



PROCESS CONTROL PROGRAM

FOR BENCH-SCALE SOLIDIFICATION USING FLUID TECH'S ABSORBENTS AND SOLIDIFICATION AGENTS

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Process Control Program for
Absorbents and Solidification Agents

1. PURPOSE

This Process Control Program (PCP) is intended for bench-scale solidification of wastes using Fluid Tech's absorbents and solidification agents. This PCP acts only as a guide for developing solidification recipes using Fluid Tech's absorbents and solidification agents and is not intended for use with absorbents and solidification agents manufactured by others.

2. SCOPE OF APPLICATION

This PCP covers the solidification of the following waste forms:

- Aqueous Liquids (Acidic and Basic)
- Oils (Hydrocarbon and Synthetic); Hydraulic Fluids
- Non-Aqueous Liquids
- Sludge's
- Emulsions
- Solids (dusts, ash, etc.)
- Resin Slurries
- Soils
- Solvents
- Combinations of the above

While this procedure is directed primarily toward the treatment of wastes in 55-gallon (200-liter) drums, the same basic techniques are applicable in bulk (batch or continuous) operations.

Wastes to be treated using Fluid Tech's absorbents and solidification agents may be acidic, basic, or neutral. However, the pH of the liquid portion of a waste shall be adjusted to be between 5 and 11 prior to testing and solidifying.

Dissolved solid concentrations may be from 0% to 100% saturation. However, power mixing may be required to ensure a homogeneous mix of waste and absorbent/solidification agent.

Fluid Tech's absorbents and solidification agents are used to treat liquid wastes at any temperature above that at which the raw-waste is completely liquid, and below 60°C (140°F).

Final physical form may be chosen to be from a firm putty-like free-standing solid to a hard concrete-like solid, as required.

3. ABSORBENTS AND SOLIDIFICATION AGENTS

All of the absorbents and solidification agents listed in this procedure result in a final product having a solid matrix that is slightly alkaline, inert, non-corrosive and non-biodegradable.

These absorbents and solidification agents function with very little rise in temperature (unlike cement or lime) and thus do not tend to "cook out" volatile organic components of the waste.

Generally speaking, Fluid Tech's absorbents and solidification agents result in modest volume and weight expansion.

Persons developing a solidification recipe using Fluid Tech's absorbents and solidification agents must check the final disposition site Waste Acceptance Criteria, and the appropriate State licensing authorities, to confirm that the Fluid Tech media to be used are approved for use by the State and disposal site to



which the treated waste will be sent.

3.1 AQUASET (FT-01)

AQUASET is a granular absorbent used to solidify aqueous solutions with low to moderate levels of dissolved solids. AQUASET is used by simply adding it to the waste in a container. Since it is used without mixing, its use in a container which has solid sludge or undissolved solids in the bottom is not recommended.

AQUASET is a versatile absorbent that is effective as a “top-off” absorbent in containers of damp or wet wastes to capture and retain moisture which otherwise, through transportation vibrations/stresses and temperature fluctuations, could become a free liquid (suits, mops, soils, sludges, etc.). The end product is a firm, soft solid.

3.2 AQUASET II (FT-02)

AQUASET II is a versatile powdered solidifier that is used to treat aqueous solutions with extremely high levels of dissolved solids, such as neutralized acids and bases, and organic liquids that are mixed with water and are water soluble or miscible (eg. alcohols, benzenes, glycols, low-molecular weight ketones). AQUASET II is often used in conjunction with PETROSET and PETROSET II.

AQUASET II is particularly useful in treating wastes which contain both heavy metals and water-miscible organics (such as glycols). The end product is a firm, soft solid.

3.3 AQUASET II-H (FT-03)

AQUASET II-H is used for the same range of wastes for which AQUASET II is used. Unlike AQUASET II, AQUASET II-H sets up to form a hard matrix. Load bearing strengths of over 5 tons per square foot or 69 pounds per square inch can be achieved.

AQUASET II-H sets up more slowly than AQUASET II.

3.4 AQUASET II-G (FT-04)

AQUASET II-G is a versatile absorbent that is used to treat aqueous solutions with extremely high levels of dissolved solids, such as neutralized acids and bases, and organic liquids that are mixed with water and are water soluble or miscible (eg. alcohols, benzenes, glycols, low-molecular weight ketones). AQUASET II-G is the absorbent of choice for liquids that are too salty or contain levels of organics too high for regular AQUASET. AQUASET II-G is a granular product that may be added to the liquid solution, mixed into a wet material, or placed under it so that it is available to absorb any liquid released. The end product is a firm, soft solid.

3.5 AQUASET II-GH (FT-05)

AQUASET II-GH is used for the same range of wastes for which AQUASET II-G is used. Unlike AQUASET II-G, AQUASET II-GH sets up to form a hard matrix. Load bearing strengths of over 5 tons per square foot or 69 pounds per square inch can be achieved.

AQUASET II-GH sets up more slowly than AQUASET II-GH.

3.6 PETROSET (FT-06)

PETROSET is used to solidify aqueous solutions with low to moderate levels of dissolved solids.



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PETROSET is used with power mixing to treat sludges and particle suspensions. With the addition of small amounts of water, PETROSET can solidify dry solids. PETROSET is frequently used in combination with other Fluid Tech products such as AQUASET II and PETROSET II. The end product is a firm, soft solid.

3.7 PETROSET-H (FT-07)

PETROSET-H is used for the same range of wastes for which PETROSET is used. Unlike PETROSET, PETROSET-H sets up to form a hard matrix. Load bearing strengths of over 5 tons per square foot or 69 pounds per square inch can be achieved.

PETROSET-H sets up more slowly than PETROSET.

3.8 PETROSET II (FT-08)

PETROSET II is a finely ground, strongly organophilic solidification agent. PETROSET II is used to solidify wastes having some or all of the liquid components that are not water-miscible (such as oils). PETROSET II is used in combination with PETROSET and/or AQUASET II to solidify wastes:

- Having both water-miscible and water immiscible components or
- When the waste to be solidified is a mixture of aqueous and non-aqueous liquids, or emulsions.

Polar activators are used to accelerate the setting of PETROSET II. Commonly used activators are low-molecular weight alcohols such as methanol, propanol, or isopropyl alcohol.

When PETROSET II is used, the temperature of the waste and the PETROSET II shall be 60°F (15°C) or higher at the time of mixing. The waste and the PETROSET II can be mixed at lower temperatures, but the waste will not set up properly until it warms up to approximately 60°F (15°C), at which point the solidification is irreversible.

4. COLLECTION OF WASTE SAMPLES

Fluid Tech recommends that sampling be done sufficiently in advance of scheduled treatment to allow adequate time for bench testing and analytical characterization, if required.

Ensure that the waste has been sufficiently mixed to obtain a representative sample. This is especially important with oil/water mixtures and sludges.

Secure samples of volume sufficient for bench testing (and analysis, if required) of both the raw-waste and the bench-treated waste. Usually 2 liters of a liquid or sludge waste, or 2 kg of a solid, will suffice.

5. WASTE CHARACTERIZATION

Proper characterization of the raw waste is essential to achieving the desired results. While customer characterization requirements may vary, recommended characterization for purposes of this PCP should include the following data:

- Water, % (by volume)
- Solids, % (by weight of total raw waste)
- Oils, % (by volume)
- pH (of aqueous phase)



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- Specific Gravity (of aqueous phase)
- Heavy Metals, ppm or mg/kg
- Flash Point, °F
- Solvents, ppm or mg/kg
- Other Organics, ppm or mg/kg

Measurements of specific gravity and pH can be used as key indicators to monitor change in the composition of a waste stream, and can even be monitored during a processing run.

In addition, a definitive statement of the process from which the waste was generated is needed that is sufficient to identify the waste with respect to previous treatment/solidification efforts. Knowledge of the process(es) generating the waste can serve to eliminate some of the analytical requirements listed above. Reliance upon process knowledge as a substitute for analytical characterization is the responsibility of the Generator.

Fluid Tech recommends that persons responsible for developing solidification recipes consult U.S. EPA 40 CFR 261.24/268.41 to determine if their waste is hazardous.

Persons developing a solidification recipe using Fluid Tech's absorbents and solidification agents must check the final disposition site Waste Acceptance Criteria, and the appropriate State or Federal licensing authorities, to confirm that the Fluid Tech media to be used are approved for use by the State and disposal site to which the treated waste will be sent. Compliance with all Federal, State, and Local regulations regarding treatment, transportation and disposition of waste solidified using Fluid Tech's absorbents and solidification agents is the responsibility of the Generator.

6. SELECTION OF MEDIA AND LOADING RATES

The selection of the appropriate Fluid Tech absorbent/solidification agent or combination of absorbent/solidification and the amount required to successfully absorb/solidify a waste requires:

- Characterization of the waste (see Section 5.0);
- Bench testing of a proposed solidification recipe (and variations thereof), as necessary
- Checks to ensure that the final solidification recipe, developed during bench testing, is in compliance with all relevant regulations and the requirements of the WAC of the receiving facility.

Fluid Tech's Recommended Media and Loading Rate Guide (see Attachment 1.0) is provided as a starting point for determining a solidification recipe. This guide is the perfect reference for finding a product or combination of products to meet your absorbent and solidification agent needs. Fluid Tech's Recommended Media and Loading Rate Guide are provided to shorten the exploratory phase of solidification recipe development for a variety of wastes.

The recommendations presented in Fluid Tech's Recommended Media and Loading Rate Guide are not intended to be restrictive. For any given waste, it is advantageous to explore loading rates significantly lower or higher than those shown in the guide. In any case, each bench-test sample shall be evaluated after cure (and being subject to any other customer-specific testing) to ensure compliance with all relevant regulations and the requirements of the WAC of the receiving facility.



6.1 Water, with Low Levels of Dissolved Solids

Preferred Media: AQUASET, PETROSET, or PETROSET-H.

PETROSET offers better volumetric efficiency (lower expansion factor) than does AQUASET. PETROSET-H shall be used when a hard end result is required. Some organic contaminants in very low concentrations may require the use of a combination of PETROSET and AQUASET II, or PETROSET-H and AQUASET II-H; bench tests are required to determine the appropriate recipe.

6.2 Neutralized Strong Acids (Nitric, Sulfuric, Hydrochloric, etc.) and Bases

Preferred Media: AQUASET II, AQUASET II-G, or a combination of PETROSET and AQUASET II.

If a hard end product is required, AQUASET II-H, AQUASET II-GH or a combination of PETROSET-H and AQUASET II- H shall be used. Loading rates (typically given in pounds per gallon) will vary with ionic concentrations; concentrations over 0.5M will require heavier loading rates. Adjusting the pH of any waste to between 5 and 11 prior to testing and solidifying is required.

6.3 Neutralized Weak Acids (Boric, Phosphoric, etc.) and Bases

Preferred Media: AQUASET II, AQUASET II-G, or a combination of AQUASET II and PETROSET.

If a hard end product is required AQUASET II-H, AQUASET II-GH or a combination of AQUASET II- H and PETROSET-H shall be used. (typically given in pounds per gallon) will vary with ionic concentrations; concentrations over 0.5M will require heavier loading rates. Adjusting the pH of any waste to between 5 and 11 prior to testing and solidifying, is required.

6.4 Miscible Organics

Preferred absorbent and/or solidification agent: AQUASET II, AQUASET II-G or a combination of AQUASET II/AQUASET II-G and PETROSET.

If a hard end product is required, AQUASET II-H or AQUASET II-GH shall be used.

6.5 Oils - Hydrocarbon

Preferred solidification agent: PETROSET II.

If a hard end product is required, water (between 30% and 50% of the oil volume) shall be added, with approximately 6.0 lbs. per gal. of water of PETROSET-H added in addition to the amount of PETROSET II required for solidification of the oil.

6.6 Oils - Synthetic

Preferred solidification agent: PETROSET II or combination PETROSET II and PETROSET.

Synthetic oils are treated similarly to hydrocarbon oils. However, synthetic oils tend to require heavier solidification agent loading rates.

6.7 Silicone Emulsions

Preferred solidification agent: AQUASET II.

Silicone fluids typically require emulsification prior to solidification. There are some silicone fluids that



cannot be solidified.

6.8 Solvents

Preferred solidification agent: PETROSET II or combination PETROSET II and PETROSET.

6.9 Other Non-Aqueous Liquids

Preferred solidification agent: PETROSET II.

6.10 Combinations of Aqueous and Non-Aqueous Liquids

Using the waste characterization data, a suitable solidifier for the aqueous phase shall be selected. PETROSET II shall be used to treat the non-aqueous phase. The proportion of PETROSET II in the total media-loading rate should be similar to the proportion of oil in the waste.

Example:

A waste is 30% water, 70% oil. The aqueous solidifier selected is PETROSET and the aqueous load rate selected is 4 lbs/gal of water. The non-aqueous solidifier is PETROSET II and the non-aqueous loading rate selected is 3 lbs/gal of oil.

The amount of PETROSET used is 30% of 4 lbs/gal or 1.2 lbs/gal of total waste. The amount of PETROSET II used is 70% of 3 lbs/gal, or 2.1 lbs. /gal. of total waste.

If needed, the activator volume is 5% of the net oil volume; in this case, 3.5% of the total volume.

When using PETROSET II in combination with PETROSET, AQUASET II, PETROSET-H or AQUASET II-H, add the materials (while mixing) in the following sequence:

- (1) Waste
- (2) PETROSET II
- (3) PETROSET, AQUASET II, PETROSET-H, or AQUASET II-H
- (4) Activator (if required)

6.11 Sludges and Slurries - Aqueous

The primary function of absorbent or solidification to be used with a sludge or slurry is to solidify the liquid component. Consequently, an absorbent or solidification agent should be selected that is appropriate for the composition of the liquid phase of a waste. An estimate of the liquid phase net volume shall be made and loading rates from Fluid Tech's Recommended Media and Loading Rate Guide used for preliminary bench testing.

6.12 Sludges and Slurries - Non-Aqueous

It is usually difficult to estimate the true liquid to solid ratio in oil sludge wastes. Therefore, the PETROSET II loading rate must be empirically established by trial. The suggested starting point is to use a loading rate of 1 lbs/gal of PETROSET II per gallon of oil sludge.

6.13 Sludges and Slurries, Combination Aqueous and Non-Aqueous

Combination sludge's shall be solidified by using PETROSET II to solidify the oil(s) and PETROSET, AQUASET II or AQUASET II-G to solidify the aqueous phase.



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6.14 Soils

Soils with appreciable concentrations of water-miscible organics should be treated with AQUASET II, AQUASET II-G or AQUASET II-H. Soils without organics should be treated with PETROSET or PETROSET-H. Soils with hydrocarbon contaminants will require, in addition to the above media, small amounts of PETROSET II (to solidify the oils). The PETROSET II loading rate should be proportionate to the % of oil in the soil, and based on a "net oil" rate of 25% by weight. Thus a soil carrying 7% oil (by weight) would require approximately 1.75% PETROSET II ($0.07 \times 25\%$) by weight of total soil.

Where mixing is required, water shall be added to facilitate the reactions of the PETROSET, AQUASET II and AQUASET II-G. Typically, a total waste moisture of 40% will be satisfactory.

6.15 Solids - Dusts, Granules, Cake, etc.

Solids require the addition of water to facilitate the reactions of Fluid Tech's absorbents and solidification agents. If there are no water-soluble solids in the raw waste, PETROSET or PETROSET-H are the preferred media. If there are water-soluble solids present, AQUASET II, AQUASET II-H or AQUASET II-G are preferred.

In any case, water must be added to bring total moisture to a level which allows mixing with good dispersion. Typically, a total waste moisture of 40% will be satisfactory.

6.16 Evaporator Concentrates - BWR and PWR

Preferred Media: AQUASET II, AQUASET II-H or AQUASET II-G

6.17 Resin Slurries, Filter Pre-Coat Slurries

These slurries can be solidified by AQUASET or AQUASET II-G in a 55 gallon open-top drum, without mixing by feeding the slurry and the media into the drum simultaneously, at rates determined by observation during the pour.

AQUASET II or AQUASET II-H can also be used, with continuous mixing.

6.18 Ethylene Glycol Solutions

Preferred Media: AQUASET II, AQUASET II-H or AQUASET II-G.

7. BENCH TESTING

Sample testing shall be performed with the waste and the absorbents/solidification agents at a temperature as close as possible to the temperature at which full-scale solidification will take place.

When first addressing a new waste stream the operator can save time by mixing three test samples at differing loading rates.

7.1 Equipment Required

- Calibrated container to mix in
- Scale or balance for solids
- Measuring device for liquids
- Spatula/spoon, stainless, for stirring
- Electric drill with stirring attachment (optional)



7.2 Bench-Scale Testing Procedure

Fluid Tech recommends that the person responsible for developing the solidification recipe uses Fluid Tech's Recommended Media and Loading Rate Guide to make a preliminary selection of absorbents/solidification agents and loading rates. In addition, preliminary exploratory tests should be conducted to narrow the range for possible loading rates, and to confirm the choice of absorbent/solidification agent.

7.2.1 AQUASET Procedure

- (a) See Fluid Tech's Recommended Media and Loading Rate Guide for AQUASET applications and loading rates.
- (b) Place 200 ml of a well-mixed, representative waste sample in a calibrated container.
- (c) If the pH is less than 5 or more than 11, neutralize the sample. In addition to the final pH, record the amount and type of neutralizer(s) used.
- (d) Place the calibrated container on the scale, and either record the gross weight indicated or tare the scale.
- (e) Add AQUASET by scattering it uniformly across the top surface of the sample, to a depth of approximately one-quarter (50 ml) of the waste volume.
- (f) Wait 4 to 6 minutes, and repeat (e), to a depth of approximately one-half (100 ml) of the waste volume.
- (g) Repeat (f), to a depth of approximately three-quarters of the waste volume (150 ml).
- (h) Repeat (f), adding enough AQUASET to produce a dry top on the waste.
- (i) Determine and record the amount of AQUASET used by subtracting the original gross weight of the waste and beaker from the final weight, or by means of the tare/net weight shown on the scale.
- (j) Divide the weight (in grams) of AQUASET used by 24; the result is the loading rate in pounds of AQUASET to be used per gallon of original waste (assuming a 200 ml test sample).
- (k) Determine and record the final volume.
$$\text{Efficiency} = \text{Original Volume (200ml)} / \text{Final Volume (ml)}$$
$$\text{Expansion Factor} = \text{Final Volume (ml)} / \text{Original Volume (200ml)}$$
- (l) After the solidified sample has been allowed to cure (48 hours for AQUASET), evaluate it to ensure compliance with all relevant regulations and the requirements of the WAC of the receiving facility.

NOTE: If 200 ml of liquid waste cannot be solidified into a putty-like state with less than 144 gm of AQUASET (equivalent to a loading rate of 6 lbs/gal), the waste shall not be treated with AQUASET. It will require AQUASET II, or a combination of AQUASET II and PETROSET, with power mixing.

7.2.2 AQUASET II and/or PETROSET Procedure

- (a) See Fluid Tech's Recommended Media and Loading Rate Guide for AQUASET II and/or PETROSET applications.
- (b) Place 200 ml of a well-mixed, representative waste sample in a calibrated container.

- (c) If the pH is less than 5 or more than 11, neutralize the sample. In addition to the final pH, record the amount and type of neutralizer(s) used.
- (d) While stirring vigorously, add the AQUASET II and/or PETROSET. Break up clumps or clots, so that uniform dispersion of the media is achieved. Stir at least one minute after the mixture has become smooth, or until stirring is no longer possible. If the mixture becomes too stiff for further mixing before complete dispersion of the media is achieved, reduce the loading rate and start another sample mix.
- (e) Divide the amount of AQUASET II and/or PETROSET added (in gm) by 24; this will be the loading rate (lbs/gal) of AQUASET II and/or PETROSET.
- (f) Determine and record the final volume.
$$\text{Efficiency} = \text{Original Volume (200ml)} / \text{Final Volume (ml)}$$
$$\text{Expansion Factor} = \text{Final Volume (ml)} / \text{Original Volume (200ml)}$$
- (g) After the solidified sample has been allowed to cure (48 hours for both AQUASET II and/or PETROSET), evaluate it to ensure compliance with all relevant regulations and the requirements of the WAC of the receiving facility.

7.2.3 PETROSET II Procedure

NOTE: *The temperature of the waste and the PETROSET II shall be 60°F (15°C) or higher at the time of mixing.*

- (a) See Fluid Tech's Recommended Media and Loading Rate Guide for PETROSET II applications.
- (b) Place 200 ml of a well-mixed, representative waste sample in a calibrated container.
- (c) If the pH is less than 5 or more than 11, neutralize the sample. In addition to the final pH, record the amount and type of neutralizer(s) used.
- (d) While stirring vigorously, add the PETROSET II. Break up clumps or clots, so that uniform dispersion of the media is achieved. Stir at least one minute after the mixture has become smooth, or until stirring is no longer possible. If the mixture becomes too stiff for further mixing before complete dispersion of the media is achieved, reduce the loading rate and start another sample mix.
- (e) If the sample does not appear to be solidifying after adding the recommended amount of PETROSET II, add 10 ml of activator (any light alcohol such as methanol). Continue stirring until no more activator can be seen. If the mixture does not solidify after further mixing, increase the loading rate and start another sample mix.
- (e) Divide the amount of PETROSET II added (in gm) by 24; this will be the loading rate (lbs/gal) of PETROSET II.
- (f) Determine and record the final volume.
$$\text{Efficiency} = \text{Original Volume (200ml)} / \text{Final Volume (ml)}$$
$$\text{Expansion Factor} = \text{Final Volume (ml)} / \text{Original Volume (200ml)}$$
- (g) After the solidified sample has been allowed to cure (48 hours for PETROSET II), evaluate it to ensure compliance with all relevant regulations and the requirements of the WAC of the receiving facility.



7.2.4 AQUASET II-G Procedure

- (a) See Fluid Tech's Recommended Media and Loading Rate Guide for AQUASET II-G applications.
- (b) Place 200 ml of a well-mixed, representative waste sample in a calibrated container.
- (c) If the pH is less than 5 or more than 11, neutralize the sample. In addition to the final pH, record the amount and type of neutralizer(s) used.
- (d) Place the calibrated container on the scale, and either record the gross weight indicated or tare the scale.
- (e) Add AQUASET II-G by scattering it uniformly across the top surface of the sample. Continue adding enough AQUASET II-G to produce a dry top on the sample.
- (f) Determine and record the amount of AQUASET II-G used by subtracting the original gross weight of the waste and beaker from the final weight, or by means of the tare/net weight shown on the scale.
- (j) Divide the weight (in grams) of AQUASET II-G used by 24; the result is the loading rate in pounds of AQUASET II-G to be used per gallon of original waste (assuming a 200 ml test sample).
- (k) Determine and record the final volume.
$$\text{Efficiency} = \text{Original Volume (200ml)} / \text{Final Volume (ml)}$$
$$\text{Expansion Factor} = \text{Final Volume (ml)} / \text{Original Volume (200ml)}$$
- (l) After the solidified sample has been allowed to cure (7 days for AQUASET II-G), evaluate it to ensure compliance with all relevant regulations and the requirements of the WAC of the receiving facility.

NOTE: If 200 ml of liquid waste cannot be solidified into a putty-like state with less than 288 gm of AQUASET II-G (equivalent to a loading rate of 12 lbs/gal), the waste shall not be treated with AQUASET II-G. It will require AQUASET, or a combination of AQUASET II and PETROSET, with power mixing.

7.2.5 AQUASET II-H and/or PETROSET-H Procedure

- (a) See Fluid Tech's Recommended Media and Loading Rate Guide for AQUASET II-H and/or PETROSET-H applications. AQUASET II-H and PETROSET-H differ from their respective namesakes in that these -H solidification agents do not set up quickly. In mixing a test sample using AQUASET II and PETROSET, the mix typically will set up to a consistency which makes continued mixing impractical within about one minute. AQUASET II-H and PETROSET-H will result in a solidified sample that will remain semi-liquid for several minutes. The mix will become quite hard in 24 hours. Most of its ultimate compressive strength will be achieved in 7 days.
- (b) The test mixing procedure for AQUASET II-G and PETROSET-H is the same as that for AQUASET II and PETROSET (Section 7.2.2).

7.2.6 AQUASET II-GH Procedure

- (a) See Fluid Tech's Recommended Media and Loading Rate Guide for AQUASET II-H. AQUASET II-GH differs from its respective namesake in that these -H solidification

agents do not set up quickly. In solidifying a test sample using AQUASET II-G, the mix typically will solidify within minutes. Samples solidified with AQUASET II-GH will become quite hard in 24 hours. Most of its ultimate compressive strength will be achieved in 7 days.

- (b) The test mixing procedure for AQUASET II-GH is the same as that for AQUASET II-G (Section 7.2.4).

7.2.7 Combinations of PETROSET II with AQUASET II and/or PETROSET Procedure

NOTE: *The temperature of the waste and the PETROSET II shall be 60°F (15°C) or higher at the time of mixing.*

- (a) See Fluid Tech's Recommended Media and Loading Rate Guide for applications using combinations of PETROSET II with AQUASET II and/or PETROSET. Calculate loading rates for each solidification agent to be used based on the waste characteristics (see Section 6.10).
- (b) Place 200 ml of a well-mixed, representative waste sample in a calibrated container.
- (c) If the pH is less than 5 or more than 11, neutralize the sample. In addition to the final pH, record the amount and type of neutralizer(s) used.
- (d) While stirring vigorously, add the PETROSET II. Break up clumps or clots, so that uniform dispersion of the media is achieved. Stir at least one minute after the mixture has become smooth. In most cases, it will be observed that the oil phase is being captured by the PETROSET II and is being segregated from the water phase.
- (e) While stirring vigorously, add the calculated amount of other solidification agents (AQUASET II and/or PETROSET) and continue mixing until homogenous.
- (e) Add the calculated amount of activator (5% by volume of the amount of oil in the waste sample). Continue stirring until no more activator can be seen. If the mixture does not solidify after further mixing, increase the loading rate of each solidification agent and start another sample mix.
- (e) Divide the amount of each solidification agent added (in gm) by 24; this will be the loading rate (lbs/gal) of each solidification agent.
- (f) Determine and record the final volume.

$$\text{Efficiency} = \text{Original Volume (200ml)} / \text{Final Volume (ml)}$$

$$\text{Expansion Factor} = \text{Final Volume (ml)} / \text{Original Volume (200ml)}$$

- (g) After the solidified sample has been allowed to cure (48 hours for PETROSET II, AQUASET II and PETROSET), evaluate it to ensure compliance with all relevant regulations and the requirements of the WAC of the receiving facility.

8. FULL-SCALE TREATMENT

Ordinarily, the absorbent/solidification agent selection and loading rates developed in bench-scale tests will "scale-up" to full-scale treatment successfully. It may happen that, due to stratification of the raw waste, a sample tested was not representative of the whole. In all cases, it is imperative to remain alert to observed changes in the raw waste stream, as well as to characteristics of the finished (solidified) product. It is necessary to be prepared to deviate carefully from the bench-scale solidification recipe, or even to halt



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full-scale processing, until the reason for the change is identified.

8.2 Power Mixing Equipment

Power mixing equipment for treating liquids, sludges, soils or solids in drums should have a minimum shaft horsepower of 5 HP. Impeller blades should be of such diameter that blade tips clear drum sidewalls by not more than 3 inches (8 cm). The impeller and shaft should be so mounted that they can be raised and lowered (under power).

Fluid Tech offers an In-Drum Mixing System for short- or long-term lease, or purchase.

8.2 Consultation

In addition to bench-scale testing support, Fluid Tech is available to provide support for full-scale treatment operations including procedure preparation, waste acceptance evaluation, and other subject matter expertise related to the management and solidification of wastes.

Contact: Greg Broda
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