

**SECTION C**  
**WASTE ANALYSIS PLAN**

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## SECTION C - WASTE ANALYSIS PLAN

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## SECTION C - WASTE ANALYSIS PLAN

### 1.0 PURPOSE AND SCOPE

The purpose and scope of the Waste Analysis Plan (WAP) is to describe the procedures, sampling and analysis requirements, and rationale that will be followed at the Systech facility to ensure adequate information is available to identify and manage Resource Conservation and Recovery Act (RCRA) hazardous waste safely, and in accordance with regulatory requirements for the receipt, storage, and processing of hazardous waste at the Systech facility.

Prior to combustion in the kilns, the waste fuel is analyzed for compliance with CPCC's permit conditions under the Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) requirements for chloride/chlorine and the metals, arsenic (As), cadmium (Cd), chromium (Cr), Lead (Pb), beryllium (Be) and mercury (Hg) following the CPCC Feedstream Analysis Plan (FAP). The FAP is outside the scope of this WAP.

### 2.0 INTRODUCTION

Systech Environmental Corporation (Systech) owns and operates the waste management facility ("facility") located within the Tulsa Cement LLC d.b.a. Central Plains Cement Company (CPCC) cement plant located in Tulsa, Oklahoma. The cement plant is owned and operated by CPCC. The facility and the cement plant are operated as a resource recovery site. Facility activities include the receiving, blending, storage, and transfer to the rotary kilns of selected waste materials as fuel in the manufacture of Portland cement. The cement plant manufactures Portland cement from limestone, clay, sand, and other materials using two rotary kilns. The kilns may obtain up to 100% of the thermal energy required in the cement manufacturing process through the combustion of fuel quality waste (FQW). The FQW replaces traditional fossil fuels (coal, coke, and natural gas) used to provide the heat energy for the kilns. The receipt, storage, and management of hazardous waste at the Systech facility is regulated under RCRA and under the Oklahoma Hazardous Waste Regulations, Oklahoma Administrative Code (OAC 252 et. al.). The combustion of the hazardous waste in the CPCC cement kilns (EPA# OKD064558703) is regulated by 40 CFR Part 63, subpart EEE, Hazardous Waste Combustor - Maximum Achievable Control Technology (MACT) regulations.

### 3.0 DESCRIPTION OF WASTE STREAMS

FQW received at the Systech Tulsa facility is analyzed prior to blending in the tanks to be prepared for combustion in the CPCC cement kilns as an alternate fuel.

#### 3.1 Waste Management Activities

Wastes received from off-site as well as wastes generated on-site are managed at the facility. The principal waste management activity at the facility is the receipt, storage, and processing of off-site generated waste for use as FQW for the cement kilns. FQW includes both RCRA-regulated hazardous waste and non-RCRA-regulated (non-hazardous) waste.

FQW may also be shipped off-site to other Systech or third-party facilities for management.

Any materials separated from the incoming wastes that cannot be handled as fuels are called non-processibles. Some on-site non-hazardous wastewaters are also managed at the facility. The facility activities regulated by RCRA at the Systech facility are:

- Two 180,000-gallon storage tanks (S02) that are also considered as Treatment Units (T04) due to the agitation system installed with each tank;
- A container storage area (S01) limited to storage of 13,100 gallons of waste that is located in the truck off-loading area, an 80 by 39 foot bermed concrete slab. This includes as many as two (2) 6,000-gallon tanker trucks and other smaller containers totaling 1,100 gallons that may be in the off-loading area.

## 3.2 Waste Hazard Characteristics and Chemical Composition

Many hazardous wastes may be useful in blending FQW. The diverse nature of sources results in FQW of variable chemical composition being stored and used at the facility. A list of waste codes that are permitted for inclusion in FQW at the facility is in the facility Part A Permit in Section A of this application. These materials are listed by the waste codes found in 40 CFR Part 261 Subparts C and D, as adopted by reference by OAC 252:205-3-2(c).

The facility is permitted to receive Listed Waste Codes (F, K, U, and P) and Characteristic Waste Codes (D) as defined in 40 CFR Part 261. Many of the fuels accepted are hazardous because they have the hazardous characteristic of ignitability (D001). The facility's storage systems for wastes are specifically designed to safely manage ignitable waste. All FQWs are managed as if they were ignitable, regardless of actual flashpoint; therefore, the actual flashpoint need not be known to safely blend or store waste at the facility.

All profile applications and manifests for hazardous waste shipments are reviewed to determine if the waste codes listed are on Systech's permitted waste code list. This process is explained further in Figure 2.

### 3.2.1 Listed Waste (F, K, P, U)

Many hazardous wastes may be useful in blending FQW. To qualify for use as FQW at Systech, the waste as burned must have energy value, must not exhibit the characteristic of corrosivity or reactivity, and must be compatible with the matrix of substances comprising the fuel product. Systech further requires that the RCRA hazardous waste received at the facility must be acceptable for energy recovery in accordance with applicable federal and ODEQ regulations. Systech has established 2,500 BTUs per pound (1,250 BTUs/lb for refinery waste) as a minimum heat of combustion for FQW. Even though Systech requires that FQW must have adequate energy value and must not be corrosive or reactive, many of the wastes identified by waste codes listed have little or no fuel value or are corrosive or reactive. Systech is able to accept such waste codes in the blended FQW it receives because of a regulatory concept known as "waste code carry through". The concept of "waste code carry through" comes from the application of the derived-from and mixture rules contained in 40 CFR Part 261 (Subpart A). All waste derived from, mixed with, or contacting a listed hazardous waste, retain the hazardous waste listing of the hazardous waste from which the waste was derived, with which it was mixed, or with which it came into contact. The waste code remains associated with the waste even if the listed hazardous waste cannot be identified in the waste. As a result, the heating value of the blended FQW, not the heating value of individual waste or waste constituents contained in the blended FQW, determines whether it is a candidate for energy recovery at the CPCC plant.

### 3.2.2 Characteristic Wastes

Characteristic wastes are those that can be shown to exhibit one of the hazardous characteristics described in 40 CFR Part 261 Subpart C (waste codes D001-D043).

Characteristic wastes exhibiting the characteristics of Ignitability (D001) and/or Toxicity Characteristics (D004-D043) will be accepted at the Systech facility.

The Systech facility will conditionally accept for processing/blending, waste carrying the characteristic waste code for corrosivity (D002) and for reactivity (D003). The conditional acceptance of D002 and D003 for fuel blending is further explained in section 3.5 Conditionally Acceptable Waste.

### 3.3 Primary Waste Physical Characteristics and Types

#### 3.3.1 Liquid Waste Fuels

Spent organic solvents, coatings, resins, and used oil from off-site industries and fuel blenders are the most frequently received liquid waste fuels at the facility. Painting, printing, lubrication, parts cleaning, and manufacturing represent the major activities producing the waste. Select flammable and combustible wastes generated by other industries are also used when available.

#### 3.3.2 Non-hazardous Wastewater

The wastewater generated on site is precipitation that falls into hazardous waste tank storage containment areas. The containment areas are sloped to sumps. Precipitation is collected in the sumps and pumped to storage tanks if the waste is found to be contaminated.

#### 3.3.3 Non-processible / Non-FQW

Non-processible wastes are generated on-site from the cleaning of equipment, general housekeeping, personal protective equipment (PPE), debris from received shipments and laboratory activities. All containers used for satellite accumulation of these materials are labeled and dated as appropriate when filled (up to 55 gallons). Once filled, they are placed in the truck unloading bay storage area pending shipment off-site. They are typically hazardous and combustible sludges or solids, some of which cannot be used as fuel on-site. These wastes are shipped to other permitted TSDFs for final treatment or disposal.

### 3.4 Prohibited Waste

Certain wastes are prohibited for acceptance at Systech based on waste type or characteristics of the waste.

- **Explosive as defined at 40 CFR 261.23(a)(4)** – Wastes exhibiting reactivity (D003) when mixed with water may generate toxic gases, vapors, or fumes in quantities sufficient to present a danger to human health or the environment are prohibited and not accepted at the facility.
- **PCB Wastes** – Polychlorinated biphenyl (PCB) wastes, as defined under the Toxic Substance Control Act (greater than or equal to 50 parts per million), are prohibited and not accepted at the facility.

- **Dioxin/Furan coded waste** – Systech will not accept for fuel blending any waste with the recognized Dioxin/Furan waste codes. These codes are F020, F021, F022, F023, F026, F027, and F028.

### 3.5 Conditionally Acceptable Waste

Certain wastes are restricted for acceptance at Systech for blending into FQW based on waste type or characteristics of the waste. However, it is possible to receive a waste that has been adequately treated to eliminate a hazardous characteristic, but which still carries the waste code. If a waste has been treated to remove the characteristic but still has underlying hazardous constituents, then the waste code still applies to the waste.

Because Systech may accept selected wastes bearing codes for corrosivity (D002) or reactivity (D003), specific tests are required to verify that these wastes will not react adversely with other wastes being blended. These procedures are the test for compatibility and pH. These tests are further described in section 5.0, Analytical Parameters and Rationale.

- **D003 Coded Waste** - FQW carrying the waste code (D003) may be accepted at the facility for processing provided it is compatible with other wastes already in storage.
- **D002 Coded Waste** - A waste with a  $\text{pH} \leq 2$  or  $\geq 12.5$  will not be blended with FQW. A waste with a  $\text{pH} \leq 2$  or  $\geq 12.5$  may be rejected or accepted for shipment to an alternate disposal facility. D002 coded wastes that have been treated to a  $\text{pH} > 2$  and  $< 12.5$  may be accepted provided it is compatible with wastes in storage.

### 3.6 Waste Quantities

The estimated quantities of hazardous waste to be accepted at the facility are found in the waste code list in the Part A Permit Forms in Section A of this application. The biennial reports submitted to ODEQ will provide information on the types and quantities of wastes actually received by the facility for each biennial reporting period.

## 4.0 WASTE APPROVAL AND ACCEPTANCE PROCESS

This section of the WAP is devoted to the process and procedures by which Systech scrutinizes FQW received from off-site. Based on information developed as a result of these procedures, Systech decides whether a shipment of FQW can be accepted for storage at the facility and subsequent use as fuel in the kilns or accepted for shipment to another TSDF. The procedures to determine acceptability of each shipment include pre-shipment waste stream qualification and reviewing the documentation accompanying such shipments, as well as reviewing the testing and analytical data developed in connection with each shipment received at the facility. Figure 1 illustrates a summary of the FQW process flow. Figure 2 illustrates the process flow between the Systech facility and the Central Plains Cement Company

### 4.1 Fuel Blending Criteria

RCRA-regulated waste received at the Systech facility for blending of FQW must meet the following criteria:

- They can be accepted in accordance with current environmental regulations or permit conditions, and
- They can be handled safely by trained facility employees using appropriate personal protective devices and health and safety procedures.

## 4.2 Waste Approval Sequence

To ensure these criteria are met, the waste approval and acceptance process is a multiple step sequence that includes:

Step 1. Qualification of the candidate waste fuel

Step 2. Manifest and land ban verification

Step 3. Receiving sampling and analysis

Step 4. Acceptance or rejection of waste

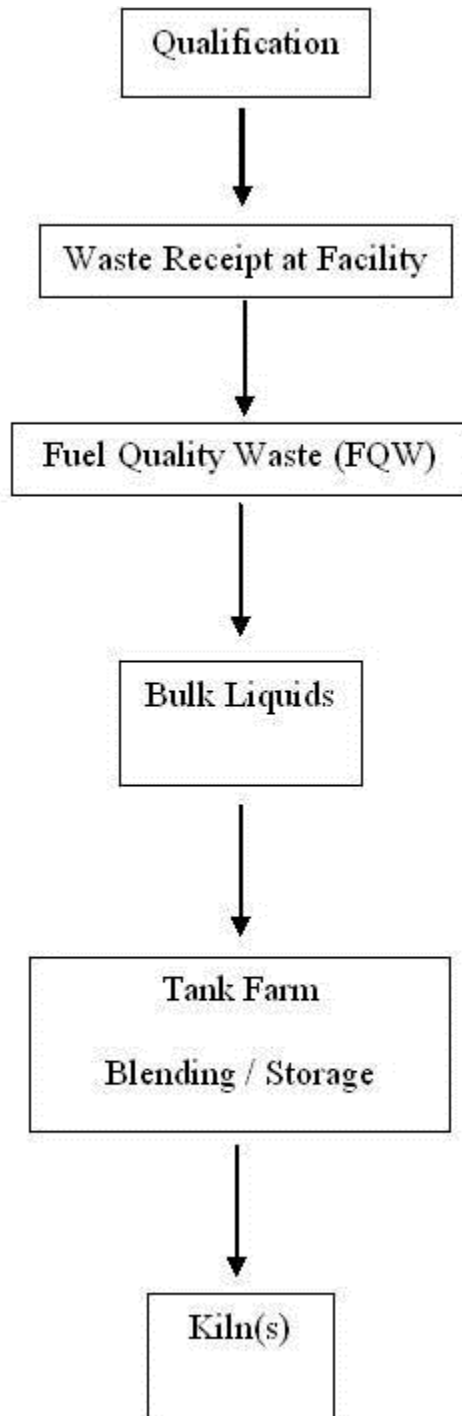
Step 5. Final sampling and analysis of FQW blended fuel prior to use in the kilns (“As fired”) for MACT analysis which is part of the FAP and beyond the scope of this WAP.

### **Step 1. - Qualification of The Candidate Waste Fuel**

Systech utilizes a Waste Stream qualification form as part of the pre-qualification process. Before waste is received at the facility the waste is evaluated. Each waste supplier (generator and broker and/or TSDF) wishing to have a waste qualified for use as a fuel is required to complete a Fuel Qualification Form that provides a detailed analysis of the waste as required by 40 CFR 264.13(a)(1) based on process knowledge by the generator. An example of this Systech profile form is provided in Attachment C-2. This questionnaire-type form requires the supplier to advise Systech of the activity producing the waste, the hazardous characteristics of the waste, and any waste codes associated with the waste. Other profile forms may be used in lieu of a Systech form provided they contain sufficient information to determine the physical and chemical hazards of the waste material. At a minimum, these profile forms will include the generator’s name, location, USEPA ID number, contact information, the activity producing the waste, the hazardous characteristics of the waste, and all waste codes associated with the waste.

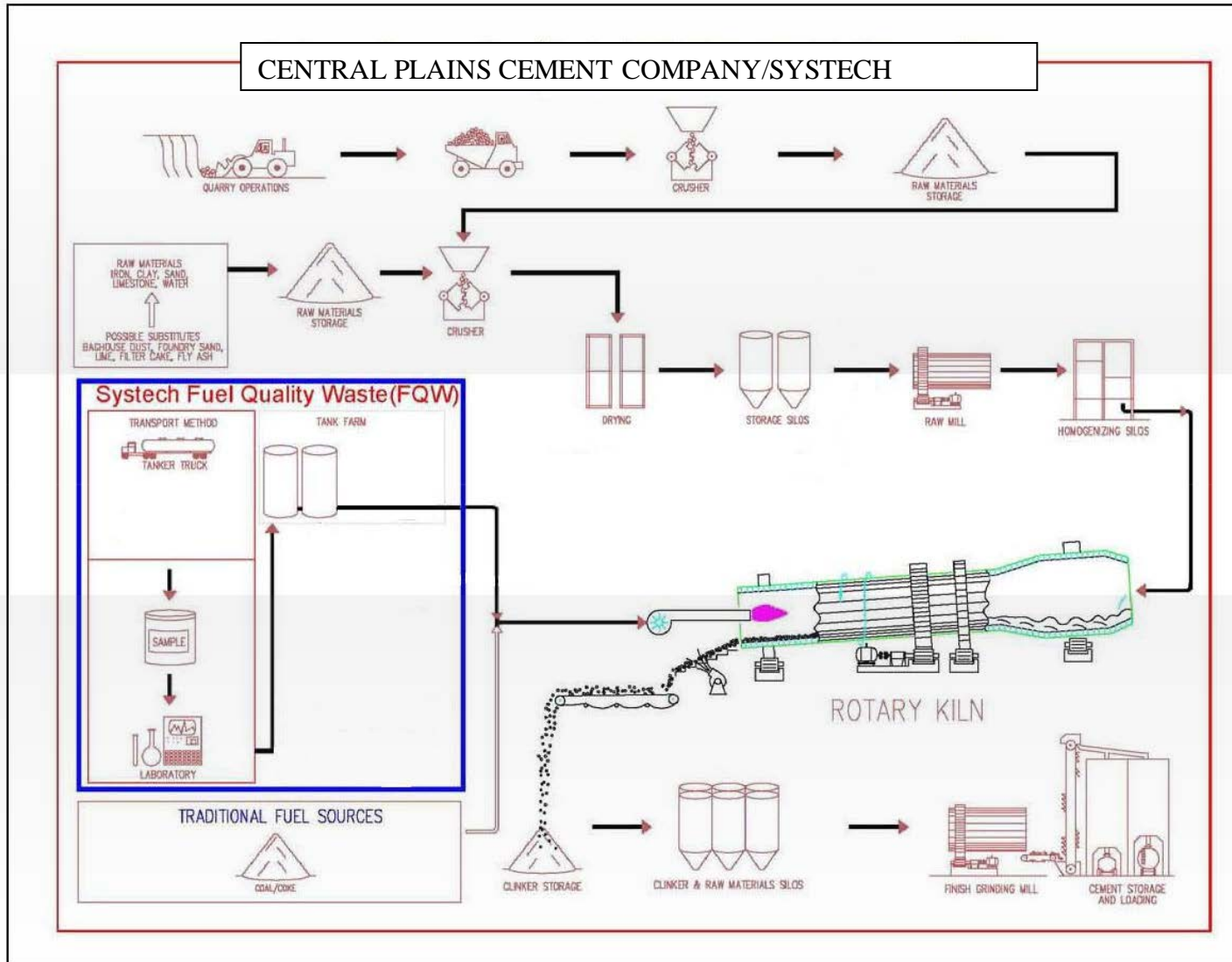


**FIGURE 1 FACILITY FLOW CHARTS FQW SUMMARY FLOW CHART**



**FIGURE 2 PROCESS FLOW CHART**

Fuel Quality Waste (FQW) and its relation to the cement manufacturing process.



The information submitted by the supplier is used to make a preliminary determination as to whether the candidate waste may be suitable for use as a fuel. The information provided on the completed form is evaluated by Systech to ensure the waste codes are permitted and it meets the acceptance criteria listed above in section 4.1 prior to approval for shipment. The signed form becomes part of the supplier's permanent file and is kept at the facility for three years after the waste is no longer being received.

Waste stream qualifications require an evaluation of the information submitted by the supplier. Systech also requests a sample of the proposed waste stream prior to receipt of the waste. The tests conducted on the qualification sample are identified in Table 2.

### **Step 2. - Manifest and Land Ban Verification**

All hazardous waste received at the site will be accompanied by a manifest. Before acceptance of the waste, the manifest and associated land ban form, where applicable, will be reviewed for accuracy, completion and to ensure that non-permitted waste codes are not accepted. Systech's computerized program utilized to track waste materials uses an electronic checklist asking for information on the form in Attachment C-1 included as part of the input data. The form is reviewed and manually completed in rare instances when the computer system is down.

Upon receipt of a shipment, Systech personnel review the hazardous waste manifest and other documents (e.g., Land Ban Notification) prepared by the generator. The manifest is reviewed to ensure that it is properly signed by the generator and transporter(s) and that it contains all information required by 40 CFR Part 262. In addition, Systech personnel check the manifest to determine whether there are any significant discrepancies in quantity actually received in the shipment. Significant discrepancies in quantity of bulk shipments occur when the weight of a shipment of FQW, as determined by Systech, varies greater than 10%.

### **Step 3. - Receiving Sampling and Analysis**

Each waste shipment is inspected, sampled, and analyzed to determine that the material shipped meets Systech's acceptance criteria and to confirm that the waste agrees with the manifest description except waste that is to be brokered/transferred off-site. Incompatible wastes as defined by 40 CFR 264 Appendix V are segregated in accordance with 40 CFR 264.177(c) for further analysis, off-site shipment or rejection. Materials that cannot be fuel blended may be accepted and sent to an alternate TSDF or rejected back to the generator depending on the nature of the waste, storage capacity, and customer instructions.

Receiving sampling and analysis methods, procedures, and acceptance criteria are further described in sections 5.0 and 6.0.

### **Step 4. - Acceptance or Rejection of Waste**

FQW waste meeting the acceptance criteria is accepted for processing and fuel blending.

For waste not meeting the acceptance criteria, the waste is rejected and, based on the customer's instructions, is either returned to the generator or shipped to an alternate TSDF.

Acceptance of the waste is documented and is entered into the facility operating record.

### 4.3 Laboratory Selection

The analytical tests described by this waste analysis plan will be conducted by the on-site laboratory or they may be conducted by an off-site laboratory following the requirements of this plan. All sampling and analytical methods will be per this plan. The Systech Tulsa facility will use these results of the analyses to demonstrate the FQW meets the acceptance criteria of this plan. After the sample has been taken by the offsite laboratory and analyzed, the container will be sealed to ensure that no changes are made to the composition of the FQW between the time it is sampled and tested and when it arrives at the Tulsa facility. Receiving sampling and analysis methods, procedures, and acceptance criteria are further described in sections 5.0 and 6.0.

## 5.0 ANALYTICAL PARAMETERS, RATIONALE, AND TEST METHODS

Table 1 lists the parameters that may be used in review of FQW. The characteristics and parameters of concern for FQW acceptance that will always be assessed are compatibility, heat of combustion, and pH. PCBs will be assessed by either direct analysis or generator certification that the material is non-TSCA regulated. Based on information provided on the waste profile form, additional parameters may be considered to further evaluate a particular waste.

Receipt analyses are typically performed at the on-site lab. However, shipments of blended FQW received may be accompanied by an analysis that meets the receiving requirements of this WAP. In all cases, the analyses performed at the off-site laboratories will be performed per the requirements of this WAP.

Also listed in Table 1 are the types of analytical reference methods used by Systech to develop its analytical methods and evaluate the various waste parameters and the rationale for the analysis. These Systech methods are compiled and documented in the Systech Analytical Methods Manual (SAMM). The corresponding Systech method numbers are also listed in Table 1.

The actual parameters tested vary depending upon the analysis plan step (qualification, receiving, and fuel blending for quality) and are listed in Table 2.

**TABLE 1 ANALYTICAL PARAMETERS, REFERENCE METHODS, AND RATIONALE**

PARAMETER	PREPARATION	REFERENCE METHODS	SYSTECH METHOD#	REASON FOR ANALYSIS
Compatibility		ASTM D5058, ASTM D4981	PC-3	System and waste compatibility
Heat Content		ASTM D240 ASTM D5468	PC-6	Fuel quality
pH		SW-846 9045 ASTM D4980	PC-1	System compatibility
PCBs	SW-846 3580 SW-846 3620 ASTM D4059	SW-846-8000 SW-846 8082 ASTM D4059	GC-2	Prohibited material

## 5.1 Analytical Parameters, Rationale

Following is a discussion of the method(s) and rationale for each parameter. The laboratory performs chemical and physical analyses using methodologies developed by Systech, using the guidelines established in SW-846, ASTM, etc. Analytical methods are periodically revised or amended to reflect improvements, changes in acceptable technology and broadening regulatory adoption and acceptance or new and improved techniques.

### 5.1.1 Compatibility

The FQW samples are analyzed for compatibility following Systech Method PC-3, Standard Procedure for Compatibility Testing of Solid or Liquid Waste.

Compatibility is tested by mixing approximately equal volumes of sample and blended FQW and observing for vigorous bubbling, splattering or frothing, heat rise, and/or hazardous polymerization. Compatibility is evaluated to ensure that wastes do not adversely react with one another when they are placed in storage tanks. If waste is being transferred to another container before shipment off-site and the material is being combined with other wastes, they will be tested for compatibility.

Systech tests for compatibility to prevent undesirable chemical reactions resulting from mixing of incompatible FQW. Results of a compatibility test that results in a temperature rise of more than 5 °F within 1 minute, or a visible vigorous reaction, splattering or frothing, hazardous polymerization, or gas evolution may constitute an incompatible material.

Undesirable chemical reactions are listed in 40CFR 264.17(b) as reactions that:

- Generate extreme heat or pressure, fire or explosion, or violent reactions;
- Produce uncontrolled toxic mist, fumes, dust, or gases in sufficient quantities to threaten human health and the environment;
- Produce uncontrolled flammable fumes or gases in sufficient quantities to pose risk of fire or explosions;
- Damage the structural integrity of the facility;
- Through other like means, threaten human health and the environment.

### 5.1.2 Heat of Combustion

The FQW samples are analyzed following Systech Method PC-6, Standard Method for Determining Heat Value and Ash Content of Liquid and Solid Waste. The heating value is determined using an oxygen bomb calorimeter. FQW must have adequate heating value to ensure its use for energy recovery. Systech has established 2,500 BTUs per pound (1,250 BTUs/lb for refinery waste) as a minimum heat of combustion for FQW. Demonstration of the minimum heat value is included in Attachment C-3.

### 5.1.3 pH

The FQW samples are analyzed for pH following Systech Method PC-1, Standard Method for the Determination of pH of Solid and Liquid Waste. Equal volumes of water and sample are thoroughly mixed together. The pH may be evaluated by either a paper or meter method.

- Paper Method: The water phase is then applied to pH paper to determine the extracted pH.
- Meter Method: The water layer is removed to a new test tube. The pH meter is calibrated. The electrode is placed in the water extract of the sample, and the pH of the sample is read.

pH is evaluated to ensure that wastes are handled appropriately. A waste with a pH  $\leq 2$  will not be unloaded and blended with waste derived fuels. A waste with a pH  $\leq 2$  may be rejected or conditionally accepted for shipment to an alternate disposal facility.

FQW samples will be tested for pH to detect materials that might corrode tanks, containers, and or ancillary equipment, including piping and pumps, or might result in deleterious reactions with incompatible FQW.

#### 5.1.4 PCBs

For FQW samples that are analyzed for PCBs following Systech Method GC-2, Standard Method for the Determination of PCBs in Solvent-Based Waste, measured portions of the waste sample and hexane are mixed in a vial or test tube. The sample mixture is digested with sulfuric acid to remove interferences then injected into a gas chromatograph equipped with an ECD detector to detect the presence of PCBs in the waste sample. PCB wastes, as defined under the Toxic Substance Control Act (greater than or equal to 50 parts per million), will not be accepted at the facility. Analyses of FQW for PCB content are conducted to ensure that no materials are stored or used at the facility that would require a Toxic Substances Control Act permit.

**TABLE 2 FQW WASTE ANALYSIS PLAN SUMMARY**

PARAMETER	QUALIFICATION <sup>1</sup>	RECEIVING FQW
Heat Content	X	X
PCB's <sup>2</sup>	X	X
Compatibility	X	X
pH	X	X

1. Qualification analyses are performed either pre-shipment or from a sample pulled upon arrival.
2. A generator certification can be used in lieu of analysis.

## 6.0 FQW SAMPLING METHODS AND FREQUENCY OF ANALYSIS

### 6.1 Qualification Sampling and Frequency

The qualification sample is typically obtained by the generator at their site. Sampling methods are not specified for the qualification analysis, but waste suppliers must certify on the waste profile form that they have provided a representative sample of the waste stream.

The qualification profile form will be updated whenever any of the following situations occur:

- whenever the generator/supplier acknowledges that a change is made to the process that generates the waste;
- at least every two years for active suppliers.

If no shipment of a waste stream was received from a supplier for a period of 2 years, a new qualification profile form will be generated.

The qualification analysis will be repeated whenever any of the following situations occur:

- whenever the generator/supplier acknowledges that a change is made to the process which generates the wastes, indicating that new waste codes are being added;
- whenever the manifest description is inconsistent with what is received.

The signed form and analytical data become part of the supplier's permanent file and is kept at the facility for three years after the waste is no longer being received.

## **6.2 Receiving: Sampling Methods and Frequency**

The receiving analysis is performed on every shipment of waste received at the facility. The receiving analysis may be repeated as necessary to ensure information is accurate and representative.

The sampling techniques used to obtain a sample of FQW for the receiving analysis are based on EPA SW-846 and/or ASTM methods and are designed to provide representative samples.

Samples of liquids and light sludges are taken using a composite liquid waste sampler (coliwasa) (for bulk shipments, a modified coliwasa with a lower end closure valve is used)

A representative sample is taken from each tank truck, or bulk container delivering waste to the facility unless a completed analysis accompanies the shipment from an approved laboratory. If the shipment is accompanied by a complete analysis of the tanker and the dome will be sealed.

## **6.3 On-site Generated Wastes: Sampling Methods and Frequency**

Non-processible material from laboratory activities, equipment cleaning, facility clean-up, PPE, and maintenance residuals that cannot be processed into fuel or otherwise managed in the kiln will be stored on-site prior to being sent to an appropriate off-site facility. Hazardous wastes are assumed to be and are managed as if they are ignitable. The facility will manage any hazardous waste being sent off-site for disposal in accordance with 40 CFR 268.7.

The wastewater generated on-site is primarily precipitation collected in the containment and unloading areas. This water does not come in contact with hazardous waste but is collected and stored to prevent its release to the ground or surface water. In order to determine whether the stormwater may be contaminated, the surface of the water will be examined for the presence of sheen on the water according to the procedure described in Attachment C-4. If a sheen is observed or visible contamination is present, the water is considered to be contaminated and will be added to one of the FQW fuel tanks or shipped off-site for appropriate treatment and disposal. If the observation does not detect contamination, the non-contaminated stormwater will be transferred to the stormwater tanks to be used in the CPCC spray water system, may be discharged to the CPCC stormwater system, or shipped off-site to an appropriate disposal facility.

Waste type and identification for on-site waste is determined from direct knowledge of the waste constituents rather than from sampling and analysis. However, other analytical parameters may be measured, as necessary, depending on the specific requirements of the off-site facility and the applicable regulations for that treatment or disposal option.

## 7.0 ADDITIONAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTES

The chemical and physical analyses described earlier meet all the waste analysis requirements to treat and store the wastes safely. All hazardous wastes accepted at the facility are assumed to be ignitable and are managed accordingly.

## 8.0 QUALITY ASSURANCE

Analyses performed to verify compliance with applicable regulations require rigidly defined procedural and quality assurance practices. It is important that the same result can be verified again at a later time by the same analyst or by an agency or another laboratory using the same methodology. Therefore, there is a need to strictly adhere to a designated methodology and to follow the quality assurance program prescribed in the methodology to meet analytical goals or Data Quality Objectives (DQO).

Systech has continuously developed and refined laboratory practices that allow for focused analysis in a timely manner. These practices are designed specifically to provide timely, useful information needed to safely blend wastes into reliable quality fuels. Appropriate levels of analytical quality control can be readily achieved with reasonable attention to standard laboratory practices.

Attachments, Appendices, and Systech Comprehensive Quality Control Assurance Plan (CQAP), and Systech Analytical Methods Manual (SAMM) identified in the WAP may be periodically revised or amended to reflect improvements, changes in acceptable technology, and broadening regulatory adoption and acceptance, or new and improved techniques. The current “latest” revisions of the CQAP and SAMM in use are readily available to all Systech laboratory personnel and are kept and maintained at the facility.

## 9.0 DEFINITIONS / GLOSSARY

**Characteristic Hazardous Waste** – These are wastes identified by USEPA with the waste codes beginning with D. These waste designations are concentration based or have some physical characteristic that makes them hazardous regardless of their method of generation. (e.g., D001 ignitable wastes, materials with a flash point <140°F)

**Qualification** – Waste stream qualifications require an evaluation of the profile information submitted by the supplier. Systech may request samples prior to receipt of the waste. Alternatively, Systech will sample and analyze the waste upon arrival at the facility to verify that the waste can be accepted. If materials are not to be processed into fuel at Systech, qualification will be limited to a review of the paperwork.

**FAP** – Facility Analysis Plan – this part of the CPCC MACT approval.

**FQW** – Fuel quality waste. Waste capable of providing heat energy when combusted.

**Fuel blending** – Mechanical processing and mixing of fuel quality waste.



**HWC MACT** – USEPA, Hazardous Waste Combustor Maximum Achievable Control Technology

**Listed Hazardous Wastes** – These are wastes identified by USEPA with the waste codes beginning with F, K, U, and P.

- **F** – wastes are non-process-specific wastes (e.g., spent solvents)
- **K** – wastes are process-specific wastes (e.g., refinery wastes)
- **U and P** – Specific Chemicals

**Non-Processible** – Any materials separated from incoming wastes or on-site generated wastes that cannot be handled as fuels.

**ODEQ** – Oklahoma Department of Environmental Quality.

**PPE** – personal protective equipment

**RCRA** – Resource Conservation and Recovery Act.

**System compatibility** – The determination that wastes are compatible or incompatible with the facility storage, processing, blending, tanks, and ancillary equipment and with waste currently being processed.

**TSDF** – Treatment, storage, and disposal Facility regulated and permitted under the Resource Conservation and Recovery Act (RCRA).

## **ATTACHMENT C-1    MANIFEST RECEIVING PROCEDURES**

## **MANIFEST RECEIVING PROCEDURES**

1. Transporter arrives on site.
2. Manifest is brought to receiving office.
3. The manifest and land disposal restriction notification (if applicable) are checked for completeness. Any omission or incorrect information is noted on the Manifest Receiving Checklist.
4. All the waste codes listed on the manifest are entered into a computer program for comparison with acceptable waste codes. Any unacceptable waste codes will be rejected by the computer. If the computer is down, the waste codes must be reviewed manually.
5. If the manifest is acceptable AND the waste codes are acceptable, the load is approved for sampling, or, if an acceptable analysis accompanies the shipment, the shipment is unloaded.
6. If the waste is NOT acceptable because waste codes are NOT acceptable, the manifest is not accepted until there is resolution between generator and System. The resolution may result in either rejection or acceptance of the waste.

## **ATTACHMENT C-2 EXAMPLE QUALIFICATION PROCESS FORM**



Profile No: (Assigned by Systech \_\_\_\_\_)

### FUEL QUALIFICATION FORM

Please answer all questions to enable us to respond promptly. PLEASE NOTE, GENERATOR MUST SIGN BELOW. WE CANNOT BEGIN THE APPROVAL PROCESS UNTIL THE APPLICATION IS COMPLETE. A representative sample of the waste stream must accompany this application. Please attach MSDS's.

A. GENERATOR Company Name: \_\_\_\_\_  
 Technical Contact: \_\_\_\_\_  
 Phone #: \_\_\_\_\_ Fax #: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 EPA ID #: (federal) \_\_\_\_\_ State ID if applicable: \_\_\_\_\_

CUSTOMER Company (BILL-TO) Name: \_\_\_\_\_  
 Customer Contact Name: \_\_\_\_\_  
 Phone #: \_\_\_\_\_ Fax #: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

B. 1. Identification of waste or DOT description: \_\_\_\_\_

2. Activity producing waste: \_\_\_\_\_

3. The waste is:  nonhazardous  hazardous  
 If nonhazardous, does it have >100 ppm organics?  yes  no  
 If hazardous, please specify EPA Waste Code(s): \_\_\_\_\_  
 State Waste Code(s) if applicable: \_\_\_\_\_

4. Quantity of waste available: \_\_\_\_\_ per \_\_\_\_\_ month \_\_\_\_\_ year \_\_\_\_\_ other (specify)

5. Physical description (ie. consistency, texture, etc.): \_\_\_\_\_

6. Method of shipment:  bulk  portable tank  drum  other (specify)

7. Check the appropriate line if the waste contains any of the following:  PCBs  cyanides  
 radioactives  reactivities  pesticides/herbicides  biologically active material  mercury >260 ppm

8. Is the material from a CERCLA site?  yes  no

9a. What is the BTU/lb of the material as generated? \_\_\_\_\_ 9b. What is the flashpoint? \_\_\_\_\_

10. What is the pH of the material? \_\_\_\_\_ <2.0 \_\_\_\_\_ >2 to <12.5 \_\_\_\_\_ ≥ 12.5

11. NESHAP Information: Is this material NESHAP regulated?  yes  no (If no go to question 12.)  
 a) total benzene concentration \_\_\_\_\_% (or \_\_\_\_\_ppm) b) water >10%?  yes  no

12. List and give approximate concentrations for primary raw material entering the waste or provide a waste analysis, if available. Account for 100 percent of the waste.

Material	%	Material	%
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

13. Is the sample being submitted to Systech representative of the waste stream?  yes  no  
 If no, explain: \_\_\_\_\_

*To the best of my knowledge, I warrant that the materials delivered to Systech will be in conformity with the description herein, all information represented by generator in this profile is accurate and complete, and all questions are answered.*

C. \_\_\_\_\_  
 Generator Signature Title Date

## **ATTACHMENT C-3 MINIMUM HEAT VALUE DEMONSTRATION**

## Minimum Heat Value that Provides Legitimate Energy Recovery

This Memorandum establishes a workable definition of “legitimate energy recovery” for purposes of complying with EPA’s policies and stakeholder expectations. The definition was developed in conjunction with CPCC’s CTS and is consistent with similar efforts undertaken by the Cement Kiln Recycling Coalition (CKRC) member companies in 1993. It is important to note that for US regulatory purposes, the heat content of the waste is determined on an “as generated” basis not on an “as fired” basis. EPA has repeatedly stated that unless a waste’s heat content is increased by virtue of treatment, it is contrary to the land disposal regulations to merely “blend up” the heat content of a waste stream to meet the safe harbor threshold of 3,000 - 5000 BTU/lb. This is different than what the kiln may require on an “as fired” basis to sustain operations and to produce quality clinker.

In the US regulatory context, legitimate energy recovery occurs when the heat content of the waste exceeds the minimum heat content needed to raise the temperature of the waste, the accompanying ash in the waste, and the combustion air to a temperature that exceeds the reaction temperature of the raw materials. For purposes of this calculation, the reaction temperature needed to create cement clinker is 1350° C. Thus, once the heat content of the waste exceeds that which is necessary to increase the temperature of the waste, ash, and combustion air to 1350° C, then any excess heat can be used by the process to make clinker. Anything beyond this point is when legitimate energy recovery occurs.

Based on the above definition and using fundamental thermodynamic principles, CTS developed a set of equations that attempts to model the heat balance in a kiln. The equations take into consideration all of the significant heat requirements and all of the expected heat losses. From this equation, the minimum heat value necessary to balance the system can be calculated. Thus, any waste with a heat content in excess of this balance point contributes that excess energy to the process and constitutes energy recovery. The following assumptions were used in developing the equations:

- Waste fuel is comprised of hydrocarbons, inorganic material and moisture. Toluene was selected as the hydrocarbon based on the heat of combustion and the percent hydrogen. Historically toluene has been one of the higher percentage components of waste derived fuel and it has 8.7% hydrogen, which is comparable to the average FQW hydrogen content of 9.74%. Silica was chosen as the inorganic material based on historical data.
- The calculations use a conservative kiln exit temperature of 400° C; this is higher than normal to account for any minor losses that might occur in the kiln system.
- The heat necessary to raise the temperature of the combustion air to reaction temperature is included. This factor had not been included in previous efforts by the CKRC member companies but is used in the CPCC procedure.
- The kiln system exhibits a heat recovery efficiency of 70%. This includes both the chain system and the heat recovery from the ash in the clinker cooler.

The calculations yield a minimum heat content of 1464 BTU/lb. The calculations balance the heat input against the heat needed to raise all of the materials to the reaction temperature taking into account the efficiency of the kiln system. The resulting heat value is called the low heat value (BTU/lb<sub>LHV</sub>). This value does not account for the heat of vaporization of the water vapor that is lost out the stack.

The commonly used industry procedure to determine a material’s heat value measures its high heat value (BTU/lb<sub>HHV</sub>). This value is derived from a test procedure that includes the energy used to convert the moisture in the material to water vapor. To convert the BTU/lb<sub>LHV</sub> value calculated from the CTS equations, to BTU/lb<sub>HHV</sub>, the moisture content of the waste must be taken into account. To determine the

minimum heat content for this exercise, the conversion assumed some maximum potential water content (i.e., this is a worst-case situation). To convert the calculated low heat value to the commonly used high heat value the formula is used:  $\text{BTU/lb}_{\text{HHV}} = \text{BTU/lb}_{\text{LHV}} + 91.23\text{H}$  where H is the total hydrogen in the system from the hydrocarbons and moisture. This results in a minimum heat content of 2450 BTU/lb<sub>HHV</sub> and is the value of wastes, on an as generated basis, that may be permissibly mixed into FQW.

This determination was developed based on the typical composition of the waste streams that Systech receives. Waste streams generated at refineries (e.g. K048, K049, K050, K051, K052, K169, K170, K171, and K172) have chemical compositions that are significantly different from typical FQW. They typically contain much higher levels of ash. These higher levels of ash significantly reduce the minimum heat content necessary for legitimate heat recovery. Recalculating the minimum heat content is appropriate for these types of waste streams. For these wastes, the calculated minimum low heat value is 767 BTU/lb<sub>LHV</sub>. Converting this value to its comparable high heat value yields an allowable “as generated” minimum of 1203 BTU/lb<sub>HHV</sub>.

By way of comparison, the results calculated using the CTS equations favorably compare to the previous values obtained by other CKRC member companies. The various values are set out below (note that CKRC member companies did not convert BTU/lb<sub>LHV</sub> to BTU/lb<sub>HHV</sub>).

- Minimum heat value necessary for legitimate energy recovery as calculated by CTS = 1464 BTU/lb<sub>LHV</sub>.
- Minimum heat value necessary for legitimate energy recovery as calculated by CKRC = 1033 BTU/lb<sub>LHV</sub> (this is the average of three such calculations).
- The CTS minimum is higher than that calculated by CKRC because CTS incorporated a more conservative kiln exit temperature and the need to heat combustion air to reaction temperature.



## **ATTACHMENT C-4 SHEEN OBSERVATION PROCEDURE**

## SHEEN OBSERVATION PROCEDURE

Purpose – This procedure describes the methods that are to be used when observing for sheen on stormwater collected in containment areas. The test is applicable only to stormwater and is not intended to be used to determine if process waters may be contaminated. Observing for sheen on stormwater is part of a determination as to whether the stormwater may have been contaminated by Fuel Quality Waste (FWW) within the secondary containment areas. A sheen is a very thin layer of non-soluble organics (0.0003 mm or less) floating on the water surface and is the most common form of spill residue seen in the later stages of a spill. Sheens vary in color according to their thickness, ranging from almost transparent for the thinnest layers, to silvers, and rainbows and grays for the thicker layers.

Summary of method – The surface of the water collected in the containment area is observed during mid-morning or mid-afternoon times from various positions to ensure that thin sheens may be viewed if they are present.

Interferences – Mid-day sun will cause glare and there may not be enough light in early morning or late afternoon. Avoid observations with the sun directly overhead or with the sun at very low angles, as there will likely be a poor contrast between the sheen and the water.

Apparatus and Materials – No equipment is required to conduct this observation. Reagents – No reagents are required for this procedure.

Sample Collection, Preservation, and Handling – No samples are taken or preserved since this observation is conducted on the water in situ.

### Procedure –

1. Perform the sheen observation no earlier than 2 hours after sunrise, no later than 2 hours before sunset. On sunny days, do not conduct observations between 11 am and 1 pm. This ensures that the sun is not too low on the horizon or directly overhead when it may be difficult to observe the contrast between the sheen and the water.
2. View the surface of the water in each of the containment areas (or subarea) from four (4) different vantage points surrounding the area. The water should be observed at an angle of between 30 and 60 degrees to best observe a potential sheen.
3. Detection of a “silvery,” “rainbow,” or “metallic” sheen or gloss, increased reflectivity, visual color, iridescence, or floating liquid on the water surface constitutes a demonstration of a release.

Recordkeeping – The result of the observation is recorded on the daily inspection form.

Photo examples of oil colors and appearances, such as silver sheen, rainbow, metallic, transitional, and dark oil slicks on water. *Source: Alun Lewis & SINTEF (Dec. 2002)*

**Metallic (M)**                      **Rainbow (R)**                      **Silver/Gray (S)**

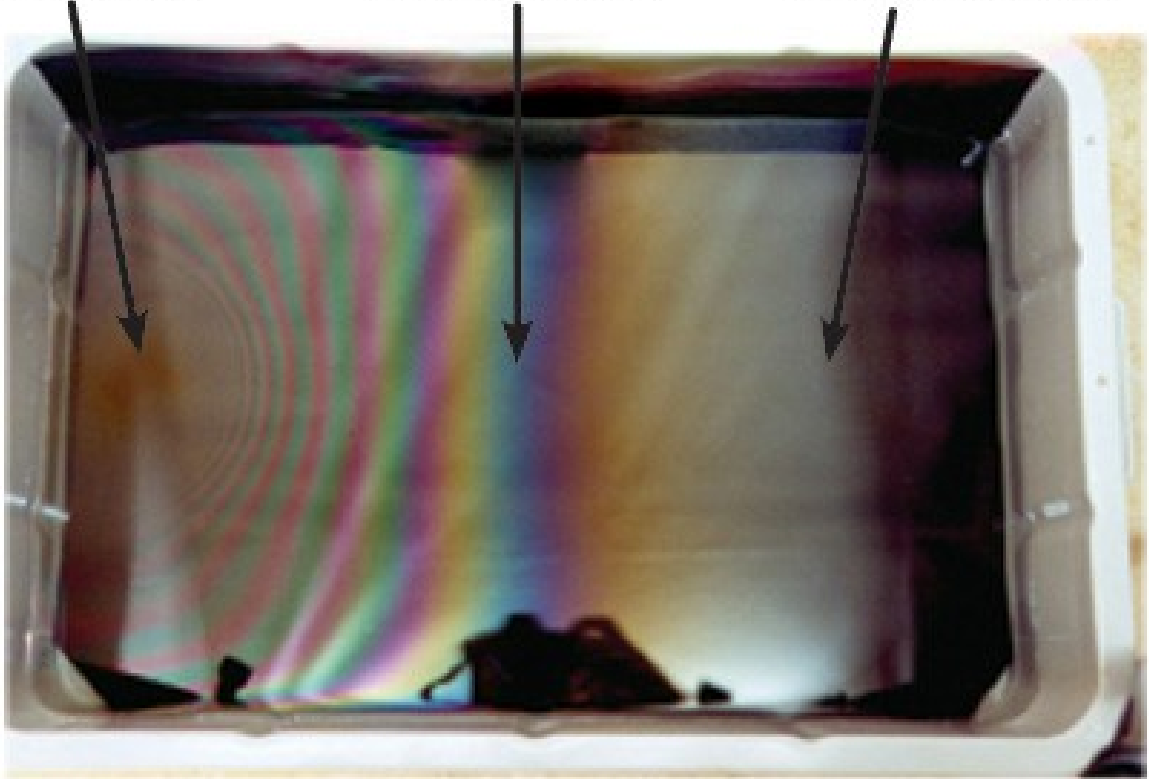


PHOTO 1      EXAMPLES OF OIL COLORS AND APPEARANCES