



VERTAC CHEMICAL CORPORATION

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TELEX 53927

September 20, 1982

Mr. Jerry Banks
Mr. Charles Estes
Mr. Steve Spangler
Mississippi Department of Natural Resources
Bureau of Pollution Control
P. O. Box 10385
Jackson, Ms. 39209

Dear Sirs:

Attached are copies of our application for permits to construct and operate a MSMA plant at our Vicksburg, Mississippi facility. We hope to have the facility in operation in January, 1983.

I have provided that information which is available in a format which attempts to transmit clearly and hope that it is complete. Nonetheless after our discussions and your further review, I am certain some information will be lacking. We will promptly, find, furnish or create that which is needed.

Best regards,

Dick Karkkainen
Director of Environment and Safety

RDK/bh

Attch.

Discussion of Process

Summary of Environmental and Safety Aspects of MSMA Process

Environmental Details

- a. Evaporation, Venting and Water Balance
- b. Control of Emissions to the Air
- c. Waste Salts
- d. Storage and Handling of Raw Materials and Products

Table 1 Textbook Chemistry

Tabel 2 Theoretical Material Balance

Appendices

- a. Safety and Handling Information
- b. Sketch - Typical Waste Bin
- c. Regulations - Metallo Organic Pesticides
- d. Regulations - Arsenic Trioxide

Confidential Section - Permit Drawings

- a. Condensed Flow Diagram
- b. Material Balance
- c. Simplified Flow Sketch

Confidential Working Drawings

- a. P and I D
- b. Plot Plans

Discussion of Process

Three arsenical herbicides will eventually be manufactured in one facility in blocked operation. Either disodium methanearsonate (DSMA), monosodium methanarsonate (MSMA), or sodium cacodylate (Caco) will be produced. The chemistry is summarized in Table 1. Theoretical material balances are presented in Table 2. MSMA will be the predominant product; initially it will be the only product.

DSMA is produced by first reacting arsenic trioxide with caustic to produce sodium arsenite. As an expedient to reduce capital and improve the time table for construction so as to enable introduction of product to the market in early 1983, sodium arsenite will be purchased as a raw material. Arsenic Trioxide is a basic raw material; however, the plant will not initially be prepared to handle it.

The sodium arsenite is reacted with methyl chloride to produce DSMA and by product sodium chloride. In order that final product meet label and safety requirements that minimize extent of trace trivalent arsenic, sodium hypochlorite is next added to oxidize trivalent arsenic to pentavalent arsenic. DSMA can be separated from the by product salt and sold as an individual product; however, presently this stream is intended to be an intermediate produced as part of this processing chain to produce MSMA.

MSMA is produced by acidification with sulfuric acid of the DSMA stream previously noted. Additional waste salt, sodium sulfate, is also produced. MSMA solution is separated from this waste salts by first pumping the solution to a centrifuge where the under flow salt cake is removed for solid waste disposal. The liquid overflow from the centrifuge is accumulated and then pumped to an evaporator where the solution is concentrated then cooled to cause precipitation of the sodium sulfate and sodium chloride salts. Separation of the salts is completed by pumping the slurry to the same centrifuge noted above; in this pass the underflow salt cake is removed for solid waste disposal, the liquid overflow is the desired product.

Caco is produced by reacting the MSMA solution noted above with sulfur dioxide and caustic then with additional methyl chloride. Once again waste salts are formed, specifically sodium chloride, sodium sulfite and sodium sulfate. Caco solution is separated from the waste salts by evaporation and centrifugation steps similar to that employed during MSMA production. Caco is a product of the future, the plant will not initially be prepared to produce it.

Summary of Environmental and Safety Aspects of MSMA Process

Regulatory aspects of MSMA production give cause for substantial attention to detail in the environmental and safety considerations of design and operation. Specifically, the following must be addressed in compliance and permitting activity:

1. The area in which arsenic trioxide will eventually be used will have to be an "OSHA regulated area" and extraordinary measures taken to avoid exposure by following an explicit set of rules.
2. Groundwater must stay within drinking water standards for arsenic.
3. The metallo-organic pesticide subcategory for pesticide chemicals allows "no discharge of process waste water pollutants to navigable waters".
4. Air emissions will be minor.
5. A daily stream of 10 tons of solid waste must be disposed in a hazardous waste landfill.

Briefly the regulatory issues have been addressed as follows:

1. Initially as noted previously sodium arsenite solution will be brought in as a raw material rather than arsenic trioxide. When arsenic trioxide is eventually brought in it will be in closed drums prior to opening within the "regulated area". Discharge to the reactor will be made by automatically inverting the open drum in a tight system vented to a baghouse and water scrubber. Those who have occasion to enter the regulated area will be trained prior to operation to comply with the detailed regulations.
2. Dikes, concrete floors, sumps and a dirty process water storage vessel will contain arsenical spills which will be recycled to the process. Groundwater is presently monitored; the analysis spectrum includes arsenic.
3. Roofs and sidewalls will minimize intrusion of rainwater in order to maintain a tight area water balance. The process itself can theoretically be closed loop on water depending on the water content of the solid waste stream and the ability to prohibit intrusion of rainwater; however, judgement indicates there will be a two gallon per minute water purge. There are two sources where best engineering judgement indicates a purge will be pollutant

free. This permit application asserts the effluent to be pollution free. Internal Vertac analyses for arsenic in these purged streams will assure that they are pollutant free.

4. Air emissions will be minimized by caustic scrubbers on methyl chloride containing vents. Total emissions will be significantly below the 100 tons per year break point above which permitting becomes difficult.
5. The solid waste stream with trace arsenic content is now permitted and routinely handled in closed bins for disposal by Chemical Waste Management in their Emelle, Alabama landfill.

Environmental Details

a. Evaporation, Venting and Water Balance

Note that each product entails the same processing: reaction, evaporation, and centrifugation. During the evaporation step the methanol formed in the side reaction is vented along with water to a vapor recovery system. Methanol and water will be condensed. The water and methanol are separated in a distillation column; methanol is sold as a by product, water is recycled to the process.

The process water balance is critical in maintaining an environmentally sound plant. From the previously presented theoretical material balance it is concluded that it is possible to maintain a closed loop on water; that is, water entering the process with raw materials and water created in the reaction is carried out with the product solution and/or slurry.

Rainwater falling on the process equipment area will be minimized by diversion dikes, roofs and walls. The rain that does fall within the process area along with spills will drain by gravity into a closed sump approximately 6,000 gallons in size. The closed sump contents will be pumped to a process water storage tank for recycle to the front end of the process to keep the reaction mass easily pumpable. Process water will additionally be used for washing the centrifuge, cleaning the centrifuge and cleaning process equipment as needed and source of water for scrubbers.

Water is also recovered in the vapor recovery system as bottoms in the methanol distillation column. Most of the water will be pumped to the process water tank noted above.

As the water recirculates within the process system it will

inevitably build in volume. The fundamental phenomena contributing to the inevitability are:

1. Reaction yields will not be 100%.
2. Water content in the salt cake sent to hazardous waste disposal may be slightly variable due to centrifuge performance.
3. The entire process area will be roofed; however, only partial walls are used on the side. There will be finite rainwater penetration.

Because of the above it is necessary to purge approximately 2 gallons per minute of water. It is possible to purge water from either or both of two sources that will be arsenic free:

1. The evaporator vapor line prior to condensation can be vented to the atmosphere. The evaporator is operated batch wise; therefore, methanol will be vented during initial period of evaporation after which water vapor could be vented with negligible accompanying pollutants. The time to vent water vapor would be established by monitoring the temperature of the vapor stream.

Alternatively the stream could be diverted to the clean water storage vessel which is separate and distinct from the vessel used to contain process water, spills and rainwater. Water from the clean water storage vessel will be purged to the effluent pond at about 2 gallons per minute. Contents of the clean water storage vessel will be monitored periodically to assure it is arsenic free.

2. The water stream that is the bottoms stream from the methanol distillation column is also pollutant free. Most of this water will be pumped to the process water storage tank for recycle; however, as needs be to maintain the water balance a portion of the stream can be diverted to the clean water storage vessel. As noted above water from the clean water storage vessel will be purged to the effluent pond at about 2 gallons per minute.

As further reassurance that the discharge to the Mississippi River from the Vicksburg complex is arsenic free it would be noted that the literature indicates arsenic to be readily adsorbable on activated carbon. Contents of the effluent pond are of course passed through carbon prior to discharge to the Mississippi River. The arsenic would adhere to the carbon during thermal regeneration by Calgon; therefore,

contamination of the carbon by arsenic would make it unavailable for recycle and is to be avoided as highly uneconomic.

b. Control of Emissions to the Air:

The initial reactor i.e., the DSMA reactor or methylator (reactor in which methyl chloride is added), will be vented to a caustic scrubber. Methyl chloride and caustic react to form methanol and sodium chloride. The scrubber tank is periodically emptied to recycle back to the process.

The second reactor, i.e., the MSMA reactor or pH adjustment vessel (reactor in which sulfuric acid is added), will be vented to the same caustic scrubber noted above.

As noted previously the evaporator will vent to condensers. Condensate is processed through the methanol recovery system for recovery of methanol and recycle of water.

As a result of the emission control systems air emissions will be negligible.

c. Waste Salts:

As evident from the process description and Tables 1 and 2 the process generates an abundance of waste salts. The salts are purged from the process system as underflow from centrifuges into salt cake disposal lines. All solid wastes will be transported to an approved waste disposal site by an approved transportation company under a manifest system. Salt bins will be provided and maintained by the transportation company.

The waste salts will of course contain trace arsenic due to lack of complete separation ability of the centrifuges. Salt separation occurs after addition of sodium hypochlorite, therefore, arsenic should be in the pentavalent form. Through contacts with previous and current MSMA manufacturers we know the arsenic content of the salt will be approximately 0.5%.

We will enter into a long term contract with Chemical Waste Management and their disposal facility in Emile, Alabama.

d. Storage and Handling of Raw Materials and Products:

Methyl Chloride is stored under pressure (v.p. $\text{CH}_3\text{CL} = 115.6$ psia). Rupture disks and relief valves protect against overpressurization.

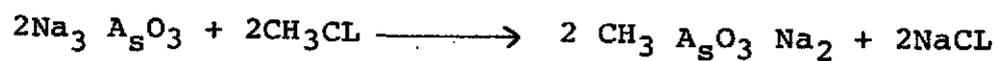
Sulfuric acid, caustic, sodium hypochlorite, sodium arsenite, and all product storage tanks vent to the atmosphere.

Special mention needs to be made of arsenic trioxide, a solid and one of the key raw materials. Arsenic trioxide is highly regulated by OSHA. Initially, as noted previously, we will purchase sodium arsenite slurry, but economics indicate the necessity of back integrating to purchase of arsenic trioxide as a raw material. A "regulated area" will be set up where arsenic trioxide is introduced into the process system. Arsenic trioxide will be shipped to the plant in sealed 25 gallon drums; each drum will contain 440 pounds net. The only opening on the drums is a pressed lid closure with a rubber seal, 185mm in diameter. Drums will be carried by mechanical conveyance to a position in close proximity to where they will be dumped into a reactor with caustic to form sodium arsenite. Once sodium arsenite is formed, the solution can be pumped in closed systems without over concern for worker exposure. The dumping itself is mechanically performed in a system that is designed to prevent worker exposure. Each drum will be placed on a mechanical conveyor where it will travel underneath a ventilation hood to a drum opening station and from there to a chute where it will be inverted, dumped and sprayed clean with water. The flow in the ventilation hood will be provided by a blower protected by a baghouse. The blower will discharge to a water scrubber.

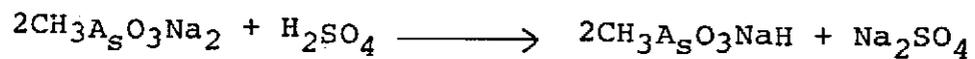
TABLE 1

Textbook Chemistry

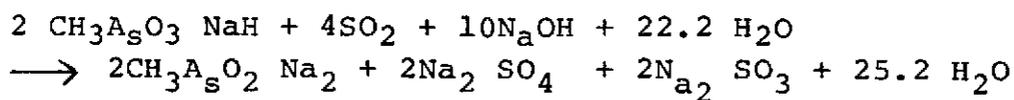
DMSA



MSMA



Caco



Methanol

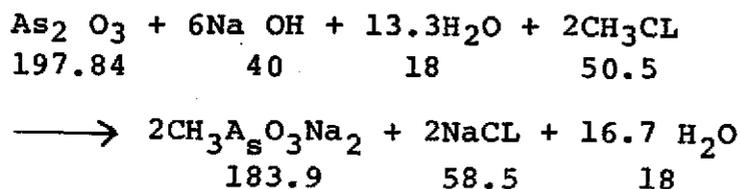


TABLE 2

Theoretical Material Balances

DMSA

1. Overall Reaction:

2. Material Balance (in pounds/pound As_2O_3)

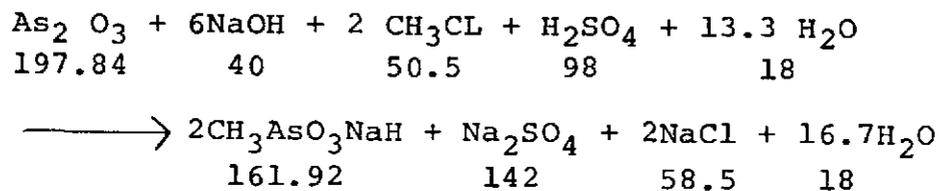
Raw Materials:

Products:

Arsenic Trioxide	1.0	Product	{ DSMA	1.9
			{ H ₂ O	1.3
50% Caustic	{ NaOH 1.2	Salt	{ NaCl 0.6	
	{ H ₂ O 1.2		{ H ₂ O 0.2	
Methyl Chloride	0.5	Vented H ₂ O		0.0
		Discharged H ₂ O		0.0

MSMA

1. Overall Reaction:

2. Material Balance (in pounds/pounds As_2O_3)

Raw Materials:

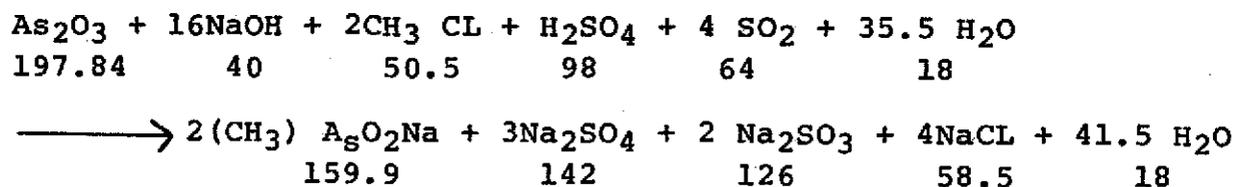
Products:

Arsenic Trioxide	1.0	Product	{ MSMA	1.6
			{ H ₂ O	1.2
50% Caustic	{ NaOH 1.2	Salt	{ Na ₂ SO ₄ 0.7	
	{ H ₂ O 1.2		{ NaCl 0.6	
			{ H ₂ O 0.3	
Methyl Chloride	0.5	Vented H ₂ O		0.0
Sulfuric Acid	0.5	Discharged H ₂ O		0.0

Table 2 (cont'd)

Caco

1. Overall Reaction:



2. Material Balance (in pounds/pound As₂O₃)

Raw Materials:

Arsenic Trioxide		1.0
50% Caustic	{ NaOH	3.2
	{ H ₂ O	3.2
Methyl Chloride		0.5
Sulfuric Acid		0.5
Sulfur Dioxide		1.3

Products:

Product	{	Caco	1.6
		H ₂ O	2.6
Salt	{	Na ₂ SO ₄	2.1
		Na ₂ SO ₃	1.2
		NaCl	1.1
		H ₂ O	1.1
Vented H ₂ O		0.0	
Discharged H ₂ O		0.0	

Appendix "a"

Safety and Handling Information

1. Sodium Hydroxide
2. Arsenic Trioxide
3. Methyl Chloride
4. Sulfuric Acid

SODIUM HYDROXIDE - NaOH - CAUSTIC SODA, WHITE CAUSTIC:

Very corrosive to animal and vegetable tissue.

Flammable: Not combustible but solid form in contact with moisture or water may generate sufficient heat to ignite combustible materials. Contact with some metals can generate hydrogen gas.

Symptoms:

Local: Conjunctivities, corneal burns, deep skin burns.

Inhalation: Irritation of respiratory tract, inflammation of lungs.

Ingestions: Burning in mouth and esophagus, nausea, vomiting, hematemesis, abdominal pain and diarrhea, occasionally with blood, edema of larynx and subsequent suffocation, mediastinitis, cardiovascular collapse and coma.

First Aid: Irrigate eyes with water. Wash contaminated areas of body with soap and water. Treat skin burns as usual. Gastric lavage, if swallowed, with 5% acetic acid, using great care not to perforate the gastrointestinal tract, followed by instillation of olive oil or demulcents.

ARSENIC TRIOXIDE - AS₂O₃:

Synonyms: White arsenic, crude arsenic, arsenious oxide, arsenious anhydride.

Uses: Pigments, ceramic enamels, textile mordant; manufacture of glass, insecticides, rodenticide, herbicide and preservatives; other arsenic compounds.

Properties: Mol wt. 197.82; sp. gr. 4.70 (25); mp 146°C; bp 465°C; sublimes when heated slowly. White or transparent, glassy, amorphous lumps or crystal powder; practically insol in alcohol, ether, carbon disulfide, chloroform, benzene; sol in water with hydrolysis.

Hazardous Potentials:

Toxicity: TLV: 0.5 mg (As)/m³
TDL: or 1-hmm LDLO: 1 mg/kg; Ohl-hmm TCL₀: 110 ug (As)/m³
TFX: SKN

Symptoms:

Acute: Usually latent for about 2 days, headache, dizziness, garlic odor of breath; numbness, chills and tingling of hands and feet; nausea, vomiting, abdominal cramping; abdominal tenderness and rigidity; bronzing of skin, pulmonary edema; jaundice and hepatomegaly, hematuria, albumiurea, oliguria, leukocytosis.

Chronic: Skin - (Usually one to six weeks after onset of exposure). Diffuse, brown, dry, fine, scaly (peeling off and inflammation of skin), desquamative eczematoid dermatitis, hyperpigmentation, hyperkeratosis of palms and soles; conjunctivitis; edema of eyelids; corneal necrosis, nasal irritation, perforation of septum; dryness of throat, hoarseness, dysphagia, brittle nails, loss of hair; keratoses, epithelioranta.

Central Nervous System: Numbness, burning, tingling of hands and feet, fasciculation and gross tremors; defective control of muscles, incoordination, shuffling locomotion, mental confusion.

Gastrointestinal: Nausea, vomiting, abdominal pain, diarrhea, hepatomegaly, jaundice.

Genitourinary: Hematuria, albuminuria, anuria.

Hematopoetic: Depression of bone marrow with hypoplastic anemia.

Handling and Storage:

Protect against physical damage. Store in well-ventilated area away from food or food products and combustible materials. The work is preferably done in closed systems. Wear mechanical filter respirator with hand rubber frame and surgical sheet wadding over nose and cheeks, rubber gloves, boots and long sleeved coveralls.

Emergency Treatment and Measures:

A. Hygienic Precautions: Adequate ventilation - wet methods where possible.

No eating or smoking in work area. Protective cotton clothing, also to be laundered daily. Physical examinations of exposed personnel periodically including complete blood count, urinalysis, and a determination of arsenic in urine, which should not exceed 0.5-1.0 mg/l of urine. Preclude from exposure those individuals with diseases of the skin, blood, liver, kidney and central nervous system.

- B. First Aid: Irrigate eyes with water - wash contaminated areas of body with soap and water.

METHYL CHLORIDE - CH₃Cl:

Synonyms: Chloromethane monochloromethane

Uses: Coolant and refrigerant; low temperature solvent and extractant; organic synthesis; manufacture of non-flammable films; manufacture of thermometers; local anesthetic.

Properties: Mol wt. 50.49; sp. gr. (20) 0.92; mp -97.6°C; bp -23.7°C ref ind (-23.7) 1.3712; crit. temp 143.12°C; crit. pres 65.9 atm. Colorless liquid with sweetish, ethereal odor. Slightly sol in water with decomposition; sol in ethanol, chloroform, benzene, carbontet, glacial acetic acid.

Hazardous Potentials:

- A. Flammability: Flammable. Flash point below 0°C; ignition temp 632°C; vapor density 2.47; flammable limits 8.1-17.2%.
- B. Toxicity: TDL orl-rat LD₅₀; 1800 mg/kg; ihl-rat LCL₀; 6500 mg/m³.

Symptoms by Inhalation:

Central nervous system - headache, vertigo (dizziness), drowsiness; slurred speech, visual disturbance, mental confusion and instability, delirium utterance, ataxia (defective control of muscles) and tremor, coma, convulsion fits.

Digestive Tract: Abdominal (lack of appetite), nausea, vomiting, abdominal pain, diarrhea, hepatomegaly and splenomegaly, jaundice.

Arinary Tract: Albuminuria, hematuria, oliguria, anuria.

Ocular System: Conjunctivitis, dimness of sight, platyconia. Contact with the liquified gas may cause freezing of skin, muscular pain, anemia, cyanosis, weakness and fever.

Handling and Storage:

Store in well-ventilated place controlled below 40°C. No exposure to direct sunlight. Protect containers against physical damage. No fire. Electrical equipment of spark-resistant construction is preferred. Land transport under conditions of temperatures below 40°, separating from flames, heat and crude system; marine transport, loading in hold free from flames and heat, and separating from cabins.

Wear rubber gloves, self-contained breathing apparatus, protective clothing and safety glasses.

Emergency Treatment and Measures:

- A. Hygienic Precautions: Ventilate well. Preclude from exposure those individuals with diseases of kidneys, liver, and central nervous system. Physical examinations of exposed personnel every 6 months including studies of liver and kidney function.

- B. First Aid: Flush eyes with water and hospitalize. Treat with oxygen against shock, and if indicated, administer stimulants. Treat burns of skin in the usual way.
- C. Fire Precautions: When fire occurs, close main valves, and cool tanks with water spray. No hazardous reaction takes place due to the agent's chemical stability. Use dry powder extinguishers.

SULFURIC ACID - H₂SO₄:

Uses: Fertilizers, chemicals, inorganic pigments, petroleum refining, etchant, alkylation catalyst; rayon and film; industrial explosives; nonferrous metallurgy, parchment paper.

Properties: Mol wt. 98.08; sp. gr. 1.84; mp 10.4°C; bp 315-338°C; decomposes at 340°C. Strongly corrosive, dense, oil liquid; colorless to dark brown pending on purity. Miscible with water in all portions. Very reactive, dissolves most metals. Concentrated acid oxidizes, dehydrates or sulfonates most organic compounds. When mixed with water, evolves heat.

Hazardous Potentials:

A. Flammability: Not flammable but highly reactive and capable of igniting finely divided combustible materials on contact. Reacts violently with water and organic materials with evolution of heat. Extremely hazardous in contact with many materials. Attacks and corrodes many metals by releasing hydrogen.

B. Toxicity: TLV: 1 mg/m³
TDL: hl-hmm TCL₀: 800 ug/m³ TFX-MTH

Symptoms:

Local: Conjunctivitis, correal necrosis, dematitis, skin burns, ulceration.

Respiratory: Irritation of nose and throat; laryngeal edema; bronchitis, pneumonitis, pulmonary edema.

Gastrointestinal: Dental erosion; shock, anuria, burning in mouth, throat and abdomen; nausea, vomiting of blood and eroded tissue; perforation of gastrointestinal tract; albumin, blood and casty in urine.

Handling and Storage:

Protect containers against physical damage and prevent contacts with water. Separate from carbides, chlorates, fulminates, nitrates, picrates, powdered metals and combustible materials. Wear rubber gloves, chemical goggles, rubber boots and chemical cartridge respirator.

Emergency Treatment and Measures:

A. Hygienic Precaution - Adequate ventilation. Preclude from exposure those individuals with pulmonary diseases.

B. First Aid - Irrigate eyes with water. Wash contaminated areas of body with soap and water. Gastric lavage (stomach wash), if swallowed. Oxygen, with use of intermittent positive pressure breathing apparatus: 5% solution of sodium bicarbonate as aerosol may be used, as well as broncodilators and decongestants.

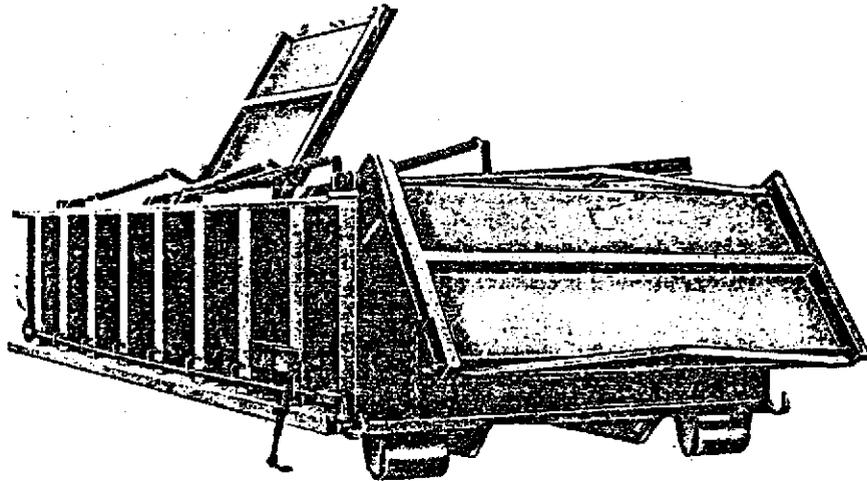
C. Fire Precautions: Fire involving small amount of combustibles may be smothered with suitable dry chemical. Use water on combustibles burning in vicinity of this material but use care as water applied directly to this acid results in evolution of heat and causes spluttering.

Spills and Leakage:

Cover with sodium carbonate or an equal mixture of soda ash and slaked lime.
After mixing, add water if necessary to form a slurry.

Galbreath Roll-Off Sludge

CONTAINER



THIS UNIT IS NOT FOR STORAGE OR
TRANSPORTATION OF FLAMMABLE
OR COMBUSTIBLE MATERIALS, OR
MATERIALS WHICH COULD CAUSE
INJURY TO PERSON OR PROPERTY.

COVERED & OPEN TOP BOX
SR-TH-2048

20' Long X 84" Wide X 48" High
4,000 gallons 20.0 yards

Top Lid Opening 5' X 7' Long
Approx. Weight 7,290 lb. Covered Top
Approx. Weight 5,543 lb. Open Top

SPECIFICATIONS

- * $\frac{1}{2}$ " Floor, $\frac{3}{16}$ " Sides, 10 Ga. Roof
- * $3\frac{1}{2}$ " X $5\frac{1}{2}$ " Side Braces on 24" Centers
- * Inside Welds Pressure Tested
- * 2" X 6" X $\frac{1}{2}$ " Rectangular Tube Long Sills
- * Solid Steel Nose Cone Added To Front of the Long Sill to Prevent Impact Damage
- * 3" Structural Channel Cross Members On 18" Centers. Each Cross Member is Gussetted and Welded to the Long Sill



Appendix "c" - Regulations - Metallo-Organic Pesticides

DATE: July 26, 1982

FROM: R. D. Karkkainen

SUBJECT:

Attached are copies of the water regulations on pesticide chemicals. Note the metallo-organic pesticide subcategory allows "no discharge of process waste water polluants to navigable waters". Hence, the emphasis on the water balance in the attached draft narrative that will form a part of the MSMA plant permit application.

Similarly the groundwater has been and will be analyzed for arsenic content. Present background content is 0.005 ppm. Problems on compliance become definite if the primary drinking water standard (0.05ppm) level is exceeded.

RDK/bh
Attch.

[49168A]

PART 455—PESTICIDES CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

Sec. 455.10 General definitions.

Subpart A—Organic Pesticide Chemicals Manufacturing Subcategory

Sec. 455.20 Applicability; description of the organic pesticide chemicals manufacturing subcategory.

455.21 Specialized definitions.

455.22 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Subpart B—Metallo-Organic Pesticide Chemicals Manufacturing Subcategory

Sec. 455.30 Applicability; description of the metallo-organic pesticide chemicals manufacturing subcategory.

455.31 Specialized definitions.

455.32 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Subpart C—Pesticide Chemicals Formulating and Packaging Subcategory

Sec. 455.40 Applicability; description of the pesticide chemicals formulating and packaging subcategory.

455.41 Specialized definitions. [Reserved]

455.42 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

AUTHORITY: Secs. 301 and 304, Federal Water Pollution Control Act, as amended (33 U.S.C. 1311, 1314, 86 Stat. 816 et seq. ("the Act").

[49168A.05]

§ 455.10 General definitions.

As used in this part:

(a)(1) "Pesticide" means any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.

(b) "Active ingredient" means an ingredient of a pesticide which is intended to prevent, destroy, repel, or mitigate any pest.

(c) "Pesticide chemicals" means the sum of all active ingredients manufactured at each facility covered by this part.

(d) "Pest" means (1) any insect, rodent, nematode, fungus, weed, or (2) any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism (except viruses, bacteria, or other micro-organisms on or in living man or other living animals) which the Administrator declares to be a pest under section 25(c)(1) of Public Law 94-140, Federal Insecticide, Fungicide and Rodenticide Act.

(e) Except as provided in this regulation, the general definitions, abbreviations and methods of analysis set forth in Part 401 of this chapter shall apply to this part.

Subpart A—Organic Pesticide Chemicals Manufacturing Subcategory

[49168A.40]

§ 455.20 Applicability; description of the organic pesticide chemicals manufacturing subcategory.

(a) For the purpose of calculating effluent limitations for COD, BOD₅, and TSS, the provisions of this subpart are applicable to discharges resulting from the manufacture of organic active ingredients, excluding the following: Allethrin, Benzyl Benzoate, Biphenyl, Bisethylxanthogen, Chlorophacinone, Coumafuryl, Dimethyl Phthalate, Diphacinone, Endothall Acid, EXD (Herbisan), Gibberellic Acid, Glyphosate, Methoprene, Naphthalene Acetic Acid, Phenylphenol, Piperonyl Butoxide, Propargite, 1,8 Naphthalic Anhydride, Quinomethionate, Resmethrin, Rotenone, Sulfoxide, Sodium Phenylphenate, Triazine compounds (both symmetrical and asymmetrical), and Warfarin and similar anticoagulants.

(b) For the purpose of calculating effluent limitations for organic pesticide chemicals, the provisions of this subpart are applicable to discharges resulting from the manufacture of the following organic active ingredients: Aldrin, BHC, Captan, Chlordane, DDD, DDE, DDT, Dieldrin, Dieldrin, Endosulfan, Endrin, Heptachlor, Lindane, Methoxychlor, Mirex, PCNB, Toxaphene, Trifluralin, Azinphos Methyl, Demeton-O, Demeton-S, Dia-

zinon, Disulfoton, Malathion, Parathion Methyl, Parathion Ethyl, Aminocarb, Carbaryl, Methiocarb, Mexacarb, Propoxur, Barban, Chlorpropham, Diuron, Fenuron, Fenuron-TCA, Linuron, Monuron, Monuron-TCA, Neburon, Propham, Swep, 2,4-D, Dicamba, Silvex, 2,4,5-T, Siduron, Perthare, and Dicofol.

(c) The intermediates used to manufacture the active ingredients and active ingredients used solely in experimental pesticides are excluded from coverage in this subpart. Insecticidal pathogenic organisms such as *Bacillus thuringiensis*, insect growth hormones, plant extracts such as pyrethrins, sex attractants and botanicals such as Rotenone are also excluded from coverage in this subpart.

[49168A.45]

§ 455.21 Specialized definitions.

(a) "Organic active ingredients" means carbon-containing active ingredients used in pesticides, excluding metalloorganic active ingredients.

(b) "Total organic active ingredients" means the sum of all organic active ingredients covered by § 455.20(a) which are manufactured at a facility subject to this subpart.

(c) "Organic pesticide chemicals" means the sum of all organic active ingredients listed in § 455.20(b) which are manufactured at a facility subject to this subpart.

[49168A.50]

§ 455.22 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitation set forth in this section, EPA took into account all information it was able to collect, develop, and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing

Subpart B—Metallo-Organic Pesticide Chemicals Manufacturing Subcategory

[19168A.75]

§ 455.30 Applicability; description of the metallo-organic pesticide chemicals manufacturing subcategory.

The provisions of this subpart are applicable to discharges resulting from the manufacture of metallo-organic active ingredients containing mercury, cadmium, arsenic, or copper. The manufacture of intermediates used to manufacture the active ingredients are excluded from coverage by this subpart.

[19168A.80]

§ 455.31 Specialized definitions.

(a) "Metallo-organic active ingredients" means carbon containing active ingredients containing one or more metallic atoms in the structure.

[19168A.85]

§ 455.32 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is possible, however, that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations.

The following limitations establish the quantity or quality of pollutants or pollutant properties controlled by this paragraph which may be discharged from the manufacture of metallo-organic active ingredients by a point source subject to the provisions of this paragraph after application of the best practicable control technology currently available: There shall be no discharge of process waste water pollutants to navigable waters.

A NEW MSMA PLANT WILL, OF COURSE, HAVE TO COMPLY WITH THIS
 RAK 7/24/82

processes, products produced, treatment technology available, energy requirements, and costs) which can affect the industry subcategorization and effluent levels established. It is possible, however, that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations.

The following limitations establish the quantity or quality of pollutants or pollutant properties controlled by this paragraph which may be discharged from the manufacture of organic active ingredient by a point source subject to the provisions of this paragraph after application of the best practicable control technology currently available.

Effluent Limitations		
Effluent characteristics	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
COD	13,000	9,000
BOD	7,400	1,600
TSS	6,100	1,800
Organic pesticide chemicals	.010	.0018
pH	(*)	(*)

*Within the range of 6.0 to 9.0.

Note.—For COD, BOD5, and TSS, metric units: Kilogram/1,000 kg of total organic active ingredients, English units: Pound/1,000 lb of total organic active ingredients. For organic pesticide chemicals—metric unit: Kilogram/1,000 kg of organic pesticide chemicals, English unit: Pound/1,000 lb of organic pesticide chemicals.

Subpart C—Pesticide Chemicals Formulating and Packaging Subcategory

[§9168A.110]

§ 455.40 Applicability; description of the pesticide chemicals formulating and packaging subcategory.

The provisions of this subpart are applicable to discharges resulting from all pesticide chemicals formulating and packaging operations.

[§9168A.115]

§ 455.41 Specialized definitions.

[Reserved]

[§9168A.120]

§ 455.42 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is possible, however, that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written find-

ing that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations.

The following limitations establish the quantity or quality of pollutants or pollutant properties controlled by this paragraph from the formulation and packaging of pesticides by a point source subject to the provisions of this paragraph after application of the best practicable control technology currently available. There shall be no discharge of process waste water pollutants to navigable waters.

[Part 455 amended at 43 F. R. 17776, 4-25-78.]

RDK
7/26/82



DATE: June 28, 1982

FROM: R. D. Karkkainen

NOTE: Initially
SODIUM ARSENITE
WILL BE USED.

SUBJECT:

R¹ 4/20/82

Inorganic arsenic is highly regulated. For completeness the entire OSHA regulations are attached. This is the sort of thing proposed for a number of chemicals. For inorganic arsenic it was implemented. The following items are significant with regard to the physical design and operation of the MSMA plant that is being concurrently designed and built.

1. Exposure monitoring must be performed.
2. The Permissible Exposure Limit is 10 micrograms per cubic meter. Employee exposure is that exposure which would occur if the employee were not using a respirator.
3. Areas where the PEL is exceeded must be established as regulated areas. Thus if one milligram of arsenic trioxide were let loose and dispersed in a 25' X 12.5' X 12.5' room, that room would have to be a regulated area.
4. Within a regulated area the following rules apply:
 - a. Only authorized personnel may enter.
 - b. Effort must be expended to minimize exposure using the best engineering methods available.
 - c. Respirators must be worn.
 - d. Protective clothing must be worn.
 - e. Change rooms must be available with separate lockers for street clothes and protective clothing.
 - f. If exposure exceeds 100 micrograms per cubic meter, facilities to allow vacuuming of clothes must be available and used. (I think prudence dictates we set up such a facility for use upon leaving the regulated area.)

- g. Signs must be posted that state "Cancer Hazard, Authorized Personnel Only".
- h. Medical surveillance and employee training programs must be in place.
- i. OSHA must be notified within 60 days of startup of the regulated area.

5. When arsenic trioxide is unloaded we can be certain that the PEL would be exceeded. Therefore, we must regulate that area. In order to minimize the area and the number of people subject to exposure and subject to the rules of a regulated area, we must physically contain that area. Hence the arsenic trioxide unloading system should be similar to that presented in the Williams Brothers Engineering Company package:

- a. The railway car is unloaded in a closed off building or enclosed structure.
- b. Unloading is by vacuum induced flow from the car to storage hopper to filter cartridge to vacuum pump all of which are within the enclosed structure. The vacuum pump would discharge to a caustic scrubber adjacent to the enclosed structure.
- c. The arsenic trioxide would be reacted with caustic in a vessel adjacent to or within the enclosed structure and dispensed in a closed system, non-dusty form to the process area.
- d. Personnel working within the regulated area would wear a full face piece air-purifying respirator equipped with a high-efficiency filter.
- e. Personnel exiting the regulated area would use a vacuuming system for their clothes and shoes.

WHEN PREPARED FOR ARSENIC TRIOXIDE.
SWITCHED TO DELIVERY IN DRUMS.
7/12/91/SZ

Di. [Signature]
bh

TOXIC SUBSTANCES

§ 1910.1018. Inorganic arsenic.

(a) *Scope and application.* This section applies to all occupational exposures to inorganic arsenic except that this section does not apply to employee exposures in agriculture or resulting from pesticide application, the treatment of wood with preservatives or the utilization of arsenically preserved wood.

(b) *Definitions.* "Action level" means a concentration of inorganic arsenic of 5 micrograms per cubic meter of air ($5 \mu\text{g}/\text{m}^3$) averaged over any eight (8) hour period.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Authorized person" means any person specifically authorized by the employer whose duties require the person to enter a regulated area, or any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring and measuring procedures under paragraph (e) of this section.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health, Education and Welfare, or designee.

"Inorganic arsenic" means copper aceto-arsenite and all inorganic compounds containing arsenic except arsine, measured as arsenic (As).

(c) *Permissible exposure limit.* The employer shall assure that no employee is exposed to inorganic arsenic at concentrations greater than 10 micrograms per cubic meter of air ($10 \mu\text{g}/\text{m}^3$), averaged over any 8-hour period.

(d) *Notification of use.* (1) By October 1, 1978 or within 60 days after the introduction of inorganic arsenic into the workplace, every employer who is required to establish a regulated area in his workplaces shall report in writing to the OSHA area office for each such workplace:

(i) The address of each such workplace;

(ii) The approximate number of employees who will be working in regulated areas; and

(iii) A brief summary of the operations creating the exposure and the actions which the employer intends to take to reduce exposures.

(2) Whenever there has been a significant change in the information required by paragraph (d)(1) of this section the employer shall report the changes in writing within 60 days to the OSHA area office.

(e) *Exposure monitoring.*—(1) *General.* (i) Determinations of airborne exposure levels shall be made from air samples that are representative of

each employee's exposure to inorganic arsenic over an eight (8) hour period.

(ii) For the purposes of this section, employee exposure is that exposure which would occur if the employee were not using a respirator.

(iii) The employer shall collect full shift (for at least 7 continuous hours) personal samples including at least one sample for each shift for each job classification in each work area.

(2) *Initial monitoring.* Each employer who has a workplace or work operation covered by this standard shall monitor each such workplace and work operation to accurately determine the airborne concentration of inorganic arsenic to which employees may be exposed.

(3) *Frequency.* (i) If the initial monitoring reveals employee exposure to be below the action level the measurements need not be repeated except as otherwise provided in paragraph (e)(4) of this section.

(ii) If the initial monitoring, required by this section, or subsequent monitoring reveals employer exposure to be above the permissible exposure limit, the employer shall repeat monitoring at least quarterly.

(iii) If the initial monitoring, required by this section, or subsequent monitoring reveals employee exposure to be above the action level and below the permissible exposure limit the employer shall repeat monitoring at least every six months.

(iv) The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least seven (7) days apart, are below the action level at which time the employer may discontinue monitoring for that employee until such time as any of the events in paragraph (e)(4) of this section occur.

(4) *Additional monitoring.* Whenever there has been a production, process, control or personal change which may result in new or additional exposure to inorganic arsenic, or whenever the employer has any other reason to suspect a change which may result in new or additional exposures to inorganic arsenic, additional monitoring which complies with paragraph (e) of this section shall be conducted.

(5) *Employee notification.* (i) Within five (5) working days after the receipt of monitoring results, the employer shall notify each employee in writing of the results which represent that employee's exposures.

(ii) Whenever the results indicate that the representative employee exposure exceeds the permissible exposure limit, the employer shall include in the written notice a statement that the permissible exposure limit was ex-

ceeded and a description of the corrective action taken to reduce exposure to or below the permissible exposure limit.

(6) *Accuracy of measurement.* (i) The employer shall use a method of monitoring and measurement which has an accuracy (with a confidence level of 95 percent) of not less than plus or minus 25 percent for concentrations of inorganic arsenic greater than or equal to $10 \mu\text{g}/\text{m}^3$.

(ii) The employer shall use a method of monitoring and measurement which has an accuracy (with confidence level of 95 percent) of not less than plus or minus 25 percent for concentrations of inorganic arsenic greater than $5 \mu\text{g}/\text{m}^3$ but less than $10 \mu\text{g}/\text{m}^3$.

(f) *Regulated area.*—(1) *Establishment.* The employer shall establish regulated areas where worker exposures to inorganic arsenic, without regard to the use of respirators, are in excess of the permissible limit.

(2) *Demarcation.* Regulated areas shall be demarcated and segregated from the rest of the workplace in any manner that minimizes the number of persons who will be exposed to inorganic arsenic.

(3) *Access.* Access to regulated areas shall be limited to authorized persons or to persons otherwise authorized by the Act or regulations issued pursuant thereto to enter such areas.

(4) *Provision of respirators.* All persons entering a regulated area shall be supplied with a respirator, selected in accordance with paragraph (h)(2) of this section.

(5) *Prohibited activities.* The employer shall assure that in regulated areas, food or beverages are not consumed, smoking products, chewing tobacco and gum are not used and cosmetics are not applied, except that these activities may be conducted in the lunchrooms, change rooms and showers required under paragraph (m) of this section. Drinking water may be consumed in the regulated area.

(g) *Methods of compliance.*—(1) *Controls.* (i) The employer shall institute at the earliest possible time but not later than December 31, 1979, engineering and work practice controls to reduce exposures to or below the permissible exposure limit, except to the extent that the employer can establish that such controls are not feasible.

(ii) Where engineering and work practice controls are not sufficient to reduce exposures to or below the permissible exposure limit, they shall nonetheless be used to reduce exposures to the lowest levels achievable by these controls and shall be supplemented by the use of respirators in accordance with paragraph (h) of this

section and other necessary personal protective equipment. Employee rotation is not required as a control strategy before respiratory protection is instituted.

(2) **Compliance Program.** (i) The employer shall establish and implement a written program to reduce exposures to or below the permissible exposure limit by means of engineering and work practice controls.

(ii) Written plans for these compliance programs shall include at least the following:

(A) A description of each operation in which inorganic arsenic is emitted; e.g. machinery used, material processed, controls in place, crew size, operating procedures and maintenance practices;

(B) Engineering plans and studies used to determine methods selected for controlling exposure to inorganic arsenic;

(C) A report of the technology considered in meeting the permissible exposure limit;

(D) Monitoring data;

(E) A detailed schedule for implementation of the engineering controls and work practices that cannot be implemented immediately and for the adaption and implementation of any additional engineering and work practices necessary to meet the permissible exposure limit;

(F) Whenever the employer will not achieve the permissible exposure limit with engineering controls and work practices by December 31, 1979, the employer shall include in the compliance plan an analysis of the effectiveness of the various controls, shall install engineering controls and institute work practices on the quickest schedule feasible, and shall include in the compliance plan and implement a program to minimize the discomfort and maximize the effectiveness of respirator use; and

(G) Other relevant information.

(iii) Written plans for such a program shall be submitted upon request to the Assistant Secretary and the Director, and shall be available at the worksite for examination and copying by the Assistant Secretary, Director, any affected employee or authorized employee representatives.

(iv) The plans required by this paragraph shall be revised and updated at least every 6 months to reflect the current status of the program.

(h) **Respiratory protection.**—(1) **General.** The employer shall assure that respirators are used where required under this section to reduce employee exposures to below the permissible exposure limit and in emergencies. Respirators shall be used in the following circumstances:

(i) During the time period necessary to install or implement feasible engineering or work practice controls;

(ii) In work operations such as maintenance and repair activities in which the employer establishes that engineering and work practice controls are not feasible;

(iii) In work situations in which engineering controls and supplemental work practice controls are not yet sufficient to reduce exposures to or below the permissible exposure limit; or

(iv) In emergencies.

(2) **Respirator selection.** (i) Where respirators are required under this section the employer shall select, provide at no cost to the employee and assure the use of the appropriate respirator

or combination of respirators from Table I below for inorganic arsenic compounds without significant vapor pressure, or Table II below for inorganic arsenic compounds which have significant vapor pressure.

(ii) Where employee exposures exceed the permissible exposure limit for inorganic arsenic and also exceed the relevant limit for particular gasses such as sulfur dioxide, any air purifying respirator supplied to the employee as permitted by this standard must have a combination high efficiency filter with an appropriate gas sorbent. (See footnote in Table 1)

TABLE I.—Respiratory protection for inorganic arsenic particulate except for those with significant vapor pressure

Concentration of inorganic arsenic (as As) or condition of use	Required respirator
(i) Unknown or greater or lesser than 20,000 $\mu\text{g}/\text{m}^3$ (20 mg/m ³) or firefighting.	(A) Any full facepiece self-contained breathing apparatus operated in positive pressure mode.
(ii) Not greater than 20,000 $\mu\text{g}/\text{m}^3$ (20 mg/m ³)	(A) Supplied air respirator with full facepiece, hood, or helmet or suit and operated in positive pressure mode.
(iii) Not greater than 10,000 $\mu\text{g}/\text{m}^3$ (10 mg/m ³)	(A) Powered air-purifying respirators in all inlet face coverings with high efficiency filters. (B) Half-mask supplied air respirators operated in positive pressure mode.
(iv) Not greater than 500 $\mu\text{g}/\text{m}^3$	(A) Full facepiece air-purifying respirator equipped with high-efficiency filter. (B) Any full facepiece supplied air respirator. (C) Any full facepiece self-contained breathing apparatus.
(v) Not greater than 100 $\mu\text{g}/\text{m}^3$	(A) Half-mask air-purifying respirator equipped with high-efficiency filter. (B) Any half-mask supplied air respirator.

*High-efficiency filter—99.97 pct efficiency against 0.3 micrometer monodisperse diethyl-hexyl phthalate (DOP) particles.

TABLE II.—Respiratory protection for inorganic arsenicals (such as arsenic trichloride¹ and arsenic phosphide) with significant vapor pressure

Concentration of inorganic arsenic (as As) or condition of use	Required respirator
(i) Unknown or greater or lesser than 20,000 $\mu\text{g}/\text{m}^3$ (20 mg/m ³) or firefighting.	(A) Any full facepiece self-contained breathing apparatus operated in positive pressure mode.
(ii) Not greater than 20,000 $\mu\text{g}/\text{m}^3$ (20 mg/m ³)	(A) Supplied air respirator with full facepiece hood, or helmet or suit and operated in positive pressure mode.
(iii) Not greater than 10,000 $\mu\text{g}/\text{m}^3$ (10 mg/m ³)	(A) Half-mask ² supplied air respirator operated in positive pressure mode.
(iv) Not greater than 500 $\mu\text{g}/\text{m}^3$	(A) Front or back mounted gas mask equipped with high-efficiency filter ¹ and acid gas canister. (B) Any full facepiece supplied air respirator. (C) Any full facepiece self-contained breathing apparatus.
(v) Not greater than 100 $\mu\text{g}/\text{m}^3$	(A) Half-mask ² air-purifying respirator equipped with high-efficiency filter ¹ and acid gas cartridge. (B) Any half-mask supplied air respirator.

*High efficiency filter—99.97 pct efficiency against 0.3 micrometer monodisperse diethyl-hexyl phthalate (DOP) particles.

²Half-mask respirators shall not be used for protection against arsenic trichloride, as it is rapidly absorbed through the skin.

[Heading of Section 1910.1018(h), Table II, corrected at 43 FR 28472, June 30, 1978]

(iii) The employer shall select respirators from among those approved for protection against dust, fume, and mist by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR Part 11.

(3) **Respirator usage.** (i) The employer shall assure that the respirator issued to the employee exhibits mini-

mum facepiece leakage and that the respirator is fitted properly.

(ii) The employer shall perform qualitative fit tests at the time of initial fitting and at least semi-annually thereafter for each employee wearing respirators, where quantitative fit tests are not required.

(iii) Employers with more than 20 employees wearing respirators shall

perform a quantitative face fit test at the time of initial fitting and least semi-annually thereafter for each employee wearing negative pressure respirators. The test shall be used to select facepieces that provide the required protection as prescribed in Table I or II.

(iv) If an employee has demonstrated difficulty in breathing during the fitting test or during use, he or she shall be examined by a physician trained in pulmonary medicine to determine whether the employee can wear a respirator while performing the required duty.

(4) *Respirator program.* (i) The employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134 (b), (d), (e) and (f).

(ii) The employer shall permit each employee who uses a filter respirator to change the filter elements whenever an increase in breathing resistance is detected and shall maintain an adequate supply of filter elements for this purpose.

(iii) Employees who wear respirators shall be permitted to leave work areas to wash their face and respirator facepiece to prevent skin irritation associated with respirator use.

(5) *Commencement of respirator use.*

(i) The employer's obligation to provide respirators commences on August 1, 1978 for employees exposed over 500 $\mu\text{g}/\text{m}^3$ of inorganic arsenic, as soon as possible but not later than October 1, 1978 for employees exposed to over 50 $\mu\text{g}/\text{m}^3$ of inorganic arsenic, and as soon as possible but not later than December 1, 1978 for employees exposed between 10 and 50 $\mu\text{g}/\text{m}^3$ of inorganic arsenic.

(ii) Employees with exposures below 50 $\mu\text{g}/\text{m}^3$ of inorganic arsenic may choose not to wear respirators until December 31, 1979.

(iii) After December 1, 1978 any employee required to wear air-purifying respirators may choose, and if so chosen the employer must provide, if it will give proper protection, a powered air purifying respirator and in addition if necessary a combination dust and acid gas respirator for times where exposures to gases are over the relevant exposure limits.

[Sections 1910.1018(h)(3)(iii), (h)(5)(i), and (h)(5)(iii) corrected at 43 FR 28472, June 30, 1978]

(i) [Reserved.]

[Section 1910.1018(i) added as Reserved at 43 FR 28472, June 30, 1978]

(j) *Protective work clothing and equipment—(1) Provision and use.* Where the possibility of skin or eye irritation from inorganic arsenic exists, and for all workers working in regulated areas, the employer shall provide at no cost to the employee and assure that employees use appropriate and clean protective work clothing and equipment such as, but not limited to:

(i) Coveralls or similar full-body work clothing;

(ii) Gloves, and shoes or coverlets;

(iii) Face shields or vented goggles when necessary to prevent eye irritation, which comply with the requirements of §1910.133 (a)(2)-(a)(6); and

(iv) Impervious clothing for employees subject to exposure to arsenic trichloride.

(2) *Cleaning and replacement.* (i) The employer shall provide the protective clothing required in paragraph (j) (1) of this section in a freshly laundered and dry condition at least weekly, and daily if the employee works in areas where exposures are over 100 $\mu\text{g}/\text{m}^3$ of inorganic arsenic or in areas where more frequent washing is needed to prevent skin irritation.

(ii) The employer shall clean, launder, or dispose of protective clothing required by paragraph (j) (1) of this section.

(iii) The employer shall repair or replace the protective clothing and equipment as needed to maintain their effectiveness.

(iv) The employer shall assure that all protective clothing is removed at the completion of a work shift only in change rooms prescribed in paragraph (m) (1) of this section.

(v) The employer shall assure that contaminated protective clothing which is to be cleaned, laundered, or disposed of, is placed in a closed container in the change-room which prevents dispersion of inorganic arsenic outside the container.

(vi) The employer shall inform in writing any person who cleans or launders clothing required by this section, of the potentially harmful effects including the carcinogenic effects of exposure to inorganic arsenic.

(vii) The employer shall assure that the containers of contaminated protective clothing and equipment in the workplace or which are to be removed from the workplace are labelled as follows:

CAUTION: Clothing contaminated with inorganic arsenic; do not remove dust by blowing or shaking. Dispose of inorganic arsenic contaminated wash water in accordance with applicable local, state, or Federal regulations.

(viii) The employer shall prohibit the removal of inorganic arsenic from protective clothing or equipment by blowing or shaking.

[Sections 1910.1018(j)(1), (j)(iii), (j)(2), and (j)(2)(vii) corrected at 43 FR 28472, June 30, 1978]

(k) *Housekeeping—(1) Surfaces.* All surfaces shall be maintained as free as practicable of accumulations of inorganic arsenic.

(2) *Cleaning floors.* Floors and other accessible surfaces contaminated with inorganic arsenic may not be cleaned by the use of compressed air, and shoveling and brushing may be used only where vacuuming or other relevant methods have been tried and found not to be effective.

(3) *Vacuuming.* Where vacuuming methods are selected, the vacuums shall be used and emptied in a manner to minimize the reentry of inorganic arsenic into the workplace.

(4) *Housekeeping plan.* A written housekeeping and maintenance plan shall be kept which shall list appropriate frequencies for carrying out housekeeping operations, and for cleaning and maintaining dust collection equipment. The plan shall be available for inspection by the Assistant Secretary.

(5) *Maintenance of equipment.* Periodic cleaning of dust collection and ventilation equipment and checks of their effectiveness shall be carried out to maintain the effectiveness of the system and a notation kept of the last check of effectiveness and cleaning or maintenance.

(l) [Reserved.]

(m) *Hygiene facilities and practices—(1) Change rooms.* The employer shall provide for employees working in regulated areas or subject to the possibility of skin or eye irritation from inorganic arsenic, clean change rooms equipped with storage facilities for street clothes and separate storage facilities for protective clothing and equipment in accordance with 29 CFR 1910.141(e).

(2) *Showers.* (i) The employer shall assure that employees working in regulated areas or subject to the possibility of skin or eye irritation from inorganic arsenic shower at the end of the work shift.

(ii) The employer shall provide shower facilities in accordance with §1910.141(d)(3).

(3) *Lunchrooms.* (i) The employer shall provide for employees working in regulated areas, lunchroom facilities which have a temperature control, positive pressure, filtered air supply, and which are readily accessible to employees working in regulated areas.

(ii) The employer shall assure that employees working in the regulated area or subject to the possibility of skin or eye irritation from exposure to inorganic arsenic wash their hands and face prior to eating.

(4) *Lavatories.* The employer shall provide lavatory facilities which comply with §1910.141(d)(1) and (2).

(5) *Vacuuming clothes.* The employer shall provide facilities for employees working in areas where exposure, without regard to the use of respirators, exceeds 100 $\mu\text{g}/\text{m}^3$ to vacuum their protective clothing and clean or change shoes worn in such areas before entering change rooms, lunchrooms or shower rooms required by paragraph (j) of this section and shall assure that such employees use such facilities.

(6) *Avoidance of skin irritation.* The employer shall assure that no employee is exposed to skin or eye contact with arsenic trichloride, or to skin or eye contact with liquid or particulate inorganic arsenic which is likely to cause skin or eye irritation.

[Sec. 1910.1018(m)(6)]

(n) *Medical surveillance*—(1) *General*—(i) *Employees covered*. The employer shall institute a medical surveillance program for the following employees:

(A) All employees who are or will be exposed above the action level, without regard to the use of respirators, at least 30 days per year; and

(B) All employees who have been exposed above the action level, without regard to respirator use, for 30 days or more per year for a total of 10 years or more of combined employment with the employer or predecessor employers prior to or after the effective date of this standard. The determination of exposures prior to the effective date of this standard shall be based upon prior exposure records, comparison with the first measurements taken after the effective date of this standard, or comparison with records of exposures in areas with similar processes, extent of engineering controls utilized and materials used by that employer.

(ii) *Examination by physician*. The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.

(2) *Initial examinations*. By December 1, 1978, for employees initially covered by the medical provisions of this section, or thereafter at the time of initial assignment to an area where the employee is likely to be exposed over the action level at least 30 days per year, the employer shall provide each affected employee an opportunity for a medical examination, including at least the following elements:

(i) A work history and a medical history which shall include a smoking history and the presence and degree of respiratory symptoms such as breathlessness, cough, sputum production and wheezing.

(ii) A medical examination which shall include at least the following:

(A) A 14" by 17" posterior-anterior chest X-ray and International Labor Office UICC/Cincinnati (ILO U/C) rating;

(B) A nasal and skin examination;

(C) A sputum cytology examination; and

(D) Other examinations which the physician believes appropriate because of the employees exposure to inorganic arsenic or because of required respirator use.

(3) *Periodic examinations*. (i) The employer shall provide the examinations specified in paragraphs (n)(2)(i) and (n)(2)(ii) (A), (B), and (D) at least annually for covered employees who are under 45 years of age with fewer than 10 years of exposure over the

action level without regard to respirator use.

(ii) The employer shall provide the examinations specified in paragraphs (n)(2)(i) and (n)(2)(ii) of this section at least semi-annually for other covered employees.

(iii) Whenever a covered employee has not taken the examinations specified in paragraphs (n)(2)(i) and (n)(2)(ii) of this section within six (6) months preceding the termination of employment, the employer shall provide such examinations to the employee upon termination of employment.

(4) *Additional examinations*. If the employee for any reason develops signs or symptoms commonly associated with exposure to inorganic arsenic the employer shall provide an appropriate examination and emergency medical treatment.

(5) *Information provided to the physician*. The employer shall provide the following information to the examining physician:

(i) A copy of this standard and its appendices;

(ii) A description of the affected employee's duties as they relate to the employee's exposure;

(iii) The employee's representative exposure level or anticipated exposure level;

(iv) A description of any personal protective equipment used or to be used; and

(v) Information from previous medical examinations of the affected employee which is not readily available to the examining physician.

(6) *Physician's written opinion*. (i) The employer shall obtain a written opinion from the examining physician which shall include:

(A) The results of the medical examination and tests performed;

(B) The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health from exposure to inorganic arsenic;

(C) Any recommended limitations upon the employee's exposure to inorganic arsenic or upon the use of protective clothing or equipment such as respirators; and

(D) A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further explanation or treatment.

(ii) The employer shall instruct the physician not to reveal in the written opinion specific findings or diagnoses unrelated to occupational exposure.

(iii) The employer shall provide a copy of the written opinion to the affected employee.

[Section 1910.1018(n)(5)(i) corrected at 43 FR 28472, June 30, 1978]

(c) *Employee information and training*—(1) *Training program*. (i) The

employer shall institute a training program for all employees who are subject to exposure to inorganic arsenic above the action level without regard to respirator use, or for whom there is the possibility of skin or eye irritation from inorganic arsenic. The employer shall assure that those employees participate in the training program.

(ii) The training program shall be provided by October 1, 1978, for employees covered by this provision, at the time of initial assignment for those subsequently covered by this provision, and shall be repeated at least quarterly for employees who have optional use of respirators and at least annually for other covered employees thereafter; and the employer shall assure that each employee is informed of the following:

(A) The information contained in Appendix A;

(B) The quantity, location, manner of use, storage, sources of exposure, and the specific nature of operations which could result in exposure to inorganic arsenic as well as any necessary protective steps;

(C) The purpose, proper use, and limitation of respirators;

(D) The purpose and a description of the medical surveillance program as required by paragraph (n) of this section;

(E) The engineering controls and work practices associated with the employee's job assignment; and

(F) A review of this standard.

(2) *Access to training materials*. (i) The employer shall make readily available to all affected employees a copy of this standard and its appendices.

(ii) The employer shall provide; upon request, all materials relating to the employee information and training program to the Assistant Secretary and the Director.

[Sections 1910.1018(o)(1)(ii)(A) and (o)(2)(i) corrected at 43 FR 28472, June 30, 1978]

(p) *Signs and labels*—(1) *General*. (i) The employer may use labels or signs required by other statutes, regulations, or ordinances in addition to, or in combination with, signs and labels required by this paragraph.

(ii) The employer shall assure that no statement appears on or near any sign or label required by this paragraph which contradicts or detracts from the meaning of the required sign or label.

(2) *Signs*. (i) The employer shall post signs demarcating regulated areas bearing the legend;

DANGER
INORGANIC ARSENIC
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY
NO SMOKING OR EATING
RESPIRATOR REQUIRED

(ii) The employer shall assure that signs required by this paragraph are illuminated and cleaned as necessary so that the legend is readily visible.

(3) **Labels.** The employer shall apply precautionary labels to all shipping and storage containers of inorganic arsenic, and to all products containing inorganic arsenic except when the inorganic arsenic in the product is bound in such a manner so as to make unlikely the possibility of airborne exposure to inorganic arsenic. (Possible examples of products not requiring labels are semiconductors, light emitting diodes and glass). The label shall bear the following legend:

DANGER

CONTAINS INORGANIC ARSENIC

CANCER HAZARD

HARMFUL IF INHALED OR SWALLOWED

USE ONLY WITH ADEQUATE VENTILATION

OR RESPIRATORY PROTECTION

(q) **Recordkeeping.**—(1) **Exposure monitoring.** (i) The employer shall establish and maintain an accurate record of all monitoring required by paragraph (e) of this section.

(ii) This record shall include:

(A) The date(s), number, duration, location, and results of each of the samples taken, including a description of the sampling procedure used to determine representative employee exposure where applicable;

(B) A description of the sampling and analytical methods used and evidence of their accuracy;

(C) The type of respiratory protective devices worn, if any;

(D) Name, social security number, and job classification of the employees monitored and of all other employees whose exposure the measurement is intended to represent; and

(E) The environmental variables that could affect the measurement of the employee's exposure.

(ii) The employer shall maintain these monitoring records for at least 40 years or for the duration of employment plus 20 years, whichever, is longer.

(2) **Medical surveillance.** (i) The employer shall establish and maintain an accurate record for each employee subject to medical surveillance as required by paragraph (n) of this section.

(ii) This record shall include:

(A) The name, social security number, and description of duties of the employee;

(B) A copy of the physician's written opinions;

(C) Results of any exposure monitoring done for that employee and the representative exposure levels supplied to the physician; and

(D) Any employee medical complaints related to exposure to inorganic arsenic.

(iii) The employer shall in addition keep, or assure that the examining

physician keeps, the following medical records:

(A) A copy of the medical examination results including medical and work history required under paragraph (n) of this section;

(B) A description of the laboratory procedures and a copy of any standards or guidelines used to interpret the test results or references to that information;

(C) The initial X-ray;

(D) The X-rays for the most recent 5 years;

(E) Any X-rays with a demonstrated abnormality and all subsequent X-rays;

(F) The initial cytologic examination slide and written description;

(G) The cytologic examination slide and written description for the most recent 5 years; and

(H) Any cytologic examination slides with demonstrated atypia, if such atypia persists for 3 years, and all subsequent slides and written descriptions.

(iv) The employer shall maintain or assure that the physician maintains those medical records for at least 40 years, or for the duration of employment plus 20 years whichever is longer.

(3) **Availability.** (i) The employer shall make available upon request all records required to be maintained by paragraph (q) of this section to the Assistant Secretary and the Director for examination and copying.

(ii) Records required by this paragraph shall be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.20(a)-(e) and (g)-(i).

[Section 1910.1018(q)(3)(ii) amended at 45 FR 35212, May 23, 1980, effective August 21, 1980]

[Section 1910.1018(q)(3)(iii) revoked at 45 FR 35212, May 23, 1980, effective August 21, 1980]

(4) **Transfer of records.** (i) Whenever the employer ceases to do business, the successor employer shall receive and retain all records required to be maintained by this section.

(ii) Whenever the employer ceases to do business and there is no successor employer to receive and retain the records required to be maintained by this section for the prescribed period, these records shall be transmitted to the Director.

(iii) At the expiration of the retention period for the records required to be maintained by this section, the employer shall notify the Director at least 3 months prior to the disposal of such records and shall transmit those records to the Director if he requests them within that period.

(iv) The employer shall also comply with any additional requirements involving the transfer of records set in 29 CFR 1910.20(h).

[Section 1910.1018(q)(4)(iv) added at 45 FR 35212, May 23, 1980, effective August 21, 1980]

[Sections 1910.1018(q), (q)(1)(ii)(E), and (q)(3)(ii) corrected at 43 FR 28472, June 30, 1978]

(r) **Observation of monitoring.**—(1) **Employee observation.** The employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to inorganic arsenic conducted pursuant to paragraph (e) of this section.

(2) **Observation procedures.** (i) Whenever observation of the monitoring of employee exposure to inorganic arsenic requires entry into an area where the use of respirators, protective clothing, or equipment is required, the employer shall provide the observer with and assure the use of such respirators, clothing, and such equipment, and shall require the observer to comply with all other applicable safety and health procedures.

(ii) Without interfering with the monitoring, observers shall be entitled to:

(A) Receive an explanation of the measurement procedures;

(B) Observe all steps related to the monitoring of inorganic arsenic performed at the place of exposure; and

(C) Record the results obtained or receive copies of the results when returned by the laboratory.

(s) **Effective date.** This standard shall become effective August 1, 1978.

(t) **Appendices.** The information contained in the appendixes to this section is not intended by itself, to create any additional obligations not otherwise imposed by this standard nor deduct from any existing obligation.

[Section 1910.1018(t) corrected at 43 FR 28472, June 30, 1978]

(u) **Startup dates.**—(1) **General.** The startup dates of requirements of this standard shall be the effective date of this standard unless another startup date is provided for either in other paragraphs of this section or in this paragraph.

(2) **Monitoring.** Initial monitoring shall be commenced on August 1, 1978, and shall be completed by September 15, 1978.

(3) **Regulated areas.** Regulated areas required to be established as a result of initial monitoring shall be set up as soon as possible after the results of that monitoring is known and no later than October 1, 1978.

(4) **Compliance program.** The written program required by paragraph (g)(2) as a result of initial monitoring shall be made available for inspection and copying as soon as possible and no later than December 1, 1978.

(5) **Hygiene and lunchroom facilities.** Construction plans for change-rooms, showers, lavatories, and lunchroom facilities shall be completed no later than December 1, 1978, and these facilities shall be constructed and in use no later than July 1, 1979. However, if as part of the compliance plan it

[Sec. 1910.1018(u)(5)]

[Sec. 1910.1018(u)(5)]

is predicted by an independent engineering firm that engineering controls and work practices will reduce exposures below the permissible exposure limit by December 31, 1979, for affected employees, then such facilities need not be completed until 1 year after the engineering controls are completed or December 31, 1980, whichever is earlier, if such controls have not in fact succeeded in reducing exposure to below the permissible exposure limit.

(6) *Summary of startup dates set forth elsewhere in this standard.*

STARTUP DATES

August 1, 1978—Respirator use over 500 $\mu\text{g}/\text{m}^3$.

AS SOON AS POSSIBLE BUT NO LATER THAN

September 15, 1978—Completion of initial monitoring.

October 1, 1978—Complete establishment of regulated areas. Respirator use for employees exposed above 50 $\mu\text{g}/\text{m}^3$. Completion of initial training. Notification of use.

December 1, 1978—Respirator use over 10 $\mu\text{g}/\text{m}^3$. Completion of initial medical. Completion of compliance plan. Optional use of powered air-purifying respirators.

July 1, 1979—Completion of lunch rooms and hygiene facilities.

December 31, 1979—Completion of engineering controls.

Other requirements of the standard have as their startup date August 1, 1978.

[Sections 1910.1018(u)(4) and (u)(6) corrected at 43 FR 28472, June 30, 1978]

APPENDIX A—INORGANIC ARSENIC SUBSTANCE INFORMATION SHEET

I. SUBSTANCE IDENTIFICATION

A. Substance. Inorganic Arsenic.

B. *Definition.* Copper acetoarsenite, arsenic and all inorganic compounds containing arsenic except arsine, measured as arsenic (As).

C. *Permissible Exposure Limit.* 10 micrograms per cubic meter of air as determined as an average over an 8-hour period. No employee may be exposed to any skin or eye contact with arsenic trichloride or to skin or eye contact likely to cause skin or eye irritation.

D. *Regulated Areas.* Only employees authorized by your employer should enter a regulated area.

II. HEALTH HAZARD DATA

A. *Comments.* The health hazard of inorganic arsenic is high.

B. *Ways in which the chemical affects your body.* Exposure to airborne concentrations of inorganic arsenic may cause lung cancer, and can be a skin irritant. Inorganic arsenic may also affect your body if swallowed. One compound in particular, arsenic trichloride, is especially dangerous because it can be absorbed readily through the skin. Because inorganic arsenic is a poison, you should wash your hands thoroughly prior to eating or smoking.

III. PROTECTIVE CLOTHING AND EQUIPMENT

A. *Respirators.* Respirators will be provided by your employer at no cost to you for routine use if your employer is in the process of implementing engineering and work practice controls or where engineering and work practice controls are not feasible or insufficient. You must wear respirators for non-routine activities or in emergency situa-

tions where you are likely to be exposed to levels of inorganic arsenic in excess of the permissible exposure limit. Since how well your respirator fits your face is very important, your employer is required to conduct fit tests to make sure the respirator seals properly when you wear it. These tests are simple and rapid and will be explained to you during training sessions.

B. *Protective clothing.* If you work in a regulated area, your employer is required to provide at no cost to you, and you must wear, appropriate, clean, protective clothing and equipment. The purpose of this equipment is to prevent you from bringing to your home arsenic-contaminated dust and to protect your body from repeated skin contact with inorganic arsenic likely to cause skin irritation. This clothing should include such items as coveralls or similar full-body clothing, gloves, shoes or coverlets, and aprons. Protective equipment should include face shields or vented goggles, where eye irritation may occur.

IV. HYGIENE FACILITIES AND PRACTICES

You must not eat, drink, smoke, chew gum or tobacco, or apply cosmetics in the regulated area, except that drinking water is permitted. If you work in a regulated area your employer is required to provide lunchrooms and other areas for these purposes.

If you work in a regulated area, your employer is required to provide showers, washing facilities, and change rooms. You must wash your face, and hands before eating and must shower at the end of the work shift. Do not take used protective clothing out of change rooms without your employer's permission. Your employer is required to provide for laundering or cleaning of your protective clothing.

V. SIGNS AND LABELS

Your employer is required to post warning signs and labels for your protection. Signs must be posted in regulated areas. The signs must warn that a cancer hazard is present, that only authorized employees may enter the area, and that no smoking or eating is allowed, and that respirators must be worn.

VI. MEDICAL EXAMINATIONS

If your exposure to arsenic is over the Action Level (5 $\mu\text{g}/\text{m}^3$)—(including all persons working in regulated areas) at least 30 days per year, or you have been exposed to arsenic for more than 10 years over the Action Level, your employer is required to provide you with a medical examination. The examination shall be every 6 months for employees over 45 years old or with more than 10 years exposure over the Action Level and annually for other covered employees. The medical examination must include a medical history; a chest x-ray; skin examination; nasal examination and sputum cytology exam for the early detection of lung cancer. The cytology exams are only included in the initial exam and examinations given after you are either 45 years or older or have 10 or more years employment over the Action Level. The examining physician will provide a written opinion to your employer containing the results of the medical exams. You should also receive a copy of this opinion. The physician must not tell your employer any conditions he detects unrelated to occupational exposure to arsenic but must tell you those conditions.

VII. OBSERVATION OF MONITORING

Your employer is required to monitor your exposure to arsenic and you or your representatives are entitled to observe the monitoring procedure. You are entitled to receive an explanation of the measurement procedure, and to record the results obtained. When the monitoring procedure is taking place in an area where respirators or personal protective clothing and equipment are required to be worn, you must also be provided with and must wear the protective clothing and equipment.

VIII. ACCESS TO RECORDS

You or your representative are entitled to records of your exposure to inorganic arsenic and your medical examination records if you request your employer to provide them. [Section 1910.1018, Appendix A (VIII) amended at 45 FR 35212, May 23, 1980, effective August 21, 1980]

IX. TRAINING AND NOTIFICATION

Additional information on all of these items plus training as to hazards of exposure to inorganic arsenic and the engineering and work practice controls associated with your job will also be provided by your employer. If you are exposed over the permissible exposure limit, your employer must inform you of that fact and the actions he is taking to reduce your exposures.

APPENDIX B—SUBSTANCE TECHNICAL GUIDELINES

ARSENIC, ARSENIC TRIOXIDE, ARSENIC TRICHLORIDE (THREE EXAMPLES)

I. Physical and chemical properties

A. Arsenic (metal).

1. Formula: As.
2. Appearance: Gray metal.
3. Melting point: Sublimes without melting at 613C.
4. Specific Gravity: (H₂O=1):5.73.
5. Solubility in water: Insoluble.

B. Arsenic Trioxide.

1. Formula: As₂O₃, (As₄O₆).
2. Appearance: White powder.
3. Melting point: 315C.
4. Specific Gravity (H₂O=1):3.74.
5. Solubility in water: 3.7 grams in 100cc of water at 20c.
6. Arsenic Trichloride (liquid).

1. Formula: AsCl₃.

2. Appearance: Colorless or pale yellow liquid.
3. Melting point: -8.5C.
4. Boiling point: 130.2C.
5. Specific Gravity (H₂O=1):2.16 at 20C.
6. Vapor Pressure: 10mm Hg at 23.5C.
7. Solubility in Water: Decomposes in water.

II. Fire, explosion and reactivity data.

A. *Fire:* Arsenic, arsenic Trioxide and Arsenic Trichloride are nonflammable.

B. Reactivity:

1. Conditions Contributing to Instability: Heat.
2. Incompatibility: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.

III. Monitoring and Measurement Procedures

Samples collected should be full shift (at least 7-hour) samples. Sampling should be

done using a personal sampling pump at a flow rate of 2 liters per minute. Samples should be collected on 0.8 micrometer pore size membrane filter (37mm diameter). Volatile arsenicals such as arsenic trichloride can be most easily collected in a midge bubbler filled with 15 ml. of 0.1 N NaOH.

The method of sampling and analysis should have an accuracy of not less than ± 25 percent (with a confidence limit of 95 percent) for 10 micrograms per cubic meter of air ($10 \mu\text{g}/\text{m}^3$) and ± 35 percent (with a confidence limit of 95 percent) for concentrations of inorganic arsenic between 5 and $10 \mu\text{g}/\text{m}^3$.

APPENDIX C—MEDICAL SURVEILLANCE GUIDELINES

I. GENERAL

Medical examinations are to be provided for all employees exposed to levels of inorganic arsenic above the action level ($5 \mu\text{g}/\text{m}^3$) for at least 30 days per year (which would include among others, all employees, who work in regulated areas). Examinations are also to be provided to all employees who have had 10 years or more exposure above the action level for more than 30 days per year while working for the present or predecessor employer though they may no longer be exposed above the level.

An initial medical examination is to be provided to all such employees by December 1, 1978. In addition, an initial medical examination is to be provided to all employees who are first assigned to areas in which worker exposure will probably exceed $5 \mu\text{g}/\text{m}^3$ (after the effective date of this standard) at the time of initial assignment. In addition to its immediate diagnostic usefulness, the initial examination will provide a baseline for comparing future test results. The initial examination must include as a minimum the following elements:

- (1) A work and medical history, including a smoking history, and presence and degree of respiratory symptoms such as breathlessness, cough, sputum production, and wheezing;
- (2) A 14" by 17" posterior-anterior chest X-ray and an International Labor Office UICC/Cincinnati (ILO U/C) rating;
- (3) A nasal and skin examination;
- (4) A Sputum Cytology examination; and
- (5) Other examinations which the physician believes appropriate because of the employee's exposure to inorganic arsenic or because of required respirator use.

Periodic examinations are also to be provided to the employees listed above. The periodic examinations shall be given annually for those covered employees 45 years of age or less with fewer than 10 years employment in areas where employee exposure exceeds the action level ($5 \mu\text{g}/\text{m}^3$). Periodic examinations need not include sputum cytology and only an updated medical history is required.

Periodic examinations for other covered employees, shall be provided every six (6) months. These examinations shall include all tests required in the initial examination, except that the medical history need only be updated.

The examination contents are minimum requirements. Additional tests such as lateral and oblique X-rays or pulmonary function tests may be useful. For workers exposed to three arsenicals which are associated with lymphatic cancer, copper acetoar-

senite, potassium arsenite, or sodium arsenite the examination should also include palpation of superficial lymph nodes and complete blood count.

II. NONCARCINOGENIC EFFECTS

The OSHA standard is based on minimizing risk of exposed workers dying of lung cancer from exposure to inorganic arsenic. It will also minimize skin cancer from such exposures.

The following three sections quoted from "Occupational Diseases: A Guide to Their Recognition", Revised Edition, June 1977, National Institute for Occupational Safety and Health is included to provide information on the nonneoplastic effects of exposure to inorganic arsenic. Such effects should not occur if the OSHA standards are followed.

A. *Local*—Trivalent arsenic compounds are corrosive to the skin. Brief contact has no effect but prolonged contact results in a local hyperemia and later vesicular or pustular eruption. The moist mucous membranes are most sensitive to the irritant action. Conjunctiva, moist and macerated areas of skin, the eyelids, the angles of the ears, nose, mouth, and respiratory mucosa are also vulnerable to the irritant effects. The wrists are common sites of dermatitis, as are the genitalia if personal hygiene is poor. Perforations of the nasal septum may occur. Arsenic trioxide and pentoxide are capable of producing skin sensitization and contact dermatitis. Arsenic is also capable of producing keratoses, especially of the palms and soles.

B. *Systemic*—The acute toxic effects of arsenic are generally seen following ingestion of inorganic arsenical compounds. This rarely occurs in an industrial setting. Symptoms develop within $\frac{1}{2}$ to 4 hours following ingestion and are usually characterized by constriction of the throat followed by dysphagia, epigastric pain, vomiting, and watery diarrhea. Blood may appear in vomitus and stools. If the amount ingested is sufficiently high, shock may develop due to severe fluid loss, and death may ensue in 24 hours. If the acute effects are survived, exfoliative dermatitis and peripheral neuritis may develop.

Cases of acute arsenical poisoning due to inhalation are exceedingly rare in industry. When it does occur, respiratory tract symptoms—cough, chest pain, dyspnea—giddiness, headache, and extreme general weakness precede gastrointestinal symptoms. The acute toxic symptoms of trivalent arsenical poisoning are due to severe inflammation of the mucous membranes and greatly increased permeability of the blood capillaries.

Chronic arsenical poisoning due to ingestion is rare and generally confined to patients taking prescribed medications. However, it can be a concomitant of inhaled inorganic arsenic from swallowed sputum and improper eating habits. Symptoms are weight loss, nausea and diarrhea alternating with constipation, pigmentation and eruption of the skin, loss of hair, and peripheral neuritis. Chronic hepatitis and cirrhosis have been described. Polyneuritis may be the salient feature, but more frequently there are numbness and parasthenias of "glove and stocking" distribution. The skin lesions are usually melanotic and keratotic and may occasionally take the form of an intradermal cancer of the squamous cell type, but without infiltrative properties.

Horizontal white lines (striations) on the fingernails and toenails are commonly seen in chronic arsenical poisoning and are considered to be a diagnostic accompaniment of arsenical polyneuritis.

Inhalation of inorganic arsenic compounds is the most common cause of chronic poisoning in the industrial situation. This condition is divided into three phases based on signs and symptoms.

First Phase: The worker complains of weakness, loss of appetite, some nausea, occasional vomiting, a sense of heaviness in the stomach, and some diarrhea.

Second Phase: The worker complains of conjunctivitis, a catarrhal state of the mucous membranes of the nose, larynx, and respiratory passage. Coryza, hoarseness, and mild tracheobronchitis may occur. Perforation of the nasal septum is common, and is probably the most typical lesion of the upper respiratory tract in occupational exposure to arsenical dust. Skin lesions, eczematoid and allergic in type, are common.

Third Phase: The worker complains of symptoms of peripheral neuritis, initially of hands and feet, which is essentially sensory. In more severe cases, motor paralysis occurs; the first muscles affected are usually the toe extensors and the peronei. In only the most severe cases will paralysis of flexor muscles of the feet or of the extensor muscles of hands occur.

Liver damage from chronic arsenical poisoning is still debated, and as yet the question is unanswered. In cases of chronic and acute arsenical poisoning, toxic effects to the myocardium have been reported based on EKG changes. These findings, however, are now largely discounted and the EKG changes are ascribed to electrolyte disturbances concomitant with arsenicalism. Inhalation of arsenic trioxide and other inorganic arsenical dusts does not give rise to radiological evidence or pneumoconiosis. Arsenic does have a depressant effect upon the bone marrow, with disturbances of both erythropoiesis and myelopoiesis.

[Section 1910.1018, Appendix C, paragraph I.B. corrected at 43 FR 28472, June 30, 1978]

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III. SPUTUM CYTOLOGY

Sputum can be collected by aerosol inhalation during the medical exam or by spontaneous early morning cough at home. Sputum is induced by transoral inhalation of an aerosolized solution of eight per cent (8 percent) sodium chloride in water. After inhaling as few as three to five breaths the

subject usually yields an adequate sputum. All sputum should be collected directly into sixty percent (60 percent) alcohol.

Scientific evidence suggests that chest X-rays and sputum cytology should be used together as screening tests for lung tests for lung cancer in high risk populations such as workers exposed to inorganic arsenic. The

tests are to be performed every six months on workers who are 45 years of age or older or have worked in the regulated area for 10 or more years. Since the tests seem to be complementary, it may be advantageous to alternate the test procedures. For instance, chest X-rays could be obtained in June and December and sputum cytologies could be

obtained in March and September. Facilities for providing necessary diagnostic investigation should be readily available as well as chest physicians, surgeons, radiologists, pathologists and immunotherapists to provide any necessary treatment services. [Section 1910.1018 added at 43 FR 19624, May 5, 1978; effective August 1, 1978]

[The next page is 31:8421]

nonpotable substance shall be such as to prevent backflow or backsiphonage into a potable water system.

(iii) Nonpotable water shall not be used for washing any portion of the person, cooking or eating utensils, or clothing. Nonpotable water may be used for cleaning work premises, other than food processing and preparation premises and personal service rooms: *Provided*, That this nonpotable water does not contain concentrations of chemicals, fecal coliform, or other substances which could create insanitary conditions or be harmful to employees.

(c) *Toilet facilities.*—(1) *General.*—(i) Except as otherwise indicated in this subdivision (1), toilet facilities in toilet rooms separate for each sex, shall be provided in all places of employment in accordance with table J-1 of this section. The number of facilities to be provided for each sex shall be based on the number of employees of that sex for whom the facilities are furnished. Where toilet rooms will be occupied by no more than one person at a time, can be locked from the inside, and contain at least one water closet, separate toilet rooms for each sex need not be provided. Where such single-occupancy rooms have more than one toilet facility, only one such facility in each toilet room shall be counted for the purpose of table J-1.

TABLE J-1

Number of employees	Minimum number of water closets ¹
1 to 15	1.
16 to 35	2.
36 to 55	3.
56 to 80	4.
81 to 110	5.
Number of employees	Minimum number of water closets ¹
111 to 150	6.
Over 150	1 additional fixture for each additional 40 employees.

¹ Where toilet facilities will not be used by women, urinals may be provided instead of water closets, except that the number of water closets in such cases shall not be reduced to less than 2/3 of the minimum specified.

(ii) The requirements of subdivision (i) of this subparagraph do not apply to mobile crews or to normally unattended work locations so long as employees working at these locations have transportation immediately available to nearby toilet facilities which meet the other requirements of this subparagraph.

(iii) The sewage disposal method shall not endanger the health of employees.

- (iv) [Revoked]
- (v) [Revoked]
- (vi) [Revoked]
- (vii) [Revoked]

(2) *Construction of toilet rooms.*—(i) Each water closet shall occupy a separate compartment with a door and walls or partitions between fixtures sufficiently high to assure privacy.

- (ii) [Revoked]
- (iii) [Revoked]
- (3) *Construction and installation of toilet facilities.* (i) [Revoked]
- (ii) [Revoked]
- (iii) [Revoked]

(d) *Washing facilities.*—(1) *General.*—Washing facilities shall be maintained in a sanitary condition.

(2) *Lavatories.*—(1) Lavatories shall be made available in all places of employment. The requirements of this subdivision do not apply to mobile crews or to normally unattended work locations if employees working at these locations have transportation readily available to nearby washing facilities which meet the other requirements of this paragraph.

Table J-2 [Revoked]

(ii) Each lavatory shall be provided with hot and cold running water, or tepid running water.

(iii) Hand soap or similar cleansing agents shall be provided.

(iv) Individual hand towels or sections thereof, of cloth or paper, warm air blowers or clean individual sections of continuous cloth toweling, convenient to the lavatories, shall be provided.

- (v) [Revoked]
- (vi) [Revoked]
- (vii) [Revoked]

(3) *Showers.*—(1) Whenever showers are required by a particular standard, the showers shall be provided in accordance with subdivisions (ii) through (v) of this subparagraph.

(ii) One shower shall be provided for each 10 employees of each sex, or numerical fraction thereof, who are required to shower during the same shift.

(iii) Body soap or other appropriate cleansing agents convenient to the showers shall be provided as specified in paragraph (d) (2) (iii) of this section.

(iv) Showers shall be provided with hot and cold water feeding a common discharge line.

(v) Employees who use showers shall be provided with individual clean towels.

(e) *Change rooms.*—Whenever employees are required by a particular standard to wear protective clothing because of the possibility of contamination with toxic materials, change rooms equipped with storage facilities for street clothes and separate storage facilities for the protective clothing shall be provided.

(f) *Clothes drying facilities.*—Where working clothes are provided by the employer and become wet or are washed between shifts, provision shall be made to insure that such clothing, is dry before reuse.

(g) *Consumption of food and beverages on the premises.*—(1) *Application.*—This paragraph shall apply only where employees are permitted to consume food or beverages, or both, on the premises.

(2) *Eating and drinking areas.*—No employee shall be allowed to consume

food or beverages in a toilet room nor in any area exposed to a toxic material.

(3) *Waste disposal containers.*—Receptacles constructed of smooth, corrosion resistant, easily cleanable, or disposable materials, shall be provided and used for the disposal of waste food. The number, size, and location of such receptacles shall encourage their use and not result in overflowing. They shall be emptied not less frequently than once each working day, unless unused, and shall be maintained in a clean and sanitary condition. Receptacles shall be provided with a solid tight-fitting cover unless sanitary conditions can be maintained without use of a cover.

(4) *Sanitary storage.*—No food or beverages shall be stored in toilet rooms or in an area exposed to a toxic material.

(h) *Food handling.*—All employee food service facilities and operations shall be carried out in accordance with sound hygienic principles. In all places of employment where all or part of the food service is provided, the food dispensed shall be wholesome, free from spoilage, and shall be processed, prepared, handled, and stored in such a manner as to be protected against contamination.

[Section 1910.141 amended at 38 FR 10932, May 3, 1973, effective June 4, 1973; Sections 1910.141 (b) (1) (ii), (b) (1) (iv), (b) (1) (vii), (c) (1) (iv) through (vii), (c) (2) (ii) and (iii), (c) (3) (i) through (iii), (d) (2) (v) through (vii) and Table J-2 revoked; and 1910.141 (d) (2) (i) amended at 43 FR 49726, October 24, 1978, effective November 24, 1978]

§1910.142 Temporary labor camps.

(a) *Site.* (1) All sites used for camps shall be adequately drained. They shall not be subject to periodic flooding, nor located within 200 feet of swamps, pools, sink holes, or other surface collections of water unless such quiescent water surfaces can be subjected to mosquito control measures. The camp shall be located so the drainage from and through the camp will not endanger any domestic or public water supply. All sites shall be graded, ditched, and rendered free from depressions in which water may become a nuisance.

(2) All sites shall be adequate in size to prevent overcrowding of necessary structures. The principal camp area in which food is prepared and served and where sleeping quarters are located shall be at least 500 feet from any area in which livestock is kept.

(3) The grounds and open areas surrounding the shelters shall be maintained in a clean and sanitary condition free from rubbish, debris, waste paper, garbage, or other refuse.

(4) Whenever the camp is closed for the season or permanently, all garbage, manure, and other refuse shall be collected and so disposed of as to prevent nuisance. All abandoned privy pits shall

1910.141(d)(3)

CONFIDENTIAL SECTION

PERMIT DRAWINGS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26		
MSMA												4500		4500		9000			9000.0			9000.0		9000.0			MSMA	
As ₂ O ₃	573.24			229.4	114.7		114.7																					As ₂ O ₃
NaOH		7961.5		1303.2	651.6																							NaOH
H ₂ O		7961.5	8675	18121.6	9060.8		9060.8		777.6	9794.3	278	9824.6	333.6	10102.7	55.5	20203.4	14040.5	260.7	5904.2	1000.8	163.1	6741.9	14442	956.1	10.5	250.2	H ₂ O	
Na ₂ AsO ₃				10676.2	5338.1																							Na ₂ AsO ₃
H ₂ SO ₄						2226.9		TRACE																				H ₂ SO ₄
CH ₃ Cl							5113.9			5113.9																		CH ₃ Cl
DMSA							2579.4			2647.4		2647.4		1588.4	1059.0	376.8			376.8		3113.3	63.5		63.5				DMSA
NaCl									86.4																			NaCl
NaOCl																												NaOCl
As ₂ O ₃ ·H ₂ O										175.0		175.0		175.0		350.0			350.0			350.0		350.0				H ₂ AsO ₄ ·H ₂ O
CH ₃ OH							521.3			521.3		521.3		521.3		1042.6		1042.6							1042.6			CH ₃ OH
H ₂ SO ₄											1360.2																	H ₂ SO ₄
Na ₂ SO ₄											1974.0		1184.4	789.6	2328.8				2328.8		2321.4	47.4		47.4				Na ₂ SO ₄
TOTAL BATCH	5732.0	15923	8675	30330.4	15165.4	2226.9	17390.1	TRACE	86.4	16284.4	1388.0	1942.3	333.6	12071.8	1904.1	36143.4	14040.5	1303.3	20799.8	1000.8	5597.8	6202.8	14442	1764.7	1053.1	250.2	TOTAL LB/BATCH	

SODIUM ARSENITE

DMSA
(NOTE THERE ARE PARALLEL PRODUCTION LINES)

NaOCl ADDITION

MSMA

FIRST CENTRIFUGE PASS

EVAPORATION

SECOND CENTRIFUGE PASS

PRODUCT STORAGE

METHANOL RECOVERY

← 2 BATCHES/DAY

← 2 BATCHES/DAY PER PRODUCTION LINE

4 BATCHES/DAY

← 2 BATCHES/DAY

60660.8

23017.6

28569.2

7616.9

11195.8

35224.0

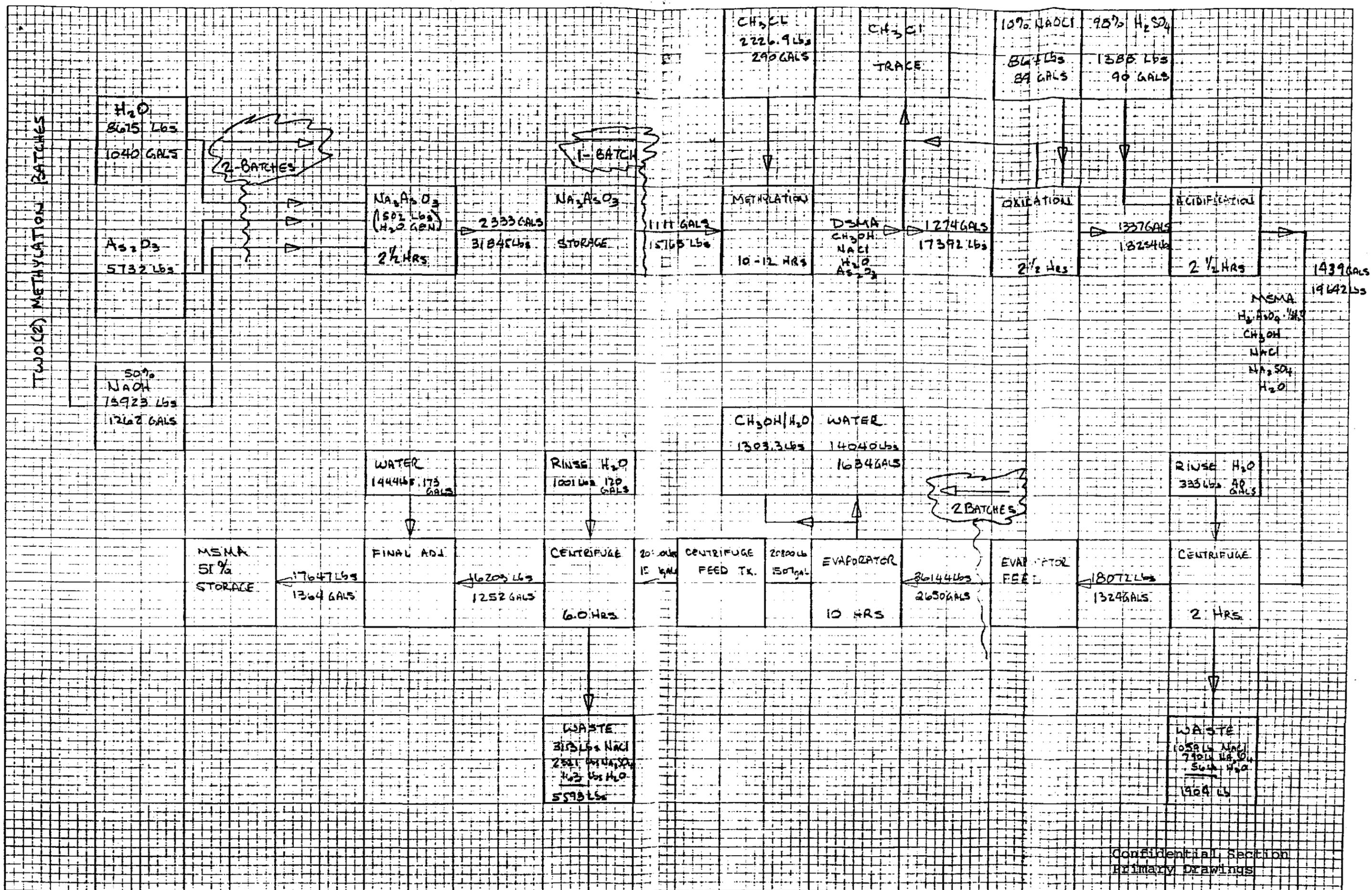
2106.2

TOTAL LOS/DAY

Confidential Section Permit Drawings

"b" Material Balance

SCALE: 10 X TO PER INCH
MADE IN U.S.A.



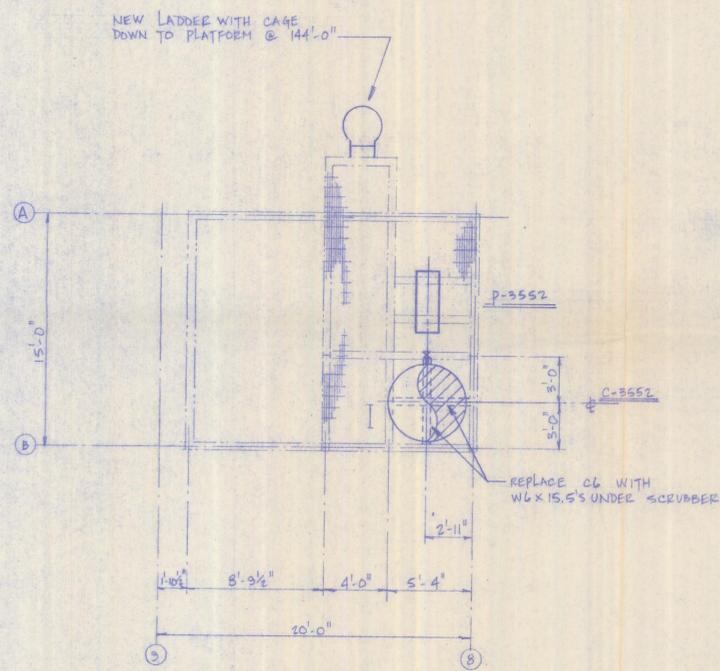
Confidential Section
Primary Drawings

c. Simplified Flow Sketch

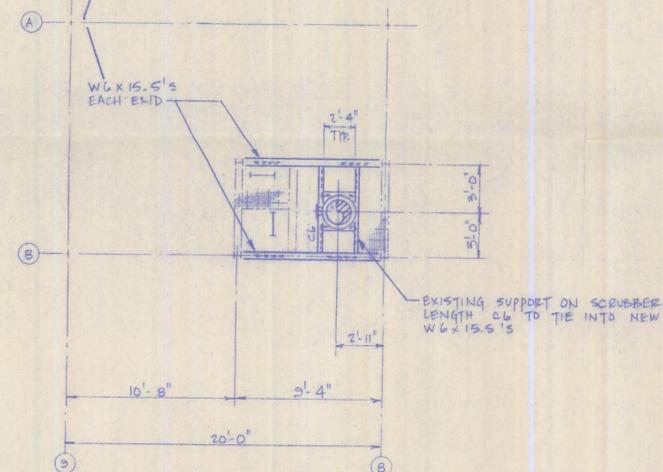
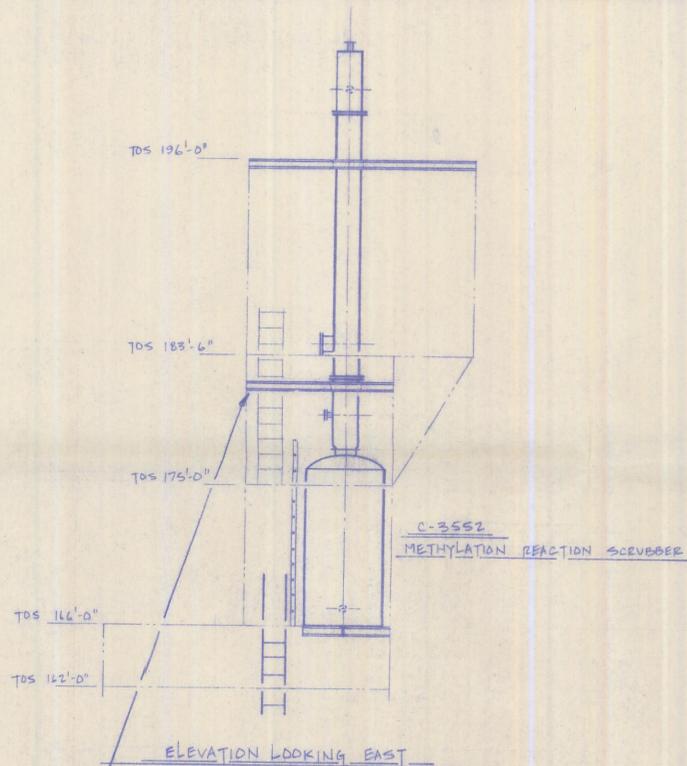
CONFIDENTIAL WORKING DRAWINGS

DRAWING LIST

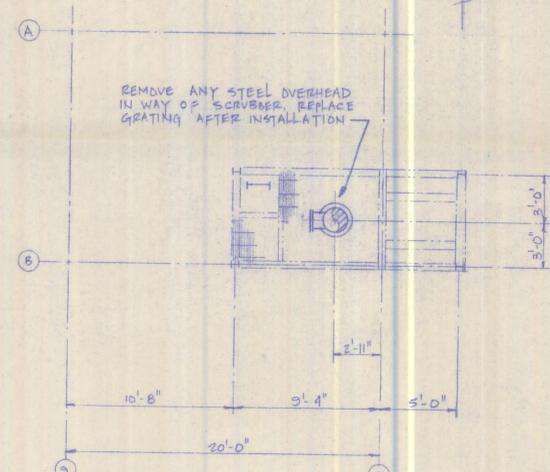
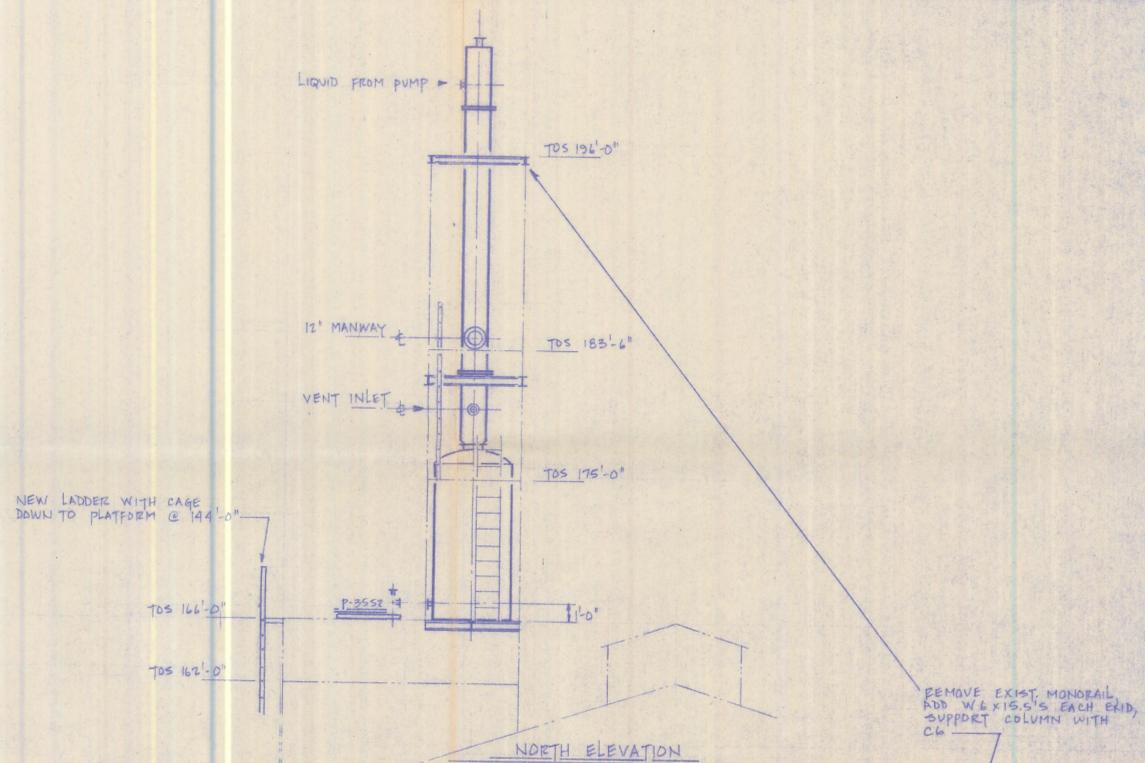
TITLE:		DRAWING NUMBER:
a.	Pond I.D. Sheet 1	001
	" 2	002
	" 3	003
	" 4	004
b.	Plot Plan Sheet 1	201
	" 2	202
c.	Scrubber Details	222
d.	Roofing - Elevation Sheet 3	233
e.	Concrete Drains and Curbs	302



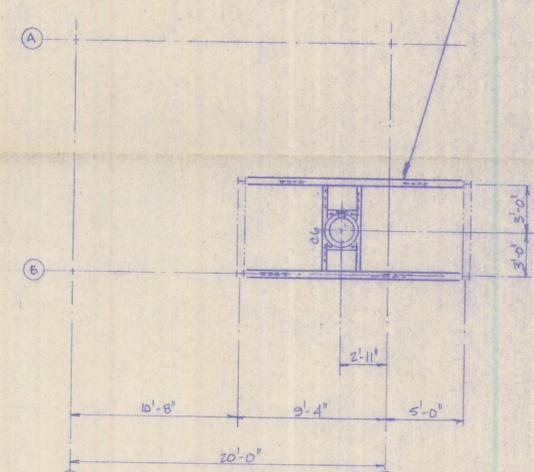
PLAN @ TDS EL 166'-0"



PLAN @ TDS EL 175'-0"



PLAN @ TDS EL 183'-6"



PLAN @ TDS EL 196'-0"

VERTAC, INC.
Vickaburg Plant

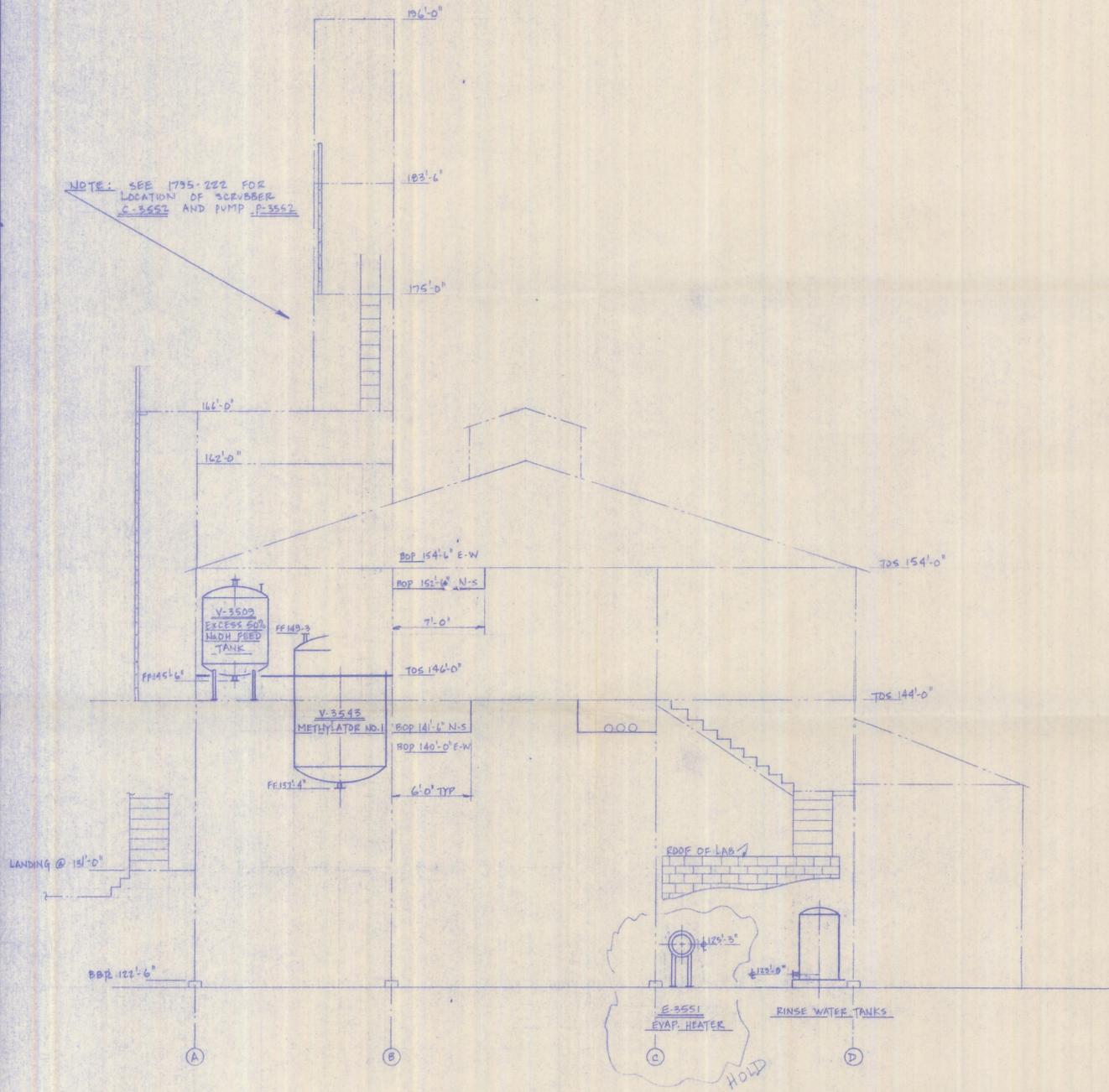
P.O. BOX 3
VICKSBURG, MISSISSIPPI 39180
TELEPHONE: (601) 636-1221

MSMA PROJECT
EQUIPMENT ARRANGEMENT
SCRUBBER AREA
PLANS AND ELEVATIONS

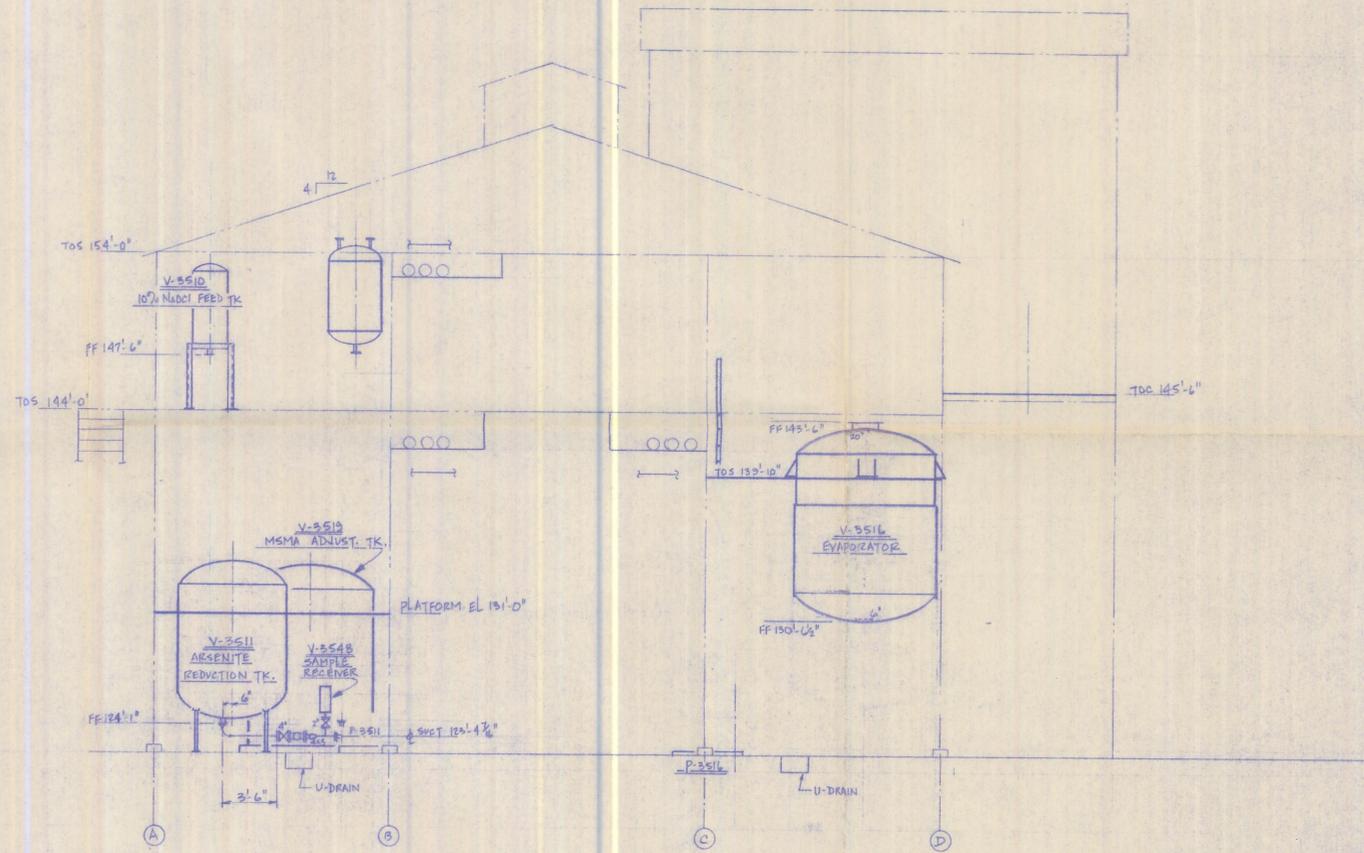
SCALE	3/16" = 1'-0"	APPROVAL- TECHNICAL
DWN	E. SHARP	APPROVAL- PRODUCTION
CKD		APPROVAL- SAFETY
DATE	9-14-82	NO. 1755-222

Handwritten signature: E. Sharp

NOTE: SEE 1795-222 FOR LOCATION OF SCRUBBER C-3552 AND PUMP P-3552



NORTH ELEVATION @ COLUMN LINE 6



NORTH ELEVATION @ COLUMN LINE 7

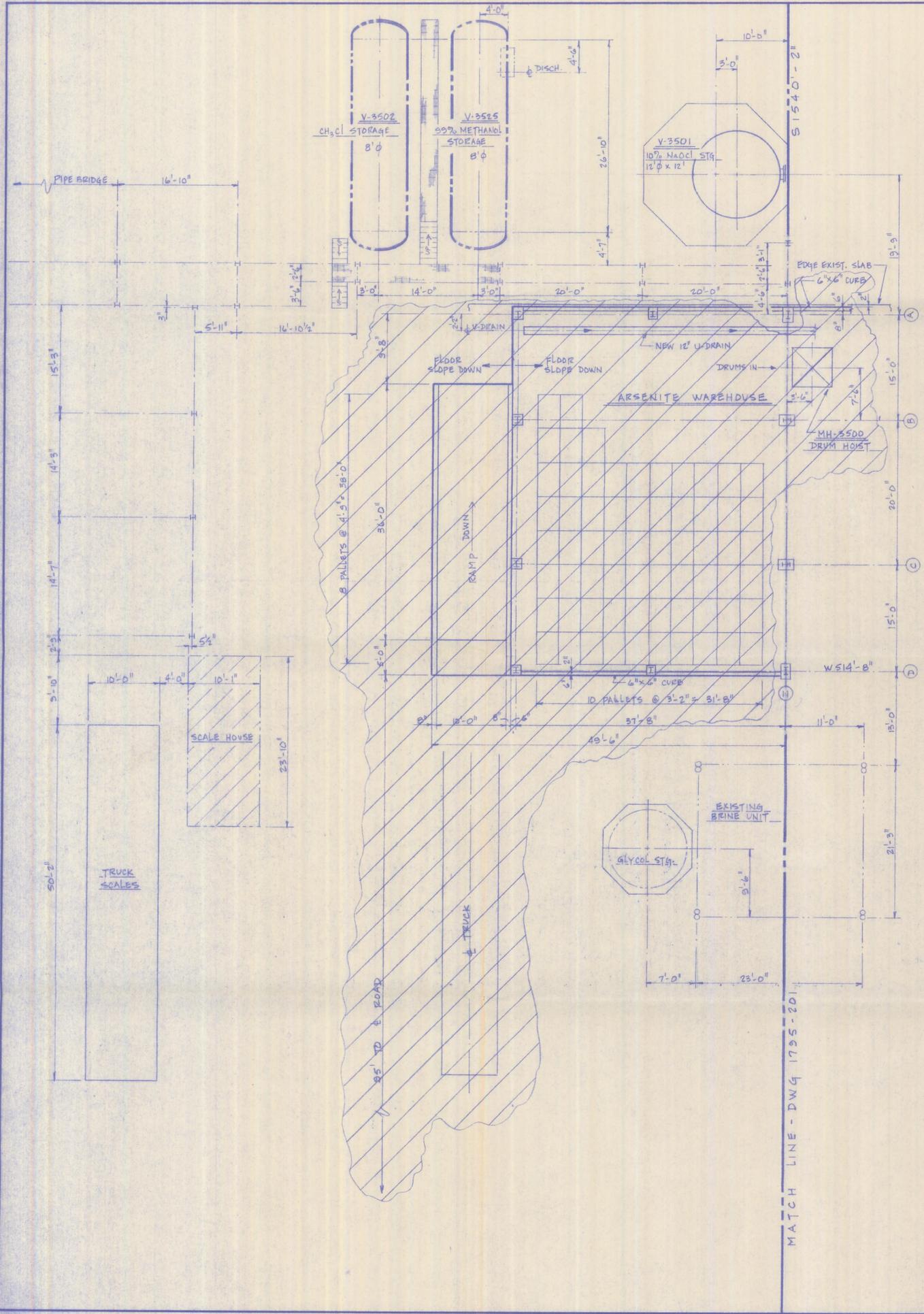


MSMA PROJECT
EQUIPMENT ARRANGEMENT
ELEVATIONS, SH. 3

*Conf. D. in Field
9/24/82*

SCALE	3/16" = 1'-0"	APPROVAL- TECHNICAL
DWN	R. SHARP	APPROVAL- PRODUCTION
CKD		APPROVAL- SAFETY
DATE	3-15-82	NO. 1795-233

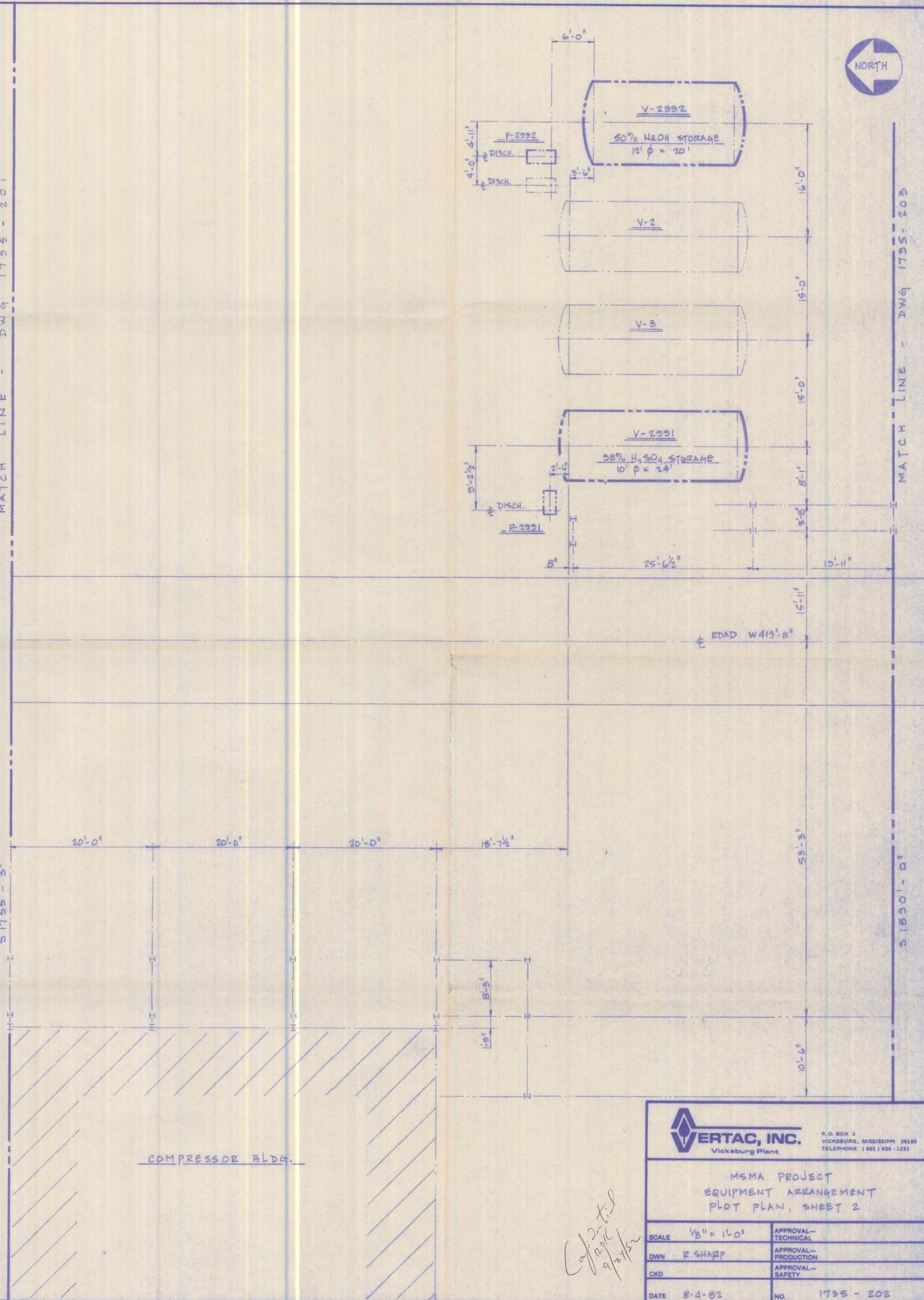
DRAWING 11525



MATCH LINE - DWG 1795 - 201

S 1755 - 3"

MATCH LINE - DWG 1795 - 201



MATCH LINE - DWG 1755 - 203

S 1801 - 01

VERTAC, INC.
Vicksburg Plant

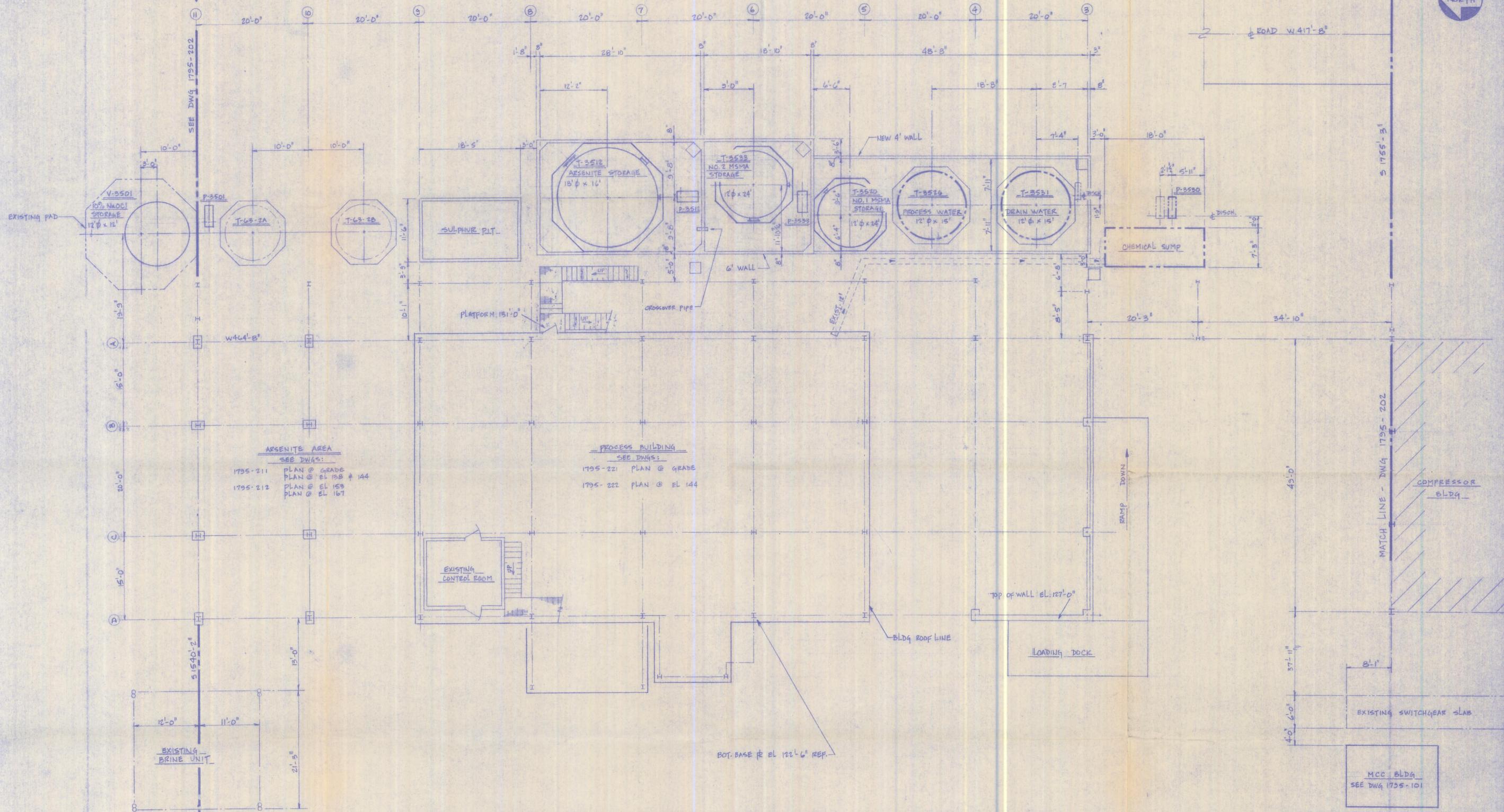
P.O. BOX 3
VICKSBURG, MISSISSIPPI 39180
TELEPHONE (601) 636-1231

MSMA PROJECT
EQUIPMENT ARRANGEMENT
PLOT PLAN, SHEET 2

SCALE	1/8" = 1'-0"	APPROVAL - TECHNICAL
DWN	R. SHARP	APPROVAL - PRODUCTION
CKD		APPROVAL - SAFETY
DATE	8-4-82	NO. 1795 - 202

*Conf. 2/2/82
9/2/82*

BRUNNIG 41625



ARSENITE AREA
 SEE DWGS:
 1795-211 PLAN @ GRADE
 PLAN @ EL 158 # 144
 1795-212 PLAN @ EL 153
 PLAN @ EL 167

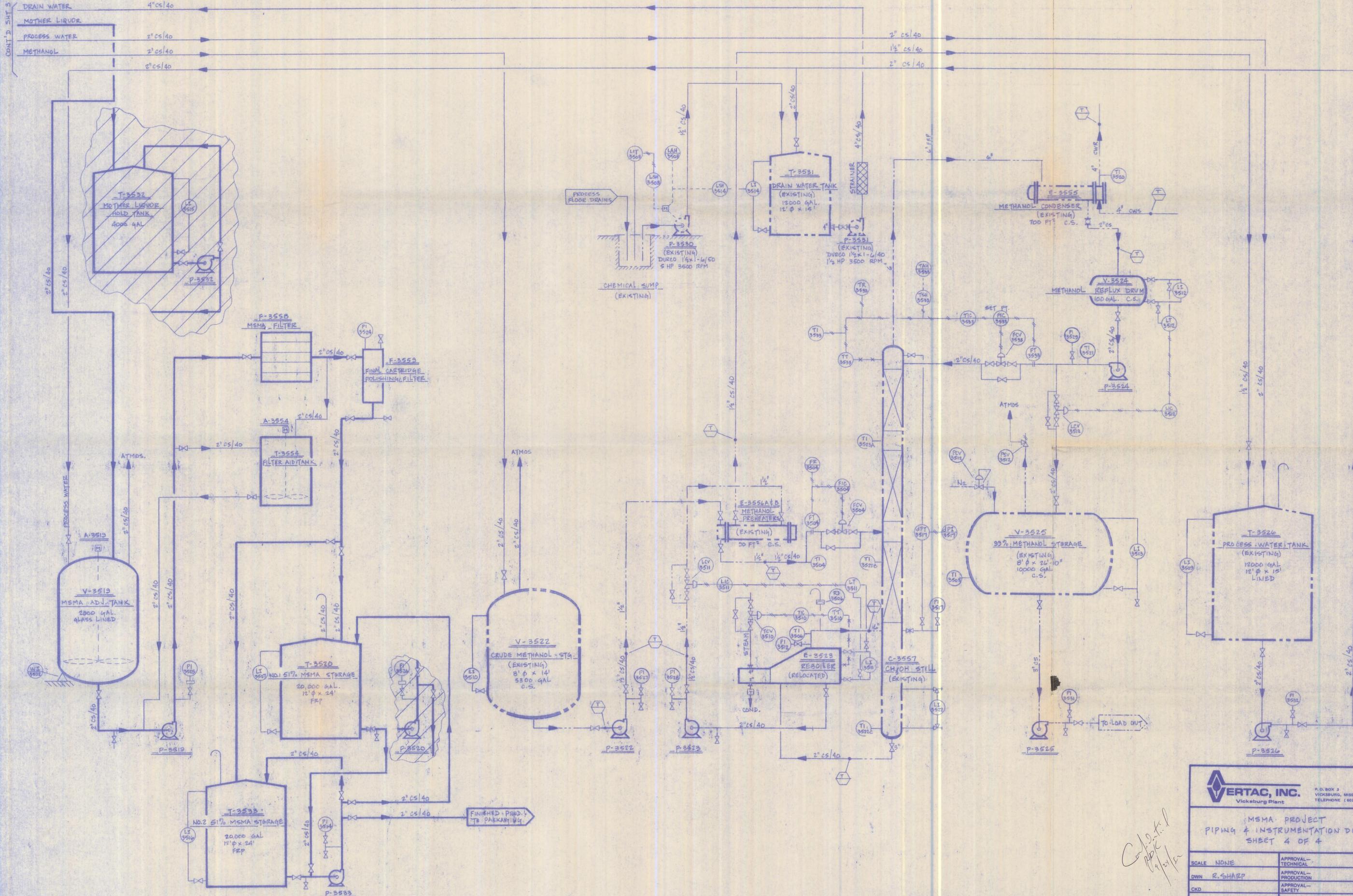
PROCESS BUILDING
 SEE DWGS:
 1795-221 PLAN @ GRADE
 1795-222 PLAN @ EL 144

*Conf. D. O. T. I.
 RPK
 9/20/82*

 Vicksburg Plant		P.O. BOX 3 VICKSBURG, MISSISSIPPI 39180 TELEPHONE (601) 636-1231
MSMA PROJECT EQUIPMENT ARRANGEMENT PLOT PLAN - SHEET 1		
SCALE 1/8" = 1'-0"	APPROVAL - TECHNICAL	
DWN P SHARP	APPROVAL - PRODUCTION	
OKD	APPROVAL - SAFETY	
DATE 7-20-82	NO. 1795-201	

BRUNING 41625

CONT'D SHEET 3



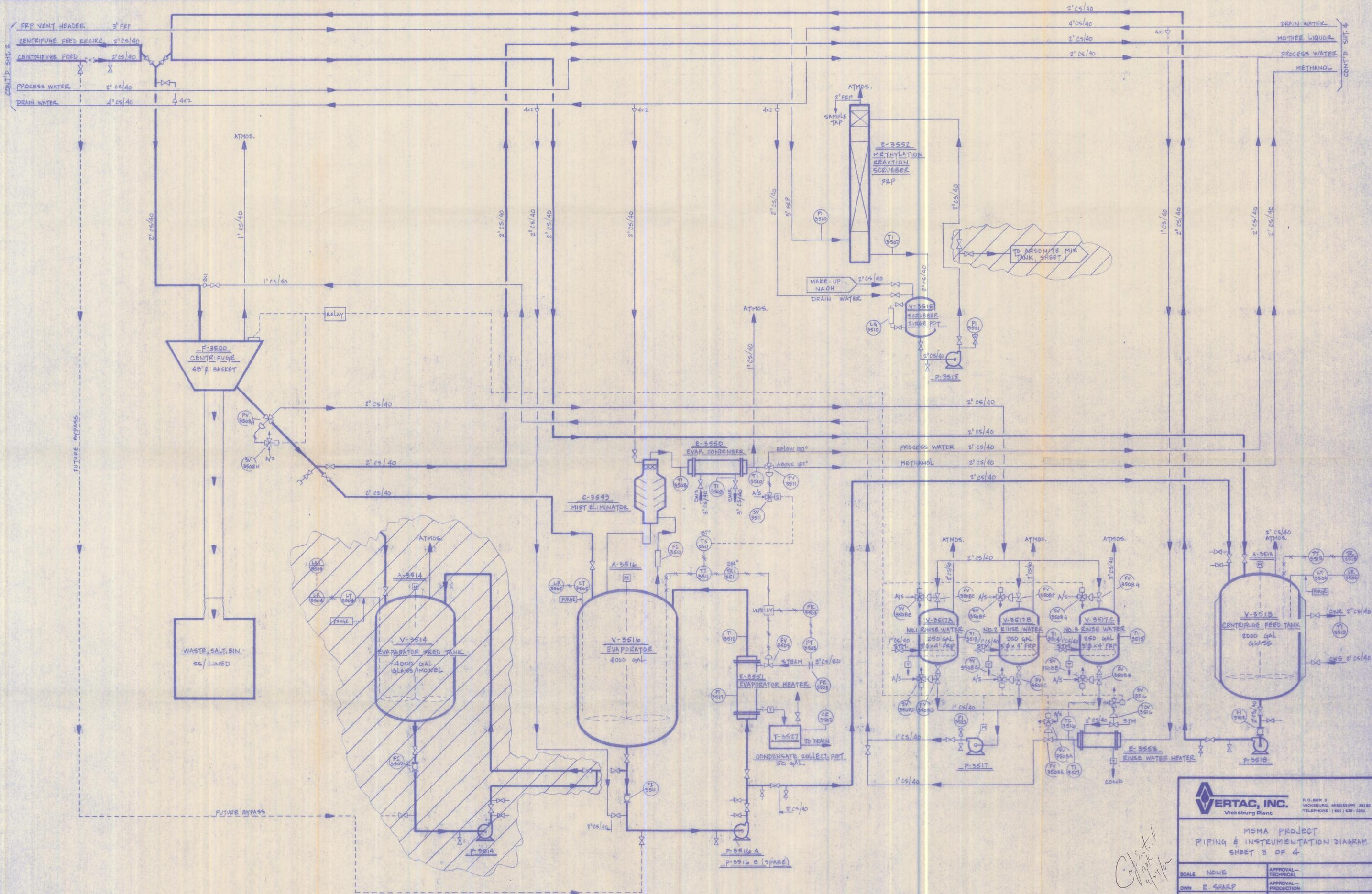
VERTAC, INC.
Vicksburg Plant
P.O. BOX 2
VICKSBURG, MISSISSIPPI 39380
TELEPHONE (601) 636-1231

MSMA PROJECT
PIPING & INSTRUMENTATION DIAGRAM
SHEET 4 OF 4

SCALE	NONE	APPROVAL-TECHNICAL
DWN	R. SHARP	APPROVAL-PRODUCTION
CKD		APPROVAL-SAFETY
DATE	7-23-82	NO. 1795-004

*Conf. D. T. P.
R. S. Sharp
7/23/82*

BRUNING 41855



VERTAC, INC.
Vicksburg Plant

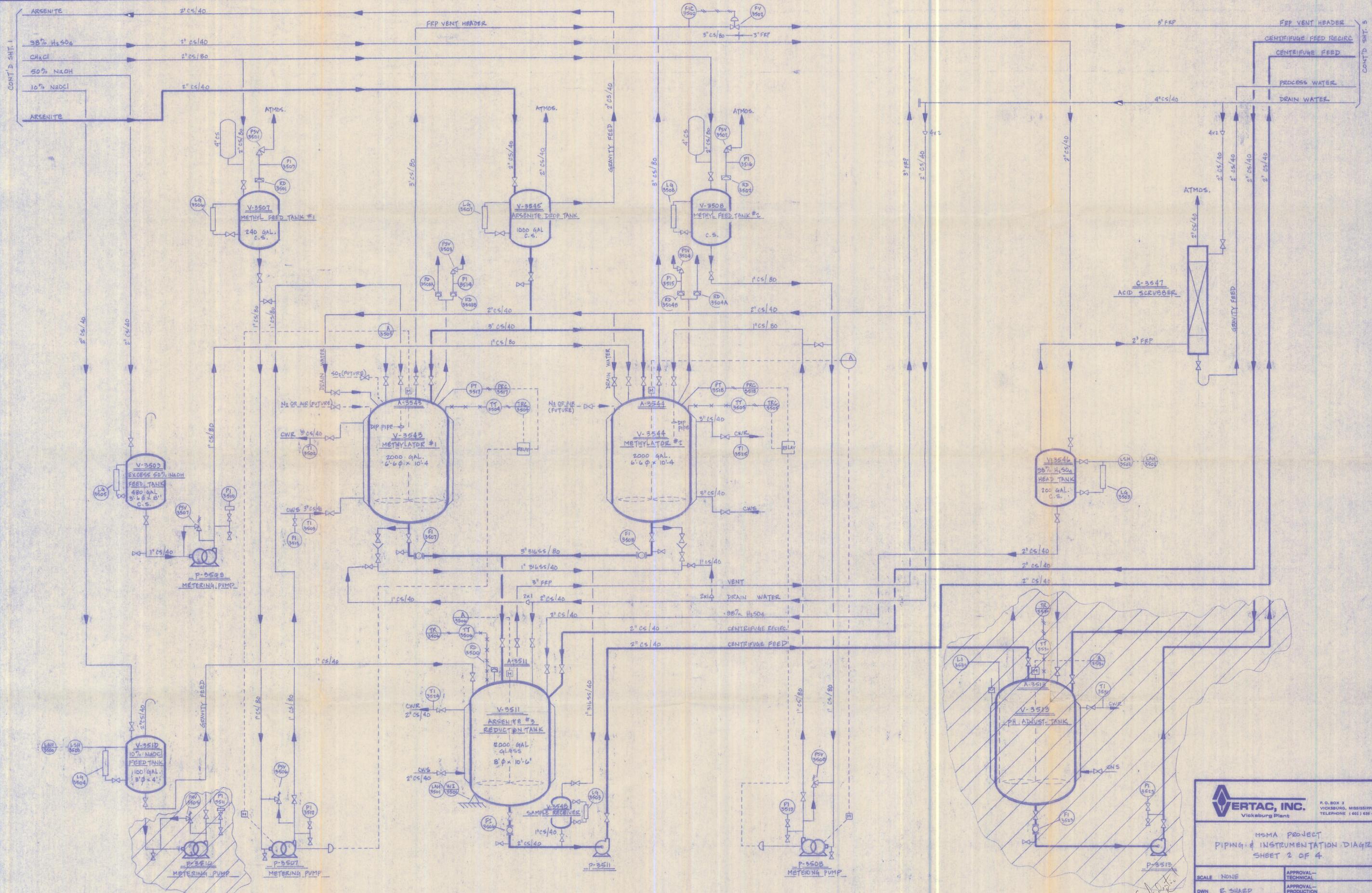
MSMA PROJECT
PIPING & INSTRUMENTATION DIAGRAM
SHEET 3 OF 4

SCALE NONE
OWN R. SHARP
CKD
DATE 7-22-82

APPROVAL-
TECHNICAL
APPROVAL-
PRODUCTION
APPROVAL-
SAFETY

NO. 1795-003

*C. J. Smith
7/22/82*



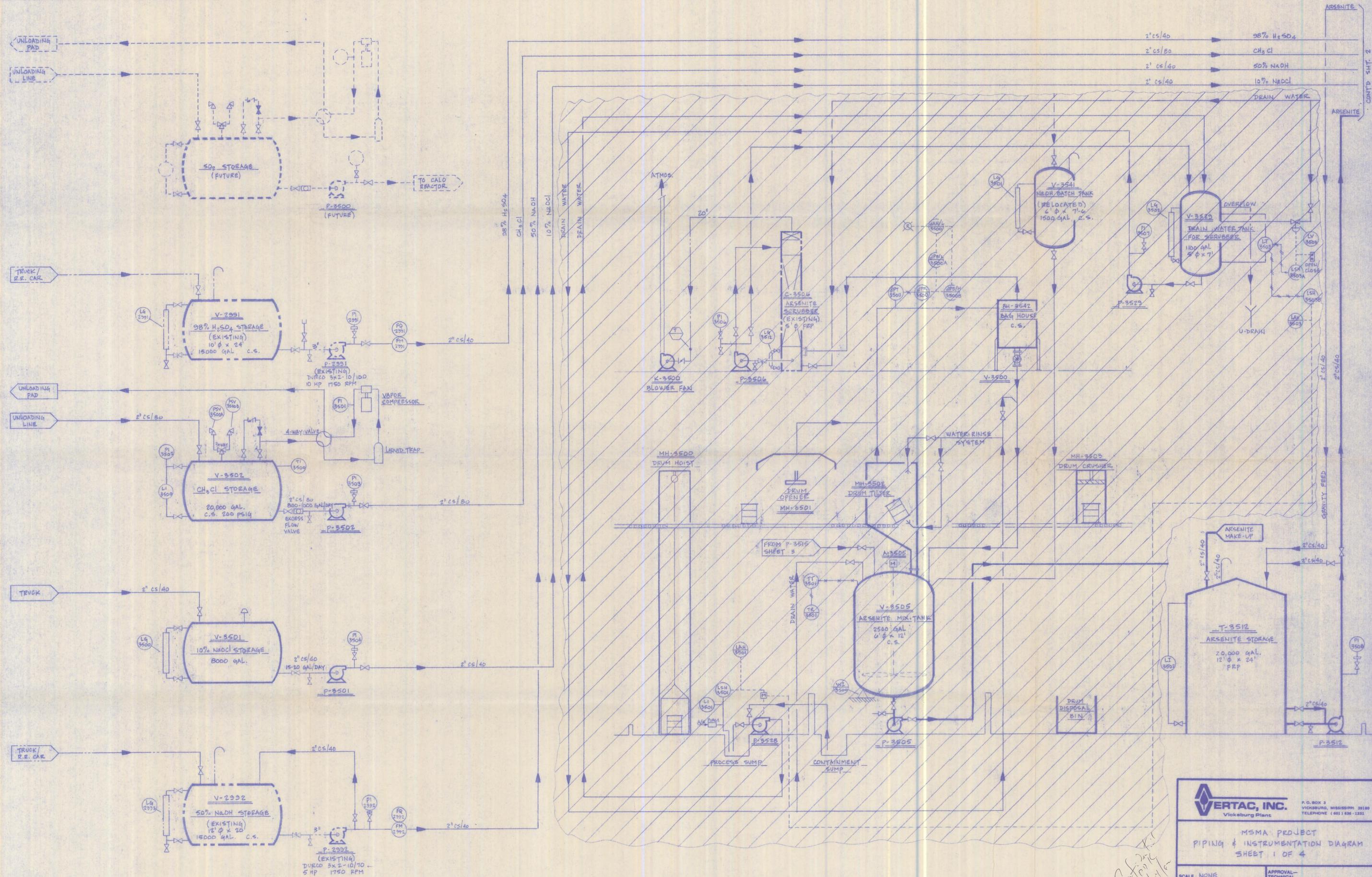
VERTAC, INC.
 Vicksburg Plant
 P.O. BOX 3
 VICKSBURG, MISSISSIPPI 39180
 TELEPHONE (601) 638-1231

MSMA PROJECT
 PIPING & INSTRUMENTATION DIAGRAM
 SHEET 2 OF 4

SCALE NONE	APPROVAL- TECHNICAL
DWN E. SHARP	APPROVAL- PRODUCTION
CKD	APPROVAL- SAFETY
DATE 7-22-82	NO. 1795-002

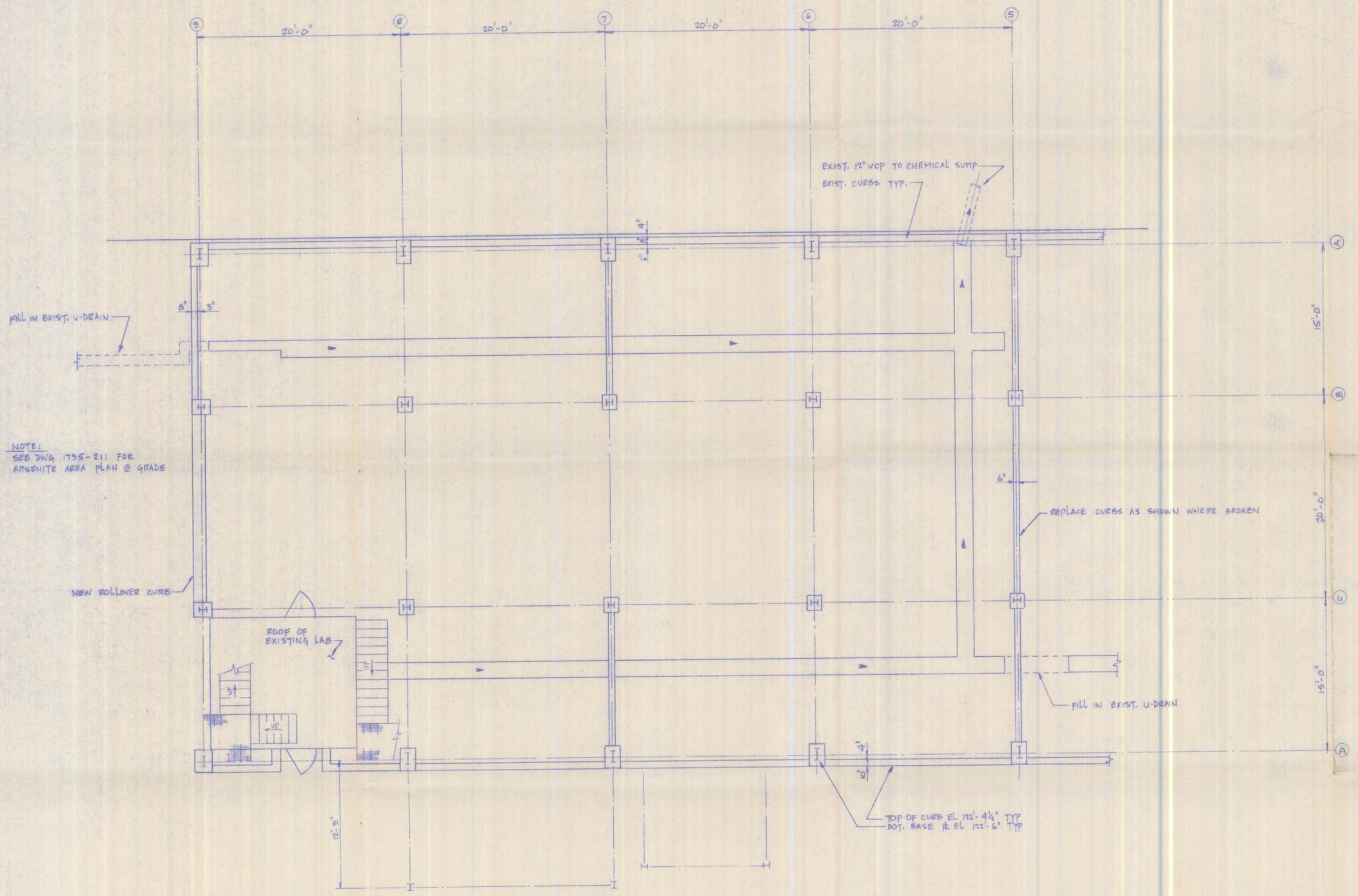
*Conf. 7/22/82
 7/24/82*

BRUNING 4/1925



 Vicksburg Plant		P.O. BOX 3 VICKSBURG, MISSISSIPPI 39180 TELEPHONE (601) 636-1322
MSMA PROJECT PIPING & INSTRUMENTATION DIAGRAM SHEET 1 OF 4		
SCALE	NONE	APPROVAL - TECHNICAL
OWN	R. SHARP	APPROVAL - PRODUCTION
CHKD		APPROVAL - SAFETY
DATE	7-21-82	NO. 1795-001

Conf. 201/1/82
 11-1-82



NOTE:
SEE DWG 1735-211 FOR
ARSENITE AREA PLAN @ GRADE

Handwritten signature:
C. J. D. F. L.
1/16/82

 Vicksburg Plant		P.O. BOX 3 VICKSBURG, MISSISSIPPI 39380 TELEPHONE (601) 636-1233
MSMA PROJECT CONCRETE PROCESS BLDG PLAN @ GRADE		
SCALE	3/16" = 1'-0"	APPROVAL - TECHNICAL
DWN	R. SHAPP	APPROVAL - PRODUCTION
CKD		APPROVAL - SAFETY
DATE	8-16-82	NO. 1735-302