



**Utility Committee
Meeting Agenda
February 18, 2025
11:30 AM
Bentonville City Hall**

Call to Order

Pledge of Allegiance

Attendance

Approval of Minutes: February 4, 2025

I. New Business

1. **Water and Wastewater Rate Analysis and Financial Plan** **Informational**

The third workshop with Raftelis and the City to discuss water rates and potential ordinance for rate increase due to the current situation and the needed water revenue.
2. **Resolution Accepting Offer of Financial Assistance from Arkansas Natural Resources Commission** **Resolution**

Staff is requesting approval of a resolution authorizing the Mayor to accept an offer of financial assistance from Arkansas Natural Resources Commission (ANRC) in the amount of \$55,000,000.00 for improvements at the City's Water Resource Recovery Facility. This funding is in addition to the original \$97,759,381.00 loan request from ANRC. No budget adjustment is needed.
3. **Resolution for Signatory Authority Associated with Arkansas Natural Resources Commission Funding** **Resolution**

Staff is requesting approval of a resolution authorizing the Mayor and City Clerk to execute certain documents in connection with funding administered by the Arkansas Natural Resources Commission concerning water and wastewater projects. No budget adjustment is needed.
4. **Resolution Authorizing an Amendment to IFB-24-68 - SE 14th St CIPP Sewer Lining Project** **Resolution**

Staff requests a Resolution authorizing the Mayor and City Clerk to amend the Professional Services Agreement with Gulf Coast Underground, LLC to increase the contract amount by \$52,395.00. This amendment is necessary to address significant groundwater infiltration issues in multiple areas before the CIPP liner

can be installed. Since the total project cost remains under budget, no budget adjustment is required. No budget adjustment is needed.

II. Adjournment



City of Bentonville, Arkansas Agenda Item Form

Item Details

Council Meeting Date:		Submitted By:	
Phone:		For Department(s):	
Email:			

Item Type (Check all that apply)

Informational	Bid Award	Enter into an Agreement	Change Order
Recognizing Funds	Budget Adjustment	Waiver of Bid	Emergency Clause
Ordinance	Resolution		Informational

Title, Recommendation & Justification

Title:	
Action Recommendation & Justification:	
Additional Comments for Consideration (Optional):	

Amount for Approval:	\$
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Budget Impact

Is this Item Budgeted? YES NO ITEM HAS NO COST OTHER: _____

Budget Adjustment (to be completed by Finance when applicable)

Account Number (ORG-OBJECT)	Account Description	\$	\$
		Expense	Revenue
Account Number (ORG-OBJECT)	Account Description	\$	\$
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Account Number (ORG-OBJECT)	Account Description	\$	\$
		Expense	Revenue
Account Number (ORG-OBJECT)	Account Description	\$	\$
		Expense	Revenue

Fund(s) Impacted

(check all that apply)

General Fund Utility Fund Street Fund Other(s): _____

Budget Impact Notes for Consideration (Optional):

City of Bentonville, Arkansas

City Hall

305 SW A Street Bentonville, AR 72712



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Title, Recommendation & Justification

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Fund(s) Impacted

(check all that apply)

General Fund

Utility Fund

Street Fund

Other(s): _____

Budget Impact Notes for Consideration (Optional):

MEMORANDUM

To: Mr. Mike Bender, P.E., Water Utilities Director
Mr. Patrick Johndrow, Finance Director

From: Brett D. Peters, P.E.

Re: Project Cost Increase Explanation

Project: Bentonville Water Resource Recovery Facility (WRRF) Improvements
Bentonville, Arkansas

HWEI Project No: 2021037

Date: February 6, 2025

The purpose of this Memorandum is to offer an explanation between our (HW) Engineer's Cost Estimate and the Construction Manager-At-Risk's (CMAR's – Crossland Heavy Contractors) Guaranteed Maximum Price (GMP – Phases 1 and 2) for the referenced project. The Engineer's Cost Estimate as defined in the Preliminary Engineering Report (PER), dated October 2022, is \$97,759,381.00 and served as the basis for the City of Bentonville's original Clean Water State Revolving Fund (CWSRF) loan application to the Arkansas Natural Resources Commission (ANRC) – A Division of the Arkansas Department of Agriculture. Of this amount, \$84,742,000.00 was designated for construction, including contingency, with the balance appropriated for engineering, legal, and capitalized interest during construction. The CMAR's GMP, dated May 2024, for both phases of the project totals \$130,056,396.00, including approximately 9.3% in contingency. Factoring in engineering, legal, and capitalized interest during construction expenses, the total project cost is \$152,759,381.00, therefore requiring a supplemental CWSRF loan application to ANRC for an additional \$55,000,000.00.

We have defined the following contributing factors that have caused the total project cost to increase by \$55,000,000.00 (\$55M) from \$97,759,381.00 (\$98M) to \$152,759,381.00 (\$153M).

- **Accelerated Design Schedule.** HW was authorized by the City to proceed with engineering design phase services in September 2023, and completed 60% Plans by April 2024 to facilitate the CMAR's preparation of their GMP prior to ANRC's June 30, 2024, deadline. Otherwise, the City would have had to turnback low interest rate ($i = 1.75\%$) loan funding that would negate a savings to the City of \$26.2M over the 20-year term of the loan. This 7-month engineering design phase concentrated on the development of process mechanical and site civil plans with limited development of the structural and electrical aspects of the design due to these time constraints. As a result, the CMAR assumed additional risk in providing a GMP prior to development of Final Plans, and this risk likely resulted in an increased GMP. Typically, the engineering design phase for a project of this magnitude would minimally extend over an 18-month period.

- *Contract Time.* The PER assumed a 36-month construction Contract Time. However, the CMAR estimates a minimum construction Contract Time of 51-months that could increase to 60-months depending upon the time lapse between being authorized to proceed with the Phase 2 construction scope of services. This lengthening of the construction Contract Time is the result of the sequence of construction required to maintain operation of the Bentonville WRRF while various improvements are being constructed. This sequence of construction could not be developed until the latter few months of the engineering design phase following the selection of the CMAR. Site constraints exacerbated these sequence of construction issues, and also require construction of a temporary access road and improvements to the existing Compost Facility road which were not in the project scope as defined in the PER. This increase in Contract Time significantly increases the CMAR's project overhead requirements (staffing, equipment rentals, temporary facilities, etc.)
- *Geotechnical Considerations.* A geotechnical investigation of the Bentonville WRRF site was not performed until the engineering design phase. The geotechnical investigation revealed a hard limestone layer of rock approximately 15 to 20-feet below the majority of the plant site except for its northern limits. Unfortunately, it also revealed poor soil conditions above this hard limestone throughout the plant site. As a result, a significant amount of over-excavation and removal of in-situ soils is required along with a replacement with select backfill below all proposed structures. This over-excavation and removal and replacement of poor in-situ soils increased the total project cost. These poor soil conditions and underlying limestone layer also complicates the temporary shoring requirements increasing their cost by approximately \$4M more than originally estimated in the PER. On the north end of the plant site, deep foundations (drilled shaft piers and micro-piles) were determined to be required to support all proposed structures because the depth to limestone increases significantly. These deep foundations also resulted in an increase to the total project cost.
- *Construction Market.* The wastewater infrastructure construction market is saturated and has been since the COVID-19 pandemic and increased government spending in the form of economic recovery grants and low interest loans. This saturation is particularly apparent in Northwest Arkansas as every major utility in the region has significant water and/or wastewater projects ongoing resulting in a reduction in Contractor competition and an increase in wet infrastructure project costs. This saturation has also resulted in inflationary pressures on the specified equipment and materials necessary to construct the project. For example, higher unit concrete costs and quantities than anticipated in the PER accounts for approximately \$10M of the total project cost increase.
- *Cost Estimate Validation.* During the study and report phase, the HW Team developed a similar cost estimate for a new process train at the North Arkansas Conservation Authority (NACA) Wastewater Treatment Plant (WWTP) prior to the most recent NACA WWTP Project bidding. This cost estimate was part of an evaluation to alternatively divert wastewater flow from Bentonville's north collection system to the NACA WWTP for treatment. The cost estimate we prepared through that effort and the NACA WWTP bids were comparable. In retrospect, this provided a false sense of confidence in our cost estimating methodology used to estimate the Bentonville WRRF Improvements Project.

Mr. Mike Bender, P.E., Water Utilities Director
Mr. Patrick Johndrow, Finance Director
Page 3 of 3
February 6, 2025

- *Value Engineering:* Following receipt of the CMAR's GMP, we collaborated with the City and the CMAR to consider several value engineering (VE) items that would eliminate project scope in an effort to reduce project costs. These VE efforts resulted in the final adjusted total project cost of \$153M.

Taking all these contributing factors into consideration and acknowledging the increased project cost (\$153M) and its impact to the City's rate payers, the alternative to increase the capacity of the Bentonville WRRF from 4.0 to 8.0-million gallons per day (MGD) remains the most economically viable to meet the City's wastewater treatment needs. We also need to point out the urgent need for increased wastewater treatment capacity in the north collection system and therefore the Bentonville WRRF. Based on current population trends, the average daily wastewater flows generated in the north collection system will exceed the existing Bentonville WRRF's treatment capacity by 2028. Therefore, we maintain our recommendation that the City needs to proceed with the proposed improvements to the Bentonville WRRF at a total project cost of \$153M.

END OF MEMORANDUM

BDP/gch

cc: Mr. Preston Newbill, Water Utilities Deputy Director
Mr. Chris Earl, Wastewater Manager



Sarah Huckabee Sanders
Governor

ARKANSAS DEPARTMENT OF AGRICULTURE

1 Natural Resources Drive, Little Rock, AR 72205
agriculture.arkansas.gov
(501) 225-1598



Wes Ward
Secretary of Agriculture

Acceptance of Loan Terms with Arkansas Natural Resources Division
Water Resource Recovery Facility Improvements
Project Number: 23-062
Loan Number: 02668-CW-L

By signing and returning this form the City of Bentonville, is accepting the offer of financial assistance in the form of a loan in the amount of up to \$55,000,000.00, approved by the Arkansas Natural Resources Commission on January 15, 2025, and acknowledges the following:

1. To close on this financial assistance the borrower will raise revenue as needed to fully fund debt service, O & M, and depreciation reserve at 110% coverage. Should it be determined, at any point, during the term of this loan that the rates are insufficient in covering the required debt service, operation and maintenances costs, and the required maintenance of the depreciation reserve fund, the City will be required to increase the sewer rates.
2. The Director will set the combined annual borrower rate and loan terms at the time of loan closing. The anticipated term for the funding is 20 years with a combined rate of 4% per annum. The loan terms are contingent on full loan closing including first disbursement of funds on or before January 1, 2026. In the event this does not occur, the combined rate will be determined based on current available program lending rates. Determining if a loan has met all program requirements and is ready to close will be the sole discretion of the Director.
3. Prior to loan closing and acceptance of funds the Borrower may reject the financial assistance, and the funds will be de-obligated.
4. The borrower understands that upon completion of the project any awarded financial assistance that is not utilized to complete the project approved in the application will be de-obligated and that any grant or principal forgiveness funds will be disbursed in a proportionate percentage to the approved loans.
5. The borrower understands that to receive this financial assistance they must comply with all State and Federal laws and program requirements.
6. The borrower must provide documentation that it is organized as a sub-division of The State of Arkansas and may issue tax (State of Arkansas and Federal Income Tax) exempt bonds. This documentation must be presented prior to loan closing and subject to ANRC's bond council review and approval. If the entity is organized as a not-for-profit entity, or a private entity it must convert to a Public Water Authority as described in Arkansas Code 4-35-101.

Acceptance of Loan Terms with Arkansas Natural Resources Division
Water Resource Recovery Facility Improvements
Project Number: 23-062
Loan Number: 02668-CW-L

7. *The borrower certifies compliance with Act 605 of 2021, Oversight of Retail Water Providers, as amended in Act 545 of 2023. If the borrower is unable to provide or has not satisfied the requirements as described in the acts mentioned previously, the borrower is not eligible to receive funding from the Arkansas Natural Resources Division of the Department of Agriculture. The funds will be de-obligated and the entity will need to reapply once they are in compliance with the laws of The State of Arkansas.*

Name of Borrower	Name and Title of Duly Authorized Representative	
Signature		Date

This acceptance must be received by February 28, 2025. Please return it to:
Bob Hunt, Finance Program Coordinator
Arkansas Natural Resources Division
10421 West Markham Street
Little Rock, Arkansas 72205-2190
bob.h.hunt@agriculture.arkansas.gov



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Title, Recommendation & Justification

Title:	
Action Recommendation & Justification:	
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Budget Impact Notes for Consideration (Optional):



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City of Bentonville, Arkansas

City Hall

305 SW A Street Bentonville, AR 72712



CITY OF BENTONVILLE, ARKANSAS

Purchasing and Compliance Department – 1000 SW 14th Street, Bentonville Arkansas 72712

City Hall – 305 SW A Street Bentonville, Arkansas 72712

CHANGE ORDER NO. 1 TO INVITATION FOR BID CONTRACT

This amendment (the “Amendment”), dated February 7, 2025 is made by the City of Bentonville, Arkansas (“City”) and Gulf Coast Underground, LLC (“Contractor”), parties to the Invitation for Bid (IFB)-24-68 with Bentonville Wastewater Department, for SE 14th Street Cured-in-Place Pipe (CIPP) Sewer Lining Project, dated December 3, 2024 (the “Agreement”).

1. In accordance with Section 4 (Work Procedures), no change orders or amendments shall be approved unless approved in writing by the City.
 - a. Change Order Proposal dated February 6, 2025, has been submitted by the Contractor requesting additional work involving Chemical Grout Injection to address active leaks identified in the CCTV inspection.
 - b. Contractor has proposed a fixed price of **\$52,395.00** to complete the additional work, which includes labor, materials, and equipment necessary to stop all leaks in the identified sewer line segments.
 - c. City agrees that this additional work is necessary to ensure the integrity and successful completion of the CIPP process.
2. The Agreement is amended as follows:
3. The Parties have mutually agreed to the additions to the Scope of Work, as follows:
 - a. The scope of work under the Agreement shall be revised to include the injection of acrylamide chemical grout into active leaks at the following sewer line segments, as detailed in the Change Order Proposal:
 - i. 405-1901 - 406-5309 (Repairs at 23', 31', 43', 49', 131', 206')
 - ii. 406-5309 - 406-5310 (Repair at 363')
 - iii. 406-5345 - 406-5344 (Repairs at 40', 121', 141', 161', 262', 329')
 - iv. 406-5310 - 406-1896 (Repairs at 59', 137', 160', 193', 211', 320')
 - v. 406-5348 - 406-5347 (Repair at 90')
 - b. The total contract price shall be increased by **\$52,395.00**, bringing the total contract amount to **\$350,829.00**. Payment shall be made in accordance with the terms outlined in the Agreement.
 - c. The Contractor shall complete the additional work within **sixty (60)** days from the date of execution of this Amendment. Any impact on the project schedule shall be addressed through a mutually agreed upon timeline extension, if necessary.



CITY OF BENTONVILLE, ARKANSAS

Purchasing and Compliance Department – 1000 SW 14th Street, Bentonville Arkansas 72712

City Hall – 305 SW A Street Bentonville, Arkansas 72712

4. This amendment shall be effective immediately when fully executed.
5. Except as set forth in this amendment, the Agreement is unaffected and shall continue in full force and effect in accordance with its terms. If there is conflict between this amendment and the Agreement, or any earlier amendment, the terms of this amendment shall prevail.

THE CITY OF BENTONVILLE, ARKANSAS

BY: _____
Stephanie Orman, Mayor

DATE: _____

Company Name: _____

BY: _____

Name(printed): _____

DATE: _____



Regional Operations North
1901 Napa Valley Dr, Suite 100
Little Rock, AR. 72212
Office: 501-765-0184

Headquarters
5655 Middle Road
Theodore, AL. 36582
Office: 251-725-0200

Regional Operations East
2720 NW 6th St., Suite 302C
Gainesville, FL. 32609
Office 352-363-7652

February 6, 2025

Mr. Landon McGarrah
Wastewater Collections Supervisor
3200 SW Municipal Dr, Bentonville, AR 72712
479-271-3140
lmcgarrah@bentonvillear.com

Re.: Change Order Request – IFB-24-68 SE 14TH STREET CURED-IN-PLACE PIPE SEWER LINING PROJECT

Dear Mr. McGarrah,

Please review and accept this change order request to proceed with Chemical Grout Injection. The scope of work includes the injection of an acrylamide chemical grout into the active leaks found in the defective pipes.

The justification is this work is required prior to CIPP because the leaks identified in the CCTV inspection effort were found to be too severe for CIPP and the risk of failure far outweighs the cost of preventative leak stopping.

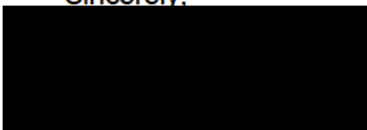
The cost of this change order proposal is **\$52,395.00**. This fixed price proposal includes all necessary labor, materials, and equipment to stop all leaks in the five segments identified below. GCU will stop all additional leaks found in these segments at no additional cost to the owner.

The specific work includes the following:

405-1901 - 406-5309	Repair gusher at 23', 31', 43', 49', 131', 206' prior to CIPP.
406-5309 - 406-5310	Repair gusher at 363' prior to CIPP.
406-5345 - 406--5344	Repair gusher at 40', 121', 141', 161', 262', 329' prior to CIPP.
406-5310 - 406-1896	Repair gusher at 59', 137', 160', 193', 211', 320', prior to CIPP.
406-5348 - 406-5347	Repair gusher at 90' prior to CIPP.

Attached are the images for the leaks and the technical submittal package for chemical grout injections. We appreciate the opportunity to work with you on this project.

Sincerely,



Paul Kleinschrodt, PE, PMP
Project Manager

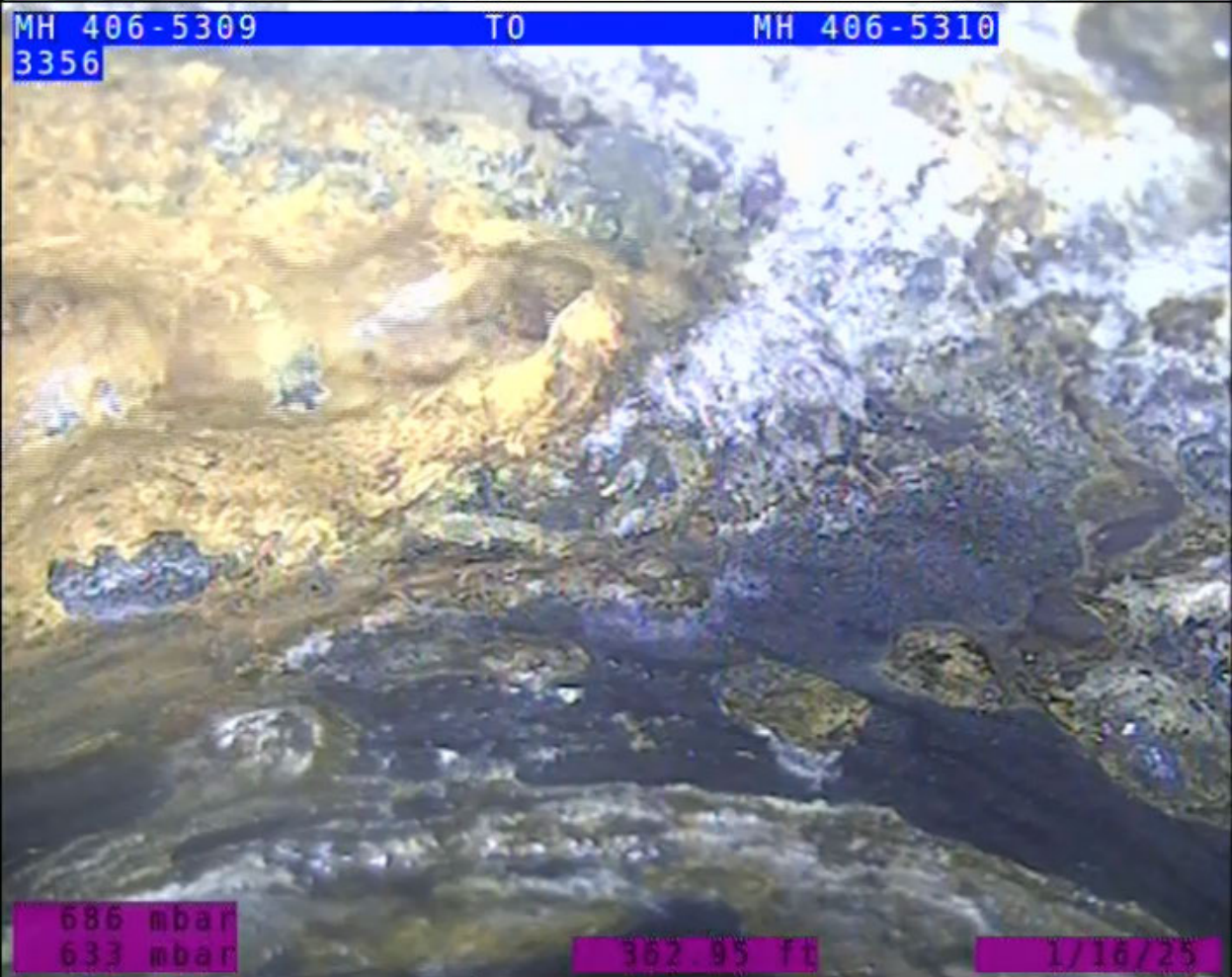
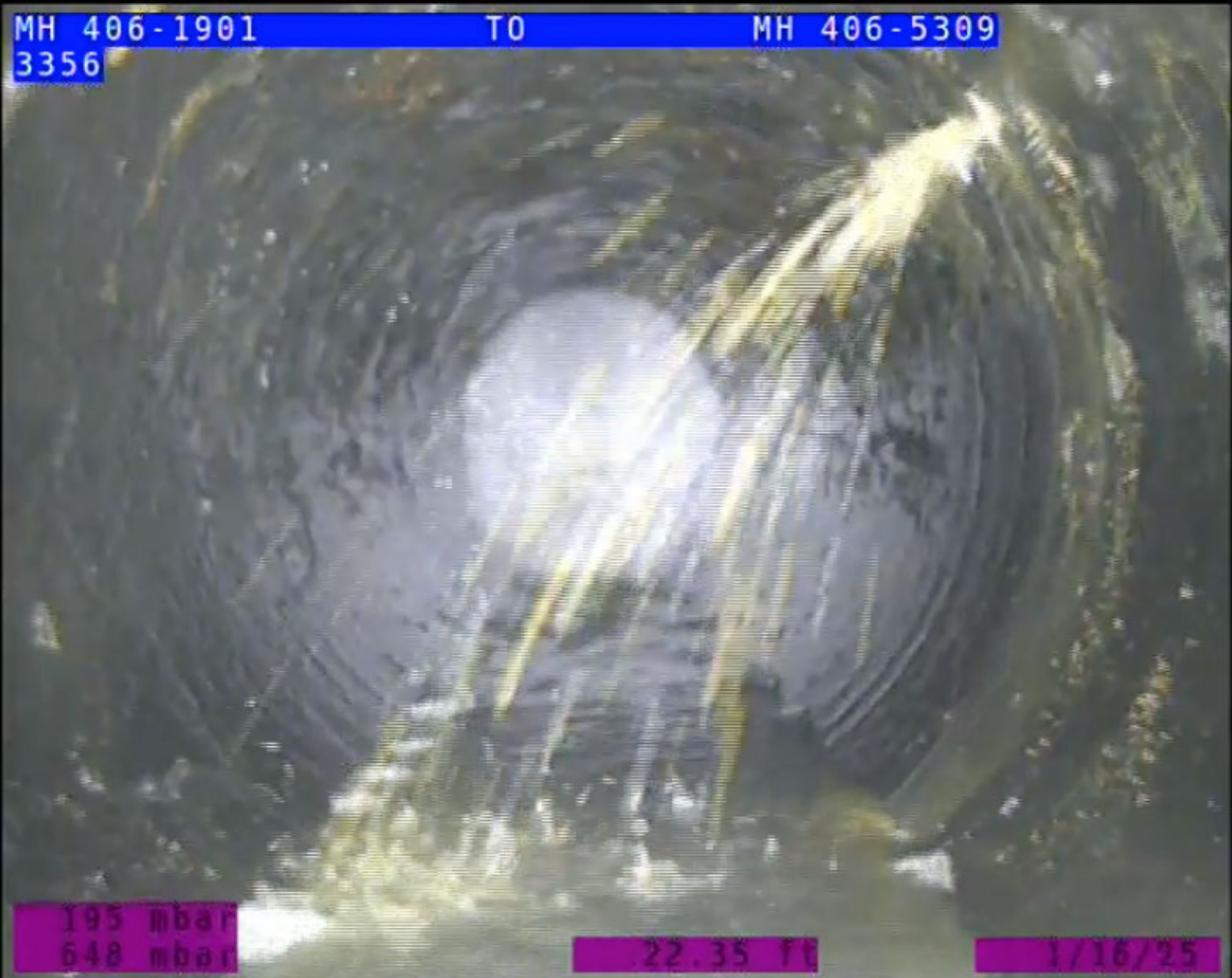


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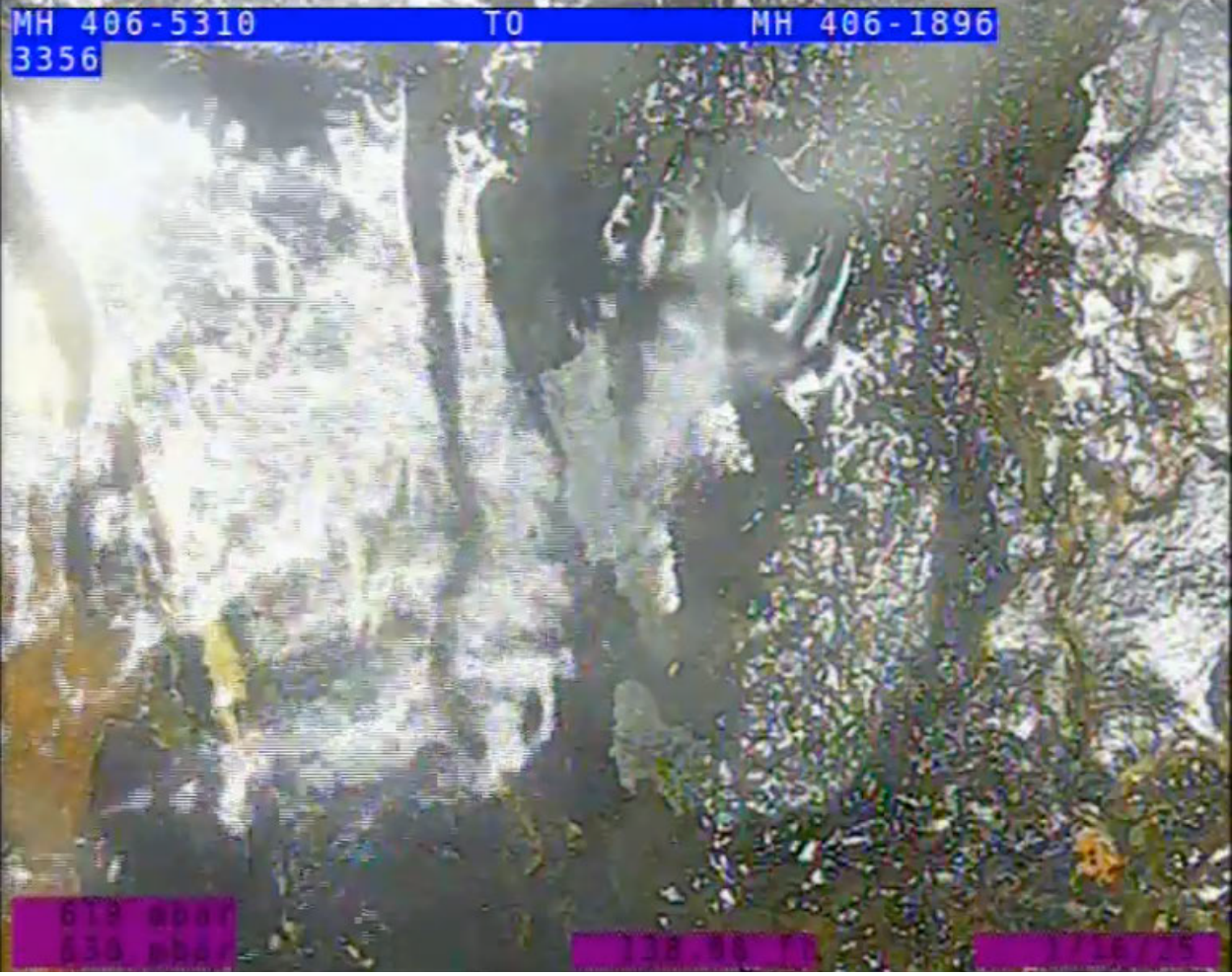
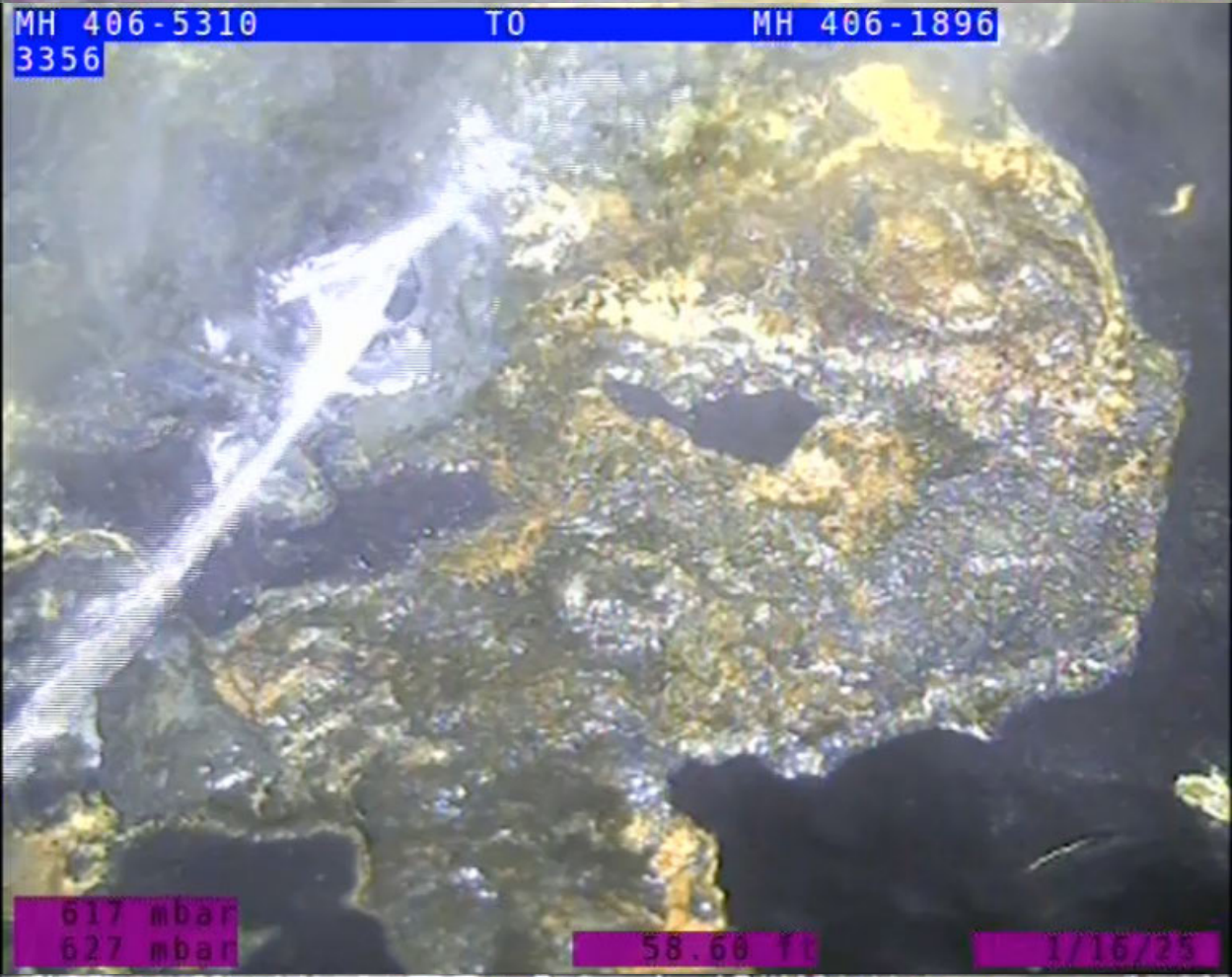
Regional Operations East
2720 NW 6th St., Suite 302C
Gainesville, FL. 32609
Office 352-363-7652

Attachment 1 – Images of Leaks

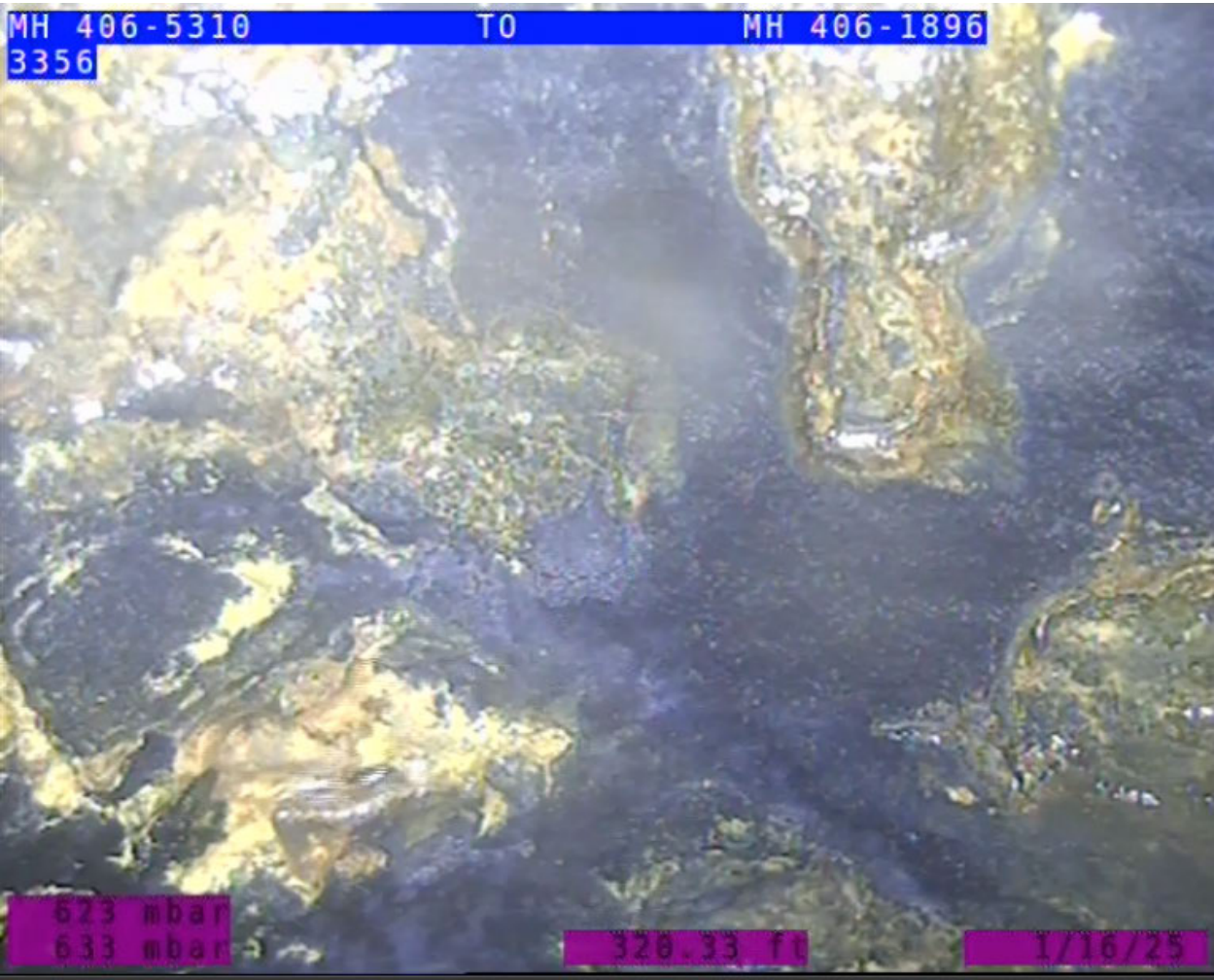














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Attachment 2 – Submittal Package



AVANTI

Stop leaks. Stabilize soil.
Control groundwater. **Permanently.**

Physical: 1100 Hercules Ave. Suite 320 - Houston, TX 77058

Mailing: P.O. Box 58448 - Webster, TX 77598

P: 800.877.2570 F: 281.486.7300

www.AvantiGrout.com

July 17, 2017

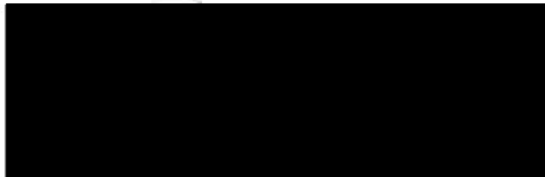
Spencer Tuell
Gulf Coast Underground
3158 Old Shell Road
Mobile, AL 36607

To Whom It May Concern:

This letter is to confirm that Gulf Coast Underground is an approved Avanti International chemical grout applicator. Their grouting staff are trained, certified, and experienced in the use and handling of AV-100 and all related products.

If you have any questions concerning this or other matters, please feel free to contact me at 800-877-2570 or via email at michael.harada@avantigrout.com.

Sincerely,



Michael Harada
Avanti International
Senior Service and Support Specialist

**AVANTI**

AvantiGrout stops leaks. Permanently.

Rev02.2012

TECHNICAL DATA SHEET**AV-100 CHEMICAL GROUT**

GRANULES / LIQUID CHEMICALLY REACTIVE GEL

DESCRIPTION

AV-100 is an ultra-low viscosity chemically reactive gel available as either granules or liquid. Having the same viscosity as water, AV-100 can permeate anywhere water can travel and cures within a controllable time frame anywhere from 5 seconds to ± 10 hours. Once it cures, it creates an effective, long-lasting water barrier while providing superb soil stabilization.

APPLICATION

- Stops water infiltration into manholes, sanitary and storm sewer mainlines, joints, laterals, tunnels, mines, and various other geotechnical applications and underground structures by stabilizing external substrate
- Ground modification/slope stability for prevention of landslides, erosion, or any place where site conditions or project requirements dictate modification of the existing soil properties

FEATURES AND BENEFITS

- Thinnest product on the market
- Can be injected through remote packer equipment
- Controllable reaction times from seconds to hours
- Will not undergo syneresis
- Half-life of 362 years as determined by U.S. Dept. of Energy
- No suspended solids
- Higher strength compared to acrylates
- Greater longevity compared to silicates
- Available in granular or liquid form

GROUTING TECHNIQUES

- Tube-a-manchette (TAM) Grouting
- Probe Grouting
- Curtain Grouting
- Remote Packer

HOW IT WORKS

AV-100 is injected using a stainless steel, dual-component pump from two containers (see mix procedure). Injecting a 1:1 ratio into the soil or external substrate will produce a strong, impermeable gel obtained via a copolymerization reaction. Additives are available to modify the reactions and cured gel characteristics.

OPTIONAL ADDITIVES

- AC-50W Root Inhibitor – inhibits future root growth (add to grout tank)
- AV-257 Icoseal – increases strength and adhesive qualities (add to grout tank)
- KFe (Potassium Ferricyanide) – extends gel time (add to grout tank)
- AV-105 Gel Guard – reduces freezing point (add equal amounts to both tanks)
- Dyes – used extensively for tracking grout flow

PACKAGING

- 270 gallon (1022 L) totes, 2300 lb (1045 kg) each
- 50 lb (22.7 kg) bags, 24 bags/pallet, gross weight 1300 lb (590 kg)
- 15 gallon (56.8 L) drums (liquid), 135 lb (61.2 kg) each – 9 drums/pallet

SHIPPING

- Motor class 77.5
- Hazard class 6.1
- Motor freight available
- Air freight available

PROPERTIES***UNCURED (solid)**

Appearance:	White granules
Specific Gravity:	1.15 @ 72°F (22°C) $\pm 3\%$
Bulk Density:	1938 lb/yd ³ $\pm 3\%$ (1150 kg/m ³ $\pm 3\%$)
Toxicological:	See MSDS

UNCURED (liquid)

Appearance:	Clear water-white liquid
Viscosity:	1 – 2 cP @ 72°F (22°C) in solution
Specific Gravity:	1.04 @ 72°F (22°C) $\pm 3\%$
Weight:	8.66 lb/gal $\pm 3\%$ (1.038 kg/L $\pm 3\%$)
Toxicological:	See MSDS

CURED

Appearance:	Clear gel mass/translucent
Hydraulic:	$< 10^{-8}$ m/s
Conductivity:	
Static Pressure:	120 psi (2585 kPa)
Toxicity:	Non-toxic

*Laboratory Results

MIX PROCEDURE (See Mixing Instructions)

Tank A: Add 10 gallons (37.8 L) of water, add one bag (granules) or one liquid drum of AV-100 to solution, add 0.5 gallons (1.9 L) of AV-101 and fill with water up to 30 gallons. Tank B: Add 10 gallons (37.8 L) of water, add 5 lbs (2.27 kg) of AV-102, and then bring to 30 gallons with water. Makes a 60 gallon (227 L) batch. Note: Ingredients are only compatible with stainless steel or plastic.

PERFORMANCE

Performance will be influenced by site conditions. If site temperatures are low, heat the product to recommended operating temperatures of 60°F – 100°F (16°C – 38°C). Decreasing pH may extend cure time. High minerals/metals content may adversely effect gel time. Refer to AV-100 Technical Manual for complete product information.

CLEANING PRODUCTS

Use water with light detergent.

STORAGE

Store in temperatures within or near 60°F – 100°F (16°C – 38°C) in a dry atmosphere.

SAFETY

Use of AV-100 is authorized by Avanti International only after completion of the required Safe Operating Practices Program (SOPP). Always use OSHA-approved personal protective equipment (PPE). Refer to the MSDS for complete safety precautions. The MSDS, mixing instructions, and Technical Manual are available by request or via download at www.AvantiGrout.com.

NOTICE

The data, information and statements contained herein are believed to be reliable, but are not construed as a warranty or representation for which Avanti International assumes any legal responsibility. Since field conditions vary widely, users must undertake sufficient verification and testing to determine the suitability of any product or process mentioned in this or any other written material from Avanti for their own particular use. NO WARRANTY OF SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE. In no case shall Avanti International be liable for consequential, special, or indirect damages resulting from the use or handling of this product.



Acrylamide Chemical Grout (AV-100) Frequently Asked Questions

Since 1978, Avanti International has been dedicated to helping the environment and "Supporting Green" not only by supplying the highest quality chemical grouts but also by educating contractors, municipalities, and engineers on the most cost-effective techniques used to protect the environment, increase the lifespan of buried infrastructure, and keep below-grade construction projects moving forward. The purpose of this document is to answer questions and provide factual information about acrylamide chemical grout: AV-100.

What is AV-100 grout?

AV-100 is a blend of acrylamide monomer (AM) and methylenebisacrylamide (MBA). AV-100 is injected as a two (2) component system, which has the same viscosity as water and changes from a liquid to a solid, firm gel in a controllable time frame ranging from 5 seconds to 10+ hours. AV-100 is a true solution grout (has no suspended solids) and is designed to be injected underground to control or stop the flow of groundwater.¹

What additional components are required to cure acrylamide (AV-100) grout?

In addition to the AV-100 grout, AV-101 Catalyst T+ (triethanolamine) and AV-102 AP (ammonium persulfate) are required. AV-101 Catalyst T+ is an organic chemical compound used as an activator for the grout; AV-102 AP is the initiator which triggers the reaction.¹

Where is acrylamide grout used?

AV-100 Chemical Grout was Avanti's first product and remains the product of choice for many owners and contractors for the control of groundwater, hazardous waste encapsulation and the sealing of entire sewer systems, underground transit systems, mine shafts and tunnels. The product can be injected via remote packer, tube-a-manchette, probe, hand-held injection wand, or F-assembly.

How long has acrylamide grout been in use?

Acrylamide has been used in the construction and rehabilitation industry for over 60 years. Its first use in the U.S. was in the 1950's for soil stabilization.²

Was the use of acrylamide chemical grout ever banned in the U.S.?

The use of acrylamide grout has never been banned. In a notice dated December 2, 2002, the EPA announced the withdrawal of a proposal that would have banned grouts containing acrylamide and the acrylamide derivative N-methyloacrylamide (NMA). After being educated on the safety and benefits of these products the EPA withdrew the proposal with the knowledge that specific worker safety training was available. Avanti continues to offer Safe Operating Practices and Procedures (SOPP) training to ensure that those handling the products know how to handle them safely.

Is acrylamide toxic?

Pure acrylamide is considered a neurotoxin. Therefore when handling AV-100, a combination of acrylamide monomer (AM) and methylenebisacrylamide (MBA), proper PPE should be worn. However, it's important to note that acrylamide has a higher LD₅₀ than everyday substances such as aspirin and caffeine.

In toxicology, the LD₅₀, or median lethal dose of a substance, is the dose required to fatally affect 50 percent of the members of a test population after a specified test duration. The LD₅₀ for a given substance is expressed as the mass of an administered substance per unit mass of test subject. For example: milligrams per kilogram of body weight. An LD₅₀ of less than 5,000 is considered toxic; therefore, the lower the LD₅₀ the more lethal the substance.³

The table below presents the acute oral LD₅₀ (rat) of acrylamide in comparison with other familiar substances.^{4, 5}

Substance	LD ₅₀ (mg/kg)
Unleaded Gasoline	18
Caffeine	192
Aspirin	200
Acrylamide Liquid	528
Table Salt	3,000

Is the cured AV-100 grout biodegradable?

AV-100 is designed as a long-term solution. Studies conducted by the US Department of Energy indicate that the half-life in the soil of properly applied AV-100 is 362 years.⁶

How fast does acrylamide (AV-100) grout cure?

The reaction time is controllable from 5 seconds to 10+ hours.

Is acrylamide found elsewhere?

Acrylamide is in our everyday diet. According to the Food and Drug Administration, acrylamide is a chemical that can form in some foods during high temperature cooking processes, such as frying, roasting and baking. Acrylamide in food forms from sugars and an amino acid (asparagine) that is naturally present in foods.⁷

Is acrylamide classified as a carcinogen?

No. According to the International Agency on Research for Cancer, IARC, acrylamide is listed under category "Group 2A: Probably Carcinogenic to Humans." Other known substances listed under the same category consist of diesel engine exhaust, emissions from high temperature frying, and emissions of burning wood to name a few.⁸

If over exposed, does acrylamide stay in the body?

Acrylamide does not build up in the body like lead. Once removed from exposure, acrylamide is excreted from the body as metabolites in the urine.⁹

Is there any health or environmental risk associated with the cured AV-100?

Once AV-100 has cured, the gel is inert, non-toxic, stable, and irreversible.

Does acrylamide grout harm the environment?

Microorganisms in soil and natural waters assimilate unreacted acrylamide molecules.⁹ Additionally, dyes are frequently added to track the individual components during the injection process. In the event of a spill, the grout should be cured and disposed of, the site neutralized with potassium persulfate and sodium metabisulfite solutions, and then rinsed with water.

Is safety training available?

Since 1978, Avanti has offered a Safe Operating Practices Program for contractors who store and use the AV-100 components.

Conclusion:

While proper care and precautions are necessary when handling any chemical, AV-100 and other well-known chemical grouts are safely and successfully used throughout the world everyday. If you have questions or need further information please feel free to contact Avanti International directly or review over 90 project case studies available at www.AvantiGrout.com.

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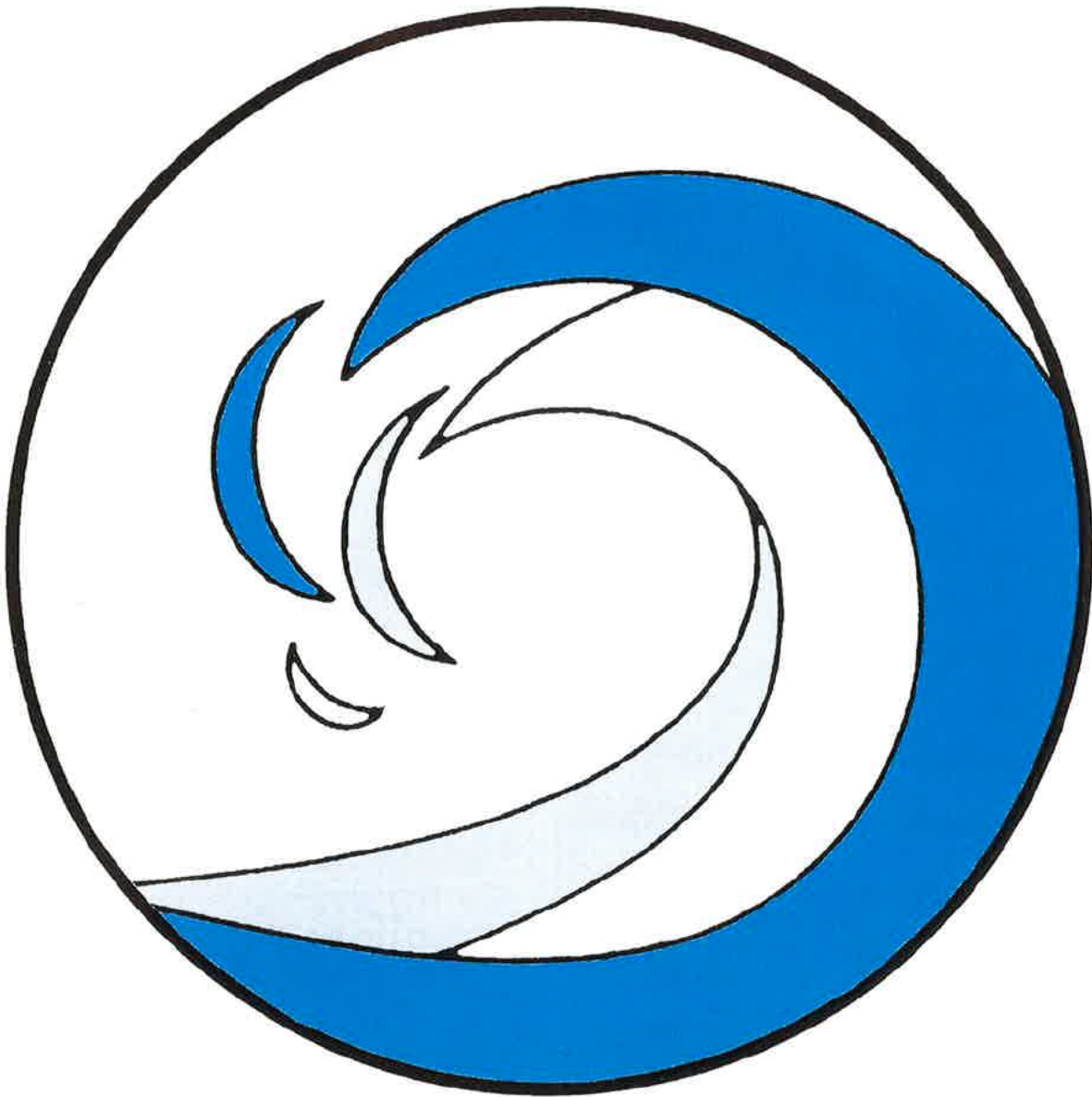
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TECHNICAL MANUAL
AV-100 Chemical Grout

Product Descriptions

AV-100 Chemical Grout

AV-100 Chemical Grout is a mixture of three or more water soluble chemicals which produce stiff gels from properly catalyzed solutions. AV-100 is also the name of the base chemical in the mixture.

AV-101 Catalyst T+

AV-101 Catalyst T+ acts as a buffer and sometimes appears to act as a catalyst in the AV-100 gel mix. Triethanolamine (TEA) is the primary ingredient in AV-101 Catalyst T+. The proprietary blend of other additives with the TEA makes up a liquid which actually functions as an activator for the reaction. These other ingredients allow field use of AV-101 in cold weather without the annoying occurrence of crystallization or "freezing" to which normal TEA is subject.

AV-102 Catalyst AP

AV-102 Catalyst AP (ammonium persulfate) is a granular material and a strong oxidizing agent. It is the initiator that triggers the reaction. The gel time begins with its addition. Generally, AP is dissolved in water and added as a 1 to 3 percent solution to the AV-100 Chemical Grout solution through a separate pump.

Special Additives

AV-105 Ethylene Glycol

AV-105 Ethylene Glycol is a clear liquid which is added to the AV-100 mix when protection against freezing temperatures or dehydrating conditions is required for the gel.

AV-257 Icoset

AV-257 Icoset is a white milky liquid which can be added to the AV-100 Chemical Grout mix to achieve increases in compressive and tensile strength as well as superior elongative potential in the gel. Do not add to AP Tank.

Potassium Ferricyanide (KFe)

Potassium Ferricyanide (KFe) is a reddish, granular material used to extend the gel time. It behaves as an inhibitor in very small quantities and must be used cautiously. KFe does not affect the strength of the final gel when used in the recommended concentrations.

Buffers

Buffers are chemicals used to control pH in AV-100 solutions. In a few rare cases, acidic water needs buffers to bring the pH to 8. AV-100 solutions can be gelled at high temperatures with ammonium persulfate alone, and in this case buffers will almost always be required; disodium phosphate heptahydrate (DSP) is recommended, although sodium carbonate may be used in soft water.

Root Inhibitors

BARRIER 50W

The AVANTI dichlobenil product is BARRIER 50W, a powder containing 50% active dichlobenil and 50% inert filler to keep the dichlobenil in suspension. BARRIER 50W should be used in the 400 ppm range. It is available in four-pound packages, packed six bags per case.

Do not add solutions containing metam sodium to any grout solution.

Using BARRIER 50W with AV-100 Chemical Grout

The manufacturer recommends incorporation of 0.04% BAR-

RIER 50W in the grout mixture. To do this in a sewer grouting rig using two 30-gallon grout tanks, add 0.2 pounds (3.2 oz.) of BARRIER 50W to about one gallon of water in a small container. Stir completely, and pour this mixed concentrate into the AV-100 tank. This mixture gives a concentration of about 400 ppm in a 60-gallon batch of AV-100 Chemical Grout.

Chemical Reactions

Catalyst Concentration

Changes in concentration of one or all of the catalysts of the mixture have a very significant effect on gel times. Too much KFe or too little AP or Catalyst T+ will produce weak gels or no gel at all. Excess AP may reduce pH to the point where a gel will not form. The recommended lower limits are 0.25% for AV-101 Catalyst T+ and 0.2% for AV-102 Catalyst AP. The upper limit for KFe is 0.035%.

Temperature

Unless otherwise noted in this manual, temperature always refers to the temperature of the AV-100 Chemical Grout solution. If the formation temperature or the temperature of the area through which grout hoses pass is very different from the solution temperature, adjustments in gel time estimates may be necessary.

Gel times increase when temperature falls and decreases when temperature rises. As a rough rule of thumb, the gel time is reduced by half if the temperature goes up 10 degrees Fahrenheit. When short gel times at low temperatures are needed, warming the grout solution may be more economical than large amounts of catalyst, but the solutions must be stirred while the heaters are in use.

pH

The solution pH may affect the gel time. Up to about a one-hour gel time, the pH should be in the range of 7 to 11. Except under very unusual conditions (presence of large amounts of acid), AV-101 Catalyst T+ maintains the pH between 8 and 9. Gel times become long and indefinite below a solution pH of 6.5.

When very long gel times are needed, especially in acid groundwater conditions, pH is maintained above 7 by a buffer such as disodium phosphate heptahydrate (DSP). Acid water usually leaches out minerals. These minerals may compensate for the low pH and in some cases cause faster than normal gel times.

The pH of AV-100 is 4.5 to 5.0 (uncatalyzed).

Air

AV-100 solutions should be mixed gently because air entrained by vigorous mixing will lengthen gel times. Bubbler mixers should not be used.

Metals

Certain metals such as iron, copper, and copper alloys accelerate gel times. If iron mixing tanks must be used, they should be coated to prevent rust.

Mix Water

Either groundwater or local drinking water may be used for mixing a solution, depending on which is most suitable. Because many of the variables which influence gel time are related to the characteristics of the mix water, gel times should be verified by tests with the water which will be used in a particular application.

Sunlight

The ultraviolet rays in direct sunlight can cause gelation of AV-100 solutions. To avoid this, cover the tanks.

Hydrogen Sulfide

Hydrogen Sulfide has a very complicated effect on AV-100 Chemical Grout. In general, it acts as an accelerator under ordinary working conditions.

Salts

Salts, such as sodium chloride, calcium chloride, sulfates, and phosphates, have an accelerating effect. The amount of acceleration depends on salt concentration and should be measured by a field test. Salts may also increase gel strength.

Certain salts, such as calcium chloride, decrease the water loss rate from gels under dehydrating conditions. Salts may also change the pH of the solution and will affect the gel time.

Freezing

Freezing of AV-100 solutions has little effect on their activity after thawing. To avoid freezing during application, salt or AV-105 Shrink Control Agent may be added. The effect that these additives have on the gel time must be checked.

Tests indicate that repeated freeze-thaw and complete wet-dry cycles will cause eventual deterioration of stabilized soil masses due to the rupture of gel-soil bonds. The effects of partial wet-dry cycles are less severe, and the effects of normal ambient temperature variations above freezing are negligible.

Beware of attempts to inject AV-100 solutions into frozen formations. Any water already in the zone to be grouted will be solid ice into which the liquid solution will probably not penetrate. This may be very important when grouting shallow sewers during the winter.

Particulate Materials

Most insoluble materials, such as clay, bentonite, and diatomaceous earth slow down gelation. If such fillers are used, the concentration of AV-101 Catalyst T+ must be increased.

Properties of AV-100 Chemical Grout

Understanding the properties of AV-100 Chemical Grout in its various forms from initial chemical components that make up the product to the in-place final gel is important. An awareness of the inherent hazards of handling any chemical component can minimize potential dangers to workers and the environment by assuring proper application of a product. Strict adherence to the SAFE OPERATING PRACTICES PROGRAM is critical and will assure safe and successful application programs.

Handling of Solid AV-100 Chemical Grout

Skin which comes in contact with solid AV-100 should be washed immediately in running water, and dust inhalation should be avoided. Use the same protective measures as described below under "Handling of AV-100 Solutions". Avoid rough handling of AV-100 containers to prevent spilling.

Solid AV-100 is shipped in disposable containers and should be stored in the original containers until used. Empty containers should be buried in an approved landfill and not used for any other purpose.

Corrosiveness

AV-100 solutions containing AV-101 Catalyst T+ are non-corrosive to common steels, aluminum, brass and rubber.

To protect against skin irritation from AV-101 Catalyst T+, operators should wear glasses and rubber gloves. Spills on the skin should be washed off with water. In case of contact with eyes, wash the eyes immediately for at least 15 minutes with plenty of water and then seek proper medical attention.

AV-102 Catalyst AP is a strong oxidizing agent and should always be handled with glasses and rubber gloves. Skin areas which have come in contact with AP should be washed with water. If spilled on clothing, AP will discolor or make holes in some fabrics.

Solubility

At normal temperatures, AV-100 solutions up to 40% are easy to prepare. Catalyst and inhibitors also dissolve easily at concentrations which are much higher than those normally used. Sodium carbonate will dissolve easily in sufficient amounts to bring the solution pH up to 10. Disodium phosphate requires vigorous mixing.

Stability

AV-100 powder will retain its properties for years at temperatures below 70°F (21°C) if stored dry in the original containers. Storage at higher temperatures will cause small insolubles to form and may cause small changes in gel time. After filtering, AV-100 solutions which contained insolubles are acceptable for use.

AV-102 Catalyst AP and AV-101 Catalyst T+ may be stored in their original unopened containers for a year or more. AV-102 deteriorates (weakens) upon repeated exposure to air.

Toxicity

AV-100 in its powder form (uncatalyzed) is a neurotoxin with LD₅₀ approximately 250 mg/kg of body weight (rat). It can enter the body through the nose, mouth or skin. Contact by these means should be avoided, and clean-up promptly achieved in case of an accident.

AV-100 in its coagulated gel form contains almost no acrylamide, and in coagulated form may be thought of as completely non-toxic.

Standard protective clothing should be worn when working with AV-100, including:

1. Waterproof coat and pants.
2. Rubber gloves.
3. Rubber boots or rubber overshoes.
4. Eye protection (either glasses or goggles)
5. Respirators approved by the U.S. Bureau of Mines for protection against toxic dusts and vapors in confined or poorly ventilated places.

Long-sleeved coveralls or long-sleeved shirts may be worn instead of waterproof clothing if contaminated clothing is removed promptly and washed before re-use.

Use care in handling of solutions to prevent liquid from coming in contact with skin or clothing. If solutions are splashed on skin or clothing, the clothing should be removed promptly and the part of the body coming in contact with the solution washed with water. Change to clean clothing.

If contact is only on clothing that is not worn next to the skin, changing is not required, although it should not be worn again without laundering. If waterproof clothing is worn, it may not need to be changed if splashed, but the splash should be washed off with water.

Wash hands with soap and water before eating or smoking, and take a shower at the end of the work day. Work clothing should not be worn home.

Areas where spills have occurred should be washed down with water. If the gel reaction is completed, ground contamination should not occur.

See the SAFE OPERATING PRACTICES PROGRAM booklet for additional information.

Properties of AV-100 Solutions

Density

The density of a 10% solution (catalyst at 68°F) of AV-100 is 1.04 grams per cubic centimeter.

Viscosity

The viscosity of a 10% solution (catalyst at 68°F) of AV-100 is 1.2 centipoise (water = 1 centipoise).

Penetrability

AV-100 solutions can generally be pumped anywhere water will flow at the same flow-rate-pressure relationship required for water.

Stability

A 10 to 30 percent solution (uncatalyzed 68 to 122°F [20 to 50°C]) will usually be stable for at least four months. Keep solutions from contact with brass, copper or iron. Solutions should be kept out of direct sunlight.

Properties of AV-100 Gel

Density

The density of AV-100 gel is essentially the same as a solution, 1.04 grams per cubic centimeter or slightly above that of water.

Shrinkage

When shrinkage in soil does occur, it produces tensile forces which increase apparent unconfined compression strength. However, these forces will never exist below the water table.

If drying is severe, rupture of the bond between gel and soil grains will occur. This may appear as a visible shrinkage crack.

When rewetted, the gel will swell to its initial volume and again fill the voids. Ruptures will not heal, however, and the stabilized mass may not have quite the strength it first had. The degree of permeability of dried stabilized sand that is rewetted has been measured at 10^{-4} to 10^{-6} cm/sec.

Loose soils will show shrinkage when gel dries since tensile forces move the soil grains closer together. Job excavations indicate that under moist conditions gels are unchanged for at least 25 years.

Shrinkage due to drying does not occur below the water table. Field experience also indicates that drying is usually not significant in soils that are six to seven feet below ground surface (even if above the water table) as long as the soil humidity level exceeds 80% to 90%. Shrinkage due to drying is a problem only when the stabilized soil is close to an underground heat source or is very close to the ground surface. AV-100 gels shrink if heated under low humidity, but when heated in water are stable to at least 150°F (77°C).

Syneresis

Syneresis is a process whereby water is squeezed out of a gel under gravitational forces due to the weight of the gel. AV-100 gels are not subject to syneresis.

Permeability

AV-100 gels are substantially impermeable ($k = 10^{-10}$ cm/sec), except that gels containing less than eight to ten percent AV-100 will swell slightly when immersed. The gels are impermeable to gases and to hydrocarbons such as kerosene. Ions will migrate through the gel.

Longevity

Chemical data and job histories from over 25 years lead to the conclusion that for all practical purposes, AV-100 gels may be considered permanent.

WARRANTY STATEMENT

The data, information and statements contained herein are believed to be reliable, but are not construed as a warranty or representation for which AVANTI INTERNATIONAL assumes any legal responsibility. Since field conditions vary widely, users must undertake sufficient verification and testing to determine the suitability of any product or process mentioned in this or any other written material from AVANTI for their own particular use. **NO WARRANTY OF SUITABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE.** Nothing in this or any other document from AVANTI INTERNATIONAL is to be taken as permission, inducement or recommendation to practice any patented invention without a license.



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AV-101 Catalyst T+
MATERIAL SAFETY DATA SHEET



Date Issued: 07/01/2014

1. PRODUCT AND COMPANY INFORMATION

PRODUCT NAME: AV-101 Catalyst T+

CLASSIFICATION: Catalyst

SUPPLIER

Avanti International
822 Bay Star Blvd.
Webster, TX 77598
Phone: 800.877.2570
Fax: 281.486.7300

EMERGENCY TELEPHONE NUMBER

Chemtrec: 800.424.9300

2. COMPOSITION / INGREDIENT INFORMATION

Ingredient / CAS Number	Exposure Limits	Concentration
Triethanolamine CAS #102-71-6	OSHA PEL: 3 ppm ACGIH TLV: 3 ppm	Trade Secret
Ethylene Glycol CAS #107-21-1	OSHA PEL: 50 ppm ACGIH TLV: 50 ppm	Trade Secret

3. HAZARDS IDENTIFICATION

EYE CONTACT: Exposure can cause irritation and burning of the eyes. May cause corneal injury.

SKIN CONTACT: May cause irritation, redness, and pain, especially on prolonged or repeated contact.

INGESTION: May be fatal if swallowed. May cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, lumbar pain and central nervous system effects, including irregular eye movements, convulsions and coma. Cardiac failure, pulmonary edema, and severe kidney damage may develop.

INHALATION: Inhalation of vapors or mists of the product may be irritating to the respiratory system.

4. FIRST AID MEASURES

EYES: Flush with plenty of water for at least 15 minutes. Get medical attention.

SKIN: Wash thoroughly with soap and water. Remove all contaminated clothing and wash or clean prior to reuse. If irritation develops, consult a physician.

INHALATION: Remove to fresh air. If breathing is difficult, administer oxygen and get medical attention.

INGESTION: Do NOT induce vomiting. Never give anything by mouth to an unconscious or convulsing person. Call a physician. Seek immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs.

5. FIRE AND EXPLOSION HAZARDS

FLASH POINT: 116°C (241°F)

FLAMMABLE LIMITS IN AIR: Lower-1.5% Upper-15.3%

AUTOIGNITION TEMPERATURE: 324°C (427°F)

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, alcohol foam or water spray.

PROTECTIVE EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.

HAZARDOUS COMBUSTION MATERIALS: Oxides of both carbon and nitrogen.

FIRE FIGHTING PROCEDURES: Isolate and restrict area access. Stop leak only if safe to do so. Move containers from fire area if you can do it without risk. Fight fire from a safe distance and from a protected location. Use flooding quantities of water for fire and water spray or fog for vapors. Containers exposed to intense heat from fire should be cooled with water to prevent vapor pressure build-up which could result in container rupture. This material may produce a floating fire hazard in extreme fire conditions. This product can produce flammable vapors which may travel to a source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

GENERAL PROCEDURES: Wear appropriate personal protective equipment. Isolate hazard area and restrict access. Stop leak only if safe to do so. Remove ignition sources and work with non-sparking tools.

SMALL SPILLS: Soak up with absorbent material and scoop into containers.

LARGE SPILLS: Prevent contamination of waterways. Dike and pump into suitable containers. Clean up residual with absorbent material, place in appropriate container and flush with water.

ENVIRONMENTAL: Prevent entry into sewers or streams, dike if needed. Consult local authorities.

7. HANDLING AND STORAGE

HANDLING: Wear protective clothing and respiratory protection. Do NOT handle or store near an open flame, heat, or other sources of ignition. DO NOT pressurize, cut, heat, or weld containers.

STORAGE: Keep in a tightly closed container. Store in a cool, dry, ventilated area, away from heat and ignition sources. Protect against physical damage. Do not store at temperatures above 110°F (43°C). Avoid oxidizers and acidic materials.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

ENGINEERING CONTROLS: Mechanical general/local exhaust to control vapor or mist below maximum exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Wear chemical goggles and/or face shield to avoid splashing on face.

SKIN: Wear chemically resistant boots, gloves, and chemical suit (Tychem or equivalent).

RESPIRATORY: If exposure exceeds occupational exposure limits, use an appropriate NIOSH approved full-face piece respirator, half-face piece respirator with splash goggles, or powered, filtered air-supplied hood.

OTHER PROTECTIVE EQUIPMENT: Provide eyewash fountain and quick drench facilities in close proximity to points of potential exposure.

HYGIENE PRACTICES: Wash with soap and water after handling. Remove contaminated clothing and wash before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Colorless to yellow liquid with slight ammonia odor

pH: Not available

SPECIFIC GRAVITY: 1.107

BOILING POINT: >197°C (>387°F)

FREEZING POINT: Not available

MELTING POINT: Not available

VAPOR PRESSURE: Not available

VAPOR DENSITY: Not available

EVAPORATION RATE: Not available

SOLUBILITY IN WATER: Soluble

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal conditions of use and storage. Darkens on exposure to air or light.

CONDITIONS TO AVOID: Avoid excessive heat, open flames and all ignition sources. Product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

MATERIALS TO AVOID: Strong oxidizing agents. Strong acids and bases. Corrosive to copper, brass, and zinc may soften and/or discolor iron. Halogenated hydrocarbons.

HAZARDOUS DECOMPOSITION PRODUCTS: Decomposition products can include and are not limited to: oxides of nitrogen, oxides of carbon, alcohols, ethers, aldehydes.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

No data has been obtained for the blend.

CARCINOGENICITY: Individual components are not considered carcinogens by NTP, IARC, or OSHA.

IARC: Group 3 for Triethanolamine.

TERATOGENICITY: Ethylene Glycol ingestion has shown to produce dose-related teratogenic effects in laboratory animals.

REPRODUCTIVE EFFECTS: Ingestion of large amounts of Ethylene Glycol has been shown to interfere with reproduction in animals.

MUTAGENICITY: N/A

ACUTE ORAL LD50 (rat)

TRIETHANOLAMINE: 4190 mg/kg

ETHYLENE GLYCOL: 4000 mg/kg

ACUTE DERMAL LD50 (rabbit)

TRIETHANOLAMINE: 2000 mg/kg

ETHYLENE GLYCOL: 9530 5L/kg

12. ECOLOGICAL INFORMATION

TRIETHANOLAMINE

LC50 (fathead minnow): 11800 mg/L

LC50 (goldfish): 5000 mg/L

ETHYLENE GLYCOL

LC50 (bluegill): 27500 mg/L

LC50 (goldfish): 27500 mg/L

LC50 (rainbow trout): 41000 mg/L

13. DISPOSAL CONSIDERATIONS

Dispose of in accordance with local, state, and federal regulations.

14. TRANSPORT INFORMATION**DOT (DEPARTMENT OF TRANSPORTATION)**

PROPER SHIPPING NAME: Not regulated

HAZARD CLASS: None

UN NUMBER: Not applicable

PACKING GROUP: Not applicable

LABEL: Not applicable

PLACARD: Not applicable

NMFC (NATIONAL MOTOR FREIGHT CARRIERS)

FREIGHT CLASS: 60

15. REGULATORY INFORMATION**CERCLA/SARA****SECTION 302**

Triethanolamine: Not listed

Ethylene Glycol: Not listed

SECTION 313

Triethanolamine: Not listed

Ethylene Glycol: Listed

TSCA REGULATORY: All components of this product are either on the TSCA Inventory or exempt.

16. OTHER INFORMATION

The information on this MSDS is accurate to the best of Avanti International's knowledge. Avanti International makes no expressed or implied warranty, and in no case shall be liable for consequential, special, or indirect damages resulting from the use or handling of this product.