SUNRAY SERVICES, INC.
A USA WASTE SERVICES CO.

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4581

January 17, 1996

Mr. Mike Hood, P.E.
Technical Manager, Solid Waste Division
Arkansas Department of Pollution Control & Ecology
P.O. Box 8913
Little Rock, AR 72219-8913

Dear Mr. Hood:

Please find enclosed the Permit Modification Application documents with a check for the application fee of $3,000.00 for the proposed Sunray Services, Inc./USA Waste Services, Inc. Class I landfill modification which is to be situated at its Tontitown, Arkansas facility.

I thank you for your attention to this matter. If you have any questions or comments, please feel free to contact me at (501) 751-7024.

Sincerely,

Kevin E. Hodges, P.E.
Division Engineer

pc G.R. Holcomb, USA Waste Services, Inc.
Hon. Charles A. Johnson, Washington County Judge
Steve Parker, Director, Four County (NW) RSWMD

Enclosures

104 N. Old Missouri Road, P. O. Box 1310, Springdale, AR 72765 1310 (501) 751-7024 (501) 751-7924 Fax

NOTICE OF APPLICATION FOR MODIFICATION OF PERMIT

In accordance with provisions of Arkansas Statutes 8-4-203(b), public notice is hereby given that an administratively complete permit modification application seeking to expand an existing Class 1 landfill located approximately two and one half miles south of Tontitown in Section 23, T-17-N, R-31-W, Washington County, Arkansas was received by the Solid Waste Management Division of the Department on January 21, 1997. The name/address of the applicant is: Sunray Services, Inc., 104 Old Missouri Road, Springdale, AR 72765. The Class 1 facility accepts municipal solid waste and non-hazardous commercial and industrial waste.

Any interested person may request that the Department hold a public hearing concerning the proposed permit modification. Requests must be in writing and must be submitted within 10 business days of the publication date of this notice. The decision on whether to schedule a public hearing is at the discretion of the Director. If a hearing is scheduled, certified mail notice will be provided to the permit applicant and to all persons who submitted individual written requests for a hearing within this 10-day period as provided by law.

Requests for a public hearing should be mailed or delivered to the Solid Waste Management Division; Arkansas Department of Pollution Control and Ecology; 8017 I-30, P. O. Box 8913; Little Rock, AR 72219-8913.

Additional details concerning the proposed permit, including a copy of the permit application, can be made available for inspection by contacting the Solid Waste Management Division at the above address or by calling 682-0602. There may be a charge to cover photocopying cost for some documents.

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Dated this [Insert Date of Publication]day of ________, 1997
By authority of the Director,
Arkansas Department of Pollution Control and Ecology

sizes) produce a curve. A uniform soil plots showing most of the particles of approximately similar size. The grain-size plots can provide an indication of a soils history. APPENDIX G contains the sieve analysis results for the GEC and SCS samples.

As indicated in TABLE 6.7, samples were analyzed in the laboratory for grain size distribution in accordance with ASTM D422. A total of 27 samples from boring locations and test pits were obtained for the purpose of characterizing the grain size distribution of local soils.

TABLE 6.7
GEOTECHNICAL RESULTS SUMMARY

TEST DESCRIPTION	AVERAGE RESULTS	RANGE OF RESULTS
% Passing # 200 Sieve	35.6	17.3 - 93.6
Natural Moisture (%)	28.4	13.5 - 50.3
Dry Unit Weight (pcf)	84.3	82.7 - 86.2
Liquid Limit (%)	70	28 - 100
Plastic Limit (%)	30	16 - 48
Plasticity Index (%)	40	15 - 59
Optimum Moisture (%)	31.1	22 - 38
Max. Dry Density (pcf)	86.9	78.5 - 103.5
Hydraulic Cond. (cm/sec)	5.6×10^{-6}	4.96×10^{-8} - 3.2×10^{-5}
U-U Triaxial Shear Strength: Cohesion (TSF)	0.99	0.43 - 1.4

6.3.7.4 ATTERBERG LIMITS SUMMARY

In the remolded state, the consistency of clay soil varies in proportion to the water content. At a higher water content, the soil-water mixture possesses the properties of a liquid. At lesser water contents a soil-water mixture possesses properties that resemble a plastic. At still lesser water contents, soil-water mixtures approach a solid or semi-solid state. The water content indicating the division between the liquid and plastic state has been designated the Liquid Limit. The division between the plastic and semi-solid state is referred to as the Plastic Limit. The numerical difference between the Liquid Limit and the Plastic Limit is identified as the Plasticity Index. These values are often referred to as Atterberg Limits. Atterberg Limits are used widely in soil applications and is a good measure of a soils workability for use in landfill liner systems. TABLE 6.7 summarizes Atterberg Limits for soil samples collected by GEC and SCS in the vicinity of the Tontitown Class 1 Modification Area.

In general, on-site clays determined to have Plasticity Indices greater than 10 (all samples) can be considered for used in the construction of any clay liner system. However, it should be noted that both subsurface studies determined that the on-site clays contain varying amounts of chert. This material must be screened in order to be utilized in a compacted clay liner system. As such, Sunray has developed an on-site screening process for such construction activities. The Atterburg Limits results are presented in APPENDIX G.

6.3.7.5 COMPACTION SUMMARY

Both SCS and GEC obtained samples from soils within the study area to determine their suitability in the construction of the clay liner system. A minimum of one composite sample per soil type was obtained and analyzed in the laboratory for determining the moisture-density relationship as defined in ASTM D698 and D1557. Based on Standard Proctor analyses taken from composite samples, it is anticipated that the optimum moisture content will be approximately 31% with a maximum dry density of approximately 86 pcf. Soil samples containing less percentages of chert will undoubtedly yield higher optimum moisture contents for compaction purposes. Standard proctor results are presented in APPENDIX G and TABLE 6.7.

6.3.7.6 HYDRAULIC CONDUCTIVITY SUMMARY

Soil samples were obtained from various locations by SCS and GEC for the purpose of characterizing the permeability characteristics of area clays. Results of these samples are presented in APPENDIX G. TABLE 6.7 summarizes the results of remolded hydraulic conductivity analysis for local soils.

Based on the above laboratory hydraulic conductivity results, it is conceivable that suitable clay material should be available on-site for use in the compacted clay liner system. Some of the clay material to be utilized in the construction of the clay liner may need to be screened to remove chert fragments. However, the clay material shall be capable of achieving a minimum hydraulic conductivity of 1x10-7 cm/s at compactions greater than 95% standard proctor density (0-4% wet of the optimum moisture content) as outlined in the Engineering Report (Volume 1).

6.3.7.7 SHEAR STRENGTH EVALUATION SUMMARY

Shear strength analysis was conducted on soil samples for the purpose of defining the relative stability of area soils in natural and engineering applications. More specifically, an unconsolidated-undrained (UU) triaxial test was performed on select samples collected by GEC from Samples #1, #2, and #3. The apparent cohesion was found to average 0.99 tons per square foot (tsf) at a 10 psi confining pressure. This information was utilized in slope stability calculations associated with natural and engineered slopes (RE: Permit Modification Application-Volume 1).

6.3.7.8 SOIL CLASSIFICATION SUMMARY

The Unified Soil Classification System (USCS) is commonly used in engineering and construction applications. Classifications are on the basis of coarse and fine grained soils and are categorized based on laboratory tests including the grain size distribution analysis and Atterberg Limits. In general, the following soil classifications were identified on site by SCS:

CH: Inorganic clays of high plasticity (fat clays);
SC: Clayey sands, sandy clay mixtures;
SM: Silty fine sands;
GC: Gravely fine clays
GM: Gravelly fine silts
MH: Silts with high plasticity

6.3.7.9 ONE-DIMENSIONAL SWELL POTENTIAL SUMMARY

According to the USDA Soil Conservation Service Soil Survey of Washington County, soils in the vicinity of the Landfill are not associated with significant shrink/swell properties which can negatively impact a clays use in construction applications. For this reason, it is not anticipated that the shrinkage/swelling characteristics of the native clay material will negatively impact the stability of the Landfill structure, therefore, one-dimensional swell potential tests were not performed on the soil material on-site.

6.3.7.10 STANDARD PROCTOR DENSITY SUMMARY

Standard Proctor density tests were performed on samples taken during both the GEC and SCS investigations in order to better classify the engineering properties of the soils on-site. Results indicate the average natural moisture content in the samples to be approximately 28.4 percent, with a range from 13.5 to 50.3 percent. The average dry unit weight was determined to be 84.3 pcf, with a range from 82.7 to 86.2 pcf. TABLE 6.7 and APPENDIX G contain all results for the standard proctor densities associated with SCS and GEC sampling events.

6.3.7.11 STANDARD PENETRATION SUMMARY

Standard penetration tests (SPT) were conducted on overburden soils in five borings during the GEC investigation. This test, when properly evaluated provides an indication of the soil strength and compressibility. This information is of particular interest associated with any seismic/liquefaction analysis that may be performed in conjunction with future investigations. The boring logs completed by GEC, located in APPENDIX G, note the "field" blow counts associated with the standard penetration test analysis.

6.3.7.12 SUITABILITY FOR LANDFILL USES

In general, soils in the vicinity of the Tontitown Class 1 Modification Area possess engineering properties which are conducive to applications pertaining to landfilling. When selecting clay for use in the construction of any compacted clay liner system, care will be given to segregate any clay materials which contain large percentages of chert.

Based upon the results of the SCS and GEC studies, the hydraulic conductivity characteristics of on-site clays are favorable to landfill applications as they provide good barriers to infiltration of water. When utilized in the construction of the compacted clay liner system, the moisture content should be maintained between 0 to 4% wet of the optimum moisture content in order to insure that the maximum hydraulic conductivity standard of 1×10^{-7} cm/s is met. The moisture content of clay liner materials shall also be closely monitored during construction to prevent any cracking or desiccation of the clay due to significant changes in moisture content. Again, it should be stressed, that the soil material with high chert content will be screened prior to use as compacted clay liner material.

6.3.7.13 SOIL BUDGET

An approximate soil budget was determined for estimating the required soil for the Tontitown Class 1 Modification Area and the available soil in the vicinity of the Tontitown Class 1 Modification Area. A soil budget summary is provided in Volume 1 of the Permit Modification Application. In general, it is estimated that approximately 794,240 cubic yards (cy) of earthen material will be required associated with the construction and operation of the Tontitown Class 1 Modification Area. Of the estimated 794,240 cy needed, 346,540 will be utilized for clay liner and cap material, with 447,700 cy allocated for cover soil requirements. It is estimated that approximately 156,000 cy of earthen material will be available for use from the excavation of the Site 3 and Site 4 areas (within the boundary of the Tontitown Class 1 Modification Area). The remaining 638,240 cy is to be obtained from on-site borrow sources that are available.

TABLE 5
CLOSURE COST ESTIMATE

ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Surface Preparation	62	AC	$500	$31,000
Gas Venting Layer	1,045,400	SF	$0.40	$418,160
Clay Cover	150,040	CY	$2.50	$375,100
Synthetic Liner*	2,700,700	SF	$0.64	1,731,150
Gas Vents *	58	EA	$250	$14,500
Drainage Protective Layer	150,040	CY	$1.10	$165,000
Biotic Barrier Layer (Optional) *	NA	N/A	N/A	NA
Filter Layer (Optional) **	NA	N/A	N/A	NA
Vegetation/Soil Top Layer	50,000	CY	$2.00	$100,000
Seeding/Fertilizing/Mulching	62	AC	$1,000	$62,000
Erosion Control	1	LS	$6,000	$6,000
Quality Assurance/Quality Control	1	LS	$35,000	$35,000
Surveying	1	LS	$2,500	$2,500
Certification	1	LS	$2,500	$2,500
Let Down Structures	1	LS	$5,000	$5,000
Side Slope Berms	1	LS	$3,000	$3,000
			TOTAL	$2,950,910

Note: All costs are in 1996 Dollars;
* Biotic Barrier Layer is not included in the final cover system design
** The costs associated with the filter layer are included with the drainage layer

The ADPC&E is required to notify the solid waste permit holder if the closure cost estimate for financial assurance is acceptable. Upon approval of acceptance of the cost estimates for closure Sunray will establish financial assurance for closure of the permitted facility in compliance with Section 22.1405. The owner or operator must provide continuous coverage for closure until released from financial assurance requirements by demonstrating compliance with Section 22.1301(h) and (i).

SUNRAY CLASS [redacted] SOLID WASTE LANDFILL
CLOSURE COST ESTIMATE
1-Oct-96

ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Surface Preparation	23000	CY	$ 1	$ 23,000
Clay Cover	69000	CY	$ 2.50	$ 172,500
Vegetation/Soil Top Layer	23000	CY	$ 6.00	$ 138,000
Erosion Layer	36,000	SF	$ 0.07	$ 2,520
Seeding/Fertilizing/Mulching	28	AC	$ 3,500	$ 98,000
Erosion Control	1	LS	$ 10,000	$ 10,000
Quality Assurance/Quality Control	1	LS	$ 50,000	$ 50,000
Surveying	1	LS	$ 6,000	$ 6,000
Certification	1	LS	$ 3,000	$ 3,000
Let Down Structures	1	LS	$ 2,500	$ 2,500
Side Slope Berms	1	LS	$ 1,500	$ 1,500
TOTAL				$ 507,020

Note: All costs are in 1996 Dollars;

SUNRAY [redacted] SOLID WASTE LANDFILL

[redacted] OST ESTIMATE

1-Oct-96

MISC. REPAIRS (SUBSIDENCE, SETTLING, EROSION, ROADS, ETC.)

ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Labor (3 people x 8 hr/day x 4 days/yr)	96	Hours	$ 15	$ 1,440
Equipment- Dozer	16	Hours	$ 98.00	$ 1,568
Dump Truck	16	Hours	$ 56.00	$ 896
Loader	16	Hours	$ 63.00	$ 1,008
Misc. Materials and Services*	1	LS	$3,500	$ 3,500
TOTAL MISC. REPAIRS				$ 8,412

MAINTAIN/OPERATE LEACHATE COLLECTION SYSTEM

ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Capital Cost of System ($30,000; Estimated Life = 2 years)				
Annual Maintenance and Repair (1/10 of Capital Cost)				$ 2,800
Leachate Generation/Yr. (Gallons)	40,000	$/gal	$ 0.01	$ 400
Annual Transportation Costs	40,000	$/gal	$ 0.07	$ 2,800
Annual Treatment Costs	40,000	$/gal	$ 0.10	$ 4,000
TOTAL LEACHATE SYSTEM O&M				$ 10,000

TOTAL ANNUAL POST-CLOSURE CARE COSTS:	$ 18,412
TOTAL POST-CLOSURE CARE COSTS (2 YEAR PERIOD)	$ 36,824

* Includes NPDES Sampling and Reporting;

TABLE 6.6
GROUNDWATER & SPRING WATER QUALITY

Parameter	Glass Spring	Greathouse Spring	MW-10	MW-11
Spec. Cond.	275 - 319	328 - 369	220	210
Bicarbonate	110 - 200	148 - 210	85.4	92.7
pH	6.7 - 7.3	6.6 - 7.3	7.5	7.0
Ammonia Nitrogen	1.43 - 4.13	1.55 - 3.45	0.02	1.66
Nitrate	0.01 - 0.26	0.01 - 0.09	0.117	0.177
Sulfate	4.2 - 13.2	4.2 - 12.5	8.83	12.67
Chloride	7.6 - 11.05	8.8 - 12.30	11.99	9.99
Calcium	45 - 56	62 - 70	54.3	39.5
Magnesium	1.36 - 1.65	1.18 - 1.75	7.48	0.68
Sodium	4.3 - 5.7	4.3 - 6.6	9.38	2.04
Potassium	1.00 - 1.87	0.76 - 2.07	2.28	1.14

Note: **(Reference 8)**

These results indicate that the water quality in both in MW-10 (downgradient) and MW-11 (upgradient) were comparable to the spring water quality.

6.3.7 GEOTECHNICAL TESTING

In order to characterize the site in terms of geotechnical properties, detailed geotechnical investigations were conducted by SCS and GEC. The investigations involved taking material samples at various locations and at various depths throughout the site and analyzing the material in the laboratory to gain information on the engineering properties of the samples. The first investigation, conducted by SCS Engineers during 1991, involved the collection of samples from soil borings and test pit excavations. The second investigation was conducted by GEC during 1996, and consisted of soil sampling during test pit excavations.

The thirteen sections that follow provide a brief summary of the investigations and the results of the associated laboratory analyses. Sections 6.3.7.1 and 6.3.7.2 summarize each field event and Sections

6.3.7.3 through 6.3.7.11 provide summaries to the various soil characteristic parameters that were analyzed in the study.

The geotechnical lab tests outlined below were conducted for characterization purposes, and compliance with ADPC&E Regulation No. 22, Section 22.1102(c)(6):

- Atterberg Limits (ASTM D4318)
- Standard Penetration Test (ASTM D1586-84)
- Sieve Analysis (ASTM D1140 & D422)
- Dry Density, Hydraulic Conductivity/Molding Water Content (%) Relationship
- Remolded Hydraulic Conductivity
- Unconsolidated, Unconfined Shear Strength of Soils (ASTM D2850)
- Standard Proctor Density (ASTM D698)
- Moisture-Density Relations of Soils and Aggregates (ASTM D1557-78)
- One Dimensional Consolidation Properties of Soils (ASTM D4546)
- Moisture Content of Soils (ASTM D2216-80)

APPENDIX G contains all geotechnical laboratory results associated with the following sampling and testing activities from the two investigations.

The subsurface investigations consisted of soil drilling, test pit excavation, and soil sampling. Samples were obtained at various locations and at different depths throughout the site during subsurface investigation activities. The sample locations were chosen in order to properly characterize soil properties in association with future Landfill uses. Cuttings were collected in some instances where it was impossible to obtain a sample using a shelby tube or split spoon sample due to the nature of the material. Shelby tubes were utilized in situations where it was desirable to obtain an undisturbed soil sample.

6.3.7.1 SCS SUBSURFACE INVESTIGATION

The SCS investigation was conducted to determine a possible final cover borrow source. The investigation was performed in the southwestern area of the Tontitown Site. According to the SCS document entitled "Final

Closure Modifications Sites 3 and 4 (February 19, 1992), the SCS subsurface investigation consisted of geotechnical laboratory testing from 26 representative soil samples obtained from four soil borings and 19 test pits. Geotechnical laboratory tests included sieve and hydrometer grain size analyses, Atterberg Limits, moisture content, density, and soil identification in accordance with the Unified Soil Classification System (USCS). Additionally, 8 samples were tested for standard proctor densities and saturated hydraulic conductivity. The results from the lab testing can be found in APPENDIX G, and are summarized below.

The SCS investigation reported the soils encountered in the test pits and soil borings to be classified as silty gravels, clayey gravels with sand, and clayey gravels. Hydraulic conductivity tests were conducted on remolded samples compacted to 95-percent of the maximum dry density only using material passing a 3/8-inch sieve. Hydraulic conductivity values for these materials ranged from 1.71×10^{-6} to 7.38×10^{-7} cm/sec.

It should be noted that this material has since been utilized for Landfill cover material and is no longer available for use. It also should be noted that the Tontitown Landfill has access to a screening operation that can screen out unwanted chert fragments to decrease hydraulic conductivity values of materials utilized for clay liners or covers.

The percent of materials passing the No. 200 sieve for all samples tested ranged from 17.3 to 93.6 percent. The samples collected from the soil borings had a range of 39.0 to 93.6 percentage of material passing the No. 200 sieve while the material from the test pits had a range of 17.3 to 53 percent. The difference can be attributed to the fact that the continuous sampler utilized in the soil borings did not collect as much rock as in the test pits. DRAWING 1 of 14 indicates areas A, B, and C that contained material greater than 30 percent of the material passing the No. 200 sieve. The apparent volume of material in the outlined areas of A, B, and C was approximately 295,463 cubic yards.

6.3.7.2 GEC SUBSURFACE INVESTIGATION

GEC conducted a subsurface study in 1996 to characterize soil materials available for potential on-site borrow areas. A total of 3 test pits were excavated on the Landfill property. DRAWING 1 of 14 displays locations of the GEC test pits.

Geotechnical laboratory results pertaining to the test pit samples are located in APPENDIX G. The material sampled consisted of a reddish brown clayey chert composition with a water content range from 26.8 to 36.6 percent. Average Liquid Limit, Plastic Limit, and Plastic Indices were determined to be 50, 33, and 17, respectively. The percent of material passing the No. 200 sieve ranged from 35 to 42 percent. Hydraulic conductivity testing was performed on each of the three samples, utilizing three different water contents. The average permeability was calculated as $8.5x10^{-6}$ cm/sec, with a range of $4.7x10^{-7}$ to $3.2x10^{-5}$ cm/sec. Blow count datum were recorded by GEC geologists during the installation of monitoring wells and piezometers (as described in Section 6.3.6.1 of this report) and are noted on boring logs presented in APPENDIX D. If needed, "corrected" standard penetration values can be determined from the blow count data reported.

The following sections combine the SCS and GEC geotechnical results to portray a more accurate overall site geotechnical summary. All results utilized for the following summaries are also available in APPENDIX G of this document.

6.3.7.3 SIEVE ANALYSIS SUMMARY

Particle size analyses were conducted by GEC and SCS on various soils at various locations and depths for the purpose of analyzing grain size distribution and classification associated with soils native to the area.

In the sieve analysis, a series of sieves (screens) having different-sized openings are stacked with the larger sizes over the smaller. The soil sample being tested is dried, clumps are broken, and the sample is passed through the series of sieves by shaking. Larger particles are caught on the upper sieves, and the smaller particles filter through to be caught on one of the smaller underlying sieves. The weight of material retained on each sieve is conventionally presented as a grain or particle size distribution curve plotted on semilog coordinates.

The appearance of the particle size distribution plot depends on the range and amounts of various sizes of particles in the soil sample. These in turn have been affected by the soil's origin or the method of deposition. Well graded soils (a distribution of particles over a relatively large range of

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Dated this [Insert Date of Publication]day of ________, 1997
By authority of the Director,
Arkansas Department of Pollution Control and Ecology