# Puerto Rico digital INTEROFFICE MEMORANDUM

TO:

Dick Esten Puerto Rico DATE:

22 August 1972

FROM:

Lawrie Best RB

DEPT: Safety and Loss Prevention

SUBJ: FIA Loss Prevention Surveys - July 1972

The latest FIA reports of the San German Plant and Warehouse reflect the excellent job being done by Hiram Quinones, Luis Velez, and Digital Management in Puerto Rico. There are no new recommendations and all previously outstanding recommendations have been completed.

Please convey our congratulations to those concerned, and keep up the good work!

tam Attachments

cc: Howard Austen Lon Beaupre Al Hanson Pete Mackey

# MARSH & MCLENNAN

#### INSURANCE

2500 Prudential Center, Boston, Mass. 02199 / 536-8110

Date August 18, 1972

Mr. R. Lawrence Best Digital Equipment Corporation 146 Main Street Maynard, Massachusetts 01754

This is the most recent inspection report for the location shown. We suggest you review it and inform us at the first opportunity of the action you propose to take on any outstanding recommendations. Your cooperation will be most appreciated.

By Leonard R. Hathaway

Location:

Insular Road #362, San German, Puerto Rico

Date:

July 25, 1972

Comments:

Congratulations on the clean slate! As can be noted, there are three problems mentioned under "Significant Changes" and "Comments" and all appear to be under control.

LRH: fep - Attachment

BE SURE TO CONSULT US IN ADVANCE BEFORE MAKING CONSTRUCTION CHANGES AND ADDING NEW PROCESSES OR EQUIPMENT SO THAT WE MAY ADVISE YOU REGARDING SAFEGUARDS.



# **FACTORY INSURANCE ASSOCIATION**

EASTERN REGIONAL OFFICE 85 WOODLAND STREET, HARTFORD, CONNECTICUT 05102

CONFIDENTIAL
THIS REPORT SHOULD BE MADE AVAILABLE
ONLY TO AUTHORIZED PERSONS.

DIGITAL EQUIPMENT CORPORATION
INSULAR ROAD #362
SAN GERMAN
PUERTO RICO 00753

BY R.E. Earle LOC.ID E-341/E-29080 DATE: July 20,25,1972

CONFERRED WITH Sr. Quinones, Plant Engr.,

Sr. Velez, Maint. Manager

OSS PREVENTION SURVEY

THE RECOMMENDATIONS IN THIS REPORT IDENTIFY AND PRESENT MEANS TO IMPROVE SELECTED PROPERTY DAMAGE LOSS POTENTIAL FEATURES AS THEY RELATE TO THE FIRE AND ALLIED COVERAGES SPECIFICALLY PROVIDED BY YOUR FIA POLICIES. IF THERE ARE ANY QUESTIONS CONCERNING THE RECOMMENDATIONS OR YOU HAVE ALTERNATE SOLUTIONS, PLEASE CONTACT US.

RECOMMENDATION UPDATE NEW\* : None

Completed: All previously outstanding.

(72-0)

There are no recommendations to submit as a result of this survey.

#### SIGNIFICANT CHANGES

The fire pump and suction tank are now in service, but not yet acceptance tested. Two attempts to witness the tests during this visit failed, and another date will be arranged. Several deficiencies were pointed out to Sr. Quinones, Plant Engineer, who will have the installer correct them prior to the acceptance test.

The pump suction tank shows signs of settling since it has been filled, and it will be surveyed to learn the extent of the problem. Undue strain is apparently being applied to the suction line between the pump house and tank. Sr. Ouinones is following the situation closely.

A new 6" connection to the plant underground was made at the West side of the Plant on July 3, 1972.

#### COMMENTS

Watchman records are not what either the Insured or the FIA require or desire, since many keys are being missed. Correction has been ordered by the Insured prior to this inspection, and during this inspection. If immediate improvement is not noted, the contract guard service will be changed, in order to achieve good coverage.

The three yard hydrants installed are improper type, in that they have pumper suction outlets as well as two fire hose outlets. Only hose outlets are permitted on yard hydrants. The installer will be requested to make the pumper outlets useless, by welding, fastening with set screws, or grinding off the lugs.

A phone "hot line" to the fire department will be installed soon, in an effort to further up-grade protection.

|  |  | USE |
|--|--|-----|
|  |  |     |
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|---------|------|---------|-----|----|------|----|-----|------|-----|-----|-----|-----|----|----|------|------------------|---------------|---|---------|
| AS      | PROT | RM      | PEP | WS | SUPR | FD | HPS | COMP | LPF | LPF | LPF | LPF | TC | MD | FREQ | IFO              | UC            | EC  | SH      |
| 10      | 8    | 8       | 9   | 7G | 6F   | 6F |     | 7    |     |     |     |     | 3  | 0  | 058  | 11               | 3             | 3   | 0       |



# **FACTORY INSURANCE ASSOCIATION**

EASTERN REGIONAL OFFICE
85 WOODLAND STREET, HARTFORD, CONNECTICUT 06102

CONFIDENTIAL
THIS REPORT SHOULD BE MADE AVAILABLE

ONLY TO AUTHORIZED PERSONS.

DIGITAL EQUIPMENT CORP.
"B" STREET
INDUSTRIAL DEVELOPMENT DIVISION
SAN GERMAN, PUERTO RICO - 00753

BY R. E. Earle DATE: July 25, 1972 LOC.ID E-341/E-30224 HRS: 2

CONFERRED WITH Sr. Luis Velez
Maintenance Manager

IOSS PREVENTION SURVEY

THE RECOMMENDATIONS IN THIS REPORT IDENTIFY AND PRESENT MEANS TO IMPROVE SELECTED PROPERTY DAMAGE LOSS POTENTIAL FEATURES AS THEY RELATE TO THE FIRE AND ALLIED COVERAGES SPECIFICALLY PROVIDED BY YOUR FIA POLICIES. IF THERE ARE ANY QUESTIONS CONCERNING THE RECOMMENDATIONS OR YOU HAVE ALTERNATE SOLUTIONS, PLEASE CONTACT US.

RECOMMENDATION

UPDATE

NEW\* :

None

None 71-1 (Watchman service) (72-0)

There are no recommendations to submit as a result of this survey.

#### SIGNIFICANT CHANGES

This facility remains leased for an indefinite term, and contains relatively lower value storage consisting of surplus machine parts, cartons, and packing materials. 900 sq. ft. in the north corner is leased to Cramer Electronics for a storage area (attended 40 hrs. per week) for resistors, diodes, and other small components, from which they fill orders to be used at the main plant in San German. There is no production here.

#### COMMENTS

Since the term of occupancy is unknown, there are no plans to provide sprinkler protection for this leased building. Loss of the contents of this building would not affect production at the main San German Plant. Only a minor part of the floor area is currently used for storage, the balance being vacant or with non-combustible parts storage.

| AS<br>4 |  | RM<br>8 | 20 |  | SUPR<br>6G |  | _ | СОМР |  | LPF | LPF | LPF | LPF | тс<br>3 | 0 | FREQ<br>12S | ifo<br>11 | 3 | 3 | 0 |
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Puerto Riis memo INTEROFFICE MEMORANDUN

Bob Sambolin, DEC, P.R.

CC: Lon Beaupre

Hiram Ouinones

Al Hanson

DATE: March 9, 1972

FROM: Lawrie Best

DEPT: Loss Control

SUBJ: Safety Committee

I appreciated the opportunity to meet with you and the other members of the Safety Committee in San German last week, and I'm sure you will have a good working committee. The attached materials from the National Safety Council will give you some ideas on how to organize and what the members of the Safety Committee should be expected to do. I will get additional copies of "You and the Safety Committee" for your distribution.

The National Safety Council is non-profit and provides many services and materials for free or at cost. Digital is a member of the National Council, as well as our local Central Mass. Chapter. If you have a chapter in Puerto Rico, I recommend that you look into membership cost.

You might consider having committee members make safety inspections of the plant, and also investigate any serious accidents, fires or hazards. Other items to discuss are:

- Compliance with the Occupational Safety and Health Act of 1970. (OSHA)
- Plant Emergency Organization (PEO).
- Protective Clothing and Equipment (Safety glasses, safety shoes, etc.).
- Machine Guarding.
- Supervisor Investigation of Accidents.
- Emergency Telephone List.

Lawrie Best

mca Attachments cc: V Central Files



Ital INTEROFFICE MEMORANDUM X R Insurance

Ron Lamb

December 21, 1971 DATE:

FROM: Lawrie Best

DEPT: Loss Control

SUBJ: PUERTO RICO INSURANCE

CERTIFICATE

To confirm our discussion this A.M., I received a telephone request from Pete Mackey, Project Manager, San German, P.R., to provide a certificate of insurance to:

> Mr. Enrique Coto Insurance Examiner Puerto Rico Industrial Development Company G.P.O. Box 2350 San Juan, Puerto Rico 00936

> > Tel. 767-4747- Ext. 506 TWX PRIDCO 02-04-001

The certificate is needed to get partial occupancy of Phase II, and the lengthy holiday season in Puerto Rico necessitates prompt action.

> Risk Insurable Value - \$313,000.

> Co. Ins. - 80% Amount to be insured - \$250,400.

Windstorm Insurable Value - \$313,000. Co. Ins. 50%

Amount to be insured - \$157,000.

Risk Earthquake Insurable Value \$330,000.

Co. Ins. 50% Amount to be insured -\$165,000.

Risk - Public Liability (OLT)

Insurable Value - 58,426 sq. ft. Amount to be insured - \$25/50/5,000.

Risk - Boiler (if any)
Amount to be insured - 100%

Please call if additional information is necessary.

Lawrie Best

mca

cc: H. Austen

G. Beebe

P. Mackey

Central Files V

Puerto Rico Central Files Memo digital INTEROFFICE MEMORÁNDUM

TO: George Wood

DATE: December 14, 1971

FROM: Lawrie Best

DEPT: Loss Control

SUBJ: ENVIRONMENTAL HEALTH

To confirm our telephone conversation on Monday, 12/13/71, and a later conversation with Dick Reynolds, we are very much interested in the recent reports of corrosion problems and chlorine odor in the San German Plant. I will call you on Monday, 12/20/71, to establish a meeting date, and would appreciate including Don Gates and Pete Mackey in the meeting, as they are much involved in the project.

Naturally the Sandza Report is reason for concern, and you said that the report should not be considered. We agree that his test results are not valid, and hope that the additional air samples by Ramon Guzman will prove it.

However, considering that the odor of chlorine was reported, and that there is a corrosion problem, we must consider that there may be severe variations in the chlorine content within the room. In view of these reports I have asked Mr. William Pierce, Environmental Health and Safety Consultant, to review the reports and to offer his expert opinion.

The attached reports and materials by Mr. Pierce highlight the toxic properties of chlorine, and that the proper control measures should be directed primarily to the replacement of the chlorine by a less toxic material. I'M sure that you have previously considered the nature of chlorine, George. Is the replacement of chlorine up for consideration? Can you brief me on just what the chlorine process means to us from a production standpoint, compared to a substitute, and if there is a suitable substitute?

Laurie Best

mea

cc: Lon Beaupre
Don Gates
Al Hanson
Pete Mackey
Dick Reynolds

ABSTRACTS
AIR POLLUTION
CHEMICAL HAZARDS
ENVIRONMENTAL HEALTH
EXPLOSIONS
HAZARD AUDITS
LABELLING
OCCUPATIONAL DISEASE SURVEYS
SAFETY AUDITS
SAFETY PROGRAMS
TECHNICAL TRANSLATIONS
French - Spanish

# WILLIAM MacLEAN PIERCE

5 CRAIGIE CIRCLE
APT, 48
CAMBRIDGE, MASS, 02138
TEL: AREA CODE 617
491-0227

Mr. E. Lawrence Best Loss Control Manager Digital Equipment Corp. 146 Main St. Maynard, Mass. 01754

Re: Chlorine

Dear Mr. Best:

The attached information based on the best information available indicates that the heavy, irritant, toxic, and chlorine gas can be used without harmful effects to the employees or the public if the hazards are recognized and the proper control measures instituted.

The controls should be directed primarily to the replacement of the chlorine by a less toxic, less corrosive etching material. From an industrial hygiene standpoint, there is scarcely any material that could be any worse than chlorine. Compared to the threshold limit of 1 ppm for chlorine, hydrogen chloride has a limit of 5 ppm, ammonia - 50 ppm, and sulfur dioxide-5 ppm.

If a suitable substitute can not be obtained, the emphasis should be placed on enclosure of the operations, local exhaust ventilation, isolation of operations, and frequent monitoring of exhaust hoods, general plant air, daily checks on cylinders, piping, and valves for leaks, monitoring of exhaust stacks, and monitoring of concentrations at the plant perimeter.

If there are any questions, please let me know.

Yours truly, William M. Pierce William M. Pierce

P.S. The Chlorine Manual which is the basis of thesafety recommendations for the use of the cylinders, piping, and valves is out of print and will not be available for 3 weeks. However, the brochure of PPG on Chlorine-Safe Handling and National Safety Council Data Sheet # 207 should be adequate until the Safety Manual is available.

WMP

#### CHLORINE

Hazards: In order to appreciate the importance of the control measures required in the use of chlorine gas, it is important to be aware of the toxic properties of chlorine.

This heavy, yellowish green, toxic, corrosive gas which is easily liquefied won notoriety when 168 tons of bottled gas was released on April 25, 1915 by the Germans against French Colonial and Canadian troops causing 15,000 casualties including 5,000 deaths. Chlorine causes severe irritation of the skin, eyes, mouth, nose, and throat. Also chlorine will cause acute respiratory distress including cough, hemoptysis, chest pain, dyspnea, cyanosis, tracheo bronchititis, bronchopneumonia, and pulmonary edema.

Properties of Chlorine:
Greenish-yellow gas
Formual- Cl<sub>2</sub>
Vapor pressure

Effect

75°F 92 1bs. 100° 142 1bs. 125° 198 1bs.

Vapor density 2.49 times as heavy as air.

Physiological response to various concentrations of chlorine gas.

|  | of chlorine |
|--|-------------|
| Threshold limit value<br>Least detectable odor   | 1.0         |
| Maximum amount that can be breathed for one hour without serious effects Least amount required to irritate the the Least amount require to cause coughing Amount dangerous in 30 min. to 1 hr Amount likely to be fatal after a few breaths. |             |

In the appendix to this report are reports of actual poisoning cases following exposure to chlorine. Since the corrosive effects are well recognized at the San German location, there will be no discussion of the corrosion hazards since an elimination of the health hazard by the maintenance of a chlorine concentration below 1 part per million should control the corrosion.

Parts /million

Control of Health Hazard from Chlorine

Exposures involved in the handling of cylinders, storage of chlorine, leaking cylinders, piping, and valves can be controlled by following the recommendations of the Chlorine Manual of the Chlorine Insitute.

Exposures involving the use of the chlorine in the plant operations involve the application of the accepted industrial hygiene control measures.

The methods which apply to the use of chlorine are as follows:

1. Substitution of less toxic material for chlorine.

The highly corrosive, toxic chlorine gas with a threshold limit of 1 part per million is an excellent candidate for the substitution method of control. Not only is a high degree of control required by ventilation, but the corposive properties of chlorine will require comstant monitoring of the process and exhaust equipment. For example, with a material such as ammonia with a threshold limit of 50 parts per million and adequate warning properties the hazard would be minimized and become a nuisance problem rather than one with fatal potentialities.

Every effort should be made to eliminate the use of the chlorine.

2. Enclosure.

The enclosure of the gas in cylinders and piping provides good control as long as there are no leaks. A chlorine leak never gets better or stops, but requires immediate emergency action by trained personnel equipped with gas masks or breathing apparatus depending on the concentrations of gas involved. If the leak can not be controlled, the plant and the immediate vicinity of the plant would have to be evacuated.

The integrity of the cylinders should be tested once a day by means of rag on a stick saturated with strong ammonia and the same method should be used on all valves, piping, exhaust piping under pressure, and hoods. There will be dense clouds of white smoke appear in case of chlorine leaks.

The hazard from leaking valves on cylinders can be increased if the supplier does not remove, inspect, and repair all valves when they are returned for refill. A certification should be required from the supplier that the returned cylinders and valves have been inspected and found in safe condition.

The catastrophe hazard may be minimized by using as small cylinders as possible for the efficient operation of the plant.

Enclosure, especially when used in conjunction with local exhaust ventilation minimizes the required ventilation.

3. Segregation.

Segregation may be by space, time, or by ventilation minimizes the number of employees exposed. Isolation of hazardous operations limits the exposure to a few employees.

#### 4. Ventilation.

Local exhaust ventilation involves the removal of the the gas at the point of origin. This method is the most effective method of control and minimizes the makeup air. The hood is built to enclose as much of the operation as possible and then the exhaust is adjusted so that there is an inward flow of air of around 200 linear feet per minute. In exceptional cases the velocities may be as high as 500 feet per minute for highly toxic materials. With chlorine consideratio should be given to the heavy nature of the gas(2.49 times that of air) in the design of the hoods and downdraft ventilation may be required. The effectiveness of local exhaust hoods and exhausts should be checked by the use of a rag soaked with ammonia on a stick, a velometer, or colorimetric tubes.

General exhaust ventilation is an ineffective method of control of a gas as toxic as chlorine since it is based on dilution which is difficult when the threshold limit is 1 part per million. Another difficulty is the heavy nature of the gas. The air should be removed near the floor level and the intake should be at ceiling level.

5. Rotation of employees
Limitation of time a man is allowed to work on a potentially hazardous job can minimize the hazard. Any man developing a heart or lung condition should be removed from proximity to chlorine.

# 6. Personal protection equipment

Both gas masks and self-contained breathing equipment should be available for the use of trained personnel in case of emergency work involving repairs or rescue work. Oxygen breathing apparatus should be available for emergency use by trained personnel. Protective equipment for dealing with liquid chlorine should be provided.

## 7. Medical controls.

Physical examinations, including chest x-rays, should be given applicants for jobs in areas where exposure to chlorine may occur. Persons handling chlorine should be examined periodically. Asthma, bronchitis, tuberculosis, or emphysema might become agravated by chlorine. Persons with a history of coronary disease should be excluded from exposure.

8. Education

Safety in handling chlorine depends, to a great extent, upon the effectiveness of employee education, proper safety instructions, intelligent supervision and the use of suitable equipment by trained employees.

The education and training of the employees to work safely and to use personal protective equipment and other safeguards are the responsibility of supervision. Training classes should be conducted for new and old employees periodically to maintain a high degree of competence in handlingprocedures. Employees should be fully informed of the hazards. Each employee should know what to do in an emergency and should be fully informed as to first aid measures. The instruction and first aid measures should be based on the attached Chlorine Manual.

#### CHLORINE INCIDENTS

#### 1. Chemical Plant, Baltimore, Md. April 7, 1964

An internal explosion of a still caused rupture of the still and considerable nearby process equipment and piping. Chlorine, released from a ruptured wash tank, spread over the area necessitating evacuation of nearby homes and impeded manual fire fighting.

#### 2. Water Treatment Plant, Windham, Ohio, January 2, 1964

Fire originated in spilled gasoline and involved plant of combustible construction. The fusible plugs on 10 - 100 lb. chlorine cylinders melted out releasing contents. Very little wind and low atmospheric temperature resulted in chlorine laying in pockets around burning structure. Manual fire fighting was impeded. Twenty-six men were temporarily incapacitated, but none seriously and only six required hospitalization.

## 3. Sewage Treatment Plant, Bayonne, New Jersey, November 13, 1962

An explosion, probably of accumulated gasoline vapors, resulted in structural damage to the Engine Room and Grit Chamber Room and broke piping from 2 - 1 ton chlorine tanks. Eighteen firemen required treatment for exposure to chlorine gas.

### 4. Swimming Pool, St. Louis, Mo., July 10, 1961

A leak developed (reasons undetermined), about 1/4-inch in diameter and 1 foot from the bottom, in a chlorine cylinder. The cylinder was located on an open platform separated from the outdoor pool area by a 6-foot high concrete block wall. The wind direction was such as to carry the gas over the pool area. One hundred and fifteen persons were taken to hospitals and twenty-six were admitted as patients.

# 5. Chemical Warehouse, Elizabeth, Pa., October 21, 1961

An explosion and fire, originating in spilled acetone, spread to drum storage of flammable liquids and cylinders of chlorine. Melting of fusible plugs released chlorine. Four firemen were injured from chlorine inhalation.

## 6. Chemical Plant, Baltimore, Md., December 6, 1960

A chlorine tank car unloading line was broken when the car was hit by a switch engine. Eight railroad and plant employees were overcome. Seven were hospitalized.

# 7. Chlorine Manufacturing Plant, Location and Date Unknown

The loading line to a chlorine tank car was broken when the car was struck during switching operations. A "few tons" of the total of 55 tons in the car was released. No data on casualties, if any.

This incident reported in some detail in Chemical Engineering Progress, Vol. 60, No. 9, p. 86-87.

Chlorine Incidents (cont.)

## 8. Chemical Plant, Leesburg, Florida, July 28, 1967

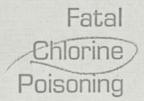
A leak developed around a valve on a parked tankcar containing 15-tons of liquid chlorine. The car was towed to a safe location by railroad employees but, in the meantime, over 8000 residents of the town were evacuated from the area.

## 9. Freight Train Derailment, Brandtsville, Pa. April 28, 1963

As a result of a derailment, the entire dome on a liquid chlorine car was sheared off along with two vapor valves and the external portion of a relief valve. Although the excess flow check valves in the vapor withdrawal lines operated, sufficient liquid chlorine leaked through the damaged relief valve (car rested on its side), to result in evacuation of a trailer court about 1/2-mile downwind and bordering on the same small stream that the car was alongside.

# CLINICAL CASE REPORT

THOMAS H. MILBY, M.D. Department Editor



W. M. DIXON, M.D., D. DREW, M.D.

Dr. Dixon is Group Medical Officer, Fisons Ltd.; and Dr. Drew is Medical Officer, Murgatroyd's Salt and Chemical Co., Ltd., Suffolk, England. A recent fatal accident due to chlorine poisoning is worthy of record because death was due primarily to pulmonary edema, a sequel of exposure to chlorine vapour which is often regarded as uncommon.

A brief review of the literature reveals somewhat mixed opinions on the occurrence of pulmonary edema following exposure to chlorine.

The standard textbooks usually consulted by industrial physicians include Hunter (1964)1 who states that ". . . even in severe cases pulmonary edema or pneumonia occur only rarely." In support of this statement he quotes Jones (1952)2 who followed up 620 cases of chlorine gassing of which nine were severe, but even in these cases pulmonary edema did not develop. Deichmann and Gerarde (1964),3 although they remark on pulmonary edema, say that chlorine causes severe irritation of the upper respiratory tract, Safety and Management (A.B.C.M., 1964) 4 lists chlorine as a lung irritant and recommends. inter alia, transport by car for a patient exposed to the gas. As this form of transport is contraindicated in pulmonary edema the inference is that it is not an important problem. However, the A.B.C.M. Gassing Casualty label "A" (1957),5 which includes chlorine, advises careful observation for the onset of pulmonary edema.

The National Safety Council (1966) in Data Sheet No. 207 on chlorine says that "difficult breathing" occurs after heavy exposure.

The British Factory Inspectorate booklet on chlorine (1966) indicates that the delayed development of pulmonary edema is not often encountered but may appear up to two days after exposure. The new Ministry of Labour Booklet (1967) on the handling of liquid chlorine includes a section on the treatment of gassing and stresses the importance of transport to hospital by ambulance. The introduction to this booklet states clearly that pulmonary edema occurs after exposure to chlorine.

So far these authoritative sources, therefore, suggest that pulmonary edema, although it may occur in chlorine poisoning is rare.

However, other textbooks, for example Von Oettingen (1958) ocnclude that pulmonary edema may follow 12 to 24 hours after exposure although even he stresses the immediate acute irritation of all mucus membranes. Patty (1963) to reports that experimental animals exposed to large concentrations of chlorine gas die from pulmonary edema. In man, although low concentrations cause irritation of nose and throat, higher concentrations he observes, cause pulmonary

congestion and edema. Incidentally, both of these authors mention an effect on the heart, Patty noting an increase in blood viscosity secondary to haemoconcentration and Von Oettingen reporting coronary thrombosis as a sequel of pulmonary edema. This observation is of some importance in the case described here.

Trainor (1966) 11 considers that, although pneumonia does not commonly follow chlorine poisoning, edema of the lungs is "quite common" following the inhalation of high concentrations of the vapour.

Cooper (1962)<sup>12</sup> notes the occurrence of pulmonary edema and recommends the inhalation of one per cent sodium bicarbonate solution.

A search in the current literature reveals few case reports of chlorine poisoning, but one major incident occurred in the United States in 1961, when a rail car spilled chlorine vapour over a wide area, fortunately in rural surroundings (Joyner and Durel 1962). 13 Over 100 patients required treatment for gassing and of the 65 detained in hospital ten had pulmonary edema. One child aged 11 months died 5 hours after exposure. In addition over 400 farm animals were killed by chlorine in this accident.

Gervais (1965)<sup>14</sup> described one case of a 63year old man who had both immediate and delayed pulmonary edema following exposure to chlorine.

#### Case Report

An incident occurred in January 1967, in a factory producing chlorine. The operators in this plant were accustomed to occasional exposures to low concentrations of irritant gases.

After a completely uneventful night, the night shift operators handed over the plant to the morning shift at 6:00 a.m. as usual.

An operator acted against instruction in closing the valve on the stock tank being filled before opening the valve to the next tank. Normally a weigh tank took any surge occurring at this time, but it was out of commission for routine maintenance.

Shortly, chlorine gas emerged from a number of points, including an emergency pressure relief cover on the top of an adjoining plant, approximately 30 feet (10 meters) in the air.

The wind at a speed of 12 miles per hour (19 k.p.h.) spread the chlorine gas in a narrow band throughout the factory; this cloud persisted for about half an hour despite immediate action to correct the abnormal conditions.

Many operators were exposed to chlorine but as canister respirators were available and were quickly donned, only minor ill-effects occurred to the operators with the exception of one man. Five men attended the Works Surgery for attention for minor gassing.

Subsequent inquiry confirmed that the gas was pure chlorine containing no phosgene or hydrochloric acid.

The man who died was a boiler plant operator aged 49. previously in good health. For reasons which are by no means clear, he remained in the chlorine cloud without immediately putting on a cannister mask which was available, and must have remained in the gas for a period of about 30 minutes before reporting to the Works Surgery for attention. He was immediately given oxygen and shortly afterwards a dose of a medicine called "Antispasmodic Gas Mixture." He was placed in a semi-reclining position and oxygen therapy by mask was continued. Shortly afterwards he began to vomit and complained of severe pain in the stomach and chest. A doctor was called and found the man to have partly recovered from the worst effects. On examination of the chest, signs of bronchial irritation and congestion were found and he was advised to remain in a sitting position for one hour and then to be taken home. During the journey home by car the patient became increasingly ill and died.

Postmortem examination revealed pulmonary edema as the prime cause of death, but coronary insufficiency due to atheroma was also found.

The interval between initial exposure and death was approximately 3 to 3½ hours. The pathologist did not consider the coronary artery disease sufficiently severe to have made a significant contribution to this man's death. However, the occurrence of coronary occlusion could have been due indirectly to pulmonary edema. (Cf. Von Octtingen 1958).

#### Discussion

It is well known that men working in concentrations of some irritant gases for prolonged periods become accustomed to their effect. These operators are able to tolerate upper respiratory tract irritation which would incapacitate, or at least cause acute discomfort to a casual visitor. Although many irritant gases, for example ammonia and sulphur dioxide, produce tolerance, this is not so in the case of chlorine. However, operators seem able to voluntarily reduce their respiratory tidal volume in an atmosphere containing limited amounts of chlorine so as to tolerate concentrations which would be intensely irritating to a newcomer or to a visitor to chlorine, (Lloyd-Potter, 1967).15 It may well be that tolerant as he was, the patient in this incident inhaled quantities of chlorine which would have driven another man out of the cloud of gas. One could suppose that chlorine would then be able to pass through the upper respiratory tract and, thus, cause alveolar edema.

This hypothesis would explain the mixed opinions expressed in the literature because only men accustomed to chlorine would develop pulmonary edema, others being protected by their

<sup>\*</sup>Antispasmodic gas mixture contains the following: Tincture of Lavender; Spirits Ammonia; Essence of Peppermint; Spirits Chloroform; Sugar and Water.

more sensitive bronchial and tracheal mucous membranes.

The treatment of this patient by the first-aid staff with what can, at best, be described as a placebo was correct according to their instructions, but in retrospect of little use. One would expect the inhalation of oxygen to be of considerable value. In the light of this case we feel that in future any patient who exhibits the slightest sign of incipient pulmonary edema—even one rale—should be kept under observation in hospital for at least 48 hours.

There is often considerable difficulty in coming to a decision about which patients will develop pulmonary edema on clinical examination alone. Ardran (1964) <sup>16</sup> suggests that a chest radiograph taken in expiration which shows an increase in lung volume indicates that pulmonary edema may develop. It is possible that pulmonary function tests might also be of value in this context, especially if the result of a previous test taken under normal conditions is available for comparison.

The injection of atropine or of a rapidly acting diuretic such as frusemide would seem worthy of trial.

Transport of patients with suspected pulmonary edema other than in an ambulance would seem, with hindsight, to be inadvisable.

The publication of this case report is intended to alert industrial medical officers and casualty staffs to the very real risks of pulmonary edema in poisoning by irritant gases, especially in men accustomed to minor degrees of exposure.

> Dr. W. M. Dixon Fisons Ltd., Harvest House, Felixstowe Suffolk, England

#### References

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#### Computers and New Drugs

Computers play a relatively unimportant part in research aimed at the discovery of new drugs. When you have a new chemical compound and want to find out whether it has a potential as a drug, the key in the development of such an agent is the ability or good luck of the experimenter to find the right thing for which to test the compound. To do this requires insight and creative imagination, and machines simply do not have these faculties. Similar situations exist in other fields of biological research. Regardless of how intricate the calculation needed to determine, for example, the characteristics of protein structures, human judgment and intuition must be applied at every stage of machine operation to guide the computer.

From "Computers and Medical Discoveries" by F. M. Berger, M.D., in Perspectives in Biology and Medicine, Autumn 1967.

# Special Article

# Accidental Liquid Chlorine Spill in a Rural Community

ROY E. JOYNER, M.D., Texas City, Tex., and EUGENE G. DUREL, M.D., New Roads, La.

T APPROXIMATELY 8:15 A.M. on Jan. 31, 1961, as a result of a derailment, about 6000 gallons of liquid chlorine was spilled in the community of La Barre, La. The resultant cloud of chlorine gas eventually covered an area of about 6 square miles (Fig. 1), necessitating the

evacuation of about 1000 persons.

On the basis of animal deaths as indicators, the cloud was rapidly lethal as far away as 1% miles from the derailment site. Concentrations sufficient to be rapidly lethal may have extended at least twice that distance across the open lands where no observations are available. The involved area, however, was not completely blanketed but shrouded in patches of varying sizes which drifted with the changing winds. While most of the observers seemed to agree that the cloud hung close to the ground, it occasionally boiled "80 to 90 feet" upward.

## Determination of Atmospheric Concentrations

Fortunately a series of determinations of accurate atmospheric concentrations were made on the scene. The tests were made with mobile equipment utilizing the orthotolodine spectrophotometric method. A total of 44 samples were collected and analyzed. The first samples were made at approximately 11:15 A.M., 3 hours after the spill occurred. At that time the contaminated area was approximately 200 yards in length along a highway that paralleled the railroad track. In the fringes of the contaminated area, levels of 10 ppm of chlorine were en-

countered. At about 3:00 P.M. levels of 400 ppm . were determined in denser areas 75 yards from the wreck. These concentrations, which persisted for about one hour, were felt to represent levels in moderately contaminated areas, but not the maximum values reached in the denser portions of the visible cloud.

Treatment of the area began about 2:00 P.M. and the atmospheric levels dropped slowly over the course of the next 3 hours. Again these levels were measured in the moderately contaminated areas and do not represent values either on the fringes or in the most dense portions of the cloud. By 5:30 P.M. the level had dropped to approximately 8 ppm and the zone of contamination was limited to the area in the immediate vicinity of the tank car which had carried the chlorine.

#### Animal Casualties

Animal casualties are discussed first in order to emphasize more clearly the lethal concentrations of chlorine which existed in the area. Thirty-six hours after the derailment the following animal fatalities were recorded: 49 hogs, 320 chickens, 1 horse, 60 ducks, 4 mules, 11dogs, 2 cows, and 4 cats.

The extent of residual disability in surviving animals cannot be estimated accurately. Three cows that were in the same area with the 2 that died, aborted calves on about the fifth day after

exposure.

A flock of 2000 chickens, which survived the exposure, experienced a marked and immediate drop in egg production which persisted for 8 weeks, followed by a gradual trend toward previous normal capacity. The exposure was stated to have caused rupture of the yolk follicles, the more mature follicles being most susceptible to these effects.

Dr. Joyner is Plant Medical Director, Union Carbide Chemicals Company, Texas City, Tex.

All analyses were performed by Kem-Tech Laboratories, Inc., Baton Rouge, La., whose assistance is gratefully acknowledged.

Submitted for publication April 5, 1961.

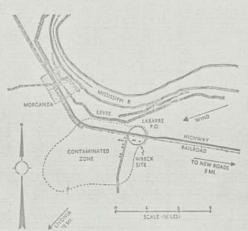


FIG. 1. Area invaded by chlorine cloud.

#### **Human Casualties**

Approximately 100 persons were treated for varying degrees of exposure to chlorine. Sixty-five of these were seen at a local hospital in New Roads, La. Others were treated by private physicians in their offices and in hospitals in nearby communities. Of the 65 casualties handled in the New Roads hospital, 15 were admitted, the others being dismissed under observation after initial care had been rendered. Ten of the hospitalized patients developed frank and unmistak-

able pulmonary edema. One human fatality occurred; an 11-monthold infant, a member of a family that was heavily exposed for about 15-20 min. approximately 150 ft. from the tank car. Most of this exposure occurred inside the house, but some (and possibly the critical portion) occurred when the father became frantic over the infant's choking and gasping and carried him outside into the even thicker clouds of gas. A 2-month-old infant who remained inside the house survived the exposure. The 11-month-old infant was brought to the hospital in a comatose condition, with severe respiratory embarrassment and acute pulmonary edema. The infant demonstrated severe dyspnea, coughing, gagging, and production of copious amounts of frothy sputum. Initial treatment consisted of postural drainage, 0.125 gm. caffeine and sodium benzoate I.M., 1/600 gr. atropine S.C., and oxygen by tent. Death, presumably due to massive pulmonary edema, occurred about 1:30 P.M., some 5 hours after ex-

Three other children and one adult were also

unconscious on admission. It was difficult to evaluate the presence of cyanosis in Negro casualties but one victim was noted to have "bluish-colored nails." All heavily-exposed victims experienced severe dyspnea, coughing, vomiting, and retching. In these patients the cough was productive of frothy, white, thin sputum. These patients regained consciousness within one hour after initiation of therapy.

Most of these patients complained of burning of the eyes and evidenced acute conjunctival injection with profuse tearing and photophobia. Some victims were noted to have minor firstdegree skin burns, principally of the face. These burns resulted from vapor exposure rather than

from splashes.

Anorexia was common among hospitalized patients. Respirations were shallow and labored. Pulse rates varied between 80 and 100 with no severe tachycardia occurring. In several cases the blood pressure was alarmingly low. One 50-year-old man suffered a drop in pressure to a level of 65 over 0 approximately 36 hours after exposure. This complication was treated with one injection of 10 mg. of Aramine. A satisfactory response was obtained and the pressure returned to normal and stabilized in the course of 12 hours.

Temperature elevation occurred in most of the hospitalized patients, usually cresting at 101° F. on the second day and falling to 99°-100° F. thereafter.

Examination of the chest in all heavilyexposed patients revealed diffuse moist crackling rales throughout both lung fields, occurring loudly, both on inspiration and expiration. Harsh, sibilant rales were also audible. Sputum in bedside containers was copious, thin, very frothy, and in one patient was tinged faintly with blood on the second day after exposure. A 50-year-old male, was noted to have very harsh expiratory asthmatic rales of sibilant nature. Prolonged expiration accompanied by an expiratory grunt was also noted. He denied previous asthma or other respiratory allergic disease. His respiratory picture strongly resembled a status asthmaticus with congestive failure. Color of the nail beds, however, appeared normal, and there were no other symptoms of congestive failure. He did not require digitalization.

Chest X-ray films made on hospitalized patients on the third and fourth day after exposure revealed striking changes consisting of fine miliary mottling distributed bilaterally and sym-

<sup>\*</sup> Merck Sharp & Dohme, Philadelphia, Pa.

metrically throughout both lung fields. The findings were compatible with pulmonary congestion. Focal atelectasis was not seen. There was no effusion and no indication of localized pneumonitis. These findings had entirely cleared by the tenth to twelfth day after exposure as shown by repeat chest X-ray. With therapy outlined below the clinical findings slowly cleared and all hospitalized patients were discharged by the sixteenth day.

## Therapy

Initial therapy varied with the treating physician. All physicians utilized oxygen by tent or by mask but none of the masks were equipped with positive-pressure exhalation valves. It is impossible to predict what benefits would have accrued from positive-pressure exhalation therapy but its wide acceptance in industrial locations leads one to believe it would likely have been a useful measure in these circumstances. Postural drainage was instituted in those who could tolerate it without excessive respiratory embarrassment. Demerol° and morphine in therapeutic doses were utilized by one physician in his office while others scrupulously avoided these agents, feeling that cough-suppression was contraindicated. There was no apparent difference in outcome with or without use of these narcotics, but it must be noted that the doctor who utilized this therapy was treating cases of less serious nature than were the physicians who avoided it. Accurate evaluation of results of narcotic therapy is impossible under such conditions. The only definite observation is that none of those receiving narcotics appeared to worsen as a result of therapy. Some diminution of coughing was observed after narcotic adminis-

Atropine (1/150 gr. S. C. for adults, less for children) was used in the more seriously affected victims, presumably on the theory that it would combat the alarming pulmonary edema. It was a general feeling among the treating physicians that atropine was definitely beneficial in reducing the copious frothy expectoration and bettering oxygen exchange.

No bronchodilators were utilized. Adrenalin was avoided. Alevaire, however, was used in

treatment of the more severely affected victims, being nebulized into the oxygen tents.

Procaine penicillin G (400,000 U. I.M. twice daily) was used prophylactically in all hospitalized victims, a fact which helps to explain the early return to normal in temperature readings. Most patients also received 250 mg, of a broadspectrum antibiotic every 6 hours by mouth.

On the theory that it would provide a medical debriden.ent of necrotic pulmonary tissue Chymar<sup>†</sup> was used intramuscularly in doses of 1 cc. twice daily for adults and ½ cc. twice daily for children. This therapy was started on the day following admission and continued for 4–5 days. Treating physicians felt that this therapy played an important part in resolving the chemical bronchiolitis.

A steroid-antibiotic ophthalmic ointment was used for the chemical conjunctivitis. Excellent results were obtained within 48 hours.

Phenobarbital sodium was used parenterally to provide needed sedation in many of the hospitalized cases. The only other therapy utilized was a "special cough syrup" brought to the scene from the manufacturer of the chlorine. The label revealed it to be a simple ammonium chloride expectorant. Many of the victims received this medication.

#### Conclusion

This report clearly demonstrates that industrial disaster may occur even in remote, rural, unlikely locations and still produce casualties sufficient to stagger a medically unprepared community. The formation of mutual aid systems and development of emergency plans in industrial areas alone is not sufficient to meet present-day threats.

# Summary

A report of an accidental spill of 6000 gallons (36 tons) of liquid chlorine in a farm community is presented. Details of the incident, causualties, clinical course, and therapy are given. Long-term follow-up and evaluation of residual effects in survivors is a subject for future investigation and report.

Union Carbide Chemical Co. Texas City, Texas

<sup>\*</sup> Winthrop Laboratories, New York, N. Y.

<sup>&</sup>lt;sup>†</sup> Armour Pharmaceutical Company, Kankakee, Ill.

Chlorine Accident in Brooklyn. Occupational Medicine; s Herbert Chassis, John A. Zapp, James H. Bannon, James L. Whittenberger, John Helm, James J. Doheny, and Colin MacLeod; 4: 152,1947

This summary is concerned primarily with the cause of the accident, the symptoms, the number of people affected, and the treatment. The extensive medical portion of the paper is not given in detail as it would repeat other material to be given elsewhereign this summary.

A tank containing approximately 100 pounds of chlorine accidently emitted the liquefied gas from a 1 1/8th inch orifice for 17 minutes from a truck on a Brooklyn street on June 1, 1944, immediately adjacent to a subway station. No visible cloud formed on the street except in the immediate vicinity of the truck, although the odor of chlorine was detected 800 to 1,000 feet downwind. The concentration of chlorine in the street and in the immediate vicinity was enough to drive people indoors for a few minutes, but a search of hospital records revealed only 2 casualties with a history of exposure on the street or in a store opening on the street.

A casualty- producing concentration of chlorine was built up in the station of the subway entrance and the ventilation grilles because of the high-density of the gas(2.49 times as heavy as air) which caused the gas to settle to low levels and from the piston action of the subway trains pulling the gas into the station.

of 133 persons admitted to Cumberland Hospital. 33 were hospitalized for 1-2 weeks and serve as the basis of the medical section of the report which will not be discussed in detail in this summary, but is available for review formeddial purposes.

The symptoms that occurred during the first few hours consisted of burning of the eyes with lacrimation, burning of the nose and mouth with rhinotrhea and increased salivation, cough accompanied by nausea, vomiting, headache, and dizziness. Syncope occurred frequently.

Except for the cough, substernal pain, and respiratory distress, immediate symptoms subsided within 24 hours.

#### Treatment:

Oxygen was administered to all acutely ill patients for up to 96 hours. Oxygen at atmospheric pressure increases arterial oxygen pressure to the normal range of all pressure who showed unsaturation.

Oxygen under pressure appeared to diminish such subjective respiratory respiratory disease and objective evidence of respiratory difficulty which persisted under atmospheric oxygen and caused diminution or disappearance of adventitious pulmonary sounds.

The incidence of pneumonia in 22 patients who received sulfadiazine or penicillin from the first day of exposure was 32 % comapred to 64 % in 11 patients who did not receive chemotherapy. Effects of Chlorine Gas upon Respiratory Function Theodore Kowitz, Richard Reba, Robert T. Parker, and William S. Spicer, Jr. Arch. Environ. Health, April 1967, 14: 545-558.

On March 28, 1961, 150 longshoremen were exposed to chlorine gas from a leaking cylinder. Eleven men were hospitalized, but there were no ftalities. The 11 hospitalized subjects showed a decrease in lung volume and diffusing capacity after 3 years. Among 59 other subjects (not hospitalized) there was a decreased vital capacity, an increased elastic work while breathing, and a decreased diffusing capacity from the exposure.

# Documentation of Threshold Limit Values



REVISED EDITION

COMMITTEE ON THRESHOLD LIMIT VALUES

limit of 0.5  $\mbox{mg/m}^3$  is therefore suggested to prevent significant accumulation and systemetrics.

#### References:

1. Fitzhugh, G.: Federal Security Agency Hearing, Washington, July 1950.

2. Alderson Reporting Co.: 306 Ninth St., N.W., Washington 4, D.C.

## CHLORINATED DIPHENYL OXIDE

# $0.5 \text{ mg/m}^3$

In a list of 14 chlorinated hydrocarbons (1), showing chlorine contents and permissible limits for air in workrooms, 0.5 mg/m³ is suggested as the value for chlorinate diphenyl oxides containing 54 and 57 per cent chlorine. Later experience (2) however, showed that the initial suggestion was not far apart from experienced judgment. The chlorinated phenyl ethers present serious industrial handling hazards, the toxicity increasing with the degree of chlorination. Toxic effects from the higher chlorinated derivatives such as 54 and 57% chlorine content, may appear as an acneform dermatitis, a systemic (liver) intoxication, or both. Although the latter has not been observed in workers to date, toxicologic studies on animals indicate a cumulative effect on the liver The limit of 0.5 mg/m³ is believed to be of a magnitude that will not result in chlorinar hydrocarbon acne.

#### References:

1. Drinker, C.K.: J. Ind. Hyg. & Tox. 21, 155 (1939).

 Hake, C.L., Rowe, V.K., in Patty Ind. Hyg. & Toxicol. Vol. II, Revised edition pp. 1706-1709, Intersci. Pub. N.Y. 1962.

#### C CHLORINE

# 1 ppm (Approximately 3 mg/m)

Chlorine is a highly irritating gas. In Heyroth's review (1), data are cited indicating that men can work without interruption in air containing 1 to 2 ppm. Exposure to concentrations of 3 to 6 ppm causes irritation of the eyes, nose and throat, and sometimes headache from irritation of nasal sinuses. He reports that exposure for  $\frac{1}{2}$  to 1 hour at a concentration of 14 to 21 ppm is dangerous, and a concentration of 100 ppm cannot be borne for longer than one minute. In a review by Henderson and Haggard (2), it is suggested that a concentration of 0.35 to 1 ppm is the maximal concentration allowable for prolonged exposure, 3.5 ppm is the least detectable odor, 4 ppm is the maximal concentration allowable for  $\frac{1}{2}$  to 1 hour, 15 ppm is the least amount causing immediate irritation to the throat, 40 to 60 ppm is dangerous for even short exposures, and 1,000 ppm is rapidly fatal on short exposure. A ceiling of 1 ppm is recommended to minimize chronic changes in the lungs, accelerated aging, and erosion of the teeth.

#### References:

 Heyroth, F.F.: The Halogens, Patty, F.A., Industrial Hygiene and Toxicology. Interscience Publications, N.Y. 1962, Vol. II, Revised edition pp. 847-849.

 Henderson, Y., Haggard, H.W.: Noxious Gases, Reinhold Publishing Co., New York, 2nd and Rev. Ed., 1943 p. 132.

#### CHLORINATED HYDROCARBONS, AROMATIC

Hazard Analysis

Toxicology: In most instances it is difficult to predict the toxicity of these compounds. However, in the case of most aromatic chlorine compounds, their toxicity is usually no greater, and frequently is less, than that of the corresponding aromatic hydrocarbons, with the

Fire Hazard: Unknown.

Explosion Hazard: Unknown.

Disaster Hazard: Dangerous; when heated to decomposition, they emit toxic fumes; they can react with oxidizing materials.

Countermeasures

Storage and Handling: Section 7.

CHLORINATED HYDROCHLORIC ETHER, Sec. ethylidene chloride.

#### CHLORINATED LIME. See bleaching powder.

#### CHLORINATED NAPHTHALENES

Hazard Analysis

Toxic Hazard Rating: Acute Local: Irritant 3 Acute Systemic: Ingestion 3; Inhalation J.

Chronic Local: Irritant 3.

Chronic Systemic: Ingestion 3; Inhalation 3; Skin Absorption 3.

Toxicology: The action of the chlorinated naphthalenes on the body is quite similar to that of the chlorinated diphenyls, the chief effects being the production of chloracne of the skin and, systemically, an acute yellow atrophy of the liver. See also chlorinated diphenyls.

Disaster Hazard: Dangerous; see chlorides.

Countermeasures

Ventilation Control: Section 2. Personnel Protection: Section 3. Personal Hygiene: Section 3, First Aid: Section 1.

Storage and Handling: Section 7 Shipping Regulations: Section 11

MCA warning label (for tri and higher).

#### CHLORINATED PHENOLS

Hazard Analysis

Toxic Hazard Rating:

Acute Local: Irritant 3, Ingestion 3; Inhalation 3.

Acute Systemic: Ingestion 3; Inhalation 3; Skin Absorp-

Chronic Local: U.

Chronic Systemic: Ingestion 3; Inhalation 3; Skin Ab-

Disaster Hazard, Dangerous, when heated to decomposition, they emit highly toxic fumes.

Countermeasures

Storage and Handling: Section 7.

Ventilation and Indicated Hygiene: Section 2 Respiratory Protection: Section 3.

#### CHLORINATED TRIPHENYLS

Hazard Analysis

Acute Local: Irritant 2.

Acute Systemic: Ingestion 2; Inhalation 2; Skin Absorp-

Chronic Local: Irritant 3.

Chronic Systemic: Ingestion 2: Inhalation 2: Skin Ab-

#### Countermeasures

Disaster Hazard: Dangerouse when heated to decomposi-

Ventilation Control: Section 2. Personnel Protection: Section 3.

Personal Hygiene: Section 3. Storage and Handling: Section 7.

#### CHLORINE

General Information

Description: Greenish-yellow gas, liquid, or rhombie crystals

Formula: CI

Constants: Mol wt: 70.914, mp; -101°C, bp: -34.5°C, d: (liquid) 1.47 at 0°C (3.65 atmos.), vap. press.; 4800 mm at 20°C, vap. d.: 2.49.

Hazard Analysis

Toxic Hazard Rating:

Acute Local: Irritant 3; Inhalation 3.

Acute Systemic: 0,

Chronic Systemic: U.

TLV: ACGIH (tentative); I part per million in air; 3 milli-

grams per cubic meter of air. Toxicology: Chlorine is extremely irritating to the mucous

membranes of the eyes and respiratory tract. It combines with moisture to liberate pascent oxygen and form hydrochloric acid. Both these substances, if present in quantity, cause inflammation of the tissues with which they come in contact. If the lung tissues are attacked, pulmonary edema may result. A concentration of 3.5 ppm produces a detectable odor; 15 ppm tions of 50 ppm are dangerous for even short exposures. 1,000 ppm may be fatal, even where the exposure is brief.

Because of its intensely irritating properties, severe industrial exposure seldom occurs, as the workman is forced to leave exposure before he can be seriously affected. In cases where this is impossible, the initial irritation of the eyes and mucous membranes of the nose and throat is followed by cough, a feeling of suffocation. and later, pain and a feeling of constriction in the chest. If exposure has been severe, pulmonary edema may follow, with rales being heard over the chest. It is a common air contaminant (Section 4).

Radiation Hazard: Section 5. For permissible levels, see

Artificial isotope 30Cl, half life 3 x 103 y. Decays to stable 26 A by emitting beta particles of 0.71 MeV.

Artificial isotope 3ºCl, half life 38 m. Decays to stable 28 A by emitting beta particles of 1.11 (31%), 2.77 (16%). 4.81 (53%) MeV. Also emits gamma rays of 1.60, 2.16

Fire Hazard: Moderate; can react to cause fires or explosions upon contact with turpentine, ether, ammonia gas, illuminating gas, hydrocarbons, hydrogen and

Explosion Hazard: Slight, by reaction with reducing agents. Disaster Hazard: Dangerous; when heated, it emits highly toxic fames; will react with water or steam to produce

Countermeasures

Ventilation Control: Section 2

Personnel Protection: Section 3.

#### TOXIC HAZARD RATING CODE, tFor detailed discussion, see Section 1.)

- 0 NONE (a) No harm under any conditions, (b) Harmful only under un-
- 2 MODERATE. May involve both irreversible and reversible charges

#### COMMONWEALTH OF PENNSYLYANIA DEPARTMENT OF HEALTH DIVISION OF OCCUPATIONAL HEALTH

HYGIENIC INFORMATION GINDE NO. 11

#### CHLORINE

#### PROPERTIES

4 .

A greenish-yellowish gas with a pungent odor. Its odor is detectable at 5 parts per million parts of air (ppm) and is colorless at this concentration.

THRESHOLD LIMIT VALUE (acceptable atmospheric concentration for an 8-hour work period):

I part per million parts of air,

SHORT-TERM LIMIT (maximum average concentration for a 5-minute exposure period);

3 parts per million parts of air.

#### MEDICAL ASPECTS:

Chlorine has an irritating action on the skin, eyes, nasal passages, mouth and respiratory system. Exposure to and inhalation of this gas causes the eyes to burn and water, a burning sensation in the nose and throat, head-ache, possible nose bleeding, sneexing and coughing. A chest soreness will develop from the sneezing and coughing. More severe exposure causes lung congestion and edema (fluid in the lung) and may lead to death. Corrosion of teeth has also occurred.

#### PREVENTION

- Preplacement: Complete physical examination. Individuals with respiratory disorders may be excluded at the discretion of the physician.
- 2. Periodic: Examination for upper respiratory conditions and corrosion of teeth.
- First Aid: Remove from exposure area; summon physician. Administer oxygen.

#### EXPOSURE CONTROL:

Because of its acute toxicity and corrosive nature chlorine use requires strict control and frequent maintenance of equipment.

- Process Control: Maintain exposures below the limits in this guide by use of closed systems, enclosure and/or local exhaust ventilation.
- 2. Personal Protection: When engineering control is impractical, for exposures of short duration and for emergency situations, personal respiratory protection should be used. Repiratory protection devices should be approved by the U. S. Bureau of Mines for protection against chlorine and for the degree of exposure. When handling liquid chlorine supplies and systems, a self-contained breathing apparatus should be used and personnel fully trained in its use.

Skin protective devices such as gloves, clothing and creams should be provided as necessary.

-- 1 JK 8 --

HIH-19053P Rev. 8/65

ABSTRACTS
AIR POLLUTION
CHEMICAL HAZARDS
ENVIRONMENTAL HEALTH
EXPLOSIONS
HAZARD AUDITS
LABELLING
GCCUPATIONAL DISEASE SURVEYS
SAFETY MUDITS
SAFETY MANUALS
SAFETY PROGRAMS
TECHNICAL TRANSLATIONS
FRENCH Spanish

# WILLIAM MacLEAN PIERCE Consultant

Dec. 8, 1971

5 CRAIGIE CIRCLE APT. 48 CAMBRIDGE, MASS, 02138 TEL: AREA CODE 617

Mr. E. Lawrence Best Loss Control Manager Digital Equipment Corp. 146 Main St. Maynard, Mass. 01754

Dear Mr. Best:

Here are a couple of afterthoughts. In connection with rain caps, I prefer T connections which throw thhe exhaust laterally instead of downwards. However, that is a minor point.

One of the first things I look for is the possibility of the exhaust fumes getting back into the plant or into a neighbors building through the air supply system. No doubt, your own engineers would have been alert for this condition, but it is the cause of many difficulties in industry. This short-circuiting of the exhaust gas to the air intakes is a special problem with chlorine which is heavy and because of its high specific gravity does not diffuse as readily as lighter gases.

I hesitate to mention this without seeing the operations, but I thought it was something you could correct in-house without any help.

Sincerely, Pierce

Wm. MacL. Pierce

Re Visit To P.R. digital INTEROFFICE MEMORANDUM

Lon Beaupre, Puerto Rico

DATE: October 5, 1971

FROM:

Lawrie Best

DEPT: Loss Control

SUBJ:

Thanks for a most informative meeting last week and for the courtesies shown to Howard, Len Hathaway and myself. The first hand knowledge of the plant and operations will be very helpful in future negotiations with our insurance carriers.

We were very favorably impressed with the loss prevention activities being performed by Louis Velez. He is certainly enthusiastic and obviously doing a competent job of loss prevention.

Under separate cover I am forwarding some additional materials and information to Louis which he requested. Thanks again for the hospitality, Lon, and please drop us a line if we can be of assistance.

mca

Howard Austen CC: Al Hanson Central Files

VXX Spinkler System Central Biles

# digital INTEROFFICE MEMORANDUM

SPRINKLER SYSTEM

SUBJECT: INSPECTION AND SERVICE

DATE:

May 10, 1971

TO:

Lon Beaupre Puerto Rico

FROM:

Lawrie Best

cc:

Pete Mackey, P.R.

DEPARTMENT: Loss Prevention Manager

L. Velez, P.R.

The attached letter from Grinnell Company is selfexplanatory and is forwarded for your consideration. If you have a maintenance man available who is familiar with the sprinkler equipment and can check the control valves once each week, this along with regular FIA inspections and alarm tests should be adequate and much less expensive.

You may wish to talk with Mr. Cullen and see what he has to offer and discuss with Pete Mackey. Please drop me a line if there are any questions.

mca

Course on dence Typem of accuracy
NAY 10 REC'D

AUTOMATIC SPRINKLER SYSTEMS GRINNELL DIAPHRAGM VALVES PIPE HANGERS AND SUPPORTS

IN REPLY REFER TO -

G. P. O. Box 3603

SAN IUAN, P. R. 00936



PIPE FITTINGS AND VALVES PLUMBING AND HEATING MATERIAL PREFABBICATED PIPING AND SUPPLIES

EXECUTIVE OFFICES PROVIDENCE, R. I. 02901

LONG BUILDING—MATADERO ROAD
PUERTO NUEVO, PUERTO RICO ...

AREA CODE-809 TEL 783-4727

May 5, 1971

Digital Equipment Corp. Maynard, Mass.

Attention: Mr. Hanson

Gentlemen:

Re: Digital Equipment Corp. of Puerto Rico, San Germán, Puerto Rico.

The automatic sprinkler system safeguarding your property is your best possible protection against fire. Yet, the effectiveness of this system can be seriously impaired if it is not maintained properly.

To assure that your system will operate at maximum efficiency, Grinnell has an Inspection and Service program available. This service can result in substantial savings in time and labor. This program meets rating bureaus requirements and it may qualify for a rate credit.

As a businessman you rely on your automatic sprinkler system to safeguard your "going business" and property against fire.

Like any other mechanical equipment, such a system requires occasional servicing or it may fail in an emergency when it is urgently needed. Should it fail, your business could be wiped out. Insurance never fully reimburses for such losses and starting again or rebuilding may be impossible.

The return of the enclosed reply card will permit us to explain the details and how this service may be of real value to you. Please fill it in and mail it today.

Cordially yours,

GRINNELL COMPANY, INC.

John B. Cullen
Department Manager
Fire Protection Div.

JBC:si

Puerto Reco

# digital

# INTEROFFICE MEMORANDUM

SUBJECT: FIA INSPECTION

DATE:

January 6, 1971

RECOMMENDATIONS-PUERTO RI

Ion Beaupre, Puerto Rico

FROM:

Lawrie Best

DEPARTMENT: Loss Prevention

The attached recommendations were developed by the New York Office of the FIA, and forwarded to me by R. J. Kasper, Engineering Supervisor, FIA, in Hartford. Mr. Kasper is particularly concerned with recommendations Nos. 70-1, 70-2, 70-3, 70-8, 70-9 and 70-10.

Some of the recommendations concern the building protection, valve pits, etc., (70-1 to sprinkler loading dock, 70-4 meter valve pit, 70-6 to provide a post indicator valve). These recommendations should be presented to PRIDCO, the building owner.

If you will advise me of the status of these items (I suspect some conditions have changed since the last inspection) and indicate the prospect of completing them, I will forward the information to the PIA.

If Plant Engineering, Maynard, can be of assistance, I will be happy to coordinate.

Tawrin

mm

cc: Cy Kendrick
Al Hanson
Howard Austen
Tom MacDonald
Ray Carlson

# FIX IT BEFORE THE FIRE

DIGITAL EQUIPMENT CORP. SAN GERMAN, PUERTO RICO NEGOTIATION

#### RECOMMENDATIONS

- 70-1 Automatic sprinkler protection should be extended to the 20' x 30' Loading Dock on the east side of the Main Building.
- 70-2 Relocate all "red label" drums of FLUX (liquid resin) away from the equipment pad. A noncombustible shed should be provided for their storage.
- 70-3 Spring operated self-closing spigots should be used for the dispensing of the liquid resin from the drums.
- 70-4 The meter valve pit should be pumped out and if necessary a sump pump should be provided to maintain the pit dry.
- 70-5 When dry, the meter should be examined to ascertain it is acceptable for fire water usage. (See "Fire Protection Handbook", 12th Edition, Section 13, Page 31).
- 70-6 A post indicator type gate valve should be provided on the 8" underground upstream of the mater.
- 70-7 Repair the 2" drains to allow proper testing of pressures on the sprinkler systems.
- 70-8 Skid all stock subject to water damage 4" to 6" above the floor.
- 70-9 A Plant Emergency Organization should be formed and should consist of the following:
  - a A man to notify the public fire department.
  - b A man to check the sprinkler control valves to ascertain they are fully opened.
  - c Two men to use the mearest appropriate fire extinguishers and
  - d Four must to utilize the two nearest inside hose connections to the area in need.



A CLOSED SPRINKLER VALVE MAY MEAN THE LOSS OF YOUR PLANT OR A SUBSTAN-TIAL PART OF IT. TO BE SURE ALL VALVES ARE FULLY OFFNER, AFTER ANY NECES-SARY IMPAIRMENT OF PROTECTION, IT IS ESSENTIAL THAT A BRAIN TEST BE MADE ON EACH SPRINKLER RISER AFTER OPENING THE CONTROL VALVE.



70-10 Care and maintenance of fire protection equipment should be made the responsibility of a competent employee and weekly report filled out and filed for representative of this Association (Plant Fire Prevention Inspection pads left and explained). Impairment to any fire protection equipment should be reported (telegraphed) to the New York Office of this Association. Notification, if possible, should be in advance of the actual impairment.

# INTEROFFICE MEMORANDUM

Al Hanson

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## igital INTEROFFICE MEMORANDUM

Al Hanson

## FIX IT BEFORE THE FIRE

DIGITAL EQUIPMENT CORP. SAN GERMAN, PUERTO RICO NEGOTIATION

### RECOMMENDATIONS

- 70-1 Automatic sprinkler protection should be extended to the 20' x 30' Loading Dock on the east side of the Main Building.
- 70-2 Relocate all "red label" drums of FLUX (liquid resin) away from the equipment pad. A noncombustible shed should be provided for their storage.
- 70-3 Spring operated self-closing spigots should be used for the dispensing of the liquid resin from the drums.
- 70-4 The meter valve pit should be pumped out and if necessary a sump pump should be provided to maintain the pit dry.
- 70-5 When dry, the meter should be examined to ascertain it is acceptable for fire water usage. (See "Fire Protection Handbook", 12th Edition, Section 13, Page 31).
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# DEC-GRAM

| O Name        | MR. RAY CARLSON                                 | 9/13/71 |
|---------------|---|---------|
| Com           | pany C/O CARIB HILTON                           | Date    |
| Stree<br>City | CAN THAN DYENGO BICO                            |         |
|               | PLEASE CALL US BEFORE 5 PM TODAY OR CALL PETE M | ACKEY   |
|               | AT MAYAGUEZ ON TUESDAY, 9/14.                   |         |
| _             | PLEASE PRINT CLEARL                             | Υ .     |
| _             |   |         |
| -             |   |         |
|               |   |         |

Puetto Rico
TELEX MESSAGE

| MSG NO   | DATE: _  | August   | 18,  | 1971     |
|--|----------|----------|------|----------|
| TO: Lon Beaupre  | OFFICE:  | Puerto   | Rico | Plant    |
| FROM: Ray Carlson  |          |          | _    |          |
| REFERENCE: John Doris Comp   | any      |          |      |          |
| We are working on the proble   |          |          |      |          |
| Hanson and I will take full  | responsi | bility o | f si | tuation. |
| Thanks.  |          |          | -    |          |
|  |          |          |      |          |
|  |          |          | -    |          |
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|  |          |          |      |          |
|  |          |          |      |          |

|                            | Puerto Rico<br>Phase I | memo             |
|----------------------------|------------------------|------------------|
| digital  MEMO TO Ray Carlo | WRITE                  | IT - Don't say i |
|                            | look it ove when you   |                  |
| West field.                | su con sgow            | am from          |
| hos love                   |                        |                  |
| DEC 5 - 1011               | Signed                 | nea              |

Puesto Reio
Phise I

Hold Appending of pending of the public for the public for the pending of t

mens 14 3, 22 C

212-682-4560

TO RAY CARLSON
FR DICK HEATON 8-2-71

Ealer spept

A VERY UPSET FRANK BOYLE FROM JOHN DIAS ( SPELLING??) JUST SHOWED UP HERE VERY UPSET ABOUT A LETTER YOU WROTE TO HIS COMPANY REGARDING REFUSAL TO PAY AN 18,000 DOLLAR INVOICE. HIS APPROACH WAS ONE OF BEING MISTREATED AND MISJUDGED. HE WANTED VERY MUCH TO SIT DOWN AND TALK TO YOU AT YOUR CONVEINCE. I GAVE HIM YOUR TELEPHONE NUMBER AND HE WILL TRY TO CALL YOU. SUGGEST YOU ALSO TRY TO CALL HIM. HE WAS MENTIONING KEN OLSON'S NAME QUITE FREELY AND I AM SURE HE WAS TRYING TO MAKE AN IMPRESSION. HE DID.

ed Marich

mens - Puerto Ries 5/19/71 Be: Puerto Ries A/C

P. F. /e ANT DE. G

DIGITAL MAYN

RCA0912/19 DIGITAL MAYN

385439 DIGITALPR

TO GREG BACON PLANT ENGINEERING.

FROM RAY CARLSON

AL HANSON HAS SKETCH OF NEW PARTITIONS ADD ALSO INVESTIGATE COOLING OF TRANSFORMERS

REA IMMED. W. Johnson

## digital interoffice memorandum

TRIP TO PUERTO RICO -

SUBJECT: 5/3 - 5/7

DATE:

May 12, 1971

TO:

Al Hanson

FROM:

Ray Carlson

DEPARTMENT: Plant Engineering

Phase II plans visited PRIDCO and discussed site drawings and building plans and had certain changes made. Picked up a set of drawings and signed them off on a preliminary basis to be reviewed in more detail in Maynard.

Changes I made were to leave wall up adjoining new phase and old, and to insert new employee entrance door.

I also picked up a set of Phase II sepias for which we owe to PRIDCO \$48.00.

Phase II known needs.

- 1. Aisle and door layout to Phase II from Phase I. This would be a direct contract with contractor.
- Distribution of electrical.
- 3. Corrected HVAC hole drawing from PRIDCO.
- Determination of air conditioning needed to offset 4 units being eliminated on connected wall Phase I and II.
- B. Sanitary Permit. Ed Schwartz said letter was in mail and, upon checking, copy is in Maynard from Lopez.
- C. Water Permit. 4" line. Letter from Pedro R. Sola, Assistant to Lopez to Engineer Jaime Ojeda asking for work to be done.

Ojeda and Suarez met with me but told me they could not do anything without approval from Engineer Javier Rios Matta, their boss at Acqueductos. I visited Matta. He said I would have no trouble with the water if I got 6 copies of a drawing from PRIDCO for him to approve showing what we want to do. Mr. Jimenez is to get drawings to him and I am to call PRIDCO, Friday, May 14, to see how we made out.

Falipe Jemenez P. R. Bearing Value of Soil 1500 PSI at Depth 2 ft below Junshed grade Called & Wood he notified thymer at Puls & Stay

P.R.

menno

## INTEROFFICE MEMORANDUM

INFORMATION ONLY

GEOLOGICAL TOPOGRAPHY

MAPS

Ken Olsen Stan Olsen DATE:

January 14, 1971

FROM:

Ray Carlson

DEPARTMENT: Plant Engineering

.Plant Engineering has 3 sets of Topo maps of Puerto Rico and the Virgin Islands.

We are sending one set to Puerto Rico and retaining 2 in our files.

DEC 5 - 1043-C (4-70)

Puerto Rico

XR correspondence

## digital INTEROFFICE MEMORANDUM

TO: CC: George Wood 1-4

Fred Bowers, P.R.

Pete Mackey

DATE: December 3, 1971

FROM: Don Gates

DEPT: Plant Engineering

SUBJ: ETCHER ENCLOSURE P.R.

Upon the recommendation of consultants Ramon Guzman and Daniel Construction Co. an enclosure for the Chem Cut Etcher has been designed.

Measure 10'w x 14' long x 8'. Construction shall be of 1/4" clear PVC modular panels to be 4' x 8' flanged and bolted. Ceiling shall be clear also to utilize existing lighting and shall be free standing. Construction of this type permits removal of any individual or series of vertical panels for equipment servicing or repair. One access door will be installed in rear of enclosure for maintenance. Operator access doors shall be field installed under our direction. Necessary exhaust equipment is presently existing and duct work modifications will be made.

National Plastifab has quoted complete fabrication and on site installation (refer quote). I recommend the complete installation because of flexibility, quality of workmanship and cost.

The complete installation will take approximately 5 production days. However, suspension of production would probably be only 2 or 3 days.

Plant Engineering will manage the entire project. Schedule installation is 2nd week in January and will be confirmed ASAP.

Budget price for complete enclosure - 5K.

Don Gates

mca

Central Files



### National Plastifab, Inc.

MULLER ROAD . BURLINGTON, MASS. 01803 . Phone 617/861-8850

teflon ppo styrenes acrylics phenolics lexan delrin nylon polypro penton DVC polyeth kynar polysulfane TPX surivn urethane

CAB

polylmides

November 30, 1971

Digital Equipment Thompson Street Maynard, Mass. 01754

Atten: Don Gates

Dear Don:

We are pleased to confirm our telephone conversation of November 30th, 1971 for One (1) Clear PVC Rectangular Closure measuring 10' x 14' x 8' high to be constructed on site in Puerto Rico by our two (2) men.

The construction will consist of welded 2 x 2 x 1/4"
PVC Angle on all 4 sides of each sheet. (see 1) The four
corners will have Angle on the inside and outside as will
the joining of the top to the four sides. (see 2) All
angle will have 1/2" x 1-1/2" PVC Nuts & Bolts every 16".
(A strip of PVC will be inserted and bolted between every
two peices of Angle for support. (see 3) The bottom angle
on the floor will be bolted to ramset lag bolts plus a
1/8" x 2" flexible PVC strip to act as a gasket and shock
absorber. All holes (per Digitals instructions will be cut
on site for operation of Chem cut etcher from outside the
closure). Tracks on windows and doors to be Teflon lined
for easy operation. Door to consist of 3/8" thick Plexiglass on Teflon lined runner.

The necessary 12" Fitting, Pipe and Damper to be fabricated and installed to existing duct work. Sufficient materials to alter or repair the clear closure will be left on hand for future use.

Cont'd to page -2-



### National Plastifab, Inc.

MULLER ROAD . BURLINGTON, MASS. 01803 - Phone 617/861-8850

noryl teflon ppo styrenes acrylics phenolics texan delrin nylon polypro kel-f penton pvc polyeth kynar polysulfane TPX surlyn urethane

CAB

FEP

polyester polyimides November 30, 1971 Page -2-

Digital will assume Air-Fare, and Six (6) nights lodging.

All materials are F.O.B. Burlington, Mass. Upon Digitals receipt of materials NATIONAL PLASTIFAB INC. will bill a partial in the amount of \$2000.00 to help cover the time lapse before fabricating the unit in Puerto Rico.

NATIONAL PLASTIFAB INC. will assume any additional expense for lodging after the 6 day period.

Price for this package will be \$3950.00. If we fabricate unit at our plant and disassemble for Digital the package price would be \$3500.00.

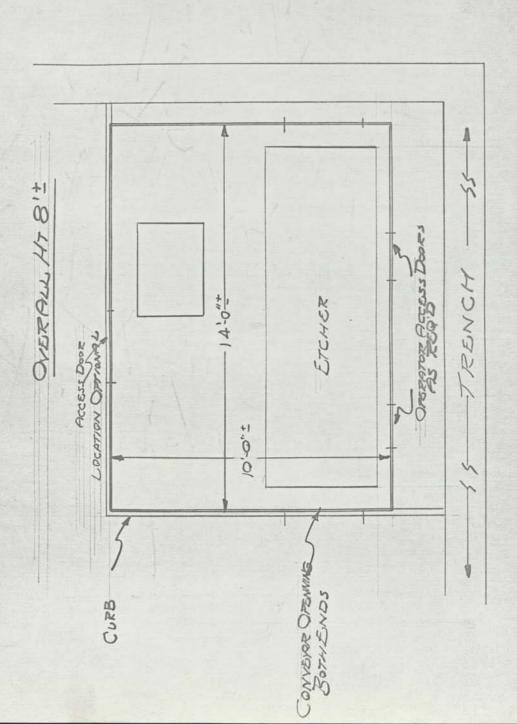
Dilivery of material to Digital will be One (1) week after receipt of order, with work to commence after January 1st 1972, or whenever Digital so desires.

Sincerely, NATIONAL PLASTIFAB INC.

C. KLYNCK

Sales Manager

CK:ca



digital

Puerto Rico

## INTEROFFICE MEMORANDUM

TO:

Bill Hanson 1-4

Lon Beaupre, P. R. George Beebe

Pete Mackey

DATE:

November 29, 1971

FROM:

Don Gates

rge Beebe

DEPT:

Plant Engineering

SUBJ:

PROPOSED OUTDOOR DINING AREA

Enclosed is a rendering of the proposed outdoor dining area in Puerto Rico - each structure to be approximately 30 ft. sq. and seat 50 people.

Construction to be of redwood concrete slab. Approximate cost to build is 3K each; this includes water and electrical power.

If seating capacity of the area were to be 300 @ 50/structure, then 6 structures would be required (18K).

Cost to construct each structure is by sq. ft. and no appreciable savings is shown by increasing or decreasing size.

Your comments are welcomed.

Don Gates

Attachment

cc: V Central Files

Puerto Rico

Central Files

INTEROFFICE MEMORANDUM

TO: G. Wood

November 24, 1971

D. P. Gates

A. Hanson P. Mackey

FROM:

G. Bacon

L. Beaupre

DEPT:

DATE:

SUBJ: P.R. Corrosion Problem

Trip 11/15 to 11/19

### Reference:

1. Daniel Engineers letter 12 Oct 71

2. Environmental Research & Applications 11 Nov 71

3. Ramon Guzman & Associates 18 Nov 71

Air flow measurement taken by myself on 11/16 reveal the following:

Conditions, all air exhaust and supply equipment operating and in good repair.

- 1. Gold machine exhaust fan Total SP wg 3.8" @ 1500 rpm from performance curve 10,100 cfm
- Tin line exhaust fan Total SP 2.1" wg from curve 600 cfm
- 3. Etcher exhaust Total SP 1.7" wg from curve 1500 cfm
- 4. Exhaust from IRS oven 200 cfm est.

Total system exhaust 12,400 + cfm

5. Air supply unit using velometer 10,500 cfm supply air

From readings taken the room is calculated to be under negative pressure. This was confirmed by smoke test taken at several wall openings in this area.

Calculation of room air changes

45,000 cu. ft. (room vol.) = 3.55 min./air change Reveal 12,600 cfm (exhaust

P.R. Corrosion Problem Trip 11/15 to 11/19 2 November 24, 1971 Rain covers on exhaust stacks were purposely omitted to avoid chemical attack on roof membrane. All fans are drained and leaking ductwork will be repaired by Sam P. Wallace Corp. immediately according to Pedro Gonzalez V.P. While observing the plant, no odor of chlorine was present in the plating room, the area outside the plating room, the switch gear room, the area outside the plant, or on the roof. The chlorine alarm system (sensitivity 3 ppm) did not sound at any time. The leaking of CuCl has been greatly reduced. Repair and treatment of floor to be completed as soon as W. R. Gracie material arrives. At present design is underway for a ventilated enclosure for the etcher and system. D. P. Gates mca cc: Central Files

Puerto Tico

memo

## INTEROFFICE MEMORANDUM XR Correspondence

Lon Beaupre TO: CC:

Greg Bacon George Beebe

Bill Hanson Pete Mackey

DATE: October 15, 1971

FROM: D. P. Gates

DEPT: Plant Engineering

SUBJ: (P.R. II FIT UP

Presently contracts with Wallace and Lord have been committed for a compressed air loop and major power distribution in Phase II. Therefore, fit up will be small compressed air lines, water lines, chilled water lines, bus duct and equipment tie-ins.

Without the information requested in my memos of 23 September and 30 September, fixed price contracting will probably be out of the question.

An alternate to this is use hourly contract labor with DEC supervision.

This possibly can be more expensive, as cost control is very difficult. However, if an accurate layout is not furnished me by November 1, we may have no choice but to go this way.

I ask you to review the pros and cons of each with respect to your present needs and commitments and reply ASAP.

D. P. Gates

mca

Central Files

## Puerto Rico digital interoffice memorandum

Lon Beaupre TO: CC:

Greg Bacon

George Beebe

Bill Hanson Pete Mackey DATE: October 15, 1971

FROM: D. P. Gates

DEPT: Plant Engineering

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D. P. Gates

mca

Central Files

digital INTEROFFICE MEMORANDUM

TO: Bill Hanson

Lon Beaupre, P.R.

Pete Mackey

DATE: Sep

September 30, 1971

FROM:

Don P. Gates

DEPT:

Plant Engineering

SUBJ: PUERTO RICO II\*

In regard to Lon's print and memo, the type (voltage)
is only part of electrical requirement. The name
plate amperage is required to determine distribution
sizing.

 The termination device of each machine is required to determine electrical hook-ups.

> Devices: such as motor starters, disconnect switches, plugs, etc.; if on machine, should be designated by Mfg., & Model No.

- 3. Is any of this equipment in our Maynard Plant and if so where?
- 4. For compressed air, we will need to figure approximate consumption and therefore description of usage is needed i.e. air blow off, air operated tools (state kind) etc.
- 5. Water -

Describe same as #4

We are planning to have major distribution and actual hook-ups contracted out as we feel that Lon's limited work force may not be able to handle too much construction work.

The more detailed information and layouts that we can use for bids, the fewer extra's are involved. Also better competitive may be obtained.

Don

Don P. Gates

mca

cc: Central Files

digital

### INTEROFFICE MEMORANDUM

TO:

Bill Hanson

Al Hanson

Lon Beaupre, P. R.

Pete Mackey

DATE:

September 23, 1971

FROM:

Don P. Gates

DEPT:

Plant Engineering

SUBJ: PUERTO RICO PLANT 2

Confirming our meeting of 21 September 71 the following information will be provided to this Department not later than 1st week of October.

- Detailed layout to show locations and type of facilities services required (i.e. water, power, compressed air).
- Installation information of all special equipment.
- Any other information that may prove useful in the fit-up of the plant.

This deadline is important so that engineering and drawings may be completed by November 1 for the purpose of obtaining necessary outside bids.

If we may be of any service in obtaining the above information, please call.

Don Gates

mca

√ cc: Central Files

ATT 64 6 16 19 71 WUINY 30951 1410 04/22 OK GA 7103470212 385439" 385439 DIGITALPR DIGITAL MAYN ZCZC MSG#740 7/22/71 TO: PETE MACKEY PUERTO RICO FROM: DON GATES MAYNARD REF: ROOF CURB SPECIAL ROOF CURB SENT TODAY. COVER FOR CURB IS NOT RIGHT. CORRECT COVER WILL BE SHIPPED SOON DON NNNN

D. P. Asites
XR A/C Vintilators



D. P. Gates March 19, 1971

### PUERTO RICO #3 SILK SCREEN DEPT.

### GENERAL CONSTRUCTION

Ventilation, A/C & Vacuum Cleaning Systems

- A. All equipment shall be supplied by Digital.
- B. All ductwork, piping, and miscellaneous parts shall be supplied by installer except where noted on respective drawings.
- C. All ductwork and piping shall comply with current ASHRAE recommendations.
- D. All PVC ductwork shall be sealed water tight.
- E. All construction shall be in accordance with any local codes and PRIDCO requirements.

digital INTEROFFICE MEMORANDUM

TO: George Wood

cc:

Seorge Reebe

George Beebe Hiram Quinones

Al Sidel

Central Files

DATE:

May 31, 1973

FROM:

Bill Krasnow

DEPT:

Facilities Planning

SUBJ: POTENTIAL SCAVENGERS - PUERTO RICO

 Inland Chemical of Indiana, Ron Mullholland, Asst. VP, Telephone: 219/432-5541

Inland is presently in construction of a chemical recovery plant in Manati (25 miles west of San Juan). They have contracts with Upjohn and Dupont for the recovery of solvents and pharmaceutical waste. Their refinery is scheduled to be completed on November 1, 1973 and their high temperature incinerator by January 1, 1974. They are definitely interested in our solvents, particularly methylene chloride, which they would purchase from us. Inland is beginning a new market study to determine what other services they should offer in Puerto Rico. I suggested a need for sludge disposal and/or sanitary landfill.

 Pollution Control, Inc., St. Paul, Minnesota, Melvyn Bell, President, Telephone: 612/445-1086

PCI is presently working with Fomento on finding a piece of land on which to build scavenging facilities. They have interviewed Abbot Labs and RCA in Puerto Rico to determine the potential market. Coincidently, RCA is looking to scavenge, sludge from plating operations. PCI plans to be in business in about a years time. They will be sending out questionaires shortly to determine the total market and will include us in their survey. I also suggested to them that they consider the landfill business.

Puerto Pico

## digital INTEROFFICE MEMORAN

FROM:

TO: cc: George Wood

Don Gates

Al Hanson

Hiram Quinones Al Sidel

Central Files

WELL WATER ANALYSIS - SAN GERMAN SUBJ:

DATE: May 29, 1973

Bill Krasnow WDK

DEPT:

Facilities Planning

Attached please find copy of water analysis of six inch well at San German. The sample was taken while Don Gates was testing the well late in March and was analyzed in Puerto Rico for Ramon Guzman.

The water is of high quality, very clear (note turbidity and color) and easily satisfies the U.S. Public Health Service standards for drinking water. While the analysis is not 100% complete since it does not indicate the levels of arsenic, chromium, cyanide, etc., there is no reason to believe these elements are present in significant quantities. These results may be considered "good news" inasmuch as minimum pretreatment facilities will be required before using this water in the plant.

I have asked Hiram to grab a sample of the new 8 inch well while it is being tested this week and have it analyzed.

### RAMON M. GUZMAN & ASSOCIATES

## Consulting Sanitary Engineers

MONSERRATE 560 · SANTURCE, PUERTO RICO 00919 · P. O. BOX 1401 · HATO REY, PUERTO RICO 00919

SIX INCH WELL MARCH 1973

### PHYSICAL AND CHEMICAL ANALYSIS OF WATER

| Deep Well at Digital Plant<br>San Germán  |   |  | LIMITS                    |
|---|---|--|---------------------------|
| Constituent   | Expressed as  | mg/1   | u.s. P. H. S.             |
| Arsenic Alkalinity pH Alkalinity Total Barium Bicarbonate Cadmium Calcium Carbonate Chloride Chromium Copper Cyanide Dissolved Oxygen Fluoride Free Carbon Dioxide Iron Total Lead Magnesium Manganese Mbas Mercury | As CaCO3 CaCO3 Ba HCO3 Cd Ca CO3 CL Cr+6 Cu CN O2 F CO2 Fe Fe Pb Mg Mn Hg | 34.4<br>0<br>62.0<br><br><br>32<br>34.4<br>0<br>62.0<br><br><br><br><br><br><br>10<br>0<br>0 | - 250<br>- 1.0<br>3<br>05 |
| Nitrate<br>Turbidy<br>Color<br>Odor<br>Total Hardness<br>Non-Carbonate Hardness<br>Conductivity<br>pH   | NO3<br>SiO2 Stds.<br>PT-Co Stds.<br>Threshold                             | 1.72<br>0<br>0<br><br>174.0<br>0<br>643<br>7.97  | - 45<br>- 5<br>- 15       |
| Saturation pH<br>Saturation Index   |   | 7.99<br>-0.02  |                           |
|   |   |  |                           |

Fuerto Rico

TO:

cc:

# gital INTEROFFICE MEMORANDUM

Al Hanson

George Beebe Henry Crouse George Wood

DATE: May 29, 1973

FROM: Bill Krasnow WDK

DEPT. Facilities Planning

THE CDM PROBLEM STIB.T.

Following our meeting with Henry Crouse and at the request of George Wood, I have re-checked the Camp Dresser & McKee design for the San German Waste Treatment Plant against the design criteria. The design criteria is shown on CDM Drawing WT-1 and also in the Operators Manual (copy attached).

My review of the rinse and dump schedules indicates that the expected effluent would have an average total heavy metals (copper, tin and silver) content of 4 parts per million which is in excess of Puerto Rico Regulation 477 which limits the total metal content to 2 ppm. I contend that the CDM design did not go far enough and that proper flocculation, precipitation, and sludge removal equipment should have been installed on day 1. I further contend that the sedimentation basin should have been taller and longer and contained more linear feet of weir.

Problems with the Treatment plant at San German and the threat of possible shutdown required George Wood, Jerry Lordi and I to make several trips to Puerto Rico as well as spend some time in Maynard working on this problem. Below is my estimate of the costs incurred by Digital in resolving this problem.

| 30 man days at "billable" cost of \$200 a day | \$6,000  |
|---|----------|
| Travel and Living Expenses                    | 3,000    |
| Polyelectrolyte injection system              | 1,000    |
| Laboratory (Omni) fees                        | 2,000    |
| Sludge Removal Equipment                      | 4,000    |
|   | \$16,000 |

As I told you before, I am more interested in CDM's admission of their errors than I am in the recovery of our costs. Furthermore my aim for CDM services on the Maynard Treatment Plant project is only slightly more than a drafting service. Between Lancy Labs and the DEC in-house capability, we have a potent engineering force. I would prefer CDM to extract from us and do the "dog" work -- prepare the 20 odd drawings and specifications; and at a reasonable price. Their first proposal for 74K and their second at 52K is ludicrous.

I have no objection to CDM doing this work on the basis described above and I hope Bob Marini will see things our way. In any event, I have a schedule to maintain and we must resolve this problem as quickly as possible.

### TABLE II-1-1

### EFFLUENT CHARACTERISTICS BOARD FABRICATION FACILITY

San German, Puerto Rico

| The state of the s | Maximum              |  |  |  |  |  |  |
|--|----------------------|--|--|--|--|--|--|
| Contaminant  | Concentration (mg/1) |  |  |  |  |  |  |
| Cyanide, CN  | 0.5                  |  |  |  |  |  |  |
| Copper, Cu   | 1.0                  |  |  |  |  |  |  |
| Tin, Sn  | 1.0                  |  |  |  |  |  |  |
| Gold, Au   | 1.0                  |  |  |  |  |  |  |
| Iron, Fe   | 2.0                  |  |  |  |  |  |  |
| pH range   | 6.5 - 9.0            |  |  |  |  |  |  |
| Zinc   | 1.0                  |  |  |  |  |  |  |
|  |                      |  |  |  |  |  |  |

Anticipated effluent concentrations will be less than the maximum shown above.

The wastewater will not contain excessive solids, either suspended or dissolved. The BOD will be nominal and the temperature less than  $110\,^{\circ}\text{F}$ .

SECTION FROM . ..

CDH 10/71

|                |               | Eliment with the  | -         | 1100                 |                          |                                 |                        |    |   |   |
|----------------|---------------|---|-----------|----------------------|--------------------------|---------------------------------|------------------------|----|---|---|
| KEY            | LOCATION      | NED SOURCE  | N<br>(gpm | 00                   | 1(11)                    | (2)<br>tute)<br>)(gal/<br>week) | • 1911                 |    | RPMAKS  | SEVER   |
| 1              | Eye Wash      |   |           | Nil                  |                          |                                 |                        |    | Directly to Sever   | (1)   |
| 21             | Eye Wash      |   |           | Nil                  |                          | *                               |                        |    | Directly to Sewer   | (1)   |
| 3              | Eye Wash      |   |           | NII                  |                          |                                 |                        |    | Directly to Sever   | (1)   |
|                |               |   | 5         |                      | 1                        |                                 |                        |    | Directly to Sever*  | (1)   |
| 4              | Scrubber      |   |           |                      |                          |                                 |                        |    | Directly to Sever   | (1)   |
| 5              | Photo Prepara |   | 10        |                      |                          |                                 |                        | MA | 0.087mg/l Silver  | (2)   |
| 6              | Screen Prepar | ation Sink  | 3         |                      |                          |                                 | 3.8                    | 0  | U.US/mg/1 Silver  | (2)   |
| 7              | Screen Wash   |   |           |                      |                          |                                 |                        |    |   |   |
|                |               | Rinse   | 1         |                      |                          |                                 | 12.3                   |    | 0.0lmg/l Silver   | (4)   |
|                |               | NaOII Tank  |           | 170                  |                          |                                 | 11.6                   | 6  | 0.068mg/1 Silver  | (5)   |
| 8 6 9          | Board Strippe | TS  |           |                      |                          |                                 |                        |    |   |   |
|                |               | Rinse   | 10        |                      |                          |                                 | 7.0                    | 0  | 0.01mg/1 Silver<br>0.15mg/1 Copper  | (1)   |
|                |               | NaOH Tank   |           | 50                   |                          |                                 | 13.3                   | 3  | 0.029mg/l Silver<br>2.9mg/l Copper  | (5)   |
| 10<br>6<br>10A | Etcher        | (Cupric Chloride Tank) (3)<br>Ferric Chloride Tank  |           | 125                  | 0                        |                                 |                        | 0  | 16.5% Iron<br>6.6% Copper   | (6)   |
|                |               | Standing Rinse  |           | 48                   |                          |                                 | 1.5                    | 5  | 6600mg/1 1ron<br>2500mg/1 Copper  | .(3)  |
|                |               | 1ST Running Rinse   | 10        |                      | (10)                     | )                               | 7.2                    | 2  | 9.8mg/1 Iron<br>4.6mg/1 Copper  | (2)   |
|                |               | NaOH Tank   |           | 120                  |                          |                                 | 13.2                   | 2  | 13.5mg/l Iron<br>30mg/l Copper  | (5)   |
|                |               | 2ND Running Rinse   | 10        |                      | (10)                     |                                 | 7.1                    | 1  | 0.135mg/1 Iron<br>0.15mg/) Copper   | (2)   |
| 11             | Scrubber      |   | 5         |                      |                          |                                 | 6.6                    | 6  | Directly to Sewer   | (1) · ·                                       |
| 12             | Gold Plate    |   |           |                      |                          |                                 |                        |    | 23 2 72   | -   |
| 12A            |               | Electroclean Rinse Anmonium Persulfate Rinse 10% Sulfuric Acid Rinse SX Sulfuric Acid Rinse (Gold Strike) (Reciain Rinse) | 5 5 5     | 30<br>26<br>24<br>26 | (5)<br>(5)<br>(5)<br>(5) | (30)<br>(26)<br>(24)<br>(26)    | 0.7<br>3.7<br>0<br>2.7 | 7  | Directly to Sever<br>Birectly to Sever<br>810mg/1 Copper<br>11.0mg/1 Copper<br>120mg/1 Copper<br>0.5mg/1 Copper | (1)<br>(1)<br>(2)<br>(3)<br>(2)<br>(3)<br>(2) |
|                |               | Rinse<br>(Gold Plate)   | 5         |                      | (5)                      |                                 | 6.7                    |    | 3.6mg/1 Gold  | (2)   |
|                |               | (Reclaim Rinse)<br>Rinse<br>Rinse   | 5         |                      | {5}<br>{1}               |                                 | 4.3                    |    | 5.lmg/1 Gold<br>5.7mg/1 Gold  | (2)<br>(2)                                    |
| 13<br>4<br>13A | Immersion Tin | Neutra Clean 7<br>Rinse<br>Anmonium Persulfate<br>Rinse   | 5         | 20                   | (5)                      |                                 | 0 2.1                  |    | Directly to Sever<br>Directly to Sever<br>160xg/1 Copper<br>2.5wg/1 Copper                                      | (1)<br>(1)<br>(7)                             |
|                |               | (Irmersion Tin)   |           |                      |                          |                                 |                        |    |   | (2)   |
|                |               | Rinse .   | 5         |                      | (5)                      |                                 | 2.0                    |    | 20ng/l Tin  | (2)   |
| 14             | Lab Sink      |   | 1         |                      | (1)                      |                                 |                        |    | Directly to Sever   | (1)   |
|                | TOTALS        |   | 101       |                      | (67)                     |                                 |                        |    | st be installed copper dust.  |   |

### NOTES:

- (1) The process cater analyses indicated herein are based on a series of tests conducted on process vaters collected at Bounday, School basetts. The analyses were made on existing operations and are only confining of expected process water quality at San German.
- (2) Discharges noted are based on information supplied and confirmed by Digital and are expected maximum to be proceeded.
- (3) Emprie Chloride to be used at San German.
  - Sewers: (1) Sentrary Sewer (2) Neak Acid (3) Strong Acid (4) Weak Base (5) Strong Mane (6) Corne (Mortde (7) Assembles Persulface

OF THE INTEROFFICE MEMORANDUM

XR Journal / Jural

TO: Al Hanson DATE:

ATE: May 25, 1973

cc: George Beebe

Don Gates FROM: Bill Krasnow WOK

Al Sidel

George Wood DEPT: Facilities Planning

Central Files

SUBJ: TRIP REPORT - PUERTO RICO, May 22-24

- 1. Aquadilla Impact Statement Ramon Guzman, Dr. Rafael Munoz (Ramon's associate) and I met with the Chief of the Environmental Advisory Section of Fomento. It is this Section's function to review the Environmental Impact Statement and ultimately submit it to the EQB and other agencies. Their first comment was that our EIS is the finest one they've ever seen. They had two questions for which I promised a speedy reply: 1) flow diagrams of the proposed systems and 2) chemicals to be stored and their quantity. They promise speedy action once this information is received.
- Aquadilla Schedule The schedule for the construction of the new facility in Aguadilla is dependent on the action on the Environmental Impact Statement. A permit for site work, footings and foundations cannot be issued until Fomento submits the EIS to the EQB and 30 other government agencies. This submittal will take place in about 2½ weeks or around June 15 which coincidently is the same date given to me by Fernando Garcia of Rexco for the completion of foundation drawings. The building permit from the Planning Board for the actual construction of the building cannot be granted until the 30 agencies and the EQB complete their review of the EIS. Under Puerto Rican law, the EQB can stall 120 days before completing their review. If we allow this to happen, construction of the building would be delayed for four months from June 15; or October 15. According to Ramon, the quickest response we could hope for is 6 to 8 weeks and this will require constant pressure by Digital on Fomento. Besides Ramon, our strongest ally is Pepe Nunez of Fomento. In any event, it appears that the earliest date we can hope for to begin construction of walls, roof, etc. is August 1.
- 3. San German Impact Statement The decision to locate the PTH facility in San German will require an Environmental Impact Statement for that location. Dr. Munoz is preparing the Statement. This EIS will look very much like the one for Aguadilla except that it will include a section on the existing process and existing waste treatment plant. Hiram and I met with Dr. Munoz to answer his questions and show him around the Plant. He is to submit his first draft to Ramon in two weeks.

- 4. San German Deep Wells On Thursday, Chardon completed the new 8"
  well at a depth of 350 feet. The well is cased with 8" schedule
  40 pipe to a depth of 90 feet. From 90 to 350 feet the drilled
  opening is 7 15/16". Chardon reported encountering a small stream
  of water at 125 feet and large quantity of water at 225 feet. A
  complete boring log is forthcoming. I witnessed large volumes of
  water, estimated at 250-300 gpm, flowing from the well with 60 psig,
  air pressure on it. The complete 72 hour test will take place during the week of May 28. I learned why we had so many problems
  with the six inch well at the 90 foot level. This well is cased
  with 6" schedule 40 pipe to 90 feet and thence drilled at 5 3/4"
  to the bottom. Chardon is to probe this 6" well and determine the
  condition of the casing at the 90 foot level. If feasible, Chardon
  will withdraw the casing and re-drill the well as an 8 inch.
- 5. Engineering Registration I learned from Ramon that the Board of Registration will only grant one temporary license to a project. Under this ruling we can get two temporary engineering licenses; one for Aguadilla and one for San German. According to Ramon any engineering that is "process related" we can do in Maynard.
- 5. San German Sanitary Plant The municipal activated sludge plant is not yet in operation due to mechanical difficulties and breakdowns, primarily broken seals and misaligned pumps. Hiram has had a topo survey made and has contracted with Sam P. Wallace for engineering services for the design of the "bypass" line. Hiram will have Victor Garcia and me check the design.

Puerto Rico Central Files
GIGILI INTEROFFICE MEMORANDUM
memo

TO: Al Hanson

DATE:

April 18, 1973 water

cc: Ge

George Beebe

Don Gates

Al Sidel George Wood

FROM:

Bill Krasnow WDK

Gerry Lordi Hiram Quinones

Ouinones DEPT:

Facilities Planning

SUBJ: TRIP REPORT - SAN GERMAN, P.R.

- Listing Treatment Plant Our polyelectrolyte tests proved very successful. The floc grows, thickens and settles to the bottom within a few minutes. The supernatant flowing over the weir in the sedimentation tank is clear and very low in copper. We are now taking composite samples each shift in two locations the total industrial waste leaving the plant and the flow over the weir in the sedimentation basin. The last 8 hour composite taken before leaving showed 1.2 ppm total copper in our industrial waste. This is below the legal limit of 2 ppm. None of the readings taken after the addition of the polyelectrolyte would endanger the activated sludge plant.
- 2. Treatment Plant Modifications Now that we're precipitating and settling copper, we're producing considerable sludge; consequently, we need a sludge pump to remove approximately 300 gal./day from the bottom of the sedimentation basin. I estimate 7-10 days worth of sludge will clog sedimentation basin and raise copper levels above the legal limit. We also require a tank truck to collect daily sludge withdrawal. Hiram checking with Air Force and others for salvage tank trucks.
- 3. Bypass Pipeline Ramon Guzman and Hiram met with Jose Goitia, Chief Production Engineer of Acueductos, regarding San German Industrial Waste. Acueductos will permit DEC to discharge industrial waste around the new activated sludge plant (scheduled to commence operations in 2-3 weeks) and tie into their discharge pipe. Hiram to get complete quote for this work assuming pipe to handle PTH waste (approximately 8" pipe). I estimate cost of this project in the vicinity of \$60K. DEC to pay full cost of pipeline and also pay monthly sewer charges.
- 4. Well Pump Installation New pigtail for pump motor arrived but due to unavailability of cranes until Monday the 16th the pump installation was temporarily delayed. The motor checks out OK and the weld in the yoke looks fine. Hopefully by the time you read this report we'll be pumping water again. In the event the well proves out, the yield should be considered minimum yield as the region is suffering a severe drought.

- 5. Well Water Cost I learned a startling piece of information from Hiram regarding Acueductos charges for well water. Apparently, a law was passed in the past year to prevent waste of the Island's precious water sources and it requires metering of all water supply including private wells! So it appears that if we find water in San German, we will have to pay Acueductos for it. Hiram to send me further information.
- 6. PTH in San German I spoke with Dick Esten and Hiram about the possibility of PTH in San German. Both feel it would be an error; and that PTH should go to Aguadilla. I brought back a scale drawing of the newer 60,000 SF module for planning and layout purposes. The existing bus duct is 7' off the floor, the lamps 8'-6" and the clear height varies from 12' to 14'-6"
- 7. Environmental Impact Statement I spend an afternoon with Ramon revising and upgrading the draft of the EIS. Revised, typed version to be sent air mail special delivery to Maynard on Monday, April 16.

Puerto Rico file mem

A Water

TO: Al Hanson

DATE:

February 22, 1973

cc: George Beebe

77011

conducty 22, 157.

Al Sidel Ed Schwartz FROM:

Bill Krasnow

George Wood

DEPT:

Facilities Planning

Don Gates

SUBJ: ADDITIONAL WATER SUPPLY FOR SAN GERMAN PTH

Since our discussion the other day of the CDM report, my careful rereading of that Report, my telephone discussion last evening with Ramon Guzman, and my re-reading of his memo of November 21, 1972, I conclude that the existence of dependable deep well water in an aquifer within 2,000' of the DEC plant may be a pipedream. (no pun intended)

If I were a lawyer I would introduce the two following documents, verbatum, as evidence and let you judge for yourself. I am taking the liberty of underlining what I consider to be key words, and adding information within parentheses.

Item 1. CDM report on Water Supply .....January 1972, Estimated Construction Costs of Wells Near Rio Guanajibo (within 2,000' of DEC plant), page 6, first paragraph. "An estimate on the number and depth of test wells required is based on information obtained from logs of existing wells in San German. This information is limited because comparatively few wells have been constructed and data for these wells is incomplete. The estimated number and depth of production wells is also based on this data and all cost estimates must therefore be regarded as preliminary and subject to revision on completion of the proposed test well program."

Item 2. Ramon Guzman memo of November 21, 1972, subject November 15
Meeting follow up, Item 4. "The planning program for additional water
supply for San German included a new battery of deep wells in the aquifer
between San German and Cabo Rojo (location of wells more than 5 km from
DEC plant) which according to the U.S. Geological Survey is the only dependable source of deep well water in the region. Studies were made to
obtain additional water from the surface streams feeding the San German
Filtration Plant, but the flow measurements indicated too low a volume to
be dependable for the regions' needs. Acuaductos Planning Division made
a request for funds to HUD for the development of these wells. At this
time the project has not been approved by HUD." (I believe that since
November due to lack of funds and minimum priority the project was turned
down. It is my understanding that Acuaductos has taken no further action
on this project since the submission of the request for funds.)

Of course anything is possible, particularly in Puerto Rico, but I find it very hard to believe that Acuaductos, in collaboration with the USGS, in planning for additional water supply for San German, would overlook, without a damn good reason, the supposed aquifer in San German. Perhaps the water is brackish or the flow too low for their demands or unavailable during the dry season; God only knows.

In any event, enter a new problem!!! I'll bet you five bucks that there is no way that Acuaductos would undertake this project even with a DEC contribution and get it done soon enough to meet George Wood's schedule. I don't know the dollar amount of the HUD request but I can only guess that with miles of large distribution piping and the construction of large diameter deep production wells, this is a very expensive project; certainly in the millions of dollars, and that a DEC contribution at this time to get the project underway would be large enough to choke a horse!!!

Al Sidel and George Beebe will be meeting with Ramon next Tuesday and probably Wednesday too, the 27th and 28th, perhaps they can gather some additional information on this subject.

As you are probably aware the deep well pump for the DEC well is being shipped next week. Hopefully therefore we shall determine if we have any water in the six inch well on the San German site by middle/late March. Don Gates and Nase Wilkins are presently preparing a list of materials necessary to install the pump, i.e. pipe, cable, etc., and shall purchase these materials against a Puerto Rican purchase order.

It therefore appears we must continue to pursue the PTH project down two paths. Aguadilla and San German, for the next several weeks.

ITT 09 13 1517

DIGITAL MAYN 385439+

2571TT G20.16 385439 DIGITALPR DIGITAL MAYN ZCZC PUERTO RICO

MSG. NO. 58 9/13/72

TO: HIRAM QUINONES - P.R.

FROM: BILL KRASNOW - MAYNARD

--- U R G E N T ---

Ses 13

4 19 PH

THANK FOR TESTING WELL WITH DUMMY PUMP. NEXT STEP WILL BECTO PURCHASE LARGEST PUMP THAT WILL FIT IN THE CASING. AL HANSON HAS RECENTLY WRITTEN YOU A LETTER EXPRESSING HIS FEELINGS ON THIS MATTER. YOU WILL PROBABLY RECEIVE THIS IN A FEW DAYS. AL WANTS US TO PURCHASE THE PUMP AND HAVE NASE WILKINS INSTALL IT. CAN YOU GIVE US A PUERTO RICO PURCHASE ORDER NUMBER? WE ESTIMATE COST OF PUMP AND OTHER MATERALS AT 4000 DLRS.

WE WILL CONTACT YOU LATER REGARDING ADDITIONAL HELP WE WILL NEED FROM YOU, SUCH AS ELECTRICAL SERVICE, FIRE HOSE, ETC. YOU MAY KEEP THE DUMMY PUMP.

REGARDS

CA NNNN

385439 DIGITALPR,,,,, 09/13/72 1520EST 002.4

#### TELEX MESSAGE

| MSG NO.   | DATE:      | 3/8/72          |  |
|---|------------|-----------------|--|
| TO: Lon Beaupre                                     | OFFICE:    | DEC-Puerto Rico |  |
| FROM: Millie Marshall                               |            |                 |  |
| REFERENCE: Message for To                           | om MacDona | ld              |  |
|   |            |                 |  |
|   |            |                 |  |
|   |            |                 |  |
| Please give this message                            | to Tom Ma  | cDonald.        |  |
| Please give this message Reservations confirmed for |            |                 |  |

Puerte Rico

file mens

ZCZC PUERTO RICO

MSG NO 64 EXIXUW

TO: LON BEAUPRE PUERTO RICO FROM: MILLIE MARSHALL MAYNARD

REF: MESSAGE FOR TOM MACDONALD

PLEASE GIVE THIS MESSAGE TO TOM MACDONALD RESERVATIONS CONFIRMED FOR THURSDAY NITE AT RACKETT CLUB FOR ALL FIVE (5) OF YOU.

RT

### Central Files INTEROFFICE MEMORANDUM ment Ruerto Rico

DATE:

March 1, 1972 XR Stenerary

Al Hanson

FROM:

T. B. MacDonald

DEPT:

Plant Engineering

SUBJ:

ITINERARY FOR DR. DONOVAN, GALWAY PUBLIC ANALYST, DR. POWERS, GALWAY MEDICAL OFFICER AND P.J. O'BRIEN, IDA, MAYNARD -SAN GERMAIN 3/6-11/72 VISITATION

Monday, 3/6

10:00 A.M. Camp, Dresser and McKee Office - Boston Attendees:

Dr. P. Donovan Dr. P. Powers

P. J. O'Brien

Dr. R. Culver, CDM

R. Marini, CDM

G. Wood, DEC

T. B. MacDonald, DEC

#### Subjects:

- (a) Philosophy and technology of effluent treatment
- (b) Effluent standards (discharge vs. receiving standards)
- (c) Work done by CDM for DEC, including meeting applicable effluent standards
- (d) CDM surveillance of DEC effluent.

Tuesday, 3/7

9:00 A.M. Arrived Maynard, Plant Engineering Meeting in Ken Olsen's office 11:00 A.M.

#### Attendees:

Dr. Donovan Dr. Powers P. J. O'Brien Ken Olsen

Nick Mazzarese Al Hanson

T. B. MacDonald

Westminster - Tour plant and review 1:30 P.M. sewerage treatment plant operation, controls, records, Dana-Perkins reports, state reports.

Wednesday, 3/8 9:00 A.M. Leave Boston for San Germain

Dr. Donovan Dr. Powers P. J. O'Brien

R. Marini, CDM T. B. MacDonald, DEC

Thursday, 3/9 Review San Germain effluent treatment plant operation, controls, records and correspondence regarding effluent standards.

Attendees:

Dr. Donovan
Dr. Powers
P. J. O'Brien
R. Marini, CDM

R. Guzman G. Wood

T. B. MacDonald

Friday, 3/11 Leave San Germain - arrive Boston 1:30 P.M.

T. B. MacDonald

mca

cc: K. Olsen

N. Mazzarese

P. Kaufmann

D. Knoll

G. Wood

G. Beebe

H. Trenouth

J. Pinder - Westminster

Lon Beaupre - San Germain, P. R.

Hiram Quinones - San Germain, P. R.

T. B. MacDonald (6)

R. Marini - CDM (3)

Central Files

- DIGITAL INTEROFFICE MEMORANDUM

TO: Al Hanson

DATE: February 18, 1972

FROM: Tom MacDonald

DEPT: Plant Engineering

SUBJ: GALWAY & SAN GERMAN, P.R. ESTIMATED WATER & WASTE TREATMENT COSTS

Following are CDM estimates based on 2/17/72 meeting with CDM's Al Rimer & Peter Ware.

|                                      | Ireland                  |                          | Puerto                   | Rico                     |
|--------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Service                              | Min.                     | Max.                     | Min.                     | Max.                     |
| Process Water In.<br>Effluent Treat. | \$377K (a)<br>\$320K (f) | \$1,259K (b)<br>320K (g) | \$386K (d)<br>\$ 70K (h) | \$476K (e)<br>\$140K (i) |

- (a) This figure based on Galway water work removing all color by revamping existing water work's filter beds and adding coagulant. Est. cost to Galway water works est. \$43,500.
- (b) This based on DEC removing color and demineralizing all process water.
- (c) If DEC removes color and demineralizes from only 25% of water, cost is estimated to be \$417,000.
- Note: Add, 555,000 to (a), (b) & (c) if fire protection water (250,000 gal) is added to 750,000 gal. process water storage tank.
- (d) This based on being able to get water from DEC property wells, which Peter Ware feels is improbable.
- (e) Based on combination of DEC and Aquaduca wells. Higher operating cost since paying for Aquaduca water.
- (f) & (g) Minimum cost if Galway will lower standard. Max. cost based on present Galway standard. If this standard required, CDM recommends recycling water, estimated to add 10-20% to maximum cost but reduce overall operating cost since water demand will be reduced. Recycling plants are operating in U.S. but require close control.
- (h) & (i) Are extension to existing silk screen treatment plant and "min-max" figures are estimates of adding treatment of PTH treatment facility & contractor's price. Would include ammonia persulphate treatment, acid dump & adding storage facility.

CDM under impression DEC will have only PTH & SS at San German, other manufacturing facilities at another P.R. facility.

CDM costs for DEC at present:

| CDM Acct. # |                |                                       |
|-------------|----------------|---------------------------------------|
| 493-4-RT    | P.R. Water     | \$10,500                              |
| 493-5-RT    | P.R. Sewerage  | 2,100                                 |
| 493-6-RT    | Ireland Water  | 3,800)                                |
| 493-7-RT    | Ireland Sewer. | 1,800) + \$2,500 (Marini's last trip) |

Based on 2/9/72 Galway meeting, Bob Marini estimated Galway Water Work color "Pilot Plant" would cost \$30,000 max. based on U.S. labor cost.

Dave Knoll, Joe St. Amour

CC: Rod Mponey, George Beebe, Pete Mackey, Lawrie Best, George Wood

Bob Marini, Al Rimer, Peter Ware

Central Files

mm

ro: G. Lordi - Bldg. 1/4

DATE: 10/28/71

G. Wood - Bldg. 1/4

FROM: T. B. MacDonald

DEPT: Plant Engineering

SUBJ: NOTES OF OUR 10/18/71 MEETING WITH CAMP, DRESSER AND MCKEE REGARDING GALWAY, IRELAND AND SAN GERMAN, PUERTO RICO WATER SUPPLY AND EFFLUENT.

REFERENCE: (A) MY 8/26 TO G. WOOD "WATER REQUIREMENTS - BALLYBAAN SITE - GALWAY".

(B) DR. POWER, GALWAY MEDICAL OFFICER, 9/27 LETTER TO R. MARINI WITH ATTACHED 9/24 LETTER AND WATER ANALYSIS FROM DR. DONOVAN, PUBLIC ANALYIST (ATT.)

ATTENDEES: Robert Marini, CDM
Peter Ware, CDM
Gerri Lordi, DEC
George Wood, DEC
T. B. MacDonald, DEC

In answer to CDM questions of how much water should be treated for "color", DEC advised 50% of PTH's 250 gpm, 50% of Silk Screen's 225 gpm, 100% of Disk Platings 100 gpm and 33 1/3% of Metal Shops 150 gpm. Though this totaled 388 gpm, G. Lordi stated that based on his California Disk Plating experience, 100 gpm is a high Disk Plate requirement, since flow in California Disk Plate operation averages 10 gpm, with peaks at 50 gpm. Based on this information, it was agreed that for the time being, we would wish to "color" treat 300 gpm with color of treated water not to exceed 5 units. However, despite the apparently high initial Disk Plating water specification of 100 gpm, it was agreed not to charge our one million Imperial gal/day specifications to IDA and Galway council. Twenty-five per cent of the 725 gpm (note ref. A) for process water requirements) process water was to be deionized per DEC.

CDM roughly estimated \$265,000 capital investment to remove color from 725 gpm flow, \$150,000 to remove color from 360 gpm flow. CDM questioned whether DEC preferred low capital investment and high operating cost or vice-versa for "color" removal since Treatment Plant can be designed either way. DEC had no comment at present.

G. Wood stated that for time being DEC would prefer to have CDM leave space in plant for "color" reduction plant and get estimated capital and operating cost numbers from CDM.

Regarding CDM survey of San German, P. R. water and effluent, I was found that CDM and Plant Engineering apparently misunderstood

al

FROM: T. B. MacDonald

DATE: 10/28/71

George Wood on September 9th since we believed that San German required 725 gpm average flow. At this meeting, George Wood stated that San German would require only 475 gpm average (250 gpm PTH and 225 gpm Silk Screen) and that would be basis of present CDM preliminary survey. CDM stated that they were aware of present San German waste water standards and system and need only to study San German water resources, both ground and municipal. CDM planned to have Mr. Ware go to San German next week and contact DEC's Pete Mackey to initiate their water survey.

Mr. Marini discussed reference (b) (copy attached) particularly Dr. Donovan's 9/24, where he has again changed standards (though he now calls them guidelines), saying his guidelines are 0.3 ppm for Zinc, 0.05 ppm for copper and 1.0 ppm for Chromium for acceptance. He states that as little as 0.1 ppm of Chromium (present in Trivalent state) would have an adverse effect on fish food (water fleas) whilst the lethal dose of chromate for fish would be much higher. Dr. Donovan concluded by stating that "These numbers would be a quideline and any relevant factors in the process of control and discharge would be a matter for discussion. Mr. Marini felt that he would have to discuss these values further with Dr. Donovan, since these guidelines may be theoretical and Dr. Donovan, though well read and extremely interested in ecology, has limited experience in the field. Attached to reference were eleven "Corrib Treated Water" water analysis which copied poorly. They may be found in Plant Engineering Central File under "Ireland-Water" if you wish to review them.

TBM:mac

Enclosure: 2 pages

CC: Al Hanson
Dave Knoll
George Beebe
Pete Mackey

Puerto Rico

memo

## INTEROFFICE MEMORANDUM

Lon Beaupre - DEC - Puerto DATE: 10/14/71 TO:

Rico

FROM: T. B. MacDonald

DEPT: Plant Engineering Dept.

SUBJ: PUERTO RICO AIR CONDITIONING/REFRIGERATION MAN

This memo is a follow up to our 10/6 conversation regarding subject, together with inputs that I have received from Pete Mackey and Greg Bacon on subject.

Regarding equipment for this man, attached is a Purchase Requisition to Supply Distributors, Boston, for \$1292.90 for A.C./Refrigeration maintenance prepared by our Air Conditioning man. I am forwarding it for your processing and order placement.

Mr. Juan Acaron, whom you have hired, advised Greg Bacon that he was a graduate of Apex Technical School, New York City. I contacted the school, at 52 East 19th Street, and they advised that Mr. Acaron attended the school, taking a 15-month course on A.C./Refrigeration, 3 nights/week, and graduated with a 91.5% average in Sept. 1970. The school is reputable, and is fully accredited by the National Association of Trade and Technical Schools, together with several other educational and governmental agencies. Hence, it would appear that the Mr. Acaron has good basic A/C, Refrigeration knowledge and just lacks extensive practical experience.

Regarding sending a Maynard A. C. man to train Mr. Acaron to maintain your A. C. units and refrigeration equipment, I would prefer waiting until you have received the equipment on the attached Purchase Requisition. Also, by the time you receive this equipment, you may have your Plant Engineer aboard and he may be able to give Mr. Acaron guidance. In the interim, Mr. Acaron may be able to develop his own preventative maintenance program and can write manufacturers for instruction and maintenance manuals for your air condition and refrigeration equipment.

mac

CC: Al Hanson George Silva

Greg Bacon Pete Mackey Central Files

Purto Rico INTEROFFICE MEMORANDUM

Al Hanson

G. Wood

DATE:

10/1/71 XR Waste Fredment

TO: Ed Schwartz

D.Knoll >G. Beebe

FROM:

Tom MacDonald

Ray Carlson Pete Mackey

Central Files

DEPT:

Plant Engineering

SUBJ: PUERTO RICO - WASTE TREATMENT - PLANT ACCEPTANCE

In my discussions on 9/30/71 with Monroe Durham, Daniel Construction, regarding Puerto Rican acceptance of CDM Waste Treatment Plant, Daniels' Roger Seavill, who is a registered P. E. in Puerto Rico, has spoken informally to Mr. Ramon Guzman, President of Registration Board in Puerto Rico, about our problem. Mr. Guzman suggests we sit tight as they might consider it a procedual error. If it develops into an issue, Victor Garcia, as sponsor, should be made to assist in getting permit.

To Geo wood.

Daniels will not segn dwgp.

Nasan twill seopardy their

lever, in PR - Slugman & I will

meet next sharty - I will solve problem

ne. way or other plant Engineering

HL HARSON CC. DISTRIBUTION

DOES THIS MEAN WE SIT ASHD WAIT .

SHOULD WE LOOK INTO ANY OTHER AVEROUSS OF APPROACH 3 WHAT WOULD HAPPEH IF WE GOT ROGER SEAVILL TO SIGH THE DRAWINGS AND THEN SUBMIT TITEM TO THE BUARD OF HEALTH .

Ger, Was.

Puerto Rico memo

## digital INTEROFFICE MEMORANDUM

Al Hanson TO:

G. Wood

Ed Schwartz Ray Carlson

G. Beebe

FROM: Tom MacDonald

/ Central Files Pete Mackey

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TBM/mac

TOM MACDONALD plant Engineering P. R. extra copy meno

## INTEROFFICE MEMORANDUM

Al Hanson Ed Schwartz

Ray Carlson

✓ G. Wood D.Knoll DATE: 10/1/71

G. Beebe

FROM:

Tom MacDonald

Central Files , Pete Mackey

DEPT:

Plant Engineering

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TBM/mac

TOM MACDONALD Plant Engineering

TO: AL HAMSON, CC. DISTRIBUTION

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Gov. Wass.

### Puerto Rico INTEROFFICE MEMORANDUM merica

D. Knoll 1=4

September 14, 1971

T. B. MacDonald 4-3

'DEPT: Plant Engineering

CAMP DRESSER AND MCKEE ENGINEERING SERVICES -PUERTO RICO AND IRELAND

Attached for your information is Robert Marini, CDM, August 27, 1971 proposal for subject.

Al Hanson, George Wood and I reviewed this proposal with Mr. Marini on Sept. 9. It was agreed that DEC would issue a purchase order to CDM not to exceed \$10,000 for them to do preliminary engineering studies on the water and effluent systems at San German and Galway immediately, with major emphasis on the water supply to our proposed facilities.

CDM will issue periodic reports of their findings and recommendations for DEC review and they shall start immediately on their study.

Following this agreement, Mr. Marini and I will be in Galway the week starting Sept. 20 to review the Galway water and sanitation systems, existing and planned, with H. G. L. O'Connor Co., Galway's consulting engineering consultant, and concerned local authorities.

> for noe Muly Tom MacDonald

Al Hanson CC: Ray Carlson George Beebe George Wood, 1-4 Central Files

meno

Al Par Harson FYI

E 385439 DIGITALPR DIGITAL MAYN

ZCZC

DIGITAL MAYN MSG 974 4/29/71

TO PETE MAKEY PUERTO RICO FROM TOM MACDONALD PLANT ENGINEERING

STRONGLY RECOMMEND YOU KEEP DAILY LOG OF SITE WEATHER CONDITIONS, ESPECIALLY RAIN. PUSH JOB- TIME MAJOR FACTOR-USE 6 DAY PLUS/WIL PER AL.

P

NNNN

file Rive

memo Re. +/c returned fr P. R WRITE IT - Don't say it мемо то воер В DATE 1/15/71 Pete Maenly advises that A/C unils setweet from Puts Rico an Edgelt into mel were tetored since P. R. senvico 4800 and 277. Heree, if The one to be utilized I may be possible to transform juice to each un In The mean time I have regularled beauge dies to beate I male Hand That Horold I had all sen's returned from westimenofer 2-4 um sie auf have regulated betage S. have und located and incontactly aming ate Signed Taker Vhally pa file

meno KR Generatore

## digital INTEROFFICE MEMORANDUM

SUBJECT: Generator for Puerto Rico (P.E. Ident. No. 040-130)

DATE: April 23, 1970

TO: Al Hanson

FROM: Tom MacDonald

cc: Pete Kaufmann

Pete Mackey

LOCATION: Plant Engineering

Phil Wood, Puerto Rico Seth Johnson Ray Carlson

Based on three quotations received for subject, I recommend that we purchase one Caterpillar Model D348 Diesel Electric Set rated 480 KW continuous duty, 545 KW continuous standby duty, .8 pf 480/277 volts, 4 wire, 60 cycle, 1800 RPM, 3 ph. per Witt-Armstrong Equipment Co., Needham Heights, Mass. quotation number 8612.

Cost of this unit and estimated installation is as follows:

\$35,380.00 Unit cost (FOB factory, Peoria, Ill.) 515.00 Export Crating F.A.S. Miami, Fla. (prefer shipping point 468.00

Jacksonville, Fla.)

Transportation (Jacksonville to San German, P.R.) 400.00 est. 5,000.00 Estimated installation \$41,763.00 Total Cost

Estimated delivery 4-6 weeks. Installation of Diesel-electric set would be outdoors at existing dock area, with switchboard mounted either indoors or at generator set, whichever is operationally more convenient. A Diesel fuel tank and connection to plant electrical system with a Kirk interlock are to be provided.

Regard the O'Brien Machinery Co. and Murphy Diesel Co. quotations for subject, the former was rejected since it does not offer as many features as Witt-Armstrong, though price and delivery are comparable. Murphy Diesel was rejected since price was higher, delivery longer and system, though offering slightly more reliability, is more complex to operate and maintain.

It should be noted that Caterpillar has maintenance service available in Puerto Rico and that Witt-Armstrong's payment terms are negotiable.

Tom

## Puerto Rico INTEROFFICE MEMORANDUM

XX Insurance

TO:

Peter Mackey

DATE:

March 10, 1972

FROM:

Ronald Lamb

DEPT:

Corporate Insurance

SUBJ: Puerto Rico Transformer Loss Our Claim File No. 1001

> While you indicated that the loss would be minimal, the insurance company has requested that any invoices or supporting documents be forwarded to them to present an insurance claim. If the total dollar amount is not yet determined, we would still like to be advised of the present status.

mef



## -digital INTEROFFICE MEMORANDUM

Ronald Lamb

DATE: 3/14/72

FROM: Pete Mackey

DEPT: Plant Engineering

SUBJ: Puerto Rico Transformer Loss Claim File # 1001

> At the present time we have no figures to give you a status cost on the transformer failure.

We hope to have the transformer installed this coming weekend, but the way things work in Puerto Rico, lets wait.

I will supply you with invoice information as soon as I get

Pete

gl

03/14/72 1139EST 001.3 ITT UI TELEX III 03 14 1139 \* DIGITAL MAYN A 385439" 16441 074ITI 616.39 385439 DIGITALPR

2222

ZCZC PUERTO RICO

MSG NO 15 3/14/72

TO: HIRAM QUINONES PUERTO RICO FROM: PETE MACKEY MAYNARD

CC: LON BEAUPRE PUERTO RICO

HIRAM CAN YOU COME TO MAYNARD FOR A COUPLE OF DAYS TO MEET OUR
PEOPLE AND TO TAKE OVER THE PHASE 11 PROJECT IN SAN GERMAIN.

I AM BEING PHASED OUT OF THIS PROJECT AS SOON AS YOU AND I
CAN GET TOGETHER.
HOW ABOUT THE WEEK OF 3/20???

PETE

MRT

# DEC-GRAM....

| то | Name Hiran Quinones       | 3/14/72                        |
|----|---------------------------|--------------------------------|
|    | Company Digital Street    | Date                           |
|    |                           | memo                           |
|    | City Puerto Rico State    | XR Fire protester              |
|    | SPRINKLER SYSTEMS MUST BE | IN SERVICE BEFORE WE MOVE INTO |
|    | PHASE TWO. WHEN IS COMPLE | TION DATE AND WILL THIS CREATE |
|    | A MOVE SCHEDULE PROBLEM?  |                                |
| -  |                           |                                |
|    | cc: Pete Mackey 4-3       |                                |
|    |                           |                                |

Puerto Rico

memo XR Janks

## digital Interoffice Memorandum

TO: George Beebe DATE: 2/17/72

CC: Al Hanson

FROM: Pete Mackey

DEPT: plant Engineering

SUBJ: Water Tanks - Puerto Rico

250,000 gals. storage for fire protection as recommended by F.I.A.

500,000 gals. recommended by Camp, Dresser & McKee for process water.

Price estimates by Peter Ware of CD&M on 2/16/72.

250,000 gal. tank ...... 70K to 75K 500,000 gal. tank ..... 95K 750,000 gal. tank ...... 150K

Price estimates by Angelo Pardo - S.P. Wallace Co. 2/16/72 Puerto Rico

250,000 gal. tank ...... 39 - 40K 500,000 gal. tank ...... 60K 750,000 gal. tank ...... 79K

Cost estimate 18 months from now add 10%

Above estimates for tank and foundation estimates only.

As of this date 2/16/72, construction of the fire protection tank has been put on hold pending a decision on future expansion and tank size.

gl

Querto Rico

## XR Construction digital INTEROFFICE MEMORANDUM

TO:

George Beebe

February 1, 1972 DATE:

FROM: Pete Mackey

DEPT: Plant Engineering

SUBJ: TRIP REPORT

This trip involved attention to numerous problems. The reporting format below separates them by subject for your easy reference.

#### SUBJECT

Phase II Fit up and construction.

#### HISTORY

Sadi Antongiorgi reluctance in letting S. P. Wallace start his fit up.

#### APPROACH

Held a meeting with Sadi and PRIDCO supervisor on plant site.

#### CONCLUSION

Was granted permission to work in one half of building (Phase II).

#### FOLLOW UP

Lord Electric and S. P. Wallace and Viking Sprinkler started working inside of building on January 28, 1972.

Pete Mackey

mca

cc: Al Hanson Lon Beaupre Greg Bacon Central Files

77° HI ES B H INL

MGS 220 TO GEORGE BECKE-PLANT ENG 4-3 CC BILL HANSON CC LON BEAUPRE

FM PETE MACKEY

1/14/72

PRIDCO WILL NOT ACCEPT THE LOCATION OF THE TANK AND PUMPHOUSE ANYWHERE WITHIN LOT 8.

THEY SUGGEST THAT THE TANK BE LOCATED TANGENT TO THE PRW RARIGHT OF WAY ON THE UPPER EASTERN CORNER OF THE PROPERTY LINE.

THIS IS MY ORIGINAL LOCATION BEFORE WE TALKED ABOUT A LUNCH AREA.

I GAVE MY OK TO PRIDCO ON THE LOCATION, WILL CONFIRM BY LETTER THRU WALLACE.

MADE OUT OK WITH SADI---HE IS GRADING THE AREA AND THEN WALLACE IS COMING IN TO LAY THE OUTSIDE FIRE LOOP.

IN ABOUT ONE WEEK WE CAN GO FULL STEAM INSIDE THE PLANT.

RAY BAUM CAN HELP DOWN HERE STARTING NEXT WEEK.

## digital INTEROFFICE MEMORANDUM Puerto Rico

See Distribution Below

DATE: December 17, 1971

FROM: Peter Mackey

DEPT: Plant Engineering

BUS DUCT FOR ELECTRIFYING CEILING

To confirm our conversation on 12/14/71 I have purchased 5000 LF of 100 AMP bus duct (Cost 20K) to be used in San German P.R. Delivery is expected in 3 weeks in Maynard.

We plan to electrify the ceiling approximating the installation in Westminster.

Peter Mackey

mca

### Distribution

G. Bacon

L. Beaupre

G. Beebe

D. Gates

B. Hanson Central Files

Dec. 3, 1971

To: George Beebe From Pete Mackey

Enclosed you will find a construction schedule that was given to me by Jose Lebron of Sam P. Wallace Co. on Friday, Dec. 3, 1971. It looks good to me if we can get into the building to start our fit-up about the middle of December. At the present time, Sade (general contractor) is being a very difficult person to deal with.

Pridco does not like our 38KV substation location. They claim it is too near our Phase III building. I have enclosed prints showing where they would like the substation placed. I asked Jose Lebron to explain to them that we are going to build a dining area in their proposed location of the 38KV sub. I also told him if they insist on that location to go ahead with the construction plans so as not to delay the installation.

I called and talked to John Murch of the General Electric Co. in Ponce in regard to the 1000 KVA transformer that failed in San German.

He gave me the following figures:

- A. To replace two coils \$5,300
- B. To replace three coils \$7,100

This does not include transportation costs from the U.S. to  $P \cdot R$ .

- A. Coil delivery five to six weeks.
- B. To rebuild transformer when coils arrive, two weeks.

George, kindly watch my mail this week. I should get a promised letter with John Murch's proposition on the repair costs.

## Puerto Rico

## digital INTEROFFICE MEMORANDUM

TO: See Distribution Below

DATE: December 17, 1971

FROM: Peter Mackey

Re:

DEPT: Plant Engineering

SUBJ: X95-07805 CLOSE OUT

As of December 17, 1971 the X95-07805 number that was used to build a circuit board Fab Shop in San German is being closed out. There will be no further charges to this project.

Peter Mackey

mca

cc: G. Bacon Lon Beaupre G. Beebe A. Craffey D. Gates A. Hanson Bill Hanson D. King G. Wood

V Central Files

Puerto Rico

XR Transformers

digital INTEROFFICE MEMORANDUM

TO:

See Distribution

DATE:

November 22, 1971

FROM:

Peter Mackey

DEPT:

Plant Engineering

SUBJ:

TRANSFORMER FAILURE

PUERTO RICO

On Tuesday, November 16, 1971, a meeting was held at the General Electric repair shop in Ponce, P.R., with the following people in attendance: Peter Mackey of DEC; Ruben Velez Lebron, President; Juan Garcia, Vice President; and Louis Falto, Engineer of Lord Electric; John W. Mirsh, Vice President and General Manager of the General Electric Reconstruction Industrial Corporation; and Cesar H. Villafana, Manager, Installation and Service Engineering Section, International General Electric Puerto Rico, Inc. The subject was the burnt windings on our 1000 KVA transformer from San German.

When I asked John Mirsch before my examination of the transformer what his opinion was as to the transformer failure, he stated that, in his opinion, it was a lightning fault. We proceeded to go into the repair shop and, upon examination of the transformer, I pointed out to John Mirsch and Cesar Villafana a neutral lead connection from the center winding that had burnt off the neutral bus bar. In my opinion, based on sixteen years of motor and transformer rebuilding and rewinding, I claimed that a defective welding connection caused a high resistance connection, creating heat causing a short circuited winding, in turn blowing the primary fuses on our 4160 volt line.

I explained my opinion to the people present and they in turn agreed it was a possibility that this was the reason for the failure. John Mirsch still held to the idea of the lightning strike until we explained to him that we had three sets of lightning arrestors ahead of the transformer, and with this he agreed that it was a remote possibility that lightning had caused the failure.

Juan Garcia told me after the meeting that Cesar Villafana admitted to him that the transformer connections were of poor workmanship.

Our warrantee with the G.E. Co. has expired. We now are in warrantee with the repair shop for one year from the rewind date.

I requested John Mirsch to strip the windings from the core and let me know if we have any iron damage. If we do have iron damage, I recommend that we get a new core.

John Mirsch is to get me a rewind cost and delivery schedule on this transformer. John tried to feel me out as to what DEC should pay towards the rewind of the transformer. I did not commit myself to any figure at this meeting.

I have taken photos of the bad lead connection for future reference.

Peter Mackey

mca

cc: G. Bacon
Lon Beaupre
G. Beebe
D. Gates
A. Hanson
Bill Hanson
Central Files

Puerto Rico INTEROFFICE MEMORANDUM XR Transformers November 22, 1971

See Distribution

Hand Engreeting

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If This is the complete history on the PR transformer failure - I have not housed from & & sence my last meeting with Ithm Much, I'm going to let sleeping dogs lie

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mca

cc: G. Bacon
Lon Beaupre
G. Beebe
D. Gates
A. Hanson
Bill Hanson
Central Files

Puerts Rico Correspondence



PONCE WEST INDUSTRIAL DEVELOPMENT, P. O. BOX 3332, PONCE, PUERTO RICO
Phone (809) 843-4225

GENERAL ELECTRIC
RECONSTRUCCION
INDUSTRIAL
CORPORATION

December 7, 1971

Digital Equipment Company Main Street Maynard, Mass.

Attention: Mr. Peter Mackey

Gentlemen:

As you know your San German transformer 1000 KVA, S/N G857907, 3 phase, 60 cycles, 4160/480/227 volts is presently in our shop, here in Ponce.

A joint inspection was made of this transformer after failure, to attempt to determine cause of failure. It was found that A & B legs of the transformer failed, which was confirmed by a ratio test.

C phase was tested and withstood all electrical tests applied, including ratio, megger, and high potential test.

Two approaches were presented for explanation of cause of failure of transformer. Our explanation was that the primary 14 KV line was subject to surges, possibly due to lightning strikes, which caused the flashing of the primary winding to ground. Subsequently, there was a failure of B coil welded connection to the bar. Your approach in explanation of the cause of failure was that the secondary connection failed first, which subsequently caused the primary winding to flash the ground.

In order to repair the transformer, we are going ahead with the replacement of two primary and secondary coils, phases A & B, as instructed by you. When this work is completed these two new replacement coils will be warranted for 1 year. However no warranty will apply to the existing C leg primary and secondary coils that were originally furnished by our factory Rome, Georgia.

December 7, 1971

Attention: Mr. Peter Mackey

Our normal price to repair this transformer on a minimum schedule would be estimated at \$5,300.00, this price does not include air transportation of the coils to Ponce, P.R. from Rome, Georgia. The factory promise delivery for these coils is 5-6 weeks, with possible improvement. An additional 2-3 weeks would be estimated for transportation and installation of the coils on the transformer core lamination assembly.

Since the cause of failure of the transformer is in dispute, since it was impossible to accurately determine the cause of failure, we propose that the cost of repair be shared on a 50-50 basis. If you agree with this approach, our billing for these services to you would be at approximately \$ 2,650.00, plus 1/2 of the air transportation expenses of the transformer coils from Rome, Georgia to Ponce, P.R.

We hope that you decide to confirm that these terms of settlement are satisfactory.

Very truly yours,

John W. Mirsch

Vice Pres. & Gen. Mgr.

and musch

JWM/er

cc: Mr. Villafaña

Correspondence Puesto Rica February 16, 1972 Mr. John W. Mirsch General Electric Reconstruccion Industrial Corporation Ponce West Industrial Development P. O. Box 3332 Ponce, Puerto Rico Dear John: Reference our conversation of Thursday, 2/10/72, in San German as to the cause and responsibility of the failure of our 1000 KVA transformer S/N - g 857907. John, my honest opinion and the opinion of the engineers that examined the transformer in your plant in Ponce was that the bad weld and open lead connection caused the failure, and being under a year's warranty, we must place the full responsibility of cost on the General Electric Co. Very truly yours, Peter Mackey Plant Engineering mca G. Bacon L. Beaupre G. Beebe A. Hanson H. Quinones Central Files

gital INTEROFFICE MEMORANDUM

Lon Beaupre TO:

Al Hanson

Bill Hanson CC:

Tom Cook Tuis Velez DATE:

November 9, 1971

FROM: Peter Mackey

DEPT: Plant Engineering XR Fransformers

SUBJ:

On Monday, November 15 I will be at the General Electric Plant in Ponce with Greg Bacon and Lord Electric to determine what caused the transformer failure on November 1, 1971 in San German.

Our standby generator carried the plant electrical load for three days.

Tuesday, November 2 - Mr. Sandza from Environmental Research was at our plant in San German and he took air samples of the board area. He will submit his report to Lon and myself.

Peter Ware of CD&M with R. Gusman of Gusman & Associates of P.R. were in P.R. with Peter Mackey on November 1 through November 5 checking on water and waste problem in San German and the Ponce areas.

We need about three weeks for a complete report.

mca

Central Files cc:

TO: See Distribution Below

DATE:

November 2, 1971

FROM:

Peter Mackey

DEPT: Plant Engineering

SUBJ: X95-07805 CLOSE OUT

As of November 30, 1971-I will close out the X95-07805 number that we used to build a circuit board Fab Shop in San German.

If for any reason this should not be closed out at this date, please contact Peter Mackey.

Peter Mackey

mca

cc: G. Bacon

Lon Beaupre

. G. Beebe

A. Craffey

D. Gates .A. Hanson

Bill Hanson

D. King

G. Wood

Central Files

digital INTEROFFICE MEMORANDUM

TO: Greg Bacon
George Beebe
Don Gates
Al Hanson

DATE: September 22, 1971
FROM: Peter Mackey

DEPT:

Plant Engineering

SUBJ:

(1) PDP-10 Installation in San German, P.R.

George Silva

(2) Build New Area Approx.
1000 sq. ft. for Accounting

A new PDP-10 is to be installed in San German and I need the following help, and information.

From George Silva - two carpenters to build a new accounting office approximately 1000 sq. ft., this also to include electrical outlets. When this is finished an area of 1000 feet is to be built with acoustical partitions to house a new PDP 10 - all of this to be ceiling high.

From Don Gates by September 28 air conditioning data for the accounting section and the PDP-10 area.

From Greg Bacon the necessary power to run the PDP-10 with future expansion.

Also at this time the electric power to run the new chiller installation should be considered. Also a new feed may be necessary to run both air compressors at the same time. Need this information by Sept. 28.

The time for the accounting office is the middle of October with the computer November 1.

Peter Mackey

mca

Puerto Rico

### INTEROFFICE MEMORANDUM

See Distribution Below

DATE:

September 7, 1971

FROM:

Peter Mackey

DEPT: Plant Engineering

SUBJ: PDP 10 LOCATION

The PDP 10 location was discussed with Lon Beaupre and Peter Mackey on August 31, 1971.

Lon Beaupre would like the installation in the area now occupied by his Accounting Dept. This would reguire building office space, ceiling high in Bay F & G -9 -10 to facilitate the Accounting Dept. Air conditioning would have to be ducted from Bay E-G-9-10 into the new office area.

The PDP 10 location requires a new power line, acoustical partitioning and air conditioning, if ceiling high partitions are required.

Power generated on the site should be considered for this installation due to the failures that occur in San German.

Peter Mackey

mca

### Distribution:

Greg Bacon George Beebe Ray Carlson George Chamberlain Al Hanson

File Gutes

Juerto Rico - memo Re: PDP. 10 Rocation

digital interoffice memorandum

TO:

See Distribution Below DATE: September 7, 1971

FROM:

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Peter Mackey

mca

Distribution:

Greg Bacon George Beebe Ray Carlson George Chamberlain Al Hanson

Central Files

Puerto Pico - memo

### INTEROFFICE MEMORANDUM XR Generators

See Distribution Below TO.

DATE: \* September 7, 1971

FROM:

Peter Mackey

DEPT: Plant Engineering

SUBJ: / EMERGENCY GENERATOR

The cost of down time due to power failure in San German, Puerto Rico can be calculated as follows:

> \$1,000.00/hr. labor cost \$11,000.00/hr. value of lost shipment

These figures are calculated on the present levels of employment and production. The value of lost shipments assumes that we cannot make up the time, and is based on our present shipment level of 12,000,000 per month at 180 hrs. of production in a four week month.

The price of diesel fuel is \$123.00 for 500 gals.

The following are power failure dates and hours:

4/26 - 6 hrs. 7/19 -5/6 - 2 7/23 -3 5/15 - 2 7/30 -2 5/21 - 4 8/3 - 10 6/1 - 1 8/4 - 43 6/9 -8/5 2

Plans are being formulated to install a PDP 10 in San German. We should consider a separate source of power generated by DEC.

Peter Mackey

mca

#### Distribution:

Greg Bacon George Beebe Ray Carlson Al Hanson Dick King Central Files digital

Puerto Rico

INTEROFFICE MEMORANDUM

TO: See Distribution Below

DATE: "

September 7, 1971

meno

FROM:

Peter Mackey

DEPT:

Plant Engineering

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These figures are calculated on the present levels of employment and production. The value of lost shipments assumes that we cannot make up the time, and is based on our present shipment level of 12,000,000 per month at 180 hrs. of production in a four week month.

The price of diesel fuel is \$123.00 for 500 gals.

The following are power failure dates and hours:

4/26 -6 hrs. 7/19 5/6 -2 7/23 5/15 -7/30 2 5/21 - 4 8/3 10 6/1 -8/4 43 6/9 8/5

Plans are being formulated to install a PDP 10 in San German. We should consider a separate source of power generated by DEC.

mca

Distribution:

Greg Bacon George Beebe Ray Carlson Al Hanson Dick King Peter Made the Market of the M

Puerto Ries XR Sam P. Wallace
Peter Mackey

September 3, 1971

Attended a meeting with Al Rodriguez and Peter Gonzales in their office on August 30, 1971.

The subject of the fmeeting was to discuss the contract in detail for Phase II in San German, Puerto Rico.

In S. P. Wallace's contract dated August 26, 1971 the following, articles were not included:

(a) Four hose stations inside of building \$1,200.00

(b) Four air dampers for A/C units 900.00

(c) Twelve air plenums with double deflection grilles 4,800.00

This bringing the total to \$353,575.

In the course of bargaining Al Rodriguez deducted the cost of the air plenum chambers bringing the contract price not to exceed \$348,775 - and if the work is less than the maximum price DEC will pay the contractor 40% of the difference between the maximum price and the actual cost.

I gave Sam P. Wallace a verbal go ahead.

On Sept. 1 I gave the Purchasing Dept. in San German a requisition to issue on P.O. for the project. On that same day Peter Gonzales was on the site and Lawrence Beaupre signed a contract to go ahead with the project.

Peter Mackey.

cc: Greg Bacon
George Beebe
Ray Carlson
Al Hanson
Dick King
Central Files

Central Files

# digital Interoffice Memorandum

TO:

P.E. Personnel

DATE:

August 23, 1971

FROM:

Peter Mackey

DEPT:

Plant Engineering

SUBJ:

mca

PUERTO RICO - PHASE II FILING

Your cooperation is requested to help clearly identify material that will go into the central files.

Starting as of the present the paperwork for Puerto Rico will be considered Phase II. Before placing any filing matter into the box, please mark "Phase II" on the upper righthand corner of the sheet as shown below.

|     |    | P |   |   |   |       |   |     | Ph | hase II |   |  |  |
|-----|----|---|---|---|---|-------|---|-----|----|---------|---|--|--|
| To: |    |   |   |   |   | Date: |   |     |    |         |   |  |  |
| Sub | j: |   |   |   |   |       |   | om: |    |         |   |  |  |
| -   | -  | _ | - | - | _ | _     | - | _   | -  | -       | - |  |  |
| -   | -  | - | - | - | - | -     | - | -   | -  | -       | - |  |  |
| -   | -  | - | - | - | - | -     | - | _   | _  | -       | _ |  |  |
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|     |    |   |   |   |   |       |   |     |    |         |   |  |  |
|     |    |   |   |   |   |       |   |     |    |         |   |  |  |

Peter Mackey

Detre Mackey

TO PETE MACKEY MFROM LEONOR PADILLA SMITH MILLER AND PATCH INC MR EDWARD BROWN VICE PRESIDENT 401 JOYCE KILMER AVE NEW BRUNSWICH, NEW JERSEY THUS IS THE ADDRESS OF OUR NEIGHBOR COMPANY AND THE PERSON TO BE CONTAC DLEONOR 00802 301-5455700 Chardon. 809 8434327

WUI NY MSG GA DIGITAL EQUIPMENT CORP 146 MAIN STREET MAYNARD, MASS 01754

ZCZC DIGITAL MAYN MSG 20 8/9/71

TO PETER MACKEY CARIB HILTON, SAN JUAN, P.R. TELEX- 365-415

FR RAY CARLSON

REF: ACQUADUCTO HAS WRONG DRAWING

THE PRINT YOU SENT ACQUADUCTO IS THE WRONG ONE. YOU MUST GET IN TOUCH WITH MR. MARININ. RIGHT DRAWING IS A TOPO THAT AL HANSON MADE UP. CALL ME AT 8:30 AM ON TUESDAY, 8/10/71.

L

PLS DELIVER THIS MSG TO PETER MACKEY IMMEDIATELY IT IS VERY IMPORTANT THANK YOU

Puerte Rics

mend

## gital INTEROFFICE MEMORANDUM

TO: See Distribution Below

DATE:

August 4, 1971

FROM:

Peter Mackey

DEPT: Plant Engineering

SUBJ: PUERTO RICO - PHASE II

Any purchase requisition that is written on Phase II Puerto Rico should have Peter Mackey's initials on it before it is processed.

Peter Mackey

mca

cc: Greg Bacon Ray Baum Ray Carlson Don Gates . Al Hanson Walt Johnson Dick King Tom MacDonald Jerry Nelson George Silva Central Files

Puesto Pies memo XR Waste Treatment igital INTEROFFICE MEMORANDUM

TO: Ray Carlson

DATE: July 30. 1971

George Beebe

FROM:

A. Hanson

Pete Mackey

Greg Bacon Central Files

DEPT: plant Engineering

Puerto Rico Board Fab Shop & Phase II SUBJ:

- 1. A Meeting was held with Peter Gonzales of the Sam P. Wallace Co. on Wednesday evening, July 28, 1971. There were numerous discussions concerning his original price of \$6,000.00 to fence in and cement pad the waste treatment area. We agreed on a price which is not to exceed \$5000.00. We will work with Puerto Rico to issue a P. O.
- 2. I talked with Mr. Chardon of the well drilling company and agreed on a cost of \$11.00 per ft. for another 200 ft. of pipe for the purpose of trying to locate water for the sprinkler and process water for the San German Plant. A P.O. will be issued as soon as the building contractor clears the area for drilling.
- 3. The inspector from Formento on the plant site in San German, claims building contractor is four weeks ahead of schedule.
- 4. Sam P. Wallace should have all projects (in board shop waste treatment area) completed by August 7th.
- 5. A Meeting was held with Jamie to bring to completion all construction costs of Board Shop. This will require about one week's work.
- 6. We will work with Camp Dresser & McKee to train San German personnel in the operation of waste treatment system.
- 7. As of the present scheduling, beginning 1/2/72 DEC should be prepared to fit up Phase II in Puerto Rico.
- 8. I had a talk with Jon Garcia of Lord Electric and asked for a second crew to help with leased building wiring. The work was completed on 7/29/71.

gl

Geten Mackey.

Themo 5-13-71 TO AL HANSON 4/3 FROM PETER MACKEY PUT A TRACER ON SEALAND TRAILERS NO 3, 4, AND 5 NEED ARRIVAL DATES. NEED ANSWER ASAP. PETE DID U RECD MSG. N NNNN

385439 DIGITALPR

4-23-71

meno metion Putt Rice

TP AL HANSON 4/3 PLANT ENG FROM PETER MACKEY PR

CONSTRUCTION SHOULD BE IN FULL SWING MONDAY-I AM TAKING FOR FRANTED MAYNARD HAS ACQUIRED ALL NECESSARY LEGAL STEPS.

PETE EOM

DIGITAL MAYN MOM PLS I HAVE SOME MSG FOR YOU MAY I SEND YES GO RIGHT AHEAD

P.R. FILE GREG BEACON 4/3 PLANT ENG. FROM PETER MACKEY PR WHY CAN'T WE ELIMINATE THE DISCONNECT SWTS AT THE MOOXXXX MOTORS WITH THE MCC CONTROL CABINET WITHIN SIGT - WE HAVE BREAKERS IN THE CABINET TO ACT AS A DISCONNECT. SHEET NO 5 CAMP DRESSER AND MCKEE , DID THEY GET MY WINDOW INSERTS ON TUES LOAD TO P.R. - THEY ROBBED MY ORIGINAL ORDER TO BUILD HEAT TENTS. PETE EOM ALSO

RCA1406/28 DIGTAL MAYN

385439 DIGITALPR4-28-71

TO AL HANSON 4/3 FROM PETE MACKEY

CANNOT GET A PHONE LINE INTO MAYNARD-MR. BENETTI OF POZOS PROFUNDOS WELL DRILLIUPAS HERE TODAY. WILL ESTIMATE WELL COST.
RAINING LIKE HELL-CANT GET A DAYS WORK OUT SIDE.

PETE

DIGITAL MAYN

Johnsto Rien

memo pr fachware

# digital INTEROFFICE MEMORANDUM

SUBJECT: SEALAND TRAILER

DATE: March 17, 1971

TO: Al Hanson

Ray Carlson Greg Bacon George Wood Tony Bader Central Files FROM: Pete Mackey

DEPARTMENT: Plant Engineering

On March 16, 1971, a Sea Land Trailer left Maynard for Puerto Rico with the following materials.

All necessary partitions and hardware for a complete installation as per our prints of new facility in Puerto Rico.

Complete set of ceiling tiles and hardware.

Touch up paint.

I understand this trailer will be held in Boston, Mass. pending legal negotiations with Pridco.

PM/mac

THE Roofing XR Ru Conditioners

TEBLE PARTY

JIJIJII DEC MAYNARD RE DEC WSTM RELAY MSG FROM PE PUERTO RICO

TO DON GATES PLANT ENG. FROM PETER MACKEY

REF TWX OF AM TODAY

SI SIZE F ROOF OPENINGS 7FT. 6 IN. LONG ---- 31 IN. WIDE. THAT IS ALL.

OK WILL SEND TO HIM BIBI FOR NOW LINDA

DEC WSTM OKD BI

P. R. memo yx Roctioners

Feb 200 12 17 (4 17)

DEC MAYNARD
MSG RELAY FROM PUERTO RICO

SURE GAHERE GOES

385439 DIGITALPR

2-25-71

TO DON GATES PLANT ENGINEER 4-3

FROM PETE MCKEY PUERTO RICO

LOCATION OF ROOF OPENINGS - AIR CONDITION

FROM POST 8D 10FT 3 IN. AS SHOWN.

FROM POST 6C 10FT 3 IN .--- NOT AS SHOWN.

FROM POST 8B 10FT 3 IN. ---- NOT AS SHOWN.

END

THAT ALL TU