(yyyy)	(m/s)	deg-C	deg-C	deg-C	deg-C	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
12	24	1996										0.10	
12	25	1996										0.10	
12	26	1996	2.1	8.1	-3.7	2.2	2.5	-12.4	45.36	4.98	2.27	0.09	
12	27	1996	2.4	8.5	0.5	4.5	5.4	-11.6	51.84	6.48	2.96	0.12	
12	28	1996	2.4	8.5	-0.9	3.8	5.6	-7	51.84	5.50	2.56	0.10	
12	29	1996	2.2	11.6	-2.3	4.65	4.9	-6	47.52	4.78	2.21	0.09	December
12	30	1996	2.2	12.3	-2.2	5.05	6.4	-6.4	47.52	5.85	2.64	0.10	Total
12	31	1996	1.9	12	3.4	7.7	9.5	-3.5	41.04	7.18	3.05	0.12	0.82
1	1	1997	1.7	12.9	-0.7	6.1	7.1	-2.8	36.72	5.13	2.22	0.09	
1	2	1997	1.5	13.8	0.2	7	8.5	-2.1	32.4	5.88	2.44	0.10	
1	3	1997	3.5	13.5	0.8	7.15	8.6	1.7	75.6	4.28	2.30	0.09	
1	4	1997	1.9	5.9	-2.1	1.9	3.2	-8	41.04	4.36	1.97	0.08	
1	5	1997	3.3	-0.7	-5.7	-3.2	-1.4	-6.4	71.28	1.74	1.02	0.04	
1	6	1997	4.3	-5.7	-13	-9.35	-6.5	-13.2	92.88	1.56	1.02	0.04	
1	7	1997	1.8	-5	-14.6	-9.8	-7.2	-16.2	38.88	1.85	0.91	0.04	
1	8	1997	1.5	-2.3	-14.3	-8.3	-5.4	-14.5	32.4	2.11	0.99	0.04	
1	9	1997	1.4	-1.7	-10.7	-6.2	-3.5	-12.7	30.24	2.43	1.11	0.04	
1	10	1997	1.9	2	-7.5	-2.75	-0.2	-8.4	41.04	2.79	1.33	0.05	
1	11	1997	3.6	2.2	-12.6	-5.2	-2.7	-8.1	77.76	1.70	1.03	0.04	
1	12	1997	5.1	-12.6	-17.3	-14.95	-9.9	-21.4	110.16	1.79	1.23	0.05	
1	13	1997	4	-10.7	-17.4	-14.05	-9.7	-19.6	86.4	1.65	1.04	0.04	
1	14	1997	3.3	-5.5	-13	-9.25	-6.8	-13.7	71.28	1.56	0.93	0.04	
1	15	1997	1.7	-3.3	-12.9	-8.1	-4.8	-14.6	36.72	2.32	1.11	0.04	
1	16	1997	2.1	-4	-11.4	-7.7	-4.1	-12.3	45.36	2.15	1.08	0.04	
1	17	1997	2.1	1.2	-13.4	-6.1	-3.5	-13.8	45.36	2.63	1.29	0.05	
1	18	1997	2.1	4.8	-9.4	-2.3	0.14	-12.5	45.36	3.85	1.81	0.07	
1	19	1997	2.2	8.2	-4.4	1.9	3.5	-8.3	47.52	4.61	2.14	0.08	
1	20	1997	1.5	5	-3.7	0.65	4.2	-6.7	32.4	4.57	1.96	0.08	
1	21	1997	3.2	5.2	-3.5	0.85	4.2	-9.1	69.12	5.20	2.65	0.10	
1	22	1997	2.2	2.3	-5.4	-1.55	3.2	-10.1	47.52	4.88	2.25	0.09	
1	23	1997	2.1	3.2	-2.7	0.25	3.6	-4.3	45.36	3.48	1.65	0.07	
1	24	1997	2.4	4.9	-3.7	0.6	4.2	-8.8	51.84	5.13	2.40	0.09	
1	25	1997	2.5	4.3	-4.3	0	3.9	-6.8	54	4.43	2.13	0.08	
1	26	1997	2.8	4.3	0.4	2.35	7.2	0.8	60.48	3.69	1.88	0.07	
1	27	1997	2.5	4.8	-3.4	0.7	4.2	-1.7	54	2.87	1.46	0.06	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)													
									indoor	vapor	Evaporation Using		
			average	maximum	minimum	average	soil average	average	average	pressure	25 Percent Wind Speed and		
month	day	year	windspeed	temperature	temperature	temperature	temperature	dewpoint	windspeed	difference	Average Soil Temperature		
(mm)	(dd)	(yyyy)	(m/s)	deg-C	deg-C	deg-C	deg-C	(deg-C)	(km/d)	(millibars)	(mm/d)	(in/d)	(in)
1	28	1997	1.6	3.3	-6	-1.35	2.6	-5.2	34.56	3.23	1.46	0.06	
1	29	1997	2.8	3.7	-2.8	0.45	3.9	-5.8	60.48	4.13	2.07	0.08	January
1	30	1997	1.8	7.5	-5.9	0.8	5.1	-6.2	38.88	4.96	2.18	0.09	Total
1	31	1997	1.5	7.7	-3.3	2.2	6.9	-6.3	32.4	6.16	2.55	0.10	2.03
2	1	1997	1.7	9.4	1.6	5.5	10.5	-8.3	36.72	9.46	3.80	0.15	February 1-3
2	2	1997	1.8	9.3	-2.2	3.55	6.5	-5.4	38.88	5.61	2.43	0.10	Total
2	3	1997	2.7	7.8	-1.7	3.05	6.2	-7.4	58.32	6.00	2.85	0.11	0.36
2	4	1997	3.4	5.4	-3.2	1.1	3.6	-9.9	73.44	5.05	2.63	0.10	
2	5	1997	4.4	3.5	-3.2	0.15	4.1	-8.9	95.04	5.10	2.92	0.11	Event
2	6	1997	2.7	0.8	-5.6	-2.4	1.4	-5.1	58.32	2.59	1.36	0.05	(12/24-2/3)
2	7	1997	1.5	-0.8	-9.1	-4.95	-1.4	-9.1	32.4	2.46	1.13	0.04	Total
2	8	1997	2	2.3	-8.2	-2.95	-0.3	-10.6	43.2	3.27	1.55	0.06	3.21
2	9	1997	2	5.1	-5.4	-0.15	2.5	-10.1	43.2	4.50	2.05	0.08	
2	10	1997	2.1	6.6	-4	1.3	4.2	-12.2	45.36	5.88	2.62	0.10	
2	11	1997	2.1	9.8	-2.9	3.45	6.7	-11.3	45.36	7.27	3.16	0.12	
2	12	1997	3.8	7	-4.7	1.15	5.6	-7.5	82.08	5.64	3.02	0.12	
2	13	1997	3.4	2.4	-2.8	-0.2	2.6	-5.8	73.44	3.42	1.87	0.07	
2	14	1997	2.2	5.9	-5.2	0.35	3.8	-8.7	47.52	4.88	2.25	0.09	
2	15	1997	2.2	8.4	-3.2	2.6	5.9	-8.9	47.52	6.20	2.78	0.11	
2	16	1997	2.5	10.9	-2.6	4.15	8.9	-7.1	54	7.84	3.53	0.14	
2	17	1997	3.5	11.2	0.8	6	11.6	-8.2	75.6	10.40	5.02	0.20	
2	18	1997	2.5	13.2	2.2	7.7	12.3	-5.4	54	10.24	4.47	0.18	
2	19	1997	4.3	9.3	1.1	5.2	8.3	-3.3	92.88	6.18	3.42	0.13	
2	20	1997	2.4	11	-1.2	4.9	7.9	-5.6	51.84	6.65	3.02	0.12	
2	21	1997	3.2	0.7	-7	-3.15	-0.25	-12.5	69.12	3.68	1.95	0.08	
2	22	1997	2.9	4.7	-7.7	-1.5	-0.1	-10.8	62.64	3.40	1.77	0.07	
2	23	1997	3.7	2.9	-4.1	-0.6	0.34	-5.3	79.92	2.15	1.28	0.05	
2	24	1997	4.2	-0.9	-4.7	-2.8	0	-6.2	90.72	2.28	1.41	0.06	
2	25	1997	3.7	-0.3	-5.5	-2.9	0	-7.9	79.92	2.75	1.59	0.06	February
2	26	1997	1.5	1.2	-6	-2.4	-0.1	-6.9	32.4	2.43	1.12	0.04	(2/1 - 2/28)
2	27	1997	4.4	3	-3.7	-0.35	1.56	-6.1	95.04	2.98	1.82	0.07	Total
2	28	1997	4.1	2.1	-5.3	-1.6	2.4	-5.6	88.56	3.25	1.91	0.08	2.71
3	1	1997	2.2	1.6	-8.9	-3.65	-0.28	-13.3	47.52	3.82	1.81	0.07	
3	2	1997	2.3	7.1	-7.8	-0.35	2.3	-12.2	49.68	4.84	2.26	0.09	
3	3	1997	4.1	11.2	-2.3	4.45	8.2	-12.5	88.56	8.57	4.48	0.18	

Evaporation Data for TA-21 (December 24, 1996 to April 1, 1997)

month (mm)	day (dd)	year (yyyy)	average windspeed (m/s)	maximum temperature deg-C	minimum temperature deg-C	average temperature deg-C	soil average temperature deg-C	average dewpoint (deg-C)	indoor average windspeed (km/d)	vapor pressure difference (millibars)	Evaporation Using 25 Percent Wind Speed and Average Soil Temperature (mm/d)	(in/d)	(in)
3	4	1997	4.5	7.8	-4.8	1.5	4.1	-13.2	97.2	6.01	3.40	0.13	
3	5	1997	2	5.7	-8.9	-1.6	2.3	-17.1	43.2	5.64	2.50	0.10	
3	6	1997	3	10.8	-5	2.9	4.5	-14.2	64.8	6.42	3.12	0.12	
3	7	1997	2.2	12.8	-0.1	6.35	8.7	-11.7	47.52	8.79	3.78	0.15	
3	8	1997	2.6	15.8	1.5	8.65	11.4	-11.7	56.16	11.02	4.82	0.19	
3	9	1997	2.5	14.4	0.1	7.25	10.2	-11.7	54	9.99	4.37	0.17	
3	10	1997	3	15.3	1.1	8.2	11.6	-10.8	64.8	11.01	5.02	0.20	
3	11	1997	3.5	18.4	1.9	10.15	13.5	-11.6	75.6	13.00	6.11	0.24	
3	12	1997	2.4	18.1	3.8	10.95	13.5	-9	51.84	12.41	5.23	0.21	
3	13	1997	3	17.8	3.8	10.8	13.4	-12.9	64.8	13.15	5.87	0.23	
3	14	1997	4.4	11.8	-3.8	4	7.9	-8.6	95.04	7.49	4.09	0.16	
3	15	1997	3.1	17.9	1.2	9.55	12.9	-8.9	66.96	11.79	5.39	0.21	
3	16	1997	3.3	18.7	3.8	11.25	14.8	-8.5	71.28	13.65	6.25	0.25	
3	17	1997	3.6	15.7	6.3	11	13.6	-7.6	77.76	12.16	5.81	0.23	
3	18	1997	4.3	15.7	3.1	9.4	12.3	-10.6	92.88	11.62	5.97	0.23	
3	19	1997	3.1	19.2	3.7	11.45	14.2	-9.3	66.96	13.21	5.95	0.23	
3	20	1997	2.5	22.4	6.1	14.25	17.1	-8.1	54	16.21	6.69	0.26	
3	21	1997	2.5	23.2	5.4	14.3	17.5	-10.4	54	17.26	7.07	0.28	
3	22	1997	3.7	17.2	3.5	10.35	13.6	-3.9	79.92	11.02	5.39	0.21	
3	23	1997	3.3	19.8	6.3	13.05	16.4	-10.5	71.28	15.94	7.17	0.28	March
3	24	1997	4.9	15.4	-1.2	7.1	11	-9.4	105.84	10.16	5.59	0.22	Total
3	25	1997	4.3	4.8	-3.6	0.6	4.5	-6.2	92.88	4.60	2.64	0.10	5.69
3	26	1997	3.2	10.7	-3.5	3.6	6.1	-5.3	69.12	5.32	2.70	0.11	
3	27	1997	4	16.3	-0.2	8.05	12.5	-5.6	86.4	10.50	5.31	0.21	
3	28	1997	3.6	17.9	*	*	*	-7.6	77.76				See Note A
3	29	1997	3.9	14.6	3.1	8.85	11.3	-10.8	84.24	10.74	5.37	0.21	
3	30	1997	3.3	15.3	-1	7.15	11.2	-13.1	71.28	11.11	5.22	0.21	April 1
3	31	1997	4	15	1.3	8.15	11.5	-7.5	86.4	10.12	5.14	0.20	Total
4	1	1997	3.6	14.1	3.8	8.95	11.9	-2.3	77.76	8.79	4.37	0.17	0.17

Assumptions:

No weather data is available for December 24 or 25, 1996. Therefore, an average pan evaporation for the remaining days of the month (December 26 through 31) will be used for these days.

Note A: Sufficient data was not available to calculate evaporation.

Daily Evaporation for Each Evaporation Scenario Using Soil Temperature					
			Actual Wind	Zero Wind	25% Wind
month	day	year	Avg. Temp.	Avg. Temp.	Avg. Temp.
(mm)	(dd)	(yyyy)	(in/d)	(in/d)	(in/d)
12	24	1996	0.18	0.08	0.10
12	25	1996	0.18	0.08	0.10
12	26	1996	0.15	0.07	0.09
12	27	1996	0.21	0.09	0.12
12	28	1996	0.18	0.07	0.10
12	29	1996	0.15	0.07	0.09
12	30	1996	0.18	0.08	0.10
12	31	1996	0.20	0.09	0.12
1	1	1997	0.14	0.07	0.09
1	2	1997	0.15	0.08	0.10
1	3	1997	0.18	0.06	0.09
1	4	1997	0.13	0.06	0.08
1	5	1997	0.08	0.03	0.04
1	6	1997	0.09	0.02	0.04
1	7	1997	0.06	0.03	0.04
1	8	1997	0.06	0.03	0.04
1	9	1997	0.07	0.04	0.04
1	10	1997	0.09	0.04	0.05
1	11	1997	0.08	0.03	0.04
1	12	1997	0.11	0.03	0.05
1	13	1997	0.09	0.03	0.04
1	14	1997	0.07	0.02	0.04
1	15	1997	0.07	0.03	0.04
1	16	1997	0.07	0.03	0.04
1	17	1997	0.09	0.04	0.05
1	18	1997	0.12	0.05	0.07
1	19	1997	0.15	0.06	0.08
1	20	1997	0.12	0.06	0.08
1	21	1997	0.21	0.07	0.10
1	22	1997	0.15	0.07	0.09
1	23	1997	0.11	0.05	0.07
1	24	1997	0.17	0.07	0.09
1	25	1997	0.15	0.06	0.08
1	26	1997	0.14	0.05	0.07
1	27	1997	0.10	0.04	0.06
1	28	1997	0.09	0.05	0.06
1	29	1997	0.15	0.06	0.08
1	30	1997	0.14	0.07	0.09
1	31	1997	0.16	0.08	0.10
2	1	1997	0.24	0.12	0.15
2	2	1997	0.16	0.08	0.10
2	3	1997	0.21	0.08	0.11
2	4	1997	0.21	0.07	0.10
2	5	1997	0.25	0.07	0.11
2	6	1997	0.10	0.04	0.05
2	7	1997	0.07	0.04	0.04
2	8	1997	0.10	0.05	0.06

Daily Evaporation for Each Evaporation Scenario Using Soil Temperature					
			Actual Wind	Zero Wind	25% Wind
month	day	year	Avg. Temp.	Avg. Temp.	Avg. Temp.
(mm)	(dd)	(yyyy)	(in/d)	(in/d)	(in/d)
2	9	1997	0.14	0.06	0.08
2	10	1997	0.18	0.08	0.10
2	11	1997	0.21	0.09	0.12
2	12	1997	0.25	0.08	0.12
2	13	1997	0.15	0.05	0.07
2	14	1997	0.15	0.07	0.09
2	15	1997	0.19	0.08	0.11
2	16	1997	0.25	0.10	0.14
2	17	1997	0.40	0.13	0.20
2	18	1997	0.32	0.13	0.18
2	19	1997	0.29	0.08	0.13
2	20	1997	0.21	0.09	0.12
2	21	1997	0.15	0.05	0.08
2	22	1997	0.13	0.05	0.07
2	23	1997	0.10	0.03	0.05
2	24	1997	0.12	0.03	0.06
2	25	1997	0.13	0.04	0.06
2	26	1997	0.07	0.04	0.04
2	27	1997	0.16	0.04	0.07
2	28	1997	0.16	0.05	0.08
3	1	1997	0.12	0.05	0.07
3	2	1997	0.16	0.07	0.09
3	3	1997	0.38	0.11	0.18
3	4	1997	0.30	0.08	0.13
3	5	1997	0.17	0.08	0.10
3	6	1997	0.24	0.08	0.12
3	7	1997	0.26	0.11	0.15
3	8	1997	0.35	0.14	0.19
3	9	1997	0.31	0.13	0.17
3	10	1997	0.38	0.14	0.20
3	11	1997	0.49	0.16	0.24
3	12	1997	0.37	0.15	0.21
3	13	1997	0.45	0.16	0.23
3	14	1997	0.35	0.10	0.16
3	15	1997	0.41	0.15	0.21
3	16	1997	0.49	0.16	0.25
3	17	1997	0.47	0.15	0.23
3	18	1997	0.51	0.14	0.23
3	19	1997	0.46	0.16	0.23
3	20	1997	0.48	0.19	0.26
3	21	1997	0.51	0.20	0.28
3	22	1997	0.44	0.14	0.21
3	23	1997	0.56	0.19	0.28
3	24	1997	0.50	0.13	0.22
3	25	1997	0.23	0.06	0.10
3	26	1997	0.21	0.07	0.11
3	27	1997	0.44	0.13	0.21

Daily Evaporation for Each Evaporation Scenario Using Soil Temperature					
			Actual Wind	Zero Wind	25% Wind
month	day	year	Avg. Temp.	Avg. Temp.	Avg. Temp.
(mm)	(dd)	(yyyy)	(in/d)	(in/d)	(in/d)
3	28	1997	0.00	0.00	0.00
3	29	1997	0.44	0.13	0.21
3	30	1997	0.41	0.14	0.21
3	31	1997	0.43	0.13	0.20
4	1	1997	0.35	0.11	0.17
			Event Evaporation Using Soil Temperature		
			Actual Wind	Zero Wind	25% Wind
			Avg. Temp.	Avg. Temp.	Avg. Temp.
			(in)	(in)	(in)
December 24 - 31, 1996			1.43	0.62	0.82
January 1 - 31, 1997			3.59	1.51	2.03
February 1 - 3, 1997			0.61	0.27	0.36
		Total Event:	5.63	2.41	3.21
			Monthly Evaporation Using Soil Temperature		
			Actual Wind	Zero Wind	25% Wind
			Avg. Temp.	Avg. Temp.	Avg. Temp.
			(in)	(in)	(in)
December 24 - 31, 1996			1.43	0.62	0.82
February 1 - 28, 1997			5.11	1.91	2.71
March 1 - 31, 1997			11.29	3.82	5.69
April 1, 1997			0.35	0.11	0.17
Assumptions:					
Temperature is average daily soil temperature.					

Appendix B

Sublimation Calculations

	Equation to Calculate Vapor Pressure						
	$p=0.0077(t^2) + 0.3368t + 4.534$						
month	day	year	mxtemp	mntemp	avgtemp	vapor pressure	avgdewp
mm	dd	yyyy	deg-C	deg-C	deg-C	mm Hg	deg-C
12	26	1996	7.7	-7.7	0	4.534	-12.4
12	27	1996	7.8	-1.1	3.35	5.749	-11.6
12	28	1996	8.2	-3	2.6	5.462	-7
12	29	1996	10.3	-5.7	2.3	5.349	-6
12	30	1996	12.1	-2.7	4.7	6.287	-6.4
12	31	1996	11	-0.5	5.25	6.514	-3.5
1	1	1997	12.5	-2	5.25	6.514	-2.8
1	2	1997	12.5	-3	4.75	6.308	-2.1
1	3	1997	12.2	-1.2	5.5	6.619	1.7
1	4	1997	4.4	-3.2	0.6	4.739	-8
1	5	1997	-1.3	-6.3	-3.8	3.365	-6.4
1	6	1997	-5.9	-15	-10.45	1.855	-13.2
1	7	1997	-5.8	-17.9	-11.85	1.624	-16.2
1	8	1997	-3	-16	-9.5	2.029	-14.5
1	9	1997	-1.6	-14.7	-8.15	2.301	-12.7
1	10	1997	1.4	-11	-4.8	3.095	-8.4
1	11	1997	1.2	-12.9	-5.85	2.827	-8.1
1	12	1997	-12.9	-18.1	-15.5	1.164	-21.4
1	13	1997	-11.2	-18.1	-14.65	1.252	-19.6
1	14	1997	-4.2	-13.5	-8.85	2.156	-13.7
1	15	1997	-3.7	-17.5	-10.6	1.829	-14.6
1	16	1997	-3.8	-14	-8.9	2.146	-12.3
1	17	1997	1.9	-14	-6.05	2.778	-13.8
1	18	1997	6.9	-9.9	-1.5	4.046	-12.5
1	19	1997	8.3	-4.3	2	5.238	-8.3
1	20	1997	5.3	-6.4	-0.55	4.351	-6.7
1	21	1997	4.2	-4.2	0	4.534	-9.1
1	22	1997	1.2	-9.8	-4.3	3.228	-10.1
1	23	1997	3.9	-2.8	0.55	4.722	-4.3
1	24	1997	3.7	-7.1	-1.7	3.984	-8.8
1	25	1997	5.8	-7.6	-0.9	4.237	-6.8
1	26	1997	4.8	-0.6	2.1	5.275	0.8
1	27	1997	4.4	-3.1	0.65	4.756	-1.7
1	28	1997	2.6	-7.3	-2.35	3.785	-5.2
1	29	1997	2.8	-4.3	-0.75	4.286	-5.8
1	30	1997	6.6	-7	-0.2	4.467	-6.2
1	31	1997	8	-5.1	1.45	5.039	-6.3
2	1	1997	8.2	-2.1	3.05	5.633	-8.3
2	2	1997	7.5	-4.3	1.6	5.093	-5.4
2	3	1997	6.5	-4	1.25	4.967	-7.4
2	4	1997	3.5	-6.6	-1.55	4.030	-9.9
2	5	1997	2.1	-3.8	-0.85	4.253	-8.9
2	6	1997	-0.2	-9.2	-4.7	3.121	-5.1
2	7	1997	-2.4	-12.9	-7.65	2.408	-9.1
2	8	1997	1.2	-11.1	-4.95	3.056	-10.6
2	9	1997	3.7	-8.3	-2.3	3.800	-10.1

	Equation to Calculate Vapor Pressure						
	$p=0.0077(t^2) + 0.3368t + 4.534$						
month	day	year	mxtemp	mntemp	avgtemp	vapor pressure	avgdewp
mm	dd	yyyy	deg-C	deg-C	deg-C	mm Hg	deg-C
2	10	1997	5.4	-8	-1.3	4.109	-12.2
2	11	1997	8.3	-6	1.15	4.932	-11.3
2	12	1997	6.1	-5.7	0.2	4.602	-7.5
2	13	1997	1.7	-5.3	-1.8	3.953	-5.8
2	14	1997	4.1	-9.6	-2.75	3.666	-8.7
2	15	1997	6.9	-7	-0.05	4.517	-8.9
2	16	1997	9.8	-4.2	2.8	5.537	-7.1
2	17	1997	9.7	-0.1	4.8	6.328	-8.2
2	18	1997	11.1	-0.3	5.4	6.577	-5.4
2	19	1997	7.3	-0.2	3.55	5.827	-3.3
2	20	1997	9.4	-3.4	3	5.614	-5.6
2	21	1997	-0.7	-8.6	-4.65	3.134	-12.5
2	22	1997	3	-10.7	-3.85	3.351	-10.8
2	23	1997	0.9	-7.8	-3.45	3.464	-5.3
2	24	1997	-2	-5	-3.5	3.450	-6.2
2	25	1997	-2.1	-7.7	-4.9	3.069	-7.9
2	26	1997	0.7	-8.4	-3.85	3.351	-6.9
2	27	1997	0.8	-7	-3.1	3.564	-6.1
2	28	1997	1.3	-9.5	-4.1	3.283	-5.6
3	1	1997	0.6	-11.3	-5.35	2.953	-13.3
3	2	1997	6.1	-10.6	-2.25	3.815	-12.2
3	3	1997	10.2	-2.5	3.85	5.945	-12.5
3	4	1997	6.5	-7.8	-0.65	4.318	-13.2
3	5	1997	4.6	-13.4	-4.4	3.201	-17.1
3	6	1997	9.3	-6.9	1.2	4.949	-14.2
3	7	1997	11.1	-2.9	4.1	6.044	-11.7
3	8	1997	13.7	-1.1	6.3	6.961	-11.7
3	9	1997	12	-3.1	4.45	6.185	-11.7
3	10	1997	14.5	-4.1	5.2	6.494	-10.8
3	11	1997	17.2	-0.9	8.15	7.790	-11.6
3	12	1997	16.3	-0.7	7.8	7.630	-9
3	13	1997	16.4	1.2	8.8	8.094	-12.9
3	14	1997	11.9	-4.4	3.75	5.905	-8.6
3	15	1997	16.3	-1.1	7.6	7.538	-8.9
3	16	1997	17.4	0.3	8.85	8.118	-8.5
3	17	1997	14.7	2.5	8.6	8.000	-7.6
3	18	1997	15.4	0.3	7.85	7.652	-10.6
3	19	1997	18.8	0.2	9.5	8.429	-9.3
3	20	1997	21.2	1.5	11.35	9.349	-8.1
3	21	1997	21.5	3.6	12.55	9.974	-10.4
3	22	1997	16	2.9	9.45	8.404	-3.9
3	23	1997	18.3	3.4	10.85	9.095	-10.5
3	24	1997	14.9	-1.4	6.75	7.158	-9.4
3	25	1997	3.1	-4	-0.45	4.384	-6.2
3	26	1997	9.7	-6	1.85	5.183	-5.3
3	27	1997	14.5	-2.6	5.95	6.811	-5.6

	Equation to Calculate Vapor Pressure						
	p=0.0077(t^2) + 0.3368t + 4.534						
month	day	year	mxtemp	mntemp	avgtemp	vapor pressure	avgdewp
mm	dd	yyyy	deg-C	deg-C	deg-C	mm Hg	deg-C
3	28	1997	17	4.1	10.55	8.944	-7.6
3	29	1997	13	-2.3	5.35	6.556	-10.8
3	30	1997	13.6	-3.8	4.9	6.369	-13.1
3	31	1997	14.1	-3	5.55	6.640	-7.5
4	1	1997	11.6	2	6.8	7.180	-2.3

ATTACHMENT A

Los Alamos National Laboratory
Technical Area 21, Building 61
Mixed Waste Container Storage Area
Potable Water Spill (December 24, 1996)

Analytical Results

- Sample Identification - Chain Of Custody
- CST Analytical Report, Number 42654: Pb
- CST Analytical Report, Number 42655: As, Hg, Se
- CST Analytical Report, Number 42650: Ag, Ba, Cd, Cr
- CST-12 Organic Analysis Group, Summary of Analytical Results for Volatiles, Request Number 24301
- Quality Assurance Data Validation Report, Organic GCMS Volatile, Request Number 24301
- CST-12 Semivolatile Organic Analysis, Summary of Analytical Results, Request Number 24301
- CST-12 PCB Analysis Laboratory, Results Summary, Request 24301

ESH-19 RCRA

~~ESH-18 WATER QUALITY~~

call
~~Send~~ Results to
Gian Bacigalupa ESH-19
7-5179

SAMPLE SUBMISSION FORM/ CHAIN OF CUSTODY RECORD

Cost Code- ~~7C18~~ 7C19 Program Code- ~~WE3E~~ WE5M

Sample Number	Site Description	Date Collected	Time Collected	Sampled By	Analysis Requested	Number of Containers	Preservatives
GAB1	TA21-61	12/24/96	1:40pm	MBailey	RCRA metals	1	1 HNO3 to pH < 2
GAB2	↓	↓	1:41pm	↓	RCRA metals Dup	1	↓
GAB3			1:41pm		VOA	1	HCl
GAB4			1:38pm		VOA Dup	1	HCl
GAB5			1:39pm		Semi Vol	1	Refrig. - NONE
GAB6			1:40pm		Semi vol dup	1	↓ ↓
GAB7	↓	↓	1:42pm	↓	Field Dup ~~Sm~~	1	

Mary Bailey

See reverse for chain of custody record

Samples collected for RCRA For spill from TA21-61 12/24/96

PCB analysis

PID screening results from EM&R are negative per Bill Purtyman.

7-5179 Gian Bacigalupa

11/05/96

REPORT NUMBER: 42654

********** CST ANALYTICAL REPORT **********

Prepared by: KLAO on 3-Jan-1997

REQUEST NUMBER: 24302 MATRIX: W ANALYST: IMS PROGRAM CODE: WE5M

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	PB	ICPMS	2.	1.	UG/L	1/03/97	
GAB2	96.11255	PB	ICPMS	2.	1.	UG/L	1/03/97	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	PB	ICPMS	1.	1.	UG/L	1/03/97	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	PB	ICPMS	10.	10.	UG/L	1/03/97	

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REPORT NUMBER: 42654 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: KLAO on 3-Jan-1997

REQUEST NUMBER: 24302 MATRIX: W ANALYST: IMS PROGRAM CODE: WE5M

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.35052	PB	617.	8.	UG/L	576.	69.	1/03/97	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

___ Only qualitative data requested

✓ Only Open (non-blind) QC samples run with this sample batch.

___ No QC samples run with this sample batch.

___ No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 42654

Analyst	Reviewer	Team Leader	QA Officer
1/3/97	1-3-97	1/6/97	1/8/97
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

****

REPORT NUMBER: 42655

********** CST ANALYTICAL REPORT **********

Prepared by: M. KOZUBAL on 3-Jan-1997

REQUEST NUMBER: 24302 MATRIX: W ANALYST: AAS PROGRAM CODE: WE5M

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135

NOTEBOOK: CST9138 PAGE: 105

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	AS	ETVAA	2.	1.	UG/L	1/03/97	
GAB1	96.11254	HG	CVAA	< 0.18		UG/L	1/03/97	
GAB1	96.11254	SE	ETVAA	7.	4.	UG/L	1/03/97	
GAB2	96.11255	AS	ETVAA	2.	4.	UG/L	1/03/97	
GAB2	96.11255	HG	CVAA	0.22	0.18	UG/L	1/03/97	
GAB2	96.11255	SE	ETVAA	5.	4.	UG/L	1/03/97	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	AS	ETVAA	2.	3.	UG/L	1/03/97	
GAB1	96.11254	HG	CVAA	< 0.18		UG/L	1/03/97	
GAB1	96.11254	SE	ETVAA	6.	4.	UG/L	1/03/97	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	AS	ETVAA	5.	4.6	UG/L	1/03/97	
GAB1	96.11254	HG	CVAA	2.	2.1	UG/L	1/03/97	
GAB1	96.11254	SE	ETVAA	5.	5.2	UG/L	1/03/97	

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REPORT NUMBER: 42655 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: M. KOZUBAL on 3-Jan-1997

REQUEST NUMBER: 24302 MATRIX: W ANALYST: AAS PROGRAM CODE: WE5M

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135

NOTEBOOK: CST9138 PAGE: 105

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.35052	AS	44.	1.	UG/L	41.5	6.	1/03/97	UNDER CONTROL
00.35052	HG	4.5	0.5	UG/L	5.85	1.	1/03/97	UNDER CONTROL
00.35052	SE	111.	4.	UG/L	73.2	10.	1/03/97	OUT OF CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

____ Only qualitative data requested

✓ Only Open (non-blind) QC samples run with this sample batch.

____ No QC samples run with this sample batch.

____ No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 42655

Analyst	Reviewer	Team Leader	QA Officer
1/3/97	1-3-97	1/6/97	1/8/97
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

****

REPORT NUMBER: 42650

********** CST ANALYTICAL REPORT **********

Prepared by: M. KOZUBAL on 3-Jan-1997

REQUEST NUMBER: 24302 MATRIX: W ANALYST: OES PROGRAM CODE: WE5M

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135

NOTEBOOK: CST9138 PAGE: 105

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	AG	ICPES	< 0.004		MG/L	1/03/97	
GAB1	96.11254	BA	ICPES	0.043	0.001	MG/L	1/03/97	
GAB1	96.11254	CD	ICPES	< 0.002		MG/L	1/03/97	
GAB1	96.11254	CR	ICPES	0.004	0.004	MG/L	1/03/97	
GAB2	96.11255	AG	ICPES	< 0.004		MG/L	1/03/97	
GAB2	96.11255	BA	ICPES	0.043	0.001	MG/L	1/03/97	
GAB2	96.11255	CD	ICPES	< 0.002		MG/L	1/03/97	
GAB2	96.11255	CR	ICPES	0.004	0.004	MG/L	1/03/97	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	AG	ICPES	< 0.004		MG/L	1/03/97	
GAB1	96.11254	BA	ICPES	0.04	0.001	MG/L	1/03/97	
GAB1	96.11254	CD	ICPES	< 0.002		MG/L	1/03/97	
GAB1	96.11254	CR	ICPES	0.004	0.003	MG/L	1/03/97	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
GAB1	96.11254	AG	ICPES	25.	27.	MG/L	1/03/97	
GAB1	96.11254	BA	ICPES	25.	25.	MG/L	1/03/97	
GAB1	96.11254	CD	ICPES	25.	24.	MG/L	1/03/97	
GAB1	96.11254	CR	ICPES	25.	24.	MG/L	1/03/97	

****

REPORT NUMBER: 42650 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: M. KOZUBAL on 3-Jan-1997

REQUEST NUMBER: 24302 MATRIX: W ANALYST: OES PROGRAM CODE: WE5M

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135

NOTEBOOK: CST9138 PAGE: 105

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.35052	AG	68.	6.	UG/L	70.7	8.	1/03/97	UNDER CONTROL
00.35052	BA	93.	3.	UG/L	102.	12.	1/03/97	UNDER CONTROL
00.35052	CD	180.	6.	UG/L	212.	25.	1/03/97	UNDER CONTROL
00.35052	CR	89.	4.	UG/L	97.5	12.	1/03/97	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

___ Only qualitative data requested

X Only Open (non-blind) QC samples run with this sample batch.

___ No QC samples run with this sample batch.

___ No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 42650

Analyst	Reviewer	Team Leader	QA Officer
1-3-97	1/3/97	1/6/97	1/8/97
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

****

CST-12 ORGANIC ANALYSIS GROUP
SUMMARY OF ANALYTICAL RESULTS FOR VOLATILES

TO: **Marc A. Bailey** **DATE:** January 3, 1997
FROM: Laura C. Ortega, CST-12 Organic Analysis

MATRIX: WATER **REQUEST NUMBER: 24301**

TL 1/3/97

Results Summary
Attached is a tabulation of samples submitted for volatiles analysis and a summary of their analytical results (target compounds found and their concentrations; see Table 1). The samples, collected on December 24, 1996, were analyzed on December 28, 1996.

Method Summary
Samples were analyzed using EPA Method 8260. In summary, a measured volume of sample, usually 5 mL, was analyzed using the purge and trap method combined with capillary column GC/MS. A Delta Perspective PTA-30 Autosampler and a Tekmar 3000 Purge and Trap Concentrator were interfaced to a Hewlett-Packard 5890 Gas Chromatograph / 5971 Mass Selective Detector to perform the analyses. The analytical column used was a J&W Scientific 75 m by 0.53 mm ID, 3 micron film, DB624 capillary column.

Anomalies And Analysis Notes
Below is a summary of required QA/QC parameters as outlined in EPA SW-846 and LANL SOPs and a summary of any anomalies which occurred during the analyses.

Calibration QC were within criteria for all analyses.
Surrogate recoveries were within criteria for all analyses.
Internal standard responses were within criteria for all analyses.

Matrix spike and matrix spike duplicate were analyzed as part of the analytical batch which included the samples from this work request. All spike recoveries and relative percent differences were within criteria. A copy of the MS/MSD recovery form is included with this report.

Holding times were met for all sample analyses.

If you have any questions regarding this data, please call Laura Ortega at 665-7407.

LCO 1/3/97

CST-12 ORGANIC ANALYSIS GROUP
SUMMARY OF ANALYTICAL RESULTS FOR VOLATILES

Table 1. Summary of results of sample analyses for volatiles.

REQUEST NUMBER: 24301

SAMPLE ID	TARGET COMPOUNDS FOUND	AMOUNT (ug/L)	LOQ (ug/L)	TICs
B97.00006	None			Y
S96.11256	Acetone	16 J	20	N
S96.11257	Acetone	21	20	N

Sample IDs beginning with the letter S are samples; those beginning with the letter B are blanks.

LOQ: Limit of quantitation. LOQs normally range between 5 and 20ug/L depending on the compound, unless otherwise noted.

TICs: Tentatively identified compounds. Y = TICs were found. N = TICs were not found.

J: This data qualifier indicates that the compound was detected, but the reported result is less than the LOQ and is an estimated value.

1/3/97

1/3/97

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.
VBLK01

Lab Name: LANL Contract: _____

Project No.: RN24 301 Site: _____ Location: _____ Group: CST-12

Matrix: (soil/water) WATER Lab Sample ID: B9700006

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: F122805.D

Level: (low/med) _____ Date Received: 12/28/96

% Moisture: not dec. _____ Date Analyzed: 12/28/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 1 Concentration Units: (ug/L or ug/Kg) ug/L

CAS Number	Compound Name	RT	Est. Conc.	Q
1. 109-99-9	Furan, tetrahydro-	6.04	6	J
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

UCL
1/3/97

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: LANL Contract: _____

Project No.: RN24240 Site: _____ Location: _____ Group: CST-12

Matrix Spike - Sample No.: S9610796

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
1,1-Dichloroethene	50	0	52	104	(61-145)
Benzene	50	0	54	108	(76-127)
Trichloroethene	50	0	53	106	(71-120)
Toluene	50	0	55	110	(76-125)
Chlorobenzene	50	0	55	110	(75-130)

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MS % REC #	% RPD #	QC LIMITS RPD	REC.
1,1-Dichloroethene	50	52	104	0	14	(61-145)
Benzene	50	54	108	0	11	(76-127)
Trichloroethene	50	54	108	2	14	(71-120)
Toluene	50	55	110	0	13	(76-125)
Chlorobenzene	50	55	110	0	13	(75-130)

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

Comments: _____

FORM III VOA-1 [illegible] 12/04/94

LOS ALAMOS NATIONAL LABORATORY
CST-12 ORGANIC ANALYSIS GROUP

DATA REVIEW CERTIFICATION

Request Number: 24301 Analysis: VOLATILES BY EPA 8260

The data contained in the enclosed report has been reviewed and approved by the people listed below:

LAURA C. ORTEGA		01/03/97
Analyst Name (print)	Analyst Signature	Date
Anthony Lombardo		01/03/97
Data Reviewer Name (print)	Data Reviewer Signature	Date

********** CST ANALYTICAL REPORT **********

EPA VOLATILES Prepared by: JA on 3-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: LAURA ORTEGA PROGRAM CODE: WE5M NOTEBOOK: F122806 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 96.11256 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/28/96 Date Analyzed: 12/28/96

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB3	96.11256	67641	< 20.		UG/L	1/03/97		Acetone
GAB3	96.11256	71432	< 5.		UG/L	1/03/97		Benzene
GAB3	96.11256	108861	< 5.		UG/L	1/03/97		Bromobenzene
GAB3	96.11256	74975	< 5.		UG/L	1/03/97		Bromochloromethane
GAB3	96.11256	75274	< 5.		UG/L	1/03/97		Bromodichloromethane
GAB3	96.11256	75252	< 5.		UG/L	1/03/97		Bromoform
GAB3	96.11256	74839	< 10.		UG/L	1/03/97		Bromomethane
GAB3	96.11256	78933	< 20.		UG/L	1/03/97		2-Butanone
GAB3	96.11256	104518	< 5.		UG/L	1/03/97		n-Butylbenzene
GAB3	96.11256	135988	< 5.		UG/L	1/03/97		sec-Butylbenzene
GAB3	96.11256	98066	< 5.		UG/L	1/03/97		tert-Butylbenzene
GAB3	96.11256	75150	< 5.		UG/L	1/03/97		Carbon disulfide
GAB3	96.11256	56235	< 5.		UG/L	1/03/97		Carbon tetrachloride
GAB3	96.11256	108907	< 5.		UG/L	1/03/97		Chlorobenzene
GAB3	96.11256	124481	< 5.		UG/L	1/03/97		Chlorodibromomethane
GAB3	96.11256	75003	< 10.		UG/L	1/03/97		Chloroethane
GAB3	96.11256	67663	< 5.		UG/L	1/03/97		Chloroform
GAB3	96.11256	74873	< 10.		UG/L	1/03/97		Chloromethane
GAB3	96.11256	95498	< 5.		UG/L	1/03/97		o-Chlorotoluene
GAB3	96.11256	106434	< 5.		UG/L	1/03/97		p-Chlorotoluene
GAB3	96.11256	96128	< 10.		UG/L	1/03/97		1,2-Dibromo-3-chloropropane
GAB3	96.11256	74953	< 5.		UG/L	1/03/97		Dibromomethane
GAB3	96.11256	95501	< 5.		UG/L	1/03/97		o-Dichlorobenzene (1,2)
GAB3	96.11256	541731	< 5.		UG/L	1/03/97		m-Dichlorobenzene (1,3)
GAB3	96.11256	106467	< 5.		UG/L	1/03/97		p-Dichlorobenzene (1,4)
GAB3	96.11256	75718	< 10.		UG/L	1/03/97		Dichlorodifluoromethane

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB3	96.11256	75343	< 5.		UG/L	1/03/97		1,1-Dichloroethane
GAB3	96.11256	107062	< 5.		UG/L	1/03/97		1,2-Dichloroethane
GAB3	96.11256	75354	< 5.		UG/L	1/03/97		1,1-Dichloroethene
GAB3	96.11256	156605	< 5.		UG/L	1/03/97		trans-1,2-Dichloroethene
GAB3	96.11256	156592	< 5.		UG/L	1/03/97		cis-1,2-Dichloroethylene
GAB3	96.11256	78875	< 5.		UG/L	1/03/97		1,2-Dichloropropane
GAB3	96.11256	142289	< 5.		UG/L	1/03/97		1,3-Dichloropropane
GAB3	96.11256	594207	< 5.		UG/L	1/03/97		2,2-Dichloropropane
GAB3	96.11256	563586	< 5.		UG/L	1/03/97		1,1-Dichloropropene
GAB3	96.11256	10061015	< 5.		UG/L	1/03/97		cis-1,3-Dichloropropene
GAB3	96.11256	10061026	< 5.		UG/L	1/03/97		trans-1,3-Dichloropropene
GAB3	96.11256	100414	< 5.		UG/L	1/03/97		Ethylbenzene
GAB3	96.11256	106934	< 5.		UG/L	1/03/97		Ethylene dibromide
GAB3	96.11256	591786	< 20.		UG/L	1/03/97		2-Hexanone
GAB3	96.11256	98828	< 5.		UG/L	1/03/97		Isopropylbenzene
GAB3	96.11256	99876	< 5.		UG/L	1/03/97		4-Isopropyltoluene
GAB3	96.11256	74884	< 5.		UG/L	1/03/97		Methyl iodide
GAB3	96.11256	108101	< 20.		UG/L	1/03/97		4-Methyl-2-pentanone
GAB3	96.11256	75092	< 5.		UG/L	1/03/97		Methylene chloride
GAB3	96.11256	103651	< 5.		UG/L	1/03/97		Propylbenzene
GAB3	96.11256	100425	< 5.		UG/L	1/03/97		Styrene
GAB3	96.11256	630206	< 5.		UG/L	1/03/97		1,1,1,2-Tetrachloroethane
GAB3	96.11256	79345	< 5.		UG/L	1/03/97		1,1,2,2-Tetrachloroethane
GAB3	96.11256	127184	< 5.		UG/L	1/03/97		Tetrachloroethylene
GAB3	96.11256	108883	< 5.		UG/L	1/03/97		Toluene
GAB3	96.11256	76131	< 5.		UG/L	1/03/97		1,1,2-Trichloro-1,2,2-trifluoroethane
GAB3	96.11256	71556	< 5.		UG/L	1/03/97		1,1,1-Trichloroethane
GAB3	96.11256	79005	< 5.		UG/L	1/03/97		1,1,2-Trichloroethane
GAB3	96.11256	79016	< 5.		UG/L	1/03/97		Trichloroethene
GAB3	96.11256	75694	< 5.		UG/L	1/03/97		Trichlorofluoromethane
GAB3	96.11256	96184	< 5.		UG/L	1/03/97		1,2,3-Trichloropropane
GAB3	96.11256	95636	< 5.		UG/L	1/03/97		1,2,4-Trimethylbenzene
GAB3	96.11256	108678	< 5.		UG/L	1/03/97		1,3,5-Trimethylbenzene
GAB3	96.11256	75014	< 10.		UG/L	1/03/97		Vinyl chloride
GAB3	96.11256	1330207	< 5.		UG/L	1/03/97		Mixed-Xylenes (o ± m ± p)

Tentatively Identified Compounds in Customer Sample # 96.11256

none

REPORT NUMBER: 42652

********** CST ANALYTICAL REPORT **********

EPA VOLATILES Prepared by: JA on 3-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: LAURA ORTEGA PROGRAM CODE: WE5M NOTEBOOK: F122806 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 96.11257 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/28/96 Date Analyzed: 12/28/96

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB4	96.11257	67641	21.	6.3	UG/L	1/03/97		Acetone
GAB4	96.11257	71432	< 5.		UG/L	1/03/97		Benzene
GAB4	96.11257	108861	< 5.		UG/L	1/03/97		Bromobenzene
GAB4	96.11257	74975	< 5.		UG/L	1/03/97		Bromochloromethane
GAB4	96.11257	75274	< 5.		UG/L	1/03/97		Bromodichloromethane
GAB4	96.11257	75252	< 5.		UG/L	1/03/97		Bromoform
GAB4	96.11257	74839	< 10.		UG/L	1/03/97		Bromomethane
GAB4	96.11257	78933	< 20.		UG/L	1/03/97		2-Butanone
GAB4	96.11257	104518	< 5.		UG/L	1/03/97		n-Butylbenzene
GAB4	96.11257	135988	< 5.		UG/L	1/03/97		sec-Butylbenzene
GAB4	96.11257	98066	< 5.		UG/L	1/03/97		tert-Butylbenzene
GAB4	96.11257	75150	< 5.		UG/L	1/03/97		Carbon disulfide
GAB4	96.11257	56235	< 5.		UG/L	1/03/97		Carbon tetrachloride
GAB4	96.11257	108907	< 5.		UG/L	1/03/97		Chlorobenzene
GAB4	96.11257	124481	< 5.		UG/L	1/03/97		Chlorodibromomethane
GAB4	96.11257	75003	< 10.		UG/L	1/03/97		Chloroethane
GAB4	96.11257	67663	< 5.		UG/L	1/03/97		Chloroform
GAB4	96.11257	74873	< 10.		UG/L	1/03/97		Chloromethane
GAB4	96.11257	95498	< 5.		UG/L	1/03/97		o-Chlorotoluene
GAB4	96.11257	106434	< 5.		UG/L	1/03/97		p-Chlorotoluene
GAB4	96.11257	96128	< 10.		UG/L	1/03/97		1,2-Dibromo-3-chloropropane
GAB4	96.11257	74953	< 5.		UG/L	1/03/97		Dibromomethane
GAB4	96.11257	95501	< 5.		UG/L	1/03/97		o-Dichlorobenzene (1,2)
GAB4	96.11257	541731	< 5.		UG/L	1/03/97		m-Dichlorobenzene (1,3)
GAB4	96.11257	106467	< 5.		UG/L	1/03/97		p-Dichlorobenzene (1,4)
GAB4	96.11257	75718	< 10.		UG/L	1/03/97		Dichlorodifluoromethane

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB4	96.11257	75343	< 5.		UG/L	1/03/97		1,1-Dichloroethane
GAB4	96.11257	107062	< 5.		UG/L	1/03/97		1,2-Dichloroethane
GAB4	96.11257	75354	< 5.		UG/L	1/03/97		1,1-Dichloroethene
GAB4	96.11257	156605	< 5.		UG/L	1/03/97		trans-1,2-Dichloroethene
GAB4	96.11257	156592	< 5.		UG/L	1/03/97		cis-1,2-Dichloroethylene
GAB4	96.11257	78875	< 5.		UG/L	1/03/97		1,2-Dichloropropane
GAB4	96.11257	142289	< 5.		UG/L	1/03/97		1,3-Dichloropropane
GAB4	96.11257	594207	< 5.		UG/L	1/03/97		2,2-Dichloropropane
GAB4	96.11257	563586	< 5.		UG/L	1/03/97		1,1-Dichloropropene
GAB4	96.11257	10061015	< 5.		UG/L	1/03/97		cis-1,3-Dichloropropene
GAB4	96.11257	10061026	< 5.		UG/L	1/03/97		trans-1,3-Dichloropropene
GAB4	96.11257	100414	< 5.		UG/L	1/03/97		Ethylbenzene
GAB4	96.11257	106934	< 5.		UG/L	1/03/97		Ethylene dibromide
GAB4	96.11257	591786	< 20.		UG/L	1/03/97		2-Hexanone
GAB4	96.11257	98828	< 5.		UG/L	1/03/97		Isopropylbenzene
GAB4	96.11257	99876	< 5.		UG/L	1/03/97		4-Isopropyltoluene
GAB4	96.11257	74884	< 5.		UG/L	1/03/97		Methyl iodide
GAB4	96.11257	108101	< 20.		UG/L	1/03/97		4-Methyl-2-pentanone
GAB4	96.11257	75092	< 5.		UG/L	1/03/97		Methylene chloride
GAB4	96.11257	103651	< 5.		UG/L	1/03/97		Propylbenzene
GAB4	96.11257	100425	< 5.		UG/L	1/03/97		Styrene
GAB4	96.11257	630206	< 5.		UG/L	1/03/97		1,1,1,2-Tetrachloroethane
GAB4	96.11257	79345	< 5.		UG/L	1/03/97		1,1,2,2-Tetrachloroethane
GAB4	96.11257	127184	< 5.		UG/L	1/03/97		Tetrachloroethylene
GAB4	96.11257	108883	< 5.		UG/L	1/03/97		Toluene
GAB4	96.11257	76131	< 5.		UG/L	1/03/97		1,1,2-Trichloro-1,2,2-trifluoroethane
GAB4	96.11257	71556	< 5.		UG/L	1/03/97		1,1,1-Trichloroethane
GAB4	96.11257	79005	< 5.		UG/L	1/03/97		1,1,2-Trichloroethane
GAB4	96.11257	79016	< 5.		UG/L	1/03/97		Trichloroethene
GAB4	96.11257	75694	< 5.		UG/L	1/03/97		Trichlorofluoromethane
GAB4	96.11257	96184	< 5.		UG/L	1/03/97		1,2,3-Trichloropropane
GAB4	96.11257	95636	< 5.		UG/L	1/03/97		1,2,4-Trimethylbenzene
GAB4	96.11257	108678	< 5.		UG/L	1/03/97		1,3,5-Trimethylbenzene
GAB4	96.11257	75014	< 10.		UG/L	1/03/97		Vinyl chloride
GAB4	96.11257	1330207	< 5.		UG/L	1/03/97		Mixed-Xylenes (o ± m ± p)

Tentatively Identified Compounds in Customer Sample # 96.11257

none

********** EM-9 QUALITY ASSURANCE REPORT **********

EPA VOLATILES Prepared by: JA on 3-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: LAURA ORTEGA PROGRAM CODE: WE5M NOTEBOOK: F122806 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QA SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

____ Only qualitative data requested

____ Only Blind QC samples run with this batch.

____ No QC samples run with this sample batch.

____ No QC samples for this constituent and matrix type available within CST

********** EM-9 QUALITY ASSURANCE REPORT **********

SUMMARY OF CONTROL STATUS OF BLANK QC SAMPLES RUN WITH THIS BATCH

Blank Results, Sample # 97.00006 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/28/96 Date Analyzed: 12/28/96

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00006	67641	< 20.		UG/L	0.0		1/03/97	UNDER CONTROL	Acetone
00.20226	97.00006	71432	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Benzene
00.20226	97.00006	108861	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromobenzene
00.20226	97.00006	74975	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromochloromethane
00.20226	97.00006	75274	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromodichloromethane
00.20226	97.00006	75252	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromoform
00.20226	97.00006	74839	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromomethane
00.20226	97.00006	78933	< 20.		UG/L	0.0		1/03/97	UNDER CONTROL	2-Butanone
00.20226	97.00006	104518	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	n-Butylbenzene
00.20226	97.00006	135988	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	sec-Butylbenzene
00.20226	97.00006	98066	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	tert-Butylbenzene
00.20226	97.00006	75150	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Carbon disulfide
00.20226	97.00006	56235	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Carbon tetrachloride
00.20226	97.00006	108907	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Chlorobenzene
00.20226	97.00006	124481	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Chlorodibromomethane
00.20226	97.00006	75003	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Chloroethane
00.20226	97.00006	67663	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Chloroform
00.20226	97.00006	74873	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Chloromethane
00.20226	97.00006	95498	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	o-Chlorotoluene
00.20226	97.00006	106434	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	p-Chlorotoluene
00.20226	97.00006	96128	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2-Dibromo-3-chloropropane

********** EM-9 QUALITY ASSURANCE REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00006	74953	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Dibromomethane
00.20226	97.00006	95501	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	o-Dichlorobenzene (1,2)
00.20226	97.00006	541731	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	m-Dichlorobenzene (1,3)
00.20226	97.00006	106467	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	p-Dichlorobenzene (1,4)
00.20226	97.00006	75718	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Dichlorodifluoromethane
00.20226	97.00006	75343	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1-Dichloroethane
00.20226	97.00006	107062	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2-Dichloroethane
00.20226	97.00006	75354	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1-Dichloroethene
00.20226	97.00006	156605	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	trans-1,2-Dichloroethene
00.20226	97.00006	156592	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	cis-1,2-Dichloroethylene
00.20226	97.00006	78875	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2-Dichloropropane
00.20226	97.00006	142289	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,3-Dichloropropane
00.20226	97.00006	594207	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	2,2-Dichloropropane
00.20226	97.00006	563586	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1-Dichloropropene
00.20226	97.00006	10061015	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	cis-1,3-Dichloropropene
00.20226	97.00006	10061026	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	trans-1,3-Dichloropropene
00.20226	97.00006	100414	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Ethylbenzene
00.20226	97.00006	106934	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Ethylene dibromide
00.20226	97.00006	591786	< 20.		UG/L	0.0		1/03/97	UNDER CONTROL	2-Hexanone
00.20226	97.00006	98828	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Isopropylbenzene
00.20226	97.00006	99876	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	4-Isopropyltoluene
00.20226	97.00006	74884	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Methyl iodide
00.20226	97.00006	108101	< 20.		UG/L	0.0		1/03/97	UNDER CONTROL	4-Methyl-2-pentanone
00.20226	97.00006	75092	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Methylene chloride
00.20226	97.00006	103651	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Propylbenzene
00.20226	97.00006	100425	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Styrene
00.20226	97.00006	630206	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,1,2-Tetrachloroethane
00.20226	97.00006	79345	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,2,2-Tetrachloroethane
00.20226	97.00006	127184	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Tetrachloroethylene
00.20226	97.00006	108883	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Toluene
00.20226	97.00006	76131	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,2-Trichloro-1,2,2-trifluoroetha
00.20226	97.00006	71556	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,1-Trichloroethane
00.20226	97.00006	79005	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,2-Trichloroethane
00.20226	97.00006	79016	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Trichloroethene
00.20226	97.00006	75694	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Trichlorofluoromethane
00.20226	97.00006	96184	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2,3-Trichloropropane

********** EM-9 QUALITY ASSURANCE REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00006	95636	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2,4-Trimethylbenzene
00.20226	97.00006	108678	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,3,5-Trimethylbenzene
00.20226	97.00006	75014	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Vinyl chloride
00.20226	97.00006	1330207	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Mixed-Xylenes (o ± m ± p)

Blank Spike Results: none

Blank Spike Duplicate Results: none

********** EM-9 QUALITY ASSURANCE REPORT **********

SUMMARY OF CONTROL STATUS OF BLIND QA SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

____ Only qualitative data requested

____ Only Open (non-blind) QC samples run with this sample batch.

____ No QC samples run with this sample batch.

____ No QC samples for this constituent and matrix type available within CST

********** EM-9 QUALITY ASSURANCE REPORT **********

SURROGATE RESULTS FOR EPA VOLATILES

Surrogate 1 = 1,2-Dichloroethane d4 (CAS # = 17060070)
Surrogate 2 = Toluene d8 (CAS # = 2037265)
Surrogate 3 = 4-Bromofluorobenzene (CAS # = 460004)
Surrogate 4 = 2-Chlorostyrene (CAS # = 2039874)
Surrogate 5 = Dibromofluoromethane (CAS # = 1868537)

SAMPLE NUMBER	UNITS	Surrogate 1	Surrogate 2	Surrogate 3	Surrogate 4	Surrogate 5	COMPLETION DATE	SAMPLE TYPE
96.11256	%	0.0	104.	88.		100.	3-Jan-1997	
96.11257	%	0.0	105.	89.		102.	3-Jan-1997	
97.00006	%	0.0	105.	89.		100.	3-Jan-1997	B
EPA Limits:								
Water	%	76 - 114	88 - 110	86 - 115	86 - 115	86 - 118		
Soil	%	70 - 121	81 - 117	74 - 121	74 - 121			

REPORT NUMBER: 42652

Analyst	Reviewer	Team Leader	QA Officer
1/3/97	1/3/97	1/3/97	1/3/97
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20

****

QUALITY ASSURANCE

DATA VALIDATION REPORT

ORGANIC GCMS VOLATILE

Prepared by

Los Alamos National Laboratory
Analytical Chemistry
Los Alamos, NM 87545

Prepared for

Data Users
Los Alamos National Laboratory
Los Alamos, NM 87545

Laboratory	CST-12
Request No.	24301
Review Level	3
Analytical Method	SW846 Method 8260
Date of Review	June 10, 1997
Customer	Mike Romero

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Attachment - Laboratory Final Reports with Applied Qualifiers
Note: Not applicable to level 1 validation reports.

A. Introduction

1. Data Review Criteria.

The review of this sample and quality control data was performed in accordance with any or all of the following documents:

a. USEPA SW-846 Methodologies;

b. USEPA CLP SOW Methodologies;

c. Non-USEPA Methodologies, where approved by the Los Alamos National Laboratory, EM-9 Quality Assurance Section;

d. Los Alamos National Laboratory, Analytical Services Requirements Document;

e. USEPA Functional Guidelines for Evaluating Inorganic/Organic Analyses.

2. Report Purpose.

The Quality Assurance Data Validation Report (QADVR) is suggested for use in conjunction with the original data produced from the laboratory, if verification or greater detail of reported data is required of data users or the responding laboratory. The purpose of the QADVR is to alert data users to failed quality-control criteria, method noncompliance, and qualification or requalification of data. Data users should consider this report final but subject to revisions when data usability can be improved through resolution, clarification, addition, and/or requalification of data.

3. Volatile Organic Data Qualifying Codes.

Should the data reviewers deem it necessary to qualify or requalify sample and/or qualify control data due to failed quality control and/or non-compliance of method applications, the following codes will be applied to any analyte(s) in the samples found in the Attachment.

Code	Description
U	The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
J	The associated numerical value is an estimated quantity.
R	The data are unusable (compound may or may not be present). Resampling and reanalysis is necessary for verification.
N	Presumptive evidence of presence of material.
NJ	Presumptive evidence of presence of the material at an estimated quantity.
UJ	The material was analyzed for, but was not detected. Quantitation limit is an estimated quantity.

4. Data Review Report.

The Data Review Report lists the data criteria which are reviewed by the data reviewer. Each element of the Data Review Report is discussed below.

a. Description of criteria reviewed column.

This column narratively describes what data criteria are being reviewed.

b. Review level column.

This column lists the numeric review level code the reviewer is working at when reviewing a particular data criteria. The cover sheet also indicates the review level. Each numeric code is followed by an alphabetic code. The data user should note that the codes change throughout the Data Review Report. Depending on the review level, not every criteria will be examined. The following table explains the meaning of the numeric and alphabetic codes.

Review level numeric	Description
1	Least stringent review of data.
2	More stringent review than level 1 but less stringent review than level 3.
3	Most stringent review of data. More stringent than levels 1 and 2.

Review level alpha	Description
f	Final laboratory reports are reviewed.
r	Raw data are reviewed.

c. Criteria met Y/N column.

If the data under review is acceptable, the data reviewer puts a yes (Y) in the column. If the data is unacceptable, the data reviewer puts a no (N) in the column.

d. Comment number and category column.

If the data reviewer comments on the acceptability or unacceptability of the data reviewed, a sequential numeric value is placed in this column. The data reviewer may comment on any data criteria which does not necessarily pertain to acceptable or unacceptable laboratory performance. The corresponding comment will be listed in Section D of the QADVR. Comments are classified as follows.

Classification Code	Description
CD	Correctable Deficiency (CD) - these are deficiencies that are correctable by the laboratory.

NCD	Noncorrectable Deficiencies (NCD) - these are deficiencies that can be addressed by the laboratory. However, corrections usually cannot be made unless reanalysis is performed.
CPD	Completeness Deficiencies (CPD) - these are deficiencies where data was not provided. Completeness deficiencies can be correctable or noncorrectable, depending on past laboratory performance.
G	General (G) - These are general comments which may or may not affect data.

5. Data Review Comments and Qualifying Statements.

As previously discussed under the Data Review Report, the data reviewer may or may not supply comments. Depending on the type of comment and the deficiency, sample and/or quality-control data can be affected. Should the sample and/or quality-control data be significantly impacted, through failed QC and/or method noncompliance, the data reviewer's comment will be followed by a data qualifying statement (DQS). The DQS informs the data user or QADVR reviewer as to what sample and/or quality-control data was affected, using a narrative discussion and qualifying codes.

6. Data Reviewer's Assessment.

The data reviewer assesses the entire data package for completeness, quality control,and contractual compliance. The data reviewer then issues an explanatory narrative assessment depicting the data package as excellent, good, average, poor, or rejected.

7. Data User's Guidance and Reviewer's Signature.

The data reviewer summarizes how the QADVR was conducted and that data qualification and/or requalification may have been performed. In addition, data users and/or QADVR reviewers are advised to understand the impact of this report on data usability from the analytical standpoint. The QADVR is then signed-off by the reviewer and peer reviewer.

8. Acronyms (partial listing).

Organic Acronyms	Description
1. GCMS	Gas Chromatography Mass Spectrometry
2. GC/ECD	Gas Chromatography/Electron Capture Detector, GC Pest/PCB
3. HPLC	High Performance Liquid Chromatography
4. GPC	Gel Permeation Chromatography, GCMS, GC
5. GC/FID	Gas Chromatography/Flame/Ionization Detector
6. MS/MSD	Matrix Spike/Matrix Spike Duplicate
7. RE	Re-extracted and/or Re-analyzed
8. DL	Secondary dilution
9. VBLK	Volatile Blank
10. SBLK	Semivolatile Blank
11. PBLK	Pesticide/Aroclor Blank

8. Acronyms (partial listing) (cont)

Organic Acronyms	Description
12. VSTD	Volatile Standard
13. SSTD	Semivolatile Standard
14. RF	Response Factor, GCMS, GC
15. CF	Calibration Factor, GC
16. SV	Semivolatile Analysis
17. VOA	Volatile Organic Analysis
18. TIC	Tentatively Identified Compound
19. CCC	Calibration Check Compound, GCMS
20. SPCC	System Performance Check Compound, GCMS
21. BFB	Bromofluorobenzene, GCMS
22. DFTPP	Decafluorotriphenylphosphine, GCMS
23. RRF	Relative Response Factor, GCMS, GC
24. TCMX	Tetrachloro-m-xylene, GC Pest/PCB
25. DCB	Decachlorobiphenyl, GC Pest/PCB
26. IS	Internal Standard, GCMS, GC
27. RT	Retention Time, GCMS, GC
28. RIC	Reconstructed Ion Chromatograph, GCMS
29. EQL	Estimated Quantitation Limit
30. SMC	System Monitoring Compound, GCMS

Common Acronyms	Description
1. SDG	Sample Delivery Group
2. SOW	Statement of Work
3. QC	Quality Control
4. COC	Chain-of-Custody
5. %D	Percent Difference
6. RSD	Relative Standard Deviation
7. RPD	Relative Percentage Difference

B. Table of Samples Reviewed

TABLE I. SAMPLES REVIEWED			
	CST-12 Sample ID	Contract Laboratory ID	Matrix
1.	96.11256	GAB3	W
2.	96.11257	GAB4	W
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

Matrix: (S) Soil, (W) Water

C. Review Report

	Description of Criteria Reviewed	Review Level	Criteria Met Y/N	Comment number and Category			
				CD	NCD	CPD	G
1.	Holding Time, Sample Collection to Analysis						
	a. Waters 14 days pres., 7 days unpres. (aromatics)	1fr,2fr,3fr	Y				
	b. Soils 14 days	1fr,2fr,3fr	NA				
2.	Tune						
	a. BFB	1f,2f,3fr	Y				
	b. Samples analyzed within 12 hour time?	1f,2f,3fr	Y				
3.	Initial Calibration						
	a. All target compounds RRF ≥0.05%?	1f,2f,3fr	Y				
	b. All target compounds RRF ≤30% RSD?	1f,2f,3fr	Y				
4.	Continuing Calibration						
	a. Was a continuing calibration performed every 12-hours?	1f,2f,3fr	Y				
	b. All target compounds RRF ≥0.05?	1f,2f,3fr	Y				
	c. All target compounds ≤25% D?	1f,2f,3fr	Y				

C. **Review Report (cont.)**

	Description of Criteria Reviewed	Review Level	Criteria Met Y/N	Comment number and Category			
				CD	NCD	CPD	G
5.	Blanks						
	a. Was a method blank performed per matrix, per concentration level for each 12-hour period?	1f,2f,3fr	Y				
	b. Was an instrument blank analyzed following any sample where high target compounds were reported?	1f,2f,3fr	NA				
	c. All method blanks are < the CRQL?	1f,2f,3fr	Y				
	d. All method and instrument blanks contain no TICs?	1f,2f,3fr	Y				
6.	System Monitoring Compounds						
	a. Are recoveries within control limits for samples and method blanks?	1f,2f,3fr	Y				
	b. If recoveries are not within control limits was a re-analysis performed for waters and low level soils and/or a re-extraction and re-analysis for medium level soils?	1f,2f,3fr	NA				
7.	Matrix Spike/Matrix Spike Duplicates						
	a. MS/MSD within control limits?		Y				
8.	Internal Standards						
	a. All samples and blanks < (±50%) a factor of 2 when compared to continuing calibration IS?	2f,3fr	Y				
	b. All samples and blanks within 30 seconds (0.5 min) retention time when compared to continuing calibration IS?	2f,3fr	Y				

C. **Review Report (cont.)**

	Description of Criteria Reviewed	Review Level	Criteria Met Y/N	Comment number and Category			
				CD	NCD	CPD	G
9.	Sample Results						
	a. Discrete shifts in the RIC baseline are not present?	1fr,2fr,3fr	Y				
	b. High RIC background levels or RT shifts are not present?	1fr,2fr,3fr	Y				
	c. Qualitation and Quantitation correct?	1fr,2fr,3fr	Y				
10.	Tentatively Identified Compounds (TICs)						
	a. Were TICs requested?	3fr	Y				
	b. Were TICs library searched and compared two best 3 matches?	3fr	Y				
11.	QC Blind Sample						
	a. Are the results of the QC blind sample within limits?	1fr,2fr,3fr	NA				

D. Data Review Comments and Qualifying Statements

Comment number	Comment

E. Data Reviewer's Assessment

The QC criteria was met in the analytical process of this request. The data package is accurate and complete. Based on the acceptable QC requirements the data package has been rated as **EXCELLENT**.

F. Data Users Guidance Criteria and Reviewer's Signature

This quality assurance data review was conducted under the guidelines as specified in the introduction section of this report. The data reviewer has reviewed the sample and quality control analyses and documented the findings in an attempt to assist data users with the assessment, completeness and accuracy of this original data package. Data qualification and/or requalification may have been performed, see Attachment, Data Reviewer's comments, and qualifying statements.

Report prepared and reviewed by

Laura Kelly 6/10/97
Date

☐	Laura Kelly	ph. (505) 665-4993
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☐	Victor Weiss	ph. (505) 665-4101

ATTACHMENT

Laboratory Final Reports with Applied Qualifiers
Note: Not applicable to level 1 validation reports.

********** CST ANALYTICAL REPORT **********

EPA VOLATILES Prepared by: JA on 3-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: LAURA ORTEGA PROGRAM CODE: WE5M NOTEBOOK: F122806 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 96.11256 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/28/96 Date Analyzed: 12/28/96

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB3	96.11256	67641	< 20.		UG/L	1/03/97		Acetone
GAB3	96.11256	71432	< 5.		UG/L	1/03/97		Benzene
GAB3	96.11256	108861	< 5.		UG/L	1/03/97		Bromobenzene
GAB3	96.11256	74975	< 5.		UG/L	1/03/97		Bromochloromethane
GAB3	96.11256	75274	< 5.		UG/L	1/03/97		Bromodichloromethane
GAB3	96.11256	75252	< 5.		UG/L	1/03/97		Bromoform
GAB3	96.11256	74839	< 10.		UG/L	1/03/97		Bromomethane
GAB3	96.11256	78933	< 20.		UG/L	1/03/97		2-Butanone
GAB3	96.11256	104518	< 5.		UG/L	1/03/97		n-Butylbenzene
GAB3	96.11256	135988	< 5.		UG/L	1/03/97		sec-Butylbenzene
GAB3	96.11256	98066	< 5.		UG/L	1/03/97		tert-Butylbenzene
GAB3	96.11256	75150	< 5.		UG/L	1/03/97		Carbon disulfide
GAB3	96.11256	56235	< 5.		UG/L	1/03/97		Carbon tetrachloride
GAB3	96.11256	108907	< 5.		UG/L	1/03/97		Chlorobenzene
GAB3	96.11256	124481	< 5.		UG/L	1/03/97		Chlorodibromomethane
GAB3	96.11256	75003	< 10.		UG/L	1/03/97		Chloroethane
GAB3	96.11256	67663	< 5.		UG/L	1/03/97		Chloroform
GAB3	96.11256	74873	< 10.		UG/L	1/03/97		Chloromethane
GAB3	96.11256	95498	< 5.		UG/L	1/03/97		o-Chlorotoluene
GAB3	96.11256	106434	< 5.		UG/L	1/03/97		p-Chlorotoluene
GAB3	96.11256	96128	< 10.		UG/L	1/03/97		1,2-Dibromo-3-chloropropane
GAB3	96.11256	74953	< 5.		UG/L	1/03/97		Dibromomethane
GAB3	96.11256	95501	< 5.		UG/L	1/03/97		o-Dichlorobenzene (1,2)
GAB3	96.11256	541731	< 5.		UG/L	1/03/97		m-Dichlorobenzene (1,3)
GAB3	96.11256	106467	< 5.		UG/L	1/03/97		p-Dichlorobenzene (1,4)
GAB3	96.11256	75718	< 10.		UG/L	1/03/97		Dichlorodifluoromethane

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTIGAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB3	96.11256	75343	< 5.		UG/L	1/03/97		1,1-Dichloroethane
GAB3	96.11256	107062	< 5.		UG/L	1/03/97		1,2-Dichloroethane
GAB3	96.11256	75354	< 5.		UG/L	1/03/97		1,1-Dichloroethene
GAB3	96.11256	156605	< 5.		UG/L	1/03/97		trans-1,2-Dichloroethene
GAB3	96.11256	156592	< 5.		UG/L	1/03/97		cis-1,2-Dichloroethylene
GAB3	96.11256	78875	< 5.		UG/L	1/03/97		1,2-Dichloropropane
GAB3	96.11256	142289	< 5.		UG/L	1/03/97		1,3-Dichloropropane
GAB3	96.11256	594207	< 5.		UG/L	1/03/97		2,2-Dichloropropane
GAB3	96.11256	563586	< 5.		UG/L	1/03/97		1,1-Dichloropropene
GAB3	96.11256	10061015	< 5.		UG/L	1/03/97		cis-1,3-Dichloropropene
GAB3	96.11256	10061026	< 5.		UG/L	1/03/97		trans-1,3-Dichloropropene
GAB3	96.11256	100414	< 5.		UG/L	1/03/97		Ethylbenzene
GAB3	96.11256	106934	< 5.		UG/L	1/03/97		Ethylene dibromide
GAB3	96.11256	591786	< 20.		UG/L	1/03/97		2-Hexanone
GAB3	96.11256	98828	< 5.		UG/L	1/03/97		Isopropylbenzene
GAB3	96.11256	99876	< 5.		UG/L	1/03/97		4-Isopropyltoluene
GAB3	96.11256	74884	< 5.		UG/L	1/03/97		Methyl iodide
GAB3	96.11256	108101	< 20.		UG/L	1/03/97		4-Methyl-2-pentanone
GAB3	96.11256	75092	< 5.		UG/L	1/03/97		Methylene chloride
GAB3	96.11256	103651	< 5.		UG/L	1/03/97		Propylbenzene
GAB3	96.11256	100425	< 5.		UG/L	1/03/97		Styrene
GAB3	96.11256	630206	< 5.		UG/L	1/03/97		1,1,1,2-Tetrachloroethane
GAB3	96.11256	79345	< 5.		UG/L	1/03/97		1,1,2,2-Tetrachloroethane
GAB3	96.11256	127184	< 5.		UG/L	1/03/97		Tetrachloroethylene
GAB3	96.11256	108883	< 5.		UG/L	1/03/97		Toluene
GAB3	96.11256	76131	< 5.		UG/L	1/03/97		1,1,2-Trichloro-1,2,2-trifluoroethane
GAB3	96.11256	71556	< 5.		UG/L	1/03/97		1,1,1-Trichloroethane
GAB3	96.11256	79005	< 5.		UG/L	1/03/97		1,1,2-Trichloroethane
GAB3	96.11256	79016	< 5.		UG/L	1/03/97		Trichloroethene
GAB3	96.11256	75694	< 5.		UG/L	1/03/97		Trichlorofluoromethane
GAB3	96.11256	96184	< 5.		UG/L	1/03/97		1,2,3-Trichloropropane
GAB3	96.11256	95636	< 5.		UG/L	1/03/97		1,2,4-Trimethylbenzene
GAB3	96.11256	108678	< 5.		UG/L	1/03/97		1,3,5-Trimethylbenzene
GAB3	96.11256	75014	< 10.		UG/L	1/03/97		Vinyl chloride
GAB3	96.11256	1330207	< 5.		UG/L	1/03/97		Mixed-Xylenes (o ± m ± p)

Tentatively Identified Compounds in Customer Sample # 96.11256

none

********** CST ANALYTICAL REPORT **********

EPA VOLATILES Prepared by: JA on 3-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: LAURA ORTEGA PROGRAM CODE: WE5M NOTEBOOK: F122806 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 96.11257 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/28/96 Date Analyzed: 12/28/96

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB4	96.11257	67641	21.	6.3	UG/L	1/03/97		Acetone
GAB4	96.11257	71432	< 5.		UG/L	1/03/97		Benzene
GAB4	96.11257	108861	< 5.		UG/L	1/03/97		Bromobenzene
GAB4	96.11257	74975	< 5.		UG/L	1/03/97		Bromochloromethane
GAB4	96.11257	75274	< 5.		UG/L	1/03/97		Bromodichloromethane
GAB4	96.11257	75252	< 5.		UG/L	1/03/97		Bromoform
GAB4	96.11257	74839	< 10.		UG/L	1/03/97		Bromomethane
GAB4	96.11257	78933	< 20.		UG/L	1/03/97		2-Butanone
GAB4	96.11257	104518	< 5.		UG/L	1/03/97		n-Butylbenzene
GAB4	96.11257	135988	< 5.		UG/L	1/03/97		sec-Butylbenzene
GAB4	96.11257	98066	< 5.		UG/L	1/03/97		tert-Butylbenzene
GAB4	96.11257	75150	< 5.		UG/L	1/03/97		Carbon disulfide
GAB4	96.11257	56235	< 5.		UG/L	1/03/97		Carbon tetrachloride
GAB4	96.11257	108907	< 5.		UG/L	1/03/97		Chlorobenzene
GAB4	96.11257	124481	< 5.		UG/L	1/03/97		Chlorodibromomethane
GAB4	96.11257	75003	< 10.		UG/L	1/03/97		Chloroethane
GAB4	96.11257	67663	< 5.		UG/L	1/03/97		Chloroform
GAB4	96.11257	74873	< 10.		UG/L	1/03/97		Chloromethane
GAB4	96.11257	95498	< 5.		UG/L	1/03/97		o-Chlorotoluene
GAB4	96.11257	106434	< 5.		UG/L	1/03/97		p-Chlorotoluene
GAB4	96.11257	96128	< 10.		UG/L	1/03/97		1,2-Dibromo-3-chloropropane
GAB4	96.11257	74953	< 5.		UG/L	1/03/97		Dibromomethane
GAB4	96.11257	95501	< 5.		UG/L	1/03/97		o-Dichlorobenzene (1,2)
GAB4	96.11257	541731	< 5.		UG/L	1/03/97		m-Dichlorobenzene (1,3)
GAB4	96.11257	106467	< 5.		UG/L	1/03/97		p-Dichlorobenzene (1,4)
GAB4	96.11257	75718	< 10.		UG/L	1/03/97		Dichlorodifluoromethane

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB4	96.11257	75343	< 5.		UG/L	1/03/97		1,1-Dichloroethane
GAB4	96.11257	107062	< 5.		UG/L	1/03/97		1,2-Dichloroethane
GAB4	96.11257	75354	< 5.		UG/L	1/03/97		1,1-Dichloroethene
GAB4	96.11257	156605	< 5.		UG/L	1/03/97		trans-1,2-Dichloroethene
GAB4	96.11257	156592	< 5.		UG/L	1/03/97		cis-1,2-Dichloroethylene
GAB4	96.11257	78875	< 5.		UG/L	1/03/97		1,2-Dichloropropane
GAB4	96.11257	142289	< 5.		UG/L	1/03/97		1,3-Dichloropropane
GAB4	96.11257	594207	< 5.		UG/L	1/03/97		2,2-Dichloropropane
GAB4	96.11257	563586	< 5.		UG/L	1/03/97		1,1-Dichloropropene
GAB4	96.11257	10061015	< 5.		UG/L	1/03/97		cis-1,3-Dichloropropene
GAB4	96.11257	10061026	< 5.		UG/L	1/03/97		trans-1,3-Dichloropropene
GAB4	96.11257	100414	< 5.		UG/L	1/03/97		Ethylbenzene
GAB4	96.11257	106934	< 5.		UG/L	1/03/97		Ethylene dibromide
GAB4	96.11257	591786	< 20.		UG/L	1/03/97		2-Hexanone
GAB4	96.11257	98828	< 5.		UG/L	1/03/97		Isopropylbenzene
GAB4	96.11257	99876	< 5.		UG/L	1/03/97		4-Isopropyltoluene
GAB4	96.11257	74884	< 5.		UG/L	1/03/97		Methyl iodide
GAB4	96.11257	108101	< 20.		UG/L	1/03/97		4-Methyl-2-pentanone
GAB4	96.11257	75092	< 5.		UG/L	1/03/97		Methylene chloride
GAB4	96.11257	103651	< 5.		UG/L	1/03/97		Propylbenzene
GAB4	96.11257	100425	< 5.		UG/L	1/03/97		Styrene
GAB4	96.11257	630206	< 5.		UG/L	1/03/97		1,1,1,2-Tetrachloroethane
GAB4	96.11257	79345	< 5.		UG/L	1/03/97		1,1,2,2-Tetrachloroethane
GAB4	96.11257	127184	< 5.		UG/L	1/03/97		Tetrachloroethylene
GAB4	96.11257	108883	< 5.		UG/L	1/03/97		Toluene
GAB4	96.11257	76131	< 5.		UG/L	1/03/97		1,1,2-Trichloro-1,2,2-trifluoroethane
GAB4	96.11257	71556	< 5.		UG/L	1/03/97		1,1,1-Trichloroethane
GAB4	96.11257	79005	< 5.		UG/L	1/03/97		1,1,2-Trichloroethane
GAB4	96.11257	79016	< 5.		UG/L	1/03/97		Trichloroethene
GAB4	96.11257	75694	< 5.		UG/L	1/03/97		Trichlorofluoromethane
GAB4	96.11257	96184	< 5.		UG/L	1/03/97		1,2,3-Trichloropropane
GAB4	96.11257	95636	< 5.		UG/L	1/03/97		1,2,4-Trimethylbenzene
GAB4	96.11257	108678	< 5.		UG/L	1/03/97		1,3,5-Trimethylbenzene
GAB4	96.11257	75014	< 10.		UG/L	1/03/97		Vinyl chloride
GAB4	96.11257	1330207	< 5.		UG/L	1/03/97		Mixed-Xylenes (o ± m ± p)

Tentatively Identified Compounds in Customer Sample # 96.11257

none

********** EM-9 QUALITY ASSURANCE REPORT **********

EPA VOLATILES Prepared by: JA on 3-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: LAURA ORTEGA PROGRAM CODE: WE5M NOTEBOOK: F122806 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QA SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

____ Only qualitative data requested

____ Only Blind QC samples run with this batch.

____ No QC samples run with this sample batch.

____ No QC samples for this constituent and matrix type available within CST

********** EM-9 QUALITY ASSURANCE REPORT **********

SUMMARY OF CONTROL STATUS OF BLANK QC SAMPLES RUN WITH THIS BATCH

Blank Results, Sample # 97.00006 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/28/96 Date Analyzed: 12/28/96

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00006	67641	< 20.		UG/L	0.0		1/03/97	UNDER CONTROL	Acetone
00.20226	97.00006	71432	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Benzene
00.20226	97.00006	108861	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromobenzene
00.20226	97.00006	74975	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromochloromethane
00.20226	97.00006	75274	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromodichloromethane
00.20226	97.00006	75252	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromoform
00.20226	97.00006	74839	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Bromomethane
00.20226	97.00006	78933	< 20.		UG/L	0.0		1/03/97	UNDER CONTROL	2-Butanone
00.20226	97.00006	104518	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	n-Butylbenzene
00.20226	97.00006	135988	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	sec-Butylbenzene
00.20226	97.00006	98066	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	tert-Butylbenzene
00.20226	97.00006	75150	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Carbon disulfide
00.20226	97.00006	56235	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Carbon tetrachloride
00.20226	97.00006	108907	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Chlorobenzene
00.20226	97.00006	124481	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Chlorodibromomethane
00.20226	97.00006	75003	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Chloroethane
00.20226	97.00006	67663	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Chloroform
00.20226	97.00006	74873	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Chloromethane
00.20226	97.00006	95498	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	o-Chlorotoluene
00.20226	97.00006	106434	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	p-Chlorotoluene
00.20226	97.00006	96128	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2-Dibromo-3-chloropropane

********** EM-9 QUALITY ASSURANCE REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00006	74953	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Dibromomethane
00.20226	97.00006	95501	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	o-Dichlorobenzene (1,2)
00.20226	97.00006	541731	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	m-Dichlorobenzene (1,3)
00.20226	97.00006	106467	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	p-Dichlorobenzene (1,4)
00.20226	97.00006	75718	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Dichlorodifluoromethane
00.20226	97.00006	75343	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1-Dichloroethane
00.20226	97.00006	107062	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2-Dichloroethane
00.20226	97.00006	75354	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1-Dichloroethene
00.20226	97.00006	156605	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	trans-1,2-Dichloroethene
00.20226	97.00006	156592	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	cis-1,2-Dichloroethylene
00.20226	97.00006	78875	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2-Dichloropropane
00.20226	97.00006	142289	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,3-Dichloropropane
00.20226	97.00006	594207	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	2,2-Dichloropropane
00.20226	97.00006	563586	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1-Dichloropropene
00.20226	97.00006	10061015	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	cis-1,3-Dichloropropene
00.20226	97.00006	10061026	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	trans-1,3-Dichloropropene
00.20226	97.00006	100414	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Ethylbenzene
00.20226	97.00006	106934	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Ethylene dibromide
00.20226	97.00006	591786	< 20.		UG/L	0.0		1/03/97	UNDER CONTROL	2-Hexanone
00.20226	97.00006	98828	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Isopropylbenzene
00.20226	97.00006	99876	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	4-Isopropyltoluene
00.20226	97.00006	74884	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Methyl iodide
00.20226	97.00006	108101	< 20.		UG/L	0.0		1/03/97	UNDER CONTROL	4-Methyl-2-pentanone
00.20226	97.00006	75092	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Methylene chloride
00.20226	97.00006	103651	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Propylbenzene
00.20226	97.00006	100425	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Styrene
00.20226	97.00006	630206	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,1,2-Tetrachloroethane
00.20226	97.00006	79345	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,2,2-Tetrachloroethane
00.20226	97.00006	127184	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Tetrachloroethylene
00.20226	97.00006	108883	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Toluene
00.20226	97.00006	76131	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,2-Trichloro-1,2,2-trifluoroethar
00.20226	97.00006	71556	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,1-Trichloroethane
00.20226	97.00006	79005	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,1,2-Trichloroethane
00.20226	97.00006	79016	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Trichloroethene
00.20226	97.00006	75694	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Trichlorofluoromethane
00.20226	97.00006	96184	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2,3-Trichloropropane

********** EM-9 QUALITY ASSURANCE REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00006	95636	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,2,4-Trimethylbenzene
00.20226	97.00006	108678	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	1,3,5-Trimethylbenzene
00.20226	97.00006	75014	< 10.		UG/L	0.0		1/03/97	UNDER CONTROL	Vinyl chloride
00.20226	97.00006	1330207	< 5.		UG/L	0.0		1/03/97	UNDER CONTROL	Mixed-Xylenes (o ± m ± p)

Blank Spike Results: none

Blank Spike Duplicate Results: none

********** EM-9 QUALITY ASSURANCE REPORT **********

SUMMARY OF CONTROL STATUS OF BLIND QA SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

____ Only qualitative data requested

____ Only Open (non-blind) QC samples run with this sample batch.

____ No QC samples run with this sample batch.

____ No QC samples for this constituent and matrix type available within CST

********** EM-9 QUALITY ASSURANCE REPORT **********

SURROGATE RESULTS FOR EPA VOLATILES

Surrogate 1 = 1,2-Dichloroethane d4 (CAS # = 17060070)
Surrogate 2 = Toluene d8 (CAS # = 2037265)
Surrogate 3 = 4-Bromofluorobenzene (CAS # = 460004)
Surrogate 4 = 2-Chlorostyrene (CAS # = 2039874)
Surrogate 5 = Dibromofluoromethane (CAS # = 1868537)

SAMPLE NUMBER	UNITS	Surrogate 1	Surrogate 2	Surrogate 3	Surrogate 4	Surrogate 5	COMPLETION DATE	SAMPLE TYPE
96.11256	%	0.0	104.	88.		100.	3-Jan-1997	
96.11257	%	0.0	105.	89.		102.	3-Jan-1997	
97.00006	%	0.0	105.	89.		100.	3-Jan-1997	B
EPA Limits:								
Water	%	76 - 114	88 - 110	86 - 115	86 - 115	86 - 118		
Soil	%	70 - 121	81 - 117	74 - 121	74 - 121			

REPORT NUMBER: 42652

Analyst	Reviewer	Team Leader	QA Officer
1/3/97	1/3/97	1/3/97	1/3/97
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20

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CST-12 SEMIVOLATILE ORGANIC ANALYSIS
SUMMARY OF ANALYTICAL RESULTS

TO: Marc A. Bailey, ESH-18 **DATE:** January 3, 1997
FROM: Anthony Lombardo, CST-12 Organic Analysis AL 1/3/97

MATRIX: Water **REQUEST NUMBER: 24301**

Results Summary
Attached is a tabulation of samples submitted for semivolatile analysis and their analytical results (Table 1.) Three sample was received for semivolatile analysis. Samples were collected on December 24, 1996. Sample extraction was started on December 25 and 29, 1996. Samples were analyzed on December 25 and 29, 1996. All hold times were met.

Method Summary
Samples were extracted by separatory funnel shakeout extraction method. A measured volume of sample, usually 1 liter, is placed in a 2 liter separatory funnel. Sample pH is adjusted to <2 (acid extraction) and is shaken with methylene chloride. The methylene chloride is separated from the sample, more methylene chloride is added to the funnel, and the process is repeated for a total of three times. The sample pH is adjusted >11 (base/neutral extraction) and methylene chloride extraction is repeated. Sample extracts were then combined, dried and concentrated to 1.0 ml final volume. Appropriate surrogate standards were added prior to extraction. Analysis was performed by capillary column GC/MS methods. Extraction and analysis methods are consistent with EPA SW-846 methods 3510 and 8270. Analytical column used was a J&W Scientific DB5.MS 30 M by 0.25 mm ID, 0.25 micron film or equivalent.

Anomalies And Analysis Notes
Below is a summary of QA/QC criteria as outlined in EPA SW-846 and LANL SOPs and a summary of any anomalies which occurred during the analyses.

Calibration QC were within criteria for all analyses.
Surrogate recoveries were within criteria for all analyses.
Internal standard responses were within criteria for all analyses.

Sample 96.11260 was received and extracted on December 25, 1996. The analyst treated this sample as radioactive and extracted 250 mL. This increased detection limits for this sample by a factor of 4.

Matrix spike/matrix spike duplicate and internal QC audit samples were not analyzed with this sample set. This sample set will be included with the next quality assurance batch.

Tentatively Identified Compounds (TICs) were identified and concentrations estimated. Low levels of non-target compounds were seen, notably compounds identified as " unknown chlorinated hydrocarbons". Molecular weight appears to be 132. In the presence of free chlorine, Surrogate Phenol-d5 is known to form deuterated chlorophenol, which has a molecular weight of 132. Surrogate Phenol-d5 was low but in criteria in these samples. Presence of the chlorinated hydrocarbons could be attributed to the presence of free chlorine in the samples.

If you have any questions regarding this data, please call Anthony Lombardo at 665-7410.

TL 1/3/97

CST-12 SEMIVOLATILE ORGANIC ANALYSIS
SUMMARY OF ANALYTICAL RESULTS

Table 1. Summary of results of sample analyses for semivolatiles.

REQUEST NUMBER: 24301

TL 1/3/97

SAMPLE ID	TARGET COMPOUNDS FOUND	AMOUNT (ug/L)	LOQ (ug/L)	TICs
BLANK01	Di-n-butylphthalate	12	10	Y
	Bis-2-ethylhexylphthalate	200 E	10	
BLANK02	Di-n-butylphthalate	23 J	40	Y
	Bis-2-ethylhexylphthalate	33 J	40	
	Di-n-octylphthalate	16 J	40	
S96.11258	Di-n-butylphthalate	7 JB	10	Y
	Bis-2-ethylhexylphthalate	5 JB	10	
S96.11259	Di-n-butylphthalate	6 JB	10	Y
	Bis-2-ethylhexylphthalate	2 JB	10	
S96.11260	Di-n-butylphthalate	9 JB	40	Y
	Bis-2-ethylhexylphthalate	7 JB	40	

LOQ: Limit of quantitation. LOQs normally range between 10 and 50ug/L depending on the compound, unless otherwise noted.

TICs: Tentatively identified compounds. Y = TICs were found. N = TICs were not found.

J: Compound is present in the sample, but at a concentration that is less than LOQ. This concentration should be considered an estimate.

B: This compound was seen in the method blank as well as the sample. Concentration is considered significant at ten times the blank amount for phthalate esters and five times blank amount for the remaining compounds.

E: Concentration was above upper limit of quantitation.

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

SBLK01

Lab Name: LANL-CST12 Contract: _____

Project No.: 2430 Site: _____ Location: _____ Group: _____

Matrix: (soil/water) WATER Lab Sample ID: B96

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: K010203.D

Level: (low/med) _____ Date Received: 12/24/96

% Moisture: 0 decanted: (Y/N) N Date Extracted: 12/29/96

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 1/2/97

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

Number TICs found: 2 Concentration Units: (ug/L or ug/Kg) ug/L

CAS Number	Compound Name	RT	Est. Conc	Q
1.	Unknown	27.50	15	J
2.	Unknown	31.21	27	J
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4.				
5.				
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TR 1/2/97

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

S9611258

Lab Name: LANL-CST12 Contract:

Project No.: 2430 Site: Location: Group:

Matrix: (soil/water) WATER Lab Sample ID: S9611258

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: K010204.D

Level: (low/med) Date Received: 12/24/96

% Moisture: 0 decanted: (Y/N) N Date Extracted: 12/29/96

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 1/2/97

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

Number TICs found: 3 Concentration Units: (ug/L or ug/Kg) ug/L

CAS Number	Compound Name	RT	Est. Conc	Q
1.	Unknown	5.96	12	J
2.	Unknown Chlorinated hydrocar	9.85	13	J
3.	Unknown Chlorinated hydrocar	13.60	9	J
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5.				
6.				
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1/2/97

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

S9611259

Lab Name: LANL-CST12 Contract:

Project No.: 2430 Site: Location: Group:

Matrix: (soil/water) WATER Lab Sample ID: S9611259

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: K010205.D

Level: (low/med) Date Received: 12/24/96

% Moisture: 0 decanted: (Y/N) N Date Extracted: 12/29/96

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 1/2/97

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

Number TICs found: 5 Concentration Units: (ug/L or ug/Kg) ug/L

CAS Number	Compound Name	RT	Est. Conc	Q
1.	Unknown	5.96	13	J
2.	Unknown Chlorinated hydrocar	9.85	11	J
3.	Unknown Chlorinated hydrocar	13.60	10	J
4.	Unknown	27.50	24	J B
5.	Unknown	31.21	35	J B
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1/2/97

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

S9611260

Lab Name: LANL-CST12 Contract:

Project No.: 2430 Site: Location: Group:

Matrix: (soil/water) WATER Lab Sample ID: S9611260

Sample wt/vol: 250.0 (g/mL) M Lab File ID: K122503.D

Level: (low/med) Date Received: 12/24/96

% Moisture: 0 decanted: (Y/N) N Date Extracted: 12/25/96

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 12/25/96

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

Number TICs found: 1 Concentration Units: (ug/L or ug/Kg) ug/L

CAS Number	Compound Name	RT	Est. Conc	Q
1.	Unknown	5.97	67	J
2.				
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TL 1/2/97

LOS ALAMOS NATIONAL LABORATORY
CST-12 ORGANIC ANALYSIS GROUP

DATA REVIEW CERTIFICATION

Request Number: 24301 **Analysis:** Semivolatiles SW-846 8270

The data contained in the enclosed report has been reviewed and approved by the people listed below:

A Lombardo	[signature]	1/2/97
Analyst Name (print)	**Analyst Signature**	**Date**
LAURA C. ORTEGA	[signature]	1/3/97
Data Reviewer Name (print)	**Data Reviewer Signature**	**Date**

REPORT NUMBER: 42659

********** CST ANALYTICAL REPORT **********

EPA SEMIVOLATILES Prepared by: JA on 7-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: ANTHONY LOMBARDO PROGRAM CODE: WE5M NOTEBOOK: K010204 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 96.11258 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/29/96 Date Analyzed: 1/02/97

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB5	96.11258	83329	< 10.		UG/L	1/07/97		Acenaphthene
GAB5	96.11258	208968	< 10.		UG/L	1/07/97		Acenaphthylene
GAB5	96.11258	62533	< 10.		UG/L	1/07/97		Aniline
GAB5	96.11258	120127	< 10.		UG/L	1/07/97		Anthracene
GAB5	96.11258	103333	< 10.		UG/L	1/07/97		Azobenzene
GAB5	96.11258	92875	< 50.		UG/L	1/07/97		m-Benzidine
GAB5	96.11258	56553	< 10.		UG/L	1/07/97		Benzo[a]anthracene
GAB5	96.11258	50328	< 10.		UG/L	1/07/97		Benzo[a]pyrene
GAB5	96.11258	205992	< 10.		UG/L	1/07/97		Benzo[b]fluoranthene
GAB5	96.11258	191242	< 10.		UG/L	1/07/97		Benzo[g,h,i]perylene
GAB5	96.11258	207089	< 10.		UG/L	1/07/97		Benzo[k]fluoranthene
GAB5	96.11258	65850	< 50.		UG/L	1/07/97		Benzoic acid
GAB5	96.11258	100516	< 10.		UG/L	1/07/97		Benzyl alcohol
GAB5	96.11258	111911	< 10.		UG/L	1/07/97		Bis(2-chloroethoxy)methane
GAB5	96.11258	111444	< 10.		UG/L	1/07/97		Bis(2-chloroethyl)ether
GAB5	96.11258	108601	< 10.		UG/L	1/07/97		Bis(2-chloroisopropyl)ether
GAB5	96.11258	117817	< 10.		UG/L	1/07/97		Bis(2-ethylhexyl)phthalate
GAB5	96.11258	101553	< 10.		UG/L	1/07/97		4-Bromophenylphenyl ether
GAB5	96.11258	85687	< 10.		UG/L	1/07/97		Butyl benzyl phthalate
GAB5	96.11258	59507	< 10.		UG/L	1/07/97		4-Chloro-3-methylphenol
GAB5	96.11258	106478	< 10.		UG/L	1/07/97		4-Chloroaniline
GAB5	96.11258	91587	< 10.		UG/L	1/07/97		2-Chloronaphthalene
GAB5	96.11258	95578	< 10.		UG/L	1/07/97		o-Chlorophenol
GAB5	96.11258	7005723	< 10.		UG/L	1/07/97		4-Chlorophenylphenyl ether
GAB5	96.11258	218019	< 10.		UG/L	1/07/97		Chrysene
GAB5	96.11258	84742	< 10.		UG/L	1/07/97		Di-n-butyl phthalate

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB5	96.11258	117840	< 10.		UG/L	1/07/97		Di-n-octyl phthalate
GAB5	96.11258	53703	< 10.		UG/L	1/07/97		Dibenzo[a,h]anthracene
GAB5	96.11258	132649	< 10.		UG/L	1/07/97		Dibenzofuran
GAB5	96.11258	95501	< 10.		UG/L	1/07/97		o-Dichlorobenzene (1,2)
GAB5	96.11258	541731	< 10.		UG/L	1/07/97		m-Dichlorobenzene (1,3)
GAB5	96.11258	106467	< 10.		UG/L	1/07/97		p-Dichlorobenzene (1,4)
GAB5	96.11258	91941	< 20.		UG/L	1/07/97		3,3'-Dichlorobenzidine
GAB5	96.11258	120832	< 10.		UG/L	1/07/97		2,4-Dichlorophenol
GAB5	96.11258	84662	< 10.		UG/L	1/07/97		Diethyl phthalate
GAB5	96.11258	131113	< 10.		UG/L	1/07/97		Dimethyl phthalate
GAB5	96.11258	105679	< 10.		UG/L	1/07/97		2,4-Dimethylphenol
GAB5	96.11258	51285	< 50.		UG/L	1/07/97		2,4-Dinitrophenol
GAB5	96.11258	121142	< 10.		UG/L	1/07/97		2,4-Dinitrotoluene
GAB5	96.11258	606202	< 10.		UG/L	1/07/97		2,6-Dinitrotoluene
GAB5	96.11258	206440	< 10.		UG/L	1/07/97		Fluoranthene
GAB5	96.11258	86737	< 10.		UG/L	1/07/97		Fluorene
GAB5	96.11258	118741	< 10.		UG/L	1/07/97		Hexachlorobenzene
GAB5	96.11258	87683	< 50.		UG/L	1/07/97		Hexachlorobutadiene
GAB5	96.11258	77474	< 10.		UG/L	1/07/97		Hexachlorocyclopentadiene
GAB5	96.11258	67721	< 10.		UG/L	1/07/97		Hexachloroethane
GAB5	96.11258	193395	< 10.		UG/L	1/07/97		Indeno[1,2,3-cd]pyrene
GAB5	96.11258	78591	< 10.		UG/L	1/07/97		Isophorone
GAB5	96.11258	534521	< 50.		UG/L	1/07/97		2-Methyl-4,6-dinitrophenol
GAB5	96.11258	91576	< 10.		UG/L	1/07/97		2-Methylnaphthalene
GAB5	96.11258	95487	< 10.		UG/L	1/07/97		2-Methylphenol
GAB5	96.11258	106445	< 10.		UG/L	1/07/97		4-Methylphenol
GAB5	96.11258	91203	< 10.		UG/L	1/07/97		Naphthalene
GAB5	96.11258	88744	< 20.		UG/L	1/07/97		2-Nitroaniline
GAB5	96.11258	99092	< 20.		UG/L	1/07/97		3-Nitroaniline
GAB5	96.11258	100016	< 20.		UG/L	1/07/97		4-Nitroaniline
GAB5	96.11258	98953	< 10.		UG/L	1/07/97		Nitrobenzene
GAB5	96.11258	88755	< 10.		UG/L	1/07/97		2-Nitrophenol
GAB5	96.11258	100027	< 50.		UG/L	1/07/97		4-Nitrophenol
GAB5	96.11258	621647	< 10.		UG/L	1/07/97		N-Nitrosodi-n-propylamine
GAB5	96.11258	62759	< 10.		UG/L	1/07/97		N-Nitrosodimethylamine
GAB5	96.11258	86306	< 10.		UG/L	1/07/97		N-Nitrosodiphenylamine

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB5	96.11258	87865	< 50.		UG/L	1/07/97		Pentachlorophenol
GAB5	96.11258	85018	< 10.		UG/L	1/07/97		Phenanthrene
GAB5	96.11258	108952	< 10.		UG/L	1/07/97		Phenol
GAB5	96.11258	109068	< 10.		UG/L	1/07/97		2-Picoline
GAB5	96.11258	129000	< 10.		UG/L	1/07/97		Pyrene
GAB5	96.11258	110861	< 10.		UG/L	1/07/97		Pyridine
GAB5	96.11258	120821	< 10.		UG/L	1/07/97		1,2,4-Trichlorobenzene
GAB5	96.11258	95954	< 10.		UG/L	1/07/97		2,4,5-Trichlorophenol
GAB5	96.11258	88062	< 10.		UG/L	1/07/97		2,4,6-Trichlorophenol

Tentatively Identified Compounds in Customer Sample # 96.11258

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS		ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB5	96.11258	100	TI	12.		UG/L	1/07/97		Unknown organic compound
GAB5	96.11258	166	TI	13.		UG/L	1/07/97		Unsaturated Hydrocarbons
GAB5	96.11258	166	TI	9.		UG/L	1/07/97		Unsaturated Hydrocarbons

********** CST ANALYTICAL REPORT **********

EPA SEMIVOLATILES Prepared by: JA on 7-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: ANTHONY LOMBARDO PROGRAM CODE: WE5M NOTEBOOK: K010204 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 96.11259 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/29/96 Date Analyzed: 1/02/97

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB6	96.11259	83329	< 10.		UG/L	1/07/97		Acenaphthene
GAB6	96.11259	208968	< 10.		UG/L	1/07/97		Acenaphthylene
GAB6	96.11259	62533	< 10.		UG/L	1/07/97		Aniline
GAB6	96.11259	120127	< 10.		UG/L	1/07/97		Anthracene
GAB6	96.11259	103333	< 10.		UG/L	1/07/97		Azobenzene
GAB6	96.11259	92875	< 50.		UG/L	1/07/97		m-Benzidine
GAB6	96.11259	56553	< 10.		UG/L	1/07/97		Benzo[a]anthracene
GAB6	96.11259	50328	< 10.		UG/L	1/07/97		Benzo[a]pyrene
GAB6	96.11259	205992	< 10.		UG/L	1/07/97		Benzo[b]fluoranthene
GAB6	96.11259	191242	< 10.		UG/L	1/07/97		Benzo[g,h,i]perylene
GAB6	96.11259	207089	< 10.		UG/L	1/07/97		Benzo[k]fluoranthene
GAB6	96.11259	65850	< 50.		UG/L	1/07/97		Benzoic acid
GAB6	96.11259	100516	< 10.		UG/L	1/07/97		Benzyl alcohol
GAB6	96.11259	111911	< 10.		UG/L	1/07/97		Bis(2-chloroethoxy)methane
GAB6	96.11259	111444	< 10.		UG/L	1/07/97		Bis(2-chloroethyl)ether
GAB6	96.11259	108601	< 10.		UG/L	1/07/97		Bis(2-chloroisopropyl)ether
GAB6	96.11259	117817	< 10.		UG/L	1/07/97		Bis(2-ethylhexyl)phthalate
GAB6	96.11259	101553	< 10.		UG/L	1/07/97		4-Bromophenylphenyl ether
GAB6	96.11259	85687	< 10.		UG/L	1/07/97		Butyl benzyl phthalate
GAB6	96.11259	59507	< 10.		UG/L	1/07/97		4-Chloro-3-methylphenol
GAB6	96.11259	106478	< 10.		UG/L	1/07/97		4-Chloroaniline
GAB6	96.11259	91587	< 10.		UG/L	1/07/97		2-Chloronaphthalene
GAB6	96.11259	95578	< 10.		UG/L	1/07/97		o-Chlorophenol
GAB6	96.11259	7005723	< 10.		UG/L	1/07/97		4-Chlorophenylphenyl ether
GAB6	96.11259	218019	< 10.		UG/L	1/07/97		Chrysene
GAB6	96.11259	84742	< 10.		UG/L	1/07/97		Di-n-butyl phthalate

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB6	96.11259	117840	< 10.		UG/L	1/07/97		Di-n-octyl phthalate
GAB6	96.11259	53703	< 10.		UG/L	1/07/97		Dibenzo[a,h]anthracene
GAB6	96.11259	132649	< 10.		UG/L	1/07/97		Dibenzofuran
GAB6	96.11259	95501	< 10.		UG/L	1/07/97		o-Dichlorobenzene (1,2)
GAB6	96.11259	541731	< 10.		UG/L	1/07/97		m-Dichlorobenzene (1,3)
GAB6	96.11259	106467	< 10.		UG/L	1/07/97		p-Dichlorobenzene (1,4)
GAB6	96.11259	91941	< 20.		UG/L	1/07/97		3,3'-Dichlorobenzidine
GAB6	96.11259	120832	< 10.		UG/L	1/07/97		2,4-Dichlorophenol
GAB6	96.11259	84662	< 10.		UG/L	1/07/97		Diethyl phthalate
GAB6	96.11259	131113	< 10.		UG/L	1/07/97		Dimethyl phthalate
GAB6	96.11259	105679	< 10.		UG/L	1/07/97		2,4-Dimethylphenol
GAB6	96.11259	51285	< 50.		UG/L	1/07/97		2,4-Dinitrophenol
GAB6	96.11259	121142	< 10.		UG/L	1/07/97		2,4-Dinitrotoluene
GAB6	96.11259	606202	< 10.		UG/L	1/07/97		2,6-Dinitrotoluene
GAB6	96.11259	206440	< 10.		UG/L	1/07/97		Fluoranthene
GAB6	96.11259	86737	< 10.		UG/L	1/07/97		Fluorene
GAB6	96.11259	118741	< 10.		UG/L	1/07/97		Hexachlorobenzene
GAB6	96.11259	87683	< 50.		UG/L	1/07/97		Hexachlorobutadiene
GAB6	96.11259	77474	< 10.		UG/L	1/07/97		Hexachlorocyclopentadiene
GAB6	96.11259	67721	< 10.		UG/L	1/07/97		Hexachloroethane
GAB6	96.11259	193395	< 10.		UG/L	1/07/97		Indeno[1,2,3-cd]pyrene
GAB6	96.11259	78591	< 10.		UG/L	1/07/97		Isophorone
GAB6	96.11259	534521	< 50.		UG/L	1/07/97		2-Methyl-4,6-dinitrophenol
GAB6	96.11259	91576	< 10.		UG/L	1/07/97		2-Methylnaphthalene
GAB6	96.11259	95487	< 10.		UG/L	1/07/97		2-Methylphenol
GAB6	96.11259	106445	< 10.		UG/L	1/07/97		4-Methylphenol
GAB6	96.11259	91203	< 10.		UG/L	1/07/97		Naphthalene
GAB6	96.11259	88744	< 20.		UG/L	1/07/97		2-Nitroaniline
GAB6	96.11259	99092	< 20.		UG/L	1/07/97		3-Nitroaniline
GAB6	96.11259	100016	< 20.		UG/L	1/07/97		4-Nitroaniline
GAB6	96.11259	98953	< 10.		UG/L	1/07/97		Nitrobenzene
GAB6	96.11259	88755	< 10.		UG/L	1/07/97		2-Nitrophenol
GAB6	96.11259	100027	< 50.		UG/L	1/07/97		4-Nitrophenol
GAB6	96.11259	621647	< 10.		UG/L	1/07/97		N-Nitrosodi-n-propylamine
GAB6	96.11259	62759	< 10.		UG/L	1/07/97		N-Nitrosodimethylamine
GAB6	96.11259	86306	< 10.		UG/L	1/07/97		N-Nitrosodiphenylamine

REPORT NUMBER: 42659

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB6	96.11259	87865	< 50.		UG/L	1/07/97		Pentachlorophenol
GAB6	96.11259	85018	< 10.		UG/L	1/07/97		Phenanthrene
GAB6	96.11259	108952	< 10.		UG/L	1/07/97		Phenol
GAB6	96.11259	109068	< 10.		UG/L	1/07/97		2-Picoline
GAB6	96.11259	129000	< 10.		UG/L	1/07/97		Pyrene
GAB6	96.11259	110861	< 10.		UG/L	1/07/97		Pyridine
GAB6	96.11259	120821	< 10.		UG/L	1/07/97		1,2,4-Trichlorobenzene
GAB6	96.11259	95954	< 10.		UG/L	1/07/97		2,4,5-Trichlorophenol
GAB6	96.11259	88062	< 10.		UG/L	1/07/97		2,4,6-Trichlorophenol

Tentatively Identified Compounds in Customer Sample # 96.11259

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS		ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB6	96.11259	100	TI	13.		UG/L	1/07/97		Unknown organic compound
GAB6	96.11259	100	TI	35.		UG/L	1/07/97		Unknown organic compound
GAB6	96.11259	100	TI	24.		UG/L	1/07/97		Unknown organic compound
GAB6	96.11259	166	TI	11.		UG/L	1/07/97		Unsaturated Hydrocarbons
GAB6	96.11259	166	TI	10.		UG/L	1/07/97		Unsaturated Hydrocarbons

********** CST ANALYTICAL REPORT **********

EPA SEMIVOLATILES Prepared by: JA on 7-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: ANTHONY LOMBARDO PROGRAM CODE: WE5M NOTEBOOK: K010204 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 96.11260 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/25/96 Date Analyzed: 12/25/96

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB7	96.11260	83329	< 40.		UG/L	1/07/97		Acenaphthene
GAB7	96.11260	208968	< 40.		UG/L	1/07/97		Acenaphthylene
GAB7	96.11260	62533	< 40.		UG/L	1/07/97		Aniline
GAB7	96.11260	120127	< 40.		UG/L	1/07/97		Anthracene
GAB7	96.11260	103333	< 40.		UG/L	1/07/97		Azobenzene
GAB7	96.11260	92875	< 200.		UG/L	1/07/97		m-Benzidine
GAB7	96.11260	56553	< 40.		UG/L	1/07/97		Benzo[a]anthracene
GAB7	96.11260	50328	< 40.		UG/L	1/07/97		Benzo[a]pyrene
GAB7	96.11260	205992	< 40.		UG/L	1/07/97		Benzo[b]fluoranthene
GAB7	96.11260	191242	< 40.		UG/L	1/07/97		Benzo[g,h,i]perylene
GAB7	96.11260	207089	< 40.		UG/L	1/07/97		Benzo[k]fluoranthene
GAB7	96.11260	65850	< 200.		UG/L	1/07/97		Benzoic acid
GAB7	96.11260	100516	< 40.		UG/L	1/07/97		Benzyl alcohol
GAB7	96.11260	111911	< 40.		UG/L	1/07/97		Bis(2-chloroethoxy)methane
GAB7	96.11260	111444	< 40.		UG/L	1/07/97		Bis(2-chloroethyl)ether
GAB7	96.11260	108601	< 40.		UG/L	1/07/97		Bis(2-chloroisopropyl)ether
GAB7	96.11260	117817	< 40.		UG/L	1/07/97		Bis(2-ethylhexyl)phthalate
GAB7	96.11260	101553	< 40.		UG/L	1/07/97		4-Bromophenylphenyl ether
GAB7	96.11260	85687	< 40.		UG/L	1/07/97		Butyl benzyl phthalate
GAB7	96.11260	59507	< 40.		UG/L	1/07/97		4-Chloro-3-methylphenol
GAB7	96.11260	106478	< 40.		UG/L	1/07/97		4-Chloroaniline
GAB7	96.11260	91587	< 40.		UG/L	1/07/97		2-Chloronaphthalene
GAB7	96.11260	95578	< 40.		UG/L	1/07/97		o-Chlorophenol
GAB7	96.11260	7005723	< 40.		UG/L	1/07/97		4-Chlorophenylphenyl ether
GAB7	96.11260	218019	< 40.		UG/L	1/07/97		Chrysene
GAB7	96.11260	84742	< 40.		UG/L	1/07/97		Di-n-butyl phthalate

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB7	96.11260	117840	< 40.		UG/L	1/07/97		Di-n-octyl phthalate
GAB7	96.11260	53703	< 40.		UG/L	1/07/97		Dibenzo[a,h]anthracene
GAB7	96.11260	132649	< 40.		UG/L	1/07/97		Dibenzofuran
GAB7	96.11260	95501	< 40.		UG/L	1/07/97		o-Dichlorobenzene (1,2)
GAB7	96.11260	541731	< 40.		UG/L	1/07/97		m-Dichlorobenzene (1,3)
GAB7	96.11260	106467	< 40.		UG/L	1/07/97		p-Dichlorobenzene (1,4)
GAB7	96.11260	91941	< 80.		UG/L	1/07/97		3,3'-Dichlorobenzidine
GAB7	96.11260	120832	< 40.		UG/L	1/07/97		2,4-Dichlorophenol
GAB7	96.11260	84662	< 40.		UG/L	1/07/97		Diethyl phthalate
GAB7	96.11260	131113	< 40.		UG/L	1/07/97		Dimethyl phthalate
GAB7	96.11260	105679	< 40.		UG/L	1/07/97		2,4-Dimethylphenol
GAB7	96.11260	51285	< 200.		UG/L	1/07/97		2,4-Dinitrophenol
GAB7	96.11260	121142	< 40.		UG/L	1/07/97		2,4-Dinitrotoluene
GAB7	96.11260	606202	< 40.		UG/L	1/07/97		2,6-Dinitrotoluene
GAB7	96.11260	206440	< 40.		UG/L	1/07/97		Fluoranthene
GAB7	96.11260	86737	< 40.		UG/L	1/07/97		Fluorene
GAB7	96.11260	118741	< 40.		UG/L	1/07/97		Hexachlorobenzene
GAB7	96.11260	87683	< 200.		UG/L	1/07/97		Hexachlorobutadiene
GAB7	96.11260	77474	< 40.		UG/L	1/07/97		Hexachlorocyclopentadiene
GAB7	96.11260	67721	< 40.		UG/L	1/07/97		Hexachloroethane
GAB7	96.11260	193395	< 40.		UG/L	1/07/97		Indeno[1,2,3-cd]pyrene
GAB7	96.11260	78591	< 40.		UG/L	1/07/97		Isophorone
GAB7	96.11260	534521	< 200.		UG/L	1/07/97		2-Methyl-4,6-dinitrophenol
GAB7	96.11260	91576	< 40.		UG/L	1/07/97		2-Methylnaphthalene
GAB7	96.11260	95487	< 40.		UG/L	1/07/97		2-Methylphenol
GAB7	96.11260	106445	< 40.		UG/L	1/07/97		4-Methylphenol
GAB7	96.11260	91203	< 40.		UG/L	1/07/97		Naphthalene
GAB7	96.11260	88744	< 80.		UG/L	1/07/97		2-Nitroaniline
GAB7	96.11260	99092	< 80.		UG/L	1/07/97		3-Nitroaniline
GAB7	96.11260	100016	< 80.		UG/L	1/07/97		4-Nitroaniline
GAB7	96.11260	98953	< 40.		UG/L	1/07/97		Nitrobenzene
GAB7	96.11260	88755	< 40.		UG/L	1/07/97		2-Nitrophenol
GAB7	96.11260	100027	< 200.		UG/L	1/07/97		4-Nitrophenol
GAB7	96.11260	621647	< 40.		UG/L	1/07/97		N-Nitrosodi-n-propylamine
GAB7	96.11260	62759	< 40.		UG/L	1/07/97		N-Nitrosodimethylamine
GAB7	96.11260	86306	< 40.		UG/L	1/07/97		N-Nitrosodiphenylamine

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB7	96.11260	87865	< 200.		UG/L	1/07/97		Pentachlorophenol
GAB7	96.11260	85018	< 40.		UG/L	1/07/97		Phenanthrene
GAB7	96.11260	108952	< 40.		UG/L	1/07/97		Phenol
GAB7	96.11260	109068	< 40.		UG/L	1/07/97		2-Picoline
GAB7	96.11260	129000	< 40.		UG/L	1/07/97		Pyrene
GAB7	96.11260	110861	< 40.		UG/L	1/07/97		Pyridine
GAB7	96.11260	120821	< 40.		UG/L	1/07/97		1,2,4-Trichlorobenzene
GAB7	96.11260	95954	< 40.		UG/L	1/07/97		2,4,5-Trichlorophenol
GAB7	96.11260	88062	< 40.		UG/L	1/07/97		2,4,6-Trichlorophenol

Tentatively Identified Compounds in Customer Sample # 96.11260

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS		ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB7	96.11260	100	TI	67.		UG/L	1/07/97		Unknown organic compound

********** EM-9 QUALITY ASSURANCE REPORT **********

EPA SEMIVOLATILES Prepared by: JA on 7-Jan-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: ANTHONY LOMBARDO PROGRAM CODE: WE5M NOTEBOOK: K010204 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QA SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

____ Only qualitative data requested

____ Only Blind QC samples run with this batch.

____ No QC samples run with this sample batch.

____ No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 42659

********** EM-9 QUALITY ASSURANCE REPORT **********

SUMMARY OF CONTROL STATUS OF BLANK QC SAMPLES RUN WITH THIS BATCH

Blank Results, Sample # 97.00008 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/29/96 Date Analyzed: 1/02/97

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00008	83329	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Acenaphthene
00.20226	97.00008	208968	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Acenaphthylene
00.20226	97.00008	62533	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Aniline
00.20226	97.00008	120127	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Anthracene
00.20226	97.00008	103333	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Azobenzene
00.20226	97.00008	92875	< 50.		UG/L	0.0		1/07/97	UNDER CONTROL	m-Benzidine
00.20226	97.00008	56553	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[a]anthracene
00.20226	97.00008	50328	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[a]pyrene
00.20226	97.00008	205992	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[b]fluoranthene
00.20226	97.00008	191242	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[g,h,i]perylene
00.20226	97.00008	207089	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[k]fluoranthene
00.20226	97.00008	65850	< 50.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzoic acid
00.20226	97.00008	100516	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzyl alcohol
00.20226	97.00008	111911	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Bis(2-chloroethoxy)methane
00.20226	97.00008	111444	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Bis(2-chloroethyl)ether
00.20226	97.00008	108601	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Bis(2-chloroisopropyl)ether
00.20226	97.00008	117817	200.	60.	UG/L	0.0		1/07/97	OUT OF CONTROL	Bis(2-ethylhexyl)phthalate
00.20226	97.00008	101553	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Bromophenylphenyl ether
00.20226	97.00008	85687	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Butyl benzyl phthalate
00.20226	97.00008	59507	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Chloro-3-methylphenol
00.20226	97.00008	106478	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Chloroaniline

********** EM-9 QUALITY ASSURANCE REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00008	91587	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Chloronaphthalene
00.20226	97.00008	95578	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	o-Chlorophenol
00.20226	97.00008	7005723	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Chlorophenylphenyl ether
00.20226	97.00008	218019	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Chrysene
00.20226	97.00008	84742	12.	3.6	UG/L	0.0		1/07/97	OUT OF CONTROL	Di-n-butyl phthalate
00.20226	97.00008	117840	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Di-n-octyl phthalate
00.20226	97.00008	53703	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Dibenzo[a,h]anthracene
00.20226	97.00008	132649	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Dibenzofuran
00.20226	97.00008	95501	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	o-Dichlorobenzene (1,2)
00.20226	97.00008	541731	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	m-Dichlorobenzene (1,3)
00.20226	97.00008	106467	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	p-Dichlorobenzene (1,4)
00.20226	97.00008	91941	< 20.		UG/L	0.0		1/07/97	UNDER CONTROL	3,3'-Dichlorobenzidine
00.20226	97.00008	120832	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4-Dichlorophenol
00.20226	97.00008	84662	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Diethyl phthalate
00.20226	97.00008	131113	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Dimethyl phthalate
00.20226	97.00008	105679	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4-Dimethylphenol
00.20226	97.00008	51285	< 50.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4-Dinitrophenol
00.20226	97.00008	121142	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4-Dinitrotoluene
00.20226	97.00008	606202	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2,6-Dinitrotoluene
00.20226	97.00008	206440	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Fluoranthene
00.20226	97.00008	86737	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Fluorene
00.20226	97.00008	118741	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Hexachlorobenzene
00.20226	97.00008	87683	< 50.		UG/L	0.0		1/07/97	UNDER CONTROL	Hexachlorobutadiene
00.20226	97.00008	77474	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Hexachlorocyclopentadiene
00.20226	97.00008	67721	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Hexachloroethane
00.20226	97.00008	193395	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Indeno[1,2,3-cd]pyrene
00.20226	97.00008	78591	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Isophorone
00.20226	97.00008	534521	< 50.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Methyl-4,6-dinitrophenol
00.20226	97.00008	91576	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Methylnaphthalene
00.20226	97.00008	95487	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Methylphenol
00.20226	97.00008	106445	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Methylphenol
00.20226	97.00008	91203	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Naphthalene
00.20226	97.00008	88744	< 20.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Nitroaniline
00.20226	97.00008	99092	< 20.		UG/L	0.0		1/07/97	UNDER CONTROL	3-Nitroaniline
00.20226	97.00008	100016	< 20.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Nitroaniline
00.20226	97.00008	98953	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Nitrobenzene

********** EM-9 QUALITY ASSURANCE REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00008	88755	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Nitrophenol
00.20226	97.00008	100027	< 50.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Nitrophenol
00.20226	97.00008	621647	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	N-Nitrosodi-n-propylamine
00.20226	97.00008	62759	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	N-Nitrosodimethylamine
00.20226	97.00008	86306	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	N-Nitrosodiphenylamine
00.20226	97.00008	87865	< 50.		UG/L	0.0		1/07/97	UNDER CONTROL	Pentachlorophenol
00.20226	97.00008	85018	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Phenanthrene
00.20226	97.00008	108952	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Phenol
00.20226	97.00008	109068	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Picoline
00.20226	97.00008	109068	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Picoline
00.20226	97.00008	129000	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Pyrene
00.20226	97.00008	110861	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Pyridine
00.20226	97.00008	110861	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	Pyridine
00.20226	97.00008	120821	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	1,2,4-Trichlorobenzene
00.20226	97.00008	95954	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4,5-Trichlorophenol
00.20226	97.00008	88062	< 10.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4,6-Trichlorophenol

Blank Results, Sample # 97.00010 Date Collected: 12/24/96 Date Received: 12/24/96 Date Extracted: 12/24/96 Date Analyzed: 1/03/97

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00010	83329	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Acenaphthene
00.20226	97.00010	208968	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Acenaphthylene
00.20226	97.00010	62533	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Aniline
00.20226	97.00010	120127	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Anthracene
00.20226	97.00010	103333	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Azobenzene

********** EM-9 QUALITY ASSURANCE REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00010	92875	< 200.		UG/L	0.0		1/07/97	UNDER CONTROL	m-Benzidine
00.20226	97.00010	56553	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[a]anthracene
00.20226	97.00010	50328	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[a]pyrene
00.20226	97.00010	205992	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[b]fluoranthene
00.20226	97.00010	191242	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[g,h,i]perylene
00.20226	97.00010	207089	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzo[k]fluoranthene
00.20226	97.00010	65850	< 200.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzoic acid
00.20226	97.00010	100516	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Benzyl alcohol
00.20226	97.00010	111911	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Bis(2-chloroethoxy)methane
00.20226	97.00010	111444	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Bis(2-chloroethyl)ether
00.20226	97.00010	108601	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Bis(2-chloroisopropyl)ether
00.20226	97.00010	117817	200.	60.	UG/L	0.0		1/07/97	OUT OF CONTROL	Bis(2-ethylhexyl)phthalate
00.20226	97.00010	101553	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Bromophenylphenyl ether
00.20226	97.00010	85687	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Butyl benzyl phthalate
00.20226	97.00010	59507	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Chloro-3-methylphenol
00.20226	97.00010	106478	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Chloroaniline
00.20226	97.00010	91587	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Chloronaphthalene
00.20226	97.00010	95578	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	o-Chlorophenol
00.20226	97.00010	7005723	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Chlorophenylphenyl ether
00.20226	97.00010	218019	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Chrysene
00.20226	97.00010	84742	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Di-n-butyl phthalate
00.20226	97.00010	117840	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Di-n-octyl phthalate
00.20226	97.00010	53703	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Dibenzo[a,h]anthracene
00.20226	97.00010	132649	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Dibenzofuran
00.20226	97.00010	95501	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	o-Dichlorobenzene (1,2)
00.20226	97.00010	541731	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	m-Dichlorobenzene (1,3)
00.20226	97.00010	106467	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	p-Dichlorobenzene (1,4)
00.20226	97.00010	91941	< 80.		UG/L	0.0		1/07/97	UNDER CONTROL	3,3'-Dichlorobenzidine
00.20226	97.00010	120832	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4-Dichlorophenol
00.20226	97.00010	84662	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Diethyl phthalate
00.20226	97.00010	131113	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Dimethyl phthalate
00.20226	97.00010	105679	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4-Dimethylphenol
00.20226	97.00010	51285	< 200.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4-Dinitrophenol
00.20226	97.00010	121142	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4-Dinitrotoluene
00.20226	97.00010	606202	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2,6-Dinitrotoluene
00.20226	97.00010	206440	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Fluoranthene

********** EM-9 QUALITY ASSURANCE REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND NAME
00.20226	97.00010	86737	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Fluorene
00.20226	97.00010	118741	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Hexachlorobenzene
00.20226	97.00010	87683	< 200.		UG/L	0.0		1/07/97	UNDER CONTROL	Hexachlorobutadiene
00.20226	97.00010	77474	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Hexachlorocyclopentadiene
00.20226	97.00010	67721	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Hexachloroethane
00.20226	97.00010	193395	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Indeno[1,2,3-cd]pyrene
00.20226	97.00010	78591	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Isophorone
00.20226	97.00010	534521	< 200.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Methyl-4,6-dinitrophenol
00.20226	97.00010	91576	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Methylnaphthalene
00.20226	97.00010	95487	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Methylphenol
00.20226	97.00010	106445	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Methylphenol
00.20226	97.00010	91203	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Naphthalene
00.20226	97.00010	88744	< 80.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Nitroaniline
00.20226	97.00010	99092	< 80.		UG/L	0.0		1/07/97	UNDER CONTROL	3-Nitroaniline
00.20226	97.00010	100016	< 80.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Nitroaniline
00.20226	97.00010	98953	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Nitrobenzene
00.20226	97.00010	88755	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Nitrophenol
00.20226	97.00010	100027	< 200.		UG/L	0.0		1/07/97	UNDER CONTROL	4-Nitrophenol
00.20226	97.00010	621647	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	N-Nitrosodi-n-propylamine
00.20226	97.00010	62759	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	N-Nitrosodimethylamine
00.20226	97.00010	86306	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	N-Nitrosodiphenylamine
00.20226	97.00010	87865	< 200.		UG/L	0.0		1/07/97	UNDER CONTROL	Pentachlorophenol
00.20226	97.00010	85018	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Phenanthrene
00.20226	97.00010	108952	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Phenol
00.20226	97.00010	109068	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Picoline
00.20226	97.00010	109068	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2-Picoline
00.20226	97.00010	129000	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Pyrene
00.20226	97.00010	110861	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Pyridine
00.20226	97.00010	110861	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	Pyridine
00.20226	97.00010	120821	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	1,2,4-Trichlorobenzene
00.20226	97.00010	95954	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4,5-Trichlorophenol
00.20226	97.00010	88062	< 40.		UG/L	0.0		1/07/97	UNDER CONTROL	2,4,6-Trichlorophenol

Blank Spike Results: none

Blank Spike Duplicate Results: none

********** EM-9 QUALITY ASSURANCE REPORT **********

SUMMARY OF CONTROL STATUS OF BLIND QA SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

____ Only qualitative data requested

____ Only Open (non-blind) QC samples run with this sample batch.

____ No QC samples run with this sample batch.

____ No QC samples for this constituent and matrix type available within CST

********** EM-9 QUALITY ASSURANCE REPORT **********

SURROGATE RESULTS FOR EPA SEMIVOLATILES

Surrogate 1 = 2-Fluorophenol (CAS # = 367124)
Surrogate 2 = Phenol-d5 (CAS # = 4165622)
Surrogate 3 = Nitrobenzene-d5 (CAS # = 4165600)
Surrogate 4 = 2-Fluorobiphenyl (CAS # = 321608)
Surrogate 5 = 2,4,6-Tribromophenol (CAS # = 118796)
Surrogate 6 = p-Terphenyl-d14 (CAS # = 26140603)
Surrogate 7 = 4-Chloroaniline (CAS # = 106478)

SAMPLE NUMBER	UNITS	Surrogate 1	Surrogate 2	Surrogate 3	Surrogate 4	Surrogate 5	Surrogate 6	Surrogate 7	COMPLETION DATE
96.11258	%	34.	16.	57.	60.	69.	78.		7-Jan-1997
96.11259	%	35.	19.	49.	53.	69.	78.		7-Jan-1997
96.11260	%	33.	23.	68.	70.	68.	75.		7-Jan-1997
97.00008	%	42.	37.	47.	51.	66.	75.		7-Jan-1997
97.00010	%	50.	39.	107.	109.	112.	116.		7-Jan-1997
EPA Limits:									
Water	%	21 - 100	10 - 94	35 - 114	43 - 116	10 - 123	33 - 141	34 - 120	
Soil	%	25 - 121	24 - 113	23 - 120	30 - 115	19 - 122	18 - 137		

REPORT NUMBER: 42659

Analyst	Reviewer	Team Leader	QA Officer
			NK for MAG
Date	Date	1/8/97 Date	1-8-97 Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in

'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20

CST-12 PCB ANALYSIS LABORATORY

Results Summary

Sample Information:

Samples **96.11258 through 96.11260** were received and analyzed.

Collection Date: **24 December 1996**

Extraction Date: **25 and 29 December 1996**

Analysis Date: **25 and 29 December 1996**

Additional samples associated with this request were analyzed:

1	**Blank**	
1	**Blind QC**	**(batched with REQ 24027)**
1	**BS/BSD**	**(batched with REQ 24027)**

HOLDING TIMES:

Extraction holding times were met for these samples.

Analytical holding times were met for these samples.

Surrogate Recoveries:

Surrogates for all samples except 96.11260 were within established control limits. The sample noted above was extracted by a different analyst on a different date and PCB surrogate was not added to the sample before extraction.

Matrix Spike Recoveries:

Recoveries for the blank spike and blank spike duplicate were calculated to be 63% and 85% respectively with a relative percent difference of 31%. Control limits have not yet been established.

Method Summary:

The method used to analyze these samples was CST-12 Analytical Method EO-430. A 250 ml aliquot of water sample 96.11260 and a 500 ml aliquot of the other water samples was extracted with methylene chloride and concentrated to a final volume of 1.0 or 10.0 ml. After exchanging the solvent to hexane, a Varian Gas Chromatograph with an Electron Capture Detector and a J&W Scientific DB-5 (30M X 0.25 MICRON FILM X 0.32 ID) column was used to obtain the data.

Additional Comments:

All of the samples associated with this request except for 96.11260 were subject to Florisil cleanup, which resulted in a 1:5 dilution. Sample 96.11260 was analyzed at a 0.25 dilution without cleanup. Dilution raises the limit of quantitation which may bias the results.

If you have questions or concerns about these samples or their analysis, please feel free to call me @ 665-2214.

********** CST ANALYTICAL REPORT **********

Prepared by: KMH on 10-Feb-1997

POLYCHLORINATED BIPHENYLS

REQUEST NUMBER: 24301 MATRIX: W ANALYST: KELLY HAKONSON PROGRAM CODE: WE5M NOTEBOOK: 0 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCEC ANALYTICAL PROCEDURE: EO-430

SUMMARY of TOTAL PCB's for customer samples on this report

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB5	96.11258	1336363	< 5.		UG/L	2/10/97		Aroclor (Mixed)
GAB6	96.11259	1336363	< 5.		UG/L	2/10/97		Aroclor (Mixed)
GAB7	96.11260	1336363	< 0.8		UG/L	2/10/97		Aroclor (Mixed)

DETAILED PCB DATA for customer samples on this report

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
GAB5	96.11258	1336363	< 5.		UG/L	2/10/97		Aroclor (Mixed)
GAB5	96.11258	53469219	< 5.		UG/L	2/10/97		Aroclor 1242
GAB5	96.11258	11097691	< 5.		UG/L	2/10/97		Aroclor 1254
GAB5	96.11258	11096825	< 5.		UG/L	2/10/97		Aroclor 1260
GAB6	96.11259	1336363	< 5.		UG/L	2/10/97		Aroclor (Mixed)
GAB6	96.11259	53469219	< 5.		UG/L	2/10/97		Aroclor 1242
GAB6	96.11259	11097691	< 5.		UG/L	2/10/97		Aroclor 1254
GAB6	96.11259	11096825	< 5.		UG/L	2/10/97		Aroclor 1260
GAB7	96.11260	1336363	< 0.8		UG/L	2/10/97		Aroclor (Mixed)
GAB7	96.11260	53469219	< 0.8		UG/L	2/10/97		Aroclor 1242
GAB7	96.11260	11097691	< 0.8		UG/L	2/10/97		Aroclor 1254
GAB7	96.11260	11096825	< 0.8		UG/L	2/10/97		Aroclor 1260

********** EM-9 QUALITY ASSURANCE REPORT **********

POLYCHLORINATED BIPHENYLS Prepared by: KMH on 10-Feb-1997

REQUEST NUMBER: 24301 MATRIX: W ANALYST: KELLY HAKONSON PROGRAM CODE: WE5M NOTEBOOK: 0 PAGE:

OWNER: Marc A. Bailey GROUP: ESH-18 MAIL-STOP: K497 PHONE: 5-8135 TECHNIQUE: GCEC ANALYTICAL PROCEDURE: EO-430

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QA SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

____ Only qualitative data requested

____ Only Blind QC samples run with this batch.

____ No QC samples run with this sample batch.

____ No QC samples for this constituent and matrix type available within CST

********** EM-9 QUALITY ASSURANCE REPORT **********

********** EM-9 QUALITY ASSURANCE REPORT **********

SUMMARY OF CONTROL STATUS OF BLIND QA SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT	COMPOUND-NAME
96.09171	1336363	6.8	1.36	UG/L	8.98	0.386	1/07/97	UNDER CONTROL	Aroclor (Mixed)
96.09171	53469219	6.8	2.04	UG/L	8.98	0.386	1/07/97	UNDER CONTROL	Aroclor 1242
96.09171	11097691	< 0.5		UG/L	0.0		1/07/97	UNDER CONTROL	Aroclor 1254
96.09171	11096825	< 0.5		UG/L	0.0		1/07/97	UNDER CONTROL	Aroclor 1260
96.09172	1336363	11.	2.2	UG/L	17.96	0.772	1/07/97	WARNING 2-3 SIG	Aroclor (Mixed)
96.09172	53469219	11.	3.3	UG/L	17.96	0.772	1/07/97	WARNING 2-3 SIG	Aroclor 1242
96.09172	11097691	< 0.5		UG/L	0.0		1/07/97	UNDER CONTROL	Aroclor 1254
96.09172	11096825	< 0.5		UG/L	0.0		1/07/97	UNDER CONTROL	Aroclor 1260

REPORT NUMBER: 43068

Analyst	Reviewer	Team Leader	QA Officer
for KMH			mag
2/10/97	2/10/97		2/11/97
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in
'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20

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ATTACHMENT B

Los Alamos National Laboratory
Technical Area 21, Building 61
Mixed Waste Container Storage Area
Potable Water Spill (December 24, 1996)

Evaporation Calculations

- "Determination of Evaporation Rates from a Potable Water Spill at Los Alamos National Laboratory, Technical Area 21, Building 61," Benchmark Environmental Corporation, May 14, 1997