Letter Report

Site Investigation and Waste Analysis of the Runnels County SWD Site, Runnels County, Texas

(RRC Site No. CU-7C-50215)

by

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INTRODUCTION

The Runnels County Salt Water Disposal (SWD), Inc., site is an abandoned commercial saltwater-disposal facility in Runnels County (fig. 1). The facility was permitted around 1976 and operated for approximately 16 yr. The site, located on the W. J. Poe Lease and approximately 6 acres in area, contains three permitted lined pits. In February 1992, the pit permits were terminated after several notices to cease operation. The permits were revoked because of excess pit-fluid levels, overflow from the pits, and excess oil and basic sediment in the pits. Site operations have ceased. Although a closure order was finalized, the site has not been closed as specified.

In addition to the 3 lined pits, the site contains 1 unlined "trash" pit, 13 metal storage tanks, and an oil overflow area. All four pits and five tanks contain varying quantities of oil, fluid, and sludge. The remaining tanks are abandoned and have no contents. The Railroad Commission of Texas (RRC) has used State funds to perform repeated emergency abatement actions to remove and dispose of pit fluids in efforts to prevent the pits from overflowing. Also at this site, the RRC has plugged two abandoned salt-water disposal wells, sampled and analyzed some of the wastes, and supervised some surface cleanup work, including limited backfill of the trash pit.

The Bureau of Economic Geology (BEG) investigated this site on behalf of the RRC to determine the composition and volume of the waste fluids at the site, consider the potential for subsurface contamination, and evaluate remedial options.

SITE CHARACTERISTICS

The Runnels County SWD facility is located approximately 8.8 km (~5.5 mi) west of the town of Winters along State Road (SR) 384 (fig. 1). It is shown on the Wilmeth USGS 7.5-minute quadrangle adjacent to SR 384, approximately 3.2 km (~2 mi) east of SR 383.

The site contains 3 lined pits, permitted in 1976, 1982, and 1986, 1 "trash" unlined pit, 13 metal storage tanks, and an overflow area (fig. 2). The site is fenced and gated to vehicular access.

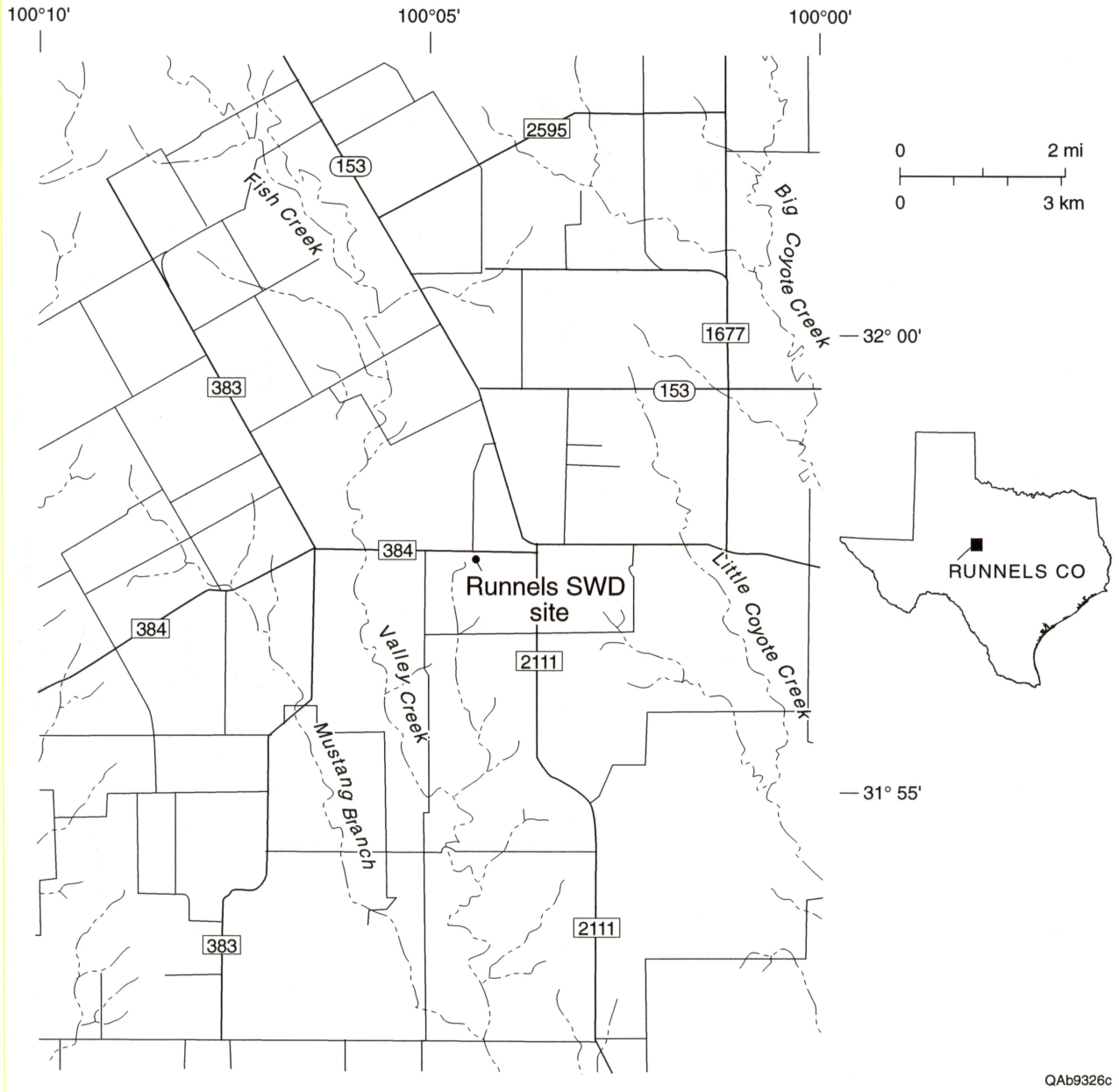

Figure 1. Location of Runnels County SWD site in Runnels County, Texas.

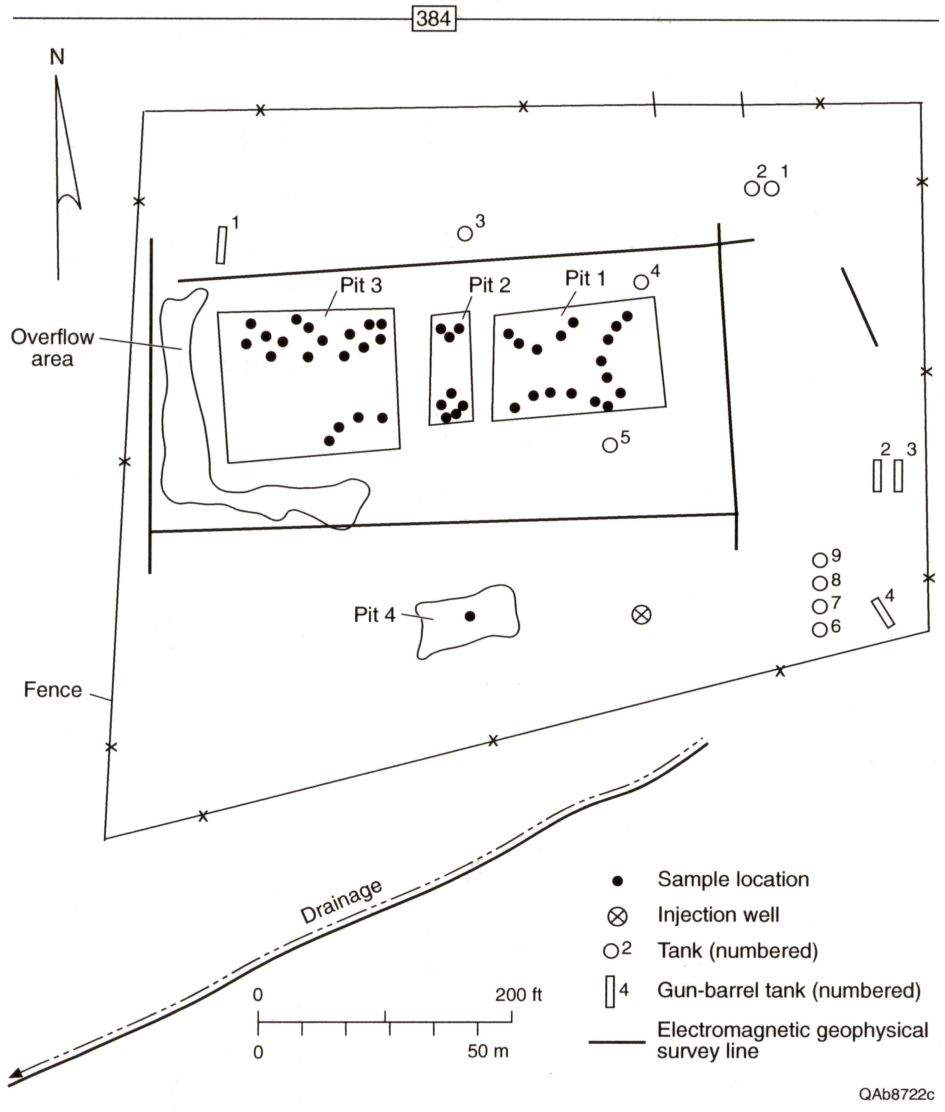

Figure 2. Map of Runnels County SWD site.

Some fencing is damaged. Both the pits and the overflow areas are highly visible from SR 384. Excessive pit-fluid levels and overflow have been documented since 1990. A cross section of the three lined pits is presented in figure 3.

The Runnels County SWD site is underlain by Pleistocene deposits of the ancestral Colorado River and its tributaries (Eifler and others, 1975). These surficial Pleistocene deposits have been dissected but are preserved in upland areas. Bedrock beneath the Quaternary deposits is the Permian Clear Fork Group (Eifler and others, 1975), which is composed of red and green shales, thin dolomite beds, and fine-grained sandstone beds.

Soils developed on the surficial Pleistocene deposits are mapped as Portales clay loam and Rowina and Tobosa soils (Weidenfeld and others, 1970). The Portales clay loam, developed on level or gently sloping areas, is a well-drained, loamy soil containing a pedogenic carbonate C horizon at depths of 50 to 90 cm (20 to 36 inches). Carbonate makes up 15 to 60 percent of this soil horizon and has been described as either soft or cemented (Weidenfeld and others, 1970). Rowina soils are distinguished by higher clay content, resulting in a heavier character and moderately slow or slow water intake. Tobosa soils are formed in the most clay rich areas of the surficial Pleistocene deposits.

Average annual precipitation is approximately 61 cm (~24 inches), with approximately 198 cm (~78 inches) of evaporation (Larkin and Bomar, 1983). Surface drainage at the site is to the south-southwest toward Valley Creek. Valley Creek, approximately 3.2 km (~2 mi) west of the Runnels County SWD site, is a tributary of the Colorado River. No wetlands are mapped at the site on the Fish and Wildlife Services wetlands map for Wilmeth, Texas, 1994.

Depth to ground water in the area is typically between 15 and 30 ft beneath ground surface, according to information from the Texas Water Development Board (table 1). The potentiometric surface in the Clear Fork Group, including the Choza Formation (upper Clear Fork), is inclined generally toward the south (fig. 4). The potentiometric surface map shown in figure 4 is composited from water-level readings taken in the 1970's and 1980's (table 1). Hydraulic head is higher beneath the upland area beneath the site than it is to the west beneath the drainage of Valley

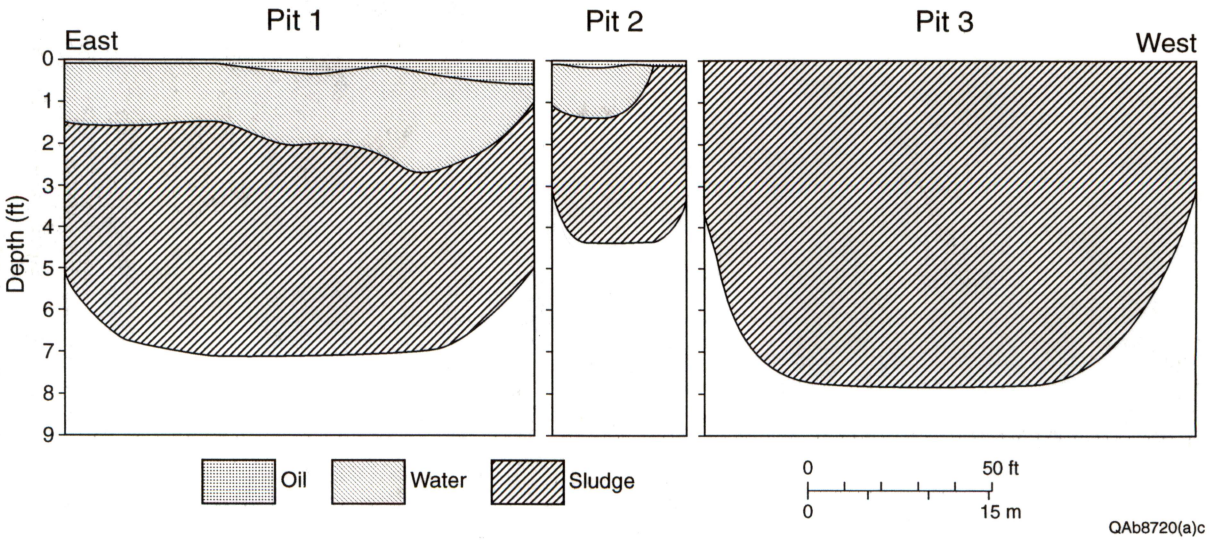

Figure 3. Profile of pit-fluid layers.

Table 1. Data on water wells near the Runnels SWD site listed in the TWDB data base. "Map no." refers to figure 4.

Map no.	State well number	Longitude	Latitude	Ground-surface elevation (ft)	Date drilled*	Well depth (ft)	Depth to water (ft)	Year measured	Water level elevation (ft)	Aquifer†
1	43-07-301	100°08'58"	31°59'36"	1998	1983	180	-46.74	1986	1951.3	3
2	29-64-701	100°06'52"	32°00'31"	2003	1973	100	-31.47	1985	1971.5	2
3	29-64-703	100°07'11"	32°00'29"	1990	1965	62	-18	1970	1972.0	4
4	43-08-104	100°06'49"	31°59'36"	1996	nr	105	-30	1970	1966.0	1
5	43-08-103	100°07'15"	31°58'41"	1971	nr	50	-16	1970	1955.0	1
6	43-08-102	100°05'11"	31°58'49"	1965	1972	120	-60.91	1982	1904.1	2
7	43-08-403	100°07'09"	31°57'15"	1936	1971	150	-31.76	1985	1904.2	2
8	43-08-502	100°04'15"	31°57'27"	1939	nr	55	-20	1970	1919.0	1
9	43-08-501	100°04'08"	31°56'38"	1938	nr	38	-28	1970	1910.0	1
10	43-08-404	100°05'29"	31°55'28"	1861	1955	18	-10	1970	1851.0	1
11	43-08-401	100°06'00"	31°55'10"	1881	1969	40	-22.9	1984	1858.1	2
12	43-08-402	100°05'57"	31°55'10"	1882	1979	60	-21.62	1986	1860.4	2
13	43-08-801	100°03'35"	31°54'53"	1910	1982	72	-36.48	1987	1873.5	2
14	43-08-601	100°00'05"	31°56'29"	1854	nr	24	-12	1970	1842.0	1
15	29-64-901	100°01'19"	32°00'30"	1929	nr	22	-8	1970	1921.0	1
16	43-08-301	100°00'19"	31°59'23"	1890	nr	12	-8.64	1978	1881.4	5

*nr not reported

†Aquifer unit
1. Choza Formation, Clear Fork Group (Permian)
2. Clear Fork Group (Permian)
3. Leona Formation
4. Merkel Dolomite Member of Choza Formation, Clear Fork Group (Permian)
5. Undifferentiated alluvium (Quaternary)

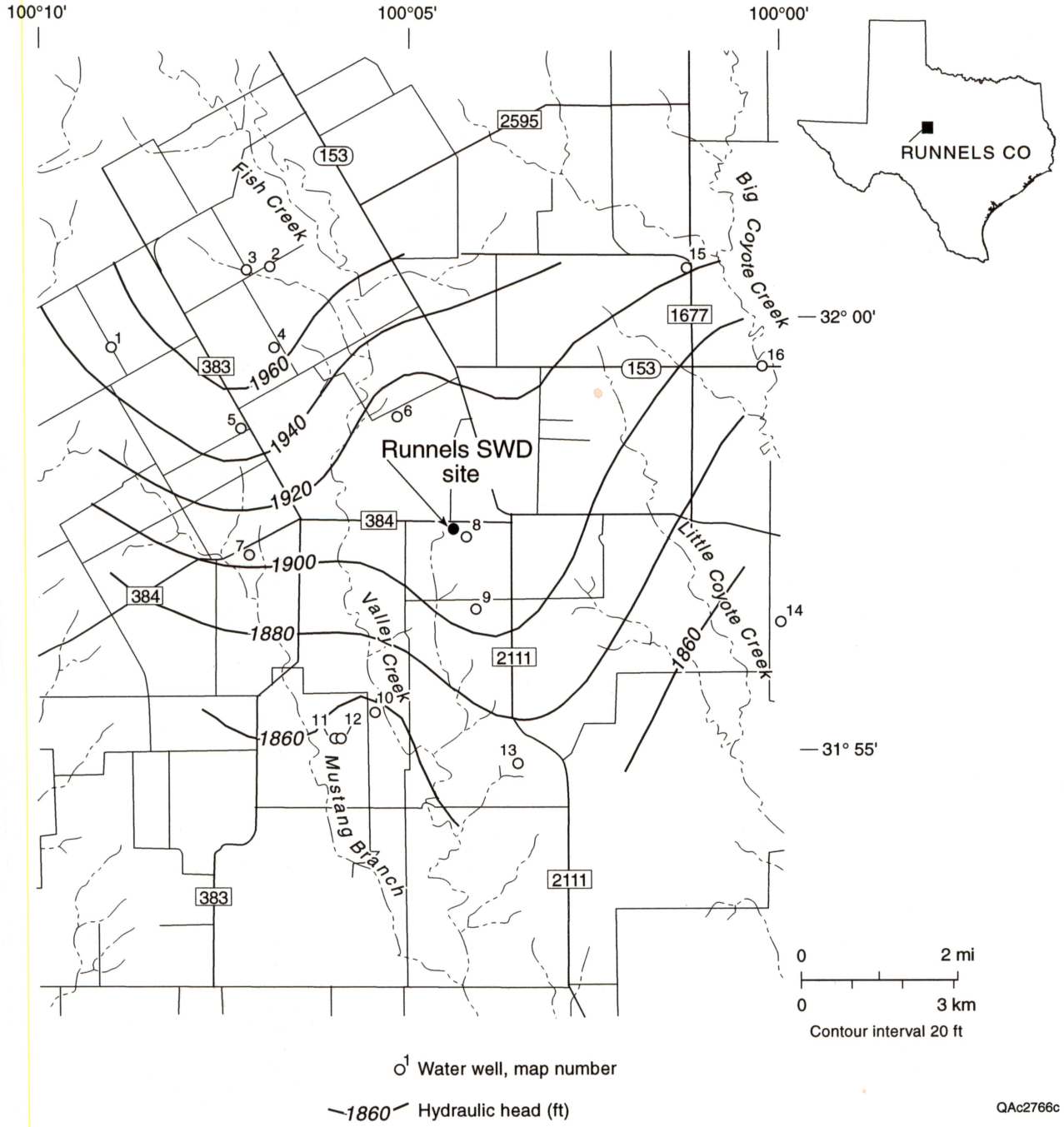

Figure 4. Regional potentiometric surface.

Creek. Flow paths of ground water beneath the site most likely curve clockwise to the south and southwest.

METHODOLOGY

The BEG reviewed project files located at the RRC office in Austin and the RRC district office in San Angelo, paying particular attention to sample-analysis results and the operational history of the site. BEG staff visited the site on March 10, 1997 and performed field work throughout May 1997.

Site activities included:

- performing an electromagnetic induction (EM) geophysical survey (fig. 2) using a Geonics EM 34-3 meter,
- conducting a global positioning survey (GPS) to map site features and geophysical survey lines accurately,
- sampling contents of the four intact tanks and one gun-barrel tank containing waste fluids, and
- sampling pit materials and measuring pit depths.

The purpose of the geophysical survey was to look for evidence of saltwater contamination in subsurface soil and ground water. Electromagnetic induction methods were used to measure apparent ground conductivity as an indicator of pore-water conductivity and an indirect measure of pore-water salinity beneath the site. Areas of increased salinity may be delineated by mapping the areas of elevated ground conductivity.

We conducted 5 geophysical transects using the Geonics EM34-3 meter and analyzed 176 data points. Transects were conducted in a rectangular pattern on the four sides of the lined pit area, and a fifth transect was located in the drainage southwest of the pit area (fig. 2). The Geonics EM34-3 ground-conductivity meter supports 10-, 20-, and 40-m (33-, 66- and 131-ft) transmitter and receiver coil separations and two principal coil orientations (horizontal and vertical dipoles). The conductivity value represents the "bulk" conductivity, or an average conductivity of the soil

volume beneath the transmitter and receiver coils. All three coil separations were used, resulting in an effective penetration depth of 6 to 25 m (20 to 82 ft) for the horizontal-dipole orientation and 12 to 50 m (39 to 164 ft) for the vertical-dipole orientation.

A global positioning survey (GPS) was performed at the Runnels County SWD site. The GPS data were combined with compass bearing and distance to generate a base map of the site (fig. 2). Positional data were organized, evaluated for accuracy, and transferred to ArcView Geographic Information System (GIS) software, and a GIS data base of the site was developed. In developing the site map, we also referred to vertical aerial photography that included the Runnels County SWD.

Sludge and oil waste from the tanks were analyzed for TPH, specific conductance, chloride, and RCRA 8 metals. Samples were analyzed according to EPA-accepted analytical methods. The analytical results provided information to RRC District 7C personnel necessary to arrange for an oil-reclamation service to empty the contents of the tanks. Approximately 100 bbl of oil was recovered from sludge in the tanks for reclamation.

We sampled the three lined pits (pits 1, 2, and 3) and probed for depth using a man-lift hydraulic boom. We took 10 samples from these pits. We then probed the pit materials to determine depth to the base of waste package. Depth was determined at 17 locations in pit 1, 9 locations in pit 2, and 19 locations in pit 3 (fig. 2). Whenever distinguishable, the thickness of oil, water, and sludge was noted. Maximum total thickness measured in the lined pits was 2.62 m (8.6 ft), correlating well with the permitted depth of the pits (2.4 to 2.7 m [8 to 9 ft]).

The unlined pit, pit 4, was sampled by hand from the edges of the pit. Pit 4 is a part remaining of the site's trash pit. Some parts of the trash pit were previously backfilled under RRC direction. The material in pit 4 was not probed to determine waste thickness.

During pit-sampling activities, personnel wore level C personal protective equipment. The breathing-air environment at the boom platform was monitored by a flame ionization detector (FID). Samples were recorded on a chain-of-custody form, stored at 4° C, and delivered within the allowable holding time to Chemsolve Laboratory in Austin, Texas, for analytical testing.

Water samples from the pits were analyzed for chloride, TPH, and RCRA 8 metals. Sludge and oil waste from the four pits were analyzed for TPH, pH, chloride, specific conductance, volatile organic carbon (VOC), TCLP metals, pesticides, and PCB's. Samples were analyzed according to EPA-accepted analytical methods, as noted on tables 2 through 4.

RESULTS

Results of the pit and tank sampling and analysis indicated that the onsite waste materials were nonhazardous. Although there was some range in constituent concentrations between the waste materials in the four pits, few distinctions exist between the wastes in the different pits. Results of the analysis of BEG samples from pit and tank samples were transmitted by letter to the RRC on September 23, 1997. Approximately 23,000 bbl of sludge and 4,200 bbl of fluids were present in the pits at the time of our field investigation. The EM survey detected no conductivity anomalies in the subsurface. This result indicates that a significant release and lateral migration of saltwater most likely has not occurred into the subsurface from site operations.

The locations of lined pits 1, 2, and 3 are shown in figure 2. GPS data were used to generate the site map and to calculate the dimensions of the pits. Unlined pit 4, located south of the lined pit area, is also shown (fig. 2).

Waste materials were contained within four of the nine tanks and one of the four gun-barrel tanks at the Runnels site (fig. 2). Table 2 presents analytical data from samples of the waste fluid in tanks. The tanks were emptied and oil was reclaimed from the sludge in these tanks.

Analytical results of pit waters are summarized in table 3. As expected in water associated with oil exploration and production wastes, barium was the predominant RCRA metal. Low levels of chromium and lead were also detected.

Results of chemical analyses of pit sludges are summarized in table 3. Sampling results indicate that the pit contents are nonhazardous. The TCLP hazardous-waste thresholds were not exceeded in any of the test results, and none of the samples tested was characteristically ignitable, corrosive, or reactive. Low levels of chromium, lead, and silver were detected in the TCLP

Table 2. Chemical analyses of sludge in tanks.

	Units	Detection limit	Tank 3 Water* 1000–1001**	Tank 4 Sludge 1018	Tank 6 Sludge 1003	Tank 7 Sludge 1004	Gun barrel Sludge 1002
TPH (method 418.1)	%	varies	0.008	86	110	150	34
Specific conductance (method 120.1)	mS/cm	not applicable	—	241	210	140	725
Chloride (method 300.1)	mg/kg	0.05	13,000	620	34	470	1,700
Arsenic (method 6010)	mg/kg	0.1	—	0.38	—	—	10
Barium (method 6010)	mg/kg	0.02	930	57	12	24	300
Cadmium (method 6010)	mg/kg	0.1	—	—	—	—	1.2
Chromium (method 6010)	mg/kg	0.1	3.5	0.61	0.32	0.17	11
Lead (method 6010)	mg/kg	0.1	2.5	3.2	5.2	0.72	290

*Water analyses in mg/L rather than mg/kg for chloride, arsenic, barium, cadmium, chromium, and lead
**Sample number

Table 3. Chemical analyses of water in pits. No water recovered from pit 3. All results in mg/L.

	Detection limit	Pit 1 1005–1006*	Pit 2 1009–1010	Pit 4 1021–1022
Chloride (method 300.1)	0.05	610	190	420
TPH (method 418.1)	varies	12	26	<0.2
Barium (method 6010)	0.001	18	5.5	0.43
Chromium (method 6010)	0.005	0.055	<0.005	<0.005
Lead (method 6010)	0.005	0.047	0.012	<0.005

*Sample number

Table 4. Chemical analyses of sludges in pits.

	Unit	Pit 1	Pit 2	Pit 3	Pit 4	MDL	TCLP limit
		1007	1011	1014	1023		
Miscellaneous							
TPH (method 418.1)	%	12	91	120	76		
Chloride (method 300.1)	mg/kg	17,000	930	290	390		
Specific conductance (method 120.1)	mS/cm	32,800	3,650	1,180	2,430		
pH (method 9045)	pH	8.2	8.3	7	8.5		
Organics (VOC's) (method 8080)							
Benzene	mg/kg	6,400	8,600	18,000	560	250 ug/Kg	
Toluene	mg/kg	390	800	bdl	2,000	250 ug/Kg	
Ethylbenzene	mg/kg	5,800	bdl	19,000	970	250 ug/Kg	
2-Hexanone	mg/kg	bdl	3,400	bdl	1,500	500 ug/Kg	
Napthalene	mg/kg	2,300	12,000	8,100	1,000	250 ug/Kg	
m,p- Xylenes	mg/kg	3,600	bdl	30,000	2,800	250 ug/Kg	
o-Xylene	mg/kg	bdl	bdl	32,000	2,700	250 ug/Kg	
1,1,2-Trichloroethane	mg/kg	250	400	bdl	280	250 ug/Kg	
Bromodichlorome-thane	mg/kg	bdl	380	bdl	bdl	250 ug/Kg	
TCLP (method 8270)							
Vinyl chloride	mg/L	0.05	bdl	bdl	bdl	0.005 mg/L	0.2 mg/L[1]
1,2-Dichloroethane	mg/L	0.005	0.014	0.01	bdl	0.005 mg/L	0.5 mg/L[1]
2-Butanone (MEK)	mg/L	0.13	0.1	0.081	bdl	0.5 mg/L	200 mg/L[1]
Benzene	mg/L	0.13	bdl	0.17	0.019	0.005 mg/L	0.5 mg/L[2]
Silver	mg/L	0.0088	bdl	bdl	0.12	0.005 mg/L	5.0 mg/L[1]
Lead	mg/L	0.013	0.017	0.0091	0.008	0.005 mg/L	5.0 mg/L[1]
Barium	mg/L	14	5.2	0.74	1.8	0.001 mg/L	100 mg/L[2]
Chromium	mg/L	bdl	bdl	bdl	0.0066	0.005 mg/L	5.0 mg/L[1]

*Sample number
MDL—Method detection limit
bdl—below detection limit; see appendix for complete results
[1]Maximum concentration of contaminants for toxicity characteristics, hazardous waste thresholds in 40 CFR 261.24, table 1
[2]TNRCC technical guidance limits for landfill disposal of special wastes associated with development of oil, gas, and geothermal resources (Texas Natural Resource Conservation Commission, 1996)

analysis. The levels of these detected constituents were orders of magnitude below regulatory limits for hazardous-waste designation (40 CFR 261.24). A low level of barium was also detected in the TCLP analysis of the pit sludges. There is no TCLP hazardous-waste threshold for barium; the levels detected were significantly below the barium level considered acceptable for MSW disposal, as determined by a TCLP test (Texas Natural Resource Conservation Commission, 1996).

Low levels of vinyl chloride, 1,2-dichloroethane, 2-butanone (MEK), and benzene were detected in TCLP analyses of the pit sludges. The TCLP levels for these constituents were notably below the TCLP thresholds for hazardous-waste designation (40 CFR 261.24). Bromodichloromethane was detected in low levels in the pit 2 sludge, and low levels of 1,1,2-trichloroethane were detected in sludges from pits 1, 2, and 4. No TCLP limit has been defined for these solvents. The presence of these low concentrations of chlorinated solvent compounds, possibly derived from degreasers contaminating the oil, should not prevent reclamation or disposal of these wastes. No pesticides or Aroclor PCB's were detected in the pit sludges.

Waste-material thickness varied across the three lined pits. Average volumes for pit waste are cited in table 5. An estimated depth of 1.5 m (5 ft) was used to calculate pit 4 volume. Actual amounts may vary from these averages because of heterogeneity in the materials, variations in thickness in pit areas beyond the reach of the hydraulic lift, or precipitation or evaporation. The apparent thickness of the water layer encountered in pits 1 and 2 varied notably during probing. In pit 3, neither a separate water layer nor the contact between oil and sludge was distinguishable. The entire fluid column in pit 3 was designated as sludge. A representative cross section shows the relative thickness of fluid layers in the three lined pits (fig. 3). Pit 4 appeared to contain partly solidified oil and a small fluid column that most likely varies seasonally. The RRC reports that 2,100, 390, and 4,500 bbl of pit water have been removed from pits 1, 2, and 3, respectively, since BEG investigated this site.

Table 5. Volume of material in pits at the Runnels SWD site.

	Pit 1	Pit 2	Pit 3	Pit 4	Total
Pit area (ft^2)	9,493	2,280	13,087	2,800	24,860
Average pit depth(ft)	5.3	4.6	5.6	nm	
Average thickness (ft)					
Oil	0.3	0.1	nd	nm	
Water	1.6	1.5	nd	variable	
Sludge/sediment	3.4	3.0	5.6	nm	
Fluid volume (bbl)					
Oil	580	60	nd	nm	640
Water	2,810	710	nd	nm	3,520
Sludge/sediment (bbl)	5,800	1,300	12,950	2,500	22,550
Sludge/sediment (yd^3)	1,210	270	2,690	520	4,690

nd not distinguishable
nm not measured

REMEDIATION OPTIONS

The no-action alternative is not appropriate for the Runnels site. Overflow of pit fluids would continue under a no-action alternative because excess fluid levels in the pits would not be addressed and waste materials would remain in the current configuration. In addition to reducing risk to public health and safety and the environment owing to contamination at the site, closing the pits will limit further cost to the State in additional emergency abatement actions.

Remediation alternatives that we considered are consistent with analytical results and site conditions. Removal of the tanks and pits and all contents mitigates the potential for exposure risk, as well as the potential for continued contamination in the future. Possible remedial techniques feasible for the removed waste at the Runnels County SWD site include reclamation, use in asphalt production, off-site disposal, land treatment, and bioremediation.

Reclamation of hydrocarbons from pit sludge is an attractive remedial option in that it provides a beneficial end use while removing the waste materials from the Runnels County SWD site. Because the sludge and basic sediment in pits 1, 2, and 3 have a high hydrocarbon content and because they tested nonhazardous, reclamation by a licensed oil and gas waste reclaimer is a viable remedial option. Removal and recycling of sludge and basic sediment is best performed during the summer months, when the fluids are warmer and less viscous, facilitating extraction of hydrocarbons from the sludge. Such removal might include bringing a centrifuge unit onsite to reduce the volume of waste and high-grade the material for hydrocarbon reclamation.

Another beneficial alternative involves using the high-petroleum-hydrocarbon-content sludges as an additive in asphalt production. Petroleum-contaminated soils have at times been used as additives in asphalt mixtures and substituted for filler material in base courses (Asphalt Institute, 1983). The Texas Department of Transportation (TXDOT) nevertheless generally limits the content of petroleum-contaminated soils to no more than 20 percent of the total material (Texas Department of Transportation, 1995). In asphalt mixing, a 20-percent-maximum-fines content is typically

allowed (Asphalt Institute, 1977). The viability of using pit sludges in asphalt production is paving-project specific and may depend upon considerations such as characteristics of the contaminated soils, performance requirements of the asphalt, asphalt mixture, and material availability. The San Angelo District TXDOT office in San Angelo or Runnels County Commissioners may provide information as to relevant projects that are scheduled around the time of site remediation.

Although waste reclamation or using wastes in asphalt production are attractive remedial alternatives and should be pursued, both options depend on external factors such as economics, processes, requirements, availability, and schedule of local reclaimers or paving projects. It is possible that some waste may be reclaimed or used as a process additive, but characteristics of another part of the waste may exclude it from use. Alternatively only a certain volume of the waste may be able to be incorporated into reclamation or reuse processes. In this case, the remaining waste volume would need to be addressed. The remediation action plan includes reclamation or reuse of waste materials as a preferred, but not exclusive, option.

In situ bioremediation of pit materials is also an attractive alternative. Although bioremediation does not have the economic potential of providing offset funds that may exist with either reclamation or use of site materials in asphalt production, it does have the potential of reducing the amount of material that may require disposal or treatment, thereby reducing project costs. The high hydrocarbon content and, with the exception of pit 1 sludge, low chloride content of the pit materials are well suited to bioremediation. The waste in pits 1, 2, and 3 is already contained within a presumably intact lined area, providing a convenient configuration for in situ bioremediation. Initially, of course, the pit-fluid levels must be lowered sufficiently to avoid overflow from the pits during bioremediation. If in situ bioremediation of the pit solids can achieve TPH levels of 1 percent or less, these solids would be suitable for use as backfill material for the pit once the liner has been removed and any subsurface contamination under the pit has been addressed. Similar to waste reclamation and waste use in asphalt production, in situ bioremediation depends on external factors such as economics, project management, and procedures required to

establish an ongoing treatment process and this site. As such, the remediation action plan includes in situ bioremediation as a project option but not a required step.

Recommended remediation of the Runnels County SWD site follows a multistep action plan. Estimated costs for disposal of water, sludge, and liner are given in tables 6 through 8.

1. Removal of free water from the pits. This step is imperative for preventing future overflow and additional site contamination. Options for disposal of water include offsite disposal at an injection well or treatment of the water and permitted discharge. Offsite disposal in an underground injection well is the simplest, quickest, and most cost-effective option. Estimated costs of water disposal are given in table 6. Considering the quantity and quality of water in the pits, onsite water treatment and discharge would not be cost effective, and design and permitting of an onsite system may be time consuming.
2. Completion of any remaining tasks relating to removal of oil and sludge and basic sediment in the tanks and decommissioning of tanks that has been undertaken by reclamation companies under the direction of RRC District 7C personnel. This step can be performed at any time during overall site remediation.
3. Excavation and reclamation of sludge/basic sediment in pits 1, 2, and 3. Excavation in conjunction with reclamation would be best performed during the summer months, when the fluids are warmer and less viscous. The waste materials in unlined pit 4 are probably undesirable to oil-field reclaimers because of a small volume of hydrocarbon waste intermingled with contaminated soil.
4. Excavation and use in asphalt production of unreclaimed sludge, basic sediment, and contaminated soils in pits 1, 2, 3, and 4.
5. Bioremediation (in situ) of waste material in pits. Similarity of waste in pits and adjacent pit configuration would be well suited to pilot or demonstration projects between different bioremediation contractors or between different microbial products. Bioremediation would require additional site operations and process monitoring, such as periodic waste sampling and analysis. As pit sludges are saturated, some oxygen

Table 6. Estimated cost of water disposal. Disposal rate for injection as produced water. Costs based on measured quantities; actual amount may vary because of additional rainfall or type of remedial procedure utilized, or both.

	Volume (bbl)	No. of 120-bbl loads	Haul cost @ $75/load	Disposal cost @ $0.30/bbl	Total
Water	7,500	63	$4,725	$2,250	~ $6,975

Table 7. Estimated cost of sludge disposal. Costs based on measured quantities; actual amounts may vary.

A. If sludge can be injected into a disposal well

	Volume (bbl)	Transfer pumping @ $0.01/gal	No. of 120-bbl loads	Transport cost @ $240/load	Disposal cost @ $2.25/bbl if injectable in disposal well	Total
Sludge	22,550	$9,471	188	$45,120	$50,738	~ $105,329

B. If sludge cannot be injected into a disposal well and requires handling as a solid

	Volume (yd^3)	Excavation cost @ 450 cy/day & $504/day	No. of 12-yd^3 loads	Transport cost @ $290/load	Disposal cost @ $6.50/$yd^3$	Total
Sludge	4,690	$5,544	391	$113,390	$30,485	~ $149,419

Table 8. Estimated cost of liner disposal at an RRC-permitted facility or a municipal solid-waste landfill. Costs based on measured quantities; actual amounts may vary.

	Estimated Volume (yd^3)	Removal and Transport Cost	Disposal cost @ $6.50/$yd^3$	Total
Liner	440	$2,360	$2,860	~ $5,200

supplementation would be required for aerobic degradation of the hydrocarbons. This supplementation may include regular (1) physical mixing of the wastes, (2) air or oxygen injection, or (3) controlled use of additives, such as hydrogen peroxide.

6. Excavation and offsite disposal of sludges, basic sediment, and contaminated soils in pits 1, 2, and 3. Alternatively excavation and offsite disposal may be required for only a part of or remainder site waste materials after reclamation, reuse, or bioremediation has been accomplished. Estimated costs of offsite disposal of all pit wastes are given in table 7. This figure provides a reference point from which to evaluate the economic feasibility and practicality of pursuing options for reclamation, reuse, or bioremediation.
7. Removal of pit liners after all materials have been removed from the pits. Liner material may be disposed of at an RRC disposal facility or a municipal solid-waste disposal facility. Cost of liner disposal is estimated in table 8.
8. Excavation of contaminated soils in the overflow area and surrounding pit 4. Volume of contaminated soil in these areas is estimated at approximately 200 yd^3. Contaminated soils may be incorporated into use in asphalt production, included in the bioremediation process, or disposed of offsite. In addition, considering the relatively small volume and existing soil and waste mixture, it is possible that these materials may be landfarmed onsite by spreading the mixture in a 5-cm (2-inch) lift and disked to 0.3 m (1 ft) with native soils. In conjunction with landfarming, continued site operations, such as routine disking and watering and process monitoring would be required.
9. Inspection and testing for contaminated soils beneath the pits. The geophysical survey did not detect a subsurface salinity impact, which suggests that the integrity of the liner is intact. We therefore do not anticipate extensive hydrocarbon contamination beneath the pits, although contamination cannot be determined until the liner has been removed. If contaminated soils are encountered beneath the pits, the soils may be excavated and sent offsite for disposal. The soils may be suitable for onsite landfarming. If it is decided to landfarm contaminated soils from the overflow area and pit 4 onsite, it would be

advantageous to schedule the remediation such that any contaminated soils from beneath the lined pits could be incorporated in that process.

10. Backfilling of pits 1, 2, 3, and 4 and grading of surface to conform to surrounding topography to promote drainage and avoid localized ponding. Solids from the pits that have been bioremediated to TPH concentrations of less than 1 percent, either by in situ bioremediation or landfarming, would likely be suitable for use as backfill material.

REFERENCES

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Texas Department of Transportation (TXDOT), 1995, Texas DOT specifications for the construction and maintenance of highways, streets and bridges.

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APPENDIX. ANALYTICAL RESULTS

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Thursday, May 29, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 26996

Project: Runnels RRC
Sample: 1000
Matrix: water
Date/Time Taken: 5/15/97 09:50
Date/Time Rec'd: 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Petroleum hydrocarbons	81	mg/L	3	418.1	5/28/97	14:30	LBK
Chloride	13,000	mg/L	0.05	300.1	5/28/97	13:29	LBK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Chloride	<0.05	7.31	20	96.3	89.5	75 - 125
Petroleum hydrocarbons	<2	0.00	48.4			

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Wednesday, May 28, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 26997

Project: Runnels RRC
Sample: 1001 **Matrix:** water
Date/Time Taken: 5/15/97 09:50 **Date/Time Rec'd:** 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time Run	By
Arsenic	<0.1	mg/L	0.1	6010	5/27/97 14:40	MCK
Barium	930	mg/L	0.02	6010	5/27/97 14:40	MCK
Cadmium	<0.1	mg/L	0.1	6010	5/27/97 14:40	MCK
Chromium	3.5	mg/L	0.1	6010	5/27/97 14:40	MCK
Lead	2.5	mg/L	0.1	6010	5/27/97 14:40	MCK
Mercury	<0.02	mg/L	0.02	7470	5/27/97 14:40	MCK
Selenium	<0.1	mg/L	0.1	6010	5/27/97 14:40	MCK
Silver	<0.1	mg/L	0.1	6010	5/27/97 14:40	MCK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Arsenic	<0.005	13.87	20	92.5	80.5	75 - 125
Barium	<0.001	0.76	20	92.0	91.3	75 - 125
Cadmium	<0.005	2.07	20	100.3	102.4	75 - 125
Chromium	<0.005	9.14	20	89.2	81.4	75 - 125
Lead	<0.005	6.28	20	82.0	77	75 - 125
Mercury	<0.001	0.85	20	94.3	93.5	75 - 125
Selenium	<0.005	3.01	20	97.7	94.8	75 - 125
Silver	<0.005	7.05	20	103.9	111.5	75 - 125

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 26998

Project: Runnels RRC
Sample: 1002 **Matrix:** waste
Date/Time Taken: 5/15/97 11:20 **Date/Time Rec'd:** 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Specific Conductance	7220	µS/cm		120.1	5/29/97	13:15	LBK
Petroleum hydrocarbons	340,000	mg/Kg	33750	418.1	5/23/97	13:30	LBK
Arsenic	10	mg/Kg	0.1	6010	5/27/97	15:02	MCK
Barium	300	mg/Kg	0.02	6010	5/27/97	15:02	MCK
Cadmium	1.2	mg/Kg	0.1	6010	5/27/97	15:02	MCK
Chromium	11	mg/Kg	0.1	6010	5/27/97	15:02	MCK
Lead	290	mg/Kg	0.1	6010	5/27/97	15:02	MCK
Mercury	<0.02	mg/Kg	0.02	7470	5/27/97	15:02	MCK
Selenium	<0.1	mg/Kg	0.1	6010	5/27/97	15:02	MCK
Silver	<0.1	mg/Kg	0.1	6010	5/27/97	15:02	MCK
Chloride	1,700	mg/Kg	0.5	300.1	5/28/97	13:35	LBK

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC
Sample: 1002

Report #: 26998

Quality Assurance Data

Parameter	Blank	Precision Limit		M.S.	M.S.D.	Limits
Specific Conductance		0.41	10			
Petroleum hydrocarbons	<2	26.30	48.4			
Arsenic	<0.005	13.87	20	92.5	80.5	75 - 125
Barium	<0.001	0.76	20	92.0	91.3	75 - 125
Cadmium	<0.005	2.07	20	100.3	102.4	75 - 125
Chromium	<0.005	9.14	20	89.2	81.4	75 - 125
Lead	<0.005	6.28	20	82.0	77	75 - 125
Mercury	<0.001	0.85	20	94.3	93.5	75 - 125
Selenium	<0.005	3.01	20	97.7	94.8	75 - 125
Silver	<0.005	7.05	20	103.9	111.5	75 - 125
Chloride	<0.05	7.31	20	96.3	89.5	75 - 125

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

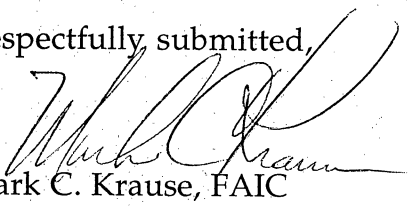
Report #: 26999

Project: Runnels RRC
Sample: 1003
Matrix: waste
Date/Time Taken: 5/15/97 13:45
Date/Time Rec'd: 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Specific Conductance	210	µS/cm		120.1	5/29/97	13:15	LBK
Petroleum hydrocarbons	1,100,000	mg/Kg	33750	418.1	5/23/97	13:30	LBK
Arsenic	<0.1	mg/Kg	0.1	6010	5/27/97	14:44	MCK
Barium	12	mg/Kg	0.02	6010	5/27/97	14:44	MCK
Cadmium	<0.1	mg/Kg	0.1	6010	5/27/97	14:44	MCK
Chromium	0.32	mg/Kg	0.1	6010	5/27/97	14:44	MCK
Lead	5.2	mg/Kg	0.1	6010	5/27/97	14:44	MCK
Mercury	<0.02	mg/Kg	0.02	7470	5/27/97	14:44	MCK
Selenium	<0.1	mg/Kg	0.1	6010	5/27/97	14:44	MCK
Silver	<0.1	mg/Kg	0.1	6010	5/27/97	14:44	MCK
Chloride	34	mg/Kg	0.5	300.1	5/28/97	13:41	LBK

Respectfully submitted,



Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC
Sample: 1003

Report #: 26999

Quality Assurance Data

Parameter	Blank	Precision	Limit	M.S.	M.S.D.	Limits
Specific Conductance		0.41	10			
Petroleum hydrocarbons	<2	26.30	48.4			
Arsenic	<0.005	13.87	20	92.5	80.5	75 - 125
Barium	<0.001	0.76	20	92.0	91.3	75 - 125
Cadmium	<0.005	2.07	20	100.3	102.4	75 - 125
Chromium	<0.005	9.14	20	89.2	81.4	75 - 125
Lead	<0.005	6.28	20	82.0	77	75 - 125
Mercury	<0.001	0.85	20	94.3	93.5	75 - 125
Selenium	<0.005	3.01	20	97.7	94.8	75 - 125
Silver	<0.005	7.05	20	103.9	111.5	75 - 125
Chloride	<0.05	7.31	20	96.3	89.5	75 - 125

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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Monday, June 9, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

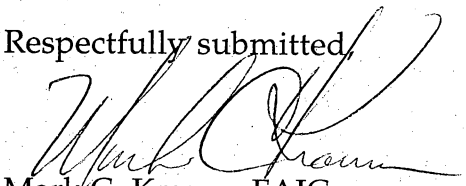
Report #: 27000

Project: Runnels RRC
Sample: 1004
Matrix: waste
Date/Time Taken: 5/15/97 14:10
Date/Time Rec'd: 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Specific Conductance	1400	µS/cm		120.1	5/29/97	13:15	LBK
Petroleum hydrocarbons	1,500,000	mg/Kg	33750	418.1	5/23/97	13:30	LBK
Arsenic	<0.1	mg/Kg	0.1	6010	5/27/97	14:31	MCK
Barium	24	mg/Kg	0.02	6010	5/27/97	14:31	MCK
Cadmium	<0.1	mg/Kg	0.1	6010	5/27/97	14:31	MCK
Chromium	0.17	mg/Kg	0.1	6010	5/27/97	14:31	MCK
Lead	0.72	mg/Kg	0.1	6010	5/27/97	14:31	MCK
Mercury	<0.02	mg/Kg	0.02	7470	5/27/97	14:31	MCK
Selenium	<0.1	mg/Kg	0.1	6010	5/27/97	14:31	MCK
Silver	<0.1	mg/Kg	0.1	6010	5/27/97	14:31	MCK
Chloride	470	mg/Kg	0.5	300.1	5/28/97	13:47	LBK

Respectfully submitted,



Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC
Sample: 1004

Report #: 27000

Quality Assurance Data

Parameter	Blank	Precision	Limit	M.S.	M.S.D.	Limits
Specific Conductance		0.41	10			
Petroleum hydrocarbons	<2	26.30	48.4			
Arsenic	<0.005	13.87	20	92.5	80.5	75 - 125
Barium	<0.001	0.76	20	92.0	91.3	75 - 125
Cadmium	<0.005	2.07	20	100.3	102.4	75 - 125
Chromium	<0.005	9.14	20	89.2	81.4	75 - 125
Lead	<0.005	6.28	20	82.0	77	75 - 125
Mercury	<0.001	0.85	20	94.3	93.5	75 - 125
Selenium	<0.005	3.01	20	97.7	94.8	75 - 125
Silver	<0.005	7.05	20	103.9	111.5	75 - 125
Chloride	<0.05	7.31	20	96.3	89.5	75 - 125

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Thursday, May 29, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27001

Project: Runnels RRC
Sample: 1005
Matrix: water
Date/Time Taken: 5/15/97 16:00
Date/Time Rec'd: 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Petroleum hydrocarbons	12	mg/L	3	418.1	5/28/97	14:30	LBK
Chloride	610	mg/L	0.05	300.1	5/28/97	14:01	LBK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Chloride	<0.05	7.31	20	96.3	89.5	75 - 125
Petroleum hydrocarbons	<2	0.00	48.4			

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Wednesday, May 28, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27002

Project: Runnels RRC
Sample: 1006 **Matrix:** water
Date/Time Taken: 5/15/97 16:00 **Date/Time Rec'd:** 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Arsenic	<0.005	mg/L	0.005	6010	5/27/97	16:03	MCK
Barium	18	mg/L	0.001	6010	5/27/97	16:03	MCK
Cadmium	<0.005	mg/L	0.005	6010	5/27/97	16:03	MCK
Chromium	0.055	mg/L	0.005	6010	5/27/97	16:03	MCK
Lead	0.047	mg/L	0.005	6010	5/27/97	16:03	MCK
Mercury	<0.001	mg/L	0.001	7470	5/27/97	16:03	MCK
Selenium	<0.005	mg/L	0.005	6010	5/27/97	16:03	MCK
Silver	<0.005	mg/L	0.005	6010	5/27/97	16:03	MCK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Arsenic	<0.005	0.09	20	100.7	100.8	75 - 125
Barium	<0.001	1.29	20	99.8	101.1	75 - 125
Cadmium	<0.005	2.25	20	100.9	103.2	75 - 125
Chromium	<0.005	2.82	20	83.8	86.2	75 - 125
Lead	<0.005	3.72	20	92.2	95.7	75 - 125
Mercury	<0.001	1.30	20	107.9	106.5	75 - 125
Selenium	<0.005	7.35	20	86.4	93	75 - 125
Silver	<0.005	3.44	20	79.8	82.6	75 - 125

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 512-471-0140

Report #: 27003

Report of Laboratory Analysis

Project: Runnels RRC
Sample: 1007
Matrix: waste
Date/Time Taken: 5/15/97 16:00
Date/Time Rec'd: 5/16/97 20:00

Parameter	Result	Units	Limit	PQL	Method	Date/Time	Run	By
Ignitability	>150	° F	150	75	1010	5/29/97	19:10	MCK
pH	8.2				9045	5/27/97	13:00	LBK
Specific Conductance	32800	µS/cm			120.1	5/29/97	13:15	LBK
Petroleum hydrocarbons	120,000	mg/Kg		2250	418.1	5/23/97	13:30	LBK
Reactivity cyanide	<10	mg/Kg	250	10	7.3.3.1	5/29/97	23:10	MCK
Reactivity sulfide	<10	mg/Kg	500	10	7.3.3.2	5/29/97	22:14	MCK
Total organic halogen	<1	mg/Kg		1	9020	5/29/97	22:16	MCK
TC Arsenic	<0.005	mg/L	5	0.005	6010	5/27/97	12:45	MCK
TC Barium	14	mg/L	100	0.001	6010	5/27/97	12:45	MCK
TC Cadmium	<0.005	mg/L	1	0.005	6010	5/27/97	12:45	MCK
TC Chromium	<0.005	mg/L	5	0.005	6010	5/27/97	12:45	MCK
TC Lead	0.013	mg/L	5	0.005	6010	5/27/97	12:45	MCK
TC Mercury	<0.001	mg/L	0.2	0.001	7470	5/27/97	12:45	MCK
TC Selenium	<0.005	mg/L	1	0.005	6010	5/27/97	12:45	MCK
TC Silver	0.0088	mg/L	5	0.005	6010	5/27/97	12:45	MCK
Chloride	17,000	mg/Kg		0.5	300.1	5/28/97	14:11	LBK
TC 1,1-dichloroethene	<0.005	mg/L	0.7	0.005	8260	5/28/97	19:54	KLM
TC 1,2-dichloroethane	0.0050	mg/L	0.5	0.005	8260	5/28/97	19:54	KLM
TC 1,4-dichlorobenzene	<0.005	mg/L	7.5	0.005	8260	5/28/97	19:54	KLM
TC 2-butanone (MEK)	0.13	mg/L	200	0.05	8260	5/28/97	19:54	KLM
TC Benzene	0.13	mg/L	0.5	0.005	8260	5/28/97	19:54	KLM
TC Carbon tetrachloride	<0.005	mg/L	0.5	0.005	8260	5/28/97	19:54	KLM
TC Chlorobenzene	<0.005	mg/L	100	0.005	8260	5/28/97	19:54	KLM
TC Chloroform	<0.005	mg/L	6	0.005	8260	5/28/97	19:54	KLM
TC Tetrachloroethene	<0.005	mg/L	0.7	0.005	8260	5/28/97	19:54	KLM
TC Trichloroethene	<0.005	mg/L	0.5	0.005	8260	5/28/97	19:54	KLM
TC Vinyl chloride	0.050	mg/L	0.2	0.005	8260	5/28/97	19:54	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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environmental analytical services
11629 Manchaca Road • Austin, Texas 78748 • (512) 280-7680

Parameter	Result	Units	Limit	PQL	Method	Date/Time	Run	By
TC 2,4,5-trichlorophenol	<0.020	mg/L	400	0.02	8270	5/27/97	11:16	KLM
TC 2,4,6-trichlorophenol	<0.020	mg/L	2	0.02	8270	5/27/97	11:16	KLM
TC 2,4-dinitrotoluene	<0.020	mg/L	0.13	0.02	8270	5/27/97	11:16	KLM
TC 2-methyphenol	<0.020	mg/L	200	0.02	8270	5/27/97	11:16	KLM
TC 3&4-methylphenol	<0.020	mg/L	200	0.02	8270	5/27/97	11:16	KLM
TC Hexachlorobenzene	<0.020	mg/L	0.13	0.02	8270	5/27/97	11:16	KLM
TC Hexachlorobutadiene	<0.020	mg/L	0.5	0.02	8270	5/27/97	11:16	KLM
TC Hexachloroethane	<0.020	mg/L	3	0.02	8270	5/27/97	11:16	KLM
TC Nitrobenzene	<0.020	mg/L	2	0.02	8270	5/27/97	11:16	KLM
TC Pentachlorophenol	<0.100	mg/L	100	0.1	8270	5/27/97	11:16	KLM
TC Pyridine	<0.040	mg/L	5	0.04	8270	5/27/97	11:16	KLM

Organic parameters follow this page

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC
Sample: 1007

Report #: 27003

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
2,4'-DDD	<10	µg/Kg	10	8080	5/27/97	17:07	KLM
2,4'-DDE	<10	µg/Kg	10	8080	5/27/97	17:07	KLM
2,4'-DDT	<10	µg/Kg	10	8080	5/27/97	17:07	KLM
4,4'-DDD	<10	µg/Kg	10	8080	5/27/97	17:07	KLM
4,4'-DDE	<10	µg/Kg	10	8080	5/27/97	17:07	KLM
4,4'-DDT	<10	µg/Kg	10	8080	5/27/97	17:07	KLM
Aldrin	<2	µg/Kg	2	8080	5/27/97	17:07	KLM
alpha-BHC	<5	µg/Kg	5	8080	5/27/97	17:07	KLM
alpha-Chlordane	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Arochlor 1016	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Arochlor 1221	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Arochlor 1232	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Arochlor 1242	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Arochlor 1248	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Arochlor 1254	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Arochlor 1260	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
beta-BHC	<5	µg/Kg	5	8080	5/27/97	17:07	KLM
delta-BHC	<5	µg/Kg	5	8080	5/27/97	17:07	KLM
Dieldrin	<2	µg/Kg	2	8080	5/27/97	17:07	KLM
Endosulfan I	<10	µg/Kg	10	8080	5/27/97	17:07	KLM
Endosulfan II	<10	µg/Kg	10	8080	5/27/97	17:07	KLM
Endosulfan sulfate	<50	µg/Kg	50	8080	5/27/97	17:07	KLM
Endrin	<5	µg/Kg	5	8080	5/27/97	17:07	KLM
Endrin aldehyde	<50	µg/Kg	50	8080	5/27/97	17:07	KLM
gamma-Chlordane	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Heptachlor	<5	µg/Kg	5	8080	5/27/97	17:07	KLM
Heptachlor epoxide	<50	µg/Kg	50	8080	5/27/97	17:07	KLM
Lindane	<5	µg/Kg	5	8080	5/27/97	17:07	KLM
Methoxychlor	<500	µg/Kg	500	8080	5/27/97	17:07	KLM
Toxaphene	<2000	µg/Kg	2000	8080	5/27/97	17:07	KLM
1,1,1,2-tetrachloroethane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,1,1-trichloroethane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
1,1,2,2-tetrachloroethane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,1,2-trichloroethane	250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,1-dichloroethane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,1-dichloroethene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,2,3-trichloropropane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,2,4-trichlorobenzene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,2-dibromoethane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,2-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,2-dichloroethane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,2-dichloropropane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,3,5-trichlorobenzene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,3-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
1,4-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
2-butanone	<2500	µg/Kg	2500	8260	5/25/97	1:51	KLM
2-chlorotoluene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
2-Hexanone	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
4-chlorotoluene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
4-methyl-2-pentanone	11,000	µg/Kg	500	8260	5/25/97	1:51	KLM
Acetone	<2500	µg/Kg	2500	8260	5/25/97	1:51	KLM
Benzene	6,400	µg/Kg	250	8260	5/25/97	1:51	KLM
Bromobenzene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Bromodichloromethane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Bromoform	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
Bromomethane	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
Carbon disulfide	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Carbon tetrachloride	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Chlorobenzene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Chlorodibromomethane	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Chloroethane	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
Chloroform	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Chloromethane	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
cis-1,2-dichloroethene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
cis-1,3-dichloropropene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Dibromomethane	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
Dichlorodifluoromethane	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
Ethylbenzene	5,800	µg/Kg	250	8260	5/25/97	1:51	KLM
m,p-Xylenes	3,600	µg/Kg	250	8260	5/25/97	1:51	KLM

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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Methylene chloride	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
Naphthalene	2,300	µg/Kg	250	8260	5/25/97	1:51	KLM
o-Xylene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Styrene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Tetrachloroethene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Toluene	390	µg/Kg	250	8260	5/25/97	1:51	KLM
trans-1,2-dichloroethene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
trans-1,3-dichloropropene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Trichloroethene	<250	µg/Kg	250	8260	5/25/97	1:51	KLM
Trichlorofluoromethane	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
Vinyl chloride	<500	µg/Kg	500	8260	5/25/97	1:51	KLM
Acenaphthene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Acenaphthylene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Anthracene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Benzo(a)anthracene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Benzo(a)pyrene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Benzo(b)fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Benzo(ghi)perylene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Benzo(k)fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Chrysene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Dibenz(ah)anthracene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Fluorene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Indeno(1,2,3-cd)pyrene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Naphthalene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Phenanthrene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM
Pyrene	<10000	µg/Kg	10000	8270	5/27/97	7:32	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC **Report #:** 27003
Sample: 1007

Report of Laboratory Quality Assurance

Parameter	Blank	Precision	Limit	M.S.	M.S.D.	Limits
Ignitability	>150	0.00	10			
pH		0.64	10			
Specific Conductance		0.41	10			
Petroleum hydrocarbons	<2	26.30	48.4			
Reactivity cyanide	<10	3.22	20	95.6	98.7	75 - 125
Reactivity sulfide	<10	0.00	10			
Total organic halogen	<0.005	13.54	20	114.7	99.2	75 - 125
TC Arsenic	<0.005	4.67	20	98.1	102.8	75 - 125
TC Barium	<0.001	5.30	20	75.2	79.3	75 - 125
TC Cadmium	<0.005	3.71	20	93.1	89.7	75 - 125
TC Chromium	<0.005	1.62	20	87.1	85.7	75 - 125
TC Lead	<0.005	1.44	20	104.8	103.3	75 - 125
TC Mercury	<0.001	1.01	20	108.2	109.3	75 - 125
TC Selenium	<0.005	9.90	20	99.6	90.2	75 - 125
TC Silver	<0.005	9.79	20	109.7	121	75 - 125
Chloride	<0.05	7.31	20	96.3	89.5	75 - 125
TC 1,1-dichloroethene	<0.005	1.89	25	97.6	95.8	70 - 130
TC 1,2-dichloroethane	<0.005	9.43	25	97.0	106.6	70 - 130
TC 1,4-dichlorobenzene	<0.005	1.86	25	129.6	127.2	70 - 130
TC 2-butanone (MEK)	<0.05	3.71	25	92.5	89.2	70 - 130
TC Benzene	<0.005	3.81	25	88.7	85.3	70 - 130
TC Carbon tetrachloride	<0.005	11.31	25	86.9	77.6	70 - 130
TC Chlorobenzene	<0.005	7.73	25	121.4	112.3	70 - 130
TC Chloroform	<0.005	6.61	25	70.0	74.8	70 - 130
TC Tetrachloroethene	<0.005	3.25	25	123.5	127.6	70 - 130
TC Trichloroethene	<0.005	13.97	25	117.8	102.4	70 - 130
TC Vinyl chloride	<0.005	14.50	25	99.9	86.3	70 - 130

Surrogate	Method	Recovery	Limits
Tetrachloro-m-xylene	8080	diluted	74-133
Dibutylchlorendate	8080	diluted	68-125
Toluene-d8	8260	107	86-114
Dibromofluoromethane	8260	98	76-121

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Bromofluorobenzene	8260	110	85-117
Bromofluorobenzene	8260	105	85-117
Dibromofluoromethane	8260	86	76-121
Toluene-d8	8260	99	86-114
Phenol-d6	8270	16	10- 94
Nitrobenzene-d5	8270	37	35-114
Tribromophenol	8270	12	10-123
Terphenyl-d14	8270	37	33-141
Fluorophenol	8270	37	21-100
Nitrobenzene-d5	8270	diluted	35-114
Fluorophenol	8270	diluted	21-100
Fluorobiphenyl	8270	diluted	43-116
Phenol-d6	8270	diluted	10- 94
Fluorobiphenyl	8270	44	43-116
Tribromophenol	8270	diluted	10-123
Terphenyl-d14	8270	diluted	33-141

PQL - Reporting Limit. %RSD - Sample Precision.
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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 512-471-0140

Report #: 27004

Report of Laboratory Analysis

Project: Runnels RRC
Sample: 1020
Matrix: other
Date/Time Taken: 5/16/97 14:30
Date/Time Rec'd: 5/16/97 20:00

Organic parameters follow this page

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Project: Runnels RRC
Sample: 1020

Report #: 27004

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
1,1,1,2-tetrachloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,1,1-trichloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,1,2,2-tetrachloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,1,2-trichloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,1-dichloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,1-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,2,3-trichloropropane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,2,4-trichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,2-dibromoethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,2-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,2-dichloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,2-dichloropropane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,3,5-trichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,3-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
1,4-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
2-butanone	<25000	µg/Kg	25000	8260	5/24/97	14:48	KLM
2-chlorotoluene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
2-Hexanone	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
4-chlorotoluene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
4-methyl-2-pentanone	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
Acetone	<25000	µg/Kg	25000	8260	5/24/97	14:48	KLM
Benzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Bromobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Bromodichloromethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Bromoform	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
Bromomethane	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
Carbon disulfide	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Carbon tetrachloride	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Chlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Chlorodibromomethane	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Chloroethane	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
Chloroform	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Chloromethane	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM

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Friday, May 30, 1997

cis-1,2-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
cis-1,3-dichloropropene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Dibromomethane	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
Dichlorodifluoromethane	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
Ethylbenzene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
m,p-Xylenes	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Methylene chloride	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
Naphthalene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
o-Xylene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Styrene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Tetrachloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Toluene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
trans-1,2-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
trans-1,3-dichloropropene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Trichloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:48	KLM
Trichlorofluoromethane	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM
Vinyl chloride	<5000	µg/Kg	5000	8260	5/24/97	14:48	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Project: Runnels RRC
Sample: 1020

Report #: 27004

Report of Laboratory Quality Assurance

Surrogate	Method	Recovery	Limits
Toluene-d8	8260	102	86-114
Dibromofluoromethane	8260	109	76-121
Bromofluorobenzene	8260	93	85-117

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Thursday, May 29, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27005

Project: Runnels RRC
Sample: 1021 **Matrix:** water
Date/Time Taken: 5/16/97 15:00 **Date/Time Rec'd:** 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Petroleum hydrocarbons	<0.2	mg/L	0.2	418.1	5/28/97	14:30	LBK
Chloride	420	mg/L	0.05	300.1	5/28/97	14:17	LBK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Chloride	<0.05	7.31	20	96.3	89.5	75 - 125
Petroleum hydrocarbons	<2	0.00	48.4			

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Wednesday, May 28, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27006

Project: Runnels RRC
Sample: 1022
Matrix: water
Date/Time Taken: 5/16/97 15:00
Date/Time Rec'd: 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time Run	By
Arsenic	<0.005	mg/L	0.005	6010	5/27/97 16:08	MCK
Barium	0.43	mg/L	0.001	6010	5/27/97 16:08	MCK
Cadmium	<0.005	mg/L	0.005	6010	5/27/97 16:08	MCK
Chromium	<0.005	mg/L	0.005	6010	5/27/97 16:08	MCK
Lead	<0.005	mg/L	0.005	6010	5/27/97 16:08	MCK
Mercury	<0.001	mg/L	0.001	7470	5/27/97 16:08	MCK
Selenium	<0.005	mg/L	0.005	6010	5/27/97 16:08	MCK
Silver	<0.005	mg/L	0.005	6010	5/27/97 16:08	MCK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Arsenic	<0.005	0.09	20	100.7	100.8	75 - 125
Barium	<0.001	1.29	20	99.8	101.1	75 - 125
Cadmium	<0.005	2.25	20	100.9	103.2	75 - 125
Chromium	<0.005	2.82	20	83.8	86.2	75 - 125
Lead	<0.005	3.72	20	92.2	95.7	75 - 125
Mercury	<0.001	1.30	20	107.9	106.5	75 - 125
Selenium	<0.005	7.35	20	86.4	93	75 - 125
Silver	<0.005	3.44	20	79.8	82.6	75 - 125

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 512-471-0140

Report #: 27007

Report of Laboratory Analysis

Project: Runnels RRC
Sample: 1008
Matrix: other
Date/Time Taken: 5/16/97 09:00
Date/Time Rec'd: 5/16/97 20:00

Organic parameters follow this page

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
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Friday, May 30, 1997

Project: Runnels RRC
Sample: 1008

Report #: 27007

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
2,4'-DDD	<10	µg/Kg	10	8080	5/27/97	18:09	KLM
2,4'-DDE	<10	µg/Kg	10	8080	5/27/97	18:09	KLM
2,4'-DDT	<10	µg/Kg	10	8080	5/27/97	18:09	KLM
4,4'-DDD	<10	µg/Kg	10	8080	5/27/97	18:09	KLM
4,4'-DDE	<10	µg/Kg	10	8080	5/27/97	18:09	KLM
4,4'-DDT	<10	µg/Kg	10	8080	5/27/97	18:09	KLM
Aldrin	<2	µg/Kg	2	8080	5/27/97	18:09	KLM
alpha-BHC	<5	µg/Kg	5	8080	5/27/97	18:09	KLM
alpha-Chlordane	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Arochlor 1016	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Arochlor 1221	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Arochlor 1232	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Arochlor 1242	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Arochlor 1248	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Arochlor 1254	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Arochlor 1260	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
beta-BHC	<5	µg/Kg	5	8080	5/27/97	18:09	KLM
delta-BHC	<5	µg/Kg	5	8080	5/27/97	18:09	KLM
Dieldrin	<2	µg/Kg	2	8080	5/27/97	18:09	KLM
Endosulfan I	<10	µg/Kg	10	8080	5/27/97	18:09	KLM
Endosulfan II	<10	µg/Kg	10	8080	5/27/97	18:09	KLM
Endosulfan sulfate	<50	µg/Kg	50	8080	5/27/97	18:09	KLM
Endrin	<5	µg/Kg	5	8080	5/27/97	18:09	KLM
Endrin aldehyde	<50	µg/Kg	50	8080	5/27/97	18:09	KLM
gamma-Chlordane	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Heptachlor	<5	µg/Kg	5	8080	5/27/97	18:09	KLM
Heptachlor epoxide	<50	µg/Kg	50	8080	5/27/97	18:09	KLM
Lindane	<5	µg/Kg	5	8080	5/27/97	18:09	KLM
Methoxychlor	<500	µg/Kg	500	8080	5/27/97	18:09	KLM
Toxaphene	<2000	µg/Kg	2000	8080	5/27/97	18:09	KLM
1,1,1,2-tetrachloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,1,1-trichloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,1,2,2-tetrachloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

1,1,2-trichloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,1-dichloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,1-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,2,3-trichloropropane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,2,4-trichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,2-dibromoethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,2-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,2-dichloroethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,2-dichloropropane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,3,5-trichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,3-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
1,4-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
2-butanone	<25000	µg/Kg	25000	8260	5/24/97	14:28	KLM
2-chlorotoluene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
2-Hexanone	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
4-chlorotoluene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
4-methyl-2-pentanone	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
Acetone	<25000	µg/Kg	25000	8260	5/24/97	14:28	KLM
Benzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Bromobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Bromodichloromethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Bromoform	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
Bromomethane	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
Carbon disulfide	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Carbon tetrachloride	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Chlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Chlorodibromomethane	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Chloroethane	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
Chloroform	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Chloromethane	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
cis-1,2-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
cis-1,3-dichloropropene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Dibromomethane	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
Dichlorodifluoromethane	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
Ethylbenzene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
m,p-Xylenes	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Methylene chloride	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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Friday, May 30, 1997

Naphthalene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
o-Xylene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Styrene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Tetrachloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Toluene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
trans-1,2-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
trans-1,3-dichloropropene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Trichloroethene	<2500	µg/Kg	2500	8260	5/24/97	14:28	KLM
Trichlorofluoromethane	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM
Vinyl chloride	<5000	µg/Kg	5000	8260	5/24/97	14:28	KLM

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M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Project: Runnels RRC
Sample: 1008

Report #: 27007

Report of Laboratory Quality Assurance

Surrogate	Method	Recovery	Limits
Tetrachloro-m-xylene	8080	diluted	74-133
Dibutylchlorendate	8080	diluted	68-125
Toluene-d8	8260	103	86-114
Dibromofluoromethane	8260	104	76-121
Bromofluorobenzene	8260	96	85-117

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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Thursday, May 29, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27008

Project: Runnels RRC
Sample: 1009
Matrix: water
Date/Time Taken: 5/16/97 09:35
Date/Time Rec'd: 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time Run	By
Petroleum hydrocarbons	26	mg/L	3	418.1	5/28/97 14:30	LBK
Chloride	190	mg/L	0.05	300.1	5/28/97 15:41	LBK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Chloride	<0.05	0.08	20	91.9	91.8	75 - 125
Petroleum hydrocarbons	<2	0.00	48.4			

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Wednesday, May 28, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27009

Project: Runnels RRC
Sample: 1010 **Matrix:** water
Date/Time Taken: 5/16/97 09:35 **Date/Time Rec'd:** 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Arsenic	<0.005	mg/L	0.005	6010	5/27/97	16:12	MCK
Barium	5.5	mg/L	0.001	6010	5/27/97	16:12	MCK
Cadmium	<0.005	mg/L	0.005	6010	5/27/97	16:12	MCK
Chromium	<0.005	mg/L	0.005	6010	5/27/97	16:12	MCK
Lead	0.012	mg/L	0.005	6010	5/27/97	16:12	MCK
Mercury	<0.001	mg/L	0.001	7470	5/27/97	16:12	MCK
Selenium	<0.005	mg/L	0.005	6010	5/27/97	16:12	MCK
Silver	<0.005	mg/L	0.005	6010	5/27/97	16:12	MCK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Arsenic	<0.005	0.09	20	100.7	100.8	75 - 125
Barium	<0.001	1.29	20	99.8	101.1	75 - 125
Cadmium	<0.005	2.25	20	100.9	103.2	75 - 125
Chromium	<0.005	2.82	20	83.8	86.2	75 - 125
Lead	<0.005	3.72	20	92.2	95.7	75 - 125
Mercury	<0.001	1.30	20	107.9	106.5	75 - 125
Selenium	<0.005	7.35	20	86.4	93	75 - 125
Silver	<0.005	3.44	20	79.8	82.6	75 - 125

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 512-471-0140

Report #: 27010

Report of Laboratory Analysis

Project: Runnels RRC
Sample: 1011
Matrix: waste
Date/Time Taken: 5/16/97 09:50
Date/Time Rec'd: 5/16/97 20:00

Parameter	Result	Units	Limit	PQL	Method	Date/Time	Run	By
Ignitability	>150	° F	150	75	1010	5/29/97	19:10	MCK
pH	8.3				9045	5/27/97	13:00	LBK
Specific Conductance	3650	µS/cm			120.1	5/29/97	13:15	LBK
Petroleum hydrocarbons	910,000	mg/Kg		33750	418.1	5/23/97	13:30	LBK
Reactivity cyanide	<10	mg/Kg	250	10	7.3.3.1	5/29/97	23:10	MCK
Reactivity sulfide	<10	mg/Kg	500	10	7.3.3.2	5/29/97	22:14	MCK
Total organic halogen	<1	mg/Kg		1	9020	5/29/97	22:16	MCK
TC Arsenic	<0.005	mg/L	5	0.005	6010	5/27/97	12:36	MCK
TC Barium	5.2	mg/L	100	0.001	6010	5/27/97	12:36	MCK
TC Cadmium	<0.005	mg/L	1	0.005	6010	5/27/97	12:36	MCK
TC Chromium	<0.005	mg/L	5	0.005	6010	5/27/97	12:36	MCK
TC Lead	0.017	mg/L	5	0.005	6010	5/27/97	12:36	MCK
TC Mercury	<0.001	mg/L	0.2	0.001	7470	5/27/97	12:36	MCK
TC Selenium	<0.005	mg/L	1	0.005	6010	5/27/97	12:36	MCK
TC Silver	<0.005	mg/L	5	0.005	6010	5/27/97	12:36	MCK
Chloride	930	mg/Kg		1.5	300.1	5/28/97	14:35	LBK
TC 1,1-dichloroethene	<0.005	mg/L	0.7	0.005	8260	5/28/97	20:14	KLM
TC 1,2-dichloroethane	0.014	mg/L	0.5	0.005	8260	5/28/97	20:14	KLM
TC 1,4-dichlorobenzene	<0.005	mg/L	7.5	0.005	8260	5/28/97	20:14	KLM
TC 2-butanone (MEK)	0.10	mg/L	200	0.05	8260	5/28/97	20:14	KLM
TC Benzene	<0.005	mg/L	0.5	0.005	8260	5/28/97	20:14	KLM
TC Carbon tetrachloride	<0.005	mg/L	0.5	0.005	8260	5/28/97	20:14	KLM
TC Chlorobenzene	<0.005	mg/L	100	0.005	8260	5/28/97	20:14	KLM
TC Chloroform	<0.005	mg/L	6	0.005	8260	5/28/97	20:14	KLM
TC Tetrachloroethene	<0.005	mg/L	0.7	0.005	8260	5/28/97	20:14	KLM
TC Trichloroethene	<0.005	mg/L	0.5	0.005	8260	5/28/97	20:14	KLM
TC Vinyl chloride	<0.005	mg/L	0.2	0.005	8260	5/28/97	20:14	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
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environmental analytical services
11629 Manchaca Road • Austin, Texas 78748 • (512) 280-7680

Parameter	Result	Units	Limit	PQL	Method	Date/Time	Run	By
TC 2,4,5-trichlorophenol	<0.020	mg/L	400	0.02	8270	5/27/97	11:49	KLM
TC 2,4,6-trichlorophenol	<0.020	mg/L	2	0.02	8270	5/27/97	11:49	KLM
TC 2,4-dinitrotoluene	<0.020	mg/L	0.13	0.02	8270	5/27/97	11:49	KLM
TC 2-methyphenol	<0.020	mg/L	200	0.02	8270	5/27/97	11:49	KLM
TC 3&4-methylphenol	<0.020	mg/L	200	0.02	8270	5/27/97	11:49	KLM
TC Hexachlorobenzene	<0.020	mg/L	0.13	0.02	8270	5/27/97	11:49	KLM
TC Hexachlorobutadiene	<0.020	mg/L	0.5	0.02	8270	5/27/97	11:49	KLM
TC Hexachloroethane	<0.020	mg/L	3	0.02	8270	5/27/97	11:49	KLM
TC Nitrobenzene	<0.020	mg/L	2	0.02	8270	5/27/97	11:49	KLM
TC Pentachlorophenol	<0.100	mg/L	100	0.1	8270	5/27/97	11:49	KLM
TC Pyridine	<0.040	mg/L	5	0.04	8270	5/27/97	11:49	KLM

Organic parameters follow this page

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC **Report #:** 27010
Sample: 1011

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
2,4'-DDD	<10	µg/Kg	10	8080	5/27/97	18:40	KLM
2,4'-DDE	<10	µg/Kg	10	8080	5/27/97	18:40	KLM
2,4'-DDT	<10	µg/Kg	10	8080	5/27/97	18:40	KLM
4,4'-DDD	<10	µg/Kg	10	8080	5/27/97	18:40	KLM
4,4'-DDE	<10	µg/Kg	10	8080	5/27/97	18:40	KLM
4,4'-DDT	<10	µg/Kg	10	8080	5/27/97	18:40	KLM
Aldrin	<2	µg/Kg	2	8080	5/27/97	18:40	KLM
alpha-BHC	<5	µg/Kg	5	8080	5/27/97	18:40	KLM
alpha-Chlordane	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Arochlor 1016	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Arochlor 1221	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Arochlor 1232	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Arochlor 1242	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Arochlor 1248	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Arochlor 1254	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Arochlor 1260	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
beta-BHC	<5	µg/Kg	5	8080	5/27/97	18:40	KLM
delta-BHC	<5	µg/Kg	5	8080	5/27/97	18:40	KLM
Dieldrin	<2	µg/Kg	2	8080	5/27/97	18:40	KLM
Endosulfan I	<10	µg/Kg	10	8080	5/27/97	18:40	KLM
Endosulfan II	<10	µg/Kg	10	8080	5/27/97	18:40	KLM
Endosulfan sulfate	<50	µg/Kg	50	8080	5/27/97	18:40	KLM
Endrin	<5	µg/Kg	5	8080	5/27/97	18:40	KLM
Endrin aldehyde	<50	µg/Kg	50	8080	5/27/97	18:40	KLM
gamma-Chlordane	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Heptachlor	<5	µg/Kg	5	8080	5/27/97	18:40	KLM
Heptachlor epoxide	<50	µg/Kg	50	8080	5/27/97	18:40	KLM
Lindane	<5	µg/Kg	5	8080	5/27/97	18:40	KLM
Methoxychlor	<500	µg/Kg	500	8080	5/27/97	18:40	KLM
Toxaphene	<2000	µg/Kg	2000	8080	5/27/97	18:40	KLM
1,1,1,2-tetrachloroethane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,1,1-trichloroethane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
1,1,2,2-tetrachloroethane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,1,2-trichloroethane	400	µg/Kg	250	8260	5/25/97	2:57	KLM
1,1-dichloroethane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,1-dichloroethene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,2,3-trichloropropane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,2,4-trichlorobenzene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,2-dibromoethane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,2-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,2-dichloroethane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,2-dichloropropane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,3,5-trichlorobenzene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,3-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
1,4-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
2-butanone	<2500	µg/Kg	2500	8260	5/25/97	2:57	KLM
2-chlorotoluene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
2-Hexanone	3,400	µg/Kg	500	8260	5/25/97	2:57	KLM
4-chlorotoluene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
4-methyl-2-pentanone	31,000	µg/Kg	500	8260	5/25/97	2:57	KLM
Acetone	<2500	µg/Kg	2500	8260	5/25/97	2:57	KLM
Benzene	8,600	µg/Kg	250	8260	5/25/97	2:57	KLM
Bromobenzene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Bromodichloromethane	380	µg/Kg	250	8260	5/25/97	2:57	KLM
Bromoform	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
Bromomethane	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
Carbon disulfide	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Carbon tetrachloride	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Chlorobenzene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Chlorodibromomethane	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Chloroethane	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
Chloroform	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Chloromethane	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
cis-1,2-dichloroethene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
cis-1,3-dichloropropene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Dibromomethane	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
Dichlorodifluoromethane	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
Ethylbenzene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
m,p-Xylenes	<250	µg/Kg	250	8260	5/25/97	2:57	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Methylene chloride	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
Naphthalene	12,000	µg/Kg	250	8260	5/25/97	2:57	KLM
o-Xylene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Styrene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Tetrachloroethene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Toluene	800	µg/Kg	250	8260	5/25/97	2:57	KLM
trans-1,2-dichloroethene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
trans-1,3-dichloropropene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Trichloroethene	<250	µg/Kg	250	8260	5/25/97	2:57	KLM
Trichlorofluoromethane	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
Vinyl chloride	<500	µg/Kg	500	8260	5/25/97	2:57	KLM
Acenaphthene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Acenaphthylene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Anthracene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Benzo(a)anthracene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Benzo(a)pyrene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Benzo(b)fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Benzo(ghi)perylene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Benzo(k)fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Chrysene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Dibenz(ah)anthracene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Fluorene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Indeno(1,2,3-cd)pyrene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Naphthalene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Phenanthrene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM
Pyrene	<10000	µg/Kg	10000	8270	5/27/97	8:20	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC **Report #:** 27010
Sample: 1011

Report of Laboratory Quality Assurance

Parameter	Blank	Precision	Limit	M.S.	M.S.D.	Limits
Ignitability	>150	0.00	10			
pH		0.64	10			
Specific Conductance		0.41	10			
Petroleum hydrocarbons	<2	26.30	48.4			
Reactivity cyanide	<10	3.22	20	95.6	98.7	75 - 125
Reactivity sulfide	<10	0.00	10			
Total organic halogen	<0.005	13.54	20	114.7	99.2	75 - 125
TC Arsenic	<0.005	4.67	20	98.1	102.8	75 - 125
TC Barium	<0.001	5.30	20	75.2	79.3	75 - 125
TC Cadmium	<0.005	3.71	20	93.1	89.7	75 - 125
TC Chromium	<0.005	1.62	20	87.1	85.7	75 - 125
TC Lead	<0.005	1.44	20	104.8	103.3	75 - 125
TC Mercury	<0.001	1.01	20	108.2	109.3	75 - 125
TC Selenium	<0.005	9.90	20	99.6	90.2	75 - 125
TC Silver	<0.005	9.79	20	109.7	121	75 - 125
Chloride	<0.05	7.31	20	96.3	89.5	75 - 125
TC 1,1-dichloroethene	<0.005	1.89	25	97.6	95.8	70 - 130
TC 1,2-dichloroethane	<0.005	9.43	25	97.0	106.6	70 - 130
TC 1,4-dichlorobenzene	<0.005	1.86	25	129.6	127.2	70 - 130
TC 2-butanone (MEK)	<0.05	3.71	25	92.5	89.2	70 - 130
TC Benzene	<0.005	3.81	25	88.7	85.3	70 - 130
TC Carbon tetrachloride	<0.005	11.31	25	86.9	77.6	70 - 130
TC Chlorobenzene	<0.005	7.73	25	121.4	112.3	70 - 130
TC Chloroform	<0.005	6.61	25	70.0	74.8	70 - 130
TC Tetrachloroethene	<0.005	3.25	25	123.5	127.6	70 - 130
TC Trichloroethene	<0.005	13.97	25	117.8	102.4	70 - 130
TC Vinyl chloride	<0.005	14.50	25	99.9	86.3	70 - 130

Surrogate	Method	Recovery	Limits
Tetrachloro-m-xylene	8080	diluted	74-133
Dibutylchlorendate	8080	diluted	68-125
Toluene-d8	8260	108	86-114
Dibromofluoromethane	8260	91	76-121

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

Bromofluorobenzene	8260	100	85-117
Bromofluorobenzene	8260	102	85-117
Dibromofluoromethane	8260	84	76-121
Toluene-d8	8260	100	86-114
Phenol-d6	8270	18	10- 94
Nitrobenzene-d5	8270	41	35-114
Tribromophenol	8270	31	10-123
Terphenyl-d14	8270	101	33-141
Fluorophenol	8270	25	21-100
Nitrobenzene-d5	8270	diluted	35-114
Fluorophenol	8270	diluted	21-100
Fluorobiphenyl	8270	diluted	43-116
Phenol-d6	8270	diluted	10- 94
Fluorobiphenyl	8270	96	43-116
Tribromophenol	8270	diluted	10-123
Terphenyl-d14	8270	diluted	33-141

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Monday, June 9, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 512-471-0140

Report #: 27011

Report of Laboratory Analysis

Project: Runnels RRC
Sample: 1014 **Matrix:** waste
Date/Time Taken: 5/16/97 10:30 **Date/Time Rec'd:** 5/16/97 20:00

Parameter	Result	Units	Limit	PQL	Method	Date/Time	Run	By
Ignitability	>150	° F	150	75	1010	5/29/97	19:10	MCK
pH	7				9045	5/27/97	13:00	LBK
Specific Conductance	1180	µS/cm			120.1	5/29/97	13:15	LBK
Petroleum hydrocarbons	1,200,00	mg/Kg		33750	418.1	5/23/97	13:30	LBK
Reactivity cyanide	<10	mg/Kg	250	10	7.3.3.1	5/29/97	23:10	MCK
Reactivity sulfide	<10	mg/Kg	500	10	7.3.3.2	5/29/97	22:14	MCK
Total organic halogen	<1	mg/Kg		1	9020	5/29/97	22:16	MCK
TC Arsenic	<0.005	mg/L	5	0.005	6010	5/27/97	12:41	MCK
TC Barium	0.74	mg/L	100	0.001	6010	5/27/97	12:41	MCK
TC Cadmium	<0.005	mg/L	1	0.005	6010	5/27/97	12:41	MCK
TC Chromium	<0.005	mg/L	5	0.005	6010	5/27/97	12:41	MCK
TC Lead	0.0091	mg/L	5	0.005	6010	5/27/97	12:41	MCK
TC Mercury	<0.001	mg/L	0.2	0.001	7470	5/27/97	12:41	MCK
TC Selenium	<0.005	mg/L	1	0.005	6010	5/27/97	12:41	MCK
TC Silver	<0.005	mg/L	5	0.005	6010	5/27/97	12:41	MCK
Chloride	290	mg/Kg		0.5	300.1	5/28/97	15:16	LBK
TC 1,1-dichloroethene	<0.005	mg/L	0.7	0.005	8260	5/28/97	20:35	KLM
TC 1,2-dichloroethane	0.010	mg/L	0.5	0.005	8260	5/28/97	20:35	KLM
TC 1,4-dichlorobenzene	<0.005	mg/L	7.5	0.005	8260	5/28/97	20:35	KLM
TC 2-butanone (MEK)	0.081	mg/L	200	0.05	8260	5/28/97	20:35	KLM
TC Benzene	0.17	mg/L	0.5	0.005	8260	5/28/97	20:35	KLM
TC Carbon tetrachloride	<0.005	mg/L	0.5	0.005	8260	5/28/97	20:35	KLM
TC Chlorobenzene	<0.005	mg/L	100	0.005	8260	5/28/97	20:35	KLM
TC Chloroform	<0.005	mg/L	6	0.005	8260	5/28/97	20:35	KLM
TC Tetrachloroethene	<0.005	mg/L	0.7	0.005	8260	5/28/97	20:35	KLM
TC Trichloroethene	<0.005	mg/L	0.5	0.005	8260	5/28/97	20:35	KLM
TC Vinyl chloride	<0.005	mg/L	0.2	0.005	8260	5/28/97	20:35	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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Parameter	Result	Units	Limit	PQL	Method	Date/Time	Run	By
TC 2,4,5-trichlorophenol	<0.020	mg/L	400	0.02	8270	5/27/97	12:22	KLM
TC 2,4,6-trichlorophenol	<0.020	mg/L	2	0.02	8270	5/27/97	12:22	KLM
TC 2,4-dinitrotoluene	<0.020	mg/L	0.13	0.02	8270	5/27/97	12:22	KLM
TC 2-methyphenol	<0.020	mg/L	200	0.02	8270	5/27/97	12:22	KLM
TC 3&4-methylphenol	<0.020	mg/L	200	0.02	8270	5/27/97	12:22	KLM
TC Hexachlorobenzene	<0.020	mg/L	0.13	0.02	8270	5/27/97	12:22	KLM
TC Hexachlorobutadiene	<0.020	mg/L	0.5	0.02	8270	5/27/97	12:22	KLM
TC Hexachloroethane	<0.020	mg/L	3	0.02	8270	5/27/97	12:22	KLM
TC Nitrobenzene	<0.020	mg/L	2	0.02	8270	5/27/97	12:22	KLM
TC Pentachlorophenol	<0.100	mg/L	100	0.1	8270	5/27/97	12:22	KLM
TC Pyridine	<0.040	mg/L	5	0.04	8270	5/27/97	12:22	KLM

Organic parameters follow this page

Respectfully submitted,

Mark C. Krause, FAIC

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chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC
Sample: 1014

Report #: 27011

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
2,4'-DDD	<10	µg/Kg	10	8080	5/27/97	19:11	KLM
2,4'-DDE	<10	µg/Kg	10	8080	5/27/97	19:11	KLM
2,4'-DDT	<10	µg/Kg	10	8080	5/27/97	19:11	KLM
4,4'-DDD	<10	µg/Kg	10	8080	5/27/97	19:11	KLM
4,4'-DDE	<10	µg/Kg	10	8080	5/27/97	19:11	KLM
4,4'-DDT	<10	µg/Kg	10	8080	5/27/97	19:11	KLM
Aldrin	<2	µg/Kg	2	8080	5/27/97	19:11	KLM
alpha-BHC	<5	µg/Kg	5	8080	5/27/97	19:11	KLM
alpha-Chlordane	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Arochlor 1016	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Arochlor 1221	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Arochlor 1232	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Arochlor 1242	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Arochlor 1248	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Arochlor 1254	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Arochlor 1260	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
beta-BHC	<5	µg/Kg	5	8080	5/27/97	19:11	KLM
delta-BHC	<5	µg/Kg	5	8080	5/27/97	19:11	KLM
Dieldrin	<2	µg/Kg	2	8080	5/27/97	19:11	KLM
Endosulfan I	<10	µg/Kg	10	8080	5/27/97	19:11	KLM
Endosulfan II	<10	µg/Kg	10	8080	5/27/97	19:11	KLM
Endosulfan sulfate	<50	µg/Kg	50	8080	5/27/97	19:11	KLM
Endrin	<5	µg/Kg	5	8080	5/27/97	19:11	KLM
Endrin aldehyde	<50	µg/Kg	50	8080	5/27/97	19:11	KLM
gamma-Chlordane	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Heptachlor	<5	µg/Kg	5	8080	5/27/97	19:11	KLM
Heptachlor epoxide	<50	µg/Kg	50	8080	5/27/97	19:11	KLM
Lindane	<5	µg/Kg	5	8080	5/27/97	19:11	KLM
Methoxychlor	<500	µg/Kg	500	8080	5/27/97	19:11	KLM
Toxaphene	<2000	µg/Kg	2000	8080	5/27/97	19:11	KLM
1,1,1,2-tetrachloroethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,1,1-trichloroethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM

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Monday, June 9, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
1,1,2,2-tetrachloroethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,1,2-trichloroethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,1-dichloroethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,1-dichloroethene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,2,3-trichloropropane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,2,4-trichlorobenzene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,2-dibromoethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,2-dichlorobenzene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,2-dichloroethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,2-dichloropropane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,3,5-trichlorobenzene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,3-dichlorobenzene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
1,4-dichlorobenzene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
2-butanone	<25000	µg/Kg	25000	8260	5/30/97	11:15	KLM
2-chlorotoluene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
2-Hexanone	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
4-chlorotoluene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
4-methyl-2-pentanone	53,000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Acetone	<25000	µg/Kg	25000	8260	5/30/97	11:15	KLM
Benzene	18,000	µg/Kg	2500	8260	5/30/97	11:15	KLM
Bromobenzene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Bromodichloromethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Bromoform	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Bromomethane	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Carbon disulfide	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Carbon tetrachloride	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Chlorobenzene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Chlorodibromomethane	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Chloroethane	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Chloroform	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Chloromethane	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
cis-1,2-dichloroethene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
cis-1,3-dichloropropene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Dibromomethane	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Dichlorodifluoromethane	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Ethylbenzene	19,000	µg/Kg	2500	8260	5/30/97	11:15	KLM
m,p-Xylenes	30,000	µg/Kg	2500	8260	5/30/97	11:15	KLM

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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Methylene chloride	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Naphthalene	8,100	µg/Kg	2500	8260	5/30/97	11:15	KLM
o-Xylene	32,000	µg/Kg	2500	8260	5/30/97	11:15	KLM
Styrene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Tetrachloroethene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Toluene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
trans-1,2-dichloroethene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
trans-1,3-dichloropropene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Trichloroethene	<2500	µg/Kg	2500	8260	5/30/97	11:15	KLM
Trichlorofluoromethane	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Vinyl chloride	<5000	µg/Kg	5000	8260	5/30/97	11:15	KLM
Acenaphthene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Acenaphthylene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Anthracene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Benzo(a)anthracene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Benzo(a)pyrene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Benzo(b)fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Benzo(ghi)perylene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Benzo(k)fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Chrysene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Dibenz(ah)anthracene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Fluorene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Indeno(1,2,3-cd)pyrene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Naphthalene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Phenanthrene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM
Pyrene	<10000	µg/Kg	10000	8270	5/27/97	9:09	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC **Report #:** 27011
Sample: 1014

Report of Laboratory Quality Assurance

Parameter	Blank	Precision	Limit	M.S.	M.S.D.	Limits
Ignitability	>150	0.00	10			
pH		0.64	10			
Specific Conductance		0.41	10			
Petroleum hydrocarbons	<2	26.30	48.4			
Reactivity cyanide	<10	3.22	20	95.6	98.7	75 - 125
Reactivity sulfide	<10	0.00	10			
Total organic halogen	<0.005	13.54	20	114.7	99.2	75 - 125
TC Arsenic	<0.005	4.67	20	98.1	102.8	75 - 125
TC Barium	<0.001	5.30	20	75.2	79.3	75 - 125
TC Cadmium	<0.005	3.71	20	93.1	89.7	75 - 125
TC Chromium	<0.005	1.62	20	87.1	85.7	75 - 125
TC Lead	<0.005	1.44	20	104.8	103.3	75 - 125
TC Mercury	<0.001	1.01	20	108.2	109.3	75 - 125
TC Selenium	<0.005	9.90	20	99.6	90.2	75 - 125
TC Silver	<0.005	9.79	20	109.7	121	75 - 125
Chloride	<0.05	0.08	20	91.9	91.8	75 - 125
TC 1,1-dichloroethene	<0.005	1.89	25	97.6	95.8	70 - 130
TC 1,2-dichloroethane	<0.005	9.43	25	97.0	106.6	70 - 130
TC 1,4-dichlorobenzene	<0.005	1.86	25	129.6	127.2	70 - 130
TC 2-butanone (MEK)	<0.05	3.71	25	92.5	89.2	70 - 130
TC Benzene	<0.005	3.81	25	88.7	85.3	70 - 130
TC Carbon tetrachloride	<0.005	11.31	25	86.9	77.6	70 - 130
TC Chlorobenzene	<0.005	7.73	25	121.4	112.3	70 - 130
TC Chloroform	<0.005	6.61	25	70.0	74.8	70 - 130
TC Tetrachloroethene	<0.005	3.25	25	123.5	127.6	70 - 130
TC Trichloroethene	<0.005	13.97	25	117.8	102.4	70 - 130
TC Vinyl chloride	<0.005	14.50	25	99.9	86.3	70 - 130

Surrogate	Method	Recovery	Limits
Tetrachloro-m-xylene	8080	diluted	74-133
Dibutylchlorendate	8080	diluted	68-125
Toluene-d8	8260	112	86-114
Dibromofluoromethane	8260	88	76-121

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

Bromofluorobenzene	8260	102	85-117
Bromofluorobenzene	8260	98	85-117
Dibromofluoromethane	8260	81	76-121
Toluene-d8	8260	107	86-114
Phenol-d6	8270	15	10- 94
Nitrobenzene-d5	8270	66	35-114
Tribromophenol	8270	57	10-123
Terphenyl-d14	8270	137	33-141
Fluorophenol	8270	44	21-100
Nitrobenzene-d5	8270	diluted	35-114
Fluorophenol	8270	diluted	21-100
Fluorobiphenyl	8270	diluted	43-116
Phenol-d6	8270	diluted	10- 94
Fluorobiphenyl	8270	106	43-116
Tribromophenol	8270	diluted	10-123
Terphenyl-d14	8270	diluted	33-141

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27012

Project: Runnels RRC
Sample: 1018 **Matrix:** waste
Date/Time Taken: 5/16/97 14:00 **Date/Time Rec'd:** 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Specific Conductance	2410	µS/cm		120.1	5/29/97	13:15	LBK
Petroleum hydrocarbons	860,000	mg/Kg	33750	418.1	5/23/97	13:30	LBK
Arsenic	0.38	mg/Kg	0.1	6010	5/27/97	14:35	MCK
Barium	57	mg/Kg	0.02	6010	5/27/97	14:35	MCK
Cadmium	<0.1	mg/Kg	0.1	6010	5/27/97	14:35	MCK
Chromium	0.61	mg/Kg	0.1	6010	5/27/97	14:35	MCK
Lead	3.2	mg/Kg	0.1	6010	5/27/97	14:35	MCK
Mercury	<0.02	mg/Kg	0.02	7470	5/27/97	14:35	MCK
Selenium	<0.1	mg/Kg	0.1	6010	5/27/97	14:35	MCK
Silver	<0.1	mg/Kg	0.1	6010	5/27/97	14:35	MCK
Chloride	620	mg/Kg	0.5	300.1	5/28/97	15:27	LBK

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC **Report #:** 27012
Sample: 1018

Quality Assurance Data

Parameter	Blank	Precision	Limit	M.S.	M.S.D.	Limits
Specific Conductance		0.41	10			
Petroleum hydrocarbons	<2	26.30	48.4			
Arsenic	<0.005	13.87	20	92.5	80.5	75 - 125
Barium	<0.001	0.76	20	92.0	91.3	75 - 125
Cadmium	<0.005	2.07	20	100.3	102.4	75 - 125
Chromium	<0.005	9.14	20	89.2	81.4	75 - 125
Lead	<0.005	6.28	20	82.0	77	75 - 125
Mercury	<0.001	0.85	20	94.3	93.5	75 - 125
Selenium	<0.005	3.01	20	97.7	94.8	75 - 125
Silver	<0.005	7.05	20	103.9	111.5	75 - 125
Chloride	<0.05	0.08	20	91.9	91.8	75 - 125

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 512-471-0140

Report #: 27013

Report of Laboratory Analysis

Project: Runnels RRC
Sample: 1019 **Matrix:** other
Date/Time Taken: 5/16/97 14:30 **Date/Time Rec'd:** 5/16/97 20:00

Organic parameters follow this page

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Project: Runnels RRC
Sample: 1019

Report #: 27013

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
2,4'-DDD	<10	µg/Kg	10	8080	5/27/97	19:42	KLM
2,4'-DDE	<10	µg/Kg	10	8080	5/27/97	19:42	KLM
2,4'-DDT	<10	µg/Kg	10	8080	5/27/97	19:42	KLM
4,4'-DDD	<10	µg/Kg	10	8080	5/27/97	19:42	KLM
4,4'-DDE	<10	µg/Kg	10	8080	5/27/97	19:42	KLM
4,4'-DDT	<10	µg/Kg	10	8080	5/27/97	19:42	KLM
Aldrin	<2	µg/Kg	2	8080	5/27/97	19:42	KLM
alpha-BHC	<5	µg/Kg	5	8080	5/27/97	19:42	KLM
alpha-Chlordane	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Arochlor 1016	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Arochlor 1221	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Arochlor 1232	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Arochlor 1242	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Arochlor 1248	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Arochlor 1254	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Arochlor 1260	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
beta-BHC	<5	µg/Kg	5	8080	5/27/97	19:42	KLM
delta-BHC	<5	µg/Kg	5	8080	5/27/97	19:42	KLM
Dieldrin	<2	µg/Kg	2	8080	5/27/97	19:42	KLM
Endosulfan I	<10	µg/Kg	10	8080	5/27/97	19:42	KLM
Endosulfan II	<10	µg/Kg	10	8080	5/27/97	19:42	KLM
Endosulfan sulfate	<50	µg/Kg	50	8080	5/27/97	19:42	KLM
Endrin	<5	µg/Kg	5	8080	5/27/97	19:42	KLM
Endrin aldehyde	<50	µg/Kg	50	8080	5/27/97	19:42	KLM
gamma-Chlordane	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Heptachlor	<5	µg/Kg	5	8080	5/27/97	19:42	KLM
Heptachlor epoxide	<50	µg/Kg	50	8080	5/27/97	19:42	KLM
Lindane	<5	µg/Kg	5	8080	5/27/97	19:42	KLM
Methoxychlor	<500	µg/Kg	500	8080	5/27/97	19:42	KLM
Toxaphene	<2000	µg/Kg	2000	8080	5/27/97	19:42	KLM
1,1,1,2-tetrachloroethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,1,1-trichloroethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,1,2,2-tetrachloroethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM

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Friday, May 30, 1997

1,1,2-trichloroethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,1-dichloroethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,1-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,2,3-trichloropropane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,2,4-trichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,2-dibromoethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,2-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,2-dichloroethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,2-dichloropropane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,3,5-trichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,3-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
1,4-dichlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
2-butanone	<25000	µg/Kg	25000	8260	5/24/97	15:08	KLM
2-chlorotoluene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
2-Hexanone	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
4-chlorotoluene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
4-methyl-2-pentanone	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
Acetone	<25000	µg/Kg	25000	8260	5/24/97	15:08	KLM
Benzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Bromobenzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Bromodichloromethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Bromoform	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
Bromomethane	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
Carbon disulfide	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Carbon tetrachloride	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Chlorobenzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Chlorodibromomethane	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Chloroethane	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
Chloroform	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Chloromethane	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
cis-1,2-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
cis-1,3-dichloropropene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Dibromomethane	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
Dichlorodifluoromethane	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
Ethylbenzene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
m,p-Xylenes	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Methylene chloride	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
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Friday, May 30, 1997

Naphthalene	18,000	µg/Kg	2500	8260	5/24/97	15:08	KLM
o-Xylene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Styrene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Tetrachloroethene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Toluene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
trans-1,2-dichloroethene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
trans-1,3-dichloropropene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Trichloroethene	<2500	µg/Kg	2500	8260	5/24/97	15:08	KLM
Trichlorofluoromethane	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM
Vinyl chloride	<5000	µg/Kg	5000	8260	5/24/97	15:08	KLM

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ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Project: Runnels RRC **Report #:** 27013
Sample: 1019

Report of Laboratory Quality Assurance

Surrogate	Method	Recovery	Limits
Tetrachloro-m-xylene	8080	diluted	74-133
Dibutylchlorendate	8080	diluted	68-125
Toluene-d8	8260	107	86-114
Dibromofluoromethane	8260	109	76-121
Bromofluorobenzene	8260	96	85-117

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 512-471-0140

Report #: 27014

Report of Laboratory Analysis

Project: Runnels RRC
Sample: 1023 **Matrix:** waste
Date/Time Taken: 5/16/97 15:00 **Date/Time Rec'd:** 5/16/97 20:00

Parameter	Result	Units	Limit	PQL	Method	Date/Time	Run	By
Ignitability	>150	° F	150	75	1010	5/29/97	19:10	MCK
pH	8.5				9045	5/27/97	13:00	LBK
Specific Conductance	2430	µS/cm			120.1	5/29/97	13:15	LBK
Petroleum hydrocarbons	760,000	mg/Kg		33750	418.1	5/23/97	13:30	LBK
Reactivity cyanide	<10	mg/Kg	250	10	7.3.3.1	5/29/97	23:10	MCK
Reactivity sulfide	<10	mg/Kg	500	10	7.3.3.2	5/29/97	22:14	MCK
Total organic halogen	<1	mg/Kg		1	9020	5/29/97	22:16	MCK
TC Arsenic	<0.005	mg/L	5	0.005	6010	5/27/97	12:32	MCK
TC Barium	1.8	mg/L	100	0.001	6010	5/27/97	12:32	MCK
TC Cadmium	<0.005	mg/L	1	0.005	6010	5/27/97	12:32	MCK
TC Chromium	0.0066	mg/L	5	0.005	6010	5/27/97	12:32	MCK
TC Lead	0.0080	mg/L	5	0.005	6010	5/27/97	12:32	MCK
TC Mercury	<0.001	mg/L	0.2	0.001	7470	5/27/97	12:32	MCK
TC Selenium	<0.005	mg/L	1	0.005	6010	5/27/97	12:32	MCK
TC Silver	0.12	mg/L	5	0.005	6010	5/27/97	12:32	MCK
Chloride	390	mg/Kg		0.5	300.1	5/28/97	15:34	LBK
TC 1,1-dichloroethene	<0.005	mg/L	0.7	0.005	8260	5/28/97	20:55	KLM
TC 1,2-dichloroethane	<0.005	mg/L	0.5	0.005	8260	5/28/97	20:55	KLM
TC 1,4-dichlorobenzene	<0.005	mg/L	7.5	0.005	8260	5/28/97	20:55	KLM
TC 2-butanone (MEK)	<0.05	mg/L	200	0.05	8260	5/28/97	20:55	KLM
TC Benzene	0.019	mg/L	0.5	0.005	8260	5/28/97	20:55	KLM
TC Carbon tetrachloride	<0.005	mg/L	0.5	0.005	8260	5/28/97	20:55	KLM
TC Chlorobenzene	<0.005	mg/L	100	0.005	8260	5/28/97	20:55	KLM
TC Chloroform	<0.005	mg/L	6	0.005	8260	5/28/97	20:55	KLM
TC Tetrachloroethene	<0.005	mg/L	0.7	0.005	8260	5/28/97	20:55	KLM
TC Trichloroethene	<0.005	mg/L	0.5	0.005	8260	5/28/97	20:55	KLM
TC Vinyl chloride	<0.005	mg/L	0.2	0.005	8260	5/28/97	20:55	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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environmental analytical services
11629 Manchaca Road • Austin, Texas 78748 • (512) 280-7680

Parameter	Result	Units	Limit	PQL	Method	Date/Time	Run	By
TC 2,4,5-trichlorophenol	<0.020	mg/L	400	0.02	8270	5/27/97	12:55	KLM
TC 2,4,6-trichlorophenol	<0.020	mg/L	2	0.02	8270	5/27/97	12:55	KLM
TC 2,4-dinitrotoluene	<0.020	mg/L	0.13	0.02	8270	5/27/97	12:55	KLM
TC 2-methyphenol	<0.020	mg/L	200	0.02	8270	5/27/97	12:55	KLM
TC 3&4-methylphenol	<0.020	mg/L	200	0.02	8270	5/27/97	12:55	KLM
TC Hexachlorobenzene	<0.020	mg/L	0.13	0.02	8270	5/27/97	12:55	KLM
TC Hexachlorobutadiene	<0.020	mg/L	0.5	0.02	8270	5/27/97	12:55	KLM
TC Hexachloroethane	<0.020	mg/L	3	0.02	8270	5/27/97	12:55	KLM
TC Nitrobenzene	<0.020	mg/L	2	0.02	8270	5/27/97	12:55	KLM
TC Pentachlorophenol	<0.100	mg/L	100	0.1	8270	5/27/97	12:55	KLM
TC Pyridine	<0.040	mg/L	5	0.04	8270	5/27/97	12:55	KLM

Organic parameters follow this page

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC **Report #:** 27014
Sample: 1023

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
2,4'-DDD	<10	µg/Kg	10	8080	5/27/97	20:13	KLM
2,4'-DDE	<10	µg/Kg	10	8080	5/27/97	20:13	KLM
2,4'-DDT	<10	µg/Kg	10	8080	5/27/97	20:13	KLM
4,4'-DDD	<10	µg/Kg	10	8080	5/27/97	20:13	KLM
4,4'-DDE	<10	µg/Kg	10	8080	5/27/97	20:13	KLM
4,4'-DDT	<10	µg/Kg	10	8080	5/27/97	20:13	KLM
Aldrin	<2	µg/Kg	2	8080	5/27/97	20:13	KLM
alpha-BHC	<5	µg/Kg	5	8080	5/27/97	20:13	KLM
alpha-Chlordane	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Arochlor 1016	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Arochlor 1221	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Arochlor 1232	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Arochlor 1242	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Arochlor 1248	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Arochlor 1254	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Arochlor 1260	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
beta-BHC	<5	µg/Kg	5	8080	5/27/97	20:13	KLM
delta-BHC	<5	µg/Kg	5	8080	5/27/97	20:13	KLM
Dieldrin	<2	µg/Kg	2	8080	5/27/97	20:13	KLM
Endosulfan I	<10	µg/Kg	10	8080	5/27/97	20:13	KLM
Endosulfan II	<10	µg/Kg	10	8080	5/27/97	20:13	KLM
Endosulfan sulfate	<50	µg/Kg	50	8080	5/27/97	20:13	KLM
Endrin	<5	µg/Kg	5	8080	5/27/97	20:13	KLM
Endrin aldehyde	<50	µg/Kg	50	8080	5/27/97	20:13	KLM
gamma-Chlordane	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Heptachlor	<5	µg/Kg	5	8080	5/27/97	20:13	KLM
Heptachlor epoxide	<50	µg/Kg	50	8080	5/27/97	20:13	KLM
Lindane	<5	µg/Kg	5	8080	5/27/97	20:13	KLM
Methoxychlor	<500	µg/Kg	500	8080	5/27/97	20:13	KLM
Toxaphene	<2000	µg/Kg	2000	8080	5/27/97	20:13	KLM
1,1,1,2-tetrachloroethane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,1,1-trichloroethane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
1,1,2,2-tetrachloroethane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,1,2-trichloroethane	280	µg/Kg	250	8260	5/25/97	4:06	KLM
1,1-dichloroethane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,1-dichloroethene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,2,3-trichloropropane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,2,4-trichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,2-dibromoethane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,2-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,2-dichloroethane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,2-dichloropropane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,3,5-trichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,3-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
1,4-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
2-butanone	<2500	µg/Kg	2500	8260	5/25/97	4:06	KLM
2-chlorotoluene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
2-Hexanone	1,500	µg/Kg	500	8260	5/25/97	4:06	KLM
4-chlorotoluene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
4-methyl-2-pentanone	9,200	µg/Kg	500	8260	5/25/97	4:06	KLM
Acetone	<2500	µg/Kg	2500	8260	5/25/97	4:06	KLM
Benzene	560	µg/Kg	250	8260	5/25/97	4:06	KLM
Bromobenzene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Bromodichloromethane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Bromoform	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
Bromomethane	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
Carbon disulfide	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Carbon tetrachloride	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Chlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Chlorodibromomethane	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Chloroethane	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
Chloroform	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Chloromethane	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
cis-1,2-dichloroethene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
cis-1,3-dichloropropene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Dibromomethane	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
Dichlorodifluoromethane	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
Ethylbenzene	970	µg/Kg	250	8260	5/25/97	4:06	KLM
m,p-Xylenes	2,800	µg/Kg	250	8260	5/25/97	4:06	KLM

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chemistry for a changing environment
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Monday, June 9, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Methylene chloride	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
Naphthalene	1,000	µg/Kg	250	8260	5/25/97	4:06	KLM
o-Xylene	2,700	µg/Kg	250	8260	5/25/97	4:06	KLM
Styrene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Tetrachloroethene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Toluene	2,000	µg/Kg	250	8260	5/25/97	4:06	KLM
trans-1,2-dichloroethene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
trans-1,3-dichloropropene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Trichloroethene	<250	µg/Kg	250	8260	5/25/97	4:06	KLM
Trichlorofluoromethane	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
Vinyl chloride	<500	µg/Kg	500	8260	5/25/97	4:06	KLM
Acenaphthene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Acenaphthylene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Anthracene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Benzo(a)anthracene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Benzo(a)pyrene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Benzo(b)pyrene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Benzo(ghi)perylene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Benzo(k)pyrene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Chrysene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Dibenz(ah)anthracene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Fluoranthene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Fluorene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Indeno(1,2,3-cd)pyrene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Naphthalene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Phenanthrene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM
Pyrene	<10000	µg/Kg	10000	8310	5/28/97	17:59	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Monday, June 9, 1997

Project: Runnels RRC
Sample: 1023

Report #: 27014

Report of Laboratory Quality Assurance

Parameter	Blank	Precision	Limit	M.S.	M.S.D.	Limits
Ignitability	>150	0.00	10			
pH		0.64	10			
Specific Conductance		0.41	10			
Petroleum hydrocarbons	<2	26.30	48.4			
Reactivity cyanide	<10	3.22	20	95.6	98.7	75 - 125
Reactivity sulfide	<10	0.00	10			
Total organic halogen	<0.005	13.54	20	114.7	99.2	75 - 125
TC Arsenic	<0.005	4.67	20	98.1	102.8	75 - 125
TC Barium	<0.001	5.30	20	75.2	79.3	75 - 125
TC Cadmium	<0.005	3.71	20	93.1	89.7	75 - 125
TC Chromium	<0.005	1.62	20	87.1	85.7	75 - 125
TC Lead	<0.005	1.44	20	104.8	103.3	75 - 125
TC Mercury	<0.001	1.01	20	108.2	109.3	75 - 125
TC Selenium	<0.005	9.90	20	99.6	90.2	75 - 125
TC Silver	<0.005	9.79	20	109.7	121	75 - 125
Chloride	<0.05	0.08	20	91.9	91.8	75 - 125
TC 1,1-dichloroethene	<0.005	1.89	25	97.6	95.8	70 - 130
TC 1,2-dichloroethane	<0.005	9.43	25	97.0	106.6	70 - 130
TC 1,4-dichlorobenzene	<0.005	1.86	25	129.6	127.2	70 - 130
TC 2-butanone (MEK)	<0.05	3.71	25	92.5	89.2	70 - 130
TC Benzene	<0.005	3.81	25	88.7	85.3	70 - 130
TC Carbon tetrachloride	<0.005	11.31	25	86.9	77.6	70 - 130
TC Chlorobenzene	<0.005	7.73	25	121.4	112.3	70 - 130
TC Chloroform	<0.005	6.61	25	70.0	74.8	70 - 130
TC Tetrachloroethene	<0.005	3.25	25	123.5	127.6	70 - 130
TC Trichloroethene	<0.005	13.97	25	117.8	102.4	70 - 130
TC Vinyl chloride	<0.005	14.50	25	99.9	86.3	70 - 130

Surrogate	Method	Recovery	Limits
Tetrachloro-m-xylene	8080	diluted	74-133
Dibutylchlorendate	8080	diluted	68-125
Toluene-d8	8260	102	86-114
Dibromofluoromethane	8260	94	76-121

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

Bromofluorobenzene	8260	98	85-117
Bromofluorobenzene	8260	107	85-117
Dibromofluoromethane	8260	81	76-121
Toluene-d8	8260	113	86-114
Fluorobiphenyl	8270	104	43-116
Fluorophenol	8270	38	21-100
Nitrobenzene-d5	8270	37	35-114
Tribromophenol	8270	36	10-123
Terphenyl-d14	8270	92	33-141
Phenol-d6	8270	12	10- 94
Nitrobenzene-d5	8310	diluted	35-114
Fluorophenol	8310	diluted	21-100
Fluorobiphenyl	8310	diluted	43-116
Tribromophenol	8310	diluted	10-123
Terphenyl-d14	8310	diluted	33-141
Phenol-d6	8310	diluted	10- 94

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27015

Project: Runnels RRC
Sample: 1024
Matrix: water
Date/Time Taken: 5/16/97 15:30
Date/Time Rec'd: 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Petroleum hydrocarbons	0.81	mg/L	0.2	418.1	5/28/97	14:30	LBK
Chloride	190	mg/L	0.05	300.1	5/28/97	15:41	LBK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Chloride	<0.05	0.08	20	91.9	91.8	75 - 125
Petroleum hydrocarbons	<2	0.00	48.4			

Respectfully submitted,

Angie O'Donnell for

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Wednesday, May 28, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 FAX: 512-471-0140

Report #: 27016

Project: Runnels RRC
Sample: 1025 **Matrix:** water
Date/Time Taken: 5/16/97 15:30 **Date/Time Rec'd:** 5/16/97 20:00

Report of Laboratory Analysis

Parameter	Result	Units	PQL	Method	Date/Time Run	By
Arsenic	<0.1	mg/L	0.1	6010	5/27/97 14:53	MCK
Barium	8.4	mg/L	0.02	6010	5/27/97 14:53	MCK
Cadmium	<0.1	mg/L	0.1	6010	5/27/97 14:53	MCK
Chromium	<0.1	mg/L	0.1	6010	5/27/97 14:53	MCK
Lead	<0.1	mg/L	0.1	6010	5/27/97 14:53	MCK
Mercury	<0.02	mg/L	0.02	7470	5/27/97 14:53	MCK
Selenium	<0.1	mg/L	0.1	6010	5/27/97 14:53	MCK
Silver	<0.1	mg/L	0.1	6010	5/27/97 14:53	MCK

Quality Assurance Data

Parameter	Blank	%RSD	Limit	M.S.	M.S.D.	Limits
Arsenic	<0.005	13.87	20	92.5	80.5	75 - 125
Barium	<0.001	0.76	20	92.0	91.3	75 - 125
Cadmium	<0.005	2.07	20	100.3	102.4	75 - 125
Chromium	<0.005	9.14	20	89.2	81.4	75 - 125
Lead	<0.005	6.28	20	82.0	77	75 - 125
Mercury	<0.001	0.85	20	94.3	93.5	75 - 125
Selenium	<0.005	3.01	20	97.7	94.8	75 - 125
Silver	<0.005	7.05	20	103.9	111.5	75 - 125

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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Friday, May 30, 1997

To: Dr. Jeri Sullivan
Bureau of Economic Geology
10100 Burnet Road, Bldg. 130
Austin, TX 78759 512-471-0140

Report #: 27017

Report of Laboratory Analysis

Project: Runnels RRC
Sample: 1026 **Matrix:** waste
Date/Time Taken: 5/16/97 15:30 **Date/Time Rec'd:** 5/16/97 20:00

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Petroleum hydrocarbons	670,000	mg/Kg	33750	418.1	5/23/97	13:30	LBK
Total organic halogen	<1	mg/Kg	1	9020	5/29/97	22:16	MCK
Arsenic	2.4	mg/Kg	0.1	6010	5/27/97	14:49	MCK
Barium	330	mg/Kg	0.02	6010	5/27/97	14:49	MCK
Cadmium	0.50	mg/Kg	0.1	6010	5/27/97	14:49	MCK
Chromium	5.3	mg/Kg	0.1	6010	5/27/97	14:49	MCK
Lead	39	mg/Kg	0.1	6010	5/27/97	14:49	MCK
Mercury	<0.02	mg/Kg	0.02	7470	5/27/97	14:49	MCK
Selenium	<0.1	mg/Kg	0.1	6010	5/27/97	14:49	MCK
Silver	<0.1	mg/Kg	0.1	6010	5/27/97	14:49	MCK
Chloride	1,100	mg/Kg	1.5	300.1	5/28/97	15:47	LBK

Organic parameters follow this page

Respectfully submitted,

Mark C. Krause, FAIC

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

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11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Project: Runnels RRC
Sample: 1026

Report #: 27017

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
2,4'-DDD	<10	µg/Kg	10	8080	5/27/97	20:43	KLM
2,4'-DDE	<10	µg/Kg	10	8080	5/27/97	20:43	KLM
2,4'-DDT	<10	µg/Kg	10	8080	5/27/97	20:43	KLM
4,4'-DDD	<10	µg/Kg	10	8080	5/27/97	20:43	KLM
4,4'-DDE	<10	µg/Kg	10	8080	5/27/97	20:43	KLM
4,4'-DDT	<10	µg/Kg	10	8080	5/27/97	20:43	KLM
Aldrin	<2	µg/Kg	2	8080	5/27/97	20:43	KLM
alpha-BHC	<5	µg/Kg	5	8080	5/27/97	20:43	KLM
alpha-Chlordane	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Arochlor 1016	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Arochlor 1221	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Arochlor 1232	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Arochlor 1242	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Arochlor 1248	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Arochlor 1254	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Arochlor 1260	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
beta-BHC	<5	µg/Kg	5	8080	5/27/97	20:43	KLM
delta-BHC	<5	µg/Kg	5	8080	5/27/97	20:43	KLM
Dieldrin	<2	µg/Kg	2	8080	5/27/97	20:43	KLM
Endosulfan I	<10	µg/Kg	10	8080	5/27/97	20:43	KLM
Endosulfan II	<10	µg/Kg	10	8080	5/27/97	20:43	KLM
Endosulfan sulfate	<50	µg/Kg	50	8080	5/27/97	20:43	KLM
Endrin	<5	µg/Kg	5	8080	5/27/97	20:43	KLM
Endrin aldehyde	<50	µg/Kg	50	8080	5/27/97	20:43	KLM
gamma-Chlordane	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Heptachlor	<5	µg/Kg	5	8080	5/27/97	20:43	KLM
Heptachlor epoxide	<50	µg/Kg	50	8080	5/27/97	20:43	KLM
Lindane	<5	µg/Kg	5	8080	5/27/97	20:43	KLM
Methoxychlor	<500	µg/Kg	500	8080	5/27/97	20:43	KLM
Toxaphene	<2000	µg/Kg	2000	8080	5/27/97	20:43	KLM
1,1,1,2-tetrachloroethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,1,1-trichloroethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,1,2,2-tetrachloroethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
1,1,2-trichloroethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,1-dichloroethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,1-dichloroethene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,2,3-trichloropropane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,2,4-trichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,2-dibromoethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,2-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,2-dichloroethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,2-dichloropropane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,3,5-trichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,3-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
1,4-dichlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
2-butanone	<2500	µg/Kg	2500	8260	5/25/97	4:29	KLM
2-chlorotoluene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
2-Hexanone	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
4-chlorotoluene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
4-methyl-2-pentanone	6,200	µg/Kg	500	8260	5/25/97	4:29	KLM
Acetone	<2500	µg/Kg	2500	8260	5/25/97	4:29	KLM
Benzene	560	µg/Kg	250	8260	5/25/97	4:29	KLM
Bromobenzene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Bromodichloromethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Bromoform	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
Bromomethane	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
Carbon disulfide	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Carbon tetrachloride	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Chlorobenzene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Chlorodibromomethane	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Chloroethane	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
Chloroform	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Chloromethane	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
cis-1,2-dichloroethene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
cis-1,3-dichloropropene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Dibromomethane	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
Dichlorodifluoromethane	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
Ethylbenzene	800	µg/Kg	250	8260	5/25/97	4:29	KLM
m,p-Xylenes	2,200	µg/Kg	250	8260	5/25/97	4:29	KLM
Methylene chloride	<500	µg/Kg	500	8260	5/25/97	4:29	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Parameter	Result	Units	PQL	Method	Date/Time	Run	By
Naphthalene	1,000	µg/Kg	250	8260	5/25/97	4:29	KLM
o-Xylene	2,100	µg/Kg	250	8260	5/25/97	4:29	KLM
Styrene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Tetrachloroethene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Toluene	1,800	µg/Kg	250	8260	5/25/97	4:29	KLM
trans-1,2-dichloroethene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
trans-1,3-dichloropropene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Trichloroethene	<250	µg/Kg	250	8260	5/25/97	4:29	KLM
Trichlorofluoromethane	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
Vinyl chloride	<500	µg/Kg	500	8260	5/25/97	4:29	KLM
Acenaphthene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Acenaphthylene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Anthracene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Benzo(a)anthracene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Benzo(a)pyrene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Benzo(b)fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Benzo(ghi)perylene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Benzo(k)fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Chrysene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Dibenz(ah)anthracene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Fluoranthene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Fluorene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Indeno(1,2,3-cd)pyrene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Naphthalene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Phenanthrene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM
Pyrene	<10000	µg/Kg	10000	8270	5/27/97	10:27	KLM

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

ChemSOLVE
chemistry for a changing environment
11629 Manchaca Road • Austin, TX 78748• (512) 280-7680

Friday, May 30, 1997

Project: Runnels RRC
Sample: 1026

Report #: 27017

Report of Laboratory Quality Assurance

Parameter	Blank	Precision	Limit	M.S.	M.S.D.	Limits
Petroleum hydrocarbons	<2	26.30	48.4			
Total organic halogen	<0.005	13.54	20	114.7	99.2	75 - 125
Arsenic	<0.005	13.87	20	92.5	80.5	75 - 125
Barium	<0.001	0.76	20	92.0	91.3	75 - 125
Cadmium	<0.005	2.07	20	100.3	102.4	75 - 125
Chromium	<0.005	9.14	20	89.2	81.4	75 - 125
Lead	<0.005	6.28	20	82.0	77	75 - 125
Mercury	<0.001	0.85	20	94.3	93.5	75 - 125
Selenium	<0.005	3.01	20	97.7	94.8	75 - 125
Silver	<0.005	7.05	20	103.9	111.5	75 - 125
Chloride	<0.05	0.08	20	91.9	91.8	75 - 125

Surrogate	Method	Recovery	Limits
Tetrachloro-m-xylene	8080	diluted	74-133
Dibutylchlorendate	8080	diluted	68-125
Toluene-d8	8260	105	86-114
Dibromofluoromethane	8260	89	76-121
Bromofluorobenzene	8260	100	85-117
Phenol-d6	8270	diluted	10- 94
Terphenyl-d14	8270	diluted	33-141
Tribromophenol	8270	diluted	10-123
Fluorobiphenyl	8270	diluted	43-116
Fluorophenol	8270	diluted	21-100
Nitrobenzene-d5	8270	diluted	35-114

PQL - Reporting Limit. %RSD - Sample Precision.
M.S. - Matrix Spike. M.S.D. - Matrix spike duplicate.

Vc Soil INC.

CHAIN O. JSTODY RECORD

PROJECT NO.	PROJECT NAME	PARAMETERS	INDUSTRIAL HYGIENE SAMPLE Y / N
	Runnels RRC		

SAMPLERS: *(Signature)* JSullivan & Matt Mahan (Printed) J. SULLIVAN / MATT MAHAN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TPH + chloride	RCRA 8 metals	EL. Cond	Moisture + Density	VOC + TOX	PAH (Method 8270)	TCLP *	Pest/PCB	O/C + GREASE	REMARKS
7014/1023	5/16	1500	X		PIT 4	1	X		X	@	X	X	X	X		soil/sludge
7015/1024	↓	1530		X	PIT 4 EB 5 (glass)	1	X									H_2O
7016/1025		1530		X	PIT 5 (plastic)	1		X								H_2O
7017/1026	↓	1530	X		PIT 5	1	X	X	~~X~~	~~@~~	X	X		X		soil/sludge

@ diluted per Gri 5/23

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
(Printed) E.J. Sullivan	5/16/97 2136	(Printed) MARK C KRAUSE	(Printed)		(Printed)

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
(Printed)		(Printed)		

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

VERSAR INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
	Runnels RRC

SAMPLERS: *(Signature)* M. Mahoney / J. Sullivan (Printed) M. MAHONEY / J. SULLIVAN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TPH ~~Petroleum~~	Chloride	RCRA 8 metals	EL. Conduct.	moisture + Density	VOC + TOX	PAH (Method 8270)	TCLP *	PEST/PCB	OIL + GREASE	REMARKS
27007 1008	5/16	0900		X	PIT 1	1						X (VOC)			X	X	OIL ~~SPLS~~ – NO TOX
27008 1009		0935		X	PIT 2 (glass)	1	X	X									H_2O
27009 1010		0935		X	PIT 2 (plastic)	1			X								H_2O
27010 1011		0950		X	PIT 2	1	X	X		X		X	X	X	X		Sludge
27011 1014		1030		X	PIT 3	1	X	X		X		X	X	X	X		Sludge
27012 1018		1400		X	TANK 4	1	X	X	X	X							Sludge
27013 1019		1430	X	~~X~~	PIT 2							X (VOC)			X	X	OIL

Selected per grab 5/16 — Attached per grab 5/16

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
(Printed) E.J. Sullivan	5/16/97 2130	(Printed) MARIC C KRAUSE	(Printed)		(Printed)
Relinquished by: *(Signature)*	**Date / Time**	**Received for Laboratory by:** *(Signature)*	**Date / Time**	**Remarks**	
(Printed)		(Printed)		*TCLP = VOC, SVOC, Metals, R/C/I OIL SPLS DO NOT GET TOX, ONLY VOC.	

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE (Y / N)
	RUNNELS RRC	

SAMPLERS: (Signature) M Mahoney (Printed)

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TPH	CHLORIDE	RCRA 8 Metals	EL. COND.	MOISTURE + DENSITY	VOC + TOX	PAH (8270 mod)	TCLP *	Pest / PCB's	REMARKS
~~RUNT 3~~	~~5/15~~	~~0950~~		~~X~~	~~TANK 3~~ (glass)	2	~~X~~	~~X~~	~~X~~							
26996 1000	5/15	0950		X	TANK 3 (glass)	1	X	X			5/23					water
26997 1001	5/15	0950		X	TANK 3 (plastic)				X							water: Preservative
26998 1002	5/15	1120	X	X	GUN Barrel 1	1	X	X	X	X						Sludge
26999 1003	5/15	1345		X	TANK 6	1	X	X	X	X						Sludge
27000 1004	5/15	1410		X	TANK 7	1	X	X	X	X						Sludge
27001 1005	5/15	1600		X	PIT 1	1	X	X								water
27002 1006	↓	↓		X	↓	1			X							water: preserv:
27003 1007 #	↓	↓		X	↓	1	X	X	~~X~~	X		X	X	X	X	Sludge #
27004 1020 **	5/16	1430		X	PIT 3	1	~~X~~					X (VOC)			X	OIL **
27005 1021	5/16	1500		X	PIT 4 (glass)	1	X	X								H_2O
27006 1022	5/16	1500		X	PIT 4 (plastic)	1			X							H_2O

delete chlorides

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed)	5/16/97 2136	(Printed) MARK C KRAUSE	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
(Printed)		(Printed)		* TCLP => VOC, SVOC, METALS, R/C/I ~~# SAMPLE # 1007 : ADD LANDFARM PARAMS~~ ~~INCREASE~~ ** SAMPLE # 1020 -> Analysis + VOC + Pest/PCB's

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).