CONSTRUCTION QUALITY CONTROL PLAN

April 13, 1998

Revised and Resubmitted
April 30, 1998

Prepared for
Roy F. Weston, Inc. and
U.S. Environmental Protection Agency

Prepared by
Ryan Inc. Central
Janesville, WI

STOUGHTON CITY LANDFILL CLOSURE
Project No. 68-W8-0089
March 30, 1998

Mr. Bill Karlovitz
Roy F. Weston, Inc.
Three Hawthorn Parkway
Suite 400
Vernon Hills, IL 60061

Re: Construction Quality Control Plan

Dear Mr. Karlovitz:

In accordance with Section 01400-Subcontractor's Quality Control, enclosed is our plan for the Construction Quality Control (CQC) for the Stoughton City Landfill Closure project. Our project team has reviewed the specifications and the overall plans and documents for this project over the past several months. The project personnel that we have identified to be responsible for this CQC plan will coordinate our company's efforts to fulfill the successful delivery of this project.

Please feel free to contact me with any comments or questions you may have as we look forward to a successful project and relationship with Weston and USEPA.

Thank you,

RYAN INC. CENTRAL

Richard G. Vorpahl, P.E.
Chief Estimator/Corporate Sponsor

RYAN INCORPORATED CENTRAL P.O. BOX 206 JANESVILLE, WISCONSIN 53547 (608) 754-2291 FAX (608) 754-3290

Ryan Inc. Central's Quality Control Organization

Ryan Inc. Central, including its predecessor companies, has been an established contractor since 1884. The company originated as a railroad builder and became highway builders as well in the early 1900's. Throughout the early twentieth century, public transportation and mining dominated the company's workload. During the 1950's the emphasis of the company shifted to a full-service grading contractor taking a large share of its work in the private industrial sector to complement its work in the public transportation area. This change led the company into the construction of waste disposal facilities for industries. During the 1970's and 1980's, Ryan expanded its role as constructors of these types of facilities to include remediation of existing sites. Today, Ryan serves both public and private entities as a constructor of state-of-the-art municipal, industrial and hazardous waste landfills and in remediation and closure of these type facilities. Ryan also contracts for work in the residential, commercial, transportation, energy and recreational markets. The company's projects are very diverse and include housing subdivisions, coal mining and reclamation, electric generating plant site work and world-class golf course construction.

In our opinion the second most important consideration, safety being the primary consideration, for successful waste remediation work is quality workmanship. Any lapse in quality can have catastrophic long-term environmental effects. We have decades of experience working with both contractor-supervised and owner-supervised QA/QC programs. We have developed through the years a formal quality manual which is modified to include project-specific quality control plans for each major project. Elements of our QA/QC program on a typical project would include defining organization and authority, designation of inspection and testing responsibilities, specifications and drawings control, materials control, equipment selection, construction operations control, inspection and testing procedures and scheduling, documentation and information flow, non-specified environmental and goodwill considerations and final reporting and warranties.

Our quality program is inflexible in its objective to insure quality construction under orderly conditions with adequate documentation. Ryan's responsibility for quality extends to its subcontractors' and suppliers' work as well as its own work.

A key element of our commitment to quality in our waste work is our policy of self-performing, rather than subcontracting, all critical facets of landfill construction including earthwork, clay liners and caps, gas collection piping, mechanical work, etc. Only by using our own experienced personnel and overseeing every aspect with our own supervision, do we feel we can guarantee a consistently high level of construction quality.

The primary responsibility for delivering a high-quality product on Ryan's projects rests with the project superintendent. Superintendents are assigned to projects based, first, on their experience and success on similar sites and, second, on other factors such as availability and proximity. The project superintendent is responsible for supervising both Ryan's employees and its subcontractors. In this capacity, he has the necessary authority to control the quality of the work.

The project superintendent for the Stoughton City Landfill will be Ron Hill. A resume describing his experience is attached.

As indicated on the attached project organization chart, Mr. Hill will be supervised by Ryan's operation manager, Mr. Don Hill, who in turn reports to Mr. Dick Vorpahl, Ryan's Corporate Sponsor. These two supervisors, as well as Mr. John Burt, Contract Administrator and Project Manager and Ms. Cheryl Demrow, Health and Safety Officer, will provide or arrange for any additional resources Ron Hill requires to successfully complete the project.

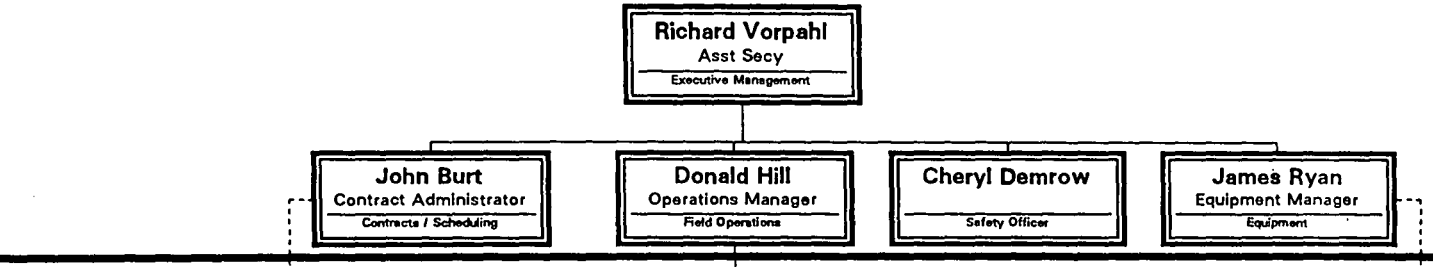
Subcontractors are selected based, first, on their qualifications and satisfactory performance on past projects with Ryan and, second, on other factors such as price, availability and proximity to the project. Satisfactory performance on past projects includes providing high quality work within the time required to complete the project. Each subcontractor will receive a copy of this CQC plan and will comply with the various requirements and submittals discussed in the plan. Subcontractors selected for Stoughton City Landfill project and their responsibilities are shown on the attached organization chart.

STOUGHTON LANDFILL CLOSURE

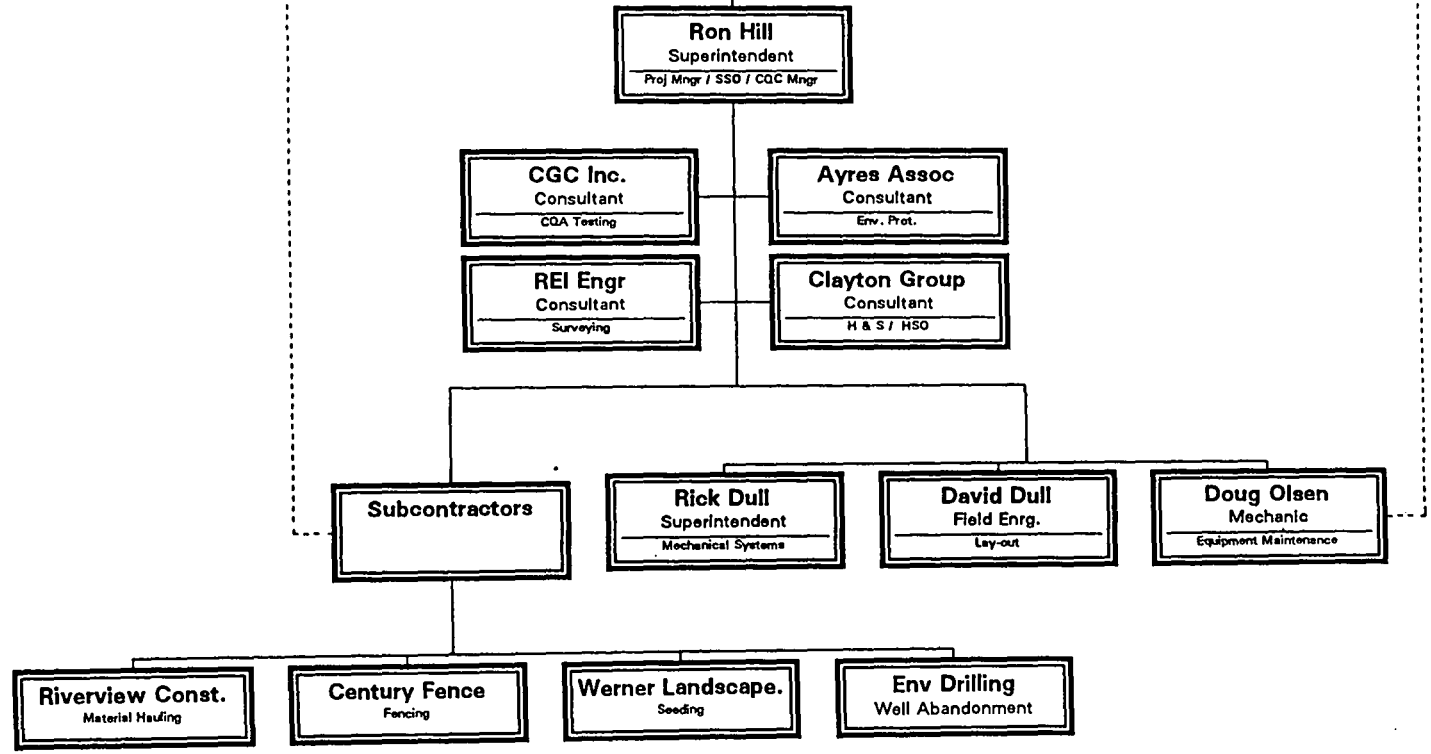
RYAN INCORPORATED CENTRAL

ROY F. WESTON, INC.

CORPORATE SUPPORT



FIELD SUPPORT



March 27, 1998
Mr. Ron Hill
CQC Manager
Ryan Inc. Central
PO Box 206
Janesville, WI 53547

RE: Stoughton City Landfill Closure Project
Authority of the Quality Control Manager

Authorization is hereby given to you as the CQC Manager to provide control and monitor the overall quality control plan for the above-mentioned project. The CQC Manager has the authority to stop any and all construction operations which are deemed inadequate based on Section 01400 and the approved Construction Quality Control Plan for this project.

The CQC Manger's specific duties include, but are not limited to:

*Shop drawings submittal/review;
*Coordination and arrangements with subcontractors and/or suppliers to provide quality materials and workmanship on the project, including procedures listed in the three-phase inspection system;
*Weekly report, including daily logs and maintaining a punch list of deficiencies to be corrected;
*Coordination of the required testing and reporting of testing;
*Control of both on-site and off-site fabrications;
*Coordination of any information that needs to be directed to the following individuals:

Mr. Bill Karlovitz, Roy F. Weston, Inc.
Richard G. Vorpahl, Ryan Inc. Central

The CQC Manager will be responsible for any changes or upgrades that is needed to the overall CQC Plan for this project. The authority outlined in this letter is effective as of the contract date for this project.

Ryan Inc. Central

Richard G. Vorpahl
Assistant Secretary

Submittal Procedures

Ryan Inc. will submit the items listed on the attached Submittal Log (Table 1) or required in the other sections of the contract documents. Unless required otherwise, six copies of each submittal will be delivered to the Contracting Officer. Each submittal will be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items will be checked and approved by the CQC representative and each will be stamped, signed and dated by the CQC representative indicating the action taken. Any deviations from the contract requirements will be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties and other such required submittals.

Testing Procedure

Ryan Inc. Central will have Construction-Geotechnical Consultants, Inc. (CGC) perform the required testing in order to verify that control measures are adequate to provide a product which conforms to the contract requirements. Quality control testing required on the project is summarized on the attached Tables 2 and 3. Ryan will perform the following activities and record and furnish the following information:

- Verify that testing procedures comply with contract requirements.
- Verify that facilities and testing equipment are available and comply with testing standards.
- Check that test instruments are calibrated, as required by the specifications.
- Verify that recording forms and test identification number systems, suitable for final documentation requirements, have been prepared.
- Check that the results of all tests taken, both passing and failing tests, are recorded by CGC on their standard forms for each test date. Copies of the field test forms will be maintained on site in the Ryan construction trailer. Contract document reference, location where tests were taken, and the sequential control number identifying the test will be given.

CQA Laboratory

Attached to this report (after Tab 2) are a summary of the qualifications, a list of standard operating procedures, resumes of key project staff, and certifications for CGC, the independent laboratory selected for quality control testing on the project.

Field Sampling and Testing

Field sampling procedures will follow the specifications and comply with WAC NR 516 requirements for closure of landfills. Sampling and testing will be performed by qualified CGC personnel. The scope of the quality control testing anticipated on the project is listed in Tables 2 and 3 after Tab 1.

Project Control Procedures

The overall management and coordination of the project will be controlled in a three-phased approach which will be managed and supervised in its entirety by the CQC system manager.

Preparatory Phase

This phase shall include a meeting conducted by the CQC manager/project superintendent, CGC personnel as applicable, and the foreman responsible for the definable feature. The results of the preparatory phase meeting shall be documented in minutes prepared by the CQC manager and attached to the daily CQC report. The contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet the contract requirements.

The following items will be discussed in this phase:

- A review of each paragraph of the technical requirements of applicable specifications.
- A review of contract drawing technical requirements.
- A check to assure that materials and/or equipment have been tested, submitted, and approved as required.
- A check to assure that provisions have been made to provide required control inspection and testing.
- Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract requirements.
- A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- A review of the appropriate activity hazard analysis to assure safety requirements are met.

- Discussion of procedures, tolerances and workmanship standards for constructing the contract work.

- A check to ensure that the portion of the plan for the contract work to be performed has been accepted by the Construction Manager.

Initial Phase

At the beginning of each definable contract item area the following checklist of activities will be accomplished:

- Check of preliminary work to ensure that it is in compliance with the contract requirements and review minutes of preparatory meeting.

- Verify contract compliance and required control inspection and testing.

- Establish level of workmanship and verify that it meets minimum acceptable workmanship standards.

- Safety check to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

- Check that advance notifications have been given to Weston, USEPA, or WDNR, as necessary.

- The initial phase should be repeated for each new crew to work on-site, or any time acceptable quality standards are not being met.

Follow-up Phase

In this phase, a complete documentation and summary of the individual item areas will be completed and submitted as needed. Daily checks will be performed to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of contract work. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by deficient work.

Scheduling

At the pre-construction meeting on April 14, 1998 a baseline schedule will be presented for review and approval. From the baseline schedule an itemized schedule will be produced using the approved scheduling software. The organization and development of the detailed construction schedule will be controlled by implementation of individual contract items.

Schedule updates will be provided on a bi-weekly basis or as requested. The project manager and CQC system manager will be responsible for all scheduling activities.

Reporting Procedures

Surveillance of Subcontractors' Operations

Surveillance of the subcontractors' operations is the responsibility of the Quality Control Manager. Major deficiencies that come to his attention will be recorded and transmitted to the related subcontractor. If the discrepancy will be covered by a preceding operation, a resolution will be made prior to the item being covered. Major deficiencies will be followed up on a daily basis. Upon correction of the major discrepancy, the date corrected will be noted and by whom.

Inspection Acceptance Procedures

All construction work shall be in accordance with the contract drawings and specifications. All rework or changes which change existing engineering drawings or specifications must be authorized by Weston. Construction work by date will be recorded on the Quality Control Manager's daily report. Work found in compliance with the drawings will be so noted. If deficiencies are found, they will be handled in accordance with the inspection deficiency procedures.

Inspection Deficiency Procedure

Deficiencies in quality, workmanship, materials, equipment, supplies, and/or unauthorized deviations from engineering requirements or specifications which are not immediately corrected will be reported on the Quality Control daily report form. Each deficiency will be numbered and recorded on a "punch list" log maintained by the QC Manager. A concise statement locating the deficiency and description of the deficiency will be included on the log.

When material, equipment, supplies, or workmanship that does not conform to the contract drawings or specifications are rejected, the Quality Control Manager will initiate a deficiency report and immediately furnish copies to the contractor's Project Manager, Weston and the supplier/subcontractor responsible for the specific task item.

Upon reviewing the deficiency report, the Project Manager or his representative, and the Quality Control Manager will examine the rejected items. If in their opinion, any of the rejected items can be reworked to a useable condition, the deficiency report will be so noted. However, if, in their opinion the item cannot be reworked from a practical and economical standpoint, the item shall be scrapped and an entry made on the deficiency report concluded to that effect.

Upon completion of rework on items specified for rework, the Quality Control Manager will be notified, and he will re-inspect the item(s) to the original requirement plus the

rework information on the deficiency report. If it is found acceptable, the deficiency report will be so noted. From this point on, the item(s) will be handled in the normal manner. If, however, the item(s) is still not acceptable to the Quality Control Manager due to poor workmanship, etc., arising from the rework, we will treat this item as a first-time rejection and this will be resubmitted for inspection only after further rework.

The deficiency report log will be periodically reviewed by the Quality Control Manager with the Project Manager to formulate a disposition of each listed uncorrected deficiency. They will establish timetables for final resolution of all deficiencies.

Definable Features of Contract Work

General Requirements

General
Site Survey
Environmental Protection
Submittals
Health and Safety
Subcontractor's Quality Control
Temporary Facilities and Controls
Mobilization and Demobilization

Site Work

Demolition and Debris Removal
Decontamination
Clearing, Grubbing, and Stripping
Earthwork
Drum Removal Contingency Plan
Waste Consolidation
Access Roads
Landfill Gas Vent System Piping
Erosion and Sediment Control
Fences and Gates
Finish Grading and Seeding

Distribution

Ryan will distribute the Contractor's Quality Control Plan for the Stoughton City Landfill to the following:

- Ayres Associates
- Century Fence
- CGC, Inc.
- Continuum Healthcare
- Environmental and Foundation Drilling Inc.
- Remedial Engineering Inc.
- Riverview Construction
- Werner Landscape

Tab 1: Tables

Table 1: Submittal Log

Table 2: Quality Control Testing Summary

Table 3: Detailed Breakdown of Testing Requirements on Landfill Cover Soils

Tab 2: Quality Control Staff-Resumes and Firm Description

Ryan Inc. Central

CGC

Continuum Healthcare

Remedial Engineering Inc. - previously submitted and not included

Table 1

Submittal Log

Stoughton City Landfill
Landfill Cap Remedial Action
Stoughton, Wisconsin

Specification Section	Component	Submittal Type	Prepared By	Date Submitted	Date Approved	Comments/ Status
01000	Summary of Work	None				
01010	Special Requirements	None				
01020	Subsurface Exploration	None				
01025	Measurement and Payment	Schedule of values for lump sum items	Ryan			
		Schedule of anticipated partial payment values	Ryan			
01030	Substitutions	Requests to be submitted as shop drawings				
01050	Site Survey	Calibration certificates for survey instruments	REI			
		Surveyor qualifications	REI			
		Accuracy verification (upon request)	REI			
		Field notes and records (upon completion)	REI			
		Record drawings (upon completion)	Ryan/REI			
01080	Codes and Standards	None				
01090	Abbreviations and Symbols	None				
01100	Environmental Protection	Environmental protection plan	Ryan			
		Preconstruction survey (photos)	Ryan			
01300	Submittals - General	Materials and equipment list	Ryan			
		Submittal Log / Schedule	Ryan			
		Initial construction schedule	Ryan			
		Bi-weekly construction schedule updates	Ryan			
		Subcontractor's shop drawings	Ryan			
		Material and product certifications and samples	Ryan/subs			
		Record documents	Ryan			
01390	Health and Safety	Health and Safety Plan (HASP)	Ryan/Continuum			
01400	Subcontractor's Quality Control	WAC NR512.18 Borrow Report	Ryan/CGC			
		Supplemental borrow source testing				
		Grading layer (2 samples)	CGC			
		Cover layer (2 samples)	CGC			
		Topsoil (1 sample)	CGC			
		Construction Quality Control Plan	Ryan / CGC			
		Field test equipment calibration certificates	CGC			
01500	Temporary Facilities and Control	Construction sign plan	Ryan			
01505	Mobilization and Demobilization	Mobilization Plan	Ryan			
01700	Contract Closeout	Written request for substantial completion	Ryan			

Table 1

Submittal Log

Stoughton City Landfill
Landfill Cap Remedial Action
Stoughton, Wisconsin

Specification Section	Component	Submittal Type	Prepared By	Date Submitted	Date Approved	Comments/ Status
02050	Demolition and Debris Relocation	Monitoring well abandonment forms	E & F Drilling			
02080	Decontamination	Material list (include in Mobilization Plan)	Ryan			
		Decon water removal and storage details (incl. in Mob Plan and HASP)	Ryan			
02120	Clearing, Grubbing, and Stripping	None				
02200	Grading Layer	Prequalification borrow source documentation report	CGC			
		Grading layer surveys (before and after)	REI			
02200	Clay Barrier Layer	WAC NR512.18 Borrow Report	Ryan / CGC			
		Documentation report	Ryan / CGC			
		Clay layer barrier survey (after)	REI			
02200	Protective Cover Layer	Prequalification borrow source documentation report	CGC			
		Protective cover layer survey (after)	REI			
02200	Topsoil	Prequalification borrow source documentation report	CGC			
		Topsoil survey (after)	REI			
02205	Drum Removal Contingency Plan	Include in Health and Safety Plan	Ryan / EMR			
02210	Ditch Clearing & Maintenance	Ditch clearing & maintenance plan	Ryan			
	Flood Control Berm	Berm clay fill material data / borrow area location	Ryan/CGC			
	Dewatering Pad and Appurtenances	Test data: Clay quality, density , permeability	CGC			
	Liquid Disposal					
	Test Pit Investigation	C.M. to document test pits	Weston (C.M.)			
	Waste Consolidation	Waste consolidation survey (before and after)	REI			
02500	Temporary Access Road	Proposed road alignments	Ryan			
		Material certificates of compliance:	Ryan			
		Wearing surface aggregate				
		Base course aggregate				
		Geotextile				
		Rip Rap				
		Test data: density	CGC			

Table 1

Submittal Log

Stoughton City Landfill
Landfill Cap Remedial Action
Stoughton, Wisconsin

Specification Section	Component	Submittal Type	Prepared By	Date Submitted	Date Approved	Comments/ Status
02500	Permanent Access Road	Material certificates of compliance: Wearing surface aggregate Base course aggregate Geotextile Culvert Culvert pipe bedding Rip Rap	Ryan			
	Permanent Access Road	Test data: density	CGC			
02530	Landfill Gas Vent System	List of suppliers of manufactured products	Ryan			
		Manufacturers' technical data	Ryan			
		Shop drawings	Ryan			
		Material certificates of compliance: Gas vent gravel PVC pipe and fittings Solvent cement Geotextile barrier Warning signs	Ryan			
02530	Landfill Gas Vent System	Gas vent riser survey	REI			
02540	Erosion, Sediment and Flood Control	Erosion and sedimentation control plan	Ayres			
		Silt fence (geotextile) mat'l samples	Ryan			
		Silt fence (geotextile) mat'l cert's of compliance	Ryan			
02831	Fence and Gates - Chain-Link	Shop drawings, manufacturers' technical data, installation instructions, details of fabrication Chain link fence fabric Steel posts Steel top Brace rail Stretcher bars Gates	Century Fence			

Table 1
Submittal Log

Stoughton City Landfill
Landfill Cap Remedial Action
Stoughton, Wisconsin

Specification Section	Component	Submittal Type	Prepared By	Date Submitted	Date Approved	Comments/ Status
02831	Fence and Gates - Wood Fence	Shop drawings, manufacturers' technical data, installation instructions, details of fabrication Pickets Posts Rails Gates Gate posts Concrete for footers	Century Fence			
02930	Finish Grading and Seeding	Material certificates of compliance: seed, fertilizer, lime, mulch spec for hydroseeding (if used) Certification of guaranteed analysis for seed and fertilizer Finish Grading and Seeding Survey	Werner Landscape Werner Landscape REI			

Notes:
C.M. = Construction manager (Weston)

Table 2
Quality Control Testing Summary

Stoughton City Landfill
Landfill Cap Remedial Action
Stoughton, Wisconsin

Work Item	Spec Section	Component	Aspect	Method	Frequency
1	01505	Mobilization and Demobilization	NA	NA	
2	02210	Test Pit Investigation	Air Monitoring	See HASP	
4	02120	Clearing, Grubbing, and Stripping	Limits of Clearing and Stripping	Visual by C.M.	Once
5	02050	Demolition and Debris Relocation	Monitoring Well Abandonment	WAC NR 141 Requirements	Once
6	02500	Temporary Access Road	Subgrade Proof-Roll	Visual by C.M.	Once
			Moisture-Density Curve for Base Course	ASTM D 698	One / material
			Base Course Field Density Tests	ASTM D2922	1 per 100 lin ft
6	02500	Permanent Access Road	Subgrade Proof-Roll	Visual by C.M.	Once
			Moisture-Density Curve for Surface Course	ASTM D698	One / material
			Surface Course Field Density Tests	ASTM D3017/D2922	1 per 100 lin ft
7	02200	Landfill Gas Vent System	Moisture-Density Curve for Trench Backfill	ASTM D698	One / material
			Field Density Tests on Trench Backfill	ASTM D2922	1 per 100 lin ft
8	02210	Dewatering Pad and Appurtenances	Dewatering Pad Clay	See Clay Barrier Tests	One set
9	02210	Liquid Disposal	Analysis for Disposal	See HASP	See HASP
10	02080	Decontamination	Subgrade preparation; geomembrane / geotextile installation	Visual by C.M.	Once
	02205	Drum Removal Contingency Plan	Waste Characterization Analyses	See HASP	See HASP
	02210	Waste Consolidation	Air Monitoring	See HASP	See HASP
11	02200	Grading Layer	Grain Size - Sieve	ASTM D422	1 per 10,000 cu yd
			Moisture-Density Curve	ASTM D698	1 per 10,000 cu yd
			Field Density Tests	ASTM D2922	100-ft grid / ft thickness
			Grading Layer Proof-Roll	Visual by C.M.	After placement
12	02200	Clay Barrier - Test Pad	Grain Size - Sieve & Hydrometer	ASTM D422	2
			Moisture Content	ASTM D2216	2
			Hydraulic Conductivity	ASTM D5084	2
			Moisture-Density Curve	ASTM D698	1
			Field Density Tests	ASTM D2922	10
			In-Place Permeability (Boutwell Tests)	U.S.EPA/600/R-93/182	3
12	02200	Clay Barrier Layer	Grain Size - Sieve & Hydrometer	ASTM D422	1 per 5,000 cu yd
			Liquid & Plastic Limits	ASTM D4318	1 per 5,000 cu yd
			Moisture Content	ASTM D2216	1 per 5,000 cu yd
			Moisture-Density Curve	ASTM D698	1 per 5,000 cu yd
			Field Density Tests	ASTM D2922	100-ft grid / ft thickness
12	02200	Clay Barrier - Shelby Tube Samples	Liquid & Plastic Limits	ASTM D4318	1 / acre / ft thickness
			Moisture Content	ASTM D2216	1 / acre / ft thickness
			Hydraulic Conductivity	ASTM D5084	50 % of Shelby tubes
			Grain Size - Sieve & Hydrometer	ASTM D422	1 / acre / ft thickness

Table 2
Quality Control Testing Summary

Stoughton City Landfill
Landfill Cap Remedial Action
Stoughton, Wisconsin

Work Item	Spec Section	Component	Aspect	Method	Frequency
13	02200	Protective Cover Layer	Grain Size - Sieve	ASTM D422	1 per 7,500 cu yd
			Moisture Content	ASTM D2216	1 per 7,500 cu yd
			USCS Classification	ASTM D422	1 per 7,500 cu yd
14	02200	Topsoil	pH, nitrogen, phosphorus, Potassium	ASTM D4972	2 per acre
			Organic Content	ASTM D2974	2 per acre
			USDA Classification	Standard reference texts	2 per acre

Notes:
C.M. = Construction manager (Weston)

Table 3
Detailed Breakdown of Soil Testing Requirements

Stoughton City Landfill
Landfill Cap Remedial Action
Stoughton, Wisconsin

Component		Grading Layer		Clay Barrier		Compacted Clay Barrier - Shelby Tube Samples		Cover Layer		Topsoil		Compacted Clay Barrier - Test Pad			
Requirements		*CL,ML,CL-ML,SC,SM,SW,GC,GH, GW / 95%C std or 90%C mod*		*CL or CH; P200>50%; LL>27; PI>12; 95%C std or 90%C mod*				*Loamy soil*		*Loamy soil; LI>10; pH 6-7*		*95%C(std)*			
Volume/Quantity		55,000 cu yd		50,500 cu yd		20 acres		61,300 cu yd		20 acres					
Testing Required	ASTM	Frequency, cu yd /test	No. Required	Frequency, cu yd / test(1)	No. Required	Frequency, tests/acre	No. Required (2 lifts)	Frequency, cu yd / test(1)	No. Required	Frequency, tests/acre	No. Required	Frequency, tests/acre	No. Required	Total No. Required	With ~10% contingency
particle size - sieve	D422	10,000	5.5					7,500	8.2					13.7	15
particle size - sieve + hyd	D422			5,000	10.1	1	40.0						2.0	52.1	57
water content	D2216			5,000	10.1	1	40.0	7,500	8.2				2.0	60.3	66
liquid & plastic limits	D4318			5,000	10.1	1	40.0							50.1	55
hydraulic conductivity	D5084					0.5	20.0						2.0	22.0	24
unit weight						1	40.0							40.0	44
proctor (5-pt)	D698 (std) or D1557 (mod)	10,000	5.5	5,000	10.1								1.0[1]	16.6	18
field density / moisture test	D2922 / D3017		170.0			4.35	174.0						10.0	354.0	389
in-place permeability test	Boutwell Method [2]												3.0		
organic content	D2974									not spec'd	5.00			5.0	6
pH/fertilizer reqmts	D4972									2	40.0			40.0	44
USCS/USDA classification	D 2488					1	40.0	7,500	8.2	2	40.0			88.2	97

Notes:
(1) Specified modified proctor ASTM Method D1557.
(2) Boutwell Method as described in Technical Guidance Document "Quality Assurance and Quality Control for Waste Containment Facilities," September 1993 (U.S. EPA / 600 / R-93 / 182).

Ryan Inc. Central

Quality Control Manager

Mr. Ronald Hill

MR. RONALD HILL

Mr. Hill joined Ryan Incorporated Central in 1979. Ron has substantial experience in both new cell construction, landfill capping and landfill remediation. His expertise includes mass grading, refuse excavation and re-consolidation, clay lining, clay capping, geosynthetic installation, leachate collection systems, gas extraction systems and waste stabilization. Below is a partial list of projects in which Howard has served as superintendent:

LANDFILL CONSTRUCTION

PROJECT:	Prairie Hill, Phase 1 Cell 2
LOCATION:	Morrison, Illinois
DATE:	1996
OWNER:	Waste Management of Illinois, Inc.
TYPE:	New Cell Construction
CONTRACT AMOUNT:	$895,000
ENGINEER:	Rust Environment & Infrastructure
SCOPE:	Construction of a new eight-acre cell including excavation (130,000 CY), clay liner (45,000 CY), 60 mil HDPE liner with geotextile cushion layer, stone drainage layer (17,000 TN) and leachate collection system piping.

PROJECT:	Prairie Hill RDF
LOCATION:	Morrison, IL
DATE:	1995 and 1996
OWNER:	Waste Management of Illinois
TYPE:	New Cell Construction
CONTRACT AMOUNT:	$2,675,000
ENGINEER:	Rust Environment & Infrastructure
SCOPE:	Site clearing, roadway embankments (400,000 CY), surface water management system (including culverts, lined ditches and rip rap), cell excavation (100,000 CY), clay lining (50,000 CY), geosynthetic lining support, geotextile placement (30,000 SY), granular drainage layer (20,000 TN) and leachate collection system (including laterals, sump, riser vault, pumps, controls and forcemain).

PROJECT :	Wood Waste Landfill
LOCATION :	Quinnessec, Michigan
DATE :	1984
OWNER :	Champion International
TYPE :	New Industrial Waste Landfill
CONTRACT AMOUNT :	$1,900,000
ENGINEER :	Brown & Root
SCOPE :	Earth excavation and grading (750,000 CY), drainage, leachate collection, pumping station and HDPE liner cover (48,000 CY of a manufactured sand) for a seventeen-acre landfill. Sitework included roadways, drainage and appurtenant features. Close coordination was required with the HDPE liner installer, Gundle Lining Systems, Inc.

PROJECT :	Weston Generating Station Fly ash Landfill
LOCATION :	Rothschild, Wisconsin
DATE :	1980
OWNER :	Wisconsin Public Service Corporation
TYPE :	New Industrial Waste Landfill
CONTRACT AMOUNT :	(Part of a $3,500,000 Sitework Contract)
ENGINEER :	Sargent & Lundy
SCOPE :	Earth excavation (90,000 CY) and grading, drainage and leachate lysimeter for a 20-acre landfill for power plant ash disposal.

LANDFILL REMEDIATION AND CLOSURE PROJECTS

PROJECT:	Whiteside County Landfill
LOCATION:	Morrison, IL
DATE:	1995
OWNER:	Whiteside County
TYPE:	Landfill Closure
CONTRACT AMOUNT:	$561,475
ENGINEER:	Rust Environment & Infrastructure
SCOPE:	Earthwork (50,000 CY), clay capping (30,000 CY), vegetative cover (50,000 CY) and revegetation.

PROJECT :	Holtz & Krause Landfill
LOCATION :	Wausau, Wisconsin
DATE :	1994 and 1995
OWNER :	Holtz & Krause Steering Committee
TYPE :	Landfill Remediation and Closure
CONTRACT AMOUNT :	$7,400,000
ENGINEER :	Dames & Moore
SCOPE :	Drum removal and disposal, active gas collection system, (including wells, laterals and flare station), waste excavation (30,000 CY), grading (140,000 CY), clay capping (225,000 CY), VLDPE capping (2,420,000 SF), vegetative support layer (245,000 CY), topsoil (60,000 CY), seeding (55 AC) and sitework for a fifty-five-acre hazardous waste landfill closure.

PROJECT :	Mid State Disposal Site
LOCATION :	Stratford, Wisconsin
DATE :	1993 and 1994
OWNER :	Weyerhaeuser Co.
TYPE :	Landfill Remediation and Closure
CONTRACT AMOUNT :	$4,100,000
ENGINEER :	STS Consultants, Ltd.
SCOPE :	Clearing, fencing, leachate pumping and transfer, excavation (50,000 CY), clay capping (130,000 CY), vegetative layer construction (225,000 CY), geotextile and geomembrane cover (350,000 SF), gas collection system (including wells, gas trenches, headers and flare station), leachate collection system (including laterals, forcemains, pumping stations, collection tanks and load-out facilities), revegetation and site infrastructure for a sixty-acre landfill and sludge lagoon.

PROJECT :	Spickler Landfill
LOCATION :	Spencer, Wisconsin
DATE :	1993 and 1994
OWNER :	Weyerhaeuser Co.
TYPE :	Landfill Remediation and Closure
CONTRACT AMOUNT :	$2,078,000
ENGINEER :	STS Consultants, Ltd.
SCOPE :	Leachate collection system (including laterals, headers, pumping stations, forcemains and storage tank), gas collection system, hazardous waste excavation and filling, grading (20,000 CY), clay lining (50,000 CY) and sitework for closure of a five-acre hazardous waste landfill.

Quality Control Testing Firm

CGC

- Firm description/qualifications/certifications
- Laboratory and field standard operating procedures
- Resumes of key staff
  - Ms. Terese McCartney, Field Technician
  - Mr. Donald Arenander, Laboratory Technician
  - Mr. William Wuellner, Project Manager

CGC, Inc.

FIRM DESCRIPTION

CGC, Inc. specializes in geotechnical engineering and design, construction observation and laboratory testing services on projects ranging from small one-story additions to major high rise buildings, wastewater treatment facilities, landfills, highways, bridges, and other structures. As a direct result of the firm's highly experienced professionals, its focus on responsive service, and its loyal clients, CGC has successfully completed over 1500 projects since its inception a few years ago. Offices in both Madison and Milwaukee are easily accessible to our clientele.

CGC focuses on the following core services:

- **Planning and design phase services**
  - Geotechnical investigations, laboratory testing and consultation
  - Phase I environmental site assessments
  - Materials engineering and testing

- **Construction phase services**
  - Field and laboratory testing on building projects
  - Field and laboratory testing on waste disposal facilities
  - Construction engineering, inspection and testing on transportation projects
  - Geotechnical and materials laboratory testing

CGC maintains the following certifications as a corporation or through its personnel:

- Reviewed and accepted by US Army Corps of Engineers 1998
- ACI-certified technicians
- NICET-certified technician in geosynthetic installation
- WDOT-certified technicians in highway materials testing
- Troxler-trained technicians in nuclear field density testing
- NRC-licensed for operation of nuclear density gauges

REPRESENTATIVE CONSTRUCTION TESTING SERVICES PROJECTS

Waste Disposal Projects

- Deer Track Park Landfill
- Ocean Spray Wastewater Lagoon
- Countryside Landfill in Grayslake, IL

Other Projects

- City of Madison Asphalt QA/AC
- COE Portage Flood Control Levee
- American Family Insurance
  NE detention pond & building pads

Building Projects

- Miller Park - Milw. Brewers Stadium
- Kohl Center - UW Basketball Arena
- Monona Terrace Convention Center
- Target Stores (Madison East & West)
- WHEDA Office Bldg/Parking Ramp
- UW Biochemistry Addn/NMR Facility
- General Motors - GMT 800 Program
- UPS Distribution Facility
- WP&L Blanket Contract

3011 Perry Street
Madison, WI 53713
608-288-4100

205 W. Galena, Suite 100
Milwaukee, WI 53212
414-271-6903

CGC,Inc.

STANDARD OPERATING PROCEDURES (SOPs) FOR GEOTECHNICAL LABORATORY AND FIELD TESTING

Atterberg Limits
ASTM D4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils

CBR Test
ASTM D1883 Bearing Ratio of Laboratory Compacted Soils

Capillary-Moisture Relationship
ASTM D2325 Capillary Moisture Relationships for Coarse- and Medium- Textured Soils by Porous Plate Apparatus

Consolidation Test
ASTM D2435 One-Dimensional Consolidation Properties of Soils (Hydraulic Conductivity)

Constant Head Permeability Test
ASTM D2434 Permeability of Granular Soils

Direct Shear Test
ASTM D3080 Direct Shear Test of Soils Under Consolidated-Drained Conditions

Drilling and Sampling
ASTM D1452 Soil Investigation and Sampling by Auger Borings
ASTM D2113 Diamond Core Drilling for Site Investigation
ASTM D420 Investigating and Sampling Soil and Rock
ASTM D1586 Penetration Test and Split-Barrel Sampling of Soils
ASTM D1587 Thin-Walled Tube Sampling of Soils

Falling Head Permeability Test (Hydraulic Conductivity)
U.S. Army Corps of Engineers Manual EM 1110-2-1906 (VII)
ASTM D5084 Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Field Density Testing
ASTM D1556 Sand Cone Density
ASTM D2922 Nuclear Density
ASTM D3017 Nuclear Moisture Content

Maximum Density of Granular Soils (Relative Density)
ASTM D4253 Maximum Index Density of Soils Using a Vibratory Table

Minimum Density of Granular Soils (Relative Density)

ASTM D4254 Minimum Index Density of Soils and Calculation of Relative Density

Natural Moisture Content

ASTM D2216 Water (Moisture) Content of Soil and Rock
ASTM D4643 Microwave Oven Method

Organic Content of Soils by Loss-on-Ignition

ASTM D2974 Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

Particle-Size Analysis

ASTM D422 Particle-Size Analysis of Soils (Hydrometer plus Sieve)
ASTM D117 Particle-Size Analysis of Soils (Sieve)

Proctor Moisture-Density Relationships

ASTM D698 Standard Proctor
ASTM D1557 Modified Proctor

Shrinkage Limit Test

ASTM D427 Shrinkage Factors of Soils

Soil Classification

ASTM D2487 Classification of Soils for Engineering Purposes
ASTM D2488 Description and Identification of Soils (Visual-Manual Procedure)

Soil Passing the No. 200 Sieve

ASTM D1140 Amount of Material in Soils Finer Than the No. 200 (0.075-mm) Sieve

Specific Gravity of Soils

ASTM D854 Specific Gravity of Soils

Swell Tests for Expansive Soils

ASTM D4546 One-Dimensional Swell or Settlemtn Potential of Cohesive Soils Head (1980) Manual of Soil Laboratory Testing--Free Swell
ASTM D4029 Expansion Index of Soils

Triaxial Compression Test

ASTM D2850 Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression
ASTM D4767 Consolidated-Undrained Triaxial Compression Test on Cohesive Soils
U.S. Army Corps of Engineers Manual EM 1110-2-1906(X)
Bishop and Henkel (1962) The Measurement of Soil Properties in the Triaxial Test

Unconfined Compressive Strength

ASTM D2166 Unconfined Compressive Strength of Cohesive Soil

Bulk Density (Unit Weight)

ASTM D2937 Density of Soil in Place - Drive Cylinder Method
ASTM D4564 Density of Soil in Place - Sleeve Method

CGC,Inc.

TERESE B. MCCARTNEY

construction services
construction testing

EDUCATION

Southern Illinois University-Carbondale: B.A./1978/Biological Sciences

REGISTRATION

OSHA 40 hr Health and Safety Training
NRC Density Gauge Operator Certification
NICET Certified in Geosynthetic Materials Installation Inspection

PROFESSIONAL HISTORY

CGC, Inc., Field Technician, 1996 to Present
Montgomery Watson, 1992-1996
St. of FL Dept. of Health, 1987-1991
Blackstone Laboratories, Inc. 1984-1986
Nurrie Construction Co., Inc., 1981-1983

REPRESENTATIVE EXPERIENCE

Ms. McCartney responsibilities have included resident construction project representative duties, construction and materials testing, environmental sampling, construction documentation and reporting, surveying, project scheduling and budget management, proposal development and report preparation. Project experience has been gained within the laboratory and in the field at multiple building construction sites, on roadway projects, and at landfill sites in Wisconsin, Illinois, Michigan, Indiana, Ohio, Kentucky, Tennessee and Florida.

CONSTRUCTION SERVICES - SOLID/HAZARDOUS WASTE

- Field Technician, Deer Track Park Landfill, I-90 and Hwy 26, Town of Farmington, WI. Provided observations and documentation of two landfill composite liner projects. Duties included field density testing of subbase and clay liners, documentation of placement of geomembrane and geotextile liners, surveying, clay borrow evaluating, documentation of leachate collection systems piping, manholes and granular drainage layer placement. Assisted project engineer in report preparation, project scheduling, and budget management.

- Field Technician, Land Reclamation Company Landfill, Oakes Road, Racine, WI. Provided observation and documentation of placement of geomembrane and geotextile liners in Corridors 8, 9, and 10. Previously provided observation and documentation of construction of the gas control system along the east slope.

- Field Technician, Ocean Spray Cranberries Wastewater Storage Lagoon project, Tomah, WI. Responsibilities included observation and documentation of the installation of 60-mil HDPE geomembrane and geotextile liners in two, 2.5 acre wastewater lagoons.

- Field Technician, Greentree Hills Landfill Capping Project, McKenna & Hammerlsy Roads, Madison, WI. Performed field observations and evaluated/documented construction of landfill capping project.

CONSTRUCTION SERVICES - TRANSPORTATION

- Quality Control Technician, Grove Recreation Area, Corbin, Kentucky. Responsibilities included all field density testing and field concrete testing for the U.S. Army Corps of Engineers project consisting of federal park construction including a marina and approximately 10 miles of asphalt roadway.

CONSTRUCTION SERVICES - BUILDINGS

- Field Technician, Lands' End Distribution Center #2, Dodgeville, WI. Duties included foundation and floor slab subgrade evaluation, concrete field testing, field density testing to evaluate backfill compaction and preparation of documentation reports.

- Field Technician, Biochemistry Addition, University of Wisconsin, Madison, WI. Duties included foundation subgrade evaluation, concrete field testing and field density testing.

- Field Technician, Wisconsin Housing and Economic Development Authority, W. Washington Avenue and S. Fairchild Street, Madison, WI. Duties included foundation subgrade evaluation, concrete field testing and field density testing.

CGC, Inc.

DONALD W. ARENANDER

waste disposal facilities
geotechnical services
construction testing
soil testing

EDUCATION

Drexel University, Philadelphia, Designing and Installing with Geosynthetics - 1991
University of Texas, Hydraulic Conductivity/Consolidation Characteristics of Soils - 1986
University of Missouri, Quality Geotechnical Lab Testing, 1979
University of Wisconsin Extension - Numerous Geotechnical Courses, 1973-present
Madison Area Technical College - Civil Highway Technology Associates Degree - 1973
Madison Area Technical College - Mechanical Drafting Degree - 1970
UW Extension Madison, Construction Inspection and Quality Control

REGISTRATION

Certified Soil Tester, State of Wisconsin (Upgrade CSTM 1994)
Certified Radiological Safety
40 Hour Hazardous Training and Health & Safety Training (OSHA)
American Concrete Institute Certification
Engineering Technician, National Institute for Certification of Engineering Technologies (NICET)

PROFESSIONAL HISTORY

CGC, Inc., Geotechnical Laboratory and Field Project Coordinator, 1994 to Present
Nummelin Testing Services, Geotechnical/Materials Supervisor - 1993-1994
Warzyn Inc., Geotechnical Laboratory Manager and Field Project Coordinator - 1973 to 1993

REPRESENTATIVE EXPERIENCE

Mr. Arenander is responsible for supervising our geotechnical testing laboratory, construction specialist and coordinating field construction projects. He has over twenty-five years of experience and expertise in physical testing of soil and materials to establish engineering properties. Also, Mr. Arenander has considerable geotechnical and materials field testing, inspection and research experience.

Mr. Arenander has extensive experience in performing a wide range of materials and geotechnical laboratory test procedures. He has extensive experience performing permeability tests, using a variety of methods. He has self-designed and fabricated much of his own specialized testing equipment. His experience includes falling and constant head tests using flexible and rigid wall permeameters, pressurized permeameter testing and tests on compacted, remolded and undisturbed samples. In addition, he has conducted and is knowledgeable in a wide range of geotechnical and materials tests such as triaxial, consolidation, direct shear, Atterberg limits, specific gravity, asphalt and concrete testing, etc.

His responsibilities have included modifying standard equipment to accommodate the specialized testing requirements of a wide range of materials including fly ash, slag materials and paper mill sludge, as well as fabrication of test equipment and testing for a variety of specialized research programs, laboratory/field. He has performed modeling tests and designs of new tests procedures for geotechnical and materials projects.

GEOTECHNICAL AND MATERIALS LABORATORY TESTING

- Deer Track Park Landfill, Farmington, WI. Geotechnical laboratory testing for clay borrow evaluation.
- Army Corps of Engineers, CDF Investigation, Waukegan, IL, Illinois Shoreline projects. Duties include performing a variety of geotechnical and triaxial tests.
- Waste Management, Omega Hills Landfill, Germantown, WI. Duties included a wide variety of geotechnical laboratory tests, some of which consisted of direct shear, consolidation, permeability and triaxial testing.
- Wisconsin Power & Light, Columbia Station, Portage, WI. Material testing of bottom and fly ash for construction uses and disposal.
- Grede Foundries, Reedsburg, WI. Geotechnical and materials laboratory testing and evaluation of slag material as a construction material for DOT projects in southern Wisconsin.

CONSTRUCTION SERVICES - LANDFILL

For each project listed below, the duties included construction inspection and documentation of clay liner placement, geosynthetic membrane and geosynthetic textile placement, leachate collection system and cover soil placement.

- Fond du Lac County Landfill, Fond du Lac, WI.
- Janesville Rock County Landfill, Janesville, WI.
- Omega Hills Landfill, Germantown, WI.
- Metro Landfill, Middleton, WI.
- Madison-Sun Prairie Landfill, Sun Prairie, WI.

CGC,Inc.

WILLIAM W. WUELLNER, P.E.

geotechnical engineering
landfill design & construction
shallow and deep foundations
construction inspection

EDUCATION

University of Illinois at Urbana-Champaign: M.S., Geotechnical Engineering, 1976
University of Illinois at Urbana-Champaign: B.S., Civil Engineering, 1972

REGISTRATION

Professional Engineer: Wisconsin

PROFESSIONAL HISTORY

CGC, Inc., Senior Geotechnical Engineer, 1996 to present
Woodward-Clyde Consultants, Senior Associate Engineer, 1992-1996
EWI Engineering Associates, Inc. Geoservices Group Manager, 1990-1992
Warzyn Engineering, Inc., Soils Engineer to Civil/Geotechnical Division Director, 1976-1990

REPRESENTATIVE EXPERIENCE

Mr. Wuellner has extensive experience in analyzing subsurface conditions and their effect on site development. In recommending suitable foundation systems for hundreds of structures throughout the Midwest, he has developed each recommendation after considering its technical feasibility, constructability and economic practicality. In addition to foundations for conventional buildings, other types of projects handled by Mr. Wuellner have included temporary and permanent earth retention systems, parking lots, roadway and airport pavements, storage lagoons, water towers and ground reservoirs, landfills and earth-sheltered structures. He has performed geotechnical assessments of soil conditions for various waterfront developments as they concern slope stability`, foundation recommendations, earthwork procedures and dewatering requirements.

His field experience includes foundation subgrade evaluation, supervision of compaction tests on earth fills, proof-testing of earth retention systems, pile load tests, observation and testing of compaction grouting programs and paving subgrade evaluation.

- Project Manager, Edgerton Sand & Gravel Landfill, Edgerton, WI. RI/FS and Closure Plan for a former municipal landfill. The project includes source control measures for the landfill itself and nearby burn pit/drum disposal area; groundwater remediation; and replacement of a water supply for neighboring, contaminated private wells, 1991-1994.

- Project Manager, Madison Area Technical College, Madison, Wi. Quality assurance testing for a new $60 million campus. Services included subgrade observations, compaction testing on engineered fill, consultation on dewatering, proof-rolling of parking subgrades, testing of bolted connections, weld inspection, and field and laboratory testing of concrete, 1985-87.

- Project Manager, S.T.H. 61, Dubuque - Dickeyville Road, Grant County, WI. Construction inspection and documentation of new four-lane divided highway. Services included inspection of 700,000 cu yd of earthwork (including rock excavation), 1.5 miles of PCC pavement and bituminous shoulders, three structures, and incidental construction, 1988-89.

- Project Manager, Portage County Landfill, Stevens Point, WI. Construction testing and observation for two phases of Portage County Landfill. Services included testing the compaction and quality of the 5 ft-thick clay liner and sidewalls; base grade documentation; and inspection of leachate collection system, holding tank, granular blanket, and incidental construction, 1982, 1985.

- Geotechnical Engineer, Ash Disposal Site, Portage, WI. Supervision of test program to evaluate fly ash setting and handling characteristics for WP&L Columbia generating station. Later work included *in situ* double-ring infiltrometer tests on hardened fly ash, 1983-86.

- Project Manager, Madison Gas & Electric, Madison, WI. Geotechnical investigation of corporate office building and parking structure, 1983.

- Project Manager, Neenah-Menasha Regional Wastewater Treatment Plant, Menasha, WI. Geotechnical investigation, 1982.

- Geotechnical Engineer, Interplant Solids Pipeline, Milwaukee, WI. Jones Island to South Shore treatment plants: geotechnical investigation for 11-mile-long force mains, including several sections to be installed by soft-ground tunneling, 1984-1985.

PUBLICATIONS, REPORTS, AND PRESENTATIONS

Mahar, J. W., H. W. Parker, and W.W. Wuellner, Shotcrete Practice in Underground Construction, DOT, Federal Railroad Administration, August 1975.

Wuellner, W. W., D. A. Wierman and H.A. Koch, "Effect of Landfill Leachate on the Permeability of Clay Soils," Eighth Annual Madison Waste Conference, September 18-19, 1985, University of Wisconsin-Madison.

Edil, T. B., V. J. Ranguette, and W.W. Wuellner, "Settlement of Municipal Refuse," Symposium on Geotechnics of Waste Fills - Theory and Practice, ASTM STP 1070, American Society for Testing and Materials, 1990.

Wuellner, W. W., "Project Performance Evaluation Checklist for Consulting Engineers," Journal of Management in Engineering, Vol. 6, No. 3, ASCE, July 1990.

Continuum Healthcare

Health & Safety Consultant

Continuum Healthcare

Continuum Healthcare in cooperation with Clayton Environmental Consultants, (a Division of Clayton Group Services, Inc. (Clayton) will provide Health and Safety Officer (HSO) support for Ryan Inc. Central at the Stoughton landfill.

Continuum Healthcare has partnered with Clayton to support Continuum in its efforts to service their customers on a nationwide basis. Clayton has been a stable presence in safety, health, and environmental services for over 40 years. With a staff of more than 400 professionals, including industrial hygienists, safety professionals, ergonomists, chemists, environmental engineers, toxicologists, and laboratory scientists, collectively the two firms provide a wide range of interdisciplinary skills and experience to help their clients manage their safety and environmental health concerns. Continuum Healthcare's professional staff complements these activities with support in the Occupational medical arena.

The Health and Safety Officer will be Clayton's Karen Boyce-Lindgren CIH, CSP. Karen has over 17 years of experience in various industries as a safety and health professional. She has extensive experience with contractors, both as a corporate Health and Safety Manager and as a consultant. As in all instances with Continuum Healthcare/Clayton, should expertise beyond the capabilities of the assigned personnel be required, it will be provided from the extensive resources within the two organizations.